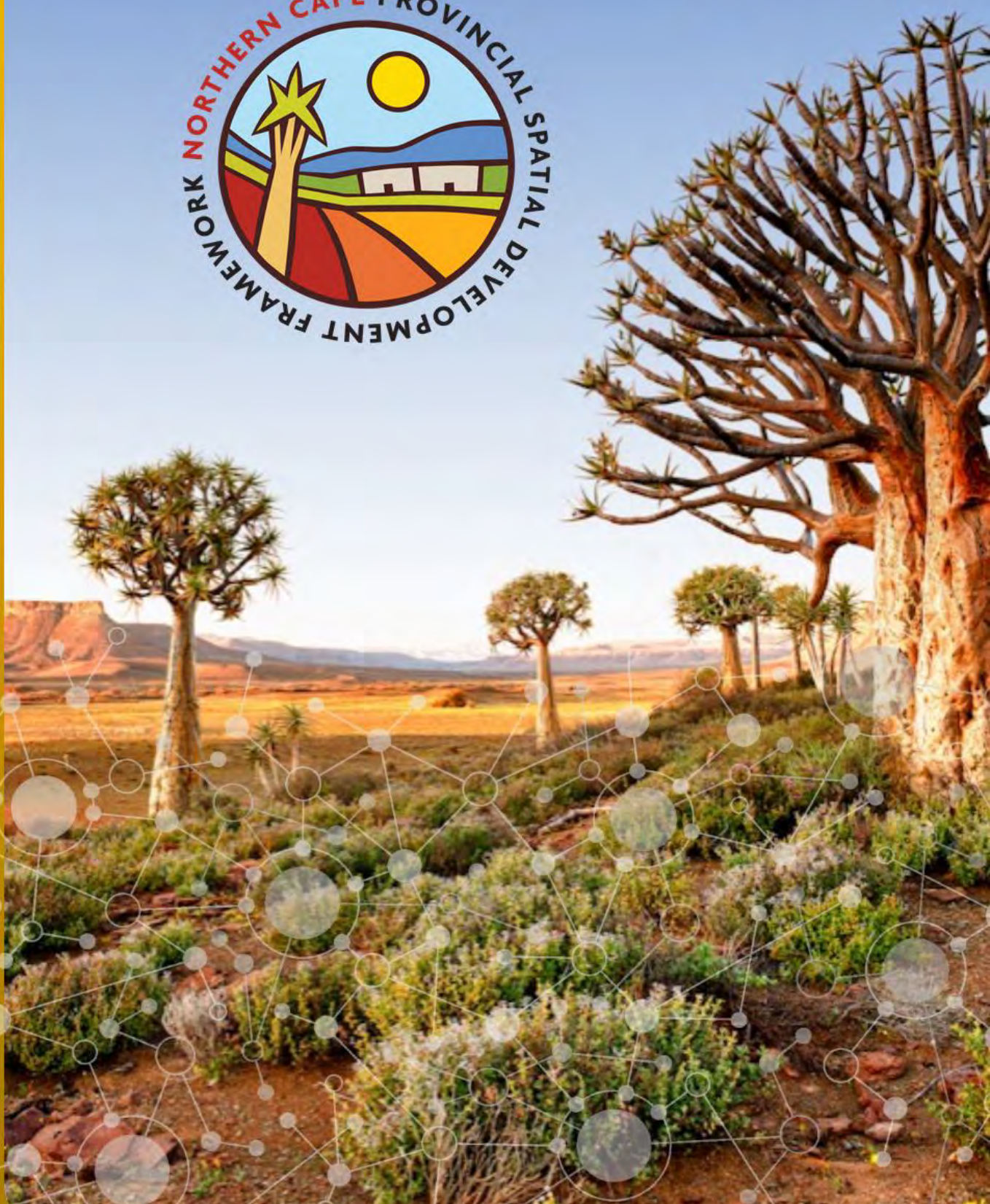
STATUS QUO ANALYSIS

NORTHERN CAPE

PROVINCIAL SPATIAL DEVELOPMENT FRAMEWORK



PROVINCIAL SPATIAL DEVELOPMENT FRAMEWORK (PSDF)
FOR THE NORTHERN CAPE PROVINCE

STATUS QUO ANALYSIS

Joint Venture between PULA Strategic Resources Management and
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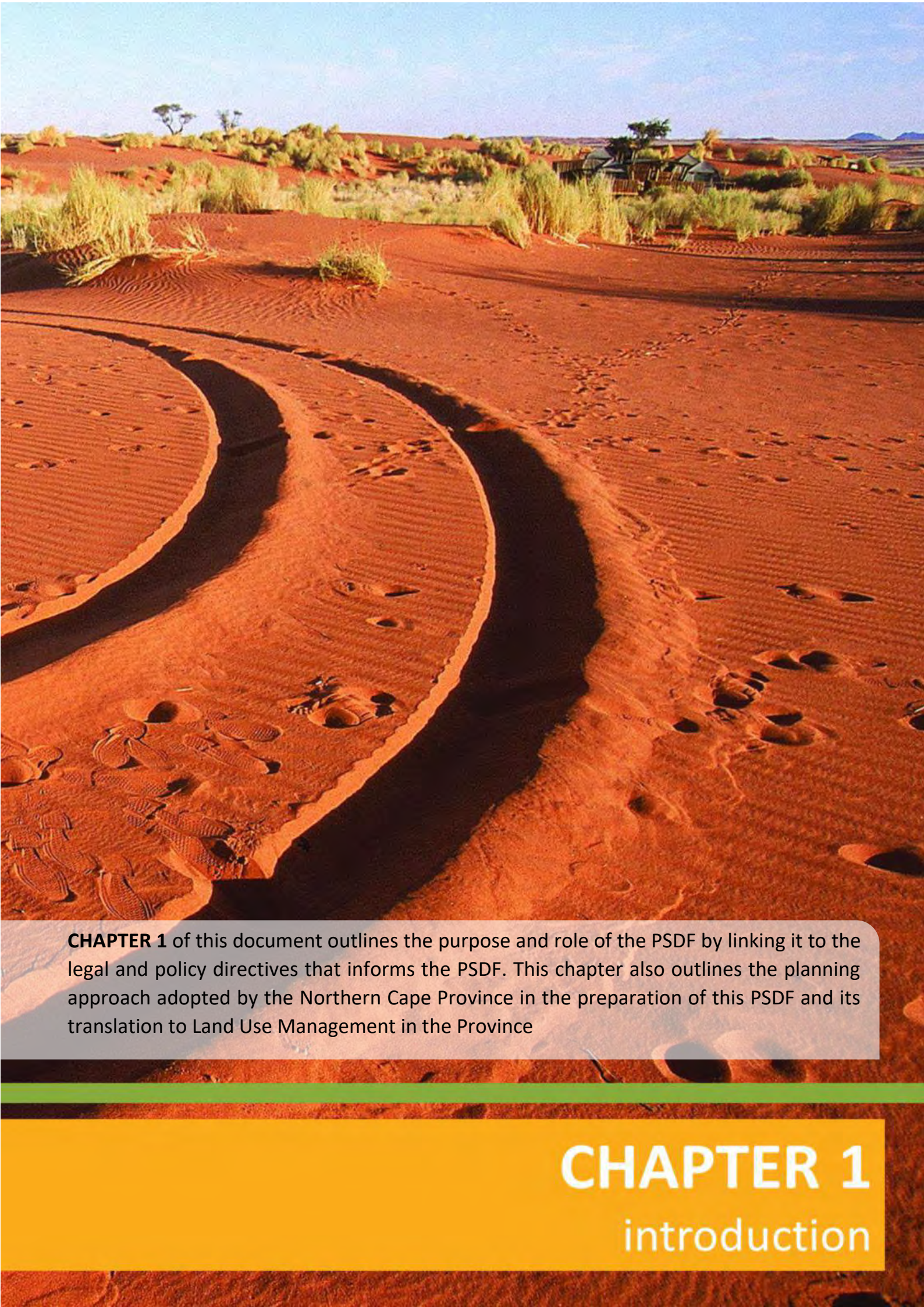
ACRONYM	DESCRIPTION
ABET	Adult Basic Education and Training
ACSA	Airports Company South Africa
ADSL	Asymmetric Digital Subscriber Line
AFOLU	Agriculture, Forestry and Other Land Use
AHP	Analytical Hierarchical Process
AIDS	Acquired Immune Deficiency Syndrome
AVMP	Animal and Veld Management Programme
AU	African Union
BCC	Basal Cell Carcinoma
BFAB	Bureau for Food and Agriculture Policy
BRICS	Brazil, Russia, India, China and South Africa
BRT	Bus Rapid Transit
CBA	Critical Biodiversity Area
CBO's	Community Based Organisations
CCAM	Climate Change Adaption Modeller
CCAM	Conformal-Cubic Atmospheric Model
CCI	Clinton Climate Initiative
CERN	European Organisation for Nuclear Research
COGHSTA	Department of Cooperative Governance, Human Settlements and Traditional Affairs
CoP	Convention of the Parties
CRDP	Comprehensive Rural Development Programme
CSD	Commission on Sustainable Development
CSIR	Council for Scientific and Industrial Research
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSP	Concentrated Solar Power
DAC	Department of Arts and Culture
DAMC	Department of Agriculture Marketing and Co-operatives
DCM	Digital Cost Model
DEAT	Department of Environmental Affairs
DENC	Northern Cape Department of Environment and Nature Conservation
DIRISA	Data Intensive Research Infrastructure South Africa
DM	District Municipality
DNI	Direct Normal Irradiation
DoA	Department of Agriculture
DoT	Department of Transport
DPE	Department of Public Enterprises
DRC	Democratic Republic of Congo
DRDLR	Department Rural Development and Land Reform
DRR	Disaster Risk Reduction

ACRONYM	DESCRIPTION
DTH	Direct-to-Home Satellite
DTI	Department of Trade and Industry
DTT	Digital Terrestrial Television
DWAF	Department of Water Affairs and Forestry
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
ESA	Environmental Sensitive Area
EU	European Union
FB	Frances Baard
FBDM	Frances Baard District Municipality
FDI	Foreign Direct Investment
FEPA	Freshwater Ecosystem Priority Areas
FPL	Food Poverty Line
FPSU	Farming Productions Support Unit
GAP2	Geospatial Analysis Platform model
GCCA	Grid Connection Capacity Assessment
GDP	Gross Domestic Product
GHG	Green House Gasses
GHI	Global Horizontal Irradiation
GIS	Geographic Information Systems
GVA	Gross Value Added
HIV	Human Immunodeficiency Virus
IBA	Important Bird Areas
ICT	Information and Communication Technology
IDP	Integrated Development Plan
IDZ	Industrial Development Zone
IGR	Inter-Governmental Relations
INDC	Intended Nationally Determined Contribution
INSPIRE	Inter-provincial collaboration programme between Northern Cape and Limpopo, funded by Finnish and South African Governments
IPAP	Industrial Policy Action Plan
IPCC	Intergovernmental Panel on Climate Chance
IPP	Independent Power Producer
IQI	Infrastructure Quality Index
IRP	Integrated Resource Plan
IUDF	Integrated Urban Development Framework
JTG DM	John Taolo Gaetsewe District Municipality
KIDJA	Kimberley International Diamond and Jewellery Academy
KISP	Kathu Industrial Supplier Park
KM	Kilometre
LBPL	Lower Bound Poverty Line
LDV	Light Duty Vehicles

ACRONYM	DESCRIPTION
LM	Local Municipality
LTE	Long-Term Evolution
LUMS	Land Use Management Scheme/System
LUPA	Land Use and Planning Ordinance
LUS	Land Use Scheme
MCDA	Multi Criteria Decision Analysis
MDG's	Millennium Development Goals
MIG	Municipal Infrastructure Grant
MISA	Municipal Infrastructure Support Agency
MPA	Marine Protected Areas
MPAP	Municipal Priority Action Plan
MSA	Municipal Systems Act
MSDF	Municipal Spatial Development Framework
MTREF	Medium Term Revenue and Expenditure Framework
MTSAO	Medium-term System Adequacy Outlook
MTSF	Medium Term Strategic Framework
MVA	Mega Volt Amp
MW	Mega Watt
NATMAP	National Transport Master Plan
NBA	National Biodiversity Assessment
NCCRWP	National Climate Change Response White Paper
NCISS	Northern Cape Information Society Strategy
NCPEAS	Northern Cape's Protected Area Expansion Strategy
NCRES	Northern Cape Renewable Energy Strategy
NCTA	Northern Cape Tourism Authority
NDC's	Nationally Determined Contributions
NDM	Namakwa District Municipality
NDM	Namakwa District Municipality
NDP	National Development Plan
NEMA	National Environment Management Act
NLTA	National Land Transportation Act
NMSC	Non-Melanoma Skin Cancer
NMT	Non-Motorised Transport
NNP	Namaqua National Park
NPAES	National Protected Area Expansion Strategy
NPC	National Planning Commission
NRW	Non-Revenue Water
NSDF	National Spatial Development Framework
NSSD	National Strategy for Sustainable Development
NUSP	National Upgrading Support Programme
O&M	Operational and Management
OtP	Office of the Premier

ACRONYM	DESCRIPTION
PAJA	Promotional of Administrative Justice Act
PASA	Petroleum Agency of South Africa
PGDP	Provincial Growth Development Plan
PKS DM	Pixley ka Seme District Municipality
PM	Particulate Matter
PMU	Project Management Unit
PoP	Points of Presence
PPD	Peak, Plateau and Decline
PPD	Peak, Plateau and Decline
PRASA	Passenger Rail Agency of South Africa
PSDF	Provincial Spatial Development Framework
PSP	Private Sector Participation
PV	Photovoltaics
RCAM	Road Classification Access Management
RDP	Rural Development Plan
REDZ's	Renewable Energy Development Zones
REID	Rural Enterprise Infrastructure Development
REIPPPP	Renewable Energy Independent Power Producer Procurement
RISFSA	Road Infrastructure Strategic Framework for South Africa
RRP	Riverine Rabbit Programme
SA	South Africa
SAAO	South African Astronomical Observatory
SADC	Southern African Development Community
SAGHOS	South African Geological Hazards Observation System
SALGA	South African Local Government Association
SALT	Southern African Large Telescope
SANBI	South African National Biodiversity Institute
SCC	Squamous Cell Carcinoma
SDBIP	Service Delivery and Budget Implementation Plan
SDF	Spatial Development Framework
SDG's	Sustainable Development Goals
SEZ	Special Economic Zone
SIM	Sustainable Investment Model
SIP	Strategic Infrastructure Plan/Project
SIV	System Input Volume
SKA	Square Kilometre Array
SMME	Small Medium and Micro-sized Enterprises
SOE's	State Owned Enterprises
SPC	Spatial Planning Category
SPLUMA	Spatial Planning and Land Use Management Act
SPTN	Strategic Public Transport Network
STATSSA	Statistics South Africa

ACRONYM	DESCRIPTION
STER	Single Transport Economic Regulator
TDP	Transmission Development Plan
TNSP	Transmission Network Service Provider
TOD	Transport Orientated Development
TRANCRAA	Transformation of Certain Rural Areas Act
TRH 26	South African Road Classification and Access Management Manual version 1.0 of August 2012
UBPL	Upper Bound Poverty Line
UDZ	Urban Development Zone
UHF	Ultra-High Frequency
UNCED	United Nations Conference on Environment and Development
UNESCO	United Nations Education, Scientific and Cultural Organisation
UNFCCC	United Nations Framework Conventions on Climate Change
UNS	Urban Network Strategy
USAASA	Universal Services and Access Agency of South Africa
UVR	Ultraviolet Radiation
WfW	Working for Water
WMA	Water Management Area
WMN	Wireless Mesh Network
WSA	Water Service Authority
ZFM DM	ZF Mgcawu District Municipality



CHAPTER 1 of this document outlines the purpose and role of the PSDF by linking it to the legal and policy directives that informs the PSDF. This chapter also outlines the planning approach adopted by the Northern Cape Province in the preparation of this PSDF and its translation to Land Use Management in the Province

CHAPTER 1
introduction

CHAPTER 1| INTRODUCTION

1 PURPOSE AND BACKGROUND

1.1 PROVINCIAL GROWTH AND DEVELOPMENT PLAN

The main purpose of this PGDP is the development of a coordinated implementation plan which will provide a sound foundation for departmental, sectoral and stakeholder annual performance planning and therefore to guide resource allocation. The Province is under pressure to develop a PGDP and needs to develop a plan to obtain and allocate financial resources, sustainably. The focus is placed on driving implementation in a coordinated and integrated manner, where progress can be measured against predetermined targets and where roles and responsibilities have been confirmed within established lines of accountability.

The PGDP should provide a provincial strategic overview of the National Development Plan (NDP); it should set goals, objectives and strategies towards a long-term perspective (vision 2040). Key form giving elements of the PGDP include:

- Development of goals and objectives;
- indicators that will be applied to measure the progress being made to achieve the desired outcomes;
- define strategic interventions required to achieve the set targets;
- identify catalytic projects in support of the PGDP goals;
- outline the institutional framework for the implementation of the PGDP; and
- establish a monitoring, evaluation, reporting and review framework for the plan

The PGDP should focus and address the following elements:

- People driven;
- Promoting Active Citizenry;
- Mobilising society;
- Reducing poverty and inequality;
- Becoming a desired destination;
- Identification of investment opportunities;
- Prioritising resource allocations; and
- Addressing the decent standard of living conditions of the Province.

1.2 PROVINCIAL SPATIAL DEVELOPMENT FRAMEWORK

The Northern Cape PSDF will act as an enabling mechanism that responds and complies with, in particular, the National Spatial Development Framework (NSDF). The latter encourages lower sphere spatial development plans and frameworks (such as the PSDF) to create an environment that promotes a developmental state. The PSDF aims to give effect to the commitment above and address the current situation in the Northern Cape which will be described in the Provincial Growth and Development Plan – Vision 2040. The PSDF builds on the notion that such a scenario requires innovative economic intervention, which can only result from a dynamic and effective developmental state.

The PSDF is to function as an innovate strategy that will apply sustainability principles to all spheres of land use management throughout the Northern Cape and which is to facilitate practical results, as it relates to the eradication of poverty and inequality and the protection of the integrity of the environment. In short, the PSDF is to serve as a mechanism towards enhancing the future of the Northern Cape and its people by ensuring that:

- All land-uses enable people to have sustainable livelihoods and enhance the integrity of the environment; through effective resource management;
- Innovative management skills and technologies are employed to bring human demands for resources into balance with the carrying capacity of the environment. In this regard the PSDF is premised on the principle that shared resources can only be sustainable if the ethic of environmental care applies at all the applicable levels, ranging from the international to the local; and
- To capitalise on the comparative and competitive advantages, in a sustainable manner, which the Northern Cape holds over its bordering provinces and the neighbouring countries abutting the Northern Cape.

The PSDF is a policy framework that will be applied in terms of the conformity principle. It does not bestow or remove land use rights. However, upgrading or amendment of existing rights will have to conform to the PSDF. This means that organs of state and officials must take account of, and apply relevant provisions of the PSDF, when making decisions that affect the use of land within the province. However, the PSDF is mainly a guideline, which must not be applied rigidly, but rather consider the merits and particular circumstances of each case in a site-specific manner as is required in terms of the bioregional planning approach and the Spatial Planning and Land Use Management Act, 16 of 2013.

2 LEGISLATIVE ALIGNMENT

2.1 PROVINCIAL GROWTH AND DEVELOPMENT PLAN

2.1.1 The Constitution of the Republic of South Africa, 1996

Chapter 6, Section 125 of the Constitution of South Africa: The Premier of a Province is the Executive Authority for that province. The Office of the Premier, therefore, plays a central role in managing the provincial government. As the Executive Authority, the Premier together with the Executive Council, must initiate and implement provincial policy, in order to ensure alignment with national policy, and the integration of the various spheres of government.

The Office of the Premier is therefore, regarded as the political nerve centre of the provincial government and plays a leading role in managing the implementation of the electoral mandate. The Office of the Premier furthermore supports the Premier with administrative management, providing strategic leadership and central coordination, and providing policy briefings/ advice to the Premier and the Executive Council. Furthermore, the Office of the Premier plays a critical leadership role in the development and implementation of Provincial Growth and Development Plan – 2030 and the Provincial Spatial Development Framework. The Planning function therefore falls within the scope of the legislative requirements of the Office of the Premier.

2.1.2 National Development Plan

The National Development Plan (NDP) of 2030 envisions a society where everybody is equally and optimally empowered by changing the past narrative of conquest, oppression and resistance (NPC[1], 2012, p. 1). The primary objective of the NDP is to eliminate poverty and reduce inequality by 2030. Since the Commissions' Diagnostic Report of 2011, the National Planning Commission set out to address 9 challenges as a long-term goal for 2030. Those challenges are as follow (NPC, 2012:15):

- High Unemployment rate;
- Substandard education quality;
- Poorly located and maintained infrastructure;
- Inclusive development is prohibited by spatial divides;
- Current economic resource consumption is unsustainable;
- Public health is under capacitated to meet the growing demand;
- Public services are unsystematically located and poor in quality;
- Corruption is beyond limits; and
- South Africa remains a divided country.

The NDP is intrinsically a multidimensional framework, meaning that addressing the challenges would need to be done interactively by fostering social cohesion through strong leadership, effective government, and active citizenry, in order to enable growth, reduce poverty and capacitate people. In broad terms, the NDP focuses on a few core areas such as poverty alleviation by increasing employment, improving quality of education, skills development and innovation. This would mean that business, labour, communities and government need to collaborate on achieving faster and sustainable economic growth. Unfortunately, the Northern Cape's economy is not a closed system and is influenced by global and national drivers and trends.

2.1.3 Expectations of the PGDP

The PGDP is regarded as a provincial perspective of the National Development Plan; it should be seen as the Integrated Development Plan (IDP) of the Province that will guide development through:

- Goals and objectives towards achieving a sustainable and viable future for the Province;
- Strategies on how to achieve these goals and objectives; and
- Indicators to measure performance towards attaining the proposed goals.

The PGDP should ensure alignment towards the NDP goals and contribute towards the National Plan. It is therefore critical that the strategies and goals, focus on areas and that indicators are aligned to the expectations of the NDP.

Unemployment and poverty reduction among other are certainly seen as one of the key challenges that need to be addressed in the PGDP, and can only be attained through sustainable economic development, which indirectly creates job opportunities. The optimal use of existing resources and

[1] *National Planning Commission. (2012). National Development Plan 2030 - Our Future - make it work. Pretoria: National Department of the Presidency*

skills would be critical towards addressing the challenges experienced within the Northern Cape Province.

Partnerships between private and public sectors are vital to facilitate the implementation of the PGDP. As underpinned in the Constitution of South Africa, active citizenry needs to be promoted where citizens must make use of opportunities in order to become the best they can be and fulfil their social responsibilities. The Northern Cape PGDP will engage the following areas within the NDP to ensure alignment between the PGDP and NDP. Each of the following objectives and actions set out will be engaged in detail within the Northern Cape Province:

- Economy and employment;
- Economic infrastructure;
- Inclusion of the rural economy
- Environmental sustainability and resilience;
- Orientating the Northern Cape within the country, region and world;
- Transforming human settlements;
- Improving education, training and innovation;
- Ensure healthcare for all;
- Building safer communities;
- Building a capable and developmental state;
- Fighting corruption; and
- Social cohesion.

Objectives and actions set out in the NDP will be captured in a Northern Cape context to ensure analysis through phase 2 of the project will be conducted taking all the relevant inputs, diagnostic reports from departments, data, etc. in to consideration.

2.2 PROVINCIAL SPATIAL DEVELOPMENT FRAMEWORK

2.2.1 SPLUMA, Act No.16 of 2013

2.2.1.1 Overview

The Constitution assigns provincial and regional planning as exclusive responsibilities of Provincial Government. In terms of Section 15 of SPLUMA 2013 and Section 4 of the Land Use Planning Act, Premiers are required to compile and publish a spatial development framework (SDF) for their Province. This PSDF must coordinate, integrate and align:

- Provincial plans and development strategies with policies of national government;
- the plans, policies and development strategies of provincial departments; and
- the plans, policies and development strategies of municipalities.

Whilst the Constitution assigns shared and exclusive spatial responsibilities to each sphere of government, it is evident that provincial government's PSDF mandate requires coordination, integration and alignment between all spheres of government.

In response to the quest of reversing the spatial effects of apartheid and infusing a new South African spatial perspective, the SPLUMA was gazetted on the 5th of August 2013, with the following aims:

- This act, as a consequence ultimately paves the way for municipalities to become the primary regulators of land use;
- The implementation of this act will assist the transformation agenda and quite progressively engineer South Africa's spatial planning and land use management systems in a way that promotes socio and economic inclusion; and
- Furthermore, it provides for the sustainable and efficient use of land resources and the redress spatial inequalities.

The Spatial Planning and Land Use Management Act (SPLUMA) was signed into law by the President on 02 August 2013, and formally came into effect on the 1st of July 2015. This Act provides a framework for all spatial planning and land use management legislation and processes in South Africa. It seeks to promote consistency and uniformity in procedures and decision-making regarding spatial planning across the country.

SPLUMA embodies the constitutional imperatives relating to the protection of the environment and property rights; the right of access to housing and the rights to sufficient food and water. The preamble to SPLUMA specifically refers to sustainable development, which requires the integration of social, economic and environmental considerations in future planning and ongoing land use management. The intent of the legislature is that municipalities must participate in national and provincial development programmes.

2.2.1.2 Synopsis of SPLUMA chapters

The Office of the Premier must ensure that all provincial departments apply the development principles and monitor the implementation thereof. The following development principles apply to spatial planning, land development and land use management:

- Spatial justice;
- Spatial sustainability;
- Efficiency;
- Spatial resilience; and
- Good administration.

Chapter 4 enables the Premier to publish a Provincial Spatial Development Framework (PSDF) that guides spatial distribution of current and desired land uses within the provincial sphere in order to give effect to the development vision, goals and objectives. Ultimately, the Office of the Premier is obligated to ensure alignment of all provincial strategic plans, Annual Performance Plans (APPs) and sector plans to the Provincial Spatial Development Framework and monitor the implementation thereof.

Chapter 4 of SPLUMA, further outlines the following in relation to the review of the PSDF and should be guide the review process:

- An SDF is a framework that seeks to guide overall spatial distribution of current and desirable land uses within a sphere/municipality in order to give effect to the development vision, goals and objectives;
- The Premier MUST compile and publish a Provincial SDF (Sec 15);
- The Executive Council MAY amend the PSDF when necessary

- The PSDF and any amendment there off MUST be approved by the Executive Council; and
- All provincial development plans, projects and programmes MUST be consistent with the PSDF (Sec 17 [2]).

2.2.1.3 SPLUMA Principles

One of the main objectives of SPLUMA is to provide a framework for spatial planning and land use management to address past spatial and regulatory imbalances. This PSDF should be consistent with SPLUMA. These are:

- Development principles set out in Chapter 2 of SPLUMA;
- Protect and promote the sustainable use of agricultural land;
- National and provincial government policies;
- The municipal spatial development framework; and
- Take into account:

    - The public interest;
    - The constitutional transformation imperatives and the related duties of the State;
    - the facts and circumstances relevant to all development;
    - the respective rights and obligations of all those affected;
    - the state and impact of engineering services, social infrastructure and open space requirements; and
    - any factors that may be prescribed, including timeframes for making decisions.

SPLUMA sets out the following five (5) main development principles applicable to spatial planning, land use management and land development:

2.2.1.3.1 Spatial sustainability:

A socially just society which is based on the principles of equality, solidarity and inclusion. While equal opportunity targets everyone within the community, where social justice targets the vulnerable, marginalised and disadvantaged groups in society. Inclusionary settlements places focus on the public realm, rather than on private enclaves; by placing emphasis on civic interaction support and equitable access throughout the public environment, in order to make urban opportunities accessible to all – especially the poor. Past spatial and other development imbalances should be redressed through the responsible and improved access to and use of land resources by disadvantaged communities.

Key observations include:

- Past spatial and other development imbalances must be redressed through improved access to and use of land;
- Spatial development frameworks and policies at all spheres of government must address the inclusion of persons and areas that were previously excluded;
- Spatial planning mechanisms, including land use schemes, must incorporate provisions that enable redress in access to land;

2.2.1.3.2 Spatial justice:

Land development should be spatially compact, resource-frugal, compatible and adaptable with cultural and scenic landscapes, and should not involve the alteration of high potential agricultural land or compromise ecosystems.

Key observations include:

- Promote land development that is within the fiscal, institutional and administrative means of the Republic;
- Ensure that special consideration is given to the protection of prime and unique agricultural land;
- Uphold consistency of land use measures in accordance with environmental management instruments;
- Promote and stimulate the effective and equitable functioning of land markets;
- Consider all current and future costs to all parties for the provision of infrastructure and social services in land developments;
- Promote land development in locations that are sustainable and limit urban sprawl; and
- Result in communities that are viable.

2.2.1.3.3 Efficiency

Efficiency relates to the form of settlements and use of resources - compaction as opposed to sprawl; mixed-use as opposed to mono- functional land uses; residential areas close to work opportunities as opposed to dormitory settlement, and prioritisation of public transport over private car use. When a settlement is compact higher densities provide thresholds to support viable public transport and transport orientated developments (TOD's), to reduce overall energy use, and lower user costs as travel distances are shorter and cheaper.

Key observations include:

- Land development optimises the use of existing resources and infrastructure;
- Decision-making procedures are designed to minimise negative financial, social, economic or environmental impacts; and
- Development application procedures are efficient and streamlined and timeframes are adhered to by all parties.

2.2.1.3.4 Spatial resilience

Resilience is about the capacity to withstand shocks and disturbances such as climate change or economic crises, and to use such events to catalyse renewal, novelty and innovation. The focus should be on creating complex, diverse and resilient spatial systems that are sustainable and adaptable in all contexts. Adaptability in spatial planning, policies and land use management systems needs to be accommodated to ensure sustainable livelihoods in communities most likely to suffer the impacts of economic and environmental shocks.

Key observations include:

- Flexibility in spatial plan, policies and land use management systems are accommodated to ensure sustainable livelihoods in communities most likely to suffer the impacts of economic and environmental shocks.

2.2.1.3.5 Good administration:

All spheres of government need to ensure an integrated approach to land use and land development that is guided by the spatial planning and land use management systems as embodied in SPLUMA. Departments must provide their sector inputs and comply with any other prescribed requirements during the preparation or amendment of spatial development frameworks. Clear and transparent communication and land use control processes are required to guide decision making in terms of national, provincial and local interest.

Key observations include:

- All spheres of government ensure an integrated approach to land use and land development that is guided by the spatial planning and land use management systems as embodied in this Act;
- All government departments must provide their sector inputs and comply with any other prescribed requirements during the preparation or amendment of spatial development frameworks;
- The requirements of any law relating to land development and land use are met timeously;
- The preparation and amendment of spatial plans, policies, land use schemes as well as procedures for development applications, include transparent processes of public participation that afford all parties the opportunity to provide inputs on matters affecting them;
- Policies, legislation and procedures must be clearly set in order to inform and empower members of the public

3 METHODOLOGY

The methodology for the preparation of the status quo report was conducted in three (3) distinct phases, as set out in detail below (refer to diagram 1). This methodology was based on the interpretation of the inception and aimed to holistically address all the status quo requirements of both the PGDP and PSDF. The approach seeks to ensure continuous alignment between both the developmental issues as well as the spatial implications of the Northern Cape Province. The process seeks to guide the identification of key priorities that needs to be addressed to improve the provincial growth path.

As per Figure 1 below, the following approach would be followed to give direction towards the development of the Provincial Growth and Development Plan and subsequent review of the Provincial Spatial Development Framework:

- A detailed qualitative analysis[2] has been done through stakeholder engagement sessions and workshops to ensure participant observation, interviews and inputs that would provide a qualitative dimension to the challenges and issues identified in the Province. This process ensure that the unique characteristics of the Northern Cape Province is prioritised during the identification of development goals and strategies.
- Similarly, the quantalities analysis done through a desktop assessment would include all the quantitative elements, specifically referring to the statistics, data, spatial information and other numerical forms of information.
- It is important to obtain direction towards the issues and challenges that needs to be prioritised and the qualitative and quantitative analysis would attempt to give direction towards priority intervention areas.
- The priority areas would then be restructured into thematic areas that needs to be represented in the strategic agenda of the Province.
- Alignment towards the National Development Plan, Sustainable Development Goals and African Union Development goals would further ensure that the thematic areas do address the key issues and challenges experienced by the Northern Cape community.
- Research studies required would complement the delineation of the thematic areas, the thematic areas would also be informed by the sustainable investment model development for the Province. Both the latter outcomes would ensure that the thematic areas are credible and would address the challenges of the Province. Both the research and the sustainable investment model would give strategic direction towards the identification of development goals and strategies.
- The provincial development goals would be derived from the thematic areas and should further inform the Development Strategies, Aims and Targets, Indicators as well as the Monitoring and Evaluation of the respective long terms strategies.
- Development strategies will be proposed through the PGDP that would include amongst other development actions and mechanism to achieve the objectives, while the PSDF would make a spatial representation of the strategies and give direction through spatial options.

[2] *Qualitative data analysis can be described as the process of making sense from research participants‟ views and opinions of situations, corresponding patterns, themes, categories and regular similarities (Cohen et al., 2007:461)*

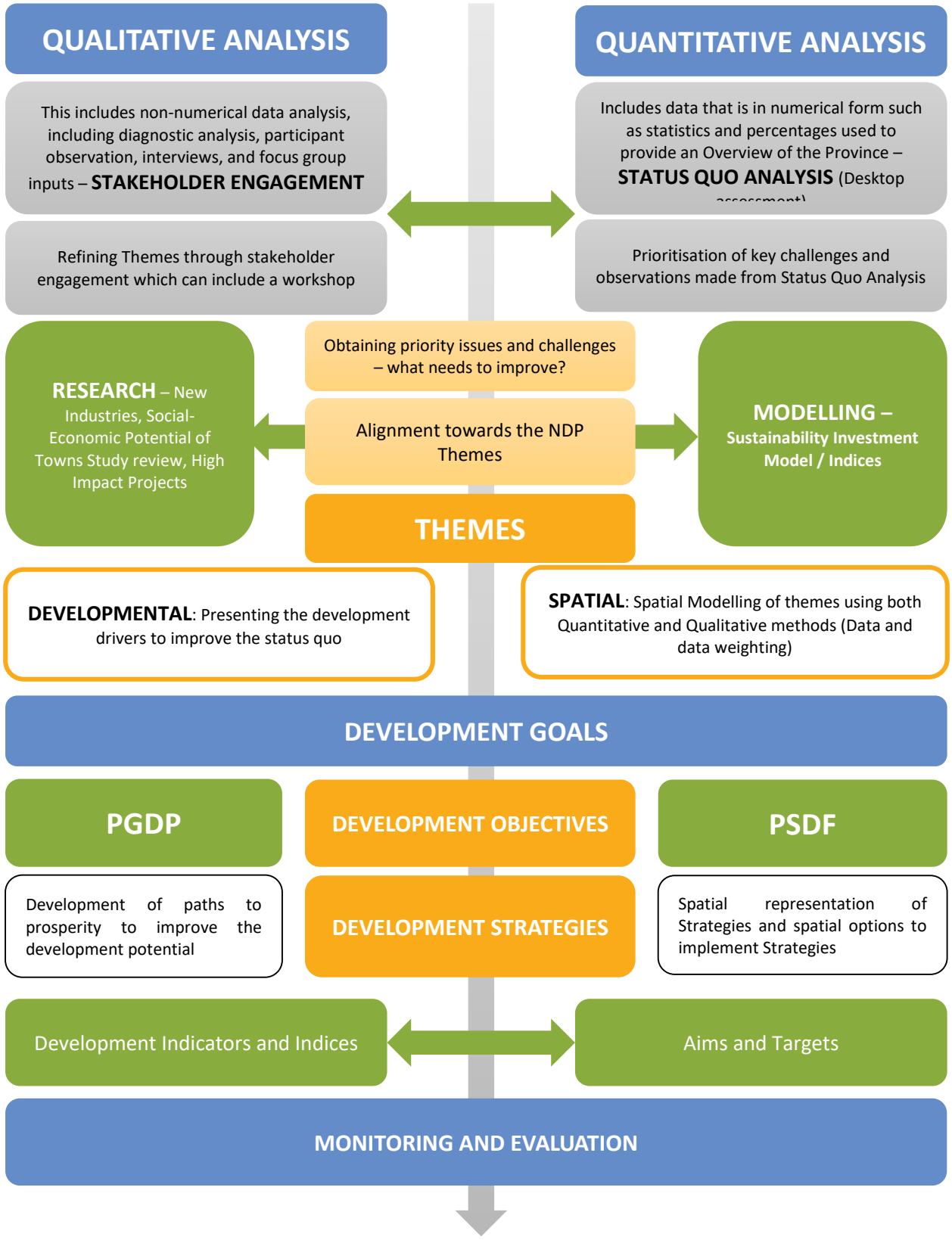


Figure 1: Proposed methodology towards the development of the status quo report of the PGDP and PSDF

3.1 PSDF ASSESSMENT

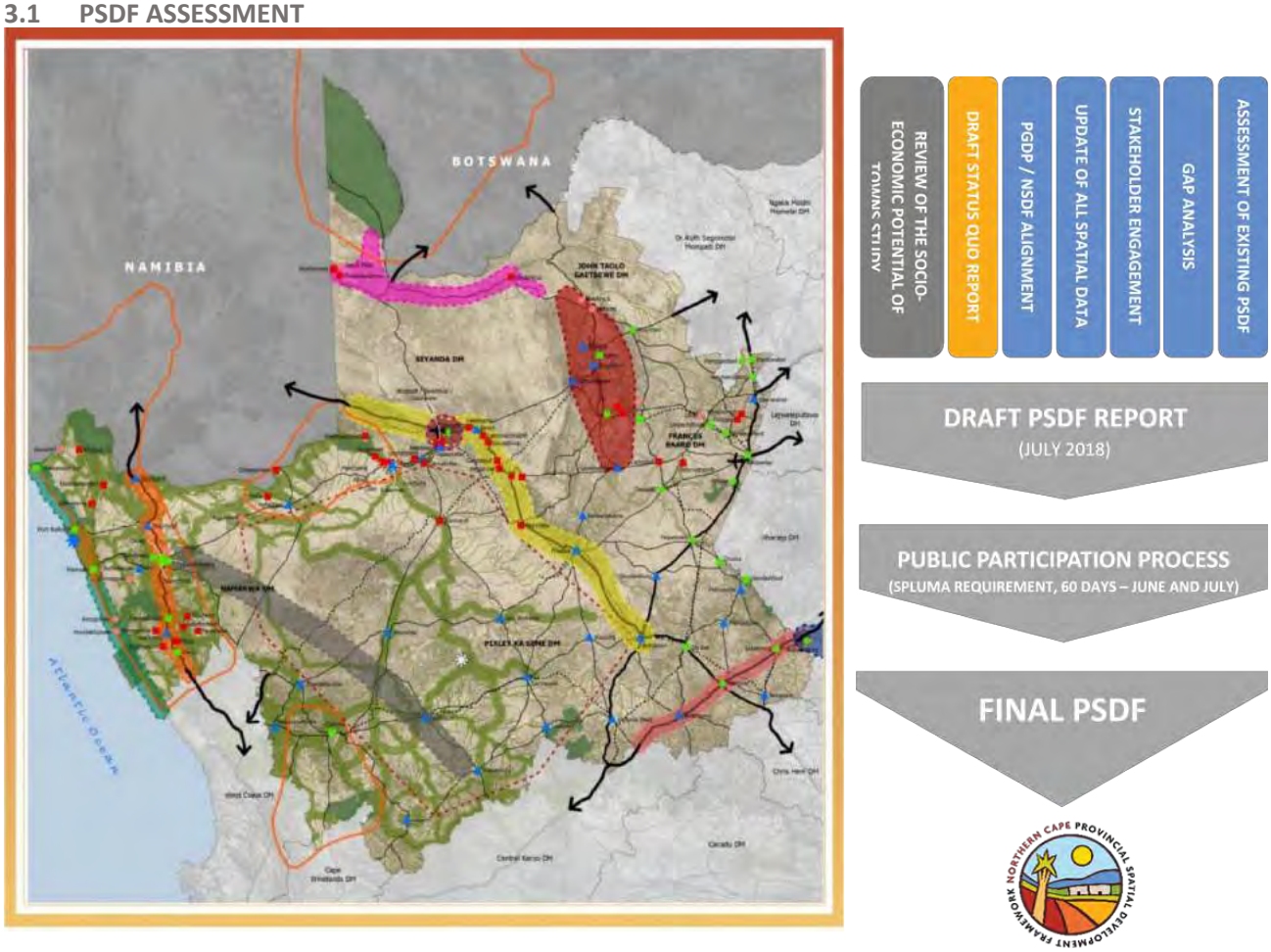


Figure 2: Current PSDF Composite Proposals and Current Phase of PSDF Review

The existing PSDF has been thoroughly assessed by the Department of Rural Development and Land Reform (DRDLR), the Department of Cooperative Governance, Human Settlements and Traditional Affairs (COGHSTA) as well as SALGA and MISA, in 2014. The assessment exercise found that the PSDF is to be reviewed due some of the following aspects (DRDLR, 2014:2):

- A greater level of alignment with policy and legislation is needed due to the limited link between the PSDF and NDP. Apart from SPLUMA, the IUDF policy has been proclaimed among others, that will also need to find expression within the PSDF.
- Limited alignment with departmental sector plans as well as the clear definition of roles and functions of departments.
- Outdated statistical data was utilised to inform the proposals made within the document.
- Monitoring and evaluation tools and mechanisms need to be developed in order to assess the level of implementation of the PSDF strategies.
- Amendment of corridor proposals in order to accurately portray development realities.
- The Spatial Planning Categories (SPC's) play a key role in defining and regulating land use management within local municipalities and should be preserved during the PSDF review process.



CHAPTER 2 provides more detail towards the Province in context, it looks at the different planning process and how the respective spheres of government engage towards the implementation and monitoring of the PGDP and PSDF. This chapter puts the Northern Cape in context with International, national, provincial and local context. It comprises a summary of national and provincial development policy guidelines which direct the strategic agenda, as well as the Provincial Vision and Mission.

CHAPTER 2

Provincial context

CHAPTER 2| PROVINCIAL CONTEXT

1 PROVINCIAL PLANNING OVERVIEW



Figure 3: The strategic and spatial approach to the development of the Northern Cape Province

1.1 INTERNATIONAL PLANNING



Recognition towards international and African policies are required to ensure that the Northern Cape Province, through its long-term growth path, gives effect towards policies such as:

1.1.1 The Sustainable Development Goals (SDG's)

The SDG Goals are applicable to all countries that should mobilise efforts to end all forms of poverty, fight inequality and tackle climate change, while ensuring that no one is left behind. The SDG's build on the success of the Millennium Development Goals (MDGs) and aim to go further to end all forms of poverty. They recognise that ending poverty must go hand-in-hand with strategies that build spatial-economic growth and addresses a range of social needs including education, health, social protection, and job opportunities, while tackling climate change and environmental protection.



Figure 4: Sustainable Development Goals (SDG's)

The PSDF strives to respond to all the goals and targets within its mandate, but is largely influenced by SDG 11: 'Making cities and human settlements inclusive, safe, resilient and sustainable' as its primary goal. Of particular importance to cities and towns are the targets that are defined for this goal. **These targets are listed below:**

- Inclusive urbanisation, capacities for human participatory planning and management;
- Sustainable public transport;
- Reducing the adverse environmental impact of cities;
- Improve air quality, municipal and other waste management;
- Universal access to public spaces;
- Access to adequate, safe and affordable housing and basic servces;
- Quality, reliable, sustainable and resilient infrastructure;
- Upgrade slums;
- Access to transport systems;
- Reduce number of deaths by disasters with focus on the poor;
- Access to public trnasport and public space with particuler attention to woman; and
- Assure access to drinking water.

1.1.2 The New Urban Agenda

The aim is promoting cities that are more sustainable, planned better, and successfully managed. A new model of urban development envisions an urbanising world that integrates all facets of sustainable development, to promote equity, welfare and shared prosperity. Sustainable development should be achieved through strengthening national, regional and local development planning, including provision of affordable housing, transport, safe and accessible public spaces, safeguarding cultural and natural heritage, with a special focus on slums' upgrading.

By readdressing the way cities and human settlements are planned, financed, developed, governed and managed, the New Urban Agenda, is seen as key instrument for national and sub-national governments including local governments and all relevant stakeholders to achieve sustainable urban development. By committing to the paradigm shift, aimed at achieving a new urbanization vision that can better respond to the above challenges as well harness future potentials, all government spheres are actively participating in order to achieve the New Urban Agenda. For effective implementation, the New Urban Agenda also requires an enabling environment and enhanced international cooperation and partnerships among Governments at all levels, the private sector, civil society, and the United Nations System, and other actors.



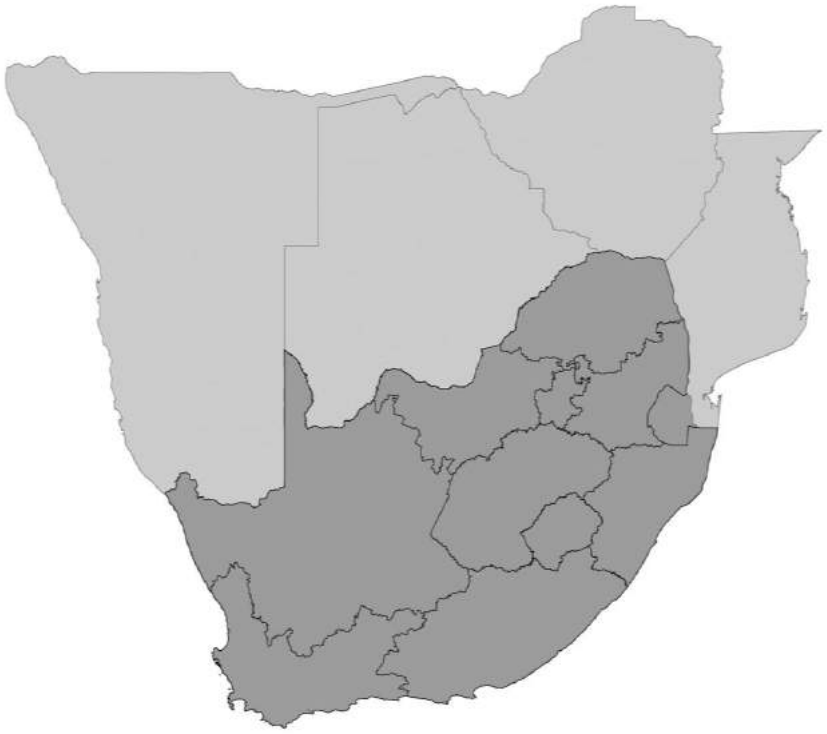
Globally agreed drivers of change for urban development include:

- National urban policies
- Urban legislation
- Urban and territorial planning
- Effective finance frameworks

1.1.3 The African Union Agenda 2063

Agenda 2063 was formulated by the African Union in collaboration with the NEPAD Coordination Agency, with support granted by the African Development Bank and the United Nation Economic Commissions for Africa. It is an African vision and action plan for the continent's transformation over the next 50 years. The framework focuses on a social, economic and political renaissance that links the past, present and future. Overall, Agenda 2063 seeks to strengthen industrialisation, linked with agriculture and food security and aims to build on the continent's comparative advantages, such as its human development potential, natural resources and geographic location.

1.2 NATIONAL PLANNING



National strategic planning follows a broad holistic approach by identifying the prominent ills or challenges within the country and identifies key appropriate strategies to address the various ills, as well as strategies to unlock potential regardless whether it is social, economic or environmental in nature. Furthermore, it provides a unified vision and objectives, for all stakeholders involved with planning, and identifies which challenges are to be prioritised. National planning is also subject to international policies and agreements, that influences the approach towards common goals, such as the Sustainable Development Goals which is derived from the Sendai Framework.

1.2.1 The National Development Plan

The National Development Plan (NDP) sets out to describe the envisioned scenario for South Africa in which its goals and objectives will be achieved. These objectives include an increased Gross Domestic Product (GDP) at an annual growth rate of 5.4 % and a national saving increase to 25% of the GDP. This also includes the rise of fixed investment to 30% of the GDP. Numerous actions are stipulated within the NDP to reinforce trade. These actions include, inter alia, trade penetration and diplomatic presence should be focused on fast growing markets (Asia, Brazil and Africa) and that the focus of implementation should be on Regional Integration Strategies. In view of the NDP's wide-ranging and extensive coverage, almost every government department is involved in its implementation, not only at national, but also at provincial and municipal levels.

Key observations for the PSDF include:

- Eliminate deficiencies in administrative procedures;
- Looking at spatial contracts;
- Development of plans that cross municipal, and even provincial boundaries;
- Explicit spatial restructuring strategy;
- Retool instruments of land-use management to achieve spatial objectives; and

- Empower municipalities to make critical interventions to redress past segregation.

1.1.1 The National Spatial Development Framework

The objective of the National Spatial Development Framework (NSDF) is to provide a spatial guideline and expression of the NDP strategies and goals from a national point of view. The document aims to coordinate public and private spending into areas which provides a high level of return on investment, in order to ensure that public entities and their funds are sustainably allocated and managed. By doing so, development and the associated interventions would be coordinated and prioritised, providing an enabling environment for economic and social growth. From 2014 the first processes were initiated for the development of the National Spatial Development Framework (NSDF). At this point in time, the NSDF is at the Draft 2 phase, and scheduled to be concluded by August 2018, as indicated by the figure below.

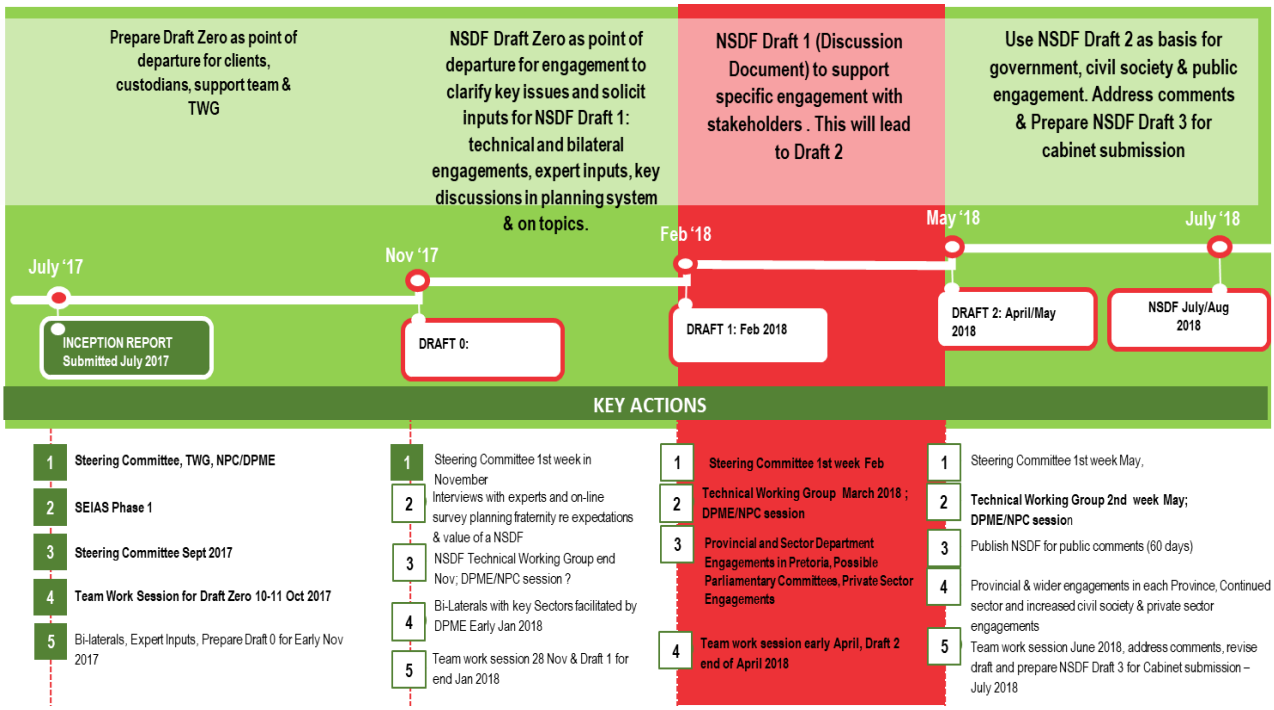


Figure 5: NSDF compilation schedule

1.2.2 The Medium Term Strategic Framework

The Medium Term Strategic Framework (MTSF) sets out the strategic plan, commitments and delivery of targets for government that are in line with the objectives of the NDP; reaffirms government's vision for a competitive economy; promotes the creation of decent work opportunities and encourages investment. To achieve this, MTSF seeks to ensure policy coherence, alignment and coordination across government plans. Outcome 4 of the MTSF relates to the creation of decent employment through inclusive economic growth and seeks to promote a more equitable distribution of ownership and income.

1.2.3 The Integrated Urban Development Framework

The Integrated Urban Development Framework (IUDF) is a policy initiative coordinated by the Department of Cooperative Governance and Traditional Affairs. The IUDF seeks to foster a shared

understanding across government and society about how best to manage urbanisation and achieve the goals of economic development, job creation and improved living conditions for our people.

The IUDF responds to the post-2015 Sustainable Development Goals (SDGs), in particular to Goal 11: Making cities and human settlements inclusive, safe, resilient and sustainable. It also builds on various chapters of the National Development Plan (NDP) and extends Chapter 8 'Transforming human settlements and the national space economy' and its vision for urban South Africa.

The IUDF presents an urban vision of creating "**liveable, safe, resource-efficient cities and towns that are socially integrated, economically inclusive and globally competitive, where residents actively participate in urban life"**. Alignment of people's jobs, livelihoods, service promises and urban dividend that can reset the country's social and economic growth trajectory. Key development Levers include:

Table 1: Strategic levers of the Integrated Urban Development Framework (IUDF)

URBAN – RURAL LINKAGES	URBAN SAFTEY	URBAN RESILIENCE
● Integrated urban planning and ● Management ● Integrated transport and mobility ● Integrated and sustainable human settlements	● Integrated urban infrastructure ● Efficient land governance and management ● nclusive economic development	● Empowered Active Communities ● Effective urban governance ● Sustainable Finances

Key PSDF observations include:

- Spatial planning forms the basis for achieving integrated urban development, which follows a specific sequence of urban policy actions;
- Integrated transport needs to inform targeted investment into integrated human settlements, underpinned by an integrated infrastructure network system;
- To seek efficient land governance which all together trigger economic diversification inclusion and empowered communities;
- To relook governance reform to enable and sustain all the above; and
- Kimberley, Upington and Kuruman has been prioritised in the IUDF for urban restructuring.

1.3 PROVINCIAL PLANNING



Provincial planning plays a key role in the alignment process with regards to national and municipal level planning, as it acts as a mediator between the local and national sphere by aligning with the national strategies as well as strategies developed on local and district levels. This greatly aids the management and implementation of large scale developments such as the SKA, which is a project of national interest, but also effects the municipal space of two district municipalities (Namakwa and Pixley ka Seme) and three local municipalities (Kareeberg, Karoo Hoogland and Hantam) indicating that alignment is crucial between spheres. Key policies and plans that are to be consulted towards the development of the Status Quo report includes:

- National Development Plan, 2011
- Draft National Spatial Development Framework, 2018;
- Draft Provincial Growth and Development Plan, 2018;
- Provincial Spatial Development Framework, 2012;
- Regional/Provincial Spatial Development Frameworks;
- Northern Cape Department of Education – Literacy Strategy, 2012;
- The Development of the Northern Cape Coastal and Marine Tourism Strategy, 2016;
- The review of the Provincial Integrated SMME Strategy, 2012;
- Draft SMME Strategy for the Northern Cape Province, 2013;
- Northern Cape Tourism Master Plan: Revised 2015;
- Agriculture and Agro-Processing Sector Strategy;
- Northern Cape Province, Fishing and Mariculture Sector Development Strategy;
- Human Resource Development Strategy, 2004-2009;
- Information and Communication Technology Strategy and Implementation Plan;

- Northern Cape Manufacturing Strategy, 2004;
- Northern Cape Strategy and Programme for the Upgrading of Informal Settlements, 2014; and
- Climate Change Adaption Response Strategy for Northern Cape, 2016.

1.4 DISTRICT PLANNING



As in the case of provincial planning, the district plays a key role in alignment with regard to configuration between the local and provincial spheres of strategic planning. The district strategic planning ensures alignment between neighbouring municipalities by providing key guidelines regarding the approaches to be followed as required by provincial and national policy and legislation. Key policy alignment instruments include:

- The respective district Integrated Development Plans (IDPs);
- The respective district Spatial Development Frameworks'(SDF's);
- District Sector Plans such as:

    - Tourism Plans;
    - Environmental Management Plans;
    - Transportation Strategies;
    - Rural Development Plans; and
    - Any other sector policies or plans that would influence district development.

1.5 LOCAL PLANNING



Local strategic planning is arguably the most important, as it is the level where all development is facilitated. SPLUMA further states that the local municipality is the authority of first instance, meaning the decision-making, with regards to any development, must be done by the local municipality in accordance with the regulations stipulated within the bylaws and land use schemes, and must be captured within the SDF, IDP and SDBIP documents. Key policy alignment instruments include:

- The respective local municipal Integrated Development Plans (IDPs);
- The respective local Spatial Development Frameworks'(SDF's);
- Sector Plans such as:

    - Tourism Plans;
    - Environmental Management Plans;
    - Transportation Strategies;
    - Infrastructure Master Plans; and
    - Any other sector policies or plans that would influence district development.

1.6 ROLE OF THE PGDP AND PSDF

Figure 6 illustrates where and how the PGDP and PSDF links with National, Provincial and Local sphere frameworks and plans. The PGDP and PSDF are long term (i.e. > 5 year) strategic frameworks from which various plans will be implemented. It is to be informed by the NDP and related spatial policies and take its strategic direction from the Northern Cape Growth and Development Plan. It conveys the Northern Cape's spatial agenda to National and Provincial departments, as well as state owned enterprises (SOEs) so that their sector plans and programmes are grounded in a sound and common spatial logic, informed by accurate and up to date data.

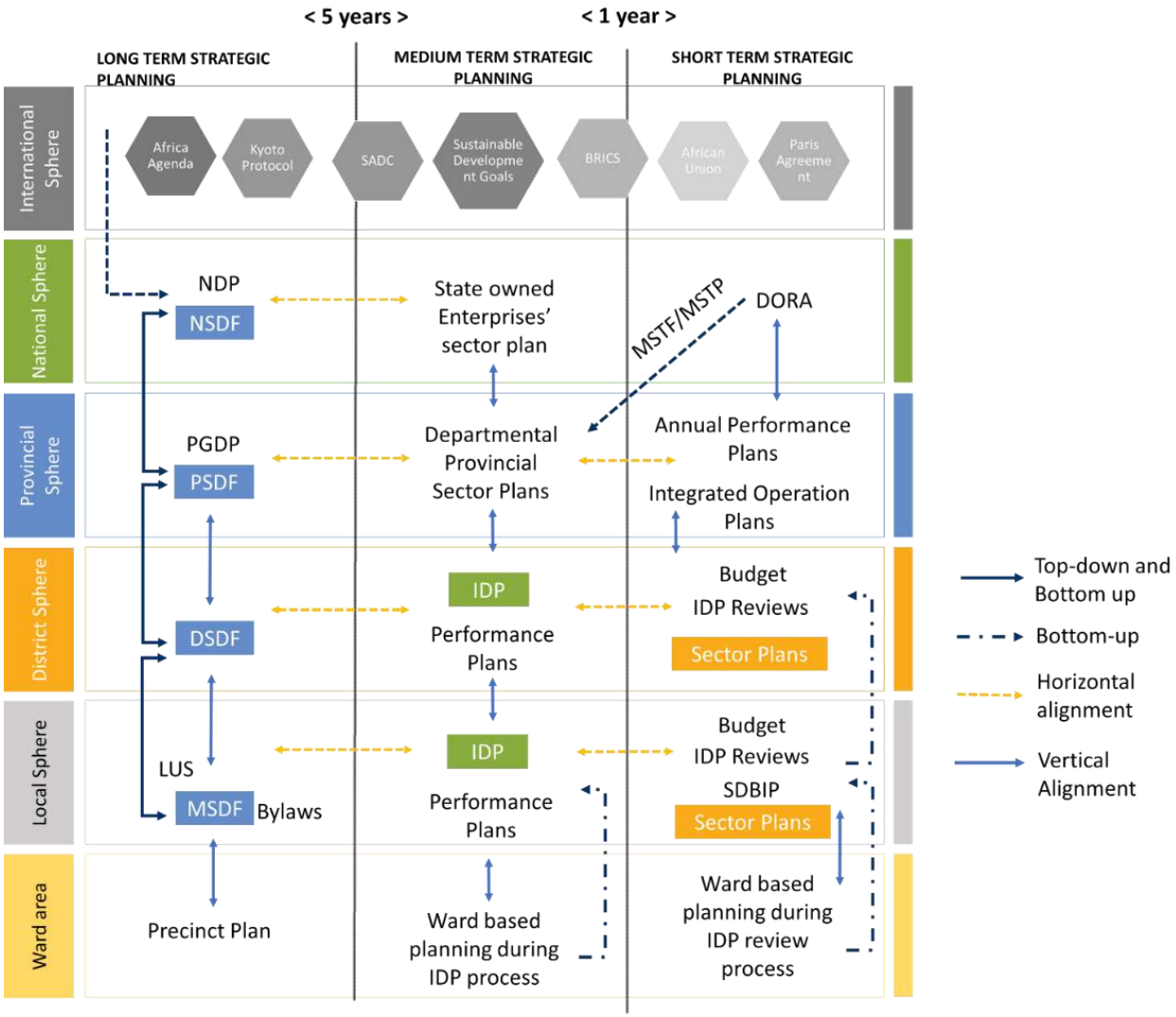


Figure 6: The context and role of the PGDP and PSDF in relation to other frameworks and plans

The PSDF also conveys the Northern Cape's spatial agenda to municipalities, so that their IDPs, SDFs and Land Use Management Systems (LUMS) are consistent with and takes the provincial spatial agenda forward. ***Figure 6*** also illustrates the linkages between spatial planning within the different spheres of government, and budgeting processes. The PSDF serves to strengthen these linkages so that the return on public investment is optimised, as well as provide greater certainty to communities and the private sector on the direction of spatial growth. As the PSDF serves to guide the location and form of public investment in the Northern Cape's urban and rural areas, the public sector is a key user of the PSDF - mainly provincial government departments, but also national and municipal government

as well as SOEs. Provincial government cannot dictate where other institutions must invest, but the PSDF can influence these investment decisions by establishing a coherent and logical spatial investment framework. As the private sector is also a user of the PSDF, the PSDF aims to provide an enabling environment for investment. Whilst the PSDF has limited influence on private sector investment patterns, it has an important contribution to make in reducing business risk (by providing clarity and certainty on where public infrastructure investment will be targeted) thereby opening-up new economic opportunities in these areas. Similarly, the transparency of the PSDF regarding where socio-economic investment will be targeted facilitates proactive and reactive responses by community-based organisations. (CBOs) and non-governmental organisations.

1.7 LEGISLATIVE ALIGNMENT TOWARDS PROVINCIAL PLANNING SYTEMS

Table 2: Legislative alignment towards the Northern Cape planning systems

LEGISLATIVE ALIGNMENT TOWARDS SPATIAL PLANNING IN THE NORTHERN CAPE PROVINCE	
Spatial Planning and Land Use Management Act, SPLUMA:	
Section 17(2)	All provincial development plans, projects and programmes must be consistent with the PSDF. Internally this places an obligation on all the provincial departments to ensure that all development plans, projects and programmes are consistent with the PSDF.
Section 17(3)	The PSDF cannot confer on any person the right to use or develop any land.
Section 42(1)(b)	SPLUMA determines that in considering and deciding a land use application a Municipal Planning Tribunal MUST make a decision which is consistent with the following: • norms and standards, • measures designed to protect and promote the sustainable use of agricultural land; • national and provincial government policies; and • the municipal spatial development framework Whereas SPLUMA in Section 22(2) provides for instances where a Municipal Planning Tribunal may deviate from the provisions of a municipal SDF, no such deviation is provided for in relation to the other aspects referred to above, including the PSDF in so far as it is a provincial policy document. This places an obligation on Municipal Tribunals, officials dealing with applications and Councils to take into account and consider the provisions contained in the PSDF in all land use decisions.
Section 22(3)	The Premier must resolve inconsistencies between the PSDF and any MSDF through the IGR Act. Read together with the identified sections below of the Municipal Systems Act - this legislation places an obligation on the WCG to ensure that municipal and provincial SDF's are aligned and consistent with each other.
Municipal Systems Act (MSA)	
Section 25(1) (e) and 26(d)	The IDP and therefore also the SDF, of a municipality MUST be "compatible with provincial development plans and planning requirements binding on the municipality in terms of legislation". In terms of these sections an obligation is again placed on both municipalities as well as the sector departments to ensure that these documents are aligned and consistent with each other and should be read together with the similar obligation in Section 22(3) of the SPLUMA.
35(1)(c)	A municipal IDP binds all other persons to the extent that those parts of the IDP plan that impose duties or affect the rights of those persons have been passed as a by-law. Although a similar provision has not been included for the PSDF, it is of course also available to the provincial sector departments to elevate certain elements of the PSDF to legislation which would then also have a similar binding effect on all persons. The provincial government would only consider such measures when its monitoring and support activities identifies the need therefore.
Section 35 (2)	Once elements of the PSDF have been elevated to legislation as described above, this section of the MSA determines that the IDP "binds the municipality in the exercise of its

LEGISLATIVE ALIGNMENT TOWARDS SPATIAL PLANNING IN THE NORTHERN CAPE PROVINCE	
	executive authority, except to the extent of any inconsistency between a municipality's integrated development plan and national or provincial legislation, in which case such legislation prevails"
Sections 32 and 33	The obligation of the provincial government to ensure that the SDF's of municipalities are aligned and consistent with the PSDF is supported with the provisions in these sections in terms of which the Provincial Minister is given an opportunity to participate in the Municipal SDF and if not successful in its endeavours to achieve the required alignment, can call into action the Ad Hoc committees to resolve the dispute or inconsistency.
Northern Cape Provincial Planning Act	
Northern Cape Planning and Development Act No7 of 1998	Before the commencement of SPLUMA, the Planning and Development Act guided the development processes within the Northern Cape Province. The Planning and Development Act was relatively similar to SPLUMA, which resulted in the ease of the transition regarding SPLUMA compliance and readiness. Currently the Act is in the process of being repealed, as the Northern Cape Spatial Planning and Land Use Management Bill is in the final stages of public participation, and due to the finding that the the Development Facilitation Act, on which the NC Planning and Development Act was based, was unconstitutional.
Section 21 and 28 (current status)	To provide a spatial and infrastructural framework to guide the location, distribution and servicing of existing and proposed urban or rural settlements
National Environmental Management Act (NEMA)	
Regulation 8 of the NEMA Regulations	The need and desirability requirement of the NEMA Regulations places an emphasis on the strategic context of a proposed development which is best found in the area's SDF as well as the PSDF which is applicable to the entire province. In evaluating EIA's, it is a legal requirement to consider the need and desirability of a proposal and without considering the consistency of any proposal with the proposals contained in the PSDF such need and desirability evaluation would be incomplete.
Promotion of Administrative Justice Act (PAJA)	
Section 6(2)	PAJA determines that a court or tribunal has the power to judicially review an administrative action if the action was taken because relevant considerations were not considered. Both SPLUMA and LUPA clearly determine that the PSDF MUST be considered in land use applications and therefore a decision of a municipality of the Minister can be set aside by a court if it can be shown that provisions contained in the PSDF were not considered.

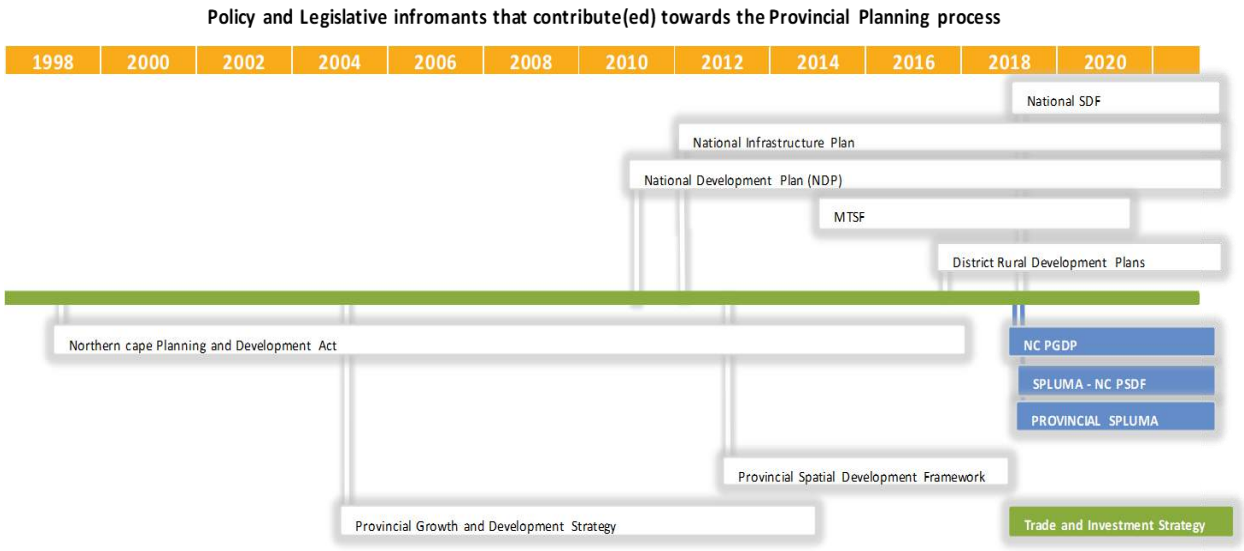


Figure 7: Policy and legislative informants that contributed towards the Provincial Planning processes

2 CURRENT GOVERNANCE STRUCTURE

The current governance model is based on the three spheres of government model (namely, national, provincial and local/municipal) where each sphere is tasked with specific tasks and functions. National government is responsible for policy formulation and making, developing national standards and norms, and rules and regulations. The provincial government deals with matters that affect their own province. Schedule 5 of the Constitution lists the issues that provincial government is responsible for. Provincial legislatures make their own laws. Local government is regarded as a sphere of government in its own right, as it is the authority of first instance with regards to any matter located within the municipal sphere.

Although each sphere has a certain function, these functions are also divided by the whether they are interrelated, interdependent or distinctive with regards to the area of operation, as depicted in ***Figure 8***. To provide further insight of the distribution of functions and responsibilities, ***Table 3***, provides an overview of the distribution of governmental functions between the three spheres.

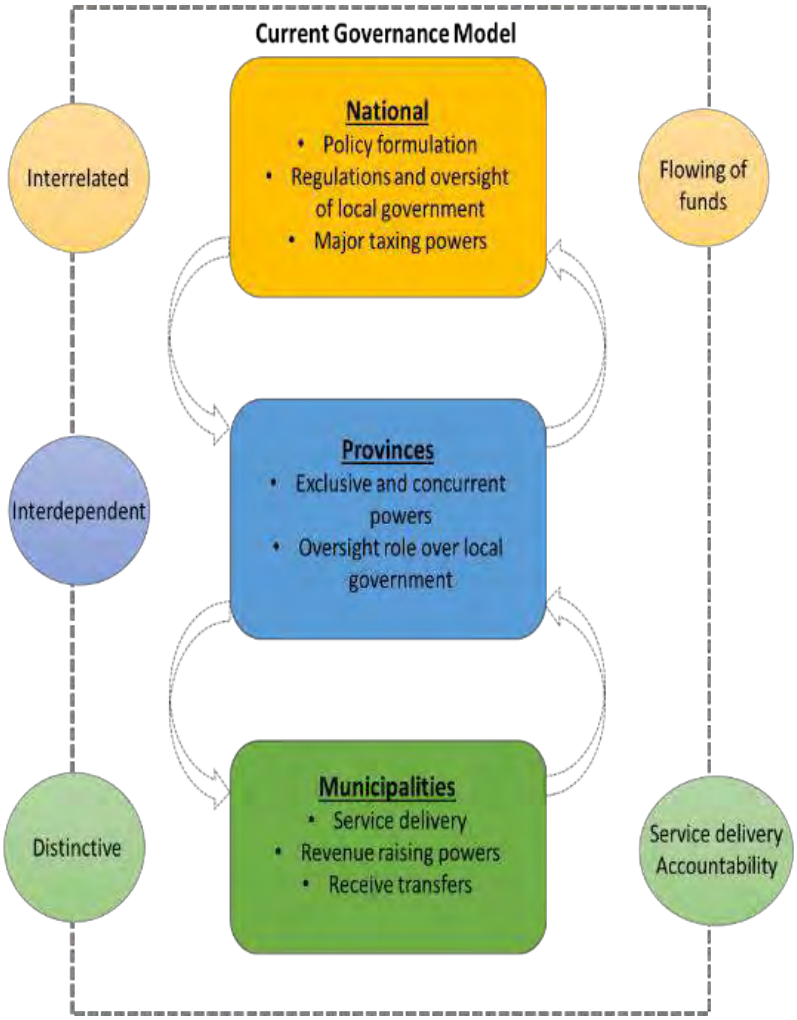


Figure 8: Current provincial governance model[3]

[3] *Adapted from Department of Local and Provincial Government, 2007:8.*

Table 3: Responsibilities of the three spheres of government[4]

NATIONAL	PROVINCIAL	MUNICIPAL
✓ Administration of indigenous forest	✓ Administration of indigenous forest	x
✓ Agriculture	✓ Agriculture	x
✓ Airports	✓ Airports other than international ✓ and national airports	✓ Municipal airport
✓ Animal control and diseases	✓ Animal control and diseases	✓ Facilities for the accommodation, care and burial of animals
✓ Casinos, racing, gambling & wagering	✓ Casinos, racing, gambling & wagering	x
✓ Lotteries and sport pools	x	x
✓ Consumer protection	✓ Consumer protection	x
✓ Cultural matters	✓ Cultural matters	x
✓ Disaster management	✓ Disaster management	✓ Firefighting management
✓ Education including tertiary	✓ Education excluding tertiary	
✓ Environment	✓ Environment	✓ Promote safe and healthy environment (objects of LG)
✓ Health services	✓ Health services	✓ Municipal health services
✓ Housing	✓ Housing	✓ Building regulations
✓ Indigenous and customary law	✓ Indigenous and customary law	x
✓ Industrial promotion	✓ Industrial promotion	✓ Local economic development
✓ Language policy	✓ Language policy	x
✓ Media services	✓ Media services	x
✓ Nature conservation	✓ Nature conservation excluding national parks, national botanical gardens and marine resources	✓ Local amenities and public places
✓ Police	✓ Police	x
✓ Pollution control	✓ Pollution control	✓ Air pollution and Noise pollution; ✓ control of nuisances
✓ Population development	✓ Population development	x
✓ Property transfer fees	✓ Property transfer fees	✓ Property rates
✓ Public enterprises	✓ Provincial public enterprises	✓ Markets and municipal abattoirs
✓ Public transport	✓ Public transport	✓ Municipal public transport
✓ Public works	✓ Public works	✓ Municipal public works
✓ Regional planning and development	✓ Regional planning and development	✓ Municipal planning

[4] *Adapted from Department of Provincial and Local Government, 2007: Annexure B*

NATIONAL	PROVINCIAL	MUNICIPAL
✓ Road traffic regulations	✓ Road traffic regulation	✓ Municipal roads, traffic and parking
✓ Soil conservation	✓ Soil conservation	x
✓ Tourism	✓ Tourism	✓ Local tourism
✓ Trade	✓ Trade	✓ Street trading; trading regulations; Licensing and control of undertakings that sells food to the public
✓ Traditional leaders	✓ Traditional leaders	x
✓ Urban and rural development	✓ Urban and rural development	✓ Planning of urban and rural development within municipal boundaries
✓ Vehicle licensing	✓ Vehicle licensing	✓ Traffic and parking
✓ Welfare services	✓ Welfare services	✓ Child care facilities
x	✓ Abattoirs	✓ Municipal abattoirs
x	✓ Ambulance services	✓ Municipal health services
✓ National Archives	✓ Archives other than national archives	x
✓ National libraries	✓ Libraries other than national libraries	x
x	✓ Liquor licenses	✓ Control of undertaking that sell liquor to the public
✓ National Museums	✓ Museum other than national museums	x
✓ National Planning	✓ Provincial planning	✓ Municipal planning
x	✓ Recreation and amenities	✓ Beaches and amusement ✓ facilities; local amenities; municipal parks and recreation; public places
✓ Sport	✓ Provincial sport	✓ Local sport facilities
x	✓ Provincial roads and traffic	✓ Traffic and parking
x	✓ Veterinary services, excluding regulation of the profession	✓ Licensing of dogs; cleansing;
✓ Electricity	X	✓ Electricity and gas reticulation
✓ International and national shipping and matters related thereto	X	✓ Potoons, ferries, jetties and harbours
x	X	✓ Stormwater management systems in build-up areas
✓ Water	X	✓ Water and sanitation
x	X	✓ Billboards and the display of ✓ advertisement in public places
x	X	✓ Cemeteries, funeral palours and crematoria
x	X	✓ Fencing and fences

NATIONAL	PROVINCIAL	MUNICIPAL
x	X	✓ Pounds
x	X	✓ Refuse removals, refuse dumps and solid waste disposal
✓ Forestry	X	x
✓ Defence	X	x
✓ Civic affairs	X	x
✓ Foreign affairs	X	x
✓ Labour	X	x

As described within the above table, national mandates are typically delegated to the province as each province will be responsible to address the national tasks within the provincial boundaries. There is to some degree a duplication or overlapping of obligations, mainly due to the size and overall distribution of the tasks throughout provinces and thus the country. The municipal sphere is mainly tasked with the implementation and regulation of the municipal functions as well as giving expression to the provincial and national functions, where applicable. The following section will discuss the specific governance structure of the Northern Cape.

2.1 NORTHERN CAPE GOVERNANCE STRUCTURE AND OPERATION

The Northern Cape governance structure, also functions on the three spheres model, namely, provincial, district municipalities and local municipalities. The provincial sphere mainly consists out of national and provincial sector departments, overseen by the Office of the Premier. OtP, national and provincial sector departments mainly function within the macro and mezzo levels, with an overview role on local municipalities, while district municipalities functions both at mezo and micro levels. An overview of the governance structure and the level at which each entity functions, is depicted by ***Figure 9*** below.

At a provincial level, the governing entities are responsible to give expression to international and national strategies, such as the Sustainable Development Goals (SDG's) and the National Development Plan (NDP). These strategies are typically distributed throughout the various mandates of the national and provincial sector departments. ***Figure 9*** provides an overview of the governance hierarchy within the Northern Cape, where the office of the premier and the Provincial Legislature are the highest authorities within the Northern Cape, where national and provincial sector department are second tier, while district and local municipalities are located on the third tier.

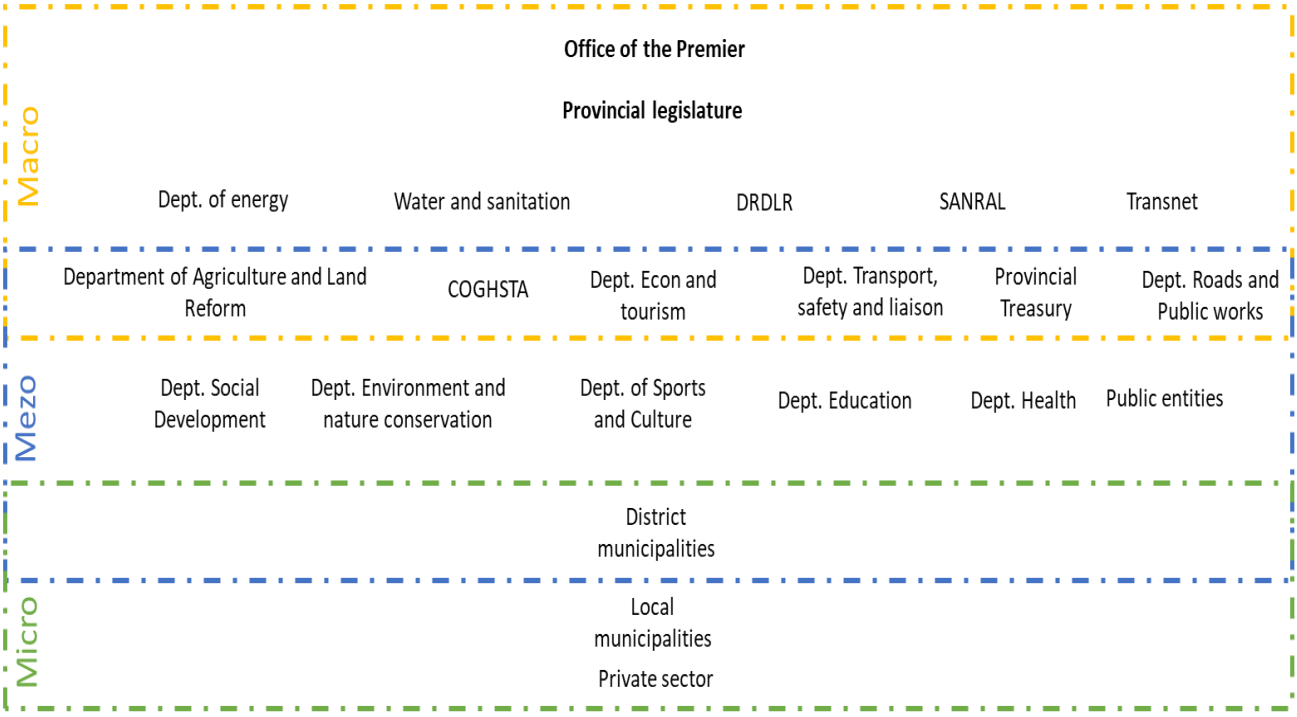


Figure 9: Governance hierarchy per activity level

Table 4: Provincial governance matrix – alignment of the SDG's and outcomes per provincial government department

| | | Sustainable Development Goals | | |

3 GOVERNANCE SYNOPSIS

3.1 OVERVIEW OF KEY ISSUES AND CHALLANGES

A Pestle Analysis[5] based on the key issues, challenges and opportunities was followed to provide an overview of provincial diagnostic reports submitted to the Northern Cape Office of the Premier (OtP).

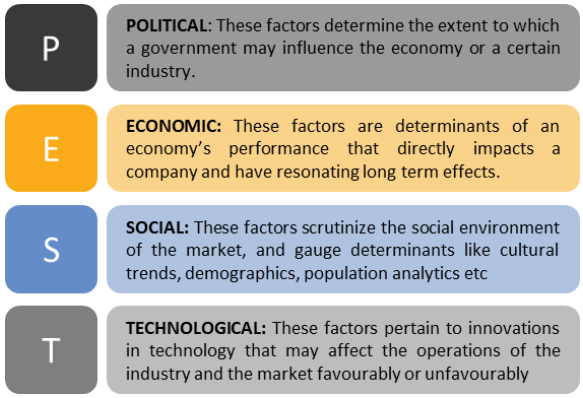


Figure 10: PEST mnemonic

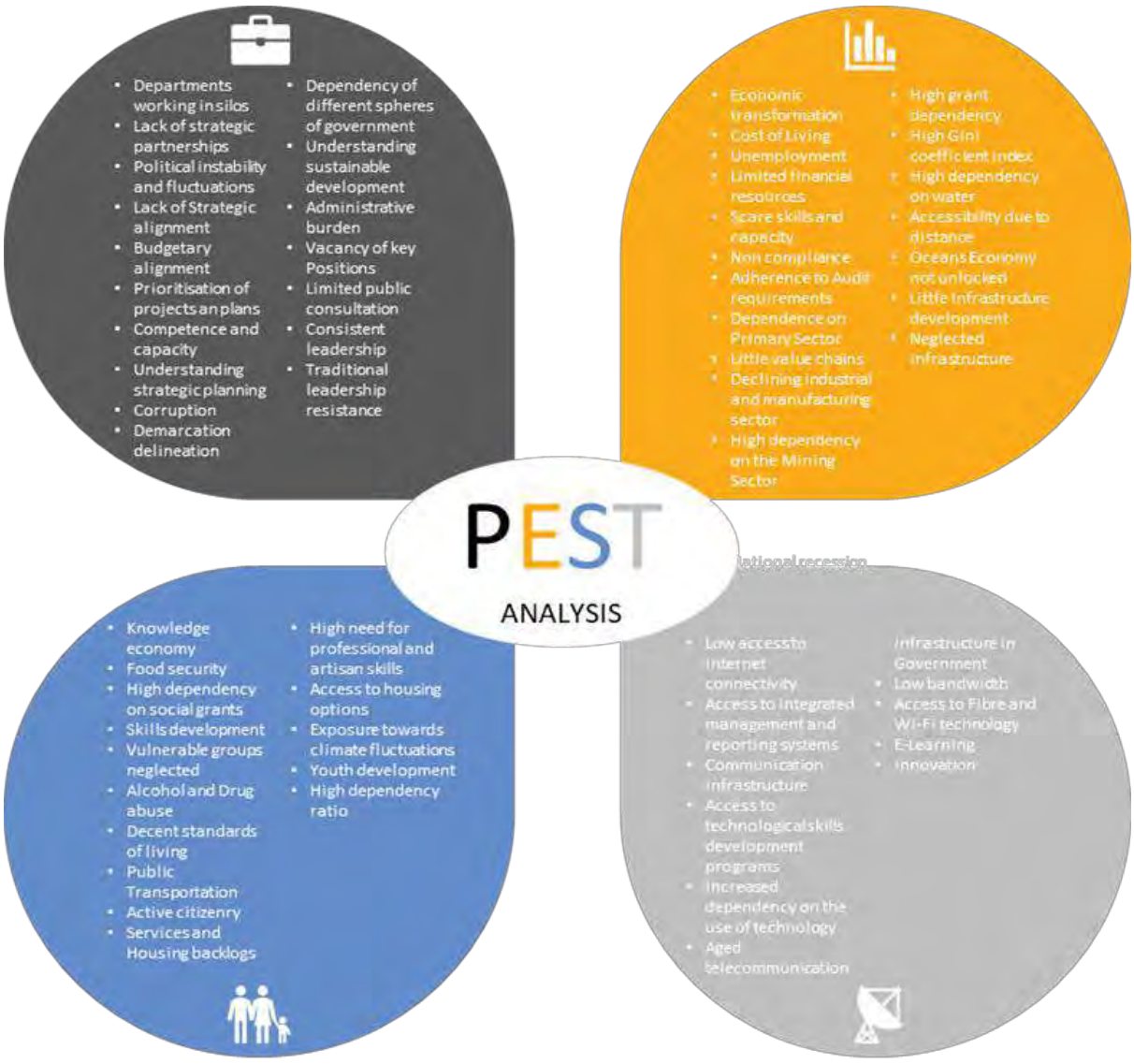


Figure 11: Overview of the key provincial challenges and issues identified using the Pestle Analysis

[5] *PESTLE or also called PEST, is a concept in marketing principles. Moreover, this concept is used as a tool by to track the environment they're operating in or are planning to launch a new project/product/service etc. PESTLE is a mnemonic which in its expanded form denotes P for Political, E for Economic, S for Social, T for Technological, L for Legal and E for Environmental. It gives a bird's eye view of the whole environment from many different angles that one wants to check and keep a track of while contemplating on a certain idea/plan. It is very critical for one to understand the complete depth of each of the letters of the PESTLE.*

3.2 SECTOR DEPARTMENT SYNOPSIS

3.2.1 Agriculture, Land Reform and Rural Development

3.2.1.1 Overview

The Mission of the Northern Cape Department of Agriculture, Land Reform and Rural Development is to champion land and agrarian transformation, promote and facilitate increase production, and provide expertise for improve livelihoods, sustainable rural development and food security for all. The department's strategic goals are to provide effective and efficient governance; ensure sustainable use and management of natural resource; promote optimal and sustainable agricultural production to ensure biosafety and biosecurity for the wellness of the public; ensure sustainable agrarian reform; include rural economic growth through promotion and support of agribusiness and agro-processing; and coordinate and facilitate the implementation of rural development programmes.

3.2.1.2 Key legislative mandate

Table 5: Legislative mandate of the department of Agriculture, Land Reform and Rural Development

LEGISLATION	ACT	YEAR
Fertilizers, Farm feeds, Agricultural Remedies and Stock Remedies Act	36	1947
Fencing Act	31	1963
Subdivision of Agricultural Land Act	70	1970
Veterinary and Para-Veterinary Professions Act	19	1982
Conservation of Agricultural Resources Act	43	1983
Animal Diseases Amendment Act	18	1984
Agricultural Product Standards Act	119	1990
Agricultural Research Act	86	1990
Agricultural Development Fund Act	175	1993
Genetically Modified Organisms Act	15	1997
Land Reform Act	3	1997
Animal Improvement Act	62	1998
Water Act	36	1998
Animal Identification Act	6	2002
Disaster Management Act	57	2002
Broad Based Black Economic Empowerment Act	53	2003
Communal Land Rights Act	11	2004
South African Abattoir Corporation Act	17	2005

3.2.1.3 Programs

Table 6: Programs and Sub Programs of the Department of Agriculture, Land Reform and Rural Development

PROGRAM	SUB PROGRAM
Administration	Office of the MEC
	Senior Management
	Corporate Services
	Financial Management
	Community Services and Information Technology Support
Sustainable Resource Management	Engineering Services
	Land Care
	Land Use Management
	Disaster Risk Management

PROGRAM	SUB PROGRAM
Farmer Support & Development	Farmer Settlement and Development
	Extension and Advisory Services
	Food Security
Veterinary Services	Animal Health
	Export Control
	Veterinary Public Health
	Veterinary Lab Services
Research & Technology Development Services	Research and Development
	Technology Transfer Services
	Research infrastructure Support
Agricultural Economics Services	Production Economics and Marketing Support
	Agro-Processing Support
	Macroeconomics Support
Rural Development Coordination	Development Planning and Monitoring
	Social Facilitation

3.2.2 Co-operative Governance, Human Settlements and Traditional Affairs

3.2.2.1 Overview

The mission of the Northern Cape Department of Co-operative Governance, Human Settlements and Traditional Affairs is to facilitate and manage integrated sustainable human settlements and infrastructure development for effective service delivery; facilitate, monitor and support the consolidation and sustainability phases at municipalities for integrated, sustainable service delivery; promote and support inter-sphere engagement for integrated planning and coordination; facilitate, development and support systems and structures to enhance traditional leadership; and ensure the efficient, effective and economic utilisation of departmental resources to maximise service.

3.2.2.2 Key legislative mandate

Table 7: Legislative mandate of the department of Co-operative Governance, Human Settlements and Traditional Affairs

LEGISLATION	ACT	YEAR
Restitution of Land Rights Act	22	1994
Land Reform (Labour Tenants) Act	3	1996
The Constitution of the Republic of South Africa	108	1996
The Interim Protection of Informal Land Rights Act	31	1996
The Extension of Security of Tenure Act	62	1997
The Housing Act	107	1997
Local Government: Municipal Demarcation Act	27	1998
Local Government: Municipal Structures Act	117	1998
Prevention of illegal eviction from and unlawful occupation of land act	19	1998
The Housing Consumer Protection Measures Act	95	1998
Rental Housing Act	50	1999
Local Government: Municipal Electoral Act	27	2000
Local Government: Municipal Systems Act	32	2000
Preferential Procurement Policy Framework Act	5	2000
Local Government: Disaster Management Act	57	2002
Local Government: Municipal Finance Management Act	56	2003
Regarding land administration, the Traditional Leadership and Governance Framework Act	41	2003
Communal Land Rights Act	11	2004

Local Government: Municipal Property Rates Act	6	2004
Northern Cape Traditional Leadership, Governance and Houses of Traditional Leaders Act	2	2007
Social Housing Act	16	2008
The Housing Development Agency Act	23	2008
Spatial Planning and Land Use Management Act	16	2013

3.2.2.3 Programs

Table 8: Programs and Sub Programs of the Department of Co-operative Governance, Human Settlements and Traditional Affairs

PROGRAM	SUB PROGRAM
Administration	Corporate Services
	Office of the CFO
	Resource Management
	Risk Management
Human Settlements	Strategic Objectives
	Resource Management
	Risk Management
Co-operative Governance	Strategic Objectives
	Resource Management
	Risk Management
Traditional Institutional Management	Strategic Objectives
	Resource Management
	Risk Management

3.2.3 Economic Development and Tourism

economic development & tourism
Department:
Economic Development & Tourism
NORTHERN CAPE PROVINCE
REPUBLIC OF SOUTH AFRICA

3.2.3.1 Overview

The vision of the Northern Cape Department of Economic Development and Tourism is a radically transformed economy in the Northern Cape. The Departments' mission is to accelerate the economic growth and development of the Northern Cape Province through diversification, empowerment, employment, business creation and sustainable development. The values and principles, as well as the service delivery in the Department is driven by the following principles: Batho Pele, professionalism, cooperation, integrity, accountability, inclusivity, and the four E's (effectiveness, efficiency, economy and excellence).

3.2.3.2 Programs

Table 9: Programs and Sub Programs of the Department of Economic Development and Tourism

PROGRAM	SUB PROGRAM
Administration	The office of the HOD
	Financial Management
	Corporate Services
Small Business Development	SMME Development
	Regional Economic Development Support
	Economic Empowerment
Trade and Sector Development	Trade and Investment Promotion
	Sector Development

	Strategic initiatives
Business Regulation and Governance	Governance
	Regulation Services
	Consumer Protection
Policy, Research and Innovation	Economic Policy Development
	Research and Development
	Knowledge Economy and Innovation
	Monitoring and Evaluation
Tourism	Tourism Growth
	Tourism Development

3.2.4 Education

Northern Cape Department of Education

3.2.4.1 Overview

The mission of the Northern Cape Department of Education is to develop and deliver a quality, effective and efficient education system in the Northern Cape that is responsive to socio-economic development goals and targets of the province and country, and the building of non-racial non-sexist and prosperous Northern Cape, through social cohesion and nation-building. The Department's strategic goals are to provide and maintain optimal administrative and logistical support systems to the Department; provide access to quality basis education ; ensure the provision and quality education at independent schools; ensure that education programmes in our schools continue to be accessible, transformative and developmental; improve and strengthen the skills base; provide quality learning opportunities to adult learners through basic education programmes; provide universal access to quality early childhood development services to all children in the province and provide support services to all children in the province and provide support services that enhance the functionality and effectiveness of basic education

3.2.4.2 Key legislative mandate

Table 10: Legislative mandate of the department of Education

LEGISLATION	ACT	YEAR
Educational Affairs Act	70	1988
Public Service Act	103	1994
South African Qualifications Authority Act	59	1995
South African Schools Act	84	1996
The Constitution of the Republic of South Africa	108	1996
The National Education Policy Act	108	1996
Employment of Educators Act	76	1998
General and Further Education and Training Quality Assurance Act	58	2001
Adult Basic Education and Training Act	52	2002
Further Education and Training Act	16	2006
Spatial Planning and Land Use Management Act	16	2013
The Division of Revenue Act	2	2013

3.2.4.3 Programs

Table 11: Programs and Sub Programs of the Department of Education

PROGRAM	SUB PROGRAM
Administration	Office of the MEC
	Corporate services
	Education Management
	Human resource development
	Education Management System
	Conditional Grants
Public Ordinary School Education	Public Primary Level
	Public Secondary Level
	Human resource development
	School, sport, culture and Media services
	Conditional Grants
Independent School Subsidies	Primary Phase
	Secondary Phase
Public Special School Education	Schools
	Human Resource Development
	School sport, culture and media services
	Conditional Grants
Early Child Development	Grade R in Public Schools
	Grade R in Early childhood development centres
	Pre-Grade R Training
	Human Resource Development
	Conditional Grant
Infrastructure Development	Administration
	Public Ordinary Schools
	Public Special Schools
	Early Childhood Development
Examination and Education Related Services	Payments to SETA
	Professional Services
	Special Projects
	External examinations
	Conditional Grants

3.2.5 Environment and Nature Conservation

Department of Environment and Nature Conservation Northern Cape

3.2.5.1 Overview

The mission of the Northern Cape Department of Environment and Nature Conservation is to conserve and protect the natural environment for the benefit, enjoyment and welfare of present and future generations by integrating sustainable utilisation with socio-economic development. The department's strategic-orientated goals are: environmental quality and biodiversity management; socio-economic benefits and employment creation; cooperative governance and administration; environmental education; research; and compliance and enforcement.

3.2.5.2 Key legislative mandate

Table 12: Legislative mandate of the department of Environment and Nature Conservation

LEGISLATION	ACT	YEAR
Marine Living Resources Act,	18	1998
National Environmental Management Act	107	1998

the World Heritage Convention Act,	49	1999
National Environmental Management: Protected Areas Act,	57	2003
The National Environmental Management: Biodiversity Act,	10	2004
The National Environmental Management Amendment Act,	62	2008
The National Environmental Management: Integrated Coastal Management Act,	24	2008
The National Environmental Management: Waste Act,	59	2008
The National Environment Laws Amendment Act,	14	2009
The National Environmental Management: Protected Areas Amendment Act	15	2009

3.2.5.3 Programs

Table 13: Programs and Sub Programs of the Department of Environment and Nature Conservation

PROGRAM	SUB PROGRAM
Administration	Office of the MEC
	Senior Management
	Corporate Services
	Financial Management
Environmental policy, planning and coordination	Intergovernmental coordination spatial and development planning
	Legislative Development
	Research and development support
	Spatial Information Management
Compliance and enforcement	Environmental quality management compliance and enforcement
	Biodiversity management compliance and enforcement
Environmental quality management	Impact management
	Air quality management
	Pollution and waste management
Biodiversity management	Biodiversity and protected area planning and management
	Conservation agencies and services
	Coastal management
Environmental empowerment services	Environmental capacity development and support
	Environmental communication and awareness raising

3.2.6 Health

3.2.6.1 Overview

The mission of the Northern Cape Department of Health is to provide quality health care services; promote a healthy, caring and responsible society; and offering caring, multi-skilled professionals who will integrate comprehensive services, using evidence-based care strategies and partnerships to maximise efficiencies for the benefit of all.

The departments strategic goals are: provision of strategic leadership and creation of a social compact for effective health service delivery; improved quality management and patient care across the system through, inter alia, developing the department's human resources; improved health outcomes in managing both communicable and non-communicable diseases; reduction of maternal, infant and child mortality; and efficient health management information system; attainment of a positive audit outcome for both financial and non-financial management; and an improved and accelerated infrastructure development programme.

3.2.6.2 Key legislative mandate

Table 14: Legislative mandate of the department of Health

LEGISLATION	ACT	YEAR
Medicines and Related Substances Act,	101	1965
Foodstuffs, Cosmetics and Disinfectants Act,	56	1972
Hazardous Substances Act,	15	1973
Occupational Diseases in Mines and Works Act,	78	1973
Pharmacy Act,	53	1973
Health Professions Act,	56	1974
International Health Regulations Act,	28	1974
Dental Technicians Act,	19	1979
Allied Health Professions Act,	63	1982
Human Tissue Act,	65	1983
South African Medical Research Council Act,	58	1991
Tobacco Products Control Act,	83	1993
Choice on Termination of Pregnancy Act,	92	1996
Medical Schemes Act,	131	1998
Sterilisation Act,	44	1998
Council for Medical Schemes Levies Act,	58	2000
National Health Laboratory Service Act,	37	2000
Mental Health Care Act,	17	2002
National Health Act,	61	2003
Nursing Act,	33	2005
Traditional Health Practitioners Act,	22	2007

3.2.6.3 Programs

Table 15: Programs and Sub Programs of the Department of Health

PROGRAM
Administration
District Health Services
Emergency Medical Services
Regional and Specialised Hospital Services
Central Hospital Services
Health Sciences and Training
Health Care Support Services
Health Facilities Management

3.2.7 Provincial Treasury

3.2.7.1 Overview

NCPT
NORTHERN CAPE PROVINCIAL TREASURY

The mission of the Northern Cape Department of Provincial Treasury is to render timeous and responsive service and transparent economic use of provincial resources, and ensure the alignment of strategic plans and budgets to the Provincial Growth and Development Strategy

3.2.7.2 Key legislative mandate

Table 16: Legislative mandate of Northern Cape Treasury

LEGISLATION	ACT	YEAR
Occupational Health and Safety Act	85	1993
Public Service Act	103	1994
Labour Relations Act,	66	1995
Qualification Authority Act	26	1995
South African Qualifications Authority Act	59	1995
The Constitution of the Republic of South Africa	108	1996
Employment Equity Act	55	1998
Employment of Educators Act	76	1998
Skills Development Act	97	1998
Public Finance Management Act	1	1999
Preferential Procurement Policy Framework Act	5	2000
Promotion of Access to Information Act	2	2000
Broad Based Black Economic Empowerment Act	53	2003
Municipal Finance Management Act	56	2003
Division of Revenue Act	3	2017

3.2.7.3 Programs

Table 17: Programs and Sub Programs of the Northern Cape Provincial Treasury

PROGRAM	SUB PROGRAM
Administration	Office of the MEC
	Management Services
	Corporate Services
	Financial Management (Office of the CFO)
Sustainable Resource Management	Programme Support
	Economic Analysis
	Fiscal Policy
	Budget Management
	Municipal Finance
Assets and Liabilities Management	Programme Support
	Asset Management
	Supporting and Interlinked Financial Systems
	Immovable Asset Management
	Banking Services and Cash Flow Management
Financial Governance	Programme Support
	Accounting Services
	Norms and Standards
	Risk Management
Internal Audit (IA)	Programme Support and audit committees
	Internal Audit: Education Cluster
	Internal Audit: Health Cluster
	Internal Audit: Agriculture Cluster
	Internal Audit: Roads and Public Works Cluster

3.2.8 Roads and Public Works

the dr&pw
Department:
Roads And Public Works
NORTHERN CAPE PROVINCE
REPUBLIC OF SOUTH AFRICA

3.2.8.1 Overview

The vision of the Northern Cape Department of Roads and Public Works is to be a trendsetter in infrastructure delivery to change the economic landscape of the province. The Departments mission is to provide and maintain all provincial land, buildings and road infrastructure in an integrated, sustainable manner

3.2.8.2 Key legislative mandate

Table 18: Legislative mandate of the department of roads and Public Works

LEGISLATION	ACT	YEAR
Advertising along Roads and Ribbon Development Act	21	1940
Road Ordinance	19	1976
National Building Regulations and Building Standards Act	103	1977
Construction Industry Development Board Act	38	2000
National Land Transport Act,	5	2009
Division of Revenue Act	3	2017

3.2.8.3 Programs

Table 19: Programs and Sub Programs of the Department of Roads and Public Works

PROGRAM	SUB PROGRAM
Administration	Office of the MEC
	Management of the Department
	Corporate Services
Public Works	Program Support
	Planning
	Design
	Construction
	Maintenance
	Immovable Asset Management
	Facilities Operation
Road Infrastructure	Program Support
	Planning
	Design
	Construction
	Maintenance
Expanded Public Works Programme	Program Support
	Community Development
	Innovation and Empowerment
	EPWP Co-Ordination and Monitoring

3.2.9 Social Development

social development
Department:
Social Development
NORTHERN CAPE

3.2.9.1 Overview

The mission of the Northern Cape Department of Social Development is to ensure the provision of comprehensive social protection services against vulnerability and poverty within the constitutional and legislative framework and create an enabling environment for sustainable development. The Department further aims to deliver integrated, sustainable and quality services, in partnership with all those committed to building a caring society.

The Departments strategic priorities are: caring for and protecting vulnerable groups, especially children, woman and people and disabilities, strengthening families and communities, transforming social relations, with a specific focus on gender and victim empowerment and strengthening instructional capacity to deliver quality services. In addition, the Department contributes to the realisation of some of the following government outcomes:

- improved quality basic education;
- a long and healthy life for all;
- citizens safety and safe public areas;
- decent employment through inclusive economic growth;
- a skilled and capable workforce to support and inclusive growth path;
- vibrant equitable sustainable rural communities contributing towards food security for all,
- sustainable human settlements and improved quality of household life;
- a responsive, accountable, effective and efficient local government system,
- and an efficient, effective and development-orientated public service, and an empowered fair and include citizenship.

3.2.9.2 Key legislative mandate

Table 20: Legislative mandate of the department of Social Development

LEGISLATION	ACT	YEAR
The Correctional Services Act	8	1959
Criminal Procedure Act	51	1977
Fund-raising Act	107	1978
Social Services Professions Act	110	1978
Prevention and Treatment of Drug Dependency Act	20	1992
Prevention of Family Violence Act	133	1993
Choice on termination of Pregnancy Act	92	1996
Film and Publications Act	65	1996
South African Schools Act	84	1996
The Constitution of the Republic of South Africa	108	1996
Non-Profit Organization Act	71	1997
Domestic Violence Act	116	1998
Maintenance Act	99	1998
Skills Development Act	97	1998
Public Finance Management Act	1	1999
Probation Services Act	35	2002
The Mental Health Care Act	17	2002
Children's Act	38	2005
Older Persons Act	13	2006
Criminal Law (Sexual Offences and related matters) Amendment Act	32	2007
Child Justice Act	75	2008
Prevention of and Treatment for Substance Abuse Act	7	2008
Prevention and Combating of Trafficking in Persons	7	2013
Division of Revenue Act	3	2017

3.2.9.3 Programs

Table 21: Programs and Sub Programs of the Department of Social Development

PROGRAM	SUB PROGRAM
Administration	Office of the MEC
	District management
	Corporate Management Services
Social Welfare Services	Care and Services to Older Persons
	Services to Persons with Disabilities
	HIV and AIDS
	Social Relief
Services to Families and Children	Care and Support Services to Families
	Child Care and Protection
	Early Childhood Development
Restorative Services	Crime Prevention and Support
	Victim Empowerment
	Substance Abuse Prevention and Rehabilitation
Development and Research	Sustainable Livelihoods
	Youth Development
	Population Policy Promotion
	Expanded Public Works Programme (EPWP)
	Institutional Funding and Monitoring

3.2.10 Sport, Arts and Culture

sport, arts & culture
Department:
Sport, Arts and Culture
NORTHERN CAPE

3.2.10.1 Overview

The Mission of the Northern Cape Department of Sport, Arts and Culture is to serve all the people of the Northern Cape by promoting, protecting and developing sport and the diverse cultures of the province, while at the same time being a catalyst in development programmes, economic empowerment and other activities, thereby entrancing nation- building and social cohesion. The Departments strategic goals area to provide political and strategic direction as well as effective and efficient human resource management, financial management and general support services to the department; promote, develop and transform arts and culture and language services in order to contribute to sustainable economic growth and opportunities, nation-building, good governance, and social and human capital development; promote, transform and promote library, information and archives services; and improve the quality of life of all people of the Northern Cape through the development, transformation and promotion of sustainable sport and recreation programmes, which will lead to increased participation and global competitiveness of sportspeople.

3.2.10.2 Key legislative mandate

Table 22: Legislative mandate of the Department of Sports, Arts and Culture

LEGISLATION	ACT	YEAR
The Museums Ordinance	8	1975
Provincial Library Service Ordinance	16	1981
The Cultural Affairs Act	65	1989
The Pan South African Language Board Act	59	1995
The National Archives of South Africa Act	43	1996
Legal Deposit Act,	54	1997
Substitution of notice 120 of 1997 concerning norms and rules for Provincial Language Committees	120	1997

Substitution of notice 121 of 1997 concerning norms and rules for National Language Board	121	1997
Local Government Municipal Structure Act	117	1998
South African Geographical Names Act	118	1998
South African Library for the Blind Act,	91	1998
The National Sport and Recreation Act	110	1998
The National Heritage Resources Act	25	1999
World Heritage Convention Act	49	1999
Administrative Justice Act	3	2000
Municipal Structures Act,	33	2000
Promotion of Access to Information Act	2	2000
National Council for Library and Information Services Act	6	2001
Electronic Communication and Transactions Act	25	2002
Official Notice 5 of 2003 (Northern Cape Provincial Gazette 744, Notice 5)	5	2003

3.2.10.3 Programs

Table 23: Programs and Sub Programs of the Department of Sport, Arts and Culture

PROGRAM	SUB PROGRAM
Administration	Office of the MEC
	Corporate Services
Cultural Affairs	Management
	Arts and Culture
	Museum Services
	Heritage Resource Services
	Language Services
Library and Archives Services	Management
	Library Services
	Archives
Sport and Recreation	Management
	Sport
	Recreation
	School Sport

3.2.11 Transport, Safety and Liaison

transport, safety & liaison
Department:
Transport, Safety & Liaison
NORTHERN CAPE

3.2.11.1 Overview

The vision of the Northern Cape Department of Transport, Safety and Liaison is to be a leader in the creation and coordination of safe, secure, and sustainable transport and policing systems for a crime-free Northern Cape Province. Its mission is to enable a safe and secure environment and mobility for the community of the Northern Cape through:

- good corporate governance, management, administration and support;
- establishing and supporting community safety partnership;
- monitoring and oversight of the police,
- facilitating and coordinating social crime prevention and road safety programmes educating, enforcing and administering road traffic legislation;
- liaison with all relevant stakeholders, role-players and clients pertaining to policing, safety and security;
- regulated and integrated transport modes that are economically and environmentally sustainable.

The departments strategic outcome-orientated goals are: to support and ensure the smooth functioning of the department; transparent and accountable law enforcement agencies in the Northern Cape by 2020; a safe and secure environment in the province by 2020; to enable and ensure effective, efficient and safe mobility in the province; to reduce road crashes as fatalities on the roads by 2019 through effective promotion, coordination and implementation of road traffic strategies legislation and to furtherance the overall quality of road traffic services by promoting coordinating and implementing road traffic safety and by managing the process of vehicle registration and licencing.

3.2.11.2 Key legislative mandate

Table 24: Legislative mandate of the department of Transport, safety and Liaison

LEGISLATION	ACT	YEAR
Control of Access to Public Premises and Vehicles Act,	53	1985
Occupational Health and Safety Act	85	1993
Labour Relations Act,	66	1995
National Road Traffic Act	93	1996
Basic Conditions of Employment Act,	75	1997
Administrative Adjudication of Road Traffic Offences Act,	46	1998
Employment Equity Act	55	1998
Public Finance Management Act	1	1999
Road Traffic Management Corporation Act,	20	1999
Promotion of Access to Information Act,	2	2000
Promotion of Administrative Justice Act,	3	2000
National Land Transport Act,	5	2009
Civilian Secretariat for Police Act, 2 of 2011	2	2011

3.2.11.3 Programs

Table 25: Programs and Sub Programs of the Department of Transport, Safety and Liaison

PROGRAM	SUB PROGRAM
Administration	Policy and planning
	Office of the CFO
	Corporate Services
Civilian Oversight	Policy and Research
	Monitoring and evaluation
	Safety Promotion
	Community Police Relations
Transport Operations	Public Transport Services
	Transport Systems
	Infrastructure operations
	Transport Safety and Compliance
	Operator Licence and Permits
Transport Regulations	Law Enforcement
	Road Safety Education
	Transport Administration and Licensing
	Transport Operator Licence and Permits

3.3 OFFICE OF THE PREMIER GOVERNANCE STRUCTURE

The governance structure, as depicted in ***Figure 12*** is divided into three programmes, namely 1) Administration, which largely a support structure for the premier and the director general, 2) Intuitional development, which is responsible for the inner management of the department, and 3) Policy and governance, which is responsible for the management and monitoring of the provincial

departments. The development planning unit, is responsible for the development, management and monitoring of the PGDP and PSDF.

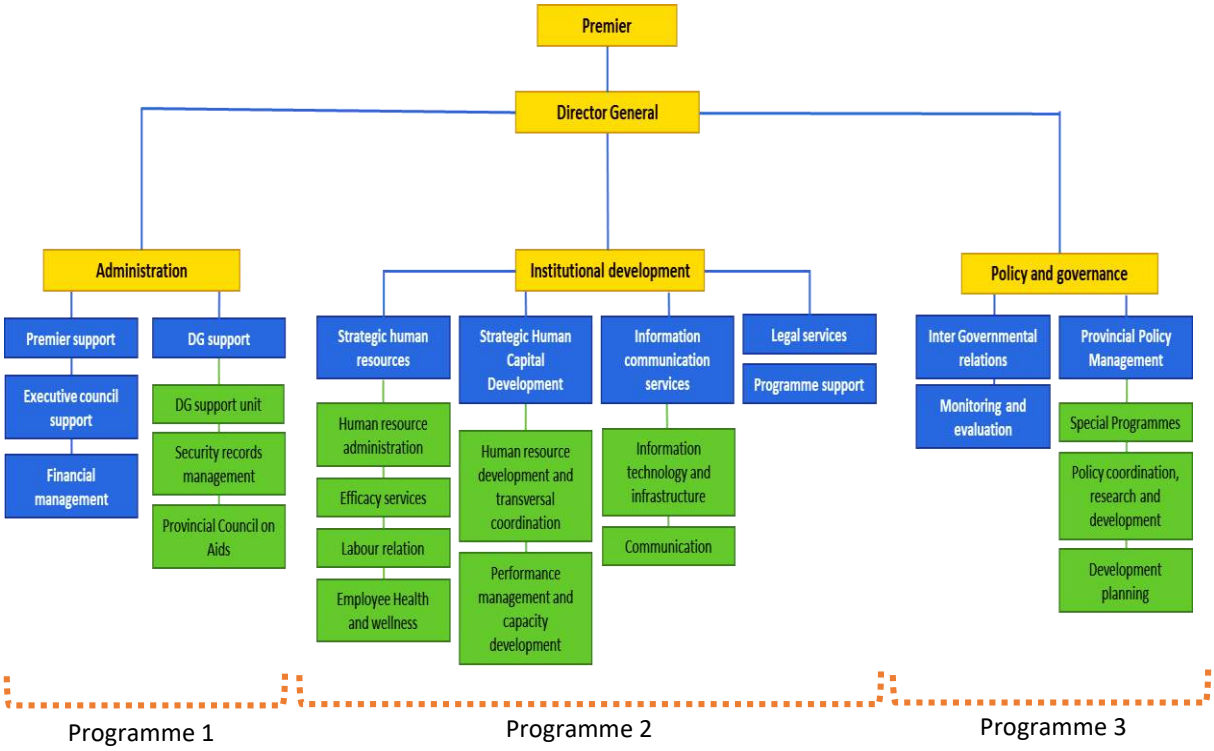
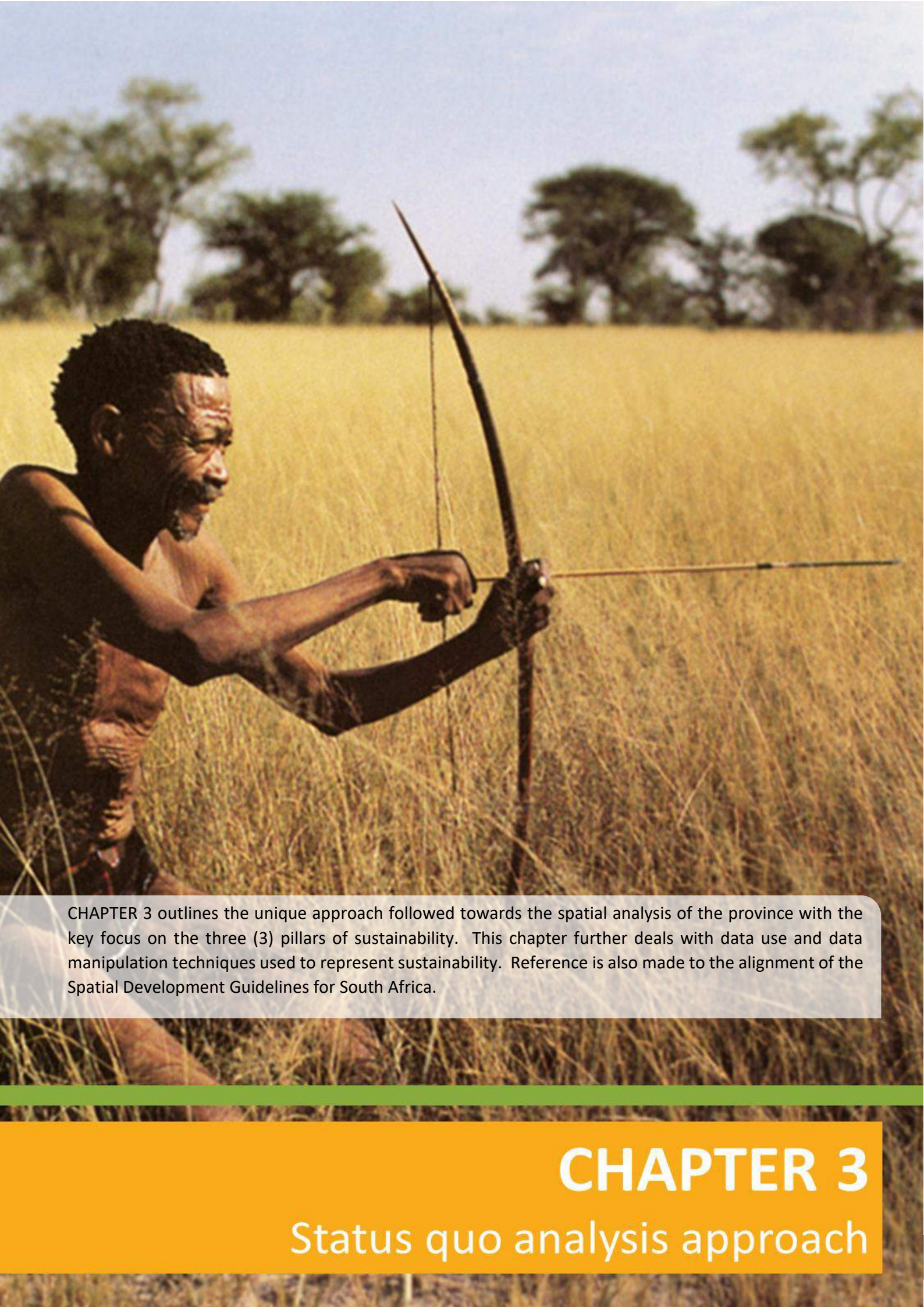


Figure 12: Office of the Premier Organogram

The Policy and Governance Programme is responsible for support and monitoring of the respective provincial sector departments, especially regarding critical issues, such as spatial and land use planning, and ensuring that the provincial sector departments interact and function in a coordinated manner.



CHAPTER 3 outlines the unique approach followed towards the spatial analysis of the province with the key focus on the three (3) pillars of sustainability. This chapter further deals with data use and data manipulation techniques used to represent sustainability. Reference is also made to the alignment of the Spatial Development Guidelines for South Africa.

CHAPTER 3

Status quo analysis approach

CHAPTER 3| STATUS QUO ANALYSIS APPROACH

1 REPORT STRUCTURE

1.1 STATUS QUO SYNOPSIS

The status quo analysis is based on the three spheres of sustainability namely, economic, social and environment. The tripartite nature of the pillars is strategically incorporated into different sections of the status quo. An attempt was made to incorporate all the respective elements of sustainability in the structure of the status quo. The primary indictors for sustainability forms the main discussion topics with the subsequent secondary and tertiary elements being used to inform the primary indicators. The primary indicators of sustainability are reflected as per *Figure 13: Elements of sustainability*.

The objective of the report structure is to allow for the integration of the three main spheres of sustainability through aggregation. Through systematically consolidating the underlying variables, the complex interrelatedness can be easily solved. Not only would the structure allow for a spatial answer towards sustainability but also identify areas where social, economic, environment and socio-economic interests overlap. Starting at the top, the first three spheres of economic, social and environment would serve as primary indicators. Next to breaking down the three primary spheres in a systematic manner to derive the nine secondary spheres. Each primary sphere is then subdivided into three secondary spheres. Choosing sub spheres needs to be done through careful research and existing theories.

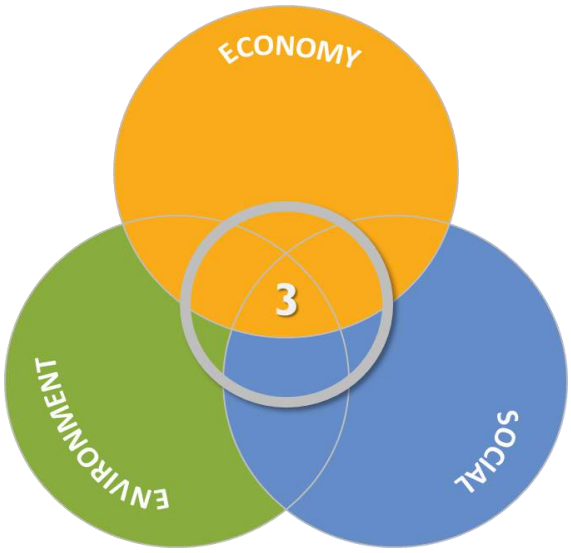


Figure 13: Elements of sustainability

For example, the three main sectors of the economy are known as the primary, secondary and tertiary economic sectors, which are well-defined in economic theory. Adhering to the tripartite nature of sustainability, not more than three sub spheres would be used to present a whole. The social sphere was subdivided according to social need, with firstly physical needs such as shelter, housing and health, then psychological such as education and lastly meta-psychological needs which refers to self enhancement. The environmental sphere was composed according to the three main spheres in geography, namely atmosphere, hydrosphere and lithosphere, which is also a standard spherical systematic unpacking of the environmental sphere and well supported. Moving on to the tertiary level, the process is repeated through a systematic break down of secondary spheres into twenty-seven tertiary spheres. For example, the primary sphere under economics referring to resource extraction has three main components agriculture, mining and energy generation. The tertiary spheres (as depicted in **Figure 14**: Primary, Secondary and Tertiary elements of sustainability that informed the structure of the Status quo report) would also be the most specific for application. The spherical paradigm of sustainability gives it a great advantage with regards to spatial manipulation, when it comes to aggregating of sub components into higher level answers. Furthermore, the tertiary spheres

serve specific answers to planning. Since South Africa makes use of three spheres of government the structure correlates intuitively to the very nature of integrated planning.



Figure 14: Primary, Secondary and Tertiary elements of sustainability that informed the structure of the Status quo report

The computational structure forms a pyramid, adhering to hierarchical modelling. Each level represents an aggregate of the underlying levels. At the top, everything converges into one single answer. Hierarchical analysis is a useful form for a continuum between what's specific and what's strategic. As illustrated the structure makes use of a 121 individual indicators as specific inputs. One can rightfully conduct from the hierarchical analysis that computational energy will decrease systematically upward with the hierarchy. As is true for all forms of aggregation, it is not possible to disaggregate, which is to derive lower level answers from higher level ones. The hierarchical model allows for myriads of indicators to be taken into account and systematically combined to get higher level abstractions from the underlying inputs.

A brief overview of each of the primary indicators (economic, social and environment) is presented through the use of info-graphics. The info-graphics provide a snapshot of the key issues and challenges experienced in the province. The secondary and tertiary indicators reflect the different levels of detail discussed in the status quo which informed the primary indicators. The results of the process followed can be measured according to each level and detail of the indicators. A spatial model has been developed to allow for the development and measurement of the indicators. The model allows for the representation of 121 indicators as reflected in *Figure 15*.

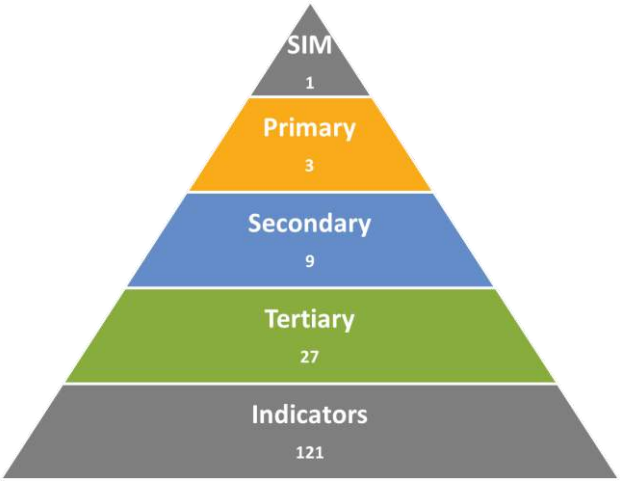


Figure 15: Pyramid structure of the status indicators

1.2 STATUS QUO LAYOUT

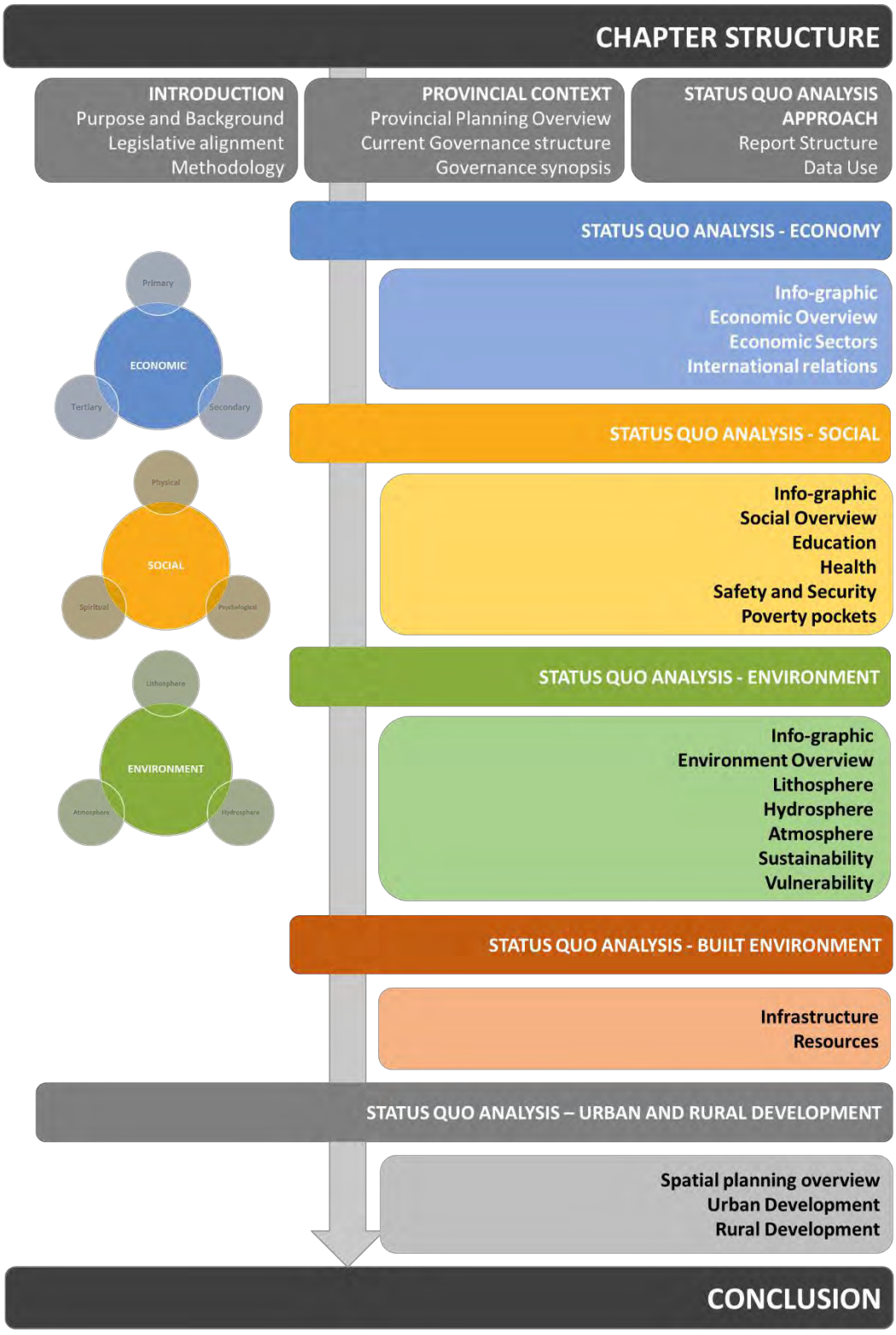


Figure 16: Status quo chapter layout

1.2.1 Alignment towards the National Guidelines for the development of Spatial Development Frameworks

Reference towards the guidelines[6] for the development of spatial development frameworks in South Africa has been made in attempt to ensure compliance towards the requirements of the PSDF and PGDP. **Table 26** below provides an overview of the elements addressed.

Table 26: Elements to be addressed in the PSDF according to the SDF guidelines

ELEMENTS	DESCRIPTION
Executive summary	
Executive summary	Mainly infographic based summary to provide an overview of the PSDF's main findings and recommendations.
Background and purpose	
PSDF scope and introduction	Provide a holistic view of the approach and methodology to be followed during the compilation of the PSDF as well as clarify the terms of reference, legislative requirements, content, aims and objectives as set out within the SDF guidelines.
Policy context and vision directives	
International policy context	The Northern Cape SDF will place emphasis on the following international policies and guidelines: • African Agenda • Sustainable Development Goals (SDG's)
National Policy context	The Northern Cape SDF describes and reference all applicable national policy documents such as the NDP and the NSDF that is also currently being developed in order to ensure alignment. All applicable policies, such as the MTREF and MTSF will be taken into account during the preparation of the PSDF.
Provincial Policy context	The PSDF will clarify the provincial development agenda by providing a spatial expression of the provincial growth and development strategy as articulated by the provincial growth and development plan (PGDP), while considering all other applicable provincial policies.
Guiding principles	Spatially express the guiding principles as stipulated within SPLUMA, while considering all other national and provincial interests and the influence thereof.
Vision directives	Draw from the vision of the PGDP, SPLUMA principles and other key policy directives to articulate the desired spatial vision of the Northern Cape Province.
Spatial challenges and opportunities	
Sector plans	The sector plans and diagnostic reports from the various departments were used to determine the current realities, challenges and opportunities faced by each, within the Northern Cape province, in order to incorporate the crucial information into the analysis and findings of the PSDF.
Biophysical analysis	The PSDF will make use of different overall themes where the biophysical elements are discussed within the environmental overview which addresses the following: • Earth system; • Biosphere; • Geosphere The environmental overview will be accompanied by spatial representations of the current realities, challenges and opportunities faced within the Northern Cape.
Socio-economic analysis	The PSDF will make use of different overall themes where the socio-economic elements are discussed within the social overview which addresses various elements such as basic services levels, poverty levels and education among others.

[6] *Reference towards the PSDF elements has been made, refer to page 47 of the SDF Guidelines: guidelines for the Development of Provincial, Regional and Municipal Spatial Development Frameworks and Precinct Plans, 2017*

ELEMENTS	DESCRIPTION
	The social overview will discuss the following broad subjects in detail: • Physical analysis • Psychological analysis • Spiritual analysis • Urban and rural analysis The social overview will be accompanied by a spatial representation of the current realities, challenges and opportunities faced within the Northern Cape.
Built-environment analysis	The Built-environment will be discussed within a seperate section and will give expression to the distribution and requirements of infrastructure. It will also refer to the distribution and management of resources required to sustain the built-environment.
Key development issues and spatial implications	Development of synthesis regarding all the issues, challenges and potential from the various overviews for the PSDF in order to illustrate the spatial implications within the Northern Cape.
Spatial Proposals	
Final spatial proposal	Discuss the preferred spatial vision the PSDF aspires to, within the conceptual framework using the sustainable investment model which indicates where investment is most likely to provide the highest returns within the Northern Cape Province.
Spatial Strategies	The PSDF articulates the various strategies to be followed in order to obtain the preferred spatial vision as discussed, by ensuring the protection of scares and threatened resources or spatial assets, providing clear outlines on how to ensure change and initiate new developments.
Composite PSDF Proposals	Consolidation of the PSDF proposals by reflecting the desired land use patterns for the entire province spatially as well as the proposed intervention areas.
Implementation framework	
Spatial Policies	Explanation of spatial policies that are to be applied by the various spheres of government regarding the planning and management of the Province's urban and rural land holdings.
Spatial guidelines	The Northern Cape SDF will provide guidance to municipal planning that is consistent and aligned to national and provincial agendas. The PSDF will further ensure to identify regional development priorities as well as land assembly within the urban and rural contexts.
Spatial framework and capital investment framework	The PSDF will identify targets for public investment within both urban and rural programmes, as well as spatial priorities regarding socio-economic backlogs including the unlocking of economic development opportunities.
Spatial Governance framework	The PSDF will establish the basis for cooperative spatial governance for the Northern Cape Province that will give effect to the objective's and priorities encapsulated within the PSDF proposals and recommendations.

2 DATA USE

Different data sets obtained via national, provincial and other resources were captured and manipulated for the Status Quo process. The process was followed to simplify the results towards the users of the PGDP and PSDF.

2.1 GIS[7] AND STRATEGIC PLANNING

Geographic Information Systems (GIS) specialised in handling spatial data, which can be validated, updated and retrieved, will be utilised to develop and illustrate the spatial objectives of the PSDF. The main advantage of using GIS in strategic planning is its unique capability of aggregating immense amounts of data in a graphical format. Calculation of spatially dependent features can be done with ease including the validation of planning impacts (Herrmann & Osinski[8], 1999: 100-101). GIS is the obvious platform of choice when it comes to planning and analysis for large datasets. Additionally, it also serves as the integrating factor for hardware, software, data, people and procedures into one very robust system. GIS has proven to be invaluable when solving real world problems, due to its inputs being geographically referenced. Although a functional GIS is simplistic in nature with inputs, storage, manipulation and output as core components, its application is powerful and diverse. One major benefit for GIS is its intimate relation to technological progress, causing it to advance accordingly. In short, a GIS would include spatial data known as features representing real world entities with attribute data linked to it, which can be analysed using various functions in the GIS such as displaying data, classifying it, running queries and statistics etc. (Saleh & Sadoun[9], 2006:210-212). Access to GIS encourages planners to formulate proposals based on evidence-based analysis and sound scientific principles. Information can be analytically combined to derive workable solutions. Assembling large quantities of data into highly aggregated solutions can only be done through computers aided analysis. The emergence of digital cartography has popularized the map making art to a much wider audience. Modern-day businesses, cooperatives and governmental institutions are all benefiting from this new wave techno discovery. Compared to the past, accessibility to maps were limited, with most regarded as secret documents, mostly produced with a particular interest in mind, and almost always militarily orientated. (Holden & Turner[10], 1997:320).

2.2 GIS DATA MANUPLIATION

2.2.1 Cost Surface Analysis

A cost surface, or cost grid, is a raster grid in which the value in each cell is the cost that a particular activity or object would be in that cell. It can also be an indexed value based on costliness. Costs could be measured monetarily or in other ways such as amount of time. A cost surface includes the cost of reaching certain cells from one or more source cells (Bolstad, P. (2008). Cost surfaces can be useful to do things such as travel cost analysis, cost path analysis, and cost distance analysis. In these analyses, cost surfaces are created for each of the factors in the overall cost of what needs to be accomplished. Varying factors could influence the cost, depending on the analysis. These cost surfaces could include slope, land ownership, environmental effects, and land value. Each of these cost surfaces would then be added together to form a total cost. If the cost surface is to be accurate as well as the final model derived from it, the cost surface should use a ratio scale in which the values are meaningful and have an absolute zero. In the case of a slope raster for example, a cell with a value of zero means that there is no slope, so this scale has a meaningful zero. Therefore, a cell with a value of 20 would

[7] *GIS - Geographical Information System or 'a system that captures, stores, analyses, manages and presents data with reference to geographic location data – it is a system of hardware and software used for storage, retrieval, mapping, and analysis of geographic data''. It is the merging of cartography, statistical analysis and database technology*

[8] *Planning sustainable land use in rural areas at different spatial levels using GIS and modelling tools - 1999*

[9] *Design and implementation of a GIS system for planning - 2006*

[10] *Western Europe, current city expansion and the use of GIS - 1997*

twice as steep as a slope with a value of 10. Land Cover for example can be costed as follow, degraded land could have a lower cost such as 5 out of 100 while irrigated areas can increase to 90 out of 100. If the values in other raster or vector layers that will compose the cost surface are nominal, they must also be converted to a ratio scale. It is important that those future values are realistic and reflect meaningful costs.

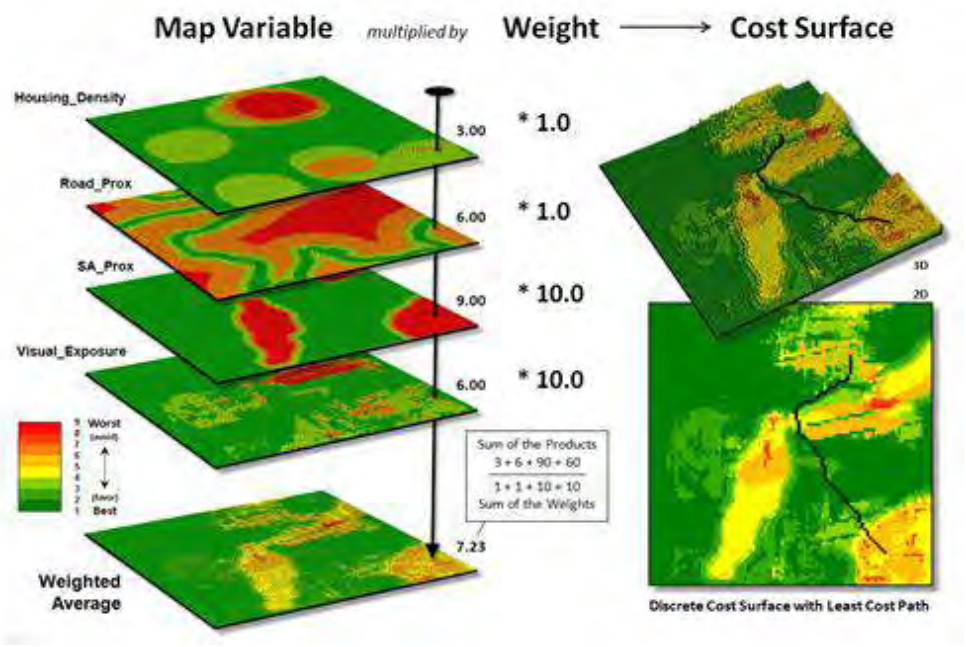


Figure 17: Brief overview of the GIS cost surface analysis process used to manipulate the spatial data obtained of the northern Cape province

All data layers are to be costed based on the importance of the different layers, shape files and other information. Less important layers would be costed lower while layers of more importance will contribute towards increased values. A single denominator will be developed by completing the process for all the data obtained in the assessment. The single denominator can then be integrated, manipulated through computed processes to provide the different results for the respective indices. The results are to be calculated on a 150m x 150m spatial grid where results can be extracted to meet the desired spatial enquiry. The spatial enquiry could be a farm portion, urban edge, municipal boundary, corridor, provincial boundary or any pre-defined physical boundary. Data gaps where cleaned through data Interpolation methods in ArcGIS. A standard deviation process would enable the mean range of the different layers that would present the specific index results for the area requested. The mean layers are further reclassified using a standard deviation classification process to enable the final reclassification of existing data layers into cost surface layers.

2.2.2 Data weighting

As per the cost surface results are further informed by different data weightings, some layers to carry more weight compared to others. For example, water related data layers are more important than land capability of the province and would therefore reflect a higher the degree of importance by

increasing the layer weighting. PriEst[11] software was utilised to determine the weighting of each layer used for the spatial results of the figures presented in the report.

2.2.3 Data visualisation

GIS based visualisations, can often be deceptive as the colour ranges manipulated at will. However, the power of visualisation is immensely important in finding answers derived from GIS, the only concern would be to oversimplify the illustrations and render the output unusable. However, the power of visualization is endless and need to be decided by the end user. Furthermore, because the spatial output in a regular matrix of values (raster) with a coherent range of 0-255, 3D surface construction is possible since it can be used as a simple Digital Cost Model (DCM) as illustrated in *Figure 18*, which gives the end user a whole new dimension in visualizing sustainability.

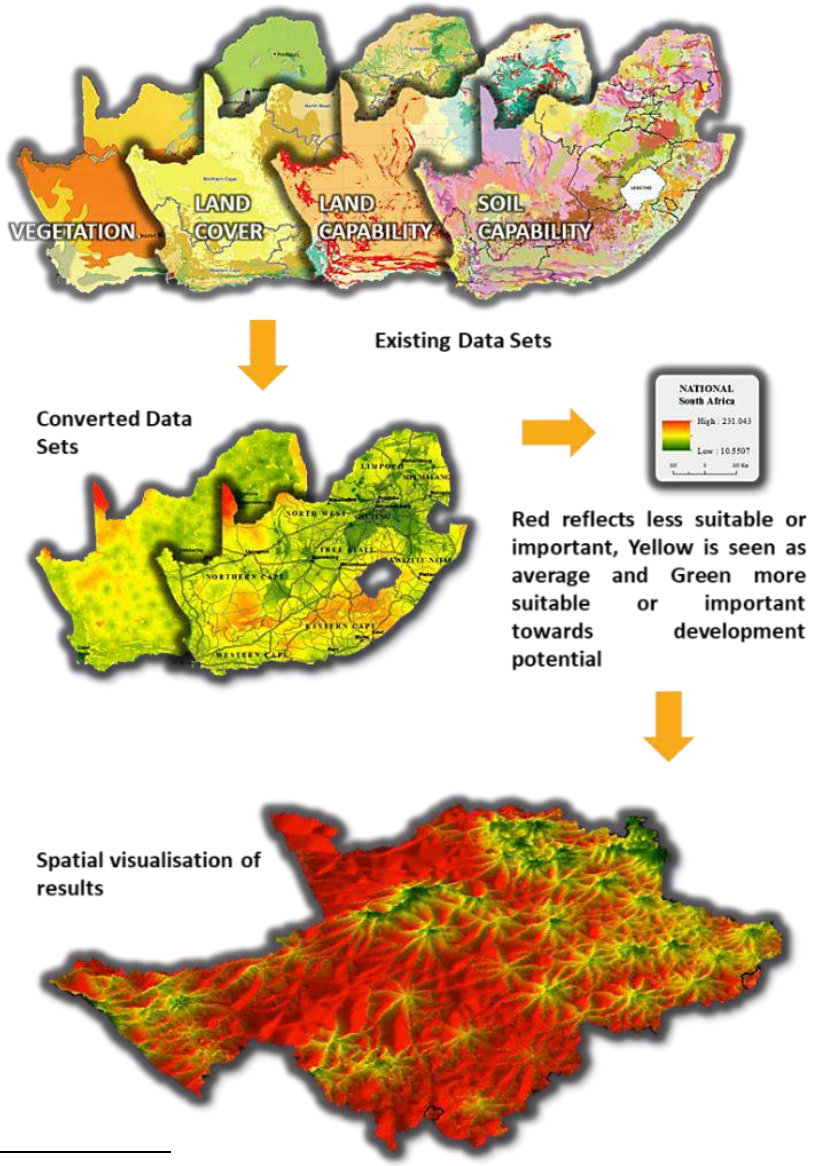


Figure 18: Brief illustration of how the shape file data was converted from normal shape files into cost surface areas

[11] *PriEsT is an acronym for 'Priority Estimation Tool' which is an open-source decision-making software that implements the Analytic Hierarchy Process (AHP) method - a comprehensive framework for decision problems. PriEsT can assist decision makers in prioritizing the options available in a given scenario. The two types of problems addressed by PriEsT are ranking problems and budgeting problems. In the ranking problems, the decision maker is interested in the order of preference for the available options. However, in budgeting, the preference weights are also required.*





CHAPTER 4 – ECONOMY outlines the key economic activities, opportunities and challenges faced in the Northern Cape Province. A strong spatial representation was followed

CHAPTER 4

Status Quo Analysis - Economy

CHAPTER 4| ECONOMIC ANALYSIS

1 ECONOMIC INFOGRAPHIC

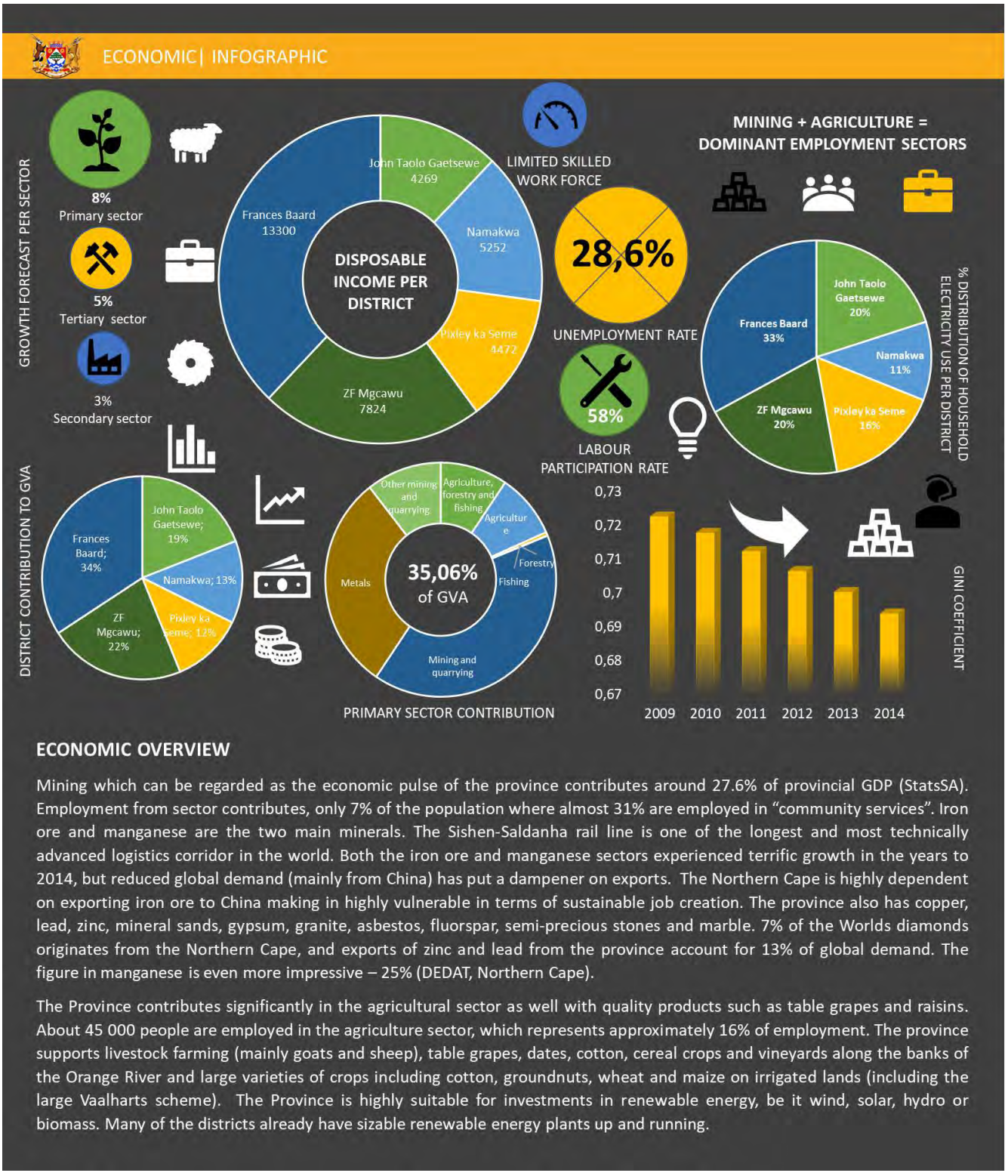
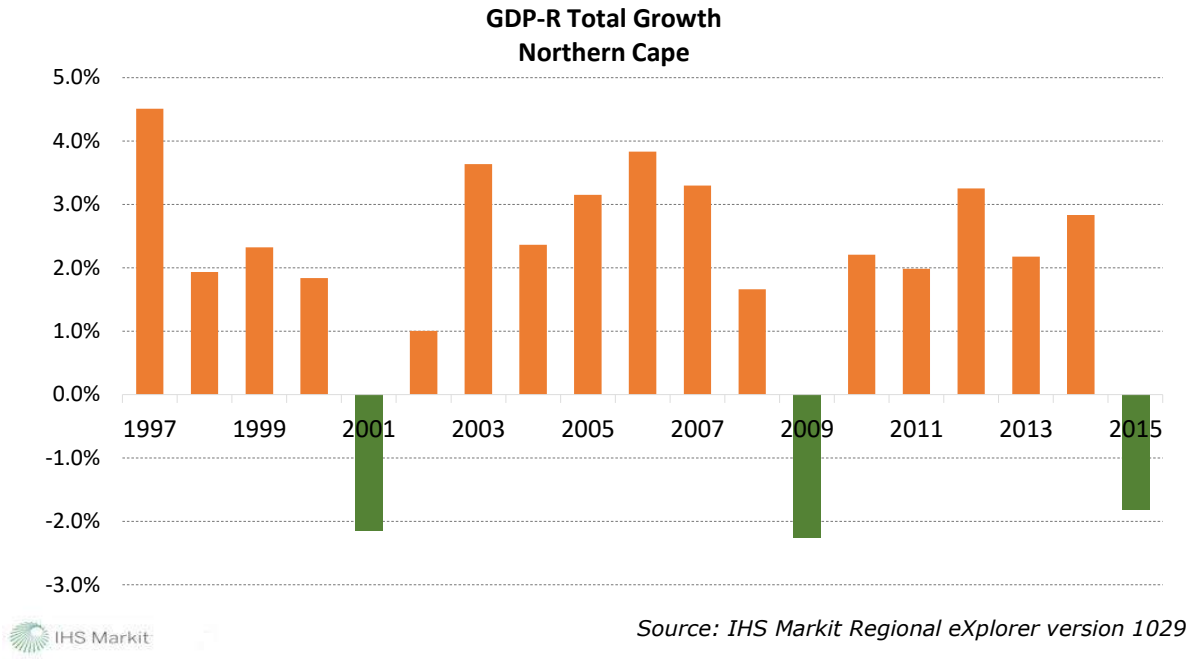


Figure 19: Infographic - Economic overview of the Northern Cape Province

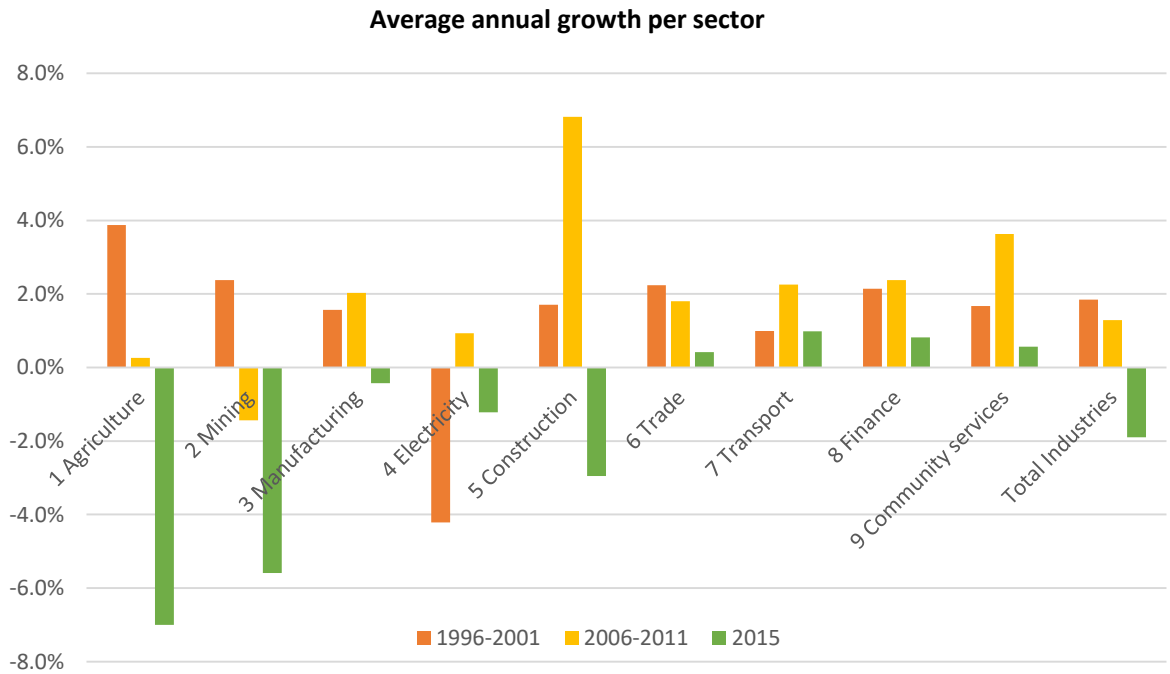
2 ECONOMIC OVERVIEW

2.1 ECONOMIC GROWTH



Source: IHS Markit Regional eXplorer version 1029

Graph 1: Gross domestic product per region – Northern Cape Province



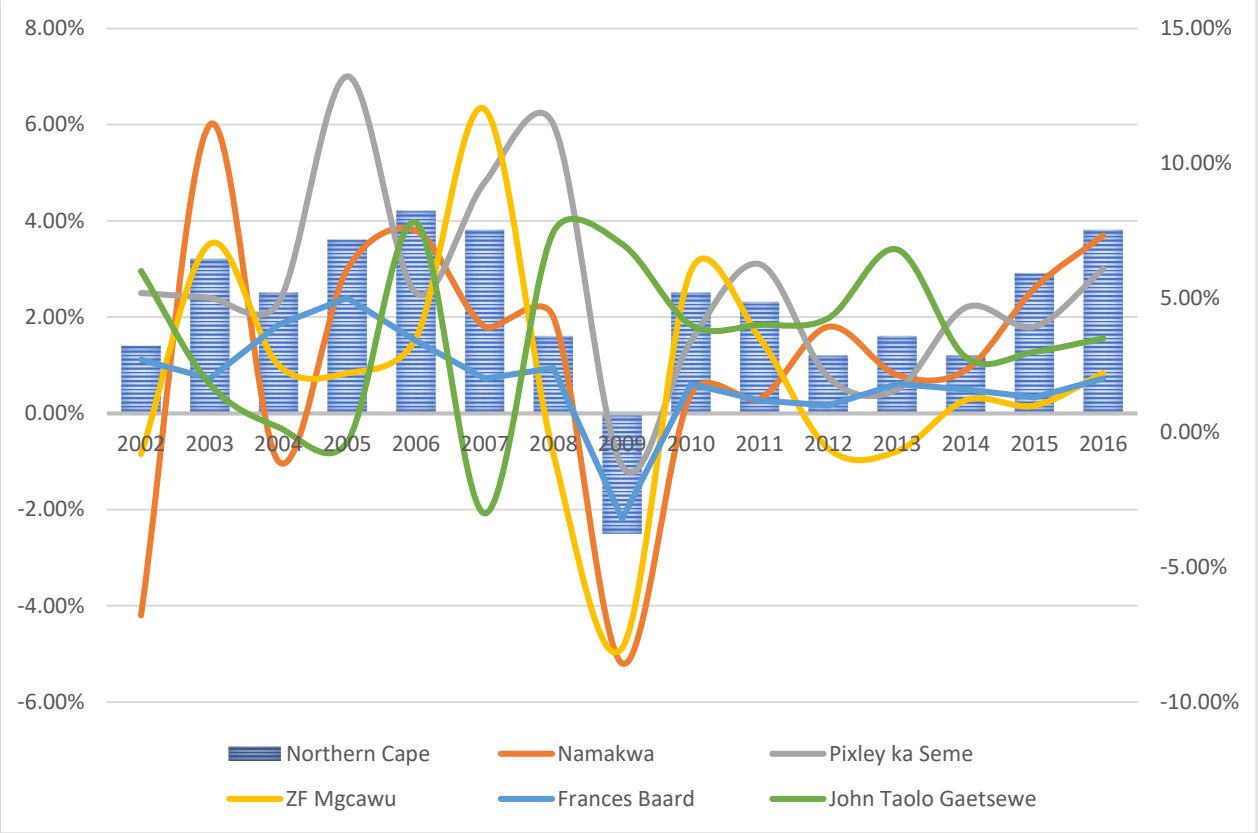
Graph 2: Annual growth rate per economic sector – Northern Cape Province

Table 27: Growth prospects per economic sector

GROWTH PROSPECTS BY ECONOMIC SECTOR FOR THE NORTHERN CAPE (GVA)												
A growth forecast for each of the main economic sectors are made for the Northern Cape Province. This is done by using the intercept and slope formula. Past trends (of five years) 2012 to 2016 are used to determine the growth prospects for 2017 to 2021.												
	Northern Cape	Past trends					Forecast					% change (forecast)
Year		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
Primary sector	Northern Cape	19670,77	20624,28	21880,47	21859,36	21155,36	22299	22720	23140	23561	23981	8%
Agriculture, forestry and fishing		3941,214	4163,358	4332,848	4364,17	4008,723	4263	4296	4330	4364	4397	3%
Mining and quarrying		15729,55	16460,92	17547,62	17495,19	17146,63	18037	18423	18810	19197	19584	9%
Secondary sector	Northern Cape	5206,173	5288,027	5331,655	5367,718	5393,326	5454	5499	5544	5590	5635	3%
Manufacturing		1931,5	1975,079	1981,896	1984,536	1994,323	2014	2028	2041	2055	2068	3%
Electricity, gas and water		1833,147	1829,005	1818,046	1814,624	1824,06	1814	1811	1807	1804	1801	-1%
Construction		1441,526	1483,943	1531,713	1568,558	1574,943	1626	1661	1696	1731	1766	9%
Tertiary sector	Northern Cape	31577,56	31903,76	32383,91	32893,81	33210,98	33671	34097	34522	34948	35374	5%
Wholesale and retail trade, catering and accommodation		7031,614	7056,117	7091,384	7115,171	7197,494	7216	7255	7294	7333	7372	2%
Transport, storage and communication		5559,576	5647,762	5763,953	5816,704	5823,186	5931	6001	6070	6140	6210	5%
Finance, insurance, real estate and business services		7487,332	7580,073	7632,606	7906,854	7981,158	8112	8243	8375	8506	8638	6%
General government		8790,824	8859,056	9102,884	9217,942	9365,149	9519	9670	9821	9972	10122	6%
Community, social and personal services		2708,216	2760,75	2793,082	2837,135	2843,988	2893	2928	2963	2997	3032	5%

Key economic observations:

- The Northern Cape has experienced negative GDP growth in 2001, 2009, 2015. The negative growth episodes are connected to the 2001 economic down turn, 2008 economic crises and the 2015 drought.
- Sector growth has varied greatly from 1996-2011.
- Major growth rates were experienced from 2006-2011 in the construction, transport and community service sectors.
- In 2015 the following major sectors experienced negative growth: Agriculture, Mining, Construction, Electricity and manufacturing.
- Overall, Northern Cape's economic sectors experienced negative growth in 2015.
- The highest growth potential is concentrated within the primary and tertiary economic sectors, as the forecasted potential growth is 8% and 5% for the respective sectors.
- The forecast predicts a negative growth of -1% for the electricity, gas and water sector. The negative growth is most likely due to the high level of water scarcity within the province, and not necessarily indicating a decline in the energy generation sector.
- The forecast predicts that the mining and construction sectors will expand, as a growth rate of 9% is predicted for both the sectors.



Graph 3: Northern Cape GDP contributions per District Municipality, 2002 – 2016

Key observations:

- The Northern Cape contributed an approximate share of 2% of the National GDP which stabilised in recent years.
- In 2014 – the economy (dominated by the agriculture, mining, manufacturing and construction sectors made up 34% of the Northern Cape's GDP output.
- The primary sector was represented by mining, with a 22% contribution, with agriculture at 7%, manufacturing at 3%, and construction at 2% providing support to the Provincial real-economy.
- The Northern Cape contributed 6% of national mining, 0,5% of national manufacturing and 7% of national agriculture, but just 1% of construction. Mining production in the Northern Cape climbed almost 5% a year from 2004 to 2011, but then fell 1% a year through 2014.
- In terms of purchasing power, as measured by the deflated rand value of production, mining growth far outstripped the rest of the Northern Cape's economy during the commodity boom. The importance of mining for the Northern Cape emerged from its dominant share in the provincial economy. During the commodity boom, its contribution climbed from 21,5% in 2004 to 25% in 2010. It then fell back to 22% in 2014 as iron ore prices collapsed.

2.2 ECONOMIC BASE

The economic base of the Northern Cape Province is the tertiary sector contributing about 56% of the total provincial real GVA. The tertiary sector includes the following industries[12] :

- Wholesale and retail trade, catering and accommodation;
- Transport, storage and communication;
- Finance, insurance, real estate and business services;
- General government; and
- Community, social and personal services.

General government and the finance and insurance sector contributes 28% and 24% respectively to the total real GVA of the provincial tertiary sector. The percentage GVA contribution were used to determine the economic base of each of the districts. The sector with the highest GVA contribution in Frances Baard district is the tertiary sector. The two main tertiary sectors are the finance, insurance, real estate and business services (28,4%) and general government (27,4%). The tertiary sector for ZF Mgcawu makes the largest GVA contribution (55.3%) to the total of the economic sector for the district. The major tertiary sectors are the general government contributing approximately 26.4% of the to the total tertiary sector and finance, insurance, real estate and business services making the second largest contribution of almost 24.5% to the tertiary sector of ZF Mgcawu district.

The economic base of Pixley ka Seme district is the tertiary sector, contributing approximately 70.5% to the total GVA of the district. The major industries in the tertiary sectors, is the general government (33.8%) and wholesale, retail trade, catering and accommodation (22.6%).

The economic base of the Namakwa district, is the primary sector, contributing 50% of the total district GVA. The major industry in the primary sector is mining and quarrying, contributing about 85% of the total primary sector GVA. The tertiary sector also makes a large contribution to economic sector. The tertiary sector contributes a total of 43% of the total GVA with the general government industry being the main industry in this sector. The primary sector contributes a total of 64% of the total GVA of John Taolo Gaetsewe district. Mining and quarrying is the main industry in the district, contributing a total of 97% of the total to the primary sector.

2.3 ECONOMIC DIVERSIFICATION

The Northern Cape Province has a relatively diverse economy with industries in both primary and tertiary sector making considerable contribution to the provincial economic sector. Data was obtained from Quantec and used to calculate the percentage contribution of each of the industries. This is used to illustrate the economic diversity. These calculations show that mining and quarrying, general government, finance, insurance and business services and wholesale and retail trade are some of the key economic industries in the Northern Cape. However, there is room for growing and establishing certain industries such as tourism to ensure a strong, diversified and sustainable economy.

[12] *Quantec - 2017*

2.3.1 Green Economy

Due to its vast open spaces, temperature and other environmental factors, the Northern Cape is considered as a mecca for the development of renewable energy resources in South Africa[13]. According to Creamer Media's Engineering, the Northern Cape boasts with 17 commercially operating solar PV plants. Some of the provinces main renewable energy projects are:

- Kalkbult Power Plant Scatec Solar in De Aar;
- The solar park in Kathu;
- Redstone Solar Thermal Power in Postmasburg;
- Droogfontein Solar Photovoltaic Plant nearby Kimberley;
- Xina Solar One near Pofadder and Kakamas; and
- Khi Solar One outside of Keimoes; and
- Kakamas Hydro-Electric Power.



Despite the fact that the agricultural and mining sectors dominate the financial landscape of the province, the province is increasingly becoming the country's hub for renewable energy. The sector already makes up R5.5-billion of its estimated R14-billion exposure in the province, second only to mining of R7-billion. The Province offers abundant potential for renewable energy production[14].

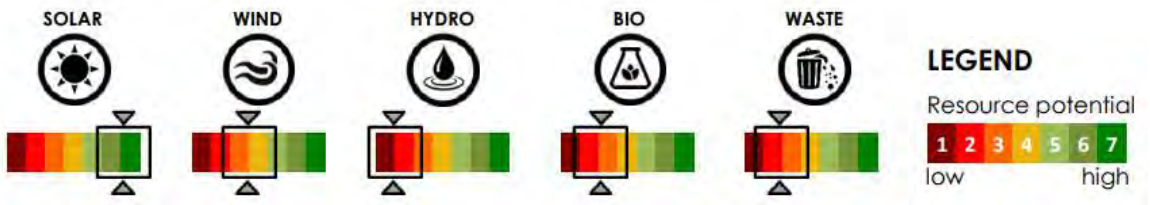


Figure 20: Renewable energy resource potential for the Northern Cape Province

2.3.2 Space Economy

Urban Space Economy considers the spatial relationships between organisations, the community and individuals. Space economy attempts to explain the reason for the formation, the function and development of cities, towns and hinterland and understanding the nature of space economy can help spatial development planning within a given region[15] The development of towns in the Northern Cape is based on the economic activity such as agriculture, mining and quarrying. Development patterns and growth trends are also based on the nature and diversity of economic activities. Many towns and/ or cities in the Northern Cape were established due to mining activities. However, as the economy

[13] *Creamer Media's Engineering News, April 2016. Available at: http://www.engineeringnews.co.za/article/northern-cape-renewable-energy-mecca-joemat-pettersson-2016*

[14] *Wind and solar high yield resource map = CSIR (http://www.csir.co.za/nationalwindsolarsea)*

[15] *SA Cities Network, April 2013. Available at: http://sacitiesnetwork.co.za/wp-content/uploads/2014/07/the_space_economy-_an_important_consideration_in_spatial_development_planning.pdf*

diversified as a result of mainly urbanisation and in some cases where the mining industry started to decline, space economy is altered and changed over time.



Another major factor, influencing space economy is the apartheid regime which resulted in a spatially, socially and economically fragmented landscape. As part of spatial development planning, it is important to identify fragmented areas and rural communities that are isolated from other socio-economic opportunities, identify initiatives and strategies that facilitate future development to integrate and provide opportunities for these rural communities and other isolated areas. Cross-boundary communication and planning is also necessary to help build stronger socio-economic linkages. Developing key nodal points within districts of the Northern Cape, may facilitate transportation and access to key amenities and socio-economic services[16]

2.3.3 Knowledge economy

The prospects for the knowledge-based economy in the Northern Cape are under-pinned by the successful award of the SKA and the immense Solar Energy potential in the Northern Cape. These advanced technological initiatives have spurred the establishment of the Province's first university, Sol Plaatje University and stimulated the necessity for a broadband telecommunications infrastructure across the province.

The Northern Cape plans to be the global benchmark for astrophysics – the Square Kilometre Array serves as the anchor for an elaborate broad band and ICT roll-out for the province to benefit from the digital era. The milieu of advance technologies provides a platform for the province to position itself as a leader and specialist, at a national and international level and specialist in astrophysics as well as the production of renewable energies.



Furthermore, the province has a rich history of indigenous knowledge, especially regarding survival techniques and approaches during droughts, that will become a crucial skill as climate change implications are very prominent, and will increase with the years to come, within the African continent.

[16] *Shaping our future. Available at: http://www.shapingourfuture.ca/downloads/Mixed_Use_Centres_Brochure.pdf*

2.3.4 Oceans economy



The Northern Cape has a coastline of 313km, but the economic value of this asset has not been utilised to its full potential, despite the growth in the abalone, fishing and crayfish industry in recent years. Operation Phakisa, a broad national strategy that targets sectors that can best achieve quick returns in terms of growth and job creation, identified the Small Harbours and State Coastal Property Development Unit (SH&SCPD) in the Northern Cape under Oceans Economy. The key objectives of the Small Harbours & State Coastal Property Development Unit are to:

- Attract investment in state coastal maritime;
- Create more work opportunities;
- Develop infrastructure and properties
- Grow local businesses;
- Redistribution of wealth; and
- To stimulate economic growth.

The Province has been allocated a quota for landing fish (primarily Hake), which makes Port Nolloth an attractive region for investors in fish processing. Plans ae also under way to develop Port Nolloth into a deep-water port, capable of receiving large vessels. Other development opportunities within the (SH&SCPD) in Port Nolloth include a waterfront for retail and tourist activities, expanding fishing and aquaculture, and developing of a boat building and maintenance industry. Priority projects in the Province Include:

- **Port Nolloth:** A new harbour development, which will include boat-building and maintenance, fishing and aquaculture and the development of a waterfront to increase economic activities in the area.
- **Hondeklip Bay:** Development of a coastal property, with economic activities such as alluvial mining, aquaculture and fishing.
- **Kleinsee:** Creation of an economic zone with economic activities such as aquaculture and development of coastal properties.

Economic sectors that have been identified within the Province and coastal towns for economic development through investment include the following:

- Education and Training;
- Renewable Energy;
- Fish Processing and Packaging;
- Maintenance and Repair of Vessels and Harbour infrastructure;
- Mining;
- Tourism; and
- Water and Waste Management.

2.3.5 Landscape economy

Tourism is one of the world's largest industries and one of the fastest growing economic sectors. For many countries tourism is seen as a main instrument for regional development, as it aids in diversifying economies as well as promotes the development of new economic activities. A functional and vibrant tourism sector has the ability to facilitate socio-economic growth through economic diversification, small enterprise development, job creation, investment attraction, poverty alleviation and social development.

Likewise, economic development does have positive implications for the tourism industry in the form of infrastructure upgrades/development, increased business tourism, meetings/conferences, small business development as well as a whole host of benefits.

However, economic development can also be intrusive to the environment and they often compete for precedence over the other, which can have significant implications for the tourism industry. This is especially true with regard to tourism based on the natural environment as well as on historical-cultural heritage (as in the case of the Northern Cape).

Laws, by-laws and legislation often creates instances of confusion or overregulation can occur and detracts from a positive organic integration and development that the tourism industry requires in order to flourish.

It is of the utmost importance that the relevant role-players (in particular those operating within the economic, environmental, legislative and tourism environments) have the necessary cognisance of the interrelationships influencing the tourism environment as well as a clear strategic direction required to create a sustainable and conducive environment in which the various resources at their disposal can be used optimally.

The objective is to grow the number and spend of tourist:

Table 28: Arrivals and expenditure – Tourism Sector

TARGET	DESCRIPTION
Increase Arrivals	Increase foreign arrivals by 8% annually from 175 40 in 2013 to 300 700 by 2020
	Increase domestic arrivals by 2% from 486 000 in 2013 to 558 200 by 2020
Increase Spend	Increase foreign spend by 8% from 845 863 000 in 2013 to 1 449 660 by 2020
	Increase domestic spend by 5% from 572 396 000 in 2013 to 805 418 700 by 2020

2.3.5.1 Core tourism experiences per District[17]:

Table 29: Core tourism experiences per District Municipality – Northern Cape Province

FRANCES BAARD DM (DIAMOND FIELDS REGION)	PIXLEY KA SEME DM (KAROO REGION)
● The Administrative Hub of the Province, Mining, History, Entertainment, Business Tourism, Strategic Location ● Big Hole & Diamond route ● Mattanu Game Reserve ● Barkley West – Good Hope Nature reserve ● Cultural activities – Galeshewe township is attracting the interest of visitors ● !Khwa ttu and San Cultural Village in Kimberley	● Desert Tourism, Dams, Vistas, Koppies, Palaeontology ● Namakwa DM (Namakwa Region) ● Flowers, Astronomy, Coastline, Mountainous Semi-Dessert, 4x4 Adventure, World Heritage Site ● Colesburg Toverberg (Magic Mountain) ● Heritage buildings ● Historic battlefields ● Anglo boer war sites and graves ● Museums ● Concentration camp and Fort ● Vanderkloof and Gariep Dam ● Adventure tourism ● Township tourism and historical tourism ● Carnarvon Astronomy & Stargazing
ZF MGCAWU DM (GREEN KALAHARI REGION)	**NAMAKWA DM (GREEN KALAHARI REGION)**
● Augrabies Falls, Farm Tourism, Orange River, Wildlife, Lifestyle and Adventure, Mining Business Tourism ● Augrabies ● 2 National parks ● Witsand nature reserve ● Trans Boegoe Eco Resort ● Boegoeberg dam ● Wonderwerk caves ● Kalahari-Oranje Museum ● Spitskop nature reserve ● Quiver tree / Kokerboom route ● Wine routes ● Red dune route ● Hot air ballooning ● Duin-in-die-Weg Guest Farm ● Sakkie se Arkie ● Riemvasmaak Ecotourism ● Khamkirri Adventure Destination ● Upington 26 ● Toro Lodge	● 4x4 ● Flowers ● Richtersveld ● Coastline ● Culture – Nama Culture
JOHN TAOLO GAETSEWE DM (KALAHARI REGION)	**PROVINCIAL TOURISM ICONS**
● Natural Springs, Caves, Hunting and Mining ● 3 Heritage Sites – Wonderwerk caves, Moffat Mission, Kuruman Eye ● Truth tree – heritage site. ● Hunting	● Augrabies Falls National Park ● The Big Hole ● SKA Telescope ● Namaqua Flowers ● National Parks

[17] *Northern Cape Tourism Master Plan: Revised 2015*



Source: IHS Markit Regional eXplorer version 1029

Graph 4: Growth in the tourism industry from 2002 – 2015 – Northern Cape Province

Key tourism aspects:

- International tourism activity is closely linked to the welfare of the international economic climate, as depicted above.
- The local tourism sector created a buffer for the decrease in the number of international tourism activity during the 2008 economic crises.
- Decreased tourism activity in the province may be a result of the overall decrease in economic welfare in South Africa, as well as globally, which in return limits the potential of households in participating in tourism and other activities that are labelled as luxurious.

2.3.5.2 Core issues

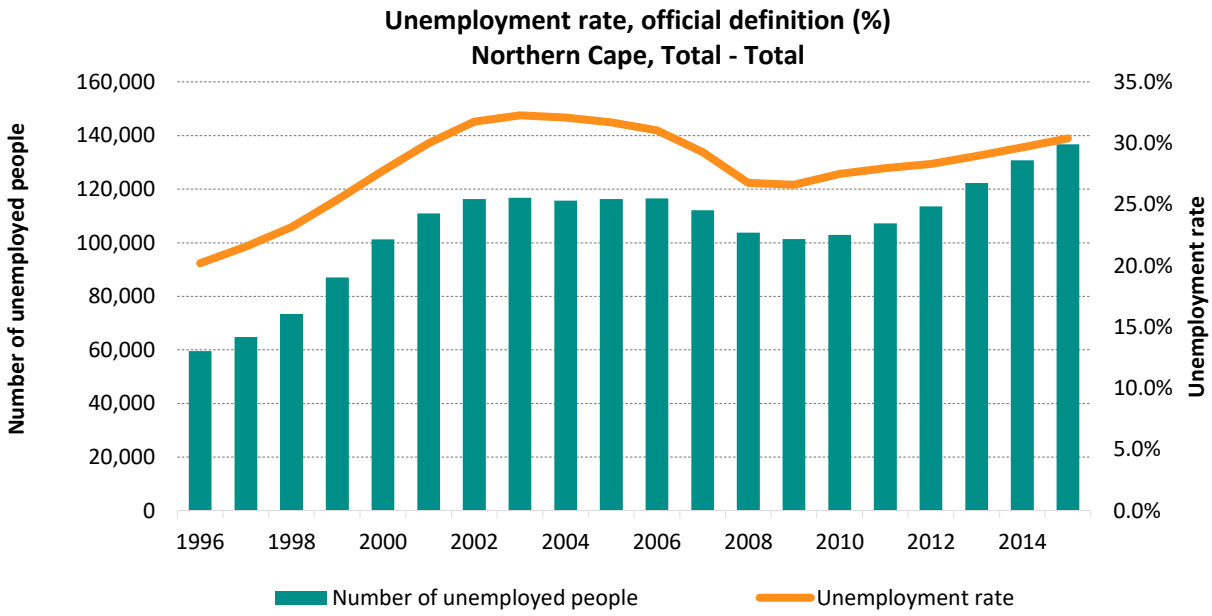
Due to the Northern Cape's expansive land area and the large number of rural areas, inadequate supporting infrastructure and service delivery is often a challenge that plagues small business and impacts on the tourism industry in rural areas.

Electricity and water interruptions, poor road quality, the lack of rail or alternative means of transportation, refuse removal services and the overall cleanliness of towns can be detrimental to the experience of tourists visiting the province. Furthermore, the lack of adequate supporting infrastructure often deters tourists from visiting a specific area or attraction.

As a result, it is imperative that tourist attractions and/or tourism nodes or areas of importance have, at the very least, the basic supporting infrastructure in place to make areas or attractions "tourist friendly".

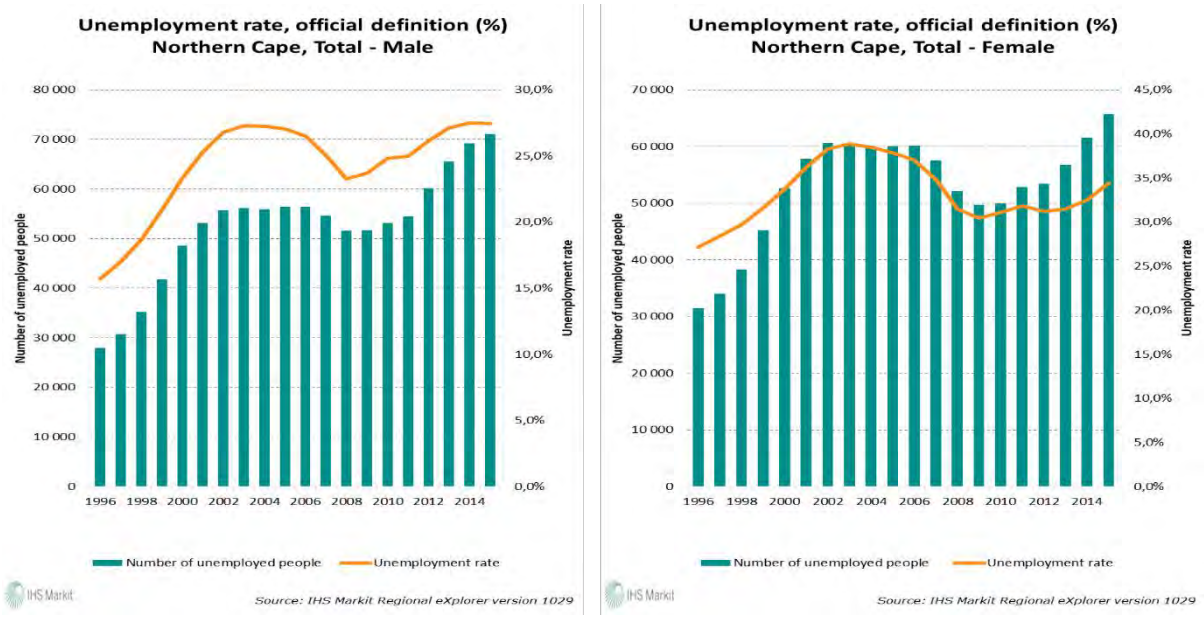
2.4 EMPLOYMENT AND UNEMPLOYMENT

2.4.1 Unemployment Rate



Source: IHS Markit Regional eXplorer version 1029

Graph 5: Unemployment rate from the period 1996 - 2014– Northern Cape Province



Graph 6: Comparison between the unemployment rate in the province (Male vs Female)

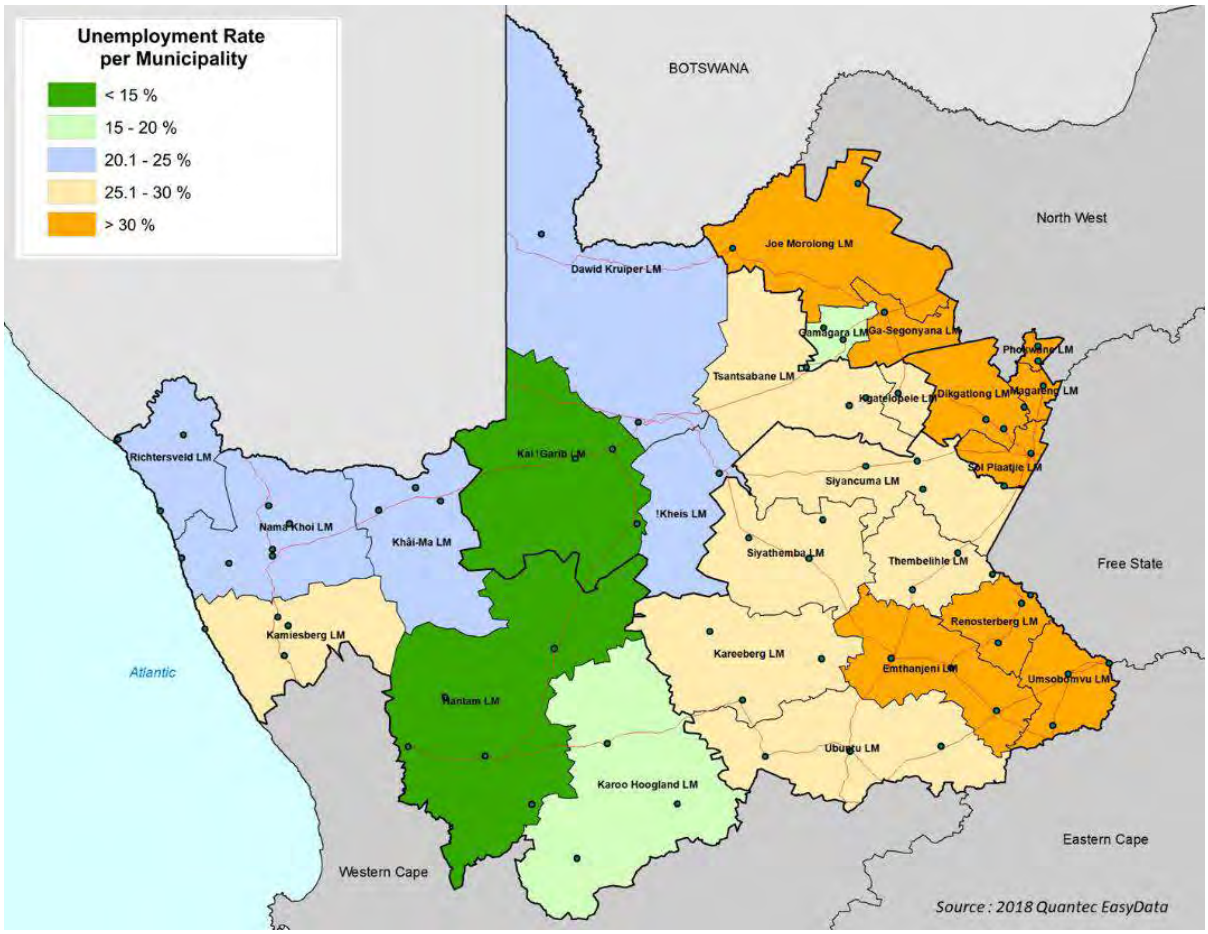


Figure 21: Unemployment rate per Municipality and total number of Unemployed people[18]

As per **Error! Reference source not found.**, the following key observations made are as follow:

- Unemployment rates are higher in the predominantly rural areas, specifically in the John Taolo Gaetsewe District Municipality;
- The highest number of people that are unemployed are concentrated in Joe Morolong, Ga-segonyana, Dikgatlong, Phokwane, Magareng Sol Plaatje, Renosterberg, Emthanjeni and Umsobomvu, Local Municipalities
- The following municipalities also have a high unemployment rate: Kamiesberg, Tsantsabane, Kgatelopele, Siyancuma, Siyathemba, Thembelihle, Kareeberg and Ubuntu Local municipalities
- Kai! Garib, Hantam and Karoo Hoogland Local Municipalities experience lower unemployment rates compared to the rest of the Province, likely due to the low population concentrations.
- Namakwa District is the lowest unemployment rates of the Province, also most likely due to the low population concentrations within the Namakwa district.

[18] *Quantec, 2017*

- The highest unemployment rates are experienced in predominantly mining areas, and areas with a low agriculture potential, which provides key employment opportunities if value chains are explored.

2.4.2 Economic active people

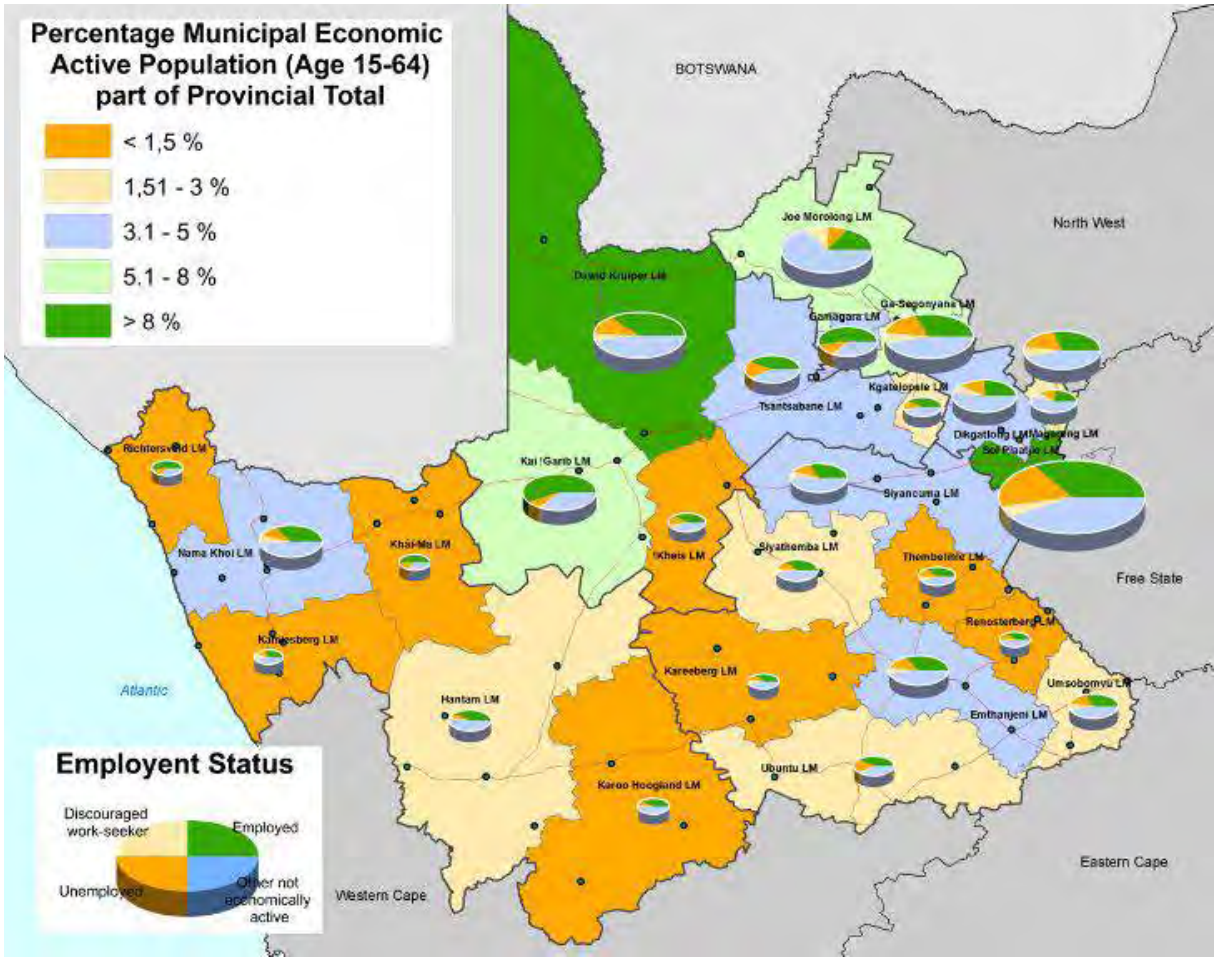


Figure 21: Percentage economic active population per Municipality and Employment Status

As per Figure 21 above the following key observations can be made:

- The highest economic active population in the Province is evident in the Sol Plaatje and Dawid Kruiper Local Municipalities, with Joe Morolong, Ga-Segonyana, Gamagara, and Kai! Garib succeeding as the most dominant economical active municipalities;
- Municipalities without small or large towns are predominantly less economic active within the provincial context;
- It is evident that the economic potential is much higher in municipalities with larger towns; and
- Joe Morolong has the highest concentration of people that are not economically active;

2.4.3 Employment per Sector

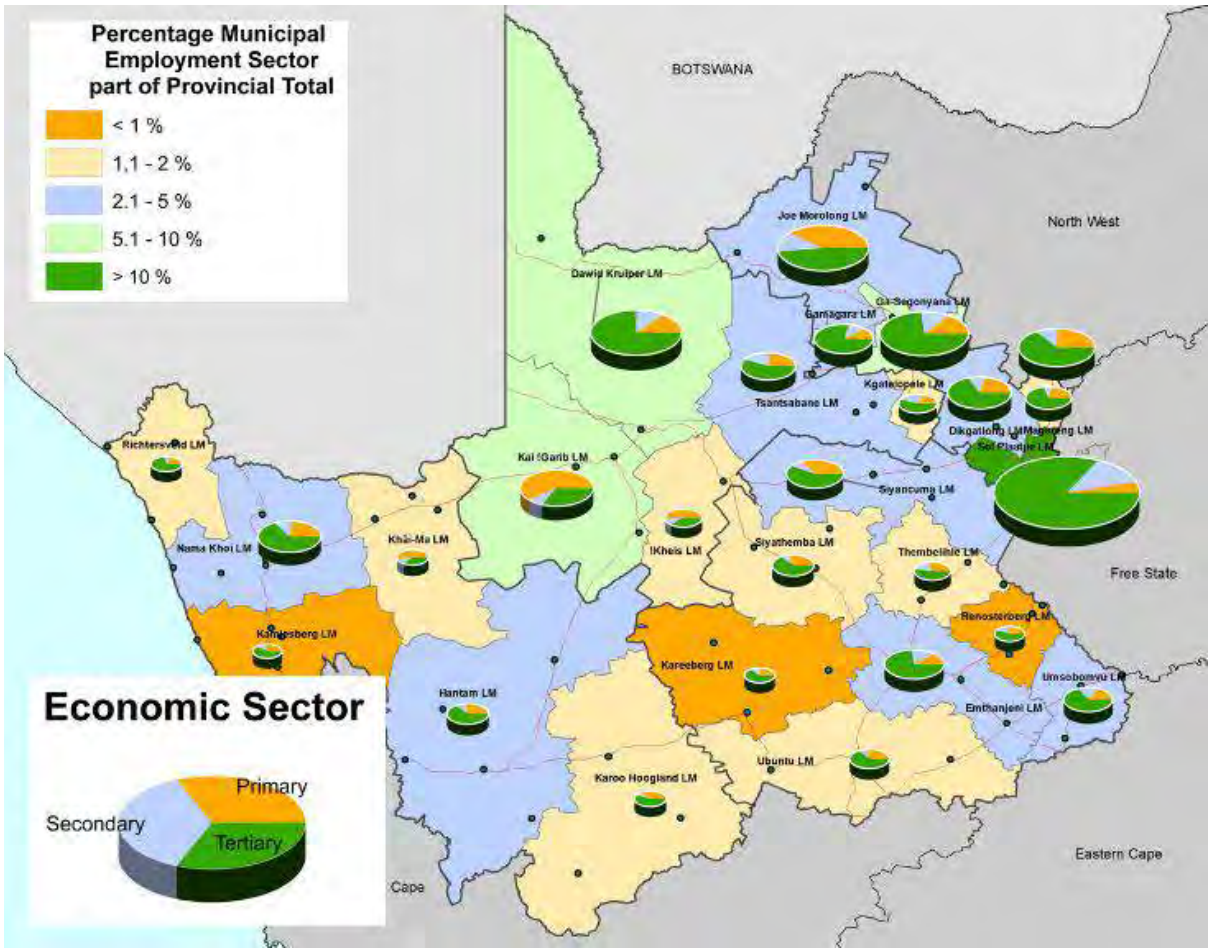


Figure 22: Percentage employment per Sector per Local Municipality

The employment sector overview provides the percentage of the workforce employed in a particular sector, classified as primary, secondary and tertiary economic sectors. ***Figure 22*** gives an indication of the percentage contribution made to employment as per local municipality. Sol Plaatje local municipality makes the largest contribution to employment of the Northern Cape Province. ***Figure 22*** evidently shows that the most prominent employment sector is tertiary sector.

Key observations from ***Figure 22***: Percentage employment per Sector per Local Municipality

- Local municipalities in the ZF Mgcawu district make a considerable contribution to the employment levels, such as Dawid Kruiper LM and Kai! Garib, which respectively contributes 5.1% to 10% to the employment of the province[19].
- The most prominent economic sector in John Taolo Gaetsewe district is the tertiary sector.
- The district also contributes on an average of about 5% to the total provincial employment.
- ZF Mgcawu district is dominated by the tertiary sector however, the primary sector contributes up to 50% and even more in !Kheis and in Kai! Garib local municipalities.
- Local municipalities in Pixley ka Seme district make a distinct contribution to the provincial employment.

[19] *Quantec Data, 2017*

- Kareeberg and Renosterberg local municipalities however, each make less than 1% contribution to employment in the Northern Cape.
- The majority of Pixley ka Seme's population are employed in tertiary economic sectors.
- The larger proportion Namakwa district's work force is employed in the tertiary sector. Khai-Ma local municipality however, has more people working in the primary sector.
- The largest contributions made are by Nama-Khoi and Hantam local municipalities each contributing 2.1% to 5% to employment in the Northern Cape.
- Kamiesberg on the other hand, makes less than 1% contribution to employment.

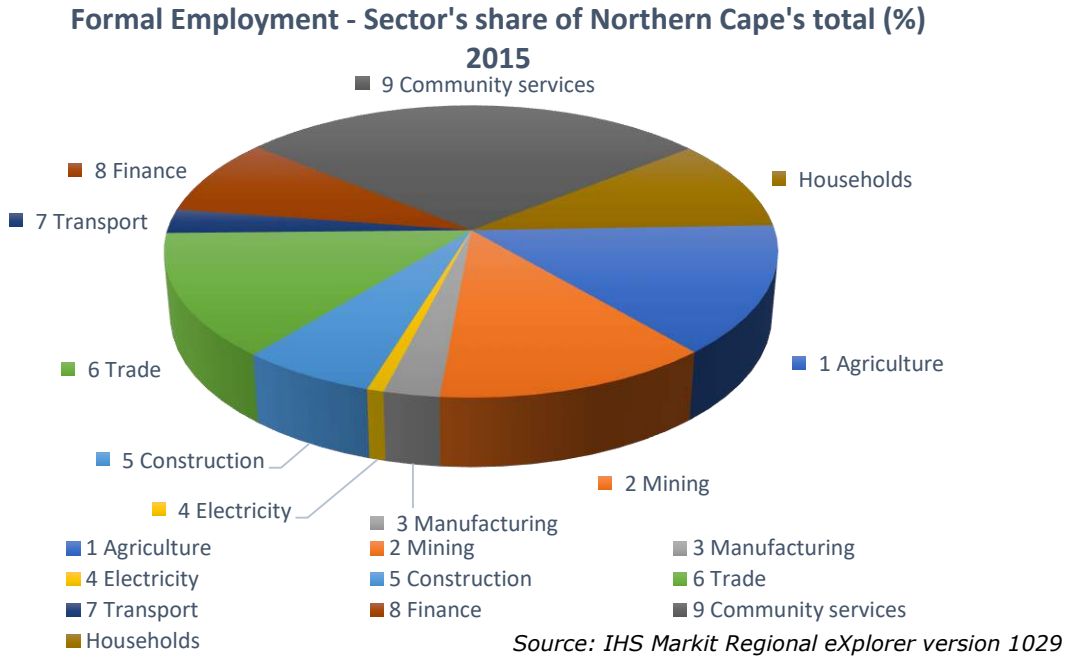
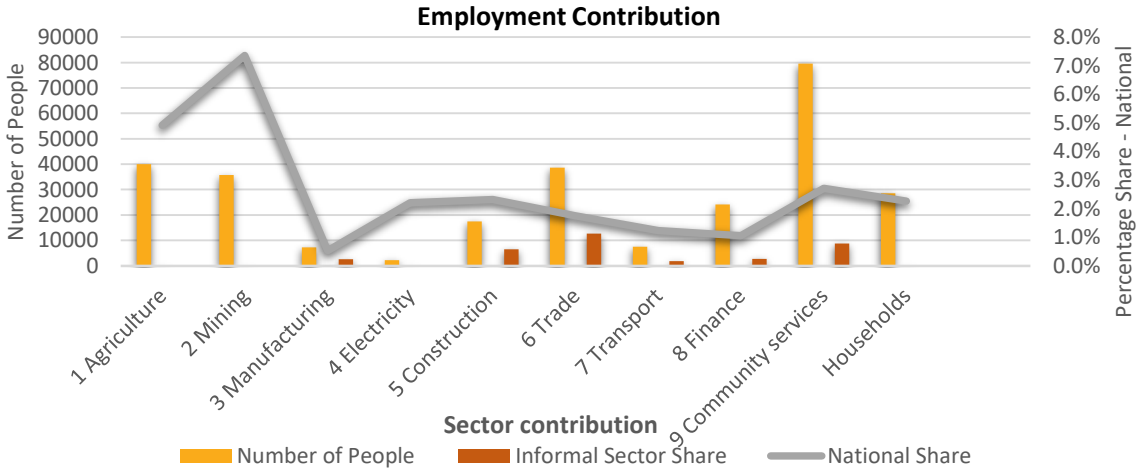


Figure 23: Formal employment – share per economic sector



Graph 7: Employment contribution per Sector, looking at number of people, informal sector's share and share of National GDP[20]

[20] Source: IHS Markit, Regional eXplorer 1029 (2.6a), Own calculations, 2018

2.4.4 Labour participation rate

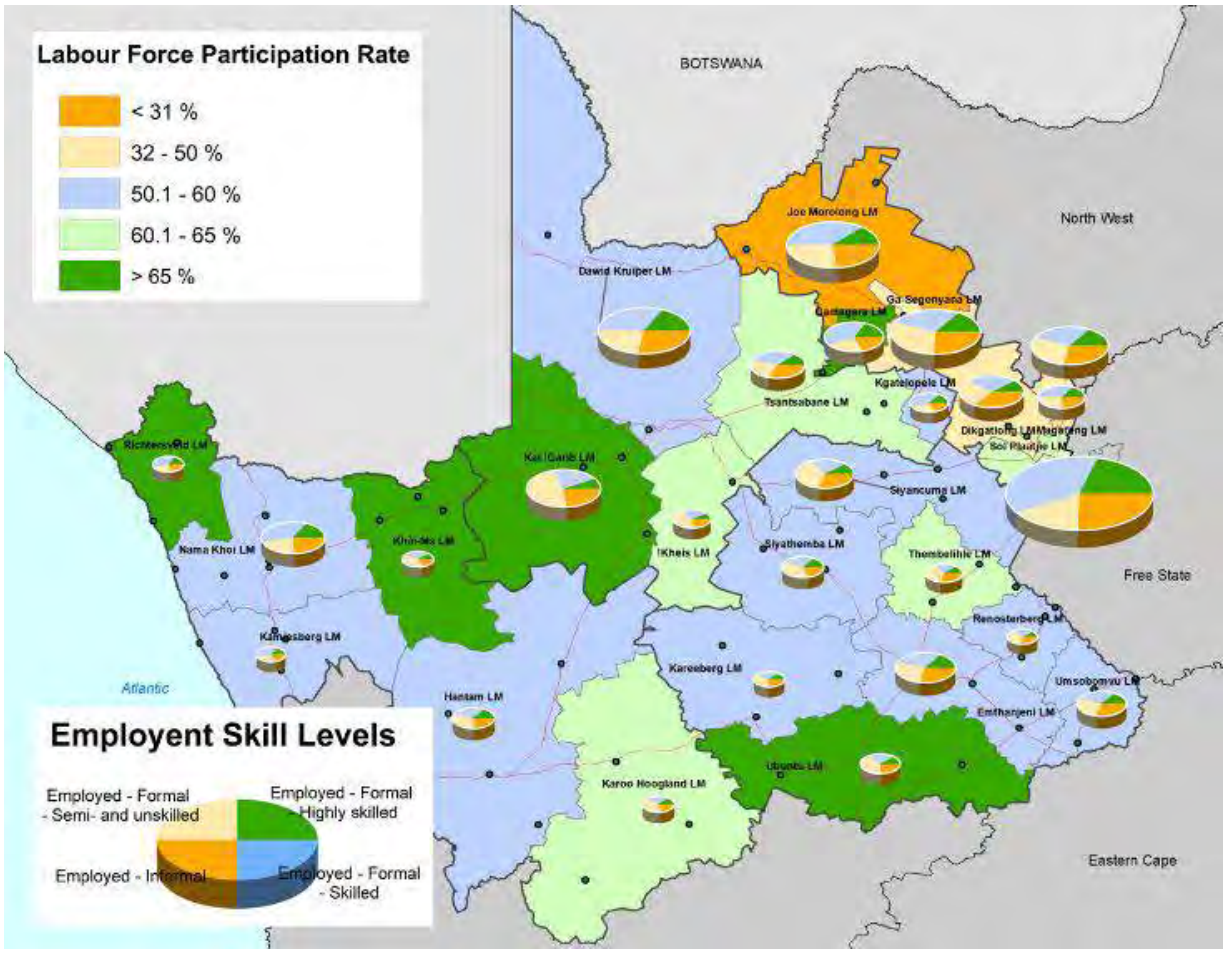


Figure 24: Percentage labour force participation rate per Municipality and Employment skills level

Employment and unemployment figures provide an impression of the labour participation rate. Data regarding the employment for the entire Northern Cape, as well as for all the Northern Cape districts are provided in Figure 25. The figure only includes the segment of the population that fall within the working age. The areas with the highest employment participation rate are Richtersveld and Khai-Ma (both in the Namakwa district); Kai! Garib (in ZF Mgcawu district); and Ubuntu (Pixley ka Seme district) local municipalities.

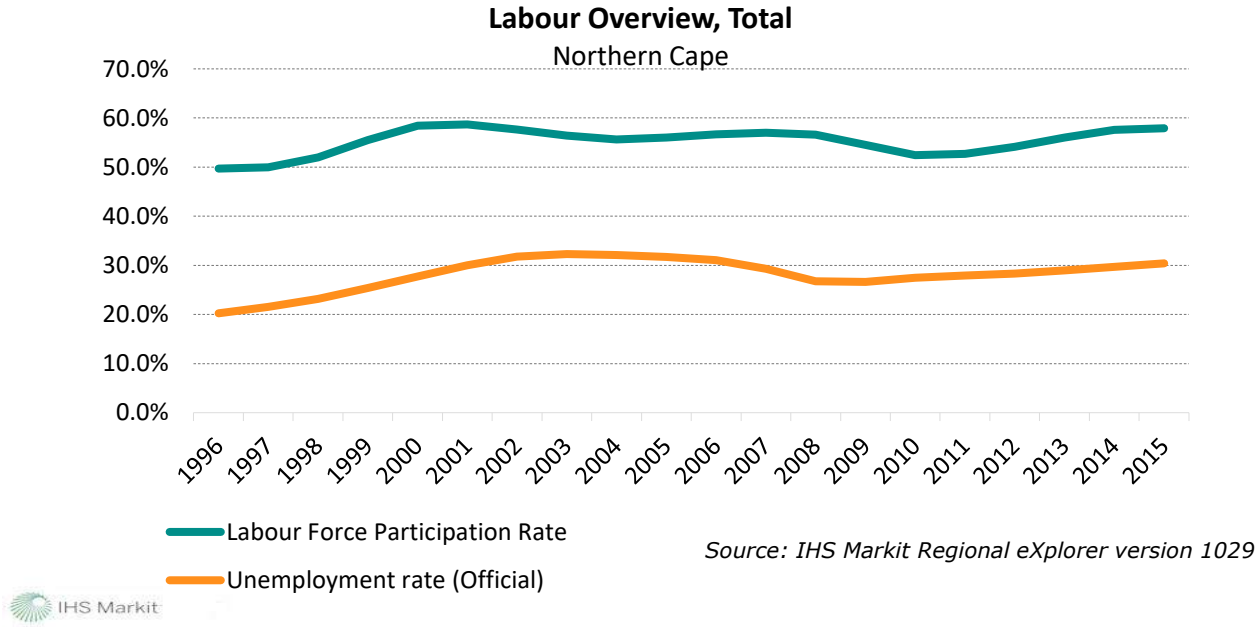
Remaining areas of Namakwa and Pixley ka Seme districts has an average labour force participation rate of between 50% and 60%, except for in the Thembelihle local municipality with an average labour force participation rate of between 60% to 65%. Johan Taolo Gaetsewe district has the lowest labour participation rate in greater parts of districts. Frances Baard district has an average labour force participation rate of 32% to 50%.

Key observations regarding labour:

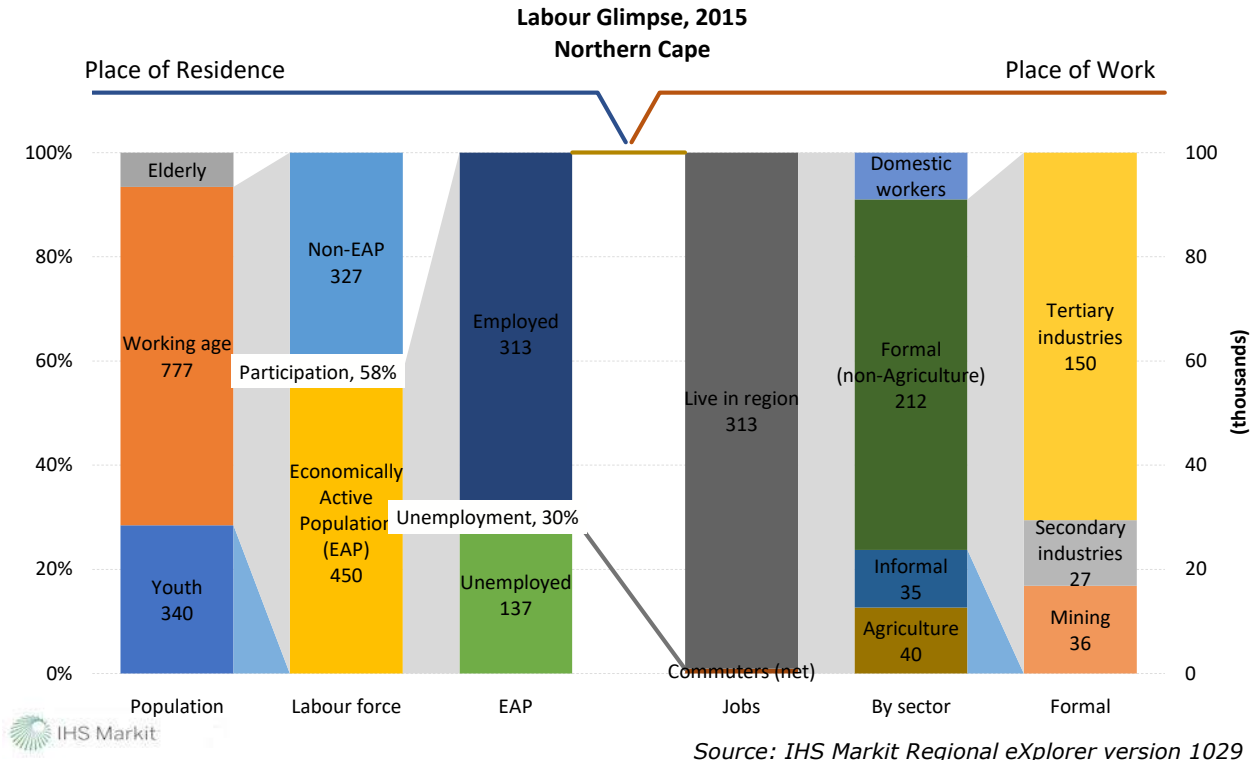
- The Northern Cape Province has revealed the largest decline nationally in the unemployment rate, which has dropped over the last year by a noteworthy 4.9 percent.[21]

[21] *Stats SA, Quarterly Labour Force Survey (QLFS) for the fourth quarter of 2017. The Quarterly Labour Force Survey (QLFS) is a household-based sample survey conducted by Stats SA. It collects data on the labour market activities of individuals aged 15 years and older who live in South Africa.*

- The unemployment rate in the Province for the last quarter of 2017 was 27.1 %. In the previous quarter (July to September 2017) it was 29.9%, while for the last quarter of 2016 it was 32%.
- The expanded unemployment rate has also dropped from 43.3 percent in the last quarter of 2016 to 40.5 percent during the same period in 2017.
- The total number of unemployed people in the Province is 120 000 (131 000 in the third quarter of 2017 and 140 000 in the fourth quarter of 2016).
- A total of 249 000 – out of a total labour force of 441 000 – in the Province are not economically active, while 65 000 are classified as discouraged job-seekers.
- In terms of the expanded unemployment rate, 219 000 people in the Province are unemployed. While the unemployment rate dropped in the Northern Cape, there was a corresponding increase in the number of employed people which rose from 298 000 in 2016 to 321 000 in 2017 (307 000 in the third quarter of 2017), an increase of 7.9 percent year-on-year.
- The labour absorption rate in the 4th quarter of 2017 was 40.7%
- The Labour Force Participation Rate was 55.9% in the 4th quarter of 2017, as determined by StatsSA.



Graph 8: Labour participation rate versus the unemployment rate of the Northern Cape Province



Source: IHS Markit Regional eXplorer version 1029

Graph 9: Labour glimpse of the Northern Cape Province – 2015

2.4.5 Employment Skills

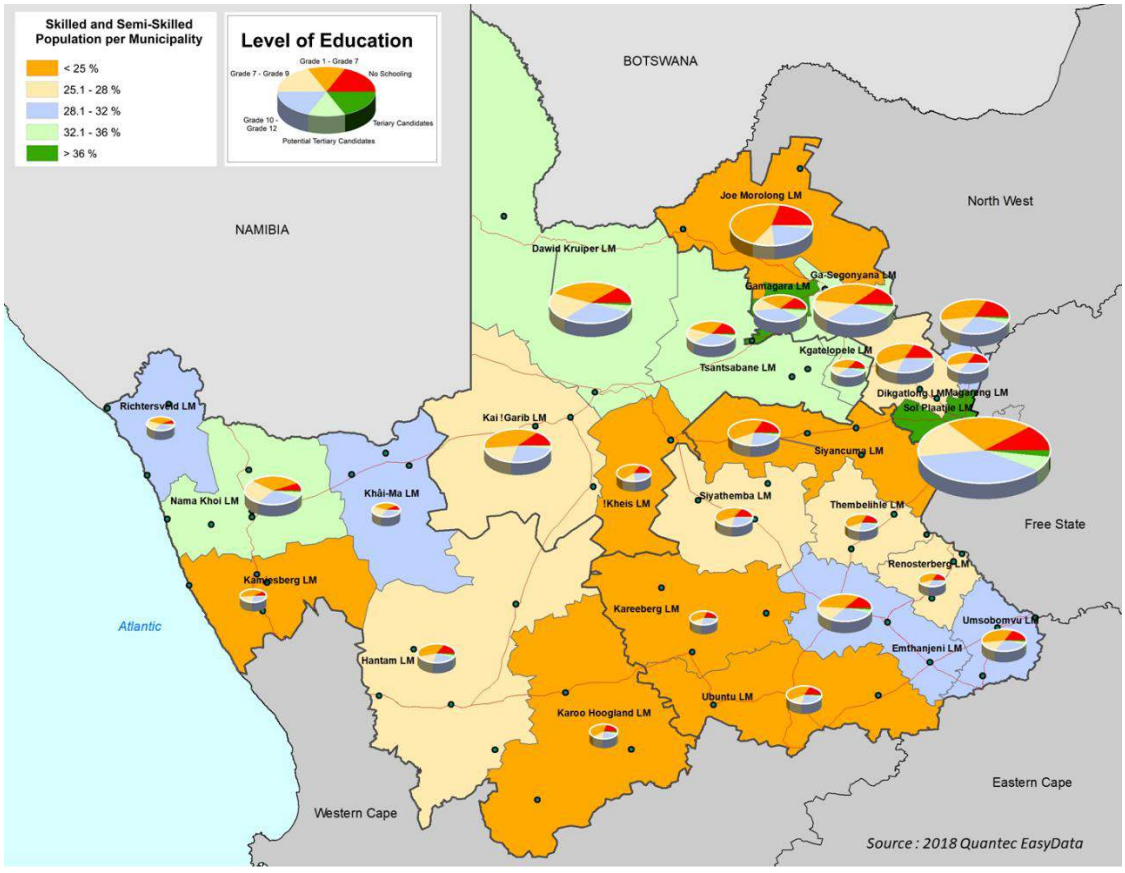


Figure 25: Level of Education per Municipality and percentage skilled

Employment skill levels are categorised as the following:

- Employed: Formal (Semi- and unskilled);
- Employed: Formal (Highly skilled);
- Employed: Formal (Skilled); and
- Employed: Informal.

Namakwa and Pixley ka Seme district municipalities have a low percentage of highly skilled employees. The majority of Namakwa's work force are employed in the formal sector, categorised in either the semi-skilled and unskilled; or the skilled category. The greater parts of John Taolo Gaetsewe has large formally employed work force, most of which are formal, or semi- and unskilled workers. The majority of Sol Plaatje local municipality (in Frances Baard) are formally employed with a large proportion of these being skilled workers. In general, the majority of the work force are formally employed, however, there are also a large contribution made by the informally employed work force.

In Pixley ka Seme, the majority of the work force is formally employed, most of which are semi- and unskilled. The informally employed work force also makes up a large contribution to the employment sector in Pixley ka Seme district. The largest part of the labour force in ZF Mgcawu district is the formally employed labour force of which the largest proportion is the semi- and unskilled labour force. This district also has a large proportion of skilled work force in areas such as Dawid Kruiper, Kgatelopele and Tsantsabane[22].

[22] *Quantec data, 2017*

2.5 INCOME AND EXPENDITURE

2.5.1 Household income

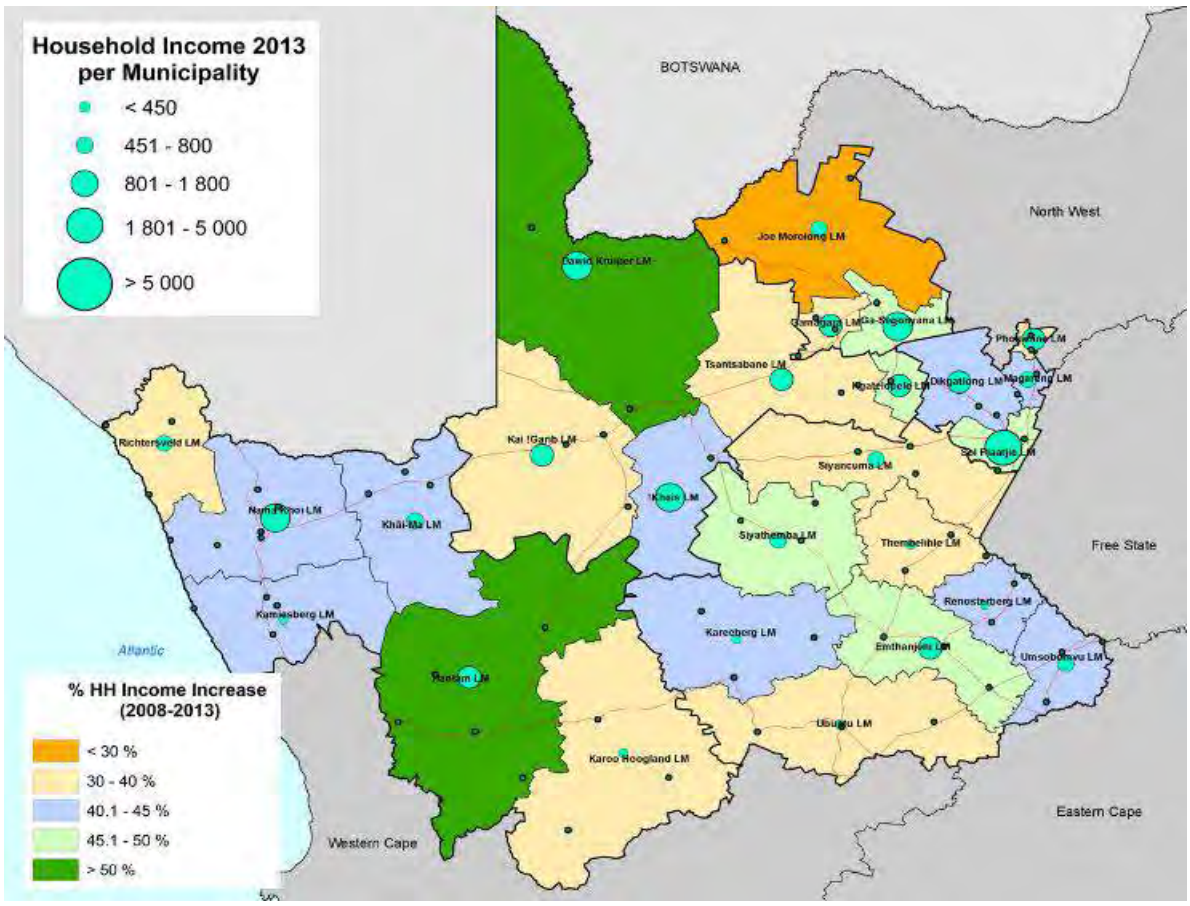
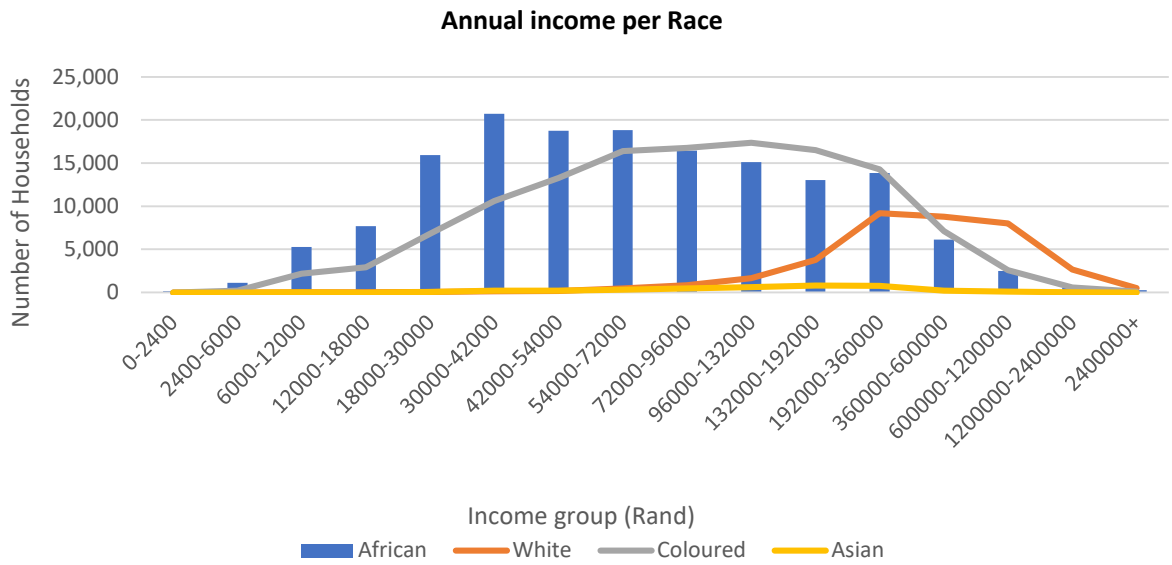


Figure 26: Household income per Household - Municipalities (R millions)



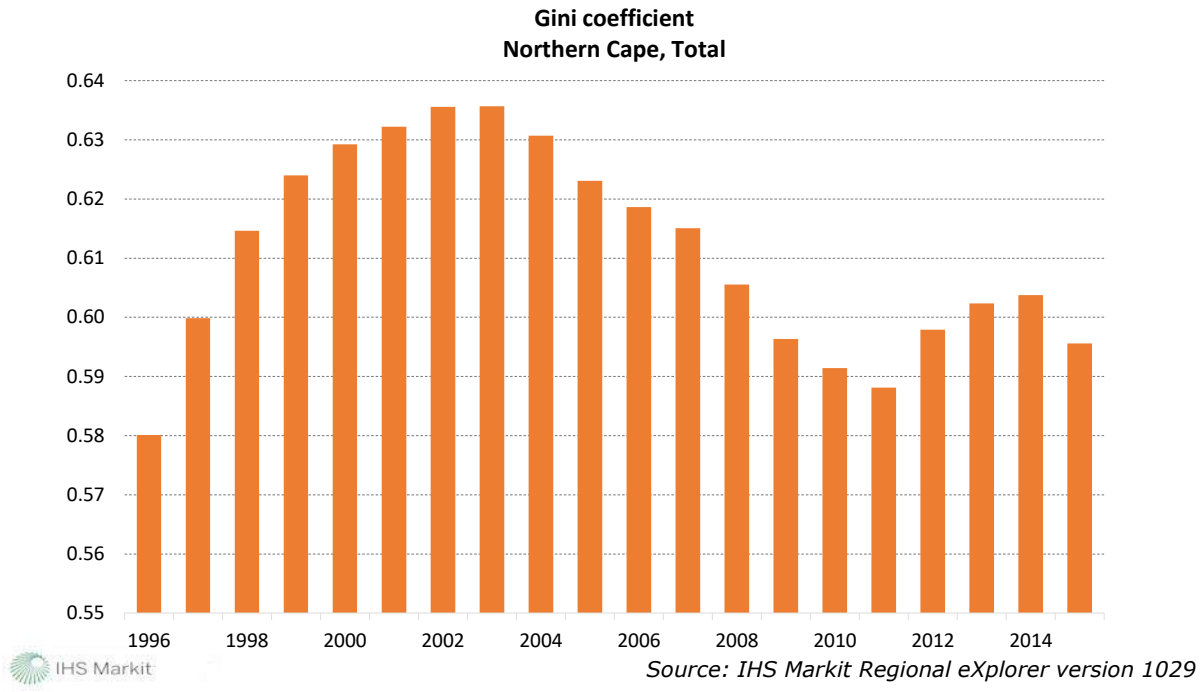
Graph 10: Annual income comparison per race – Northern Cape Province[23]

[23] Source: IHS Markit, Regional eXplorer 1029 (2.6a), Own calculations, 2018

Key observations of income distribution:

- African households generally occupy the lower income brackets, as the household income is concentrated between the range of R18 000 and R72 000 per annum.
- Households within the coloured community tend to earn more as the household incomes are concentrated between the range of R54 000 and R360 000 per annum.
- The white households tend earn high incomes as the yearly income is concentrated between the range of R132 000 and R2 400 000 per annum.

2.5.2 Gini Coefficient



Graph 11: Gini-coefficient – Northern Cape Province

The Gini-coefficient is a measure of income inequality that condense income distribution into a number of between 0 and 1 the higher the number, the greater the degree of income inequality. For the purpose of this discussion, the Gini-coefficient uses disposable income to measure inequality within the various districts.

The average Gini-coefficient is 0.568, therefore there is a rather high degree of income inequality in the Northern Cape. When comparing the Gini-coefficient of all the district municipalities, there is only small differences between the various districts. The district with the highest degree of income inequality is Frances Baard with a Gini-coefficient of 0.58 whereas John Taolo Gaetsewe and Pixley ka Seme has the lowest degree of income inequality each having a Gini coefficient of 0.56.

When comparing the Gini-coefficient with the income distribution, the Apartheid legacy is still visible, as the White racial group's income levels are disproportionately higher than that of the African, Coloured and Asian communities. With this said, it is like that the Coloured community and their income levels have improved, and the same is expected for the African households, which will aid in curbing the high level of income inequality.

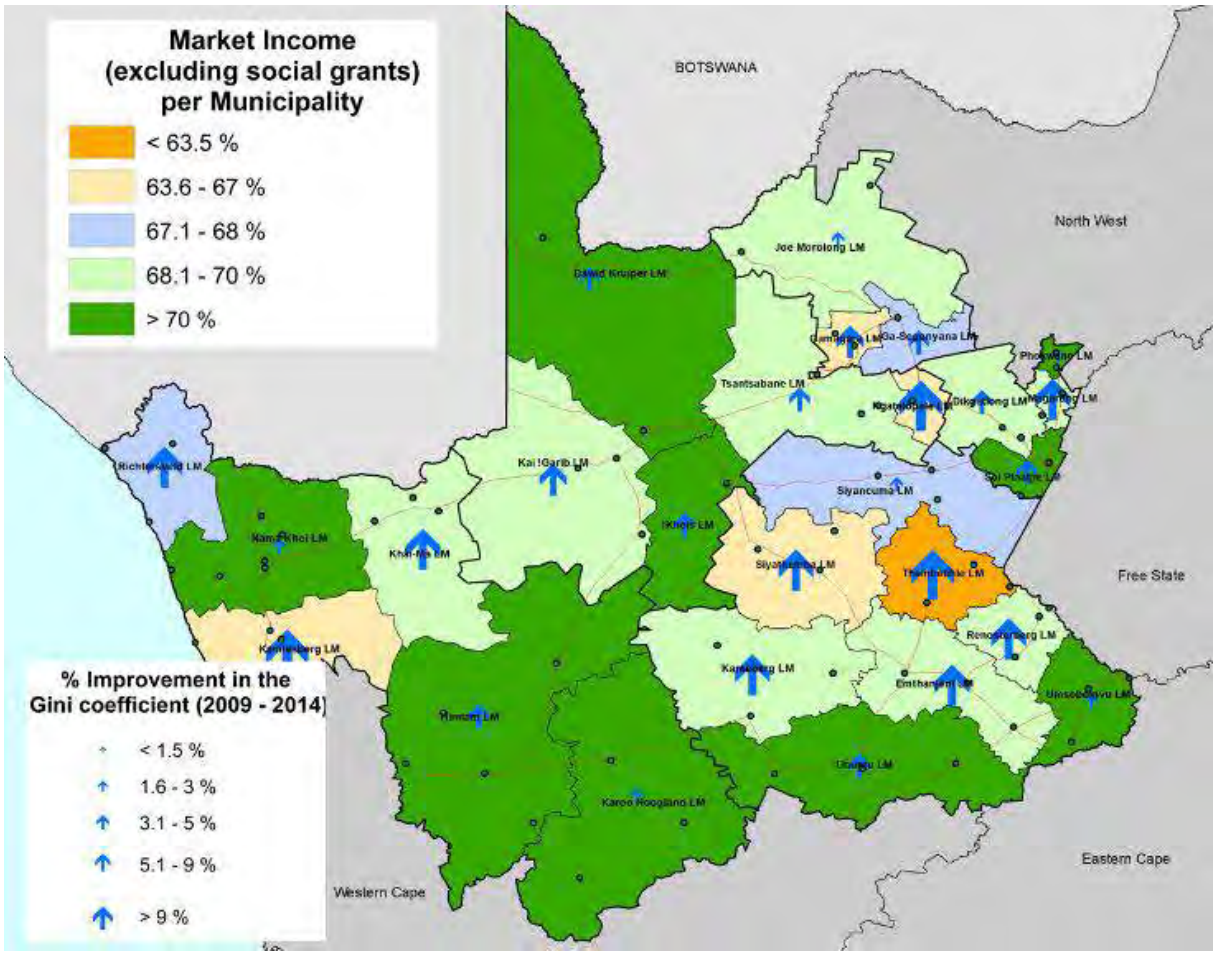
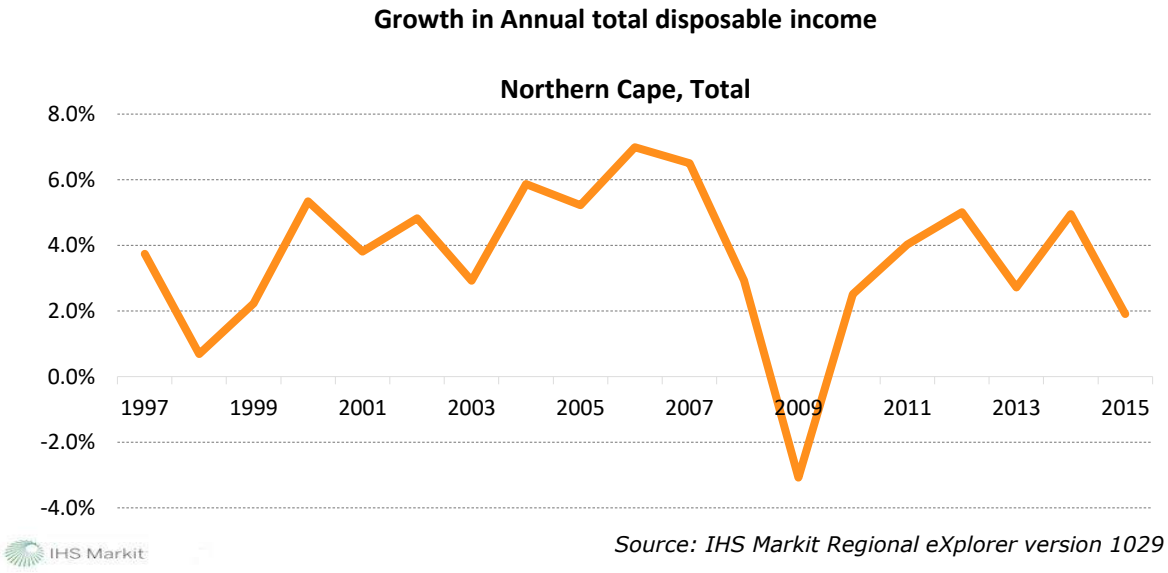


Figure 27: Percentage market income per Municipality and Percentage improvement of Gini coefficient

2.5.3 Disposable income



Graph 12: Growth in annual total disposable income – Northern Cape Province

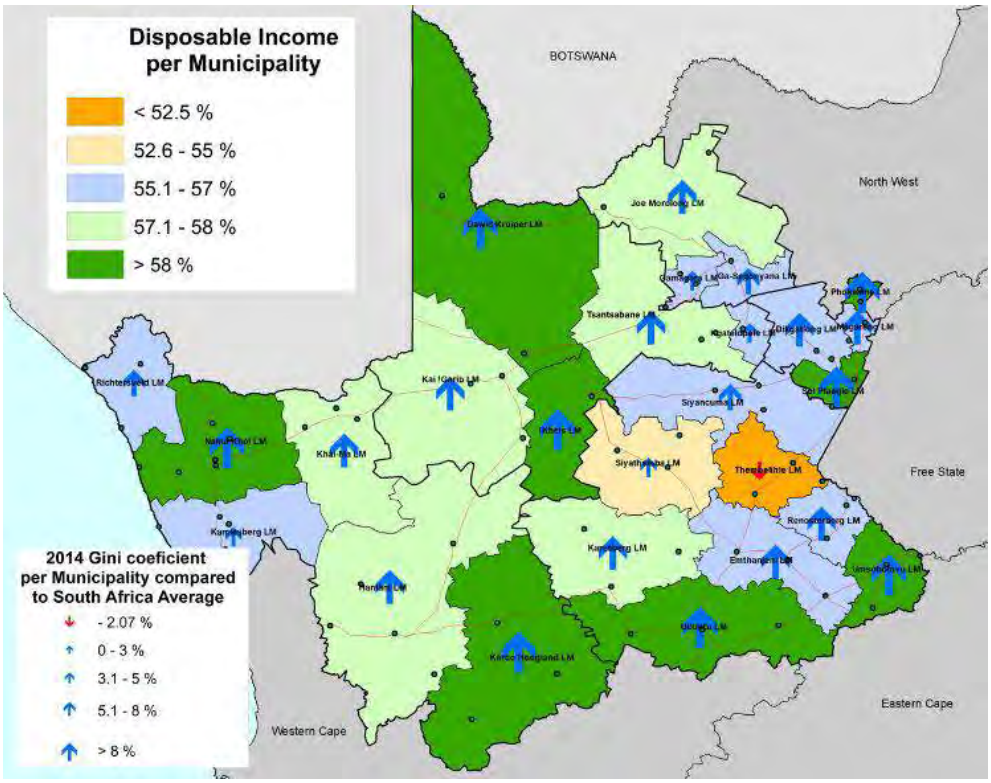


Figure 28: Disposable income and Gini coefficient comparison per Municipality

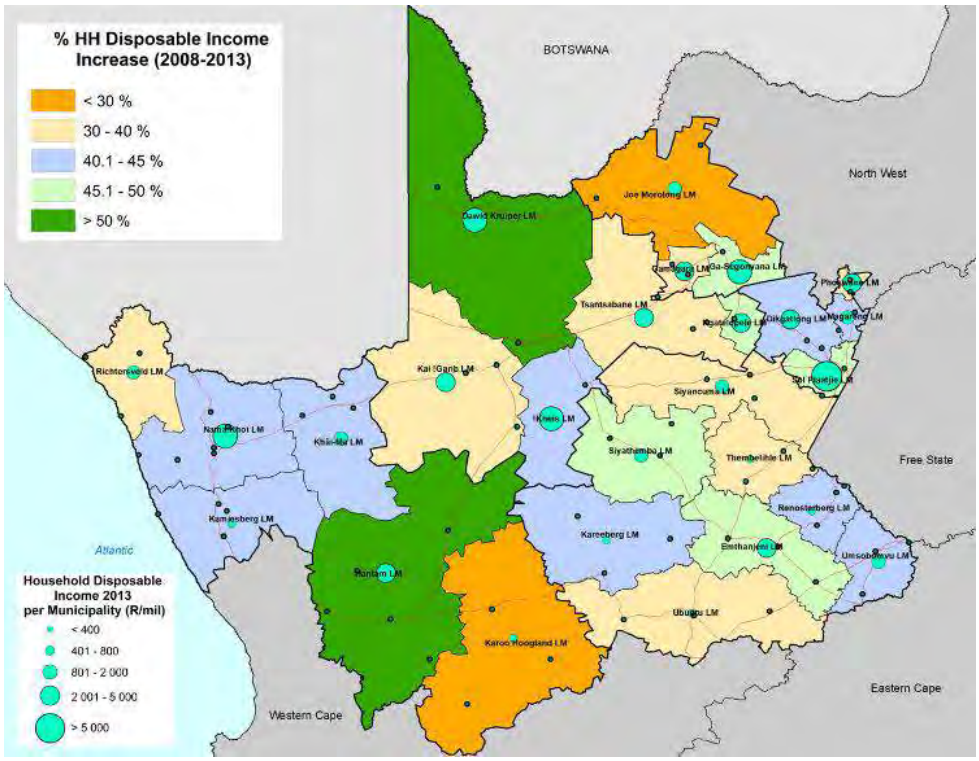
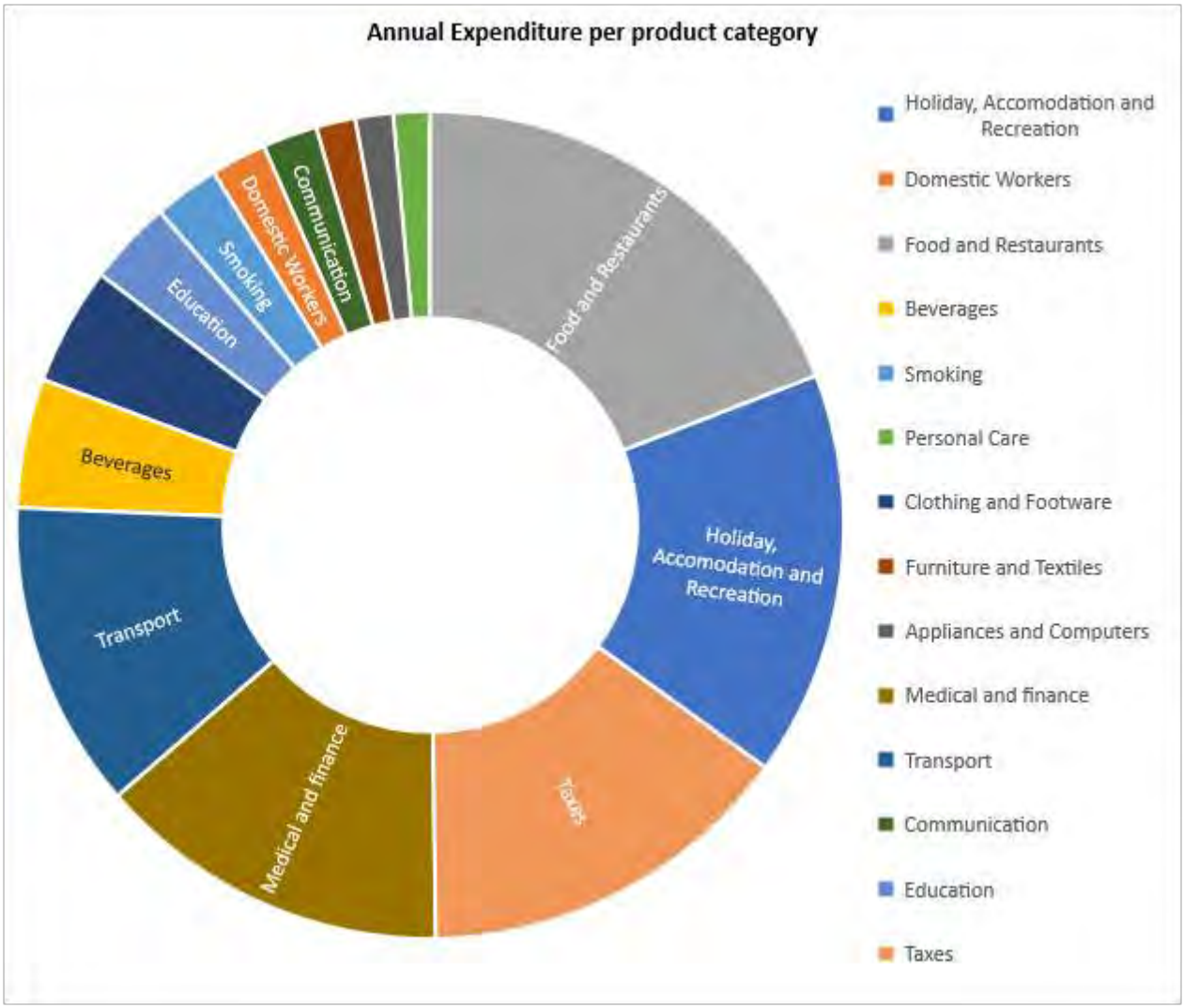


Figure 29: Disposal income per Household (increase 2008-2013)

Key disposable income observations:

- The level of disposable income of the Northern Cape fluctuates greatly over the 10-year period, hitting an all-time low during the 2008/2009 economic crises.
- The heavy reliance on the Primary and Tertiary sectors results in an economy that is sensitive or vulnerable to any external shocks or events, such as drought or a decline in commodity prices.

2.5.4 Expenditure



Graph 13: Annual expenditure per product category – Northern Cape Province

The food and non-alcoholic beverages expenditure category consisted of eight subgroups. Out of all the groups, the bread & cereals and meat & fish subgroups accounted for more than half of food expenditure in 2015 for both poor and non-poor households. Focusing on poor households, their larger portion of food expenditure was on bread and cereals, accounting for 33,9% of the total average food expenditure. Under this subgroup, mealie meal was the largest expenditure proportion (11,3%), followed by brown bread (8,1%) and rice (4,6%). The meat and fish subgroup had the second largest food expenditure proportion, and accounted for a quarter of food expenditure, with poultry having the highest expenditure proportion of 13,8% and beef coming second at 3,6%. Non-poor households

spent the most on the meat and fish category, which constituted 32,1% of their total food expenditure, while bread and cereals came second at 20,3%. Non-poor households spent the least on brown bread (4,4%) followed by mealie meal/maize flour (3,8%) compared to the poor households. The differences in household expenditure on vegetables and fruits were marginal between poor and non-poor households. This also applies to the expenditure on oils and fats, where both poor and non-poor households had their smallest food expenditure proportions. Expenditure of nonpoor households on non-alcoholic beverages accounted for 8,0%, while poor households spent slightly less at 5,7%. Figure 5.3 shows the graphical spending patterns of the poor and the non-poor.

Key findings on household expenditure revealed from the "Poverty Trends in South Africa: An examination of absolute poverty between 2006 and 2015"[24]:

- Average annual household expenditure was R103 293, with the largest expenditure being on housing and utilities (32,6%)
- Female-headed households had an average annual expenditure of R77 671, which is 36,0% less than that of male-headed households (R121 363). Male-headed households (R165 853) on average still earn more than female-headed households (R98 911).
- Coloured-headed households had an average annual household expenditure of R124 445, which is approximately twice the expenditure of black African-headed households (R67 828). Indian/Asian-headed households (R195 336) and white-headed households (R350 937) spent almost three times and five times more than black African-headed households, respectively.
- Poor households have a larger household size than that of non-poor households. The average size of a poor household is almost twice (4,6) the size of a non-poor household (2,4). 110
- Poor households spent the largest proportion of 30,0% on food, compared to 10,5% of nonpoor households. The biggest proportion of household expenditure for non-poor households was towards housing and utilities (34,0%).
- Non-poor households had better access to services compared to poor households. A high proportion of non-poor households had access to electricity (91,4%) and piped water inside the dwelling or in site (86,7%) compared to the 59,0% of poor households that had access to piped water and the 80,5% that had access to electricity.

[24] *Statistics South Africa, 2017*

2.6 REVENUE ENHANCEMENT

2.6.1 Equitable Share

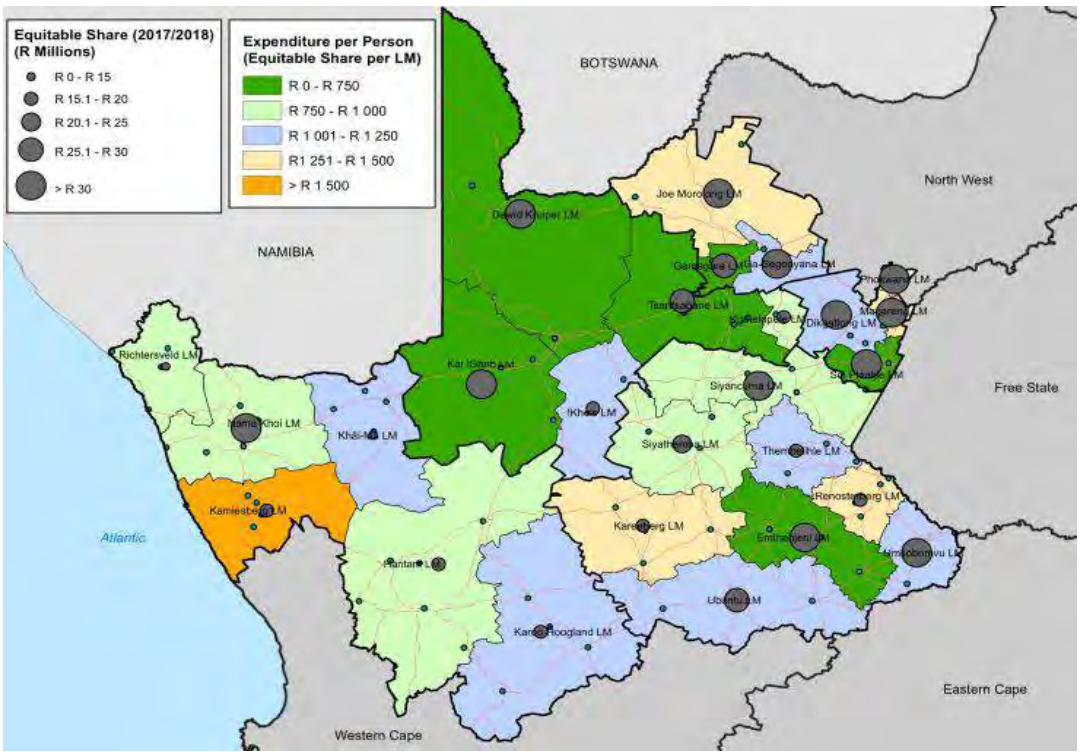


Figure 30: Equitable share relationship towards average share per person in the Province - Comparison between Municipalities

Figure 30: Equitable share relationship towards average share per person in the Province - Comparison between Municipalities provides an overview of the equitable share distribution per municipality. The biggest distribution is evident towards the north-eastern parts of the province which also reflects the highest population concentration. Kamiesberg Local Municipality has the highest equitable share rate per person with Dawid Kruiper, Kai! Garib, Tsantsabane, Sol Plaatje, Gamagara and Emthanjeni Local Municipalities the lowest equitable share ration per person. Figure 30 reflects a comparison of the Municipalities receiving more or less than the provincial average of R950 per person as a proportion of the Equitable share. Kamiesberg Local Municipality receives well above average whereas the Municipalities discussed under Figure 31 sees less than the provincial average.

Table 30: Provincial equitable share (per person reference)[25]

PROVINCE	FINANCIAL YEAR (R MILLION)				AVERAGE ANNUAL MTEF GROWTH	POPULATION (2016)	SHARE PER PERSON
	2016/17	2017/18	2018/19	2019/20			
Eastern Cape	58060	61848	66167	70961	6,90%	7061700	R9 369,84
Free State	22995	24522	26285	28165	7,00%	2861600	R9 185,42
Gauteng	79600	86653	93030	100227	8,00%	13498200	R6 892,03
Kwazulu-Natal	87898	93757	99741	106841	6,70%	11079700	R9 002,14
Limpopo	48709	51960	55386	59371	6,80%	5803900	R9 542,89
Mpumalanga	33450	36082	38489	41214	7,20%	4328300	R8 892,41
Northern Cape	**10863**	**11720**	**12501**	**13418**	**7,30%**	**1191700**	**R10 490,06**
North West	28062	30330	32473	34857	7,50%	3790600	R8 566,72
Western Cape	41062	44470	47452	51049	7,50%	6293200	R7 540,20
Total	**410699**	**441331**	**471522**	**506104**	**7,20%**	**55908900**	**R8 433,76**

[25] *National Treasury, Division of revenue and spending by provinces and municipalities, 2017*

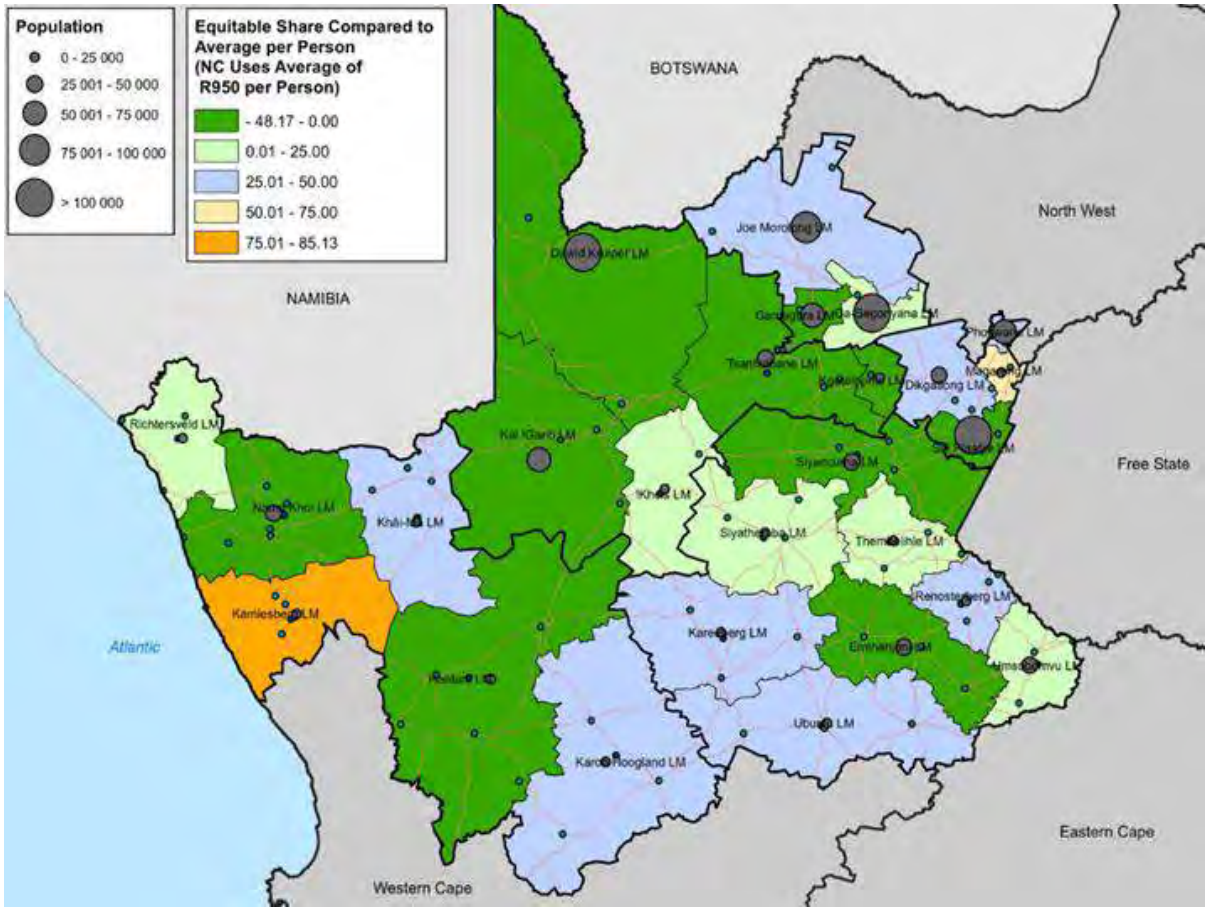


Figure 31: Equitable share relationship towards average share per person in the Province - Comparison between Municipalities

2.6.2 Revenue collection

The increase in municipal debt is predominantly prevalent in smaller municipalities that have struggled with capacity, governance, institutional and operational inefficiencies. Municipalities continue to prepare budgets that are not funded and implementable, despite the allocations and receipt of conditional and unconditional grants. Municipalities are faced with liquidity problems to all their creditors. Non-compliance with the expenditure management and settling of invoices issued for payment is another challenge. There is a challenge with growing Eskom and Water Boards accounts and non-adherence to the payment arrangements that were entered into with Eskom and Water Boards. These payment arrangements are not provided for in the budget of municipalities[26].

Municipalities are largely self-financing. This means that the bulk of their resources must be raised from own resources such as rates and taxes. Revenue determines the capacity of the municipality to provide and sustain services. To ensure that revenue is adequate to support the desired levels of services, the municipality must carefully and routinely monitor all amounts due to it. This implies that aggressive policy of collection must be followed for all receivables.

In aggregate, municipalities in the province had received R4.6 billion or 91 per cent of their total adjusted budget of R5.1 billion. The highest revenue was reported under other/sundry revenue at

[26] *PGDP Diagnostic Report, Northern Cape Provincial Treasury, 2017*

R2.3 billion or 49 per cent of the total revenue of R4.6 billion, followed by service charges at R1.6 billion or 35 per cent and the lowest was reported under property rates at 721.991 million or 16 per cent. On average municipalities are reporting higher revenues due to government grants and subsidies[27]. Municipalities in ZF Mgcawu district reported the highest revenue at R1.3 billion or 106 per cent of their total adjusted budget of R1.3 billion, followed by those in Frances Baard at R687.088 million or 94 per cent, John Taolo Gaetsewe at R1.3 billion or 88 per cent, Pixley ka Seme at R782.590 million or 74 per cent and the lowest was reported in Namakwa at R758.274 million or 70 per cent.

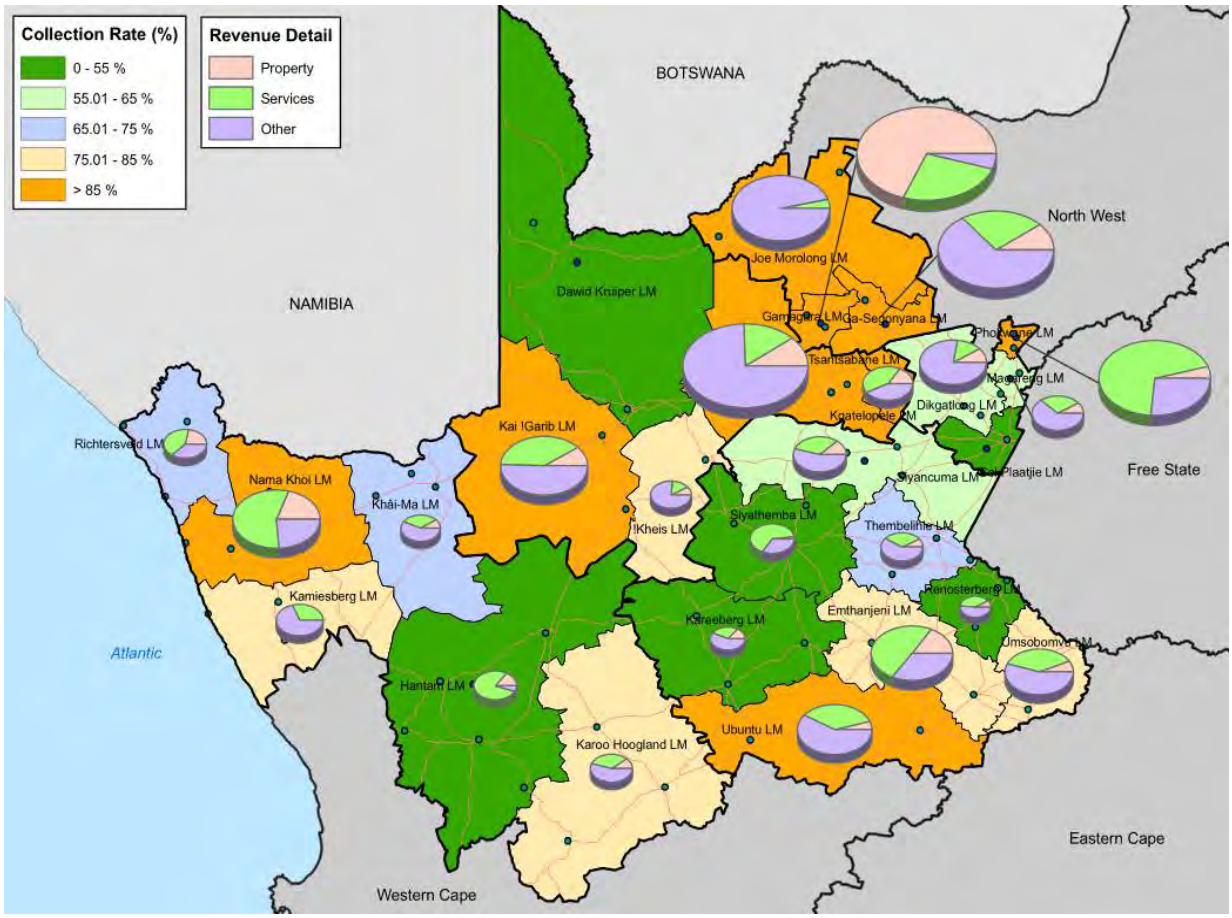


Figure 32:Overview of Municipal collection rates per Municipality[28]

Figure 32 provides an overview of the percentage collection rate per municipality in the province and shows evident signs of improvement that is required to sustain the provision of basic services towards the Northern Cape communities.

[27], [45] *PGDP Diagnostic Report, Northern Cape Provincial Treasury, 2017*

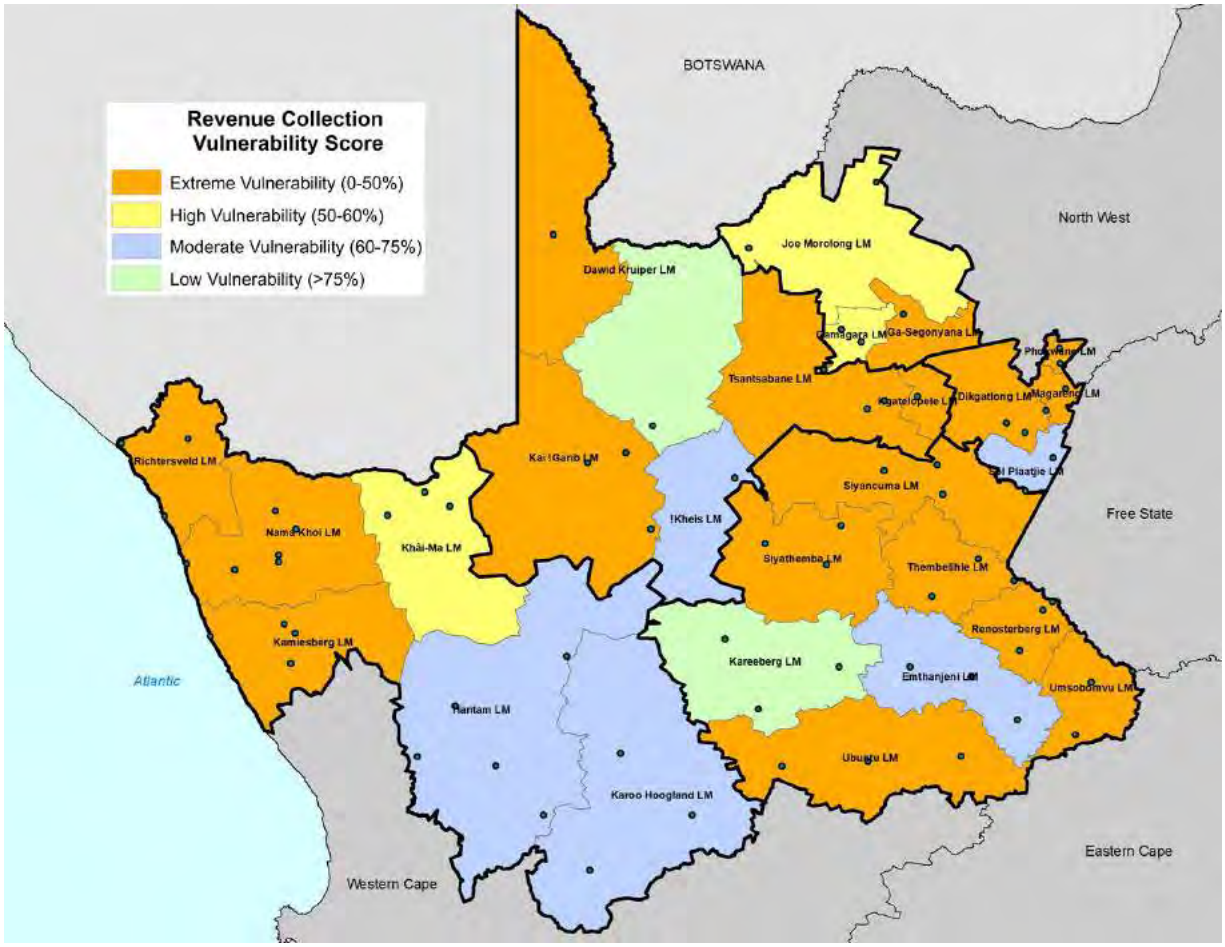
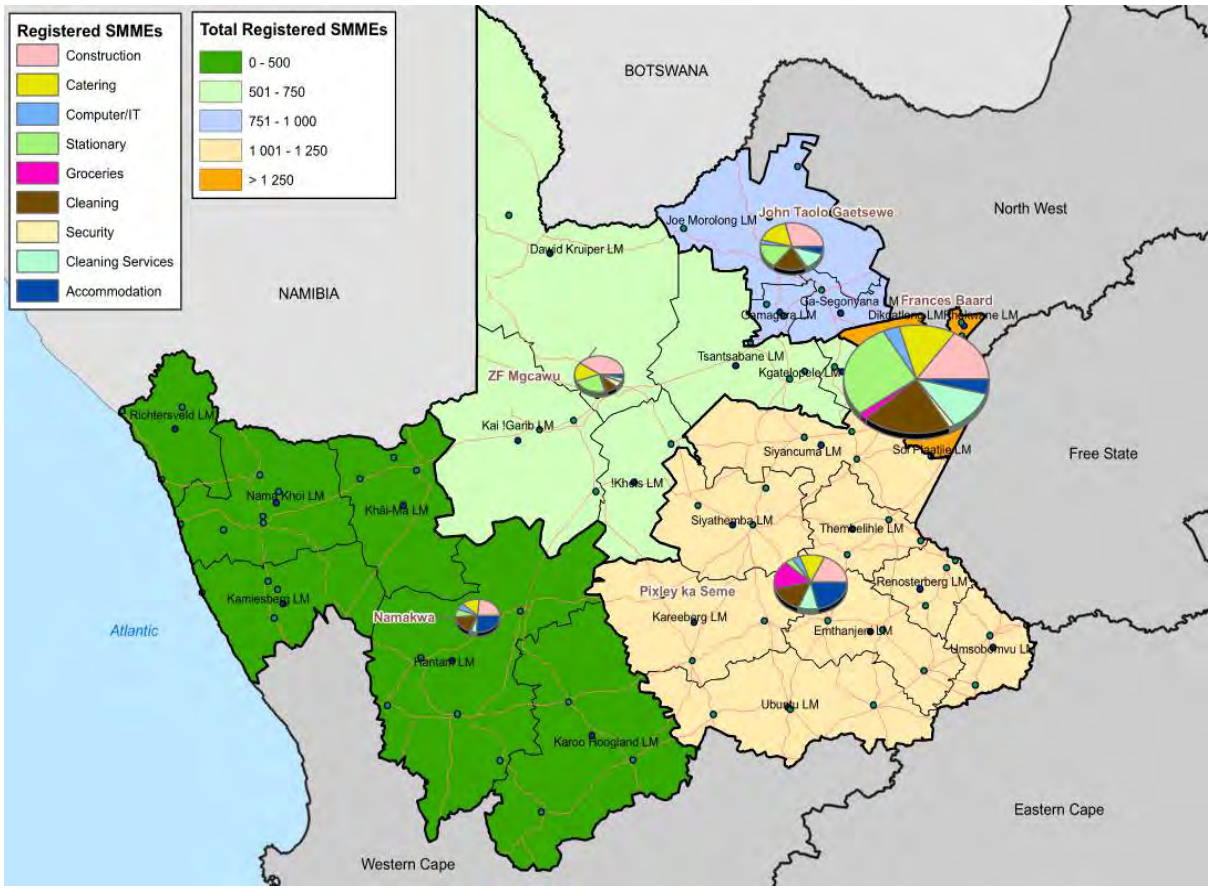


Figure 33: Revenue collection vulnerability score, MuSSA[29], 2016

[29] *Municipal Services Strategic Assessment (MuSSA), 2016. MuSSA focuses on assessing overall Business Health of WSAs to fulfil the water services function. The MuSSA is a self-assessment completed by the municipalities*

2.7 SMME DEVELOPMENT



The SMME development landscape in the Northern Cape is dominated by the workforce age group, between 35 and 64 years of age, contributing 64% of the provincial total, followed by the youth age group, between 15 and 35 years of age, contributing 30% to the provincial total.

Key SMME development observations:

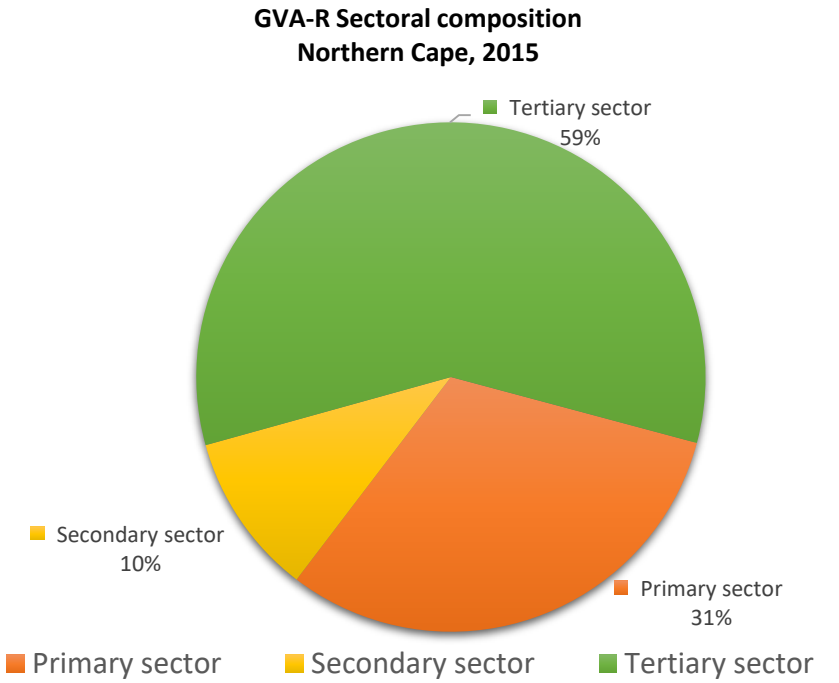
- According to Quantec[30] , the largest above 65 years age group contributors to the provincial total resides in John Taolo Gaetsewe DM, contributing 6.82%.
- The Namakwa DM contributes 2% of the provincial total, comprised mainly of the workforce age group. The Pixley ka Seme DM contributes 7% of provincial total, with the youth age group contributing 2% and the workforce group contributing 4%.
- The ZF Mgcawu DM contributes 18% of provincial total, with 9% being contributed by the youth age group and 9% from the workforce age group.
- The Frances Baard DM contributes 15% of provincial total, with the youth age group contributing 10% and the workforce age group contributing 5% to the provincial total.
- The John Taolo Gaetsewe DM contributes 27% to provincial total, comprised of 8% by the youth age group, 12% from the workforce age group, and 7% from over 65 years age group.

[30] *Quantec Data 2017*

To summaries, the largest contributors to the provincial SMME landscape is the workforce age group located within the John Taolo Gaetsewe DM, with a contribution of 12%, followed by the youth age group located in the Frances Baard DM, with a contribution of 10%. The lowest contributor is the youth age group located within the Namakwa DM, with approximately o% contribution. The greatest district contribution is made by the John Taolo Gaetsewe DM, with a contribution of 27%.

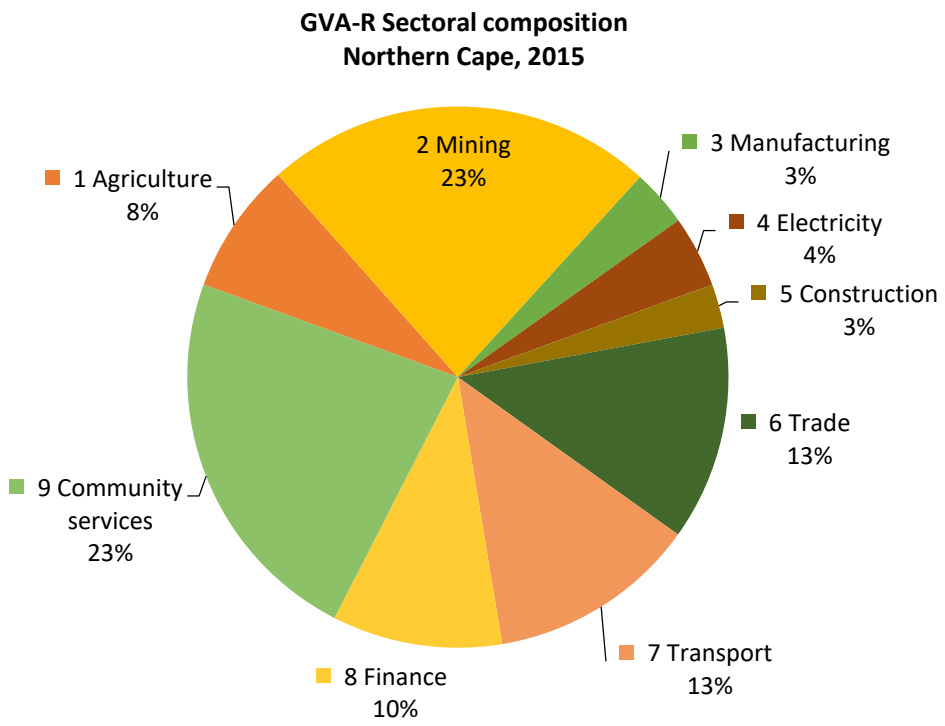
3 ECONOMIC SECTORS

The primary sector is referred to as the sector that solely depends on natural resources. The three main primary sectors discussed are: agriculture, forestry, mining and fishing. The secondary sector highly depends on the primary sector in order to produce manufactured products and goods. The tertiary sector provides services for the community, organisations and individuals. The real GVA is used to calculate the contribution made by each of the various industries within the respective districts.



Source: IHS Markit Regional eXplorer version 1029

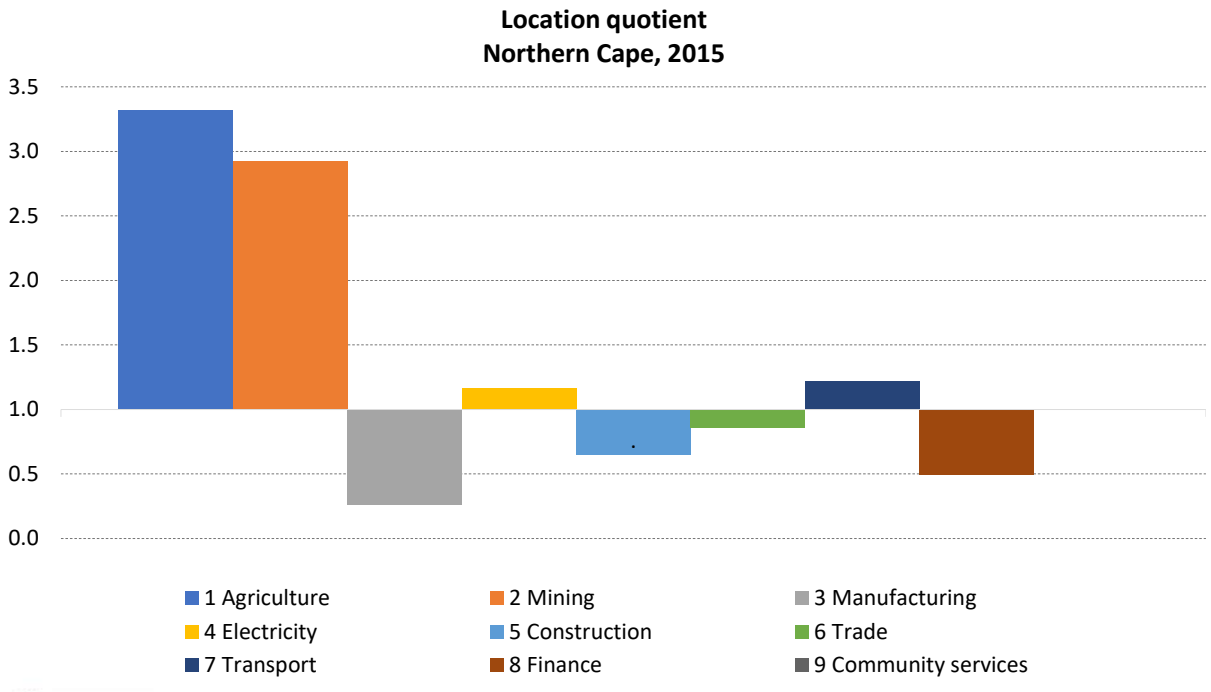
Graph 14: Regional Gross Value Added (GVA) composition per major economic sector – Northern Cape Province



IHS Markit

Source: IHS Markit Regional eXplorer version 1029

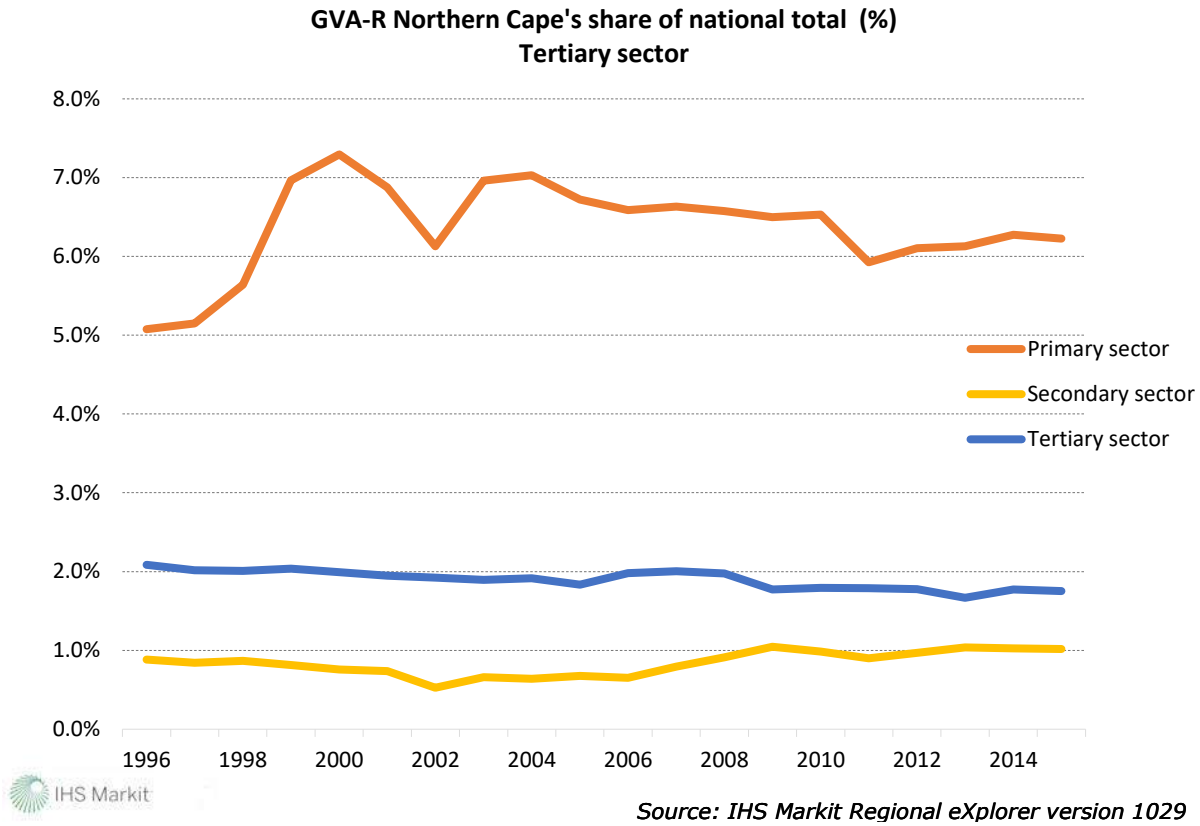
Graph 15: Regional Gross Value Added (GVA) composition per Economic Sector – Northern Cape Province



IHS Markit

Source: IHS Markit Regional eXplorer version 1029

Graph 16: Location quotient – Northern Cape Province, 2015



Source: IHS Markit Regional eXplorer version 1029

Graph 17:Regional Gross Value Added (GVA) contribution as part of the National share – Northern Cape Province, 2015

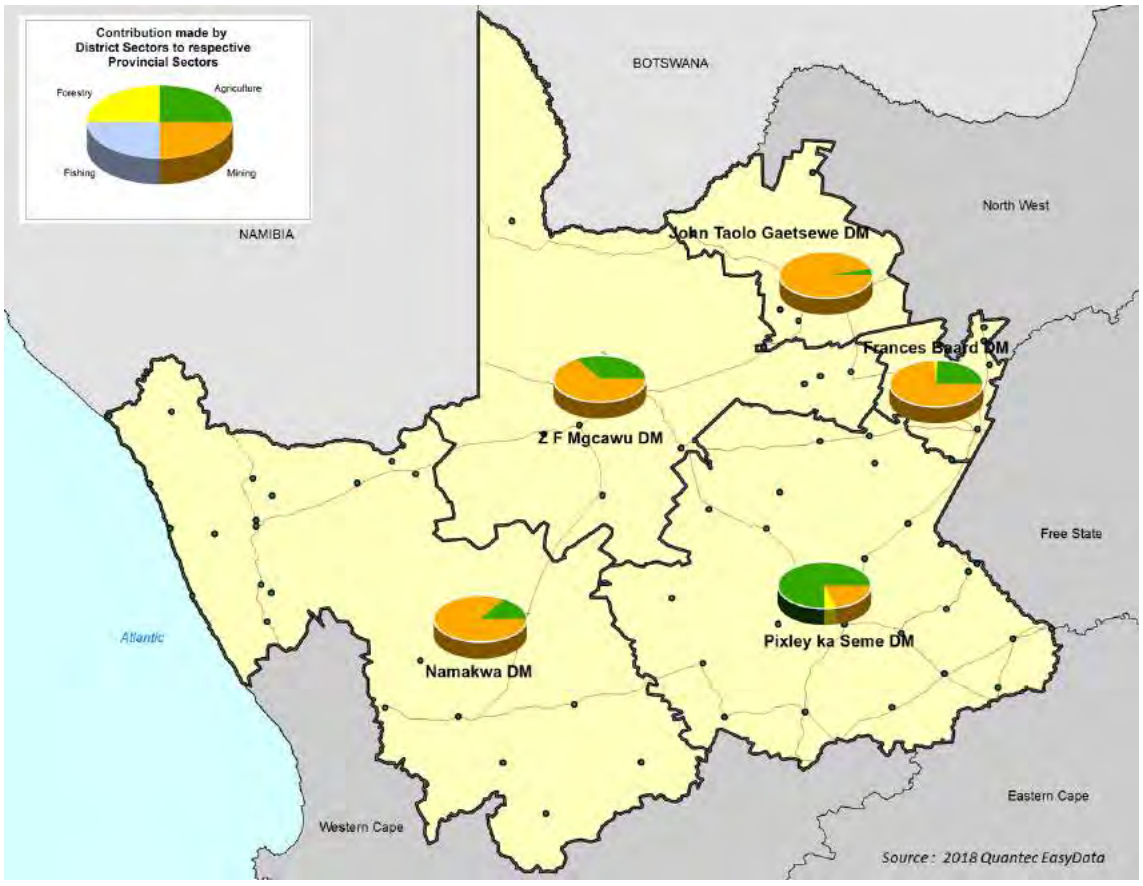


Figure 34: District contribution towards Primary Economic Sector of the Northern Cape

Key observation of economic sector activity/prominence:

- The secondary economic sector is the smallest, representing only 10% of the Northern Cape economy, indicating that there is a limited amount of production and manufacturing activities take place in the province.
- The largest economic sector is tertiary, due to large prominence of community service, governance and trade sectors, which mainly supports the primary sector.
- The primary sector holds a significant 31% of the Northern Cape economy due to the prominence of the agricultural and mining sectors of the province.
- According to the location quotient, the Northern Cape's comparative advantages lie in the Agriculture, Mining, Energy and Transport sectors, where agriculture is the most prominent of all. The full utilisation of the comparative advantages in the transport and energy sectors has not yet been achieved and should be aggressively pursued.
- The sector with the lowest level of comparative advantages, is that of manufacturing. This does not imply that manufacturing should not take place within the Northern Cape, but that it is most under-utilised economic sector within the province.
- Community services encompasses 23% of the total economy, indicating a heavy reliance on governmental services as a sector.
- The Mining sector contributes 23% to the Northern Cape economy, indicating a large reliance on the sector for employment and income for the Northern Cape population.
- Although the Northern Cape is well positioned regarding energy production, at this point is only contributes 4% to the total economy, indicating a sluggish up take of the opportunities regarding the generation and distribution of energy

Table 31: Standard Industrial Classification Index per Local Municipality has been derived using the GVA Mesozone,2009 data to determine the top three (3) economic sectors of each of the municipalities in the province. Kai Garib, Dawid Kruiper and Phokwane Local Municipalities dominate the Agricultural Sector, while Gamagara, Kgatlopele, Dikgatlong, Tsantsabane, Ga-Segonyana and Kamiesberg dominate the Mining Sector. Sol Plaatje Municipality presents a fairly strong manufacturing Sector with Phokwane and Dikgatlong providing further support in this sector. The community social and personal services which includes the government sector is very strong in all the Municipalities. The Northern Cape lacks economic diversity and this would necessitate further investment in sectors that would decrease the dependency on the three (3) major economic sectors.

Table 31: Standard Industrial Classification Index per Local Municipality

LM NAME	AGRICULTURE, FORESTRY AND FISHING	MINING AND QUARRYING	MANUFACTURING	ELECTRICY, GAS AND WATER SUPPLY	WHOLESALE AND RETAIL	TRANSPORT, STORAGE AND COMMUNICATION	FINANCIAL INTERMEDIATION, INSURANCE	COMMUNITY SOCIAL AND PERSONAL SERVICES	DOMINANT SECTOR
!Kheis LM	75	0	18	19	29	15	56	59	Agriculture, forestry and fishing
Kai! Garib LM	344	3	44	38	131	21	92	167	Agriculture, forestry and fishing
Dawid Kruiper LM	247	0	75	220	761	250	548	977	Community Social and Personal Services

LM NAME	AGRICULTURE, FORESTRY AND FISHING	MINING AND QUARRYING	MANUFACTURING	ELECTRICY, GAS AND WATER SUPPLY	WHOLESALE AND RETAIL	TRANSPORT, STORAGE AND COMMUNICATION	FINANCIAL INTERMEDIATION, INSURANCE	COMMUNITY SOCIAL AND PERSONAL SERVICES	DOMINANT SECTOR
Emthanjeni LM	10	0	24	28	212	61	409	530	Community Social and Personal Services
Hantam LM	8	0	6	16	67	25	140	217	Community Social and Personal Services
Kareeberg LM	1	0	6	0	34	34	19	114	Community Social and Personal Services
Karoo Hoogland LM	3	0	17	0	35	26	18	97	Community Social and Personal Services
Magareng LM	6	70	12	12	46	37	71	106	Community Social and Personal Services
Nama Khoi LM	40	174	24	27	365	156	301	731	Community Social and Personal Services
Phokwane LM	108	0	85	93	175	132	170	257	Community Social and Personal Services
Richtersveld LM	19	66	10	4	83	82	94	149	Community Social and Personal Services
Siyancuma LM	53	21	27	11	100	58	74	203	Community Social and Personal Services
Siyathemba LM	6	0	27	2	70	23	36	161	Community Social and Personal Services
Sol Plaatjie LM	24	80	152	59	1366	585	1659	3897	Community Social and Personal Services
Ubuntu LM	6	0	22	6	45	10	86	120	Community Social and Personal Services
Umsobomvu LM	6	0	23	6	84	26	84	155	Community Social and Personal Services
Renosterberg LM	5	0	9	30	14	17	60	55	Financial Intermediation, Insurance
Thembelihle LM	10	0	8	8	71	12	81	78	Financial Intermediation, Insurance
Dikgatlong LM	13	874	81	21	138	99	73	156	Mining and Quarrying
Gamagara LM	2	4851	11	14	175	82	159	256	Mining and Quarrying
Ga-Segonyana LM	4	696	45	28	381	71	216	675	Mining and Quarrying
Joe Morolong LM	18	204	0	43	26	50	9	167	Mining and Quarrying
Kamiesberg LM	2	320	1	1	42	21	40	152	Mining and Quarrying
Kgatelopele LM	2	1081	74	1	110	38	47	113	Mining and Quarrying
Tsantsabane LM	3	871	26	13	54	124	66	140	Mining and Quarrying
Khai-Ma LM	13	0	15	7	34	105	40	99	Transport, Storage and Communication

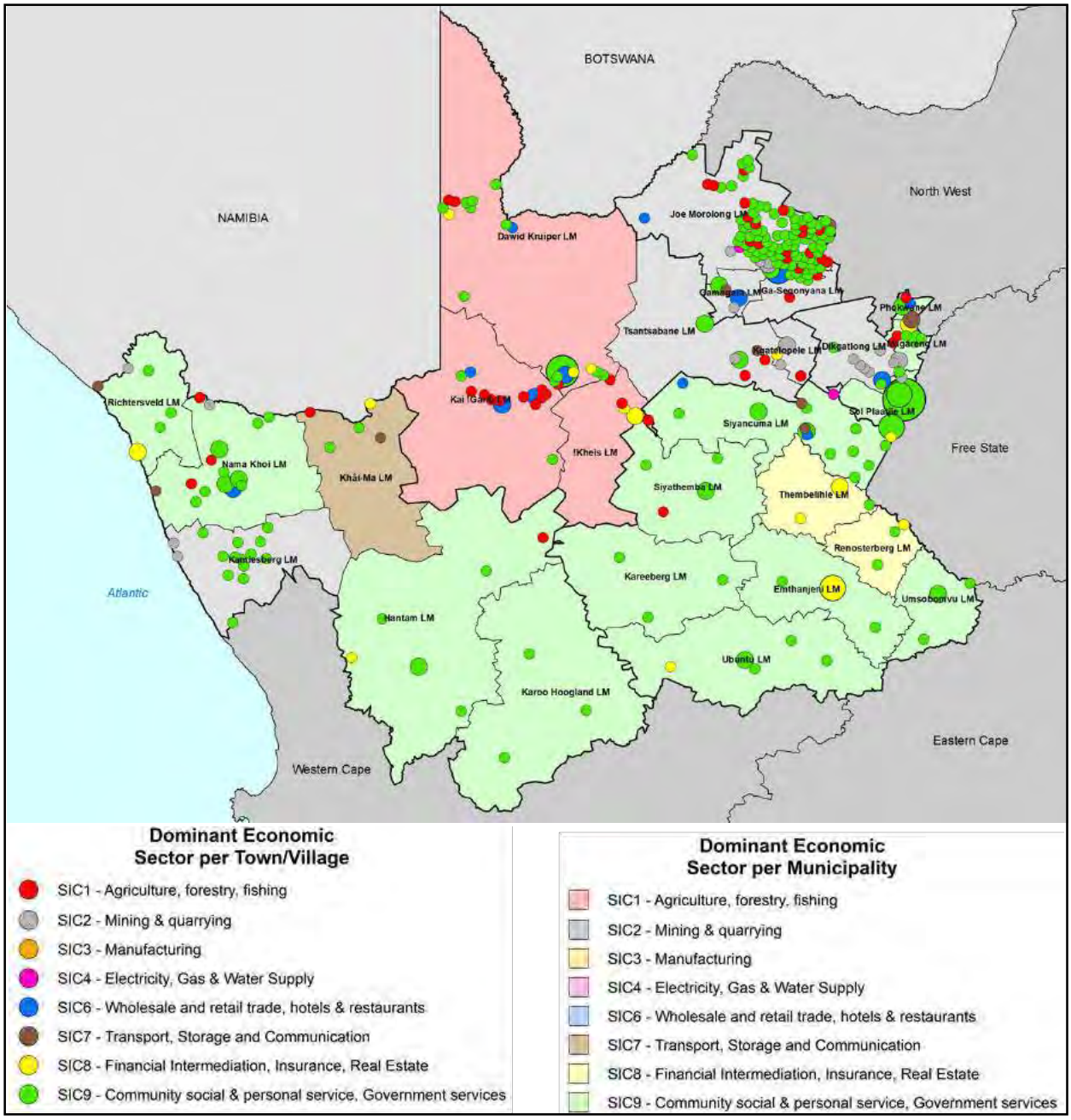
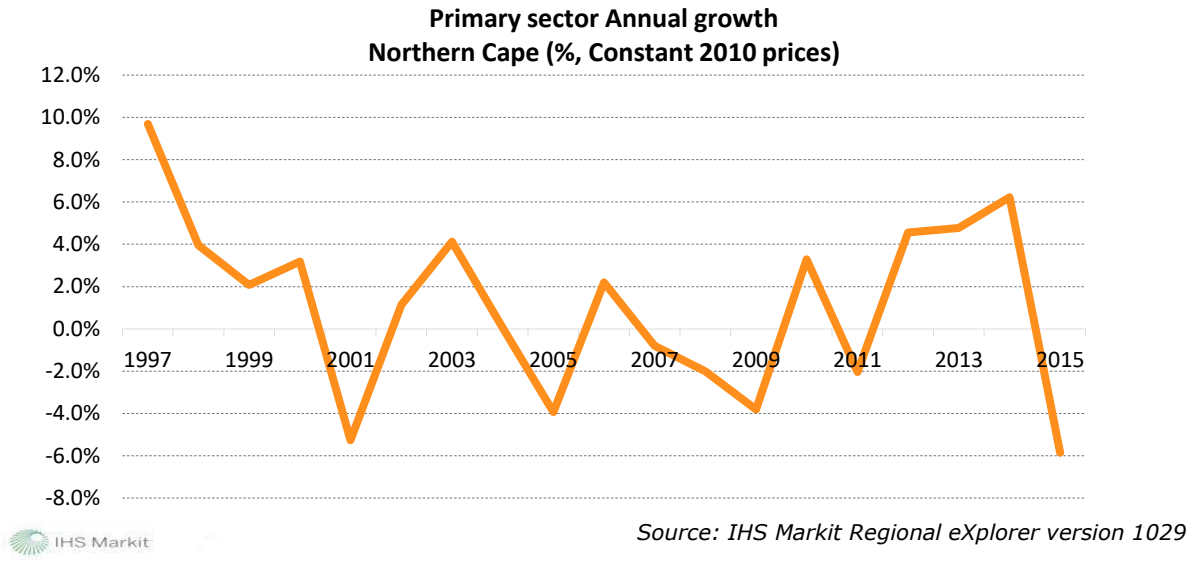


Figure 35: Dominant economic sectors per town/village - Northern Cape Province

Key observations of local economies:

- The largest portions of the Namakwa and Pixley ka Seme, local municipalities and towns main economic activity relates to community, social and personal services as well as government services.
- All the local economies within the John Taolo Gaetsewe DM relates to the mining and quarrying sector, as would be expected due to the high concentration of minerals and mines within the area

3.1 PRIMARY



Source: IHS Markit Regional eXplorer version 1029

Graph 18: Annual growth of the Primary Economic sector – Northern Cape Province, 2015

John Taolo Gaetsewe district contributes the majority (almost 45%) to the total Northern Cape primary sector GVA. This is followed by ZF Mgcawu contributing 21% of the total primary sector GVA of the Northern Cape[31].

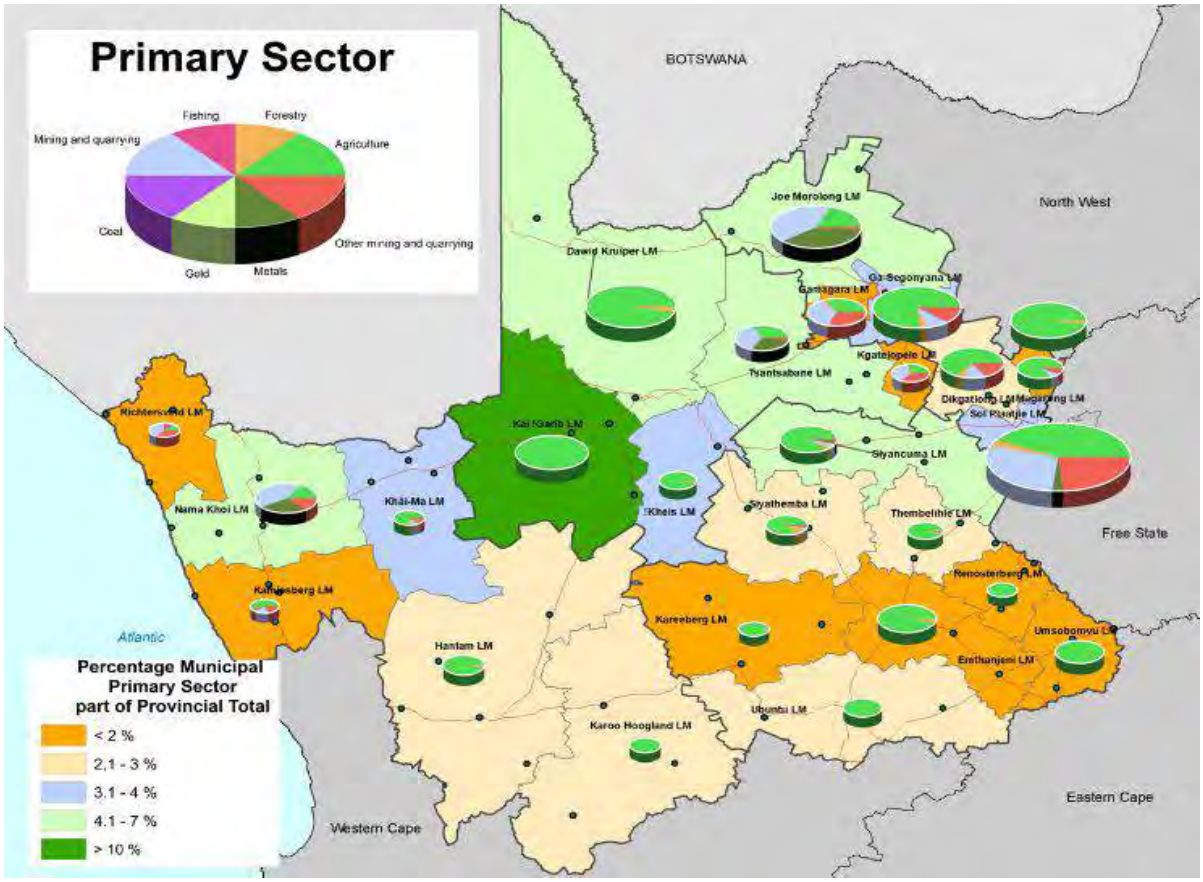


Figure 36: Primary Sector Contribution and percentage contribution per Municipality

[31] *Quantec data, 2017*

3.1.1 Agriculture and Forestry

On a provincial level, the agriculture industry contributes approximately 17.93% of the total of Northern Cape primary sector. In John Taolo Gaetsewe district the agricultural industry only contributes about 3% to the districts primary sector GVA. The agricultural industry in Namakwa contributes almost 14% to the total GVA of the district's primary sector. The agricultural industry makes a major contribution of 75% to the primary sector GVA in Pixley ka Seme district, however Pixley ka Seme makes a small contribution of only 5% to the total primary sector GVA in the province. The primary sector of ZF Mgcawu district makes the second largest contribution to the primary sector GVA in the province. The agricultural industry in this district makes a contribution of almost 36% to the total GVA of the district's primary sector. The agricultural industry in Frances Baard contributes almost 25% to the total GVA of the primary sector in the district, while the primary sector of Frances Baard District contributes 11% to the total GVA of the provincial primary sector9.

3.1.2 Mining

Mining and quarrying makes the largest contribution of about 81% to the total GVA of the provincial primary sector. Mining and quarrying also contributes the largest part of the total primary sector in all Northern Cape districts, except for in Pixley ka Seme where agricultural makes the largest contribution to the district's primary sector GVA. This industry contributes almost 97% of all primary sector activities in John Taolo Gaetsewe district, 85% of primary sector activities in Namakwa district. In Frances Baard and ZF Mgcawu districts, the mining and quarrying industry each makes a contribution of approximately 73% and 63% to the respective district's primary sector.

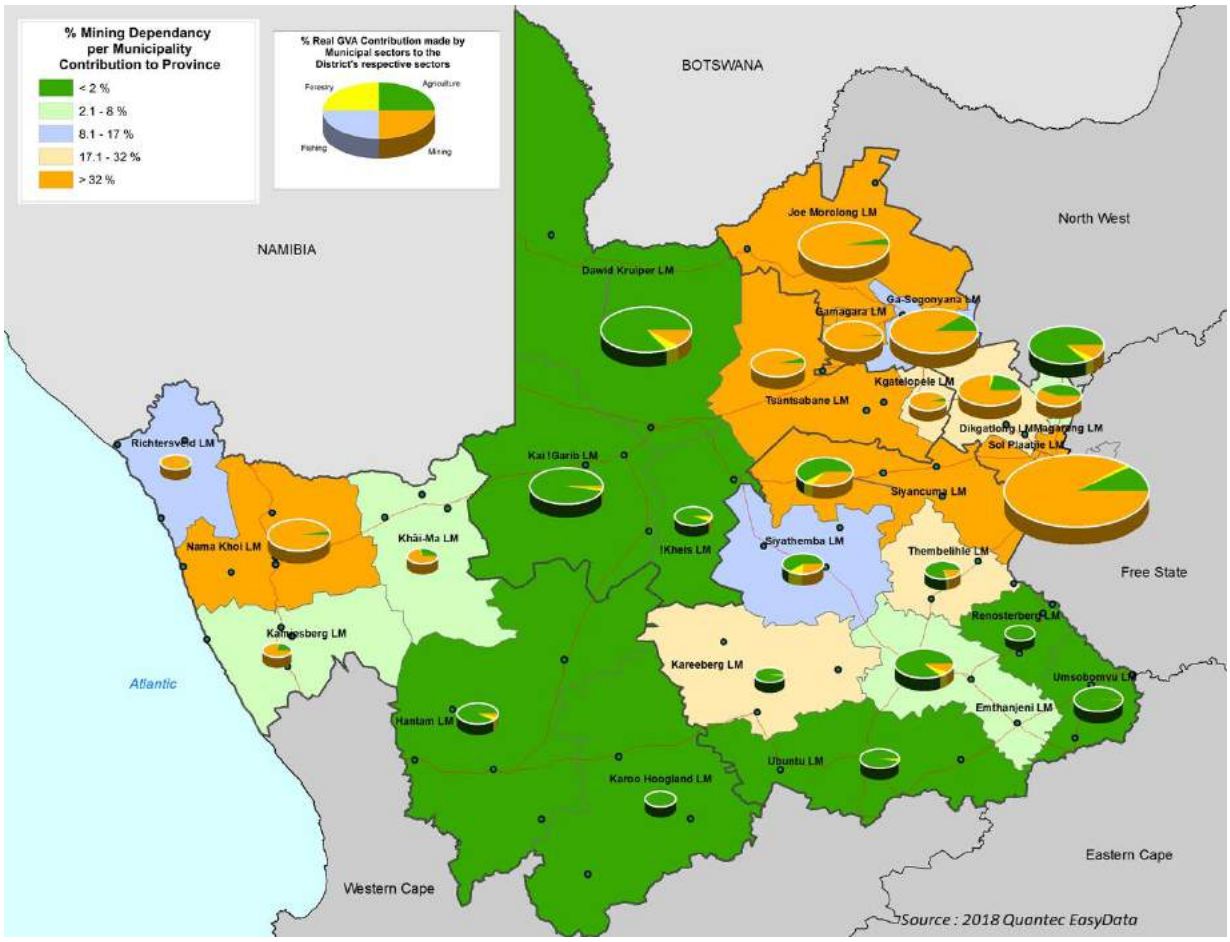
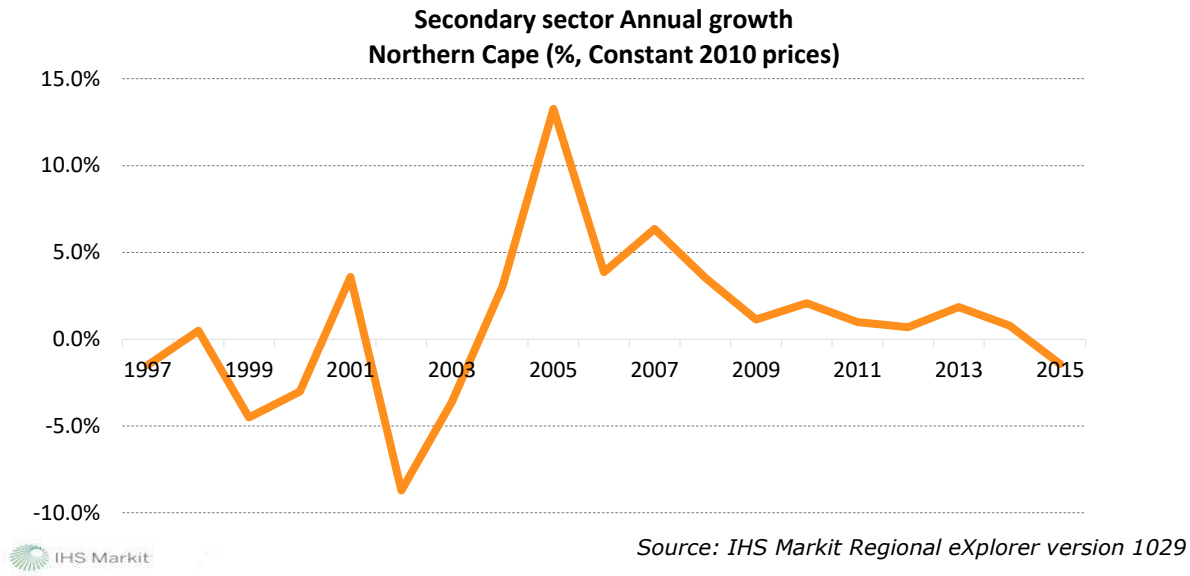


Figure 37: Level of dependency on the mining sector

3.1.3 Fishing

Fishing does not play major role in the primary sector economy in the Northern Cape and only makes a small contribution of 0.1% to the provincial primary sector GVA. Namakwa, Pixley ka Seme, ZF Mgcawu and Frances Baard districts each contributes 0.41%, 0.02% and 0.14% respectively to the district's primary sector GVA. The largest contribution made is by Namakwa districts, as it is also the district that touches the coast.

3.2 SECONDARY



Graph 19: Annual growth of the Secondary Economic sector – Northern Cape Province, 2015

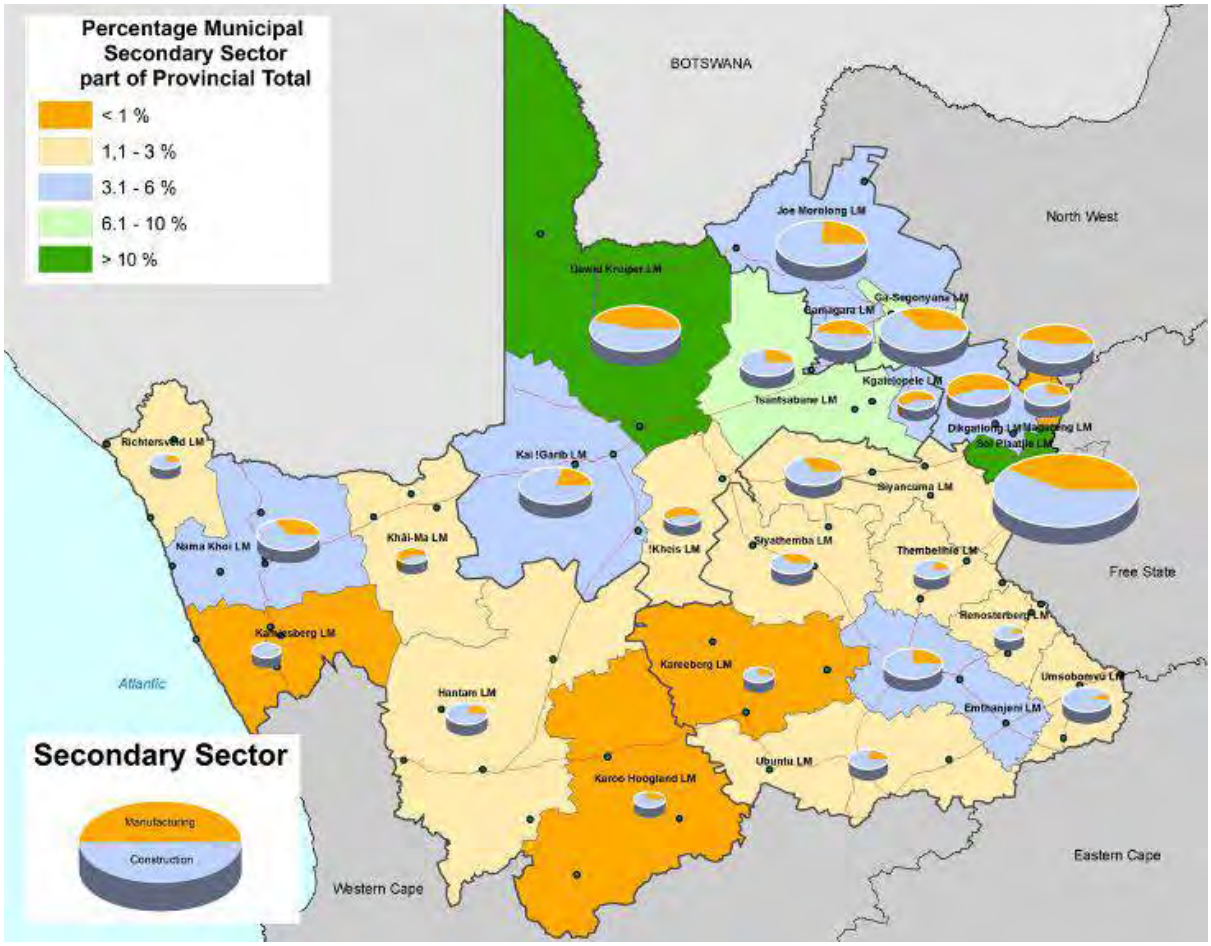


Figure 38: Percentage secondary sector contribution by type per Municipality

Frances Baard district makes the largest contribution of almost 36% to the provincial secondary sector GVA. This is followed by ZF Mgcawu district and John Taolo Gaetsewe district each making a contribution of 26.07% and 14.42% respectively to the total provincial secondary sector[32].

3.2.1 Manufacturing

Manufacturing contributes approximately 37% of the total provincial secondary sector GVA, also making it the industry with the largest contribution to the provincial secondary sector, even though that the secondary economic sector is the weakest. The manufacturing industry in ZF Mgcawu contributes about 42% to the district's secondary sector GVA. In Frances Baard district, the manufacturing industry contributes almost 40% to the district's total secondary sector. In John Taolo Gaetsewe, Namakwa and Pixley ka Seme districts, manufacturing contributes about 36%, 33% and 23% to each of the district's total manufacturing industry. Special Economic Zones are intended to attract new investments and promote economic development. Special Economic Zones (SEZs) are created in terms of the Special Economic Zones Act of 2014 (Act 16 of 2014). The act defines an SEZ as "geographically designated areas of the country that are set aside for specifically targeted economic activities, and supported through special arrangements and systems that are often different from

[32] *Quantec data, 2017*

those that apply to the rest of the country". Lower corporate tax rates and duty-free imports are among the advantages that accrue to investors.

South Africa is targeting a variety of sectors in SEZs around the country, but there is an emphasis on beneficiation, mainly of minerals but also of agricultural products. Policy-makers want South Africa to do much more with the product of its soils – using manganese to convert iron into steel or creating fruit juices out of apples and pears.

These interventions form part of broader trade and investment plans such as National Development Plan (NDP) and the Industrial Policy Action Plan (IPAP). The NDP is a broad-strokes plan that seeks to coordinate development in a range of sectors and promotes ambitious infrastructural projects.

In the context of the burgeoning renewable energy sector, the state (through the Department of Trade and Industry, DTI) can pass legislation that requires developers to increase the level of local content on the solar panels or wind turbines that are used. In this way, a totally new local industry can be created; and an SEZ would be the place to do it. Attracting foreign direct investment (FDI) and boosting employment are other objectives, together with skills transfer.

3.2.1.1 Upington SEZ

The 400ha site of the Upington SEZ in the Northern Cape Province is close to the Upington International Airport and is well served by access roads. One of the goals is to capitalise on the already existing (and fast-growing) solar power industry by promoting special investment packages to investors in that field and encouraging the development of skills and services to support that sector within the SEZ. The Dawid Kruiper Municipality has agreed to transfer the necessary land to the SEZ, and has approved the infrastructure plan that has been put forward. Airports Company South Africa (ACSA) is a partner in the project. A one-stop shop to help investors deal with paperwork will be established in the SEZ. The Upington SEZ presents the following investment opportunities:

- Solar energy;
- Aeronautics;
- Mining;
- Defence technology;
- Agro-processing;
- Astronomy;
- Microtechnology; and
- Incubator for manufacturing and high-value microtechnology

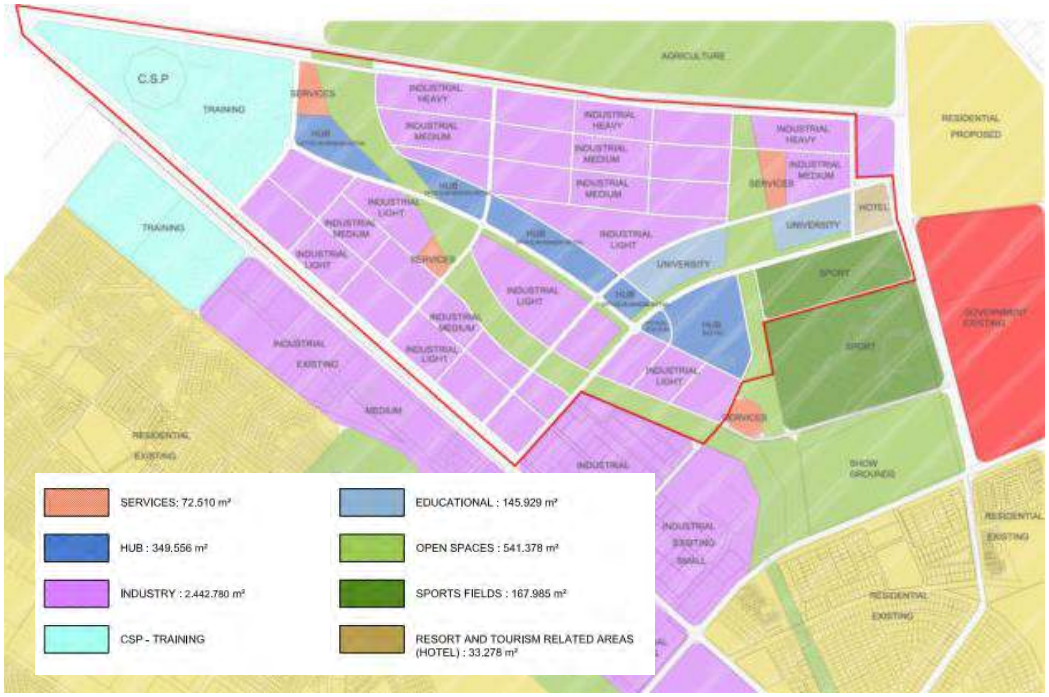


Figure 39: Upington special economic development zone land use allocation

3.2.1.1.1 SEZ vision and mission[33]

VISION STATEMENT	MISSION STATEMENT
To establish a world-class industrial hub to service the Southern African Development Community (SADC) region in the following sectors: ● Solar ● Mining ● Agriculture ● Aeronautics ● Defence technology ● Astronomy	To offer investors sound investment opportunities and support in the fields of: ● Solar-component manufacturing, maintenance and assembly ● Mining equipment manufacturing and assembly ● Agro-processing ● Aircraft assembly ● Solar and astronomy-related logistics, assembly and warehousing ● High-value micro-technology production (solar, electronic, robotic, astronomical, programming)

3.2.1.2 Metal manufacturing

John Taolo Gaetsewe District Municipality has the highest metal manufacturing concentration. The mining sector is strongly represented in this area, where the activities are concentrated around Kuruman, Kathu, Hotazel. The Kgatelopele and Tsantsabane local municipalities also represents large concentration of mining and metal manufacturing activities, especially in the Postmasburg, Olifantshoek and Danielskuil areas.

3.2.1.3 Clothing manufacturing

Clothing manufacturing activities are mainly found in the Frances Baard District Municipality, more specifically within Kimberley, Jan Kempdorp, Warrenton. The existing diamond beneficiation projects

[33] https://www.upington-sez.co.za – *Providing more detail in terms of the Upington SEZ and programs planned.*

that exist in Kimberley were recently boosted by the signing of Memorandums of Understanding with Turkey and India for diamond cutting and polishing as well as jewellery manufacturing at the Kimberley International Diamond and Jewellery Academy (KIDJA).

3.2.1.4 Agri-processing

Agri-processing activities are mainly found in the ZF Mgcawu District Municipality, due to the production and processing of wine, grapes and raisins, animal hides and abattoirs along the Orange River. The activities are concentrated is the following areas: Groblershoop, Kakamas, Upington where dates, olives, citrus and rooibos tea are seen as sectors with great potential to grow.

3.2.2 Construction

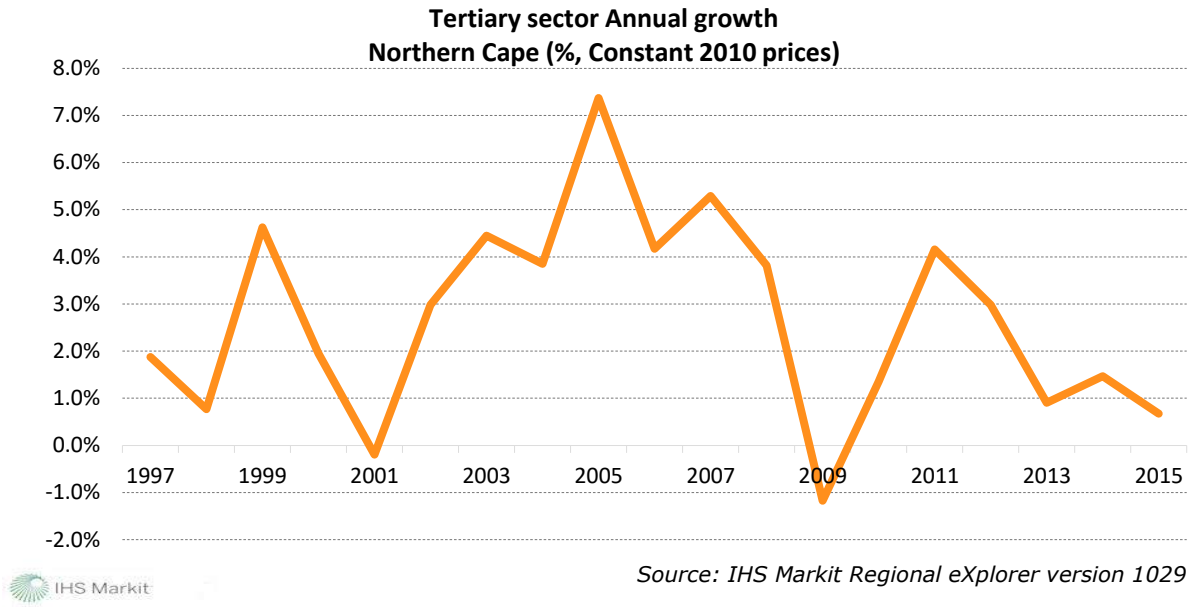
The Northern Cape construction industry contributes about 30% to the total provincial secondary sector. The construction industry of Frances Baard and ZF Mgcawu districts makes the largest contributions of 28% and 25% respectively, to the provincial construction industry. However, the construction industry of the two districts make the smallest contribution to the construction industry on the district level. The construction industries for John Taolo Gaetsewe, Namakwa and Pixley ka Seme districts makes a contribution of approximately 35% to each of the respective district's secondary sector. In Namakwa, the construction industry makes the largest proportional contribution to the secondary sector.

3.2.3 Utilities

This sector includes the supply of electricity; the production, collection and distribution of electricity; the manufacturing and distribution of gaseous fuels through mains; supply of water; and the collection, purification and distribution of water.

According to the Northern Cape Renewable Energy Strategy (NCRES, 2013), the province aims to become a net exporter of green electricity by 2020. The realisation of this vision is subject to the attainment of a number of milestones, as set out in the NCRES, 2013. The Northern Cape has prepared the Renewable Energy Strategy, to take advantage of the significant potential in the Province to develop renewable energy sources. More specifically, the Northern Cape has the largest prospects for harnessing solar energy, especially at utility-scale. This implies that, in line with the objectives set in the Province's Renewable Energy Strategy, a large number of advances will need to take place in the Northern Cape in terms of renewable energy development.

3.3 TERTIARY



Source: IHS Markit Regional eXplorer version 1029

Graph 20: Annual growth of the Tertiary Economic sector – Northern Cape Province, 2015

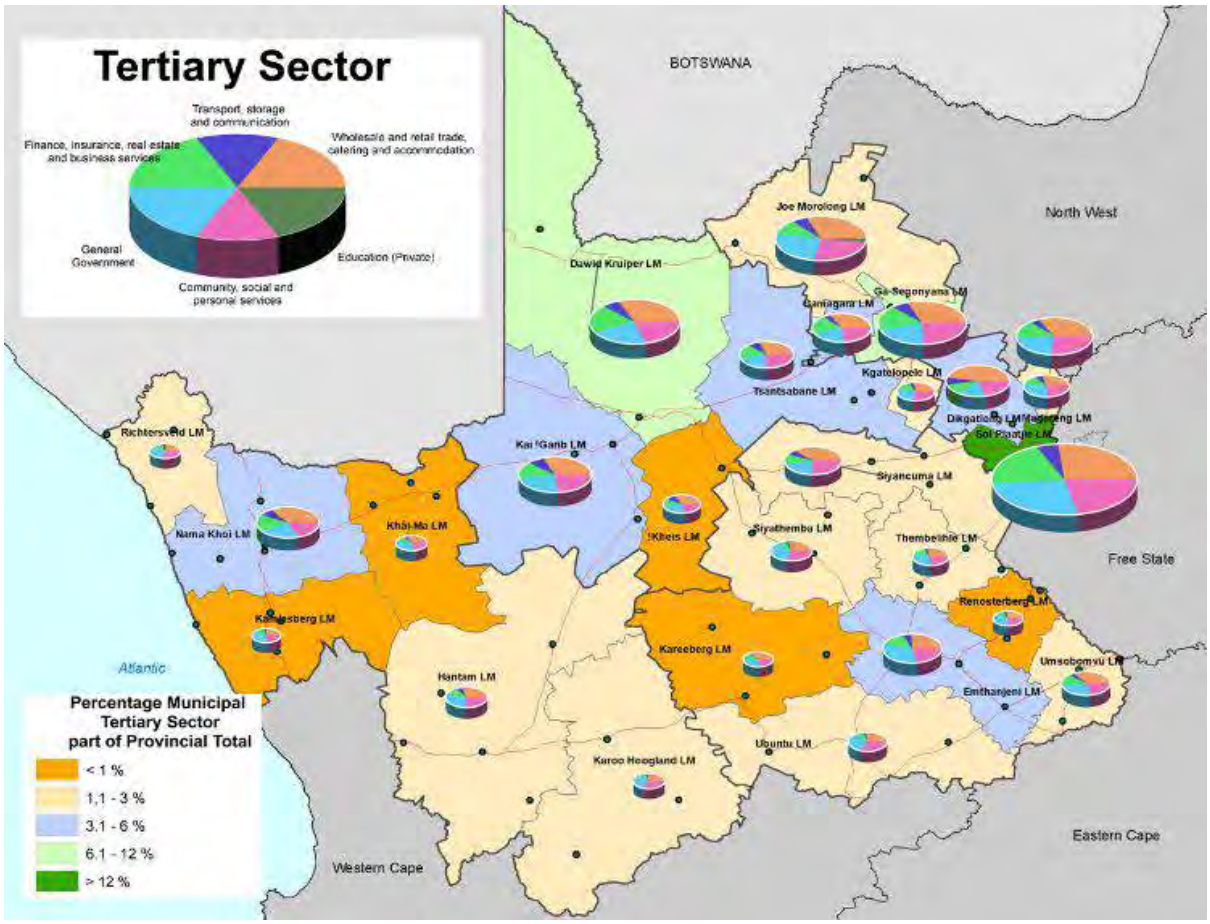


Figure 40: Tertiary sector contribution and percentage contributed per Municipality

The main tertiary sectors discussed within this section are: transport and storage, finance and insurance, education (private) and health and social work. The tertiary sector of Frances Baard district makes the largest contribution, of 42%, to the provincial tertiary sector. This is followed by the tertiary sector of ZF Mgcawu contributing 21% to the Northern Cape tertiary sectors[34].

3.3.1 Finance

The finance and insurance sector contribute 7% to the total of the provincial tertiary sector. Frances Baard district makes the largest contribution of almost 47% to the provincial finance and insurance sector, which is more than double of the contribution made by ZF Mgcawu district (20%). Despite the large contribution made to the provincial finance and insurance industry, this industry only makes a small contribution of 8% and 7% to Frances Baard and ZF Mgcawu districts' respective tertiary sectors. The finance and insurance industries in John Taolo Gaetsewe, Namakwa and Pixley ka Seme districts make a contribution of 6%, 6% and 7% to the respective tertiary sectors in each district.

3.3.2 Transport and storage



Transport and storage in the Northern Cape contributes about 13% to the total tertiary sector in the province. Frances Baard district contributes the largest proportion of almost 41% to the provincial transport and storage industry, followed by ZF Mgcawu district making a contribution of 25% to the provincial transport and storage industry. John Taolo Gaetsewe, Namakwa and Pixley ka Seme districts contribute the remaining 34% of the provincial transport and storage sector. The contribution made by transport and storage industry to the tertiary sector in each of the respective districts, ranges between 11% to 15%.

3.3.3 Health and Social work

A small contribution of 2.16% is made by the health and social work industry to the provincial tertiary sector. The Frances Baard health and social work industry makes the largest contribution (48%) to the provincial health and social industry. Falling far behind is the contribution made by ZF Mgcawu district

[34] *Quantec data, 2017*

of 16,5%. John Taolo Gaetsewe, Namakwa and Pixley ka Seme districts contributes the remaining 35.5% of the total provincial tertiary sector. The private sector health and social work industry within all districts, contributes all 2% to each of the tertiary sectors within the respective districts. The high concentration of public and private health care and social facilities within Kimberley is most likely causing the prominence of the Frances Baard DM regarding the contribution to the tertiary section. Due to the limited availability of health service within the more rural districts, their contribution will be expected to be limited.

3.3.4 Education

The education sector contributes only approx.2% of the total provincial tertiary sector. The education industry of Frances Baard makes the largest contribution (38.5%) to the provincial education industry, like due to the high population concentration and the presence of the Sol Plaatje University within Kimberley. ZF Mgcawu makes the second largest contribution of almost 19% to the provincial education industry. Due to the rural nature of the remaining three districts, and the difficulty faced with skill retention within the educational structures, the remaining 42.5% of the provincial education sector is jointly contributed by John Taolo Gaetsewe, Namakwa and Pixley ka Seme districts[35].

3.3.5 Trade and Investment

The trade sector entails wholesale and trade commission; retail trade; repair of personal household goods; sale, maintenance and repair i.e. motor vehicles; hotels, restaurants, bars, canteens, camping sites and other provision of short-stay accommodation.

The tourism industry generally spans across various economic sectors, ranging from accommodation and catering, retail and wholesale, manufacturing, business services and social services. For the purpose of classification, it is captured under trade.

The vast geography of the Northern Cape and natural wonders, combined with the rich culture and heritage the Northern Cape, offers a unique holiday destination for the adventurous, seeking unspoilt nature combined with luxury. This is planned to be accentuated by the Kimberley Adventure Resort that will cater to all adventure seekers.

The potential for tourism extends across the province and is based on the natural splendour combined with the critical infrastructure, the latest addition is the Northern Cape MICE strategy that focus on business and conferencing related tourism.

[35] *Quantec data, 2017*

4 INTERNATIONAL RELATIONS

4.1 BRICS INITIATIVE

The composition of the BRICS export basket has changed significantly over time, with the contribution made by capital goods exports have risen from 13.4% of the total in 2001 to 23.6% by 2014. Consumption goods, in return, saw their share of overall BRICS exports decline from 33.2% to 26.7%, whilst that of raw materials also declined from 15.3% to 13.6% during the same period. A gradual shift has taken place in the manufacturing sector in the BRICS economies, from labour-intensive to progressively capital-intensive manufacturing.

Manufacturing exports experienced the most drastic changes in China and India. The structure of exports in both countries has shifted from labour-intensive and low-tech products such as food and beverages and textiles to more capital-intensive and high-tech products such as metal products, machinery and electrical equipment in China and chemicals in India. Similar changes in the structure of manufacturing exports have taken place in Brazil and South Africa, with transport equipment, machinery, and electrical equipment making up the bulk of exports. In the Russian Federation, by contrast, the composition of manufactured exports has not changed much, with a high concentration of capital-intensive goods.

South Africa's exports to the BRICS collectively have been largely dominated by minerals and beneficiated products, with iron ore exports representing almost one-third of the export basket. Centrifuges, which claimed 4% of the export basket in 2001, represented a mere 1.7% share by 2014.

China is the primary destination for South Africa's iron ore exports and, as indicated in ***Table 32*** below, this product category topped the list of exports destined for this Asian giant in 2014. Coal products, in turn, dominated the export trade with India and Brazil, whilst vehicles for the transportation of goods led the list of export products sold in the Russian market. Although relatively smaller, the export baskets destined for Brazil and Russia were more diverse and included higher value-add products.

Table 32: South Africa's leading export categories to other BRICS countries (in order of importance)

BRAZIL	RUSSIA	INDIA	CHINA
Coal; briquettes, ovoid's and similar solid fuels manufactured from coal	Trucks, motor vehicles for the transport of goods	Coal; briquettes, ovoid's and similar solid fuels manufactured from coal	Iron ores and concentrates, including roasted iron pyrites
Insecticides, fungicides, herbicides packaged for retail sale	Citrus fruit, fresh or dried	Ferrous waste and scrap; re-melting scrap ingots or iron or steel	Coal; briquettes, ovoid's and similar solid fuels manufactured from coal
Polymers of propylene or of other olefins, in primary forms	Manganese ores and concentrates etc.	Iron ores & concentrates; including roasted iron pyrites	Chromium ores and concentrates
Aluminium plates, sheets and strip, of a thickness exceeding 0.2mm	Apples, pears and quinces, fresh	Manganese ores and concentrates etc.	Ferro-alloys
Flat-rolled products of stainless steel (width >/= 600mm)	Wine of fresh grapes	Diphosphorus pentoxide; phosphoric acid and polyphosphoric acids	Manganese ores and concentrates etc.
Ferro-alloys	Grapes, fresh or dried	Unwrought aluminium	Petroleum oils
Flat-rolled iron and steel products	Radar apparatus, radio navigational apparatus and	Ferro-alloys	Niobium, tantalum, vanadium or zirconium ores and concentrates

BRAZIL	RUSSIA	INDIA	CHINA
(width>/=600mm), clad, plated or coated	radio remote control apparatus		
Engines, spark-ignition reciprocating or rotary internal combustion; pistons	Machinery for sorting/screening/washing; agglomerating/shaping mineral products	Chemical wood pulp, dissolving grades	Platinum, unwrought or in semi manufactured forms
Acyclic hydrocarbons	Flat-rolled products of stainless steel	Diamonds, not mounted or set	Copper waste and scrap
Unsaturated acyclic and cyclic monocarboxylic acid and anhydrides, halides	Chromium ores and concentrates	Aluminium waste and scrap	Wool, not carded or combed

Source: IDC, compiled from International Trade Centre data

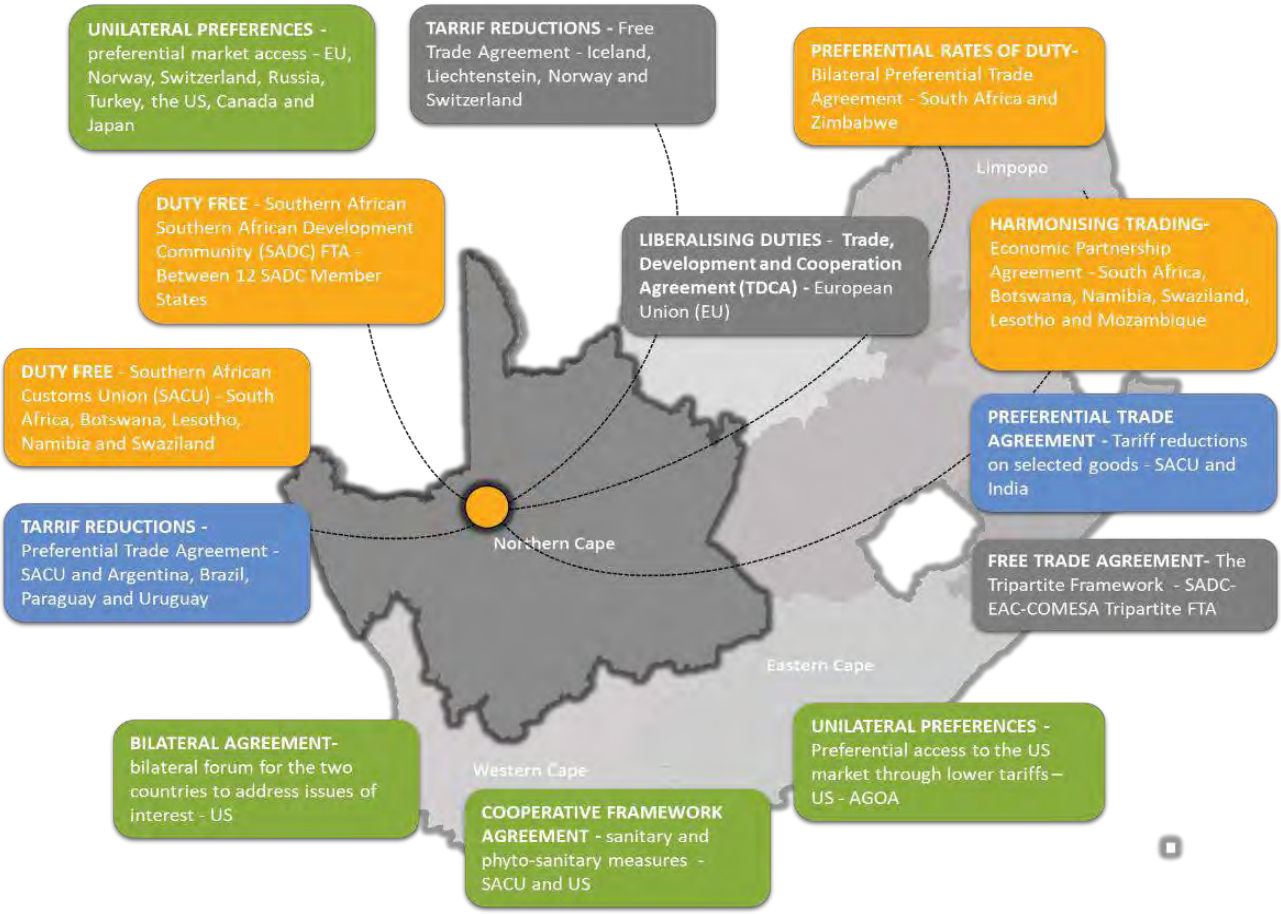


Figure 41: BRICS Trade agreements affecting the Northern Cape Province

4.2 AFRICAN UNION

South Africa's trade and industrial policy is moving away from a highly protected, inward looking economy towards an internationally competitive economy, capitalising on its competitive and comparative advantages. For years, South Africa's ability to trade with the outside world was severely limited by the sanctions placed on the country. South Africa's economy is still largely reliant on the export of primary and intermediate commodities to industrialised countries. However, manufactured goods account for approximately 70 percent of exports to Africa. Net gold exports are responsible for a large part of foreign exchange earnings. Earnings from this resource, however, fluctuates with the shifting international gold price, making it a relatively volatile market. Imports mainly consist of capital goods, raw materials, semi-manufactured goods (approximately 76 percent of total trade imports), and consumer commodities. South Africa maintains formal trade relations with various countries by means of treaties, trade agreements, and membership in international trade institutions. The centrepiece of South Africa's foreign economic policy is the Southern African Development Community (SADC), comprising Angola, Botswana, the Democratic Republic of Congo (DRC), Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Tanzania, Zambia, and Zimbabwe. The government's key policy objective is to strengthen trade and investment linkages between South

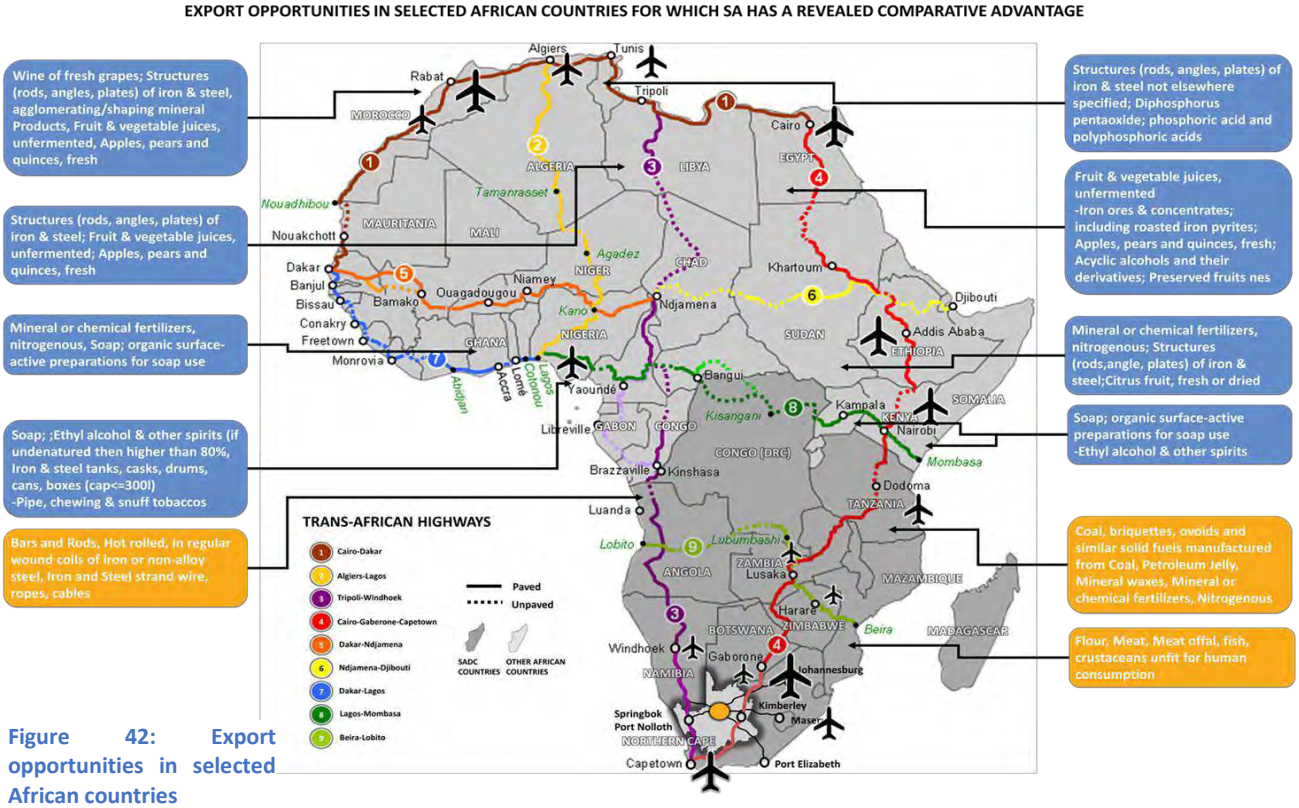


Figure 42: Export opportunities in selected African countries

The Northern Cape is well positioned to access the Tripoli-Windoek and Cairo-Gaberone-Cape Town Trans African Highways. A comparative advantage for iron/steel products, fruit and vegetable juice, fish and related products, meat offal, dried fruits and wine and spirits are presented for the Northern Cape Province





CHAPTER 5 – **SOCIAL** outlines the key social activities, opportunities and challenges faced in the Northern Cape Province. A strong spatial representation was followed

CHAPTER 5

Status Quo Analysis - Social

CHAPTER 5| SOCIAL ANALYSIS

1 SOCIAL INFOGRAPHIC

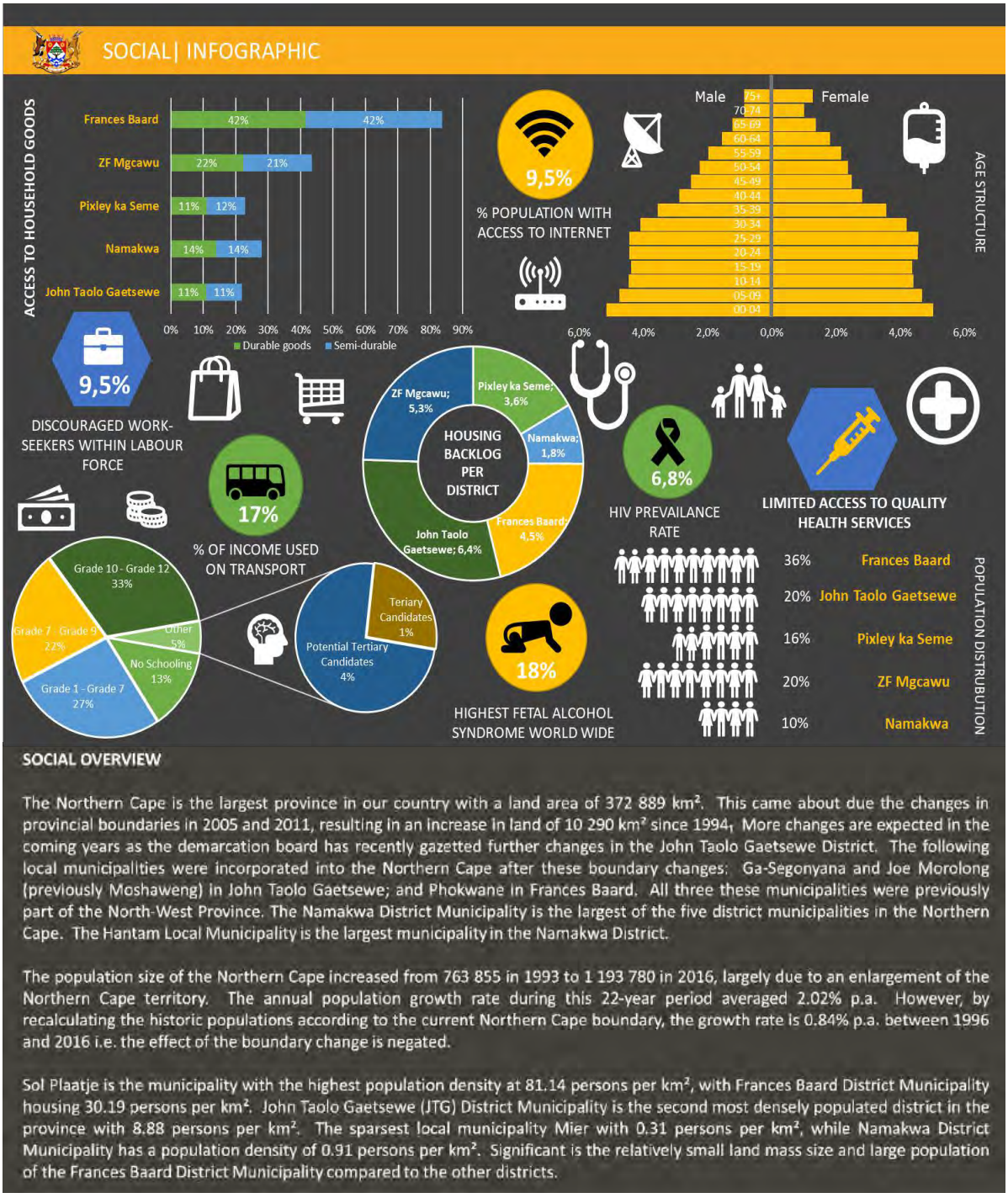


Figure 43: Infographic – Social overview of the Northern Cape Province

2 SOCIAL OVERVIEW

2.1 POPULATION

2.1.1 Population growth

Error! Reference source not found. represents the population growth rates per district, as reported by the (IHS MarkIT[36], 2017). Contextually, the John Taolo Gaetsewe and the Frances Baard district municipalities have the highest population growth rates in the province, of 1.8%. This notable growth in the population of the two district is not of great surprise given the dynamics at play in the said regions. In the Frances Baard region, the 1.8% population growth rate could be due to the increase in the number of migration into the district, from within the province and beyond. The increase in the migration[37] levels could partially be attributed to the vast economic opportunities presented by the district, as it hosts the Provincial Legislature and all provincial government departments, as well as the being the host of the Sol Plaatje Municipality, in which the provincial capitol (Kimberley) is situated in. The establishment and construction of the Sol Plaatje University has also led to an increase in the population both students (in the province and across South Africa) and professionals[38]. In 2007, the population of the district was over 335 000 and increased by over forty-five thousand (i.e. 45 053) people, to be at 380 185 in 2016.

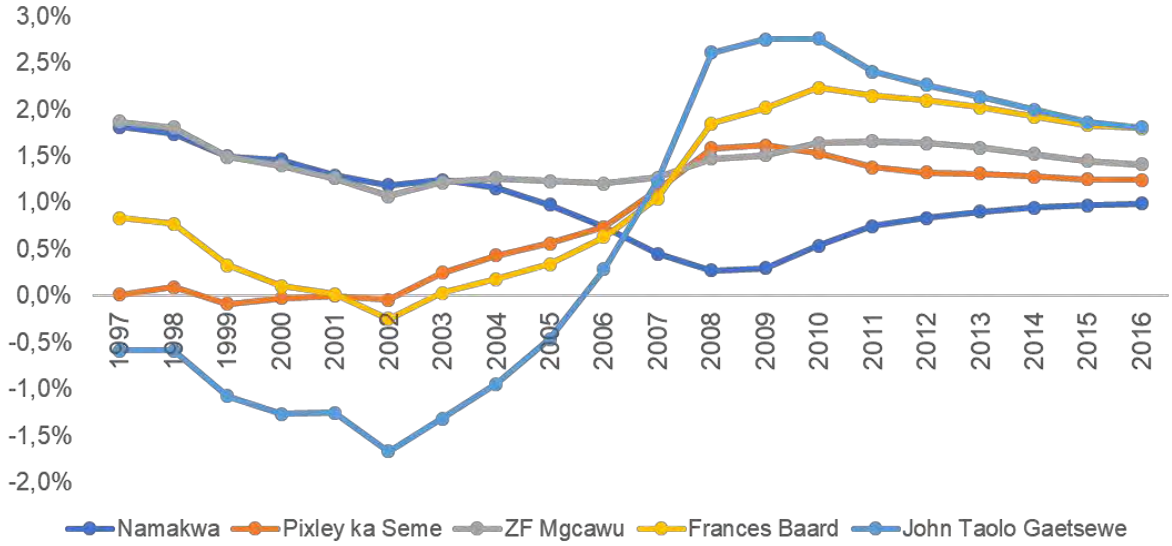


Figure 44: Population change per municipality 2012-2017

Whilst in the case of the John Taolo Gaetsewe district municipality, the district is the fastest growing region in the province, in terms of population size. The rapid economic growth experienced is in the main attributable to the burgeoning mining sector in the district. As such, the population growth can be attributed to the in-ward migration by the productive and reproductive age population to toil in the mining sector. In 2007, the population of the district was over 186 000 and increased by over forty-two thousand (i.e. 42 111) people, to be at 228 681 in 2016. The gradual increase in the population

[36] IHS Markit (Nasdaq: INFO) is a world leader in critical information, analytics and solutions for the major industries and markets that drive economies worldwide

[37] The migration in the context of this analysis is in the main related to the phenomenon of economic migration and thus tends to be people of productive and reproductive age.

[38] Professionals in this regard relates to the number of Academics (i.e. Lecturers and Professors) and non-academic staff (this includes those managing the institution and support services).

growth figures of the province could see the province population reaching the 1.2 million (i.e. 1 200 705) mark in 2017, if the forecast by Statistics South Africa is anything to go by. In the outer year (i.e. 2021) of the forecast period, StatsSA predicts that the provincial population will be around 1 233 820. **Figure 45** presents the population change per municipality to give an indication of the migration patterns as well as the areas that show growth and decline.

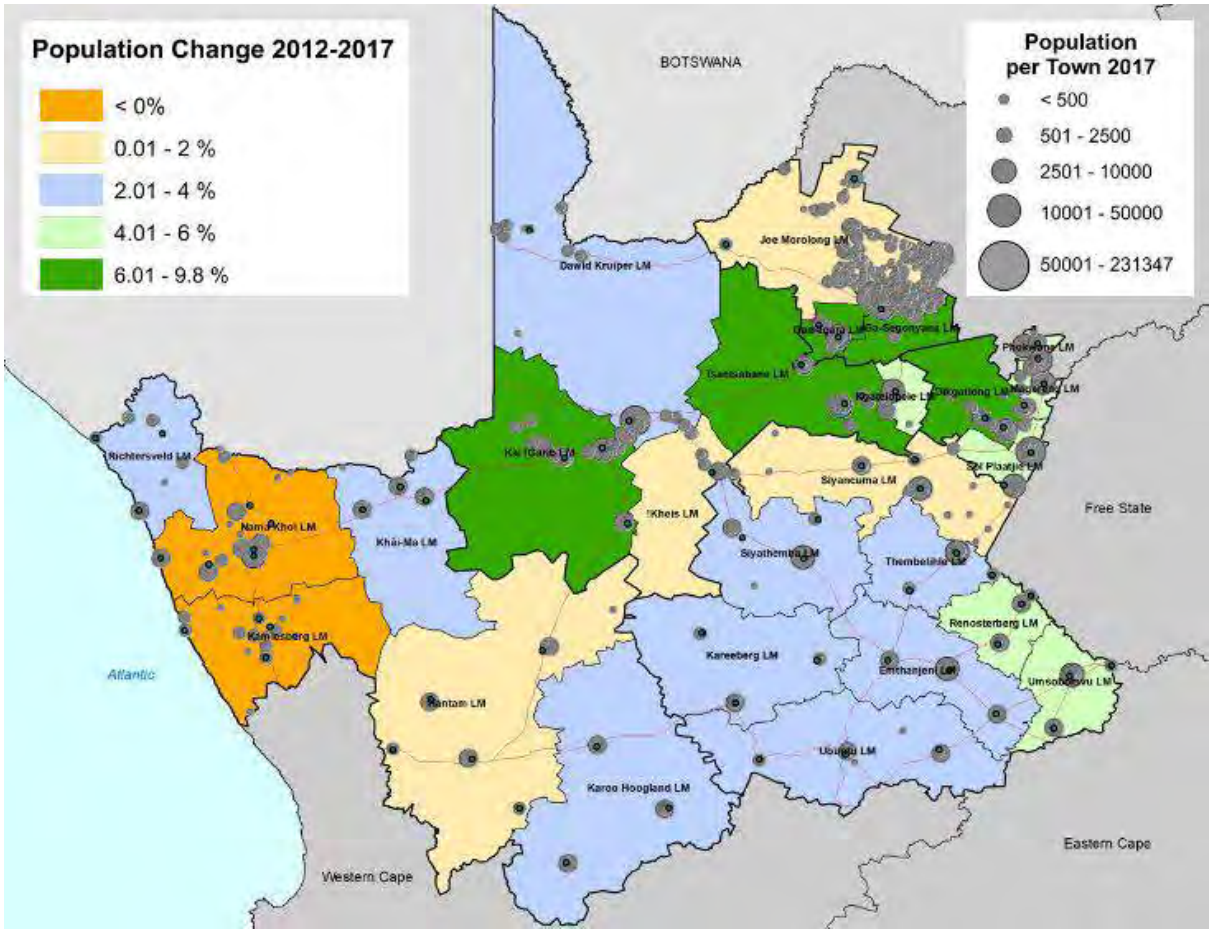


Figure 45: Population change per municipality 2012-2017

2.1.2 Population group comparison

Figure 46 reflects the population per Municipality based on the population group composition. A noticeably higher concentration of Africans, is evident towards the John Taolo Gaetsewe district. This area is encumbered with many traditional areas where most of the population resides. The John Taolo District is also one of the fastest growing regions, due to the intensive mining activities, also resulting in a higher level of migration (from districts, neighbouring provinces and countries) towards the Kuruman region, which further contributes to the higher concentration of the African race within the district.

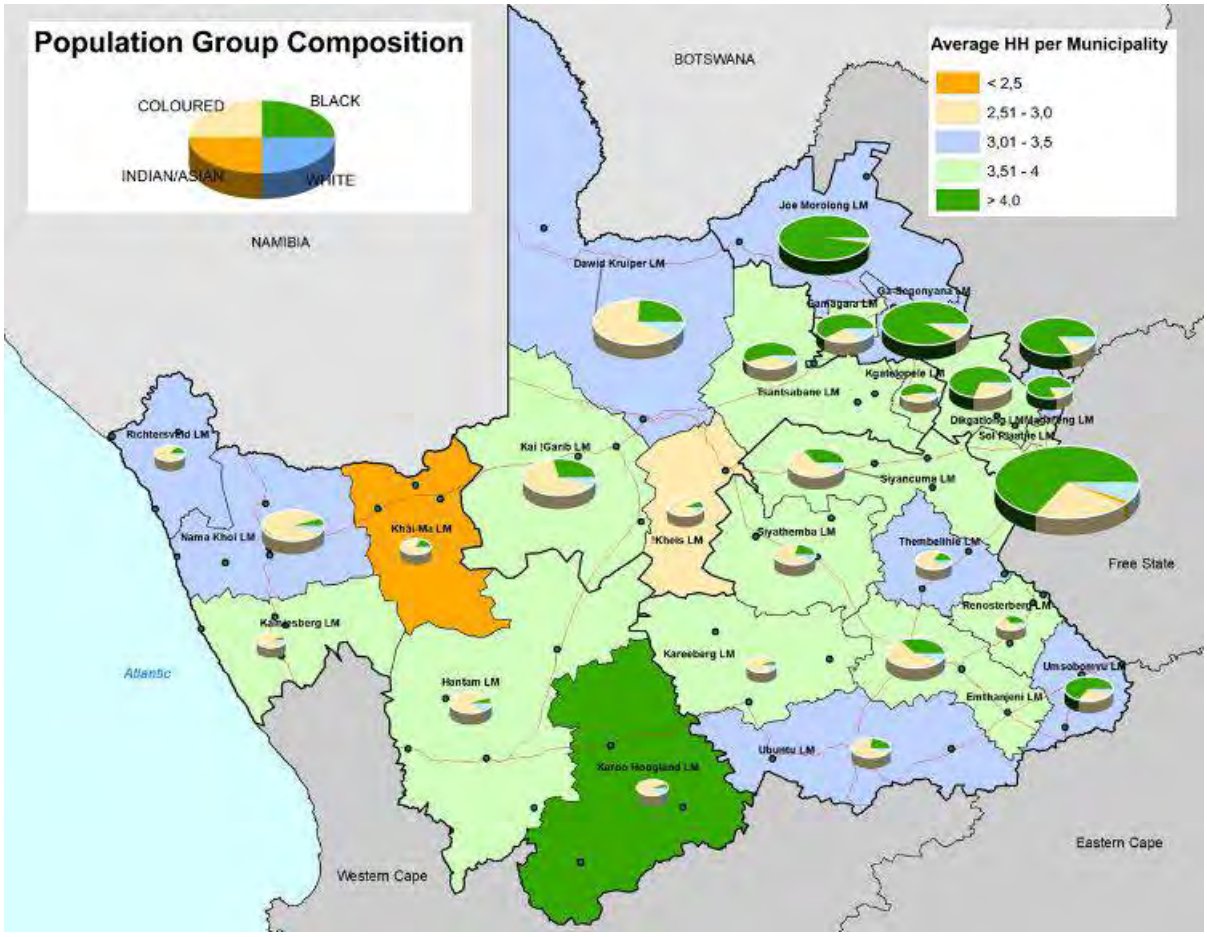


Figure 46: Population group composition per Municipality

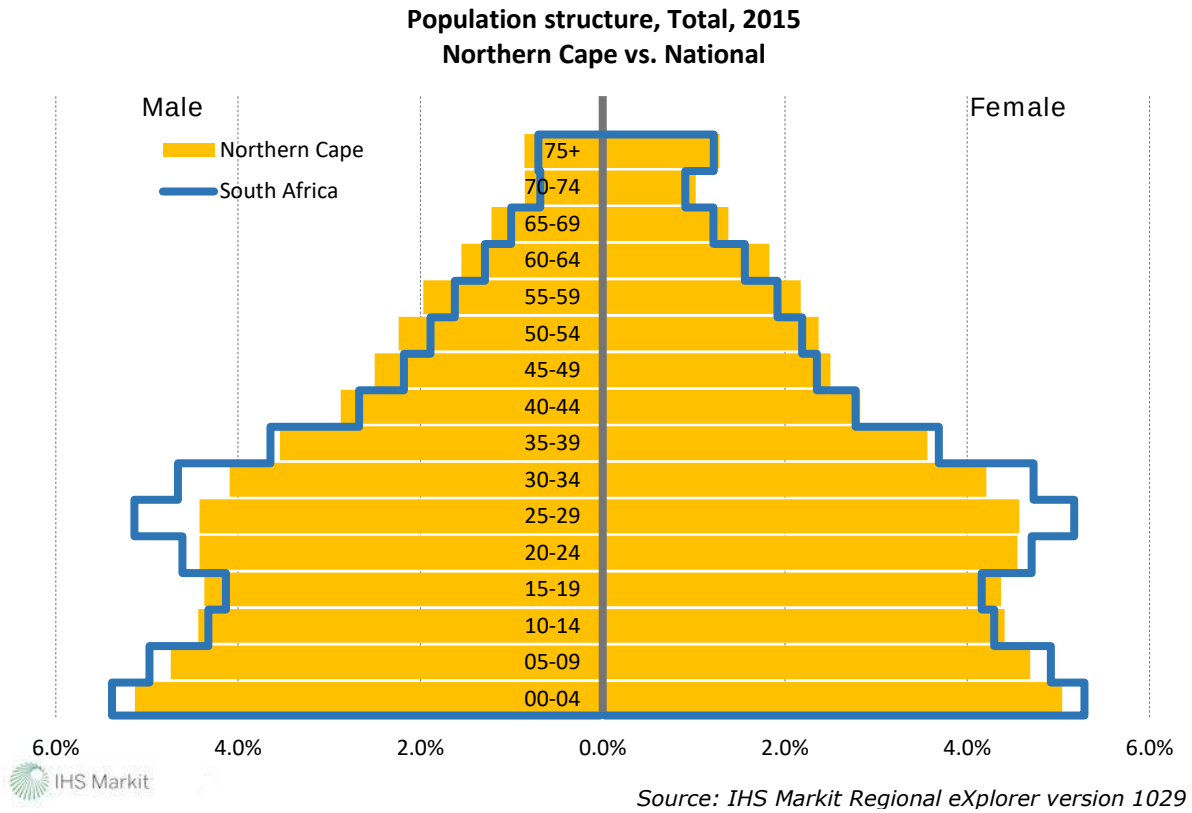
2.1.3 Household Size

Generally, there is a decline in the average household size[39] in the province. The Northern Cape's average household size was 3.66 persons per household in 2007. The implication of a declining averaged household's size as that the number of households increase, thus efforts of the municipalities will need to be increased to provide the necessary services, especially with regards to housing. The municipality with the largest average household size was Dikgatlong local municipality (4.15) followed by Sol Plaatje with 4.04, whilst the lowest was Siyancuma with 2.44. where the average household sizes are generally lower for households living in informal dwellings (3.21) compared to those living in formal and other dwellings (3.74). However, average household sizes for those in informal dwellings ranged from 2.40 in Karoo Hoogland to 4.12 in !Kheis. This corresponds to a higher percentage of single person households in informal dwellings (Department of Cooperative Governance, Human Settlements and Traditional Affairs (COGHSTA[40]), 2013).

[39] *The average household size is computed by dividing the population size (based on Statistics South Africa (StatsSA) data) with the number of households provided by the IHS MarkIT data. Thus, analyse the data with caution.*

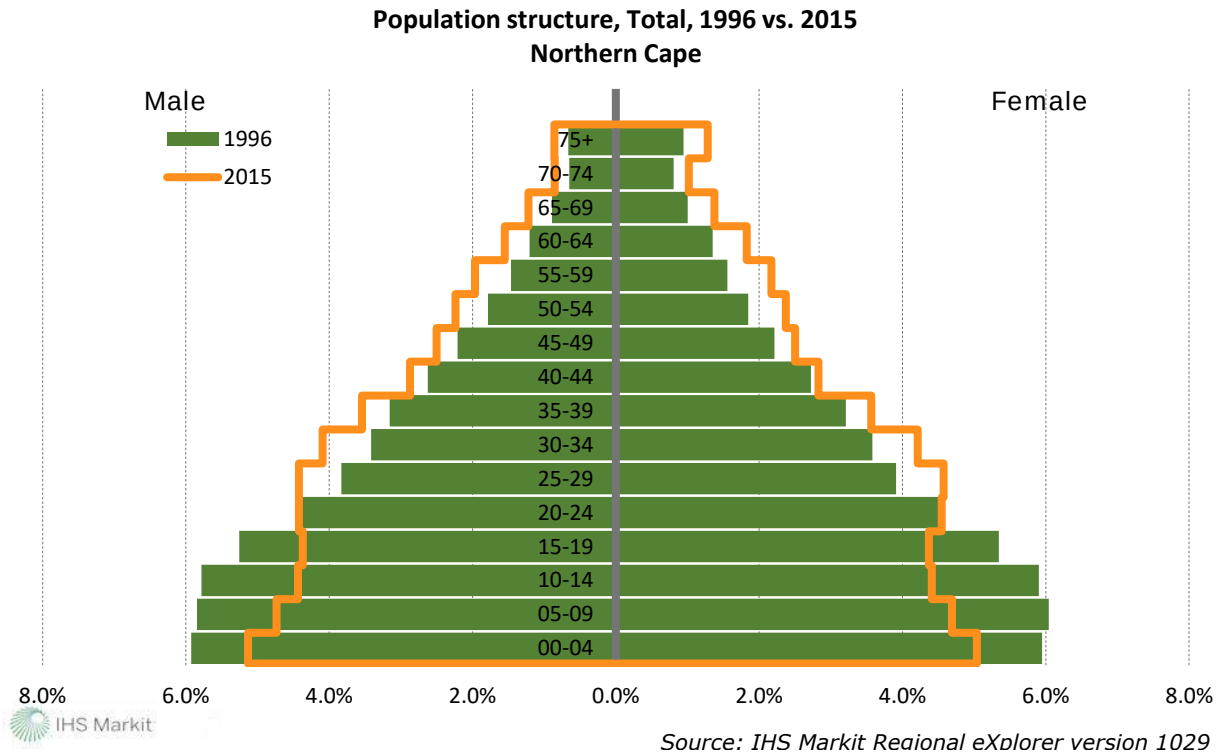
[40] *PGDP diagnostic report, COGHSTA, page 88, 2017*

2.1.4 Population Structure



Source: IHS Markit Regional eXplorer version 1029

Graph 21:Population structure, South Africa versus Northern Cape Province, 2015



Source: IHS Markit Regional eXplorer version 1029

Graph 22:Population structure comparison between 1996 and 2015, Northern Cape Province

Key observations of the population structure:

- Northern Cape Population structure is similar to the of the National structure, some deviations occur at the youth and labour force age structure, where the 10 to 19 age groups are somewhat larger, and the labour force age group between 20 – 39 years are significantly lower than the national ratios.
- The population structure has changed from an extremely wide based pyramid in 1996, which is indicative of a developing economy, the shallower base and distribution seen in 2015 is indicative of a developing economy that is maturing.

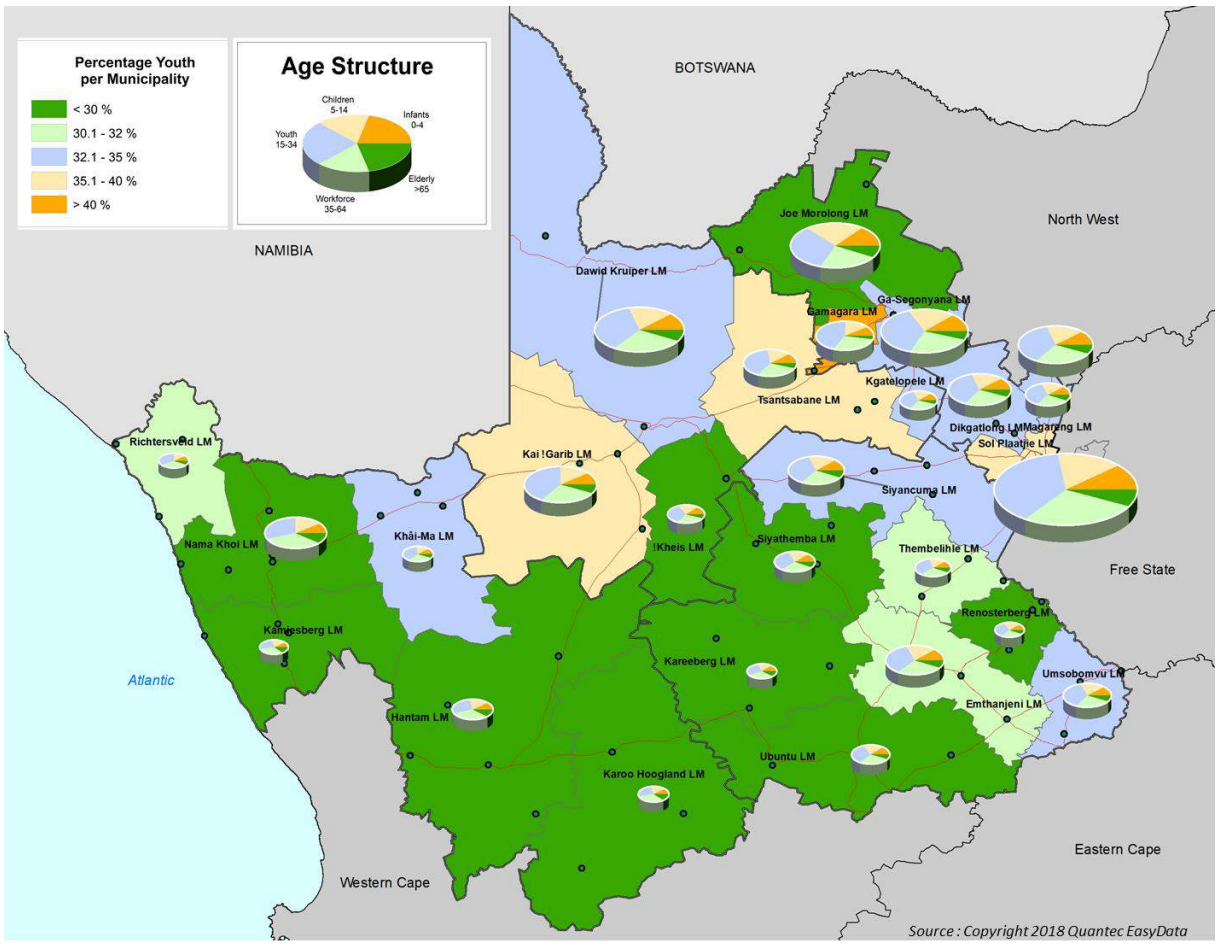


Figure 47: Age structure and percentage of youth per Municipality

As per Graph 21: Population structure comparison between 1996 and 2015, Northern Cape Province

Key observations of the population structure:

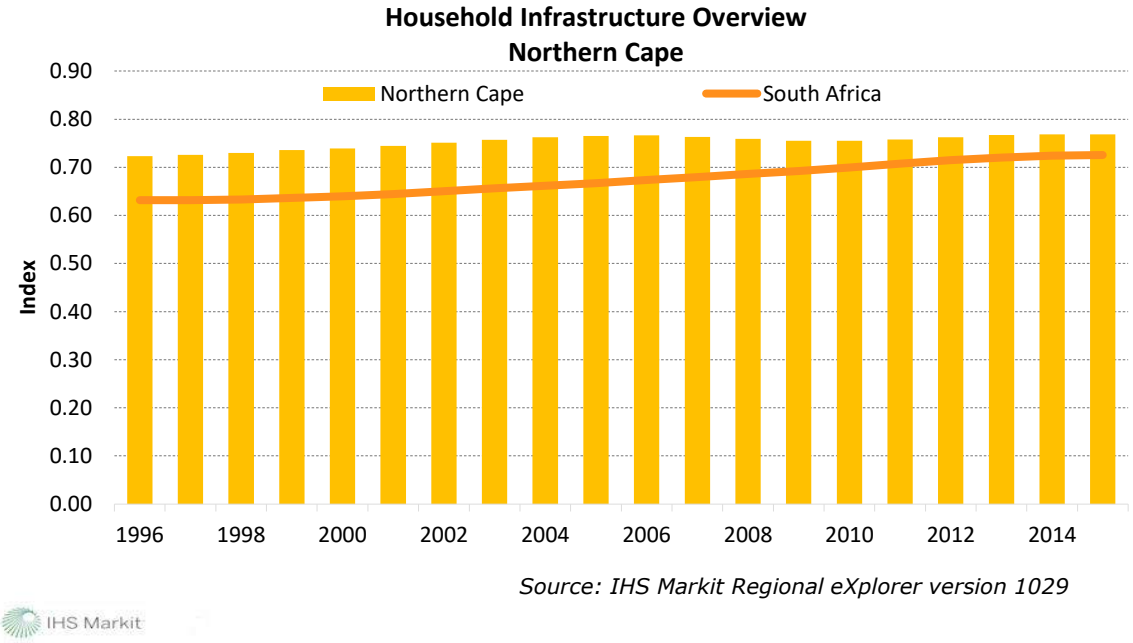
Northern Cape Population structure is similar to the of the National structure, some deviations occur at the youth and labour force age structure, where the 10 to 19 age groups are somewhat larger, and the labour force age group between 20 – 39 years are significantly lower than the national ratios.

- The population structure has changed from an extremely wide based pyramid in 1996, which is indicative of a developing economy, the shallower base and distribution seen in 2015 is indicative of a developing economy that is maturing.

Figure 47 the largest section of the population is comprised out of youth (ages 0 to 24years) which represents 48.7% of the total provincial population. This results in high dependency ratio on the labour force as the youth and elderly rely on the income of individuals that are active within the labour force. Although the youth population is the largest, they tend to be concentrated in areas or municipalities which provide more economic opportunities, especially regarding intensive agriculture and mining activities. Rural municipalities within the Namakwa and Pixley ka Seme districts tend to have a larger elderly population group, which again puts pressure on the economically active population, as the elderly are also dependant on economically active citizens.

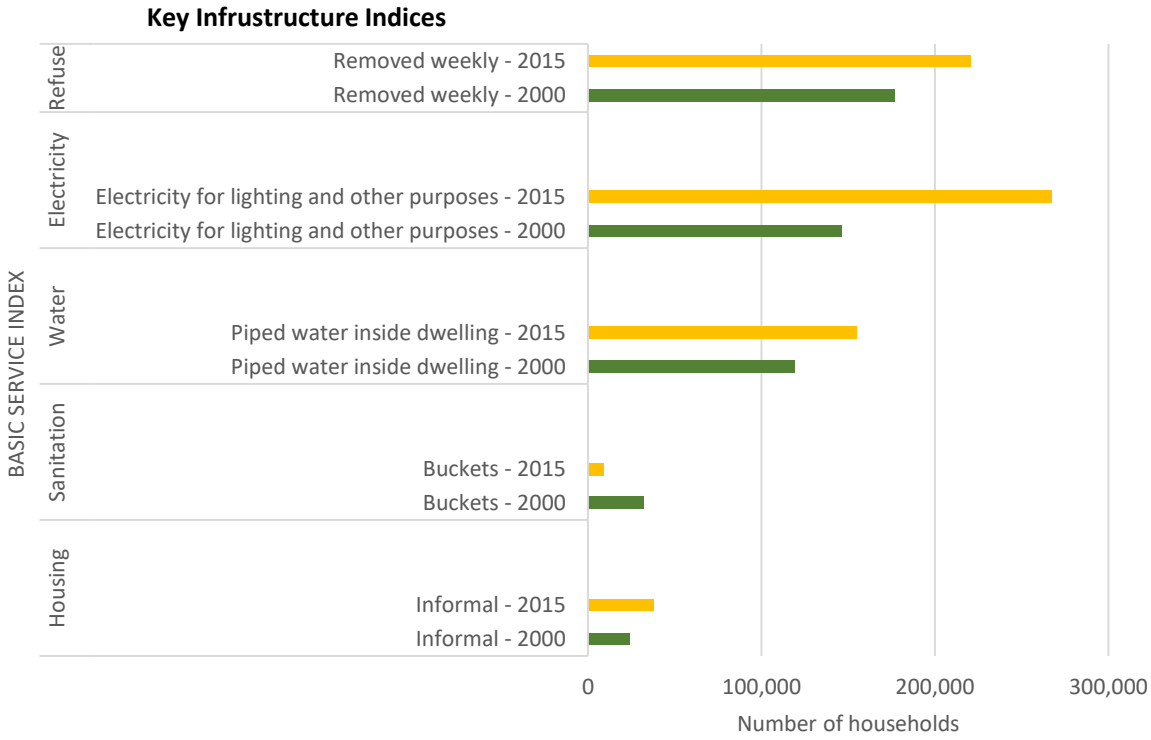
2.2 BASIC SERVICES

2.2.1 Overview



Graph 23: Household infrastructure overview of the Northern Cape Province[41]

[41] *Global Insight, IHS Markit Regional eXplorer version 1029 and Stats SA, Community Survey 2016*



Graph 24: Key infrastructure Indices, Northern Cape Province, 2015

2.2.2 Access to piped water

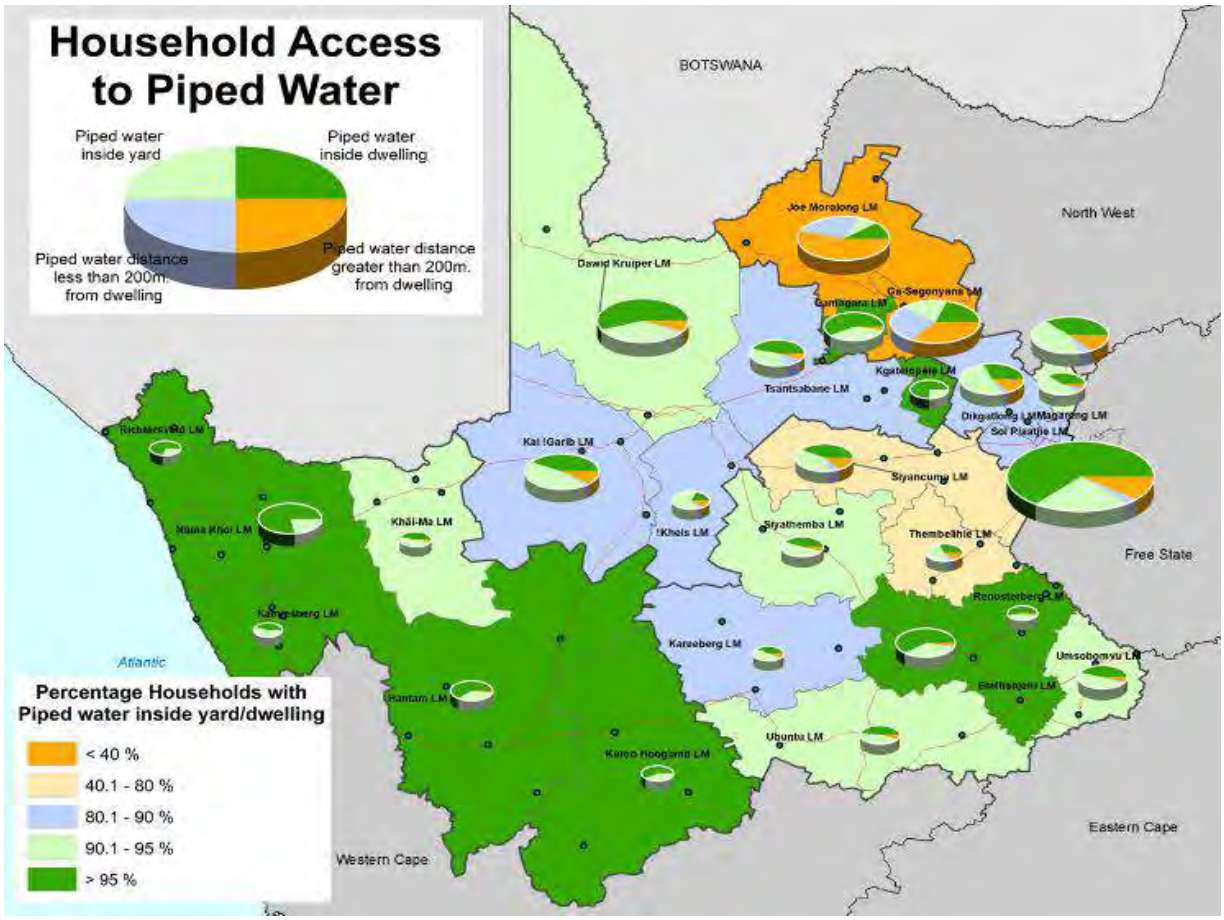
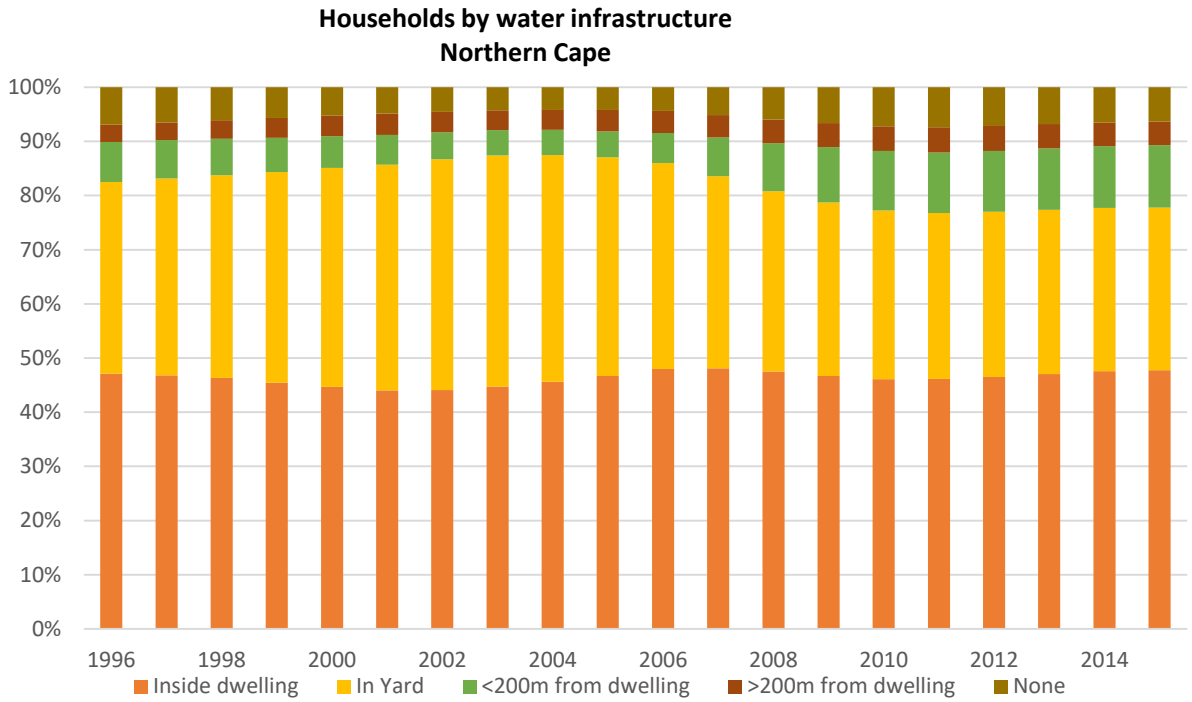


Figure 48: Access to basic services per Municipality - Access to piped water

The provincial average regarding water provision is estimated at 97.1% relating to the improvement in access to water. The Kai! Garib and the Mier municipalities have the lowest access to improved water, with 87.7% and 90.3%, respectively. The Emthanjeni (99.6%), Karoo Hoogland (99.4%) and Kgatelopele (99.4%) local municipalities have the highest access to improved water. This high quality of access to improved water is a hallmark of the quality of service delivery provision. The province has also a noted high level of access to piped water, averaged at 93.2% (Statistics South Africa (StatsSA), 30 March 2017). Access to piped water inside the dwelling is however of concern, especially in the John Taolo Gaetsewe District with an average of below 40%. The minimum standard towards access to water has been defined by the department of Water Affairs as access to piped water inside the dwelling. See ***Figure 48*** for an overview of access to piped water inside the dwelling for the province. Sanitation in terms of basic sanitation services, the Strategic Framework for Water Services (2003), aims to ensure that sanitation facilities are easily accessible to households and sustainable, including the safe removal of human waste and wastewater from the premises where this is appropriate and necessary. In the provincial context, access to improved sanitation is said to be at 81.2%, with the Ga-Segonyana local municipality having the lowest in the province. Whilst also having a high number (28.5%) of its population sharing a toilet, meaning a communal toilet, this is conceivable given the fact that the municipality is considered as rural. However, the local municipalities with the highest percentage sharing a toilet are the Gamagara (47.4%), Dikgatlong (44.2%) and Kai! Garib (31.9%).



Graph 25: Water infrastructure availability in the Northern Cape Province

2.2.3 Access to sanitation

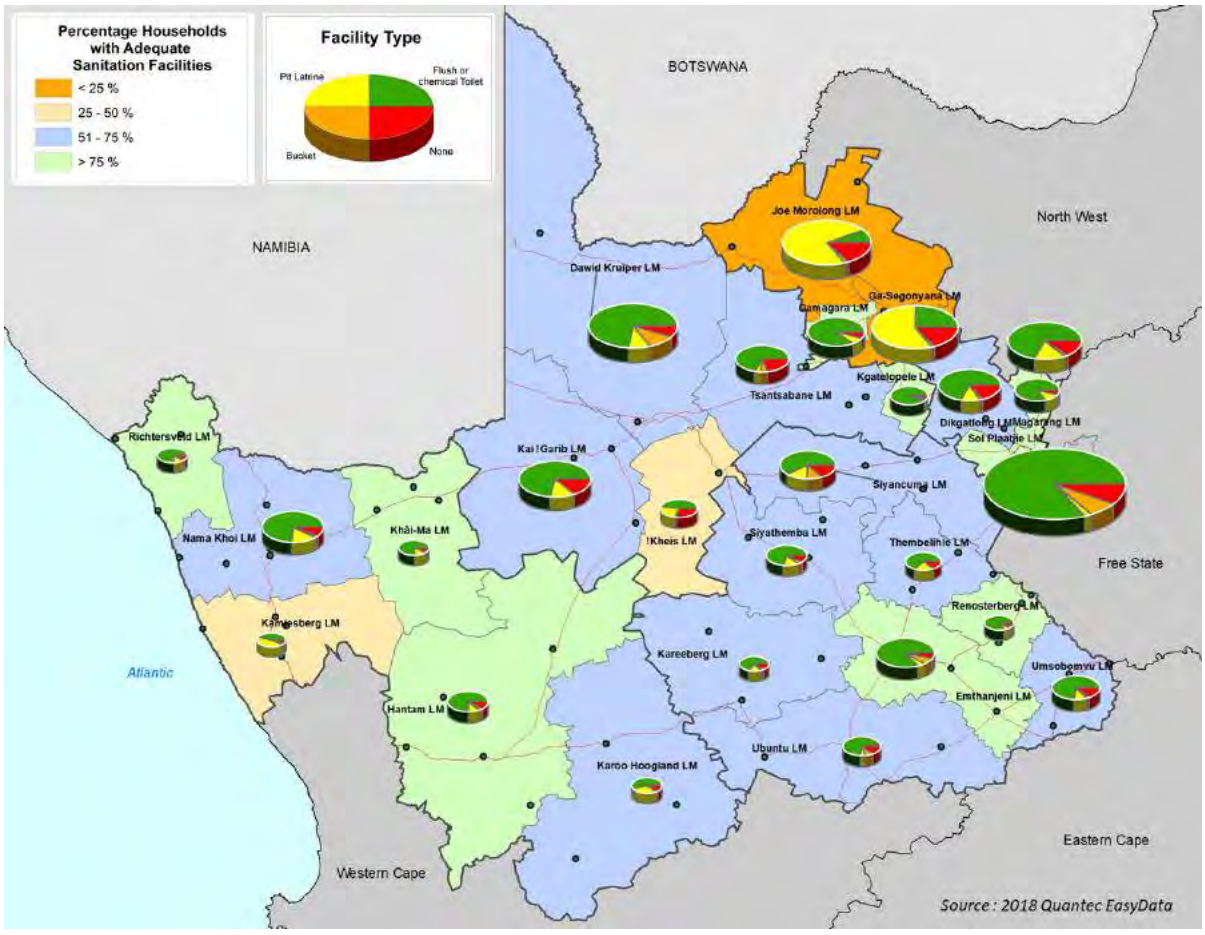


Figure 49: Sanitation accessibility levels

Key findings of ***Figure 49:***

- The lowest level of access to basic sanitation services is concentrated in the Joe Morolong municipality, followed closely by Ga-segonyana municipality, as less than 25% of the households in these municipalities have decent access to sanitation services.
- A large portion of the Northern Cape households still make use of the bucket or pit latrine system.
- A large portion of Kamiesberg municipal residents make use of pit latrines.
- A significant portion of residents in the !Kheis municipality have no access to sanitation.
- Due to water scarcity throughout the province, the provision of formal sanitation is not always a viable option, especially in isolated rural locations.

2.2.4 Access to refuse removal

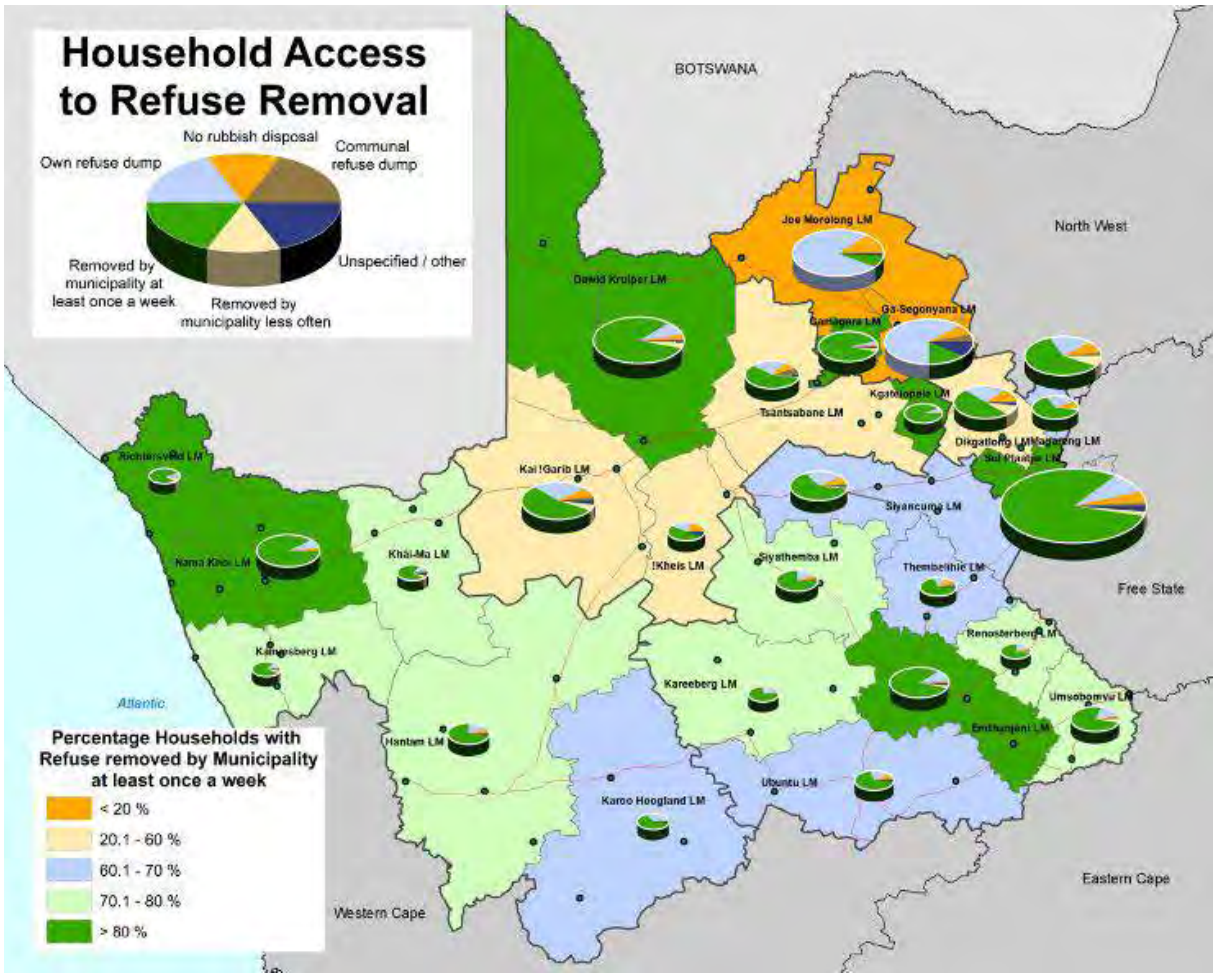
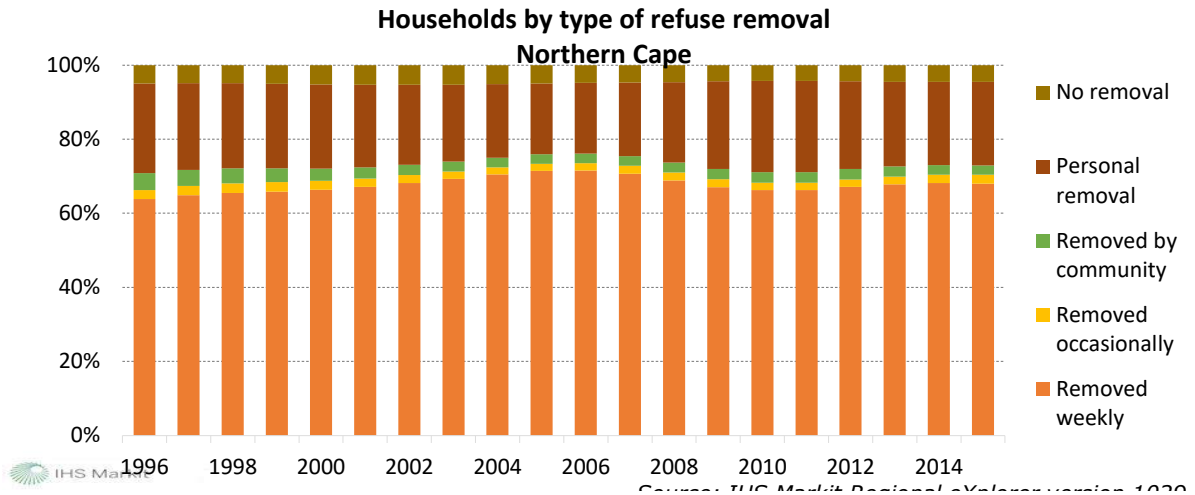


Figure 50: Access to basic services per Municipality - Refuse removal

Basic refuse removal is defined as the most appropriate level of waste removal services provided by local municipal. This is notably one of the key indicators for service delivery at a local government sphere, worryingly though is the fact that the provincial average is 67.5%. While also based on (Statistics South Africa (StatsSA), 2017) data, the province is still confronted with municipalities with a low provision of refuse removal, the Joe Morolong has a 4.2% access to refuse removal. This is predominantly due to difficulties faced by the LM due to vast distribution of isolated tribal villages, and the challenges faced with regards to gaining access to these areas with the necessary vehicles or

equipment. The Ga-Segonyana and the Mier (amalgamated with Dawid Kruiper) local municipalities follows on the heels of the Joe Morolong local municipality, with 12.5% and 28.4% access to refuse removal, respectively.



Graph 26: Households by type of refuse removal - Northern Cape Province[42]

2.2.5 Access to electricity

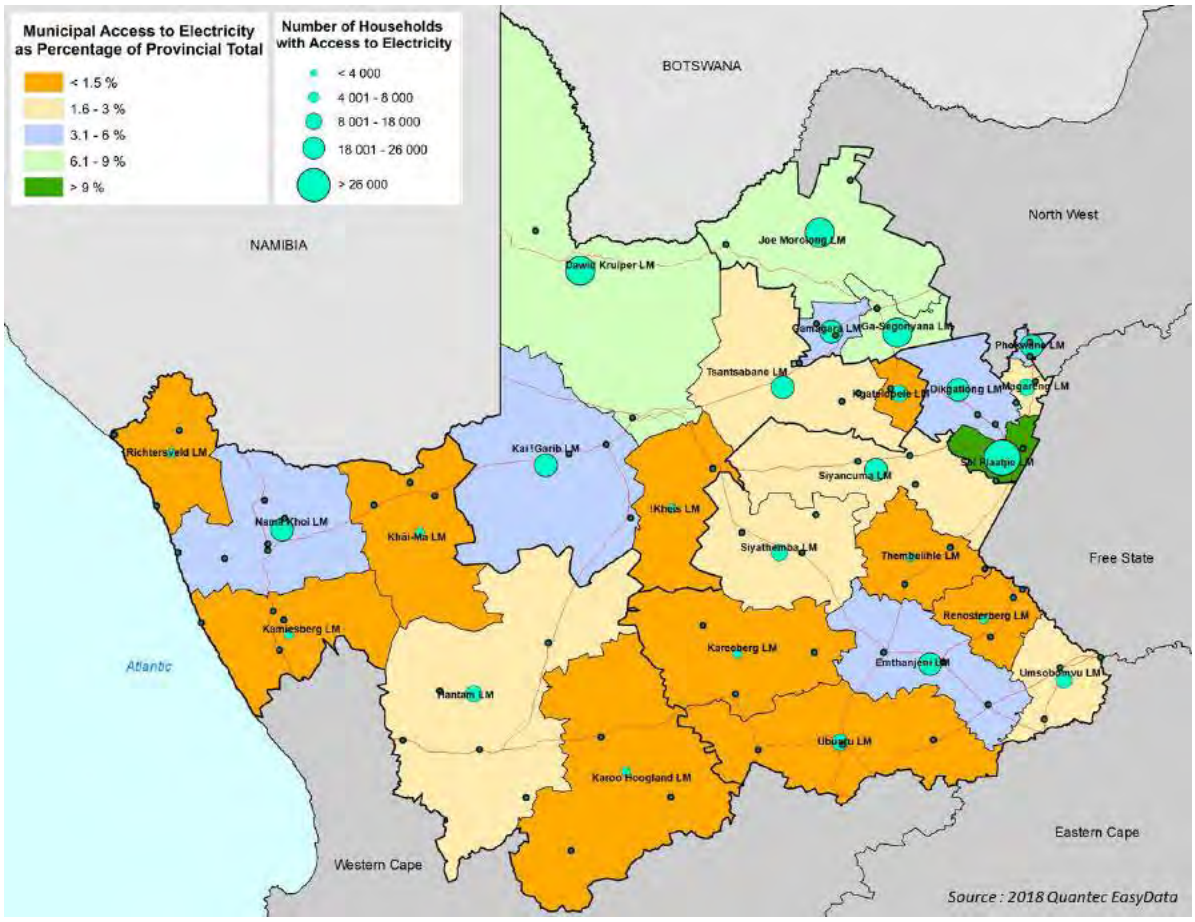
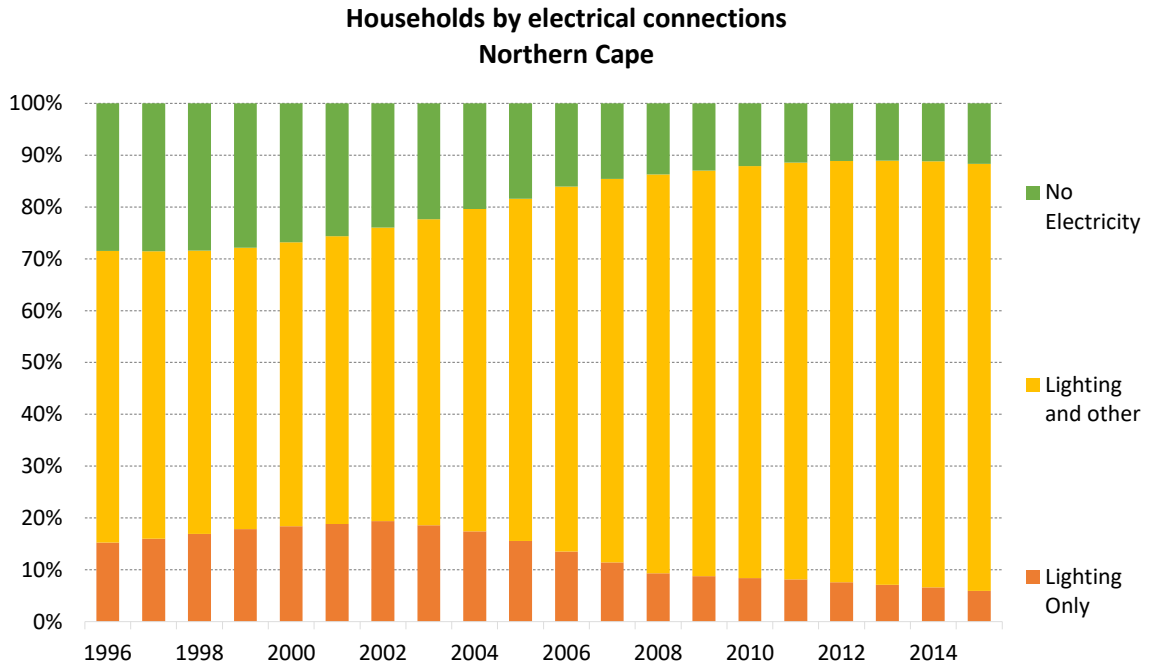


Figure 51: Access to basic services per Municipality - Electricity

[42] Statsa SA, Community Survey 2016

According (Statistics South Africa (StatsSA), 2017), the provision of electricity can contribute significantly to the improvement of quality of life. Therefore, in addition to providing a host of social benefits, access to electricity could also stimulate local economic development. Local governments play an important role in the provision and distribution of electricity. Electricity is an important source of local government funding, particularly for larger urban municipalities. Although significant progress has been made since 1994 with the provision of electricity, significant challenges remain. Government is committed to not only expand the electricity infrastructure, but to also provide free basic electricity services to poor households (Statistics South Africa (StatsSA), 2017).

Notably, the Northern Cape Province is performing sufficiently in the provision of electricity with approximately at 87.1% of households provisioned with electricity. The Karoo Hoogland has a relatively lower provisioning of electricity to households, with only 66.5% of the households in the municipality having access to electricity. Meanwhile, Nama-Khoi and the Kgatelopele local municipality have the highest percentage of households with access to electricity, with 96.2% and 96.0%, respectively. Interestingly, the Kareeberg, Nama-Khoi and the Siyathemba local municipalities did not experience any electricity interruptions during the period of the survey.



Source: IHS Markit Regional eXplorer version 1029

Figure 52: Households by electrical connections - Northern Cape

2.2.6 Access to Housing

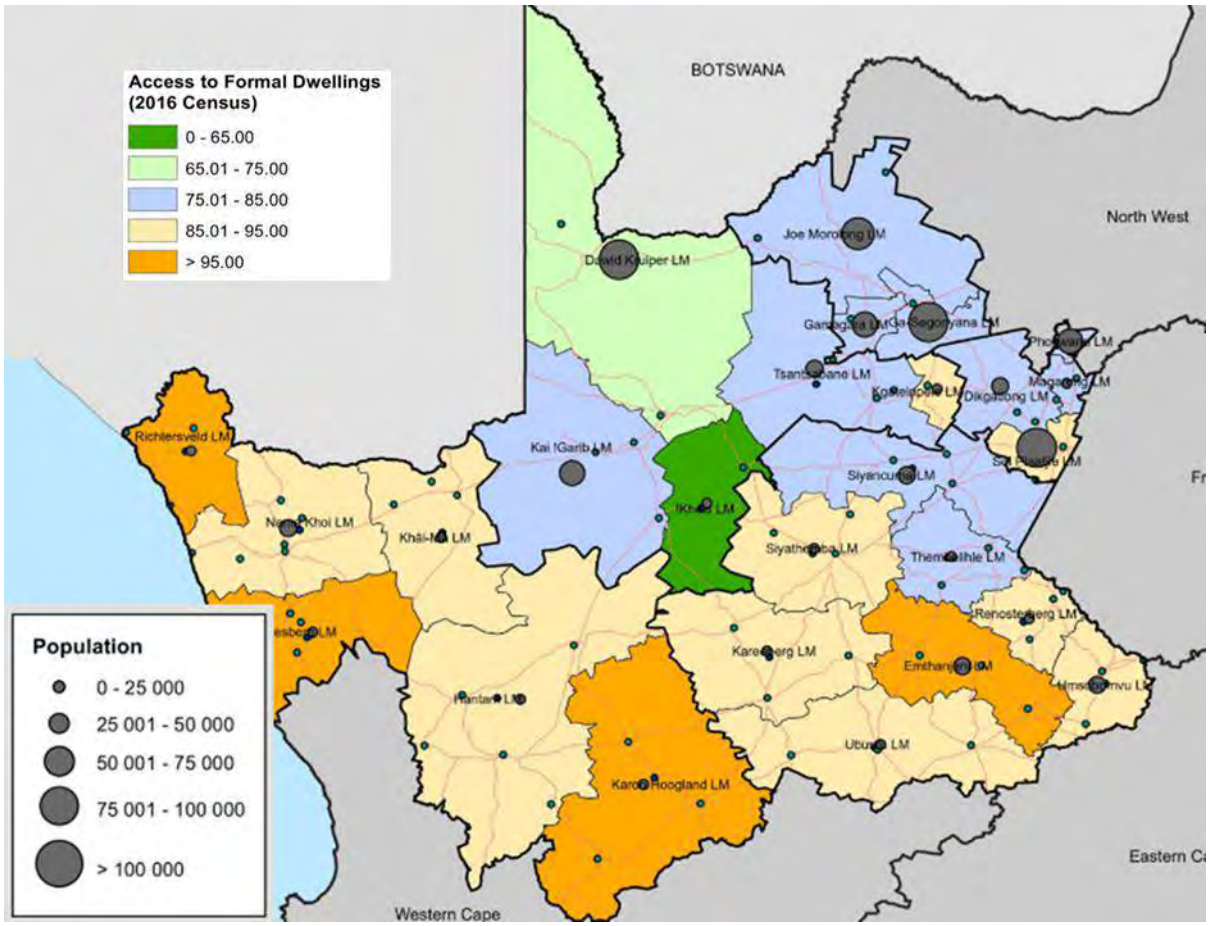
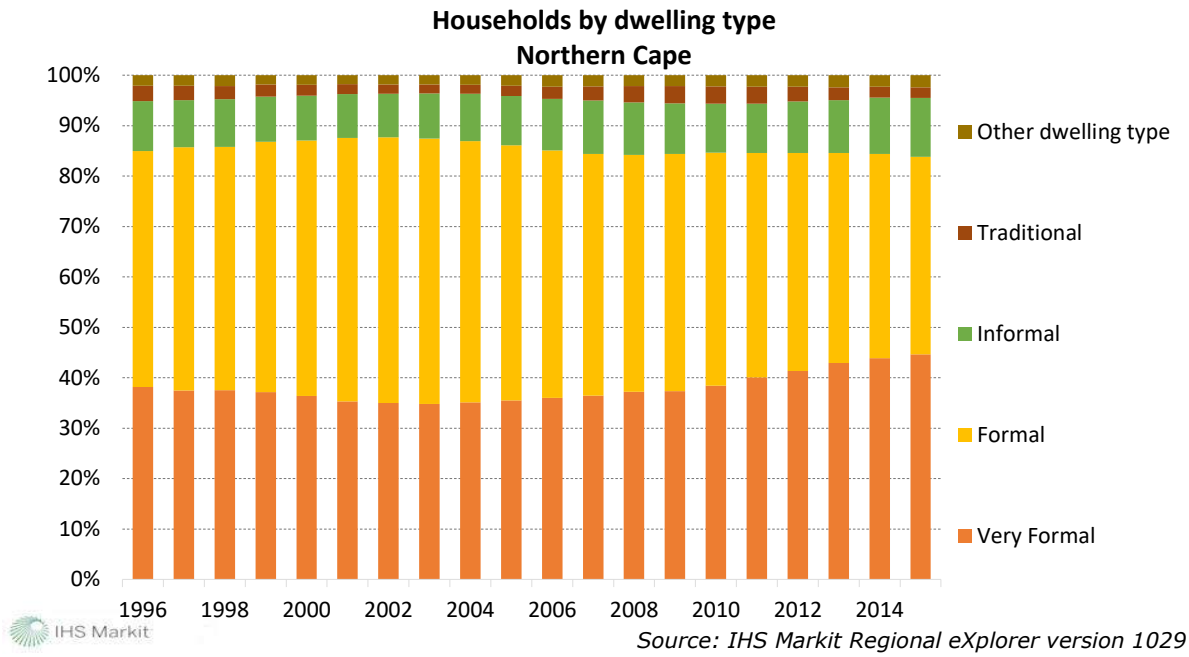


Figure 53: Access to Formal Housing per Municipality (2016)

Figure 53 reflects the percentage of access to formal dwellings per Municipality in the Northern Cape Province. !Kheis Local Municipality has the lowest access to Housing percentage while, Richtersveld, Kamiesberg, Karoo Hoogland, and Emthanjeni Local Municipalities reflect the highest access to housing percentages. According to Stats SA, 2016[43], almost 14% of communities lives in informal dwelling units, while almost 85% reside in formal housing.

[43] Stats SA, General Household Survey 2016



Source: IHS Markit Regional eXplorer version 1029

Graph 27: Households by dwelling type - Northern Cape Province

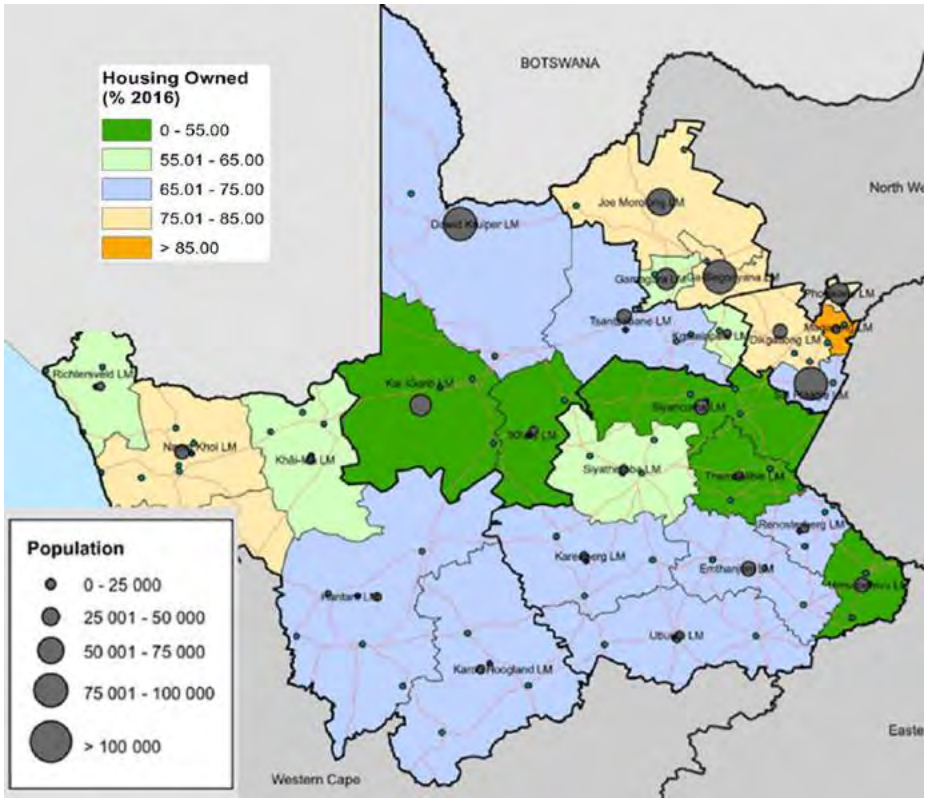


Figure 54: Percentage housing owned per municipality - Northern Cape Province

2.2.7 Housing backlogs

As per ***Figure 55*** below, the highest backlogs are evident in Dawid Kruiper, Joe Morolong, Ga-Segonyana, Sol Plaatje and Umsobomvu Local Municipalities. The backlogs range from above 7500 (Sol Plaatje is estimated around 10000) housing backlogs down to 2500 in these Municipalities. The size of housing backlogs can be attributed mostly due to migration patterns, due to the influx of job

seekers into municipal region with high economic potential. Other areas such as Joe Morolong that also presents with a high housing backlog, may be a result of the inability to provide housing in isolated areas, as well as due to geological limitations due to the presence of asbestos. The Municipalities towards the central and western areas of the Province experience less backlogs, this is due to the lower population estimates.

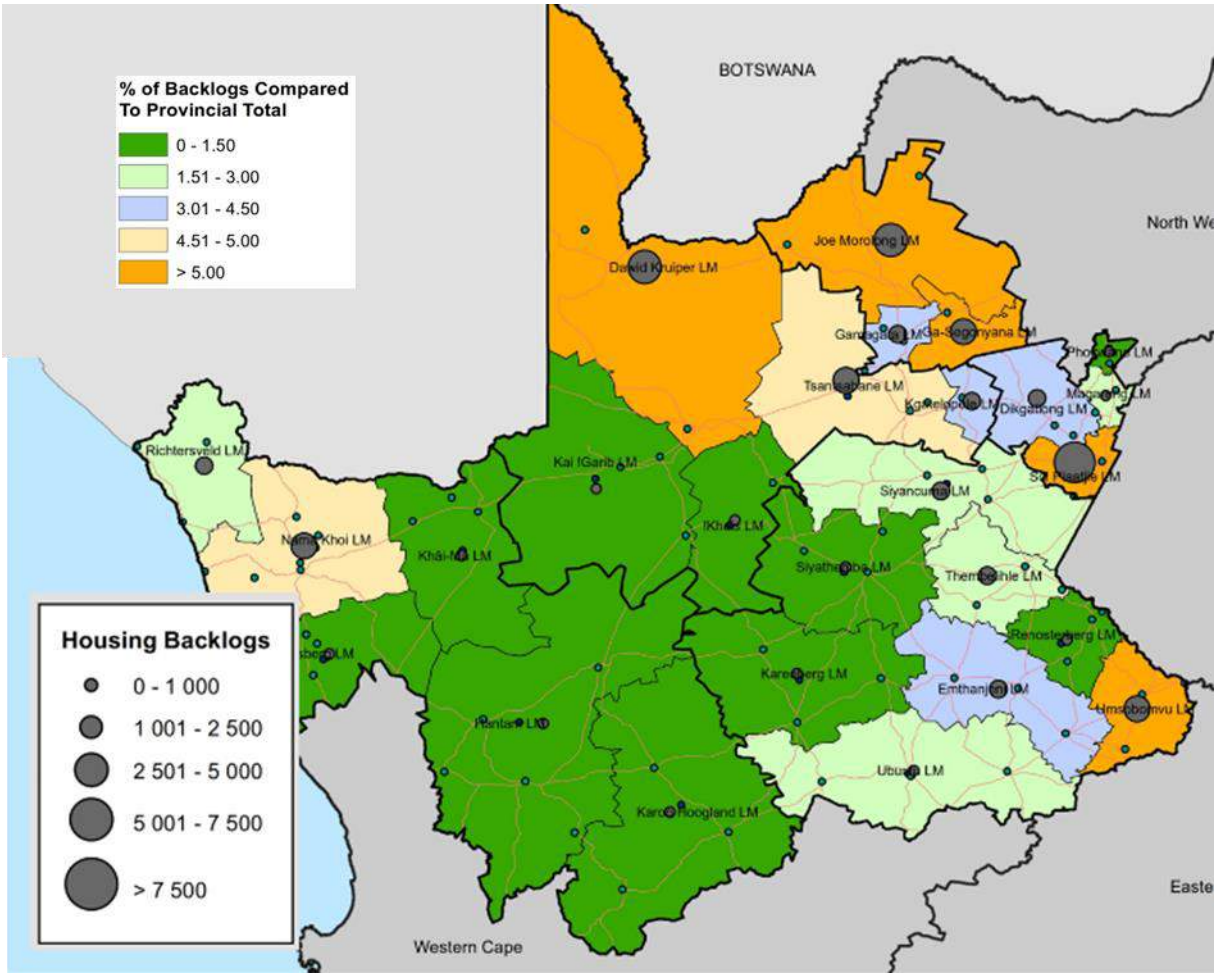


Figure 55: Housing backlog analysis per Municipality (2017)

2.2.8 Planned housing projects

Northern Cape Sustainable Human Settlements mapping of 2016/17 and 2017/18 projects. Planned projects include:

- Planned number of units (scope) = 11 437;
- Completed units = 1 609;
- 3370 sites ready for construction; and
- 6458 sites to be serviced.

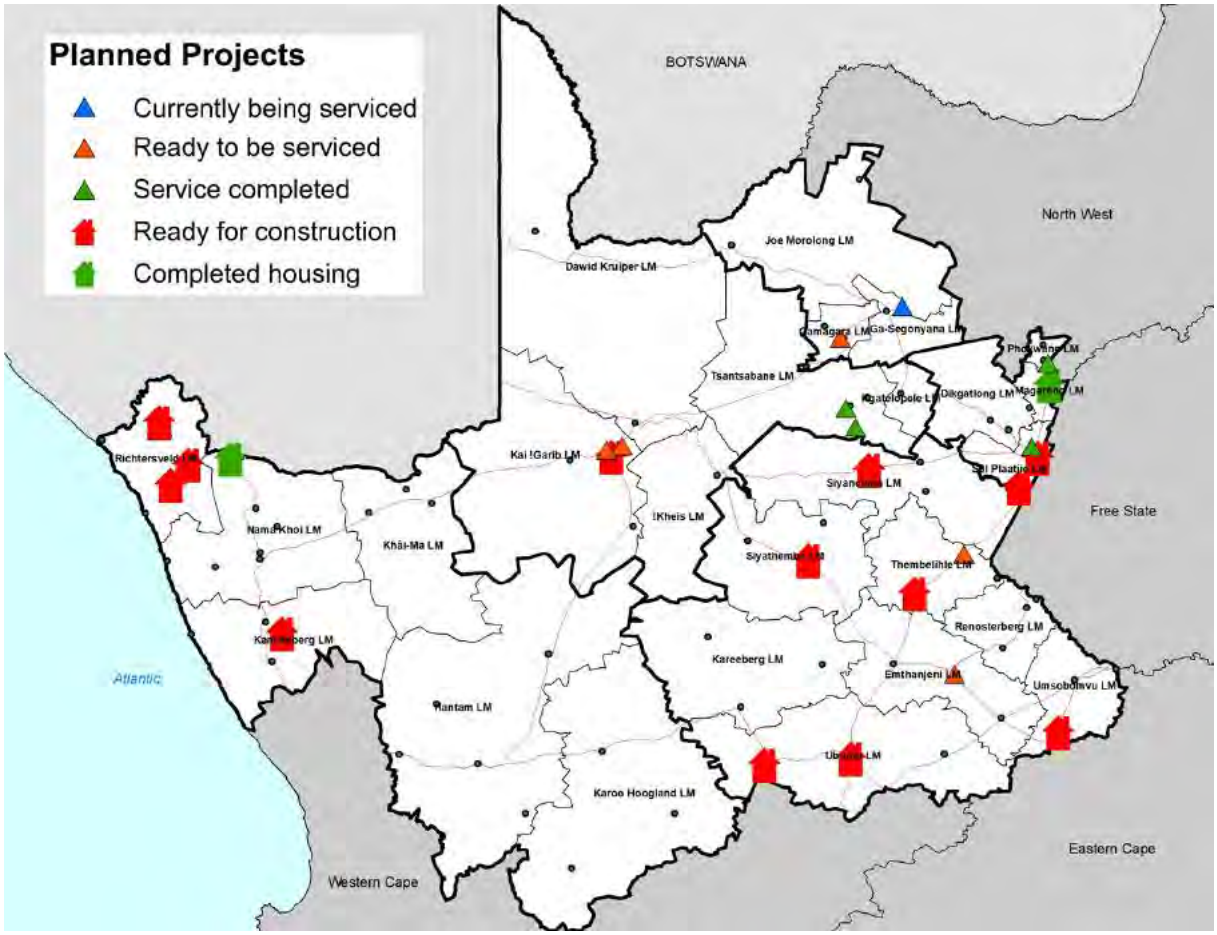


Figure 56: Planned and existing housing projects - Northern Cape Province

Key housing development principles identified by COGSHTA[44] , Northern Cape include:

- Balance between the natural and built environments;
- Vibrant living and movement spaces for people;
    - Future demand and needs have implications on; space; densities; movement capacities; infrastructure carrying capacities; and ecological carrying capacities to sustain human life;
- Connectivity to their wider regions;
- Generate and sustaining sufficient bulk water and power requirements;
- Integrate innovative means and technologies;
- Ensure access and affordability to services; and
- Decent housing in integrated neighbourhoods or mixed-use zones

2.2.9 Municipal Infrastructure Grant (MIG)

Figure 57 provides a brief overview of the MIG expenditure per Municipality, where the Tsantsabane Local Municipality was allocated the lowest share and Joe Morolong and Ga-segonyana the highest allocation percentage. The MIG allocations are well aligned towards the services backlogs. As per Error! Reference source not found. Water, Sanitation and Roads and Storm water received the biggest

[44] *Department: Co-operative Governance, Human Settlements & Traditional Affairs Northern Cape, 2017*

allocation of the Provincial MIG allocations. Almost 96% of the MIG allocation is provided for basic services, while 4 % is allocated for Sports Facilities, Cemeteries, PMU services and Community Halls.

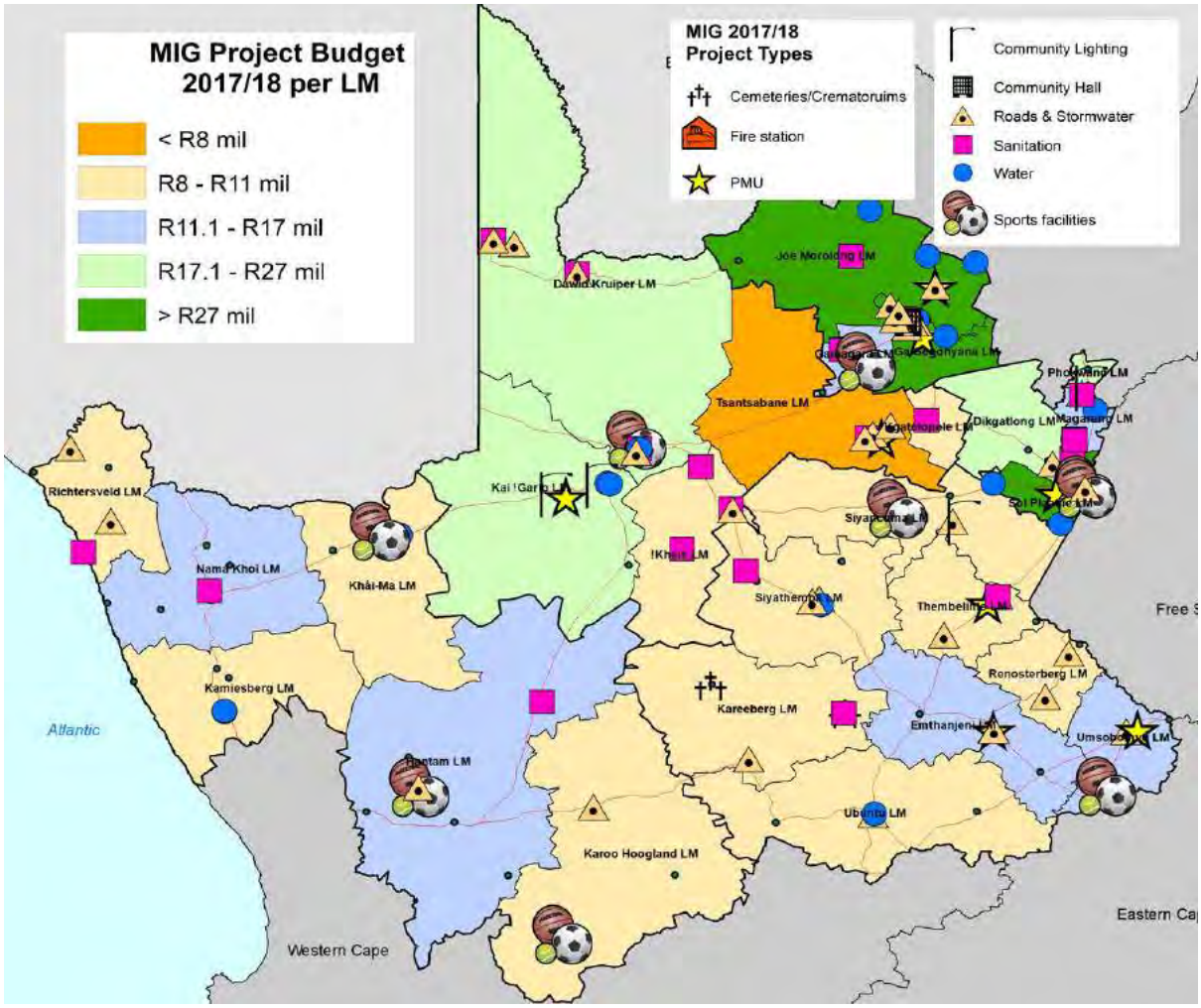
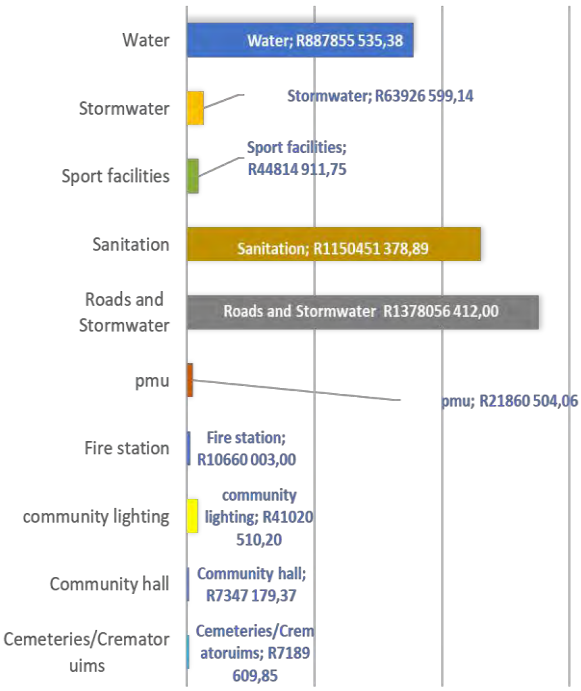


Figure 57:Overview of MIG expenditure per Municipality for the 2017/2018 budget



The Northern Cape MIG Expenditure is targted towards the Dawid Kruiper, Joe Morolong, Ga-segonyana, Phokwane, Sol Plaatje and Dikgatlong Municipalities. These areas are also known for the highest population concentrations. A strong focus on the Water, Sanitation and Roads sectors are evident and rightfully so as these sectors are key to sustainable development of the province.

Graph 28: MIG Allocation for the Northern Cape Municipalities Average quality of Basic Services

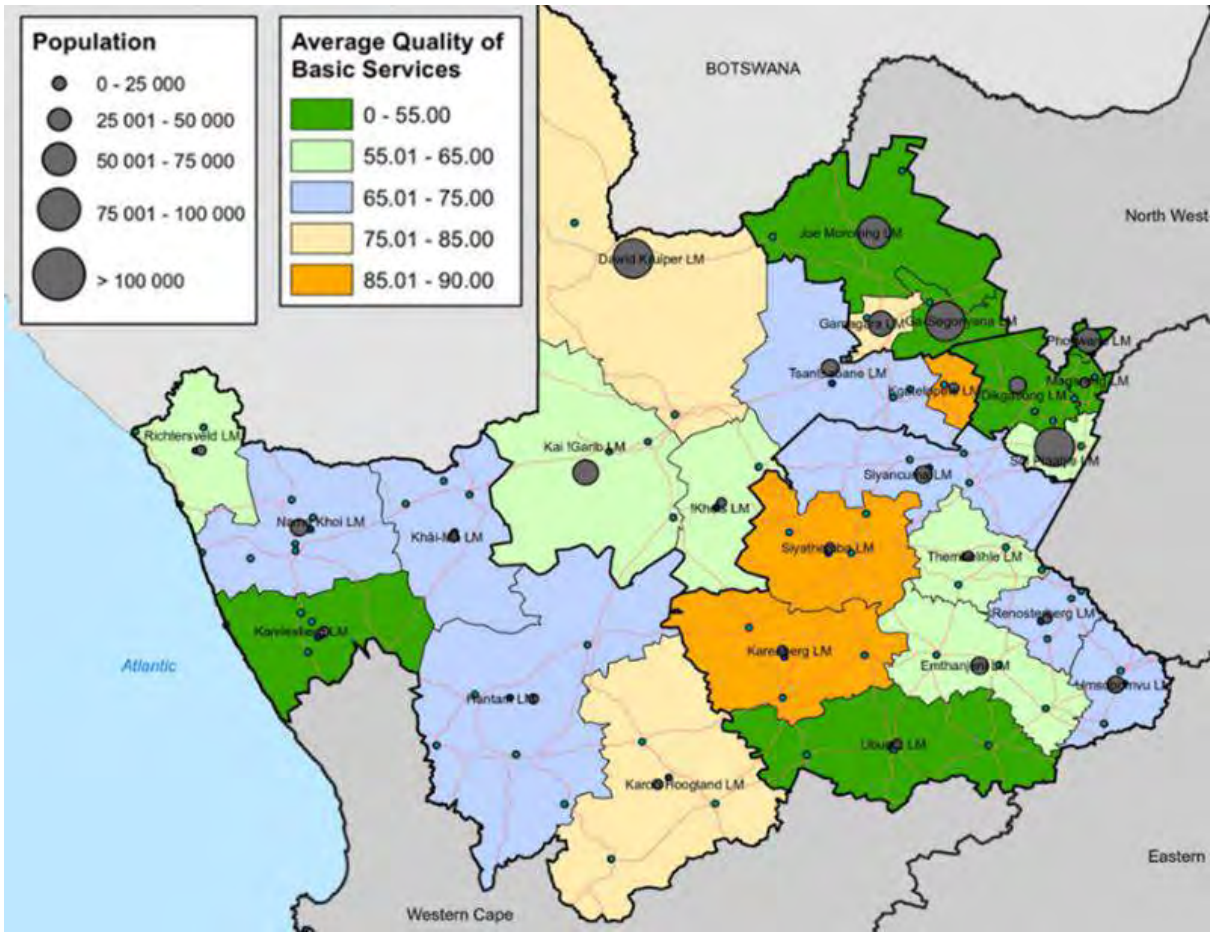
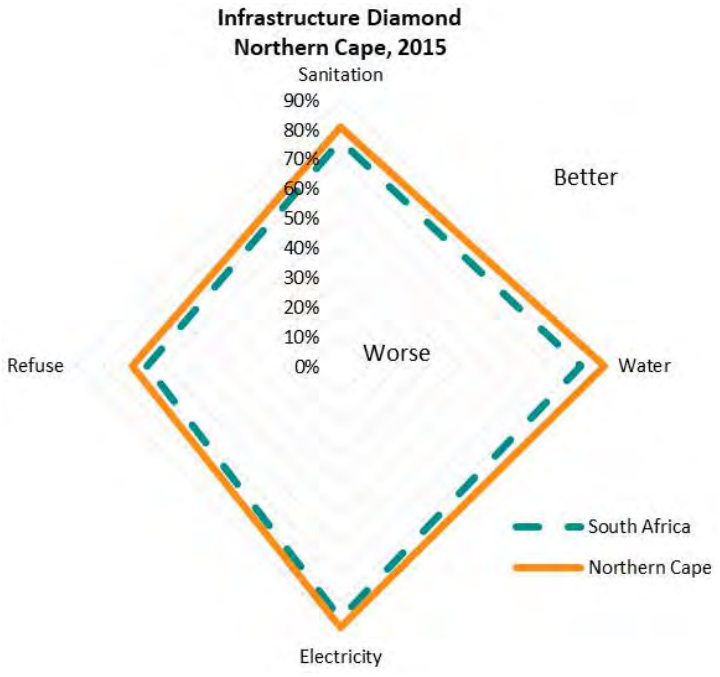


Figure 58: Average quality of basic services - Northern Cape Province (0% - low and 100% - excellent)



Graph 29: Infrastructure diamond - quality of services, 2015

According to (Statistics South Africa (StatsSA), 30 March 2017), the Infrastructure Quality Index (IQI) combines the individual index scores that were calculated for sanitation, water, refuse disposal and electricity in order to create an overall measure of service delivery across municipalities. This is done by creating a weighted average of the individual index scores (see table 4 below). Accordingly, the Pixley Ka Seme district infrastructure quality index stands at 4.36 according to the (Statistics South Africa (StatsSA), 30 March 2017), with the provision of sanitation and the electricity connections being highest in term of the index scoring. As per its mandate the

Department of Cooperative Governance, Human Settlement and Traditional Affairs (COGHSTA).

3 EDUCATION

3.1 EDUCATION OVERVIEW

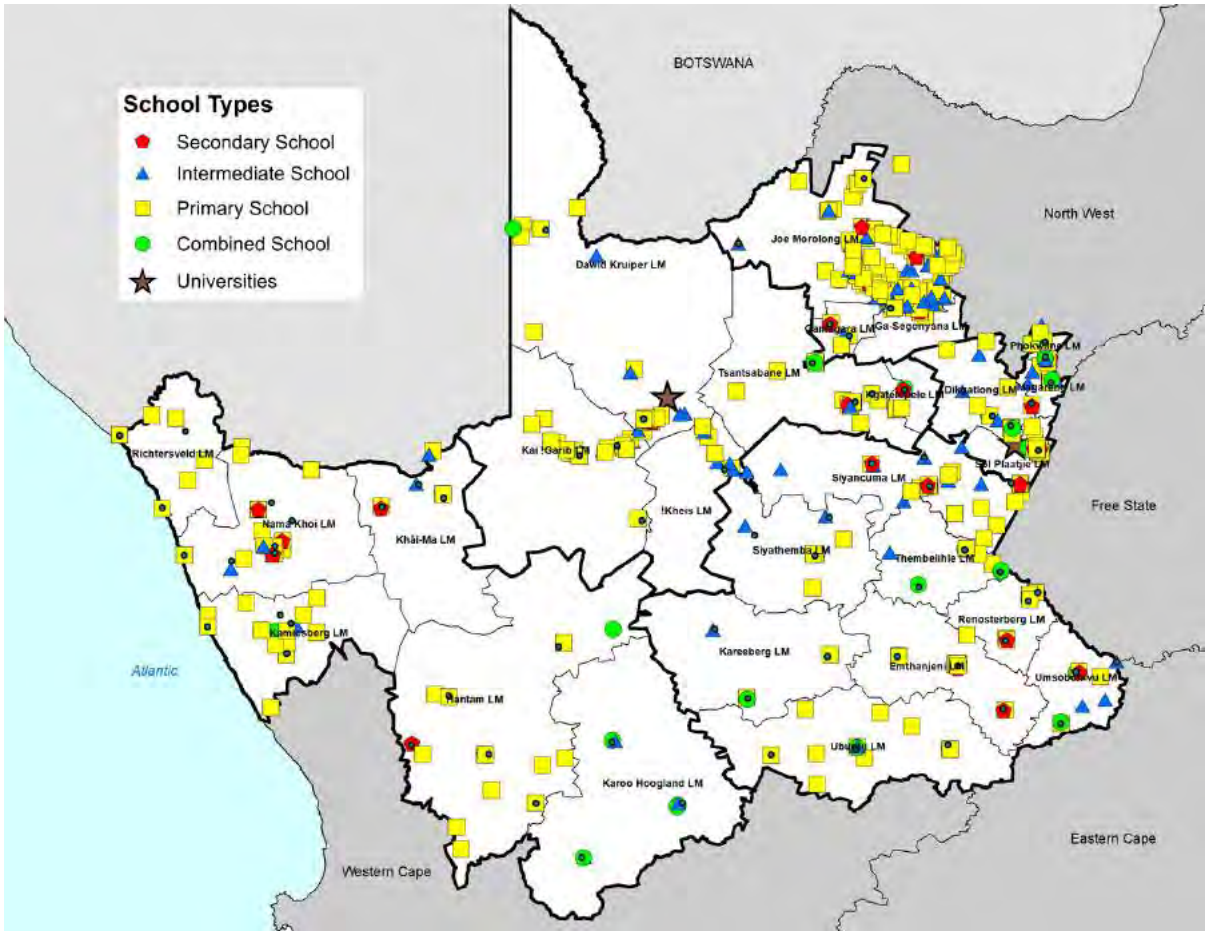


Figure 59: Overview of Education facilities within the Northern Cape Province

The proportion of skilled and semi-skilled population in the Northern Cape Province is largely distributed to urbanised regions. The North and eastern regions of the ZF Mgcawu DM consist of more than 32.1% of skilled and semi-skilled population, whereas the southern regions have less than 28% skilled and semi-skilled population. The northern region of the John Taolo Gaetsewe DM consists of less than 25% skilled and semi-skilled population, while the southern region has more than 28.1%, with more than 36% in the Gamagara LM.

The Frances Baard DM consists of more than 28.1% skilled and semi-skilled residents, including Sol Plaatje with more than 36% skilled and semi-skilled residents. The eastern regions of the Pixley ka Seme DM consists of between 28.1% and 36% skilled and semi-skilled residents, although the entire district consists largely of between 25.1% and 28% skilled and semi-skilled population. The southern region of the Namakwa DM consists of less than 28% skilled and semi-skilled population and between 28.1% and 36% of the population of the northern region is skilled or semi-skilled.

The ZF Mgcawu DM consists of a Small portion of residents with no schooling. Majority of the district's residents have some schooling, with a higher proportion of residents with between Grade 10 and Grade 12 reside in the eastern region. The district has a very low proportion of potential tertiary and

tertiary education candidates. The John Taolo Gaetsewe DM consists of a high portion of residents with no schooling. The majority of the residents have some schooling. A higher proportion of residents with between Grade 10 and Grade 12 are found in the southern regions, where a relatively larger proportion of potential tertiary and tertiary education candidates reside[45].

The Frances Baard DM consists of a small portion of residents with no schooling while the majority of residents have between Grade 10 and Grade 12 in the eastern region. So Plaatje LM has highest proportion of potential tertiary and tertiary education candidates in the Northern Cape Province. The Pixley ka Seme DM consists of a small portion of residents with no schooling while the majority of residents have some schooling experience. There is a high proportion of residents with between Grade 10 and Grade 12 in the eastern region, nonetheless, a very low proportion of potential tertiary and tertiary education candidates can be found in the district.

The Namakwa DM has a very small portion of residents with no schooling in the northern regions although the majority of the district residents have some schooling. A higher proportion of residents with between Grade 10 and Grade 12 are located in the Northern regions, with a higher proportion of potential tertiary and tertiary education candidates on a district level.

3.1.1 Learner Teacher Ratio

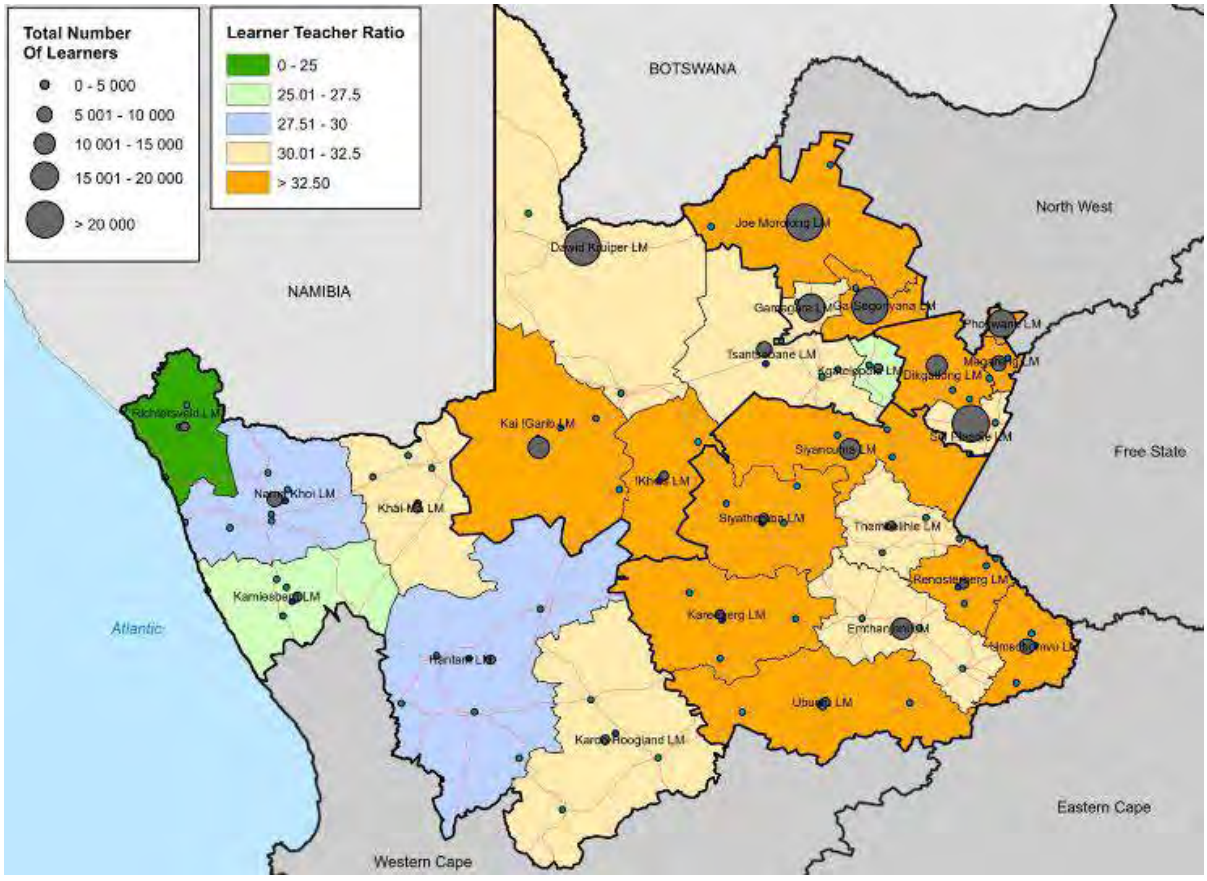


Figure 60: Learner - teacher ratio and number of learners per Municipality

[45] *Quantec data, 2017*

4 HEALTH

4.1 HEALTH OVERVIEW

Health issues can be caused as a result of various contributing factors such limited refuse removal especially in poor and rural communities. This can cause pollution and extensive health problems. Other health issues such as HIV/AIDS also poses extensive health issues. With better access to health care and health care services, diseases and other health issues can be attended to much quicker and can also increase health conditions of the population. Several hospitals and clinics are distributed across the Northern Cape Province.

Data received from the Department of Health, indicates that there is a about 179 health care facilities distributed across the Northern Cape Province of which 137 are clinics and 38 are hospitals.

The distribution of the clinics is as follow:

- 137 Clinics in the Northern Cape,
- 36 are located in John Taolo Gaetsewe district,
- 24 located in Sol Plaatje district,
- 25 are located in Namakwa,
- 20 located in ZF Mgcawu and
- 32 are located in Pixley ka Seme.

The distribution of the hospitals is as follow:

- Total 38 hospitals in the province,
- 3 are located in John Taolo Gaetsewe district,
- 8 in Sol Plaatje,
- 11 hospitals are located in Namakwa,
- are located in ZF Mgcawu district and
- 11 are located in Pixley ka Seme.

Furthermore, a crucial aspect that came forth from the data, is that there was a significant decline in health facilities from 2013 to 2017, as indicated by ***Figure 61*** and ***Figure 62***. This may be due to utilisation of mobile clinics, resulting in the decrease of health facility with a fixed position or location.

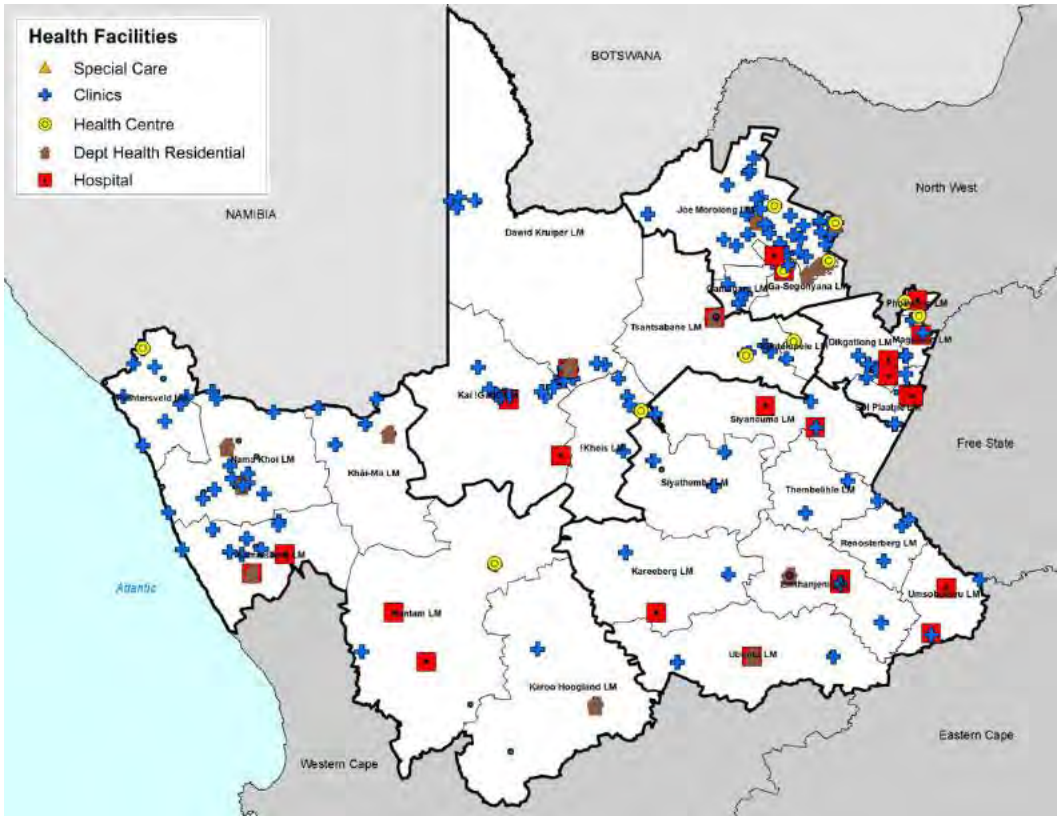


Figure 61: Health facilities overview – Northern Cape Province, 2013

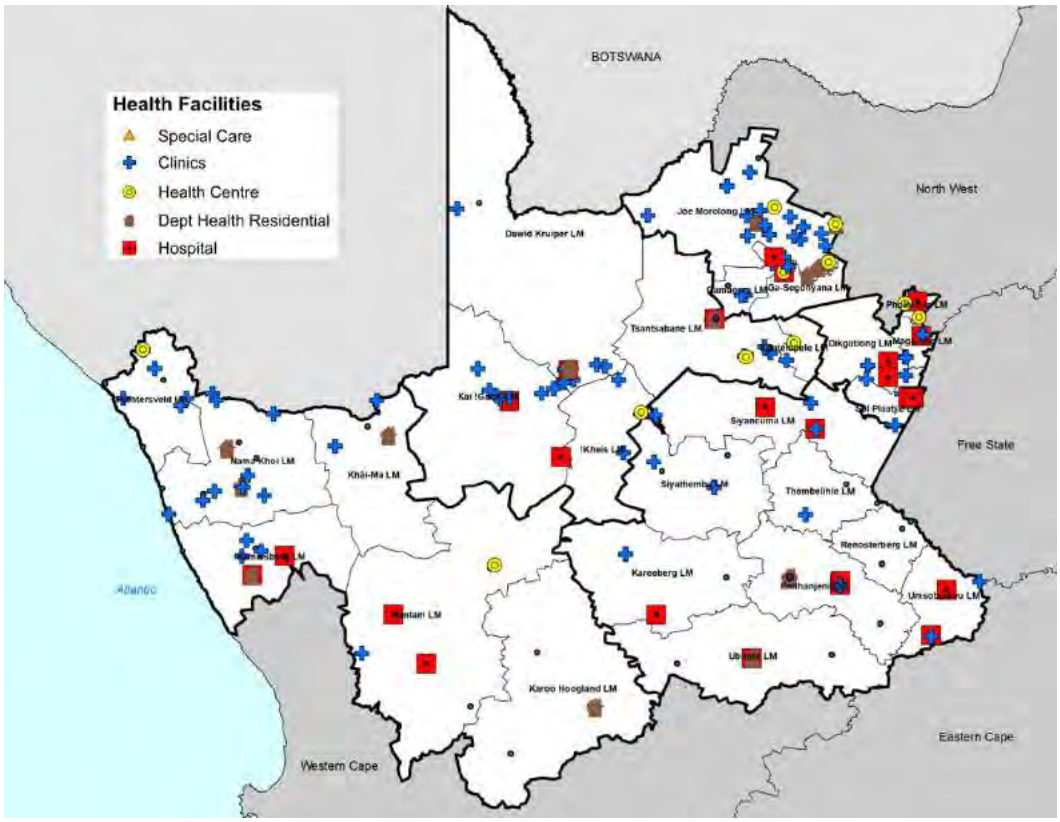


Figure 62: Health facilities overview – Northern Cape Province, 2017

4.1.1 District health profiles

4.1.1.1 Frances Baard District Municipality

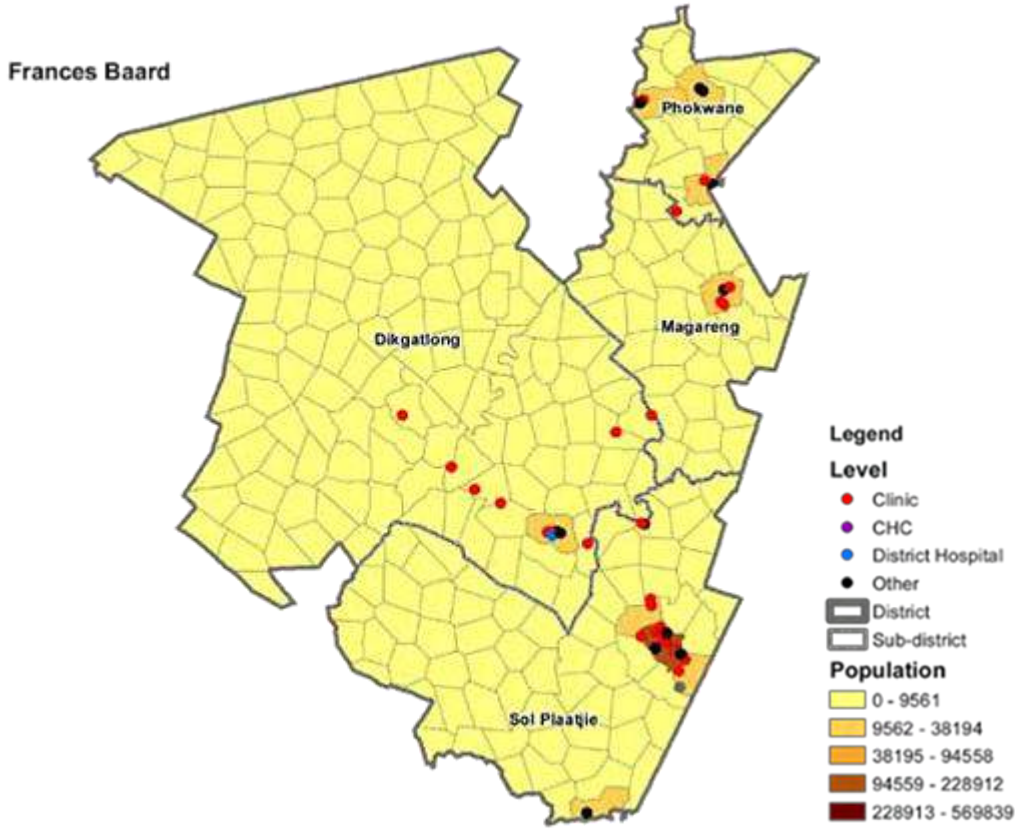


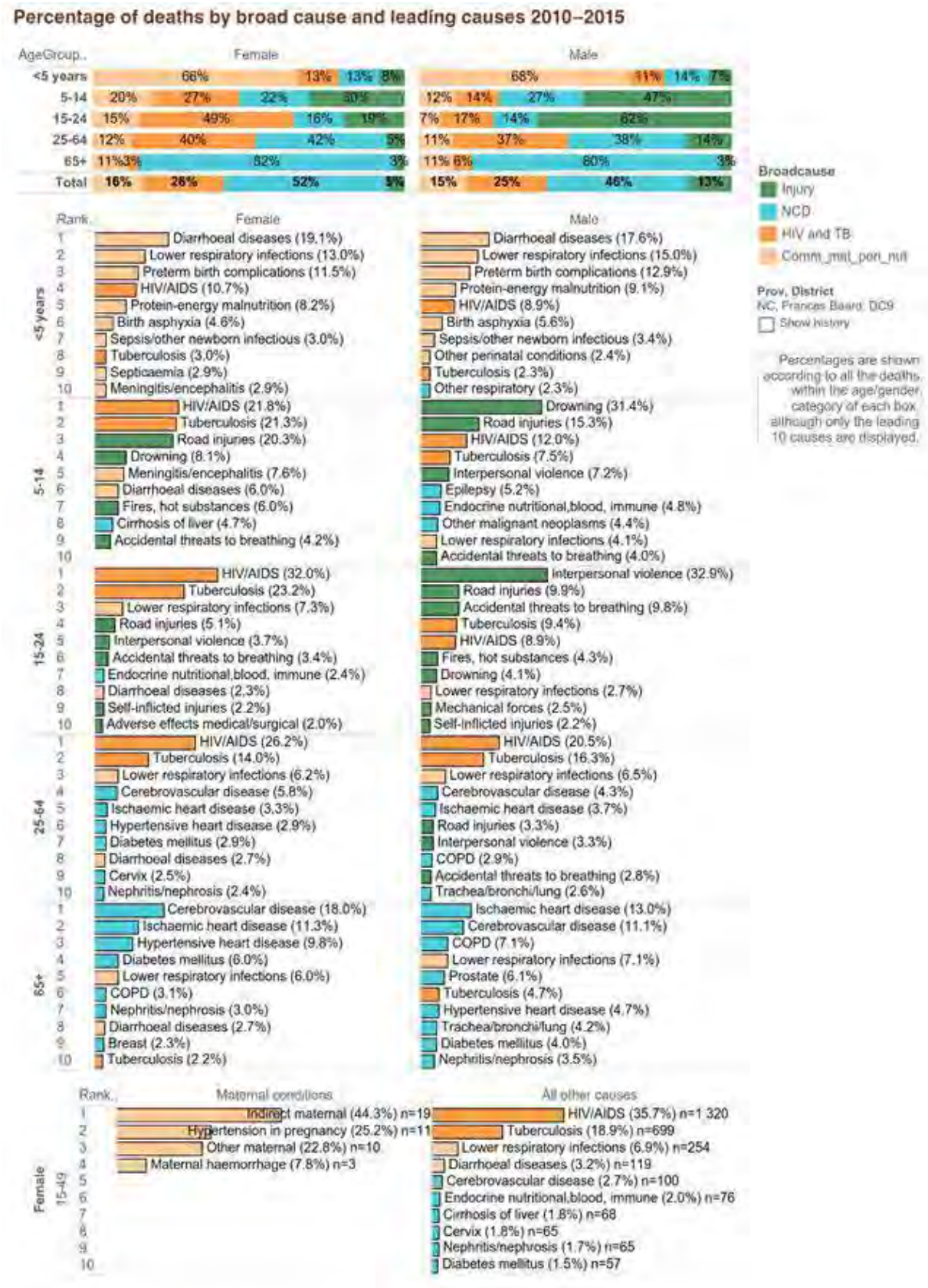
Table 33: Health facilities by District - Frances Baard District[46]

LOCAL MUNICIPALITY	WARDBASED OUTREACH	CLINIC	CHC	DISTRICT HOSPITAL	REGIONAL HOSPITAL	CENTRAL/ TERTIARY	OTHER HOSPITALS
Dikgatlong	3	5	0	1	0	0	0
Magareng	2	3	1	0	0	0	0
Phokwane	10	5	2	1	0	0	0
Sol Plaatje	13	13	1	0	0	1	4
Frances Baard	28	26	4	2	0	1	4

Frances Baard key health findings:

- Sol Plaatje has the highest concentration of health services within the province.
- Health facilities are mainly concentrated within larger settlement areas, limiting the accessibility to health care to rural communities.
- Gender roles play a major role in the determination of death causes (main death causes of young males are drowning, interpersonal violence and road injuries, where main female death causes are HIV/AIDS and TB).
- The leading death causes for the elderly are: Cerebrovascular disease, ischemic heart disease and hypertensive heart disease.

[46] *DHIS, 2016, Northern Cape District Profiles. DHIS is an open source software platform for reporting, analysis and dissemination of data for all health programs, developed by the Health Information Systems Programme (HISP)*



Graph 30: Summary of causes of death within Frances Baard

4.1.1.2 John Taolo Gaetsewe District Municipality

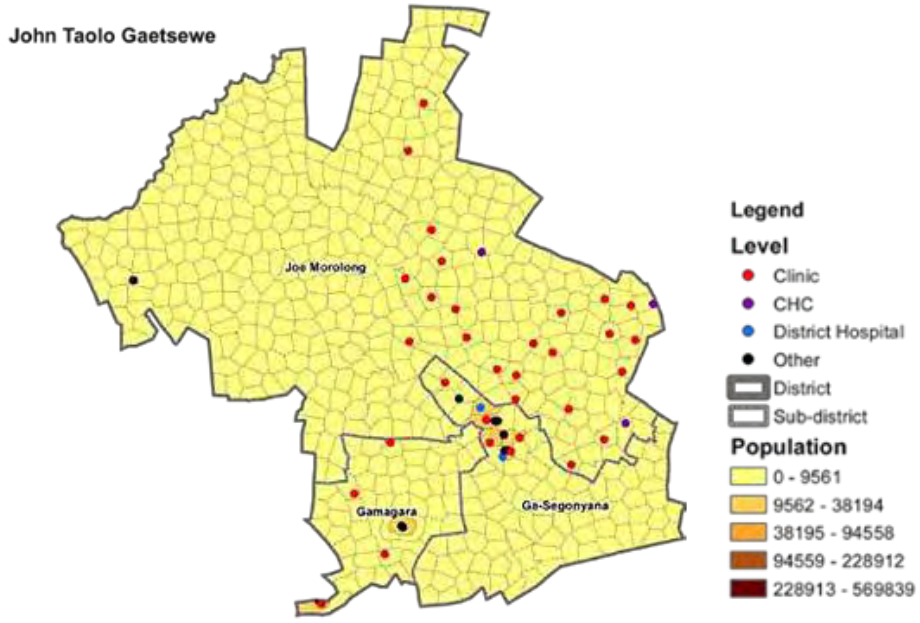


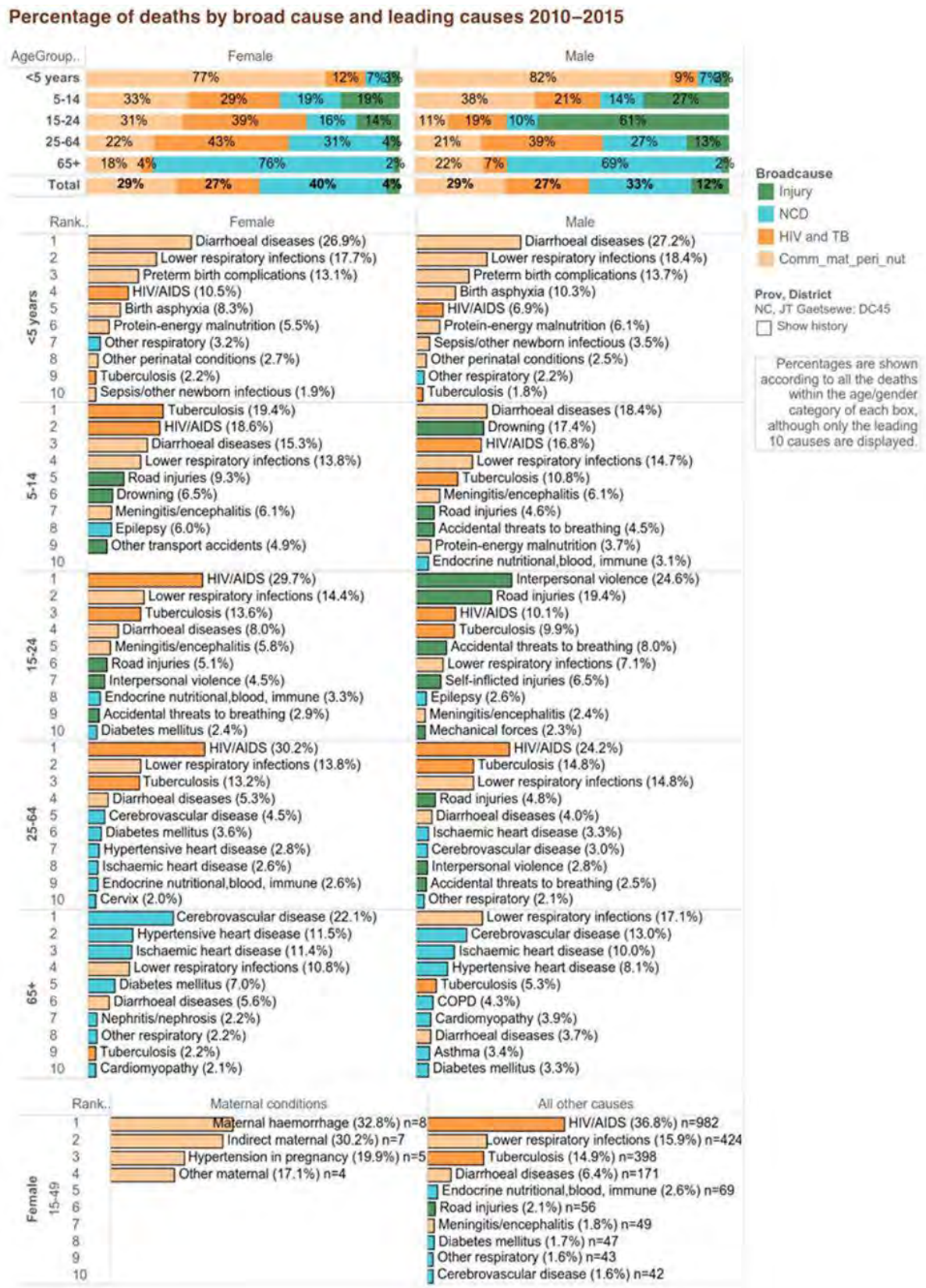
Table 34: Health facilities by District - John Taolo Gaetsewe District[47]

LOCAL MUNICIPALITY	WARDBASED OUTREACH TEAMS	CLINIC	CHC	DISTRICT HOSPITAL	REGIONAL HOSPITAL	CENTRAL/ TERTIARY HOSPITALS	OTHER HOSPITALS
Ga-Segonyana	13	7	1	2	0	0	0
Gamagara	2	5	1	0	0	0	0
Joe Morolong	17	25	3	0	0	0	0
John Taolo Gaetsewe	32	37	5	2	0	0	0

John Taolo Gaetsewe key health findings:

- Ga-segonyana (Kuruman) has the highest concentration of health services within the district.
- Health facilities are scattered, with the only significant concentration in Kuruman.
- Gender roles play a major role in the determination of death causes (main death causes of young males are diarrhoeal diseases, drowning, interpersonal violence and road injuries, where main female death causes are respiratory infections, HIV/AIDS and TB).
- The leading death causes for the elderly are: Lower respiratory infections, cerebrovascular disease, ischemic heart disease and hypertensive heart disease.

[47] *DHIS, 2016,Northern Cape District Profiles. DHIS is an open source software platform for reporting, analysis and dissemination of data for all health programs, developed by the Health Information Systems Programme (HISP)*



Graph 31: Summary of causes of death in John Taolo Gaetsewe

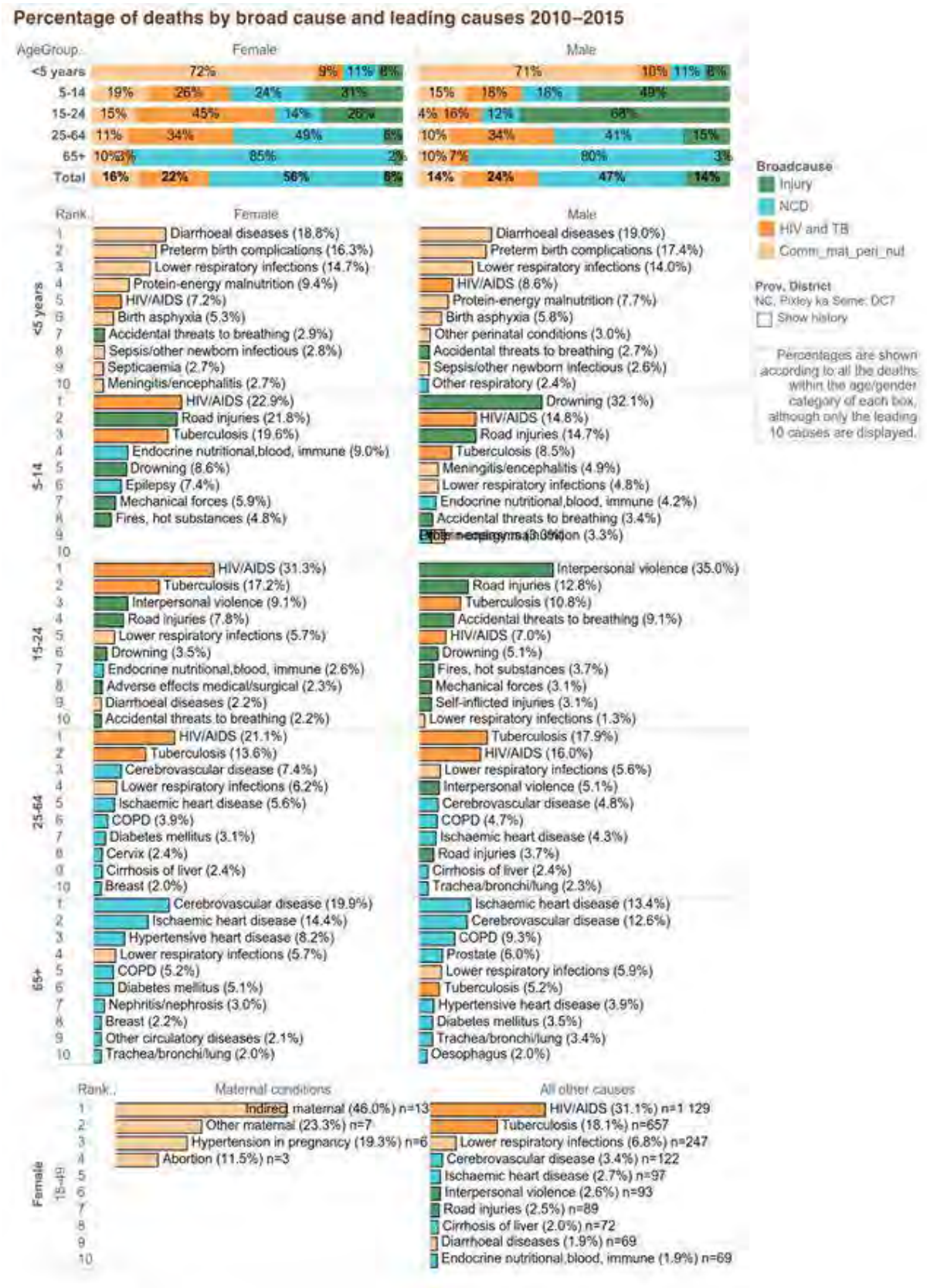
4.1.1.3 Pixley Ka Seme District Municipality



Table 35: Health facilities by District - Pixley Ka Seme District[48]

LOCAL MUNICIPALITY	WARDBASED OUTREACH	CLINIC	CHC	DISTRICT HOSPITAL	REGIONAL HOSPITAL	CENTRAL/ TERTIARY	OTHER HOSPITALS
Emthanjeni SD	8	7	0	1	0	0	0
Kareeberg SD	3	2	2	0	0	0	0
Renosterberg SD	4	3	0	0	0	0	0
Siyancuma SD	6	3	2	0	0	0	0
Siyathemba SD	4	4	0	1	0	0	0
Thembelihle SD	3	2	1	0	0	0	0
Ubuntu SD	4	3	2	0	0	0	0
Umsobomvu SD	5	7	1	1	0	0	0
Pixley Ka Seme	37	31	8	3	0	0	0

[48] *DHIS, 2016,Northern Cape District Profiles. DHIS is an open source software platform for reporting, analysis and dissemination of data for all health programs, developed by the Health Information Systems Programme (HISP)*



Graph 32: Summary of causes of death of Pixley ka Seme

4.1.1.4 ZF Mgcawu District Municipality

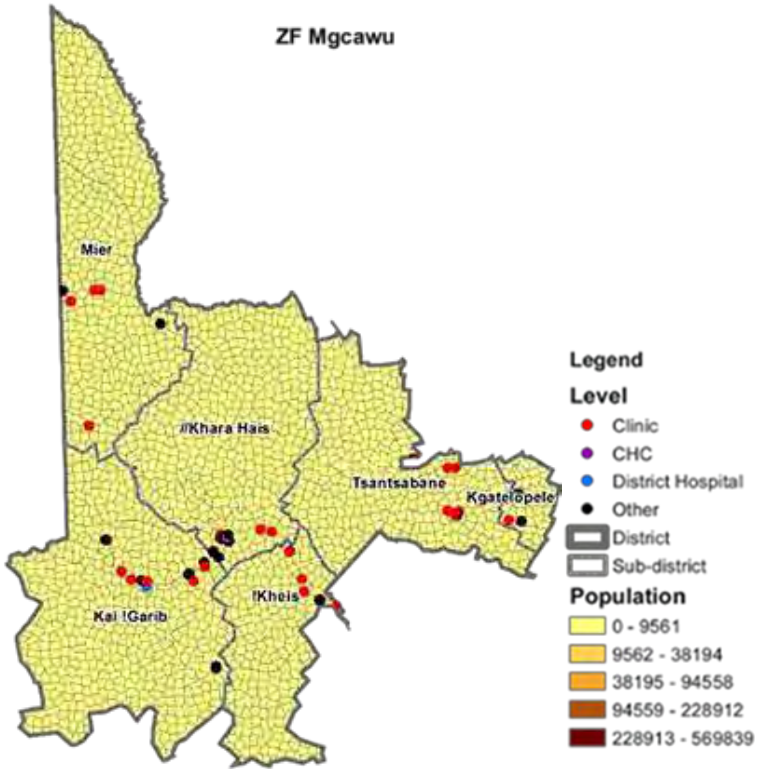


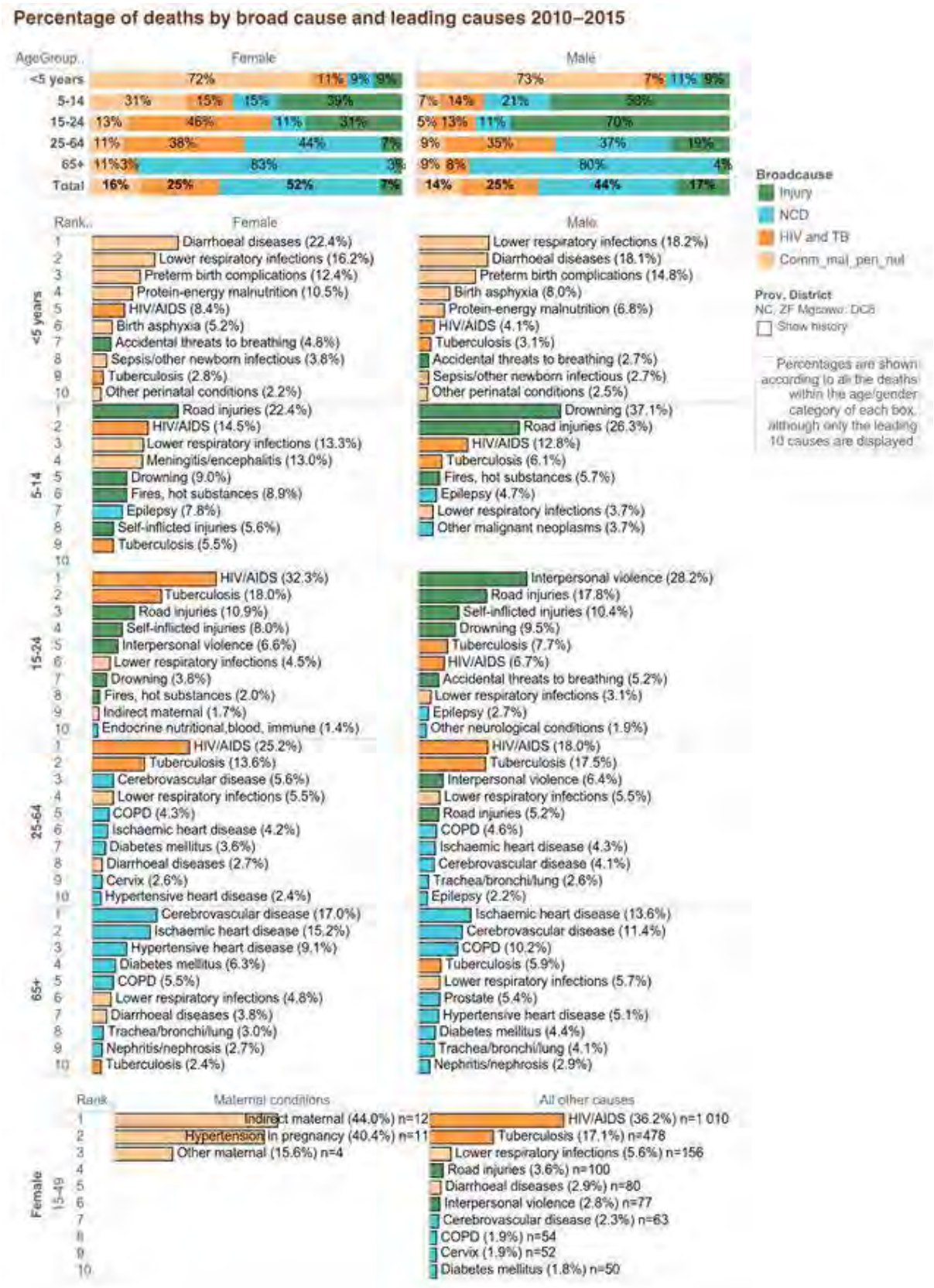
Table 36: Health facilities by District - ZF Mgcawu District[49]

LOCAL MUNICIPALITY	WARDBASED OUTREACH	CLINIC	CHC	DISTRICT HOSPITAL	REGIONAL HOSPITAL	CENTRAL/ TERTIARY	OTHER HOSPITALS
//Khara Hais SD	7	8	0	0	1	0	1
!Kheis SD		1	1	0	0	0	0
Kai !Garib SD	4	4	2	1	0	0	0
Kgatelopele SD	1	0	1	0	0	0	0
Mier SD	3	0	2	0	0	0	0
Tsantsabane SD	3	4	0	1	0	0	0
ZF Mgcawu	18	17	6	2	1	0	1

ZF Mgcawu key health findings:

- Health facilities are highly concentrated along the Orange River corridor, as well as in the prominent mining towns.
- District and other public hospitals have a more central location aiding in accessibility, although some rural areas, still have limited access to these health services.
- Gender roles play a smaller role in the determination of the leading causes of death, than in other districts.
- The leading death causes for the elderly are: Diabetes, cerebrovascular disease, ischemic heart disease and hypertensive heart disease.

[49] *DHIS, 2016, Northern Cape District Profiles. DHIS is an open source software platform for reporting, analysis and dissemination of data for all health programs, developed by the Health Information Systems Programme (HISP)*



Graph 33: Summary of causes of death for ZF Mgcawu

4.1.1.5 Namakwa District Municipality

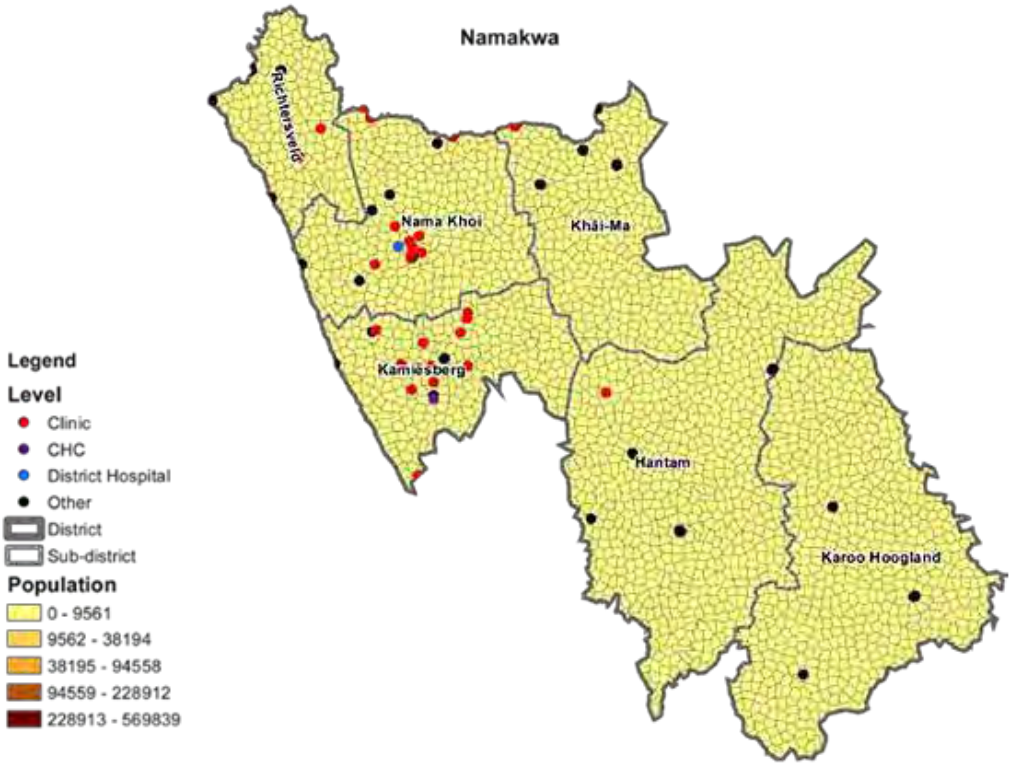


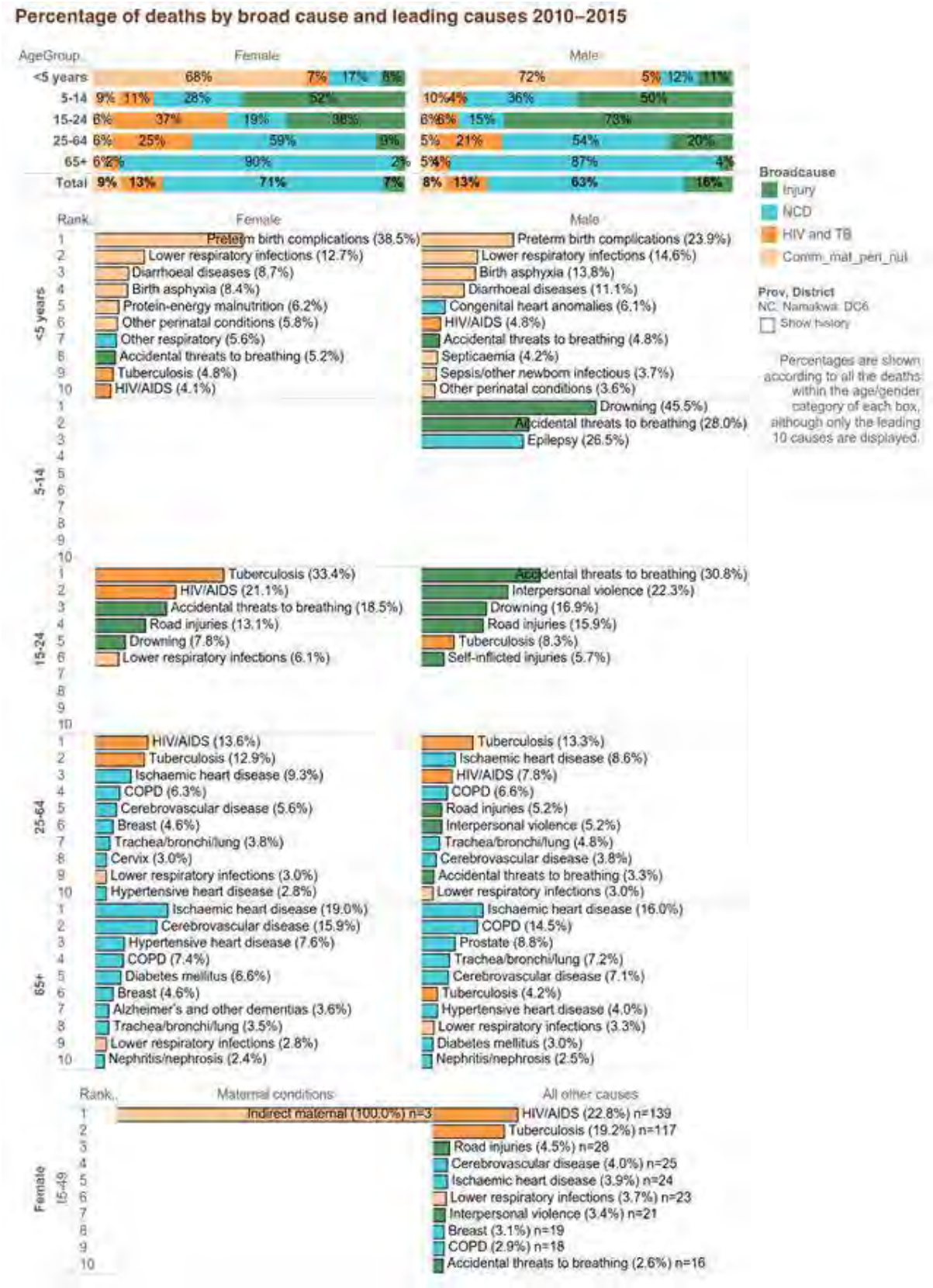
Table 37: Health facilities by District - Namakwa District[50]

LOCAL MUNICIPALITY	WARDBASED OUTREACH	CLINIC	CHC	DISTRICT HOSPITAL	REGIONAL HOSPITAL	CENTRAL/ TERTIARY	OTHER HOSPITALS
Hantam	4	3	2	1	0	0	0
Kamiesberg	3	5	1	0	0	0	0
Karoo Hoogland	3		3	0	0	0	0
Khai-Ma	4	4	1	0	0	0	1
Nama Khoi	9	9	1	1	0	0	1
Richtersveld	6	4	2	0	0	0	0
Namakwa	29	25	10	2	0	0	2

Namakwa key health findings:

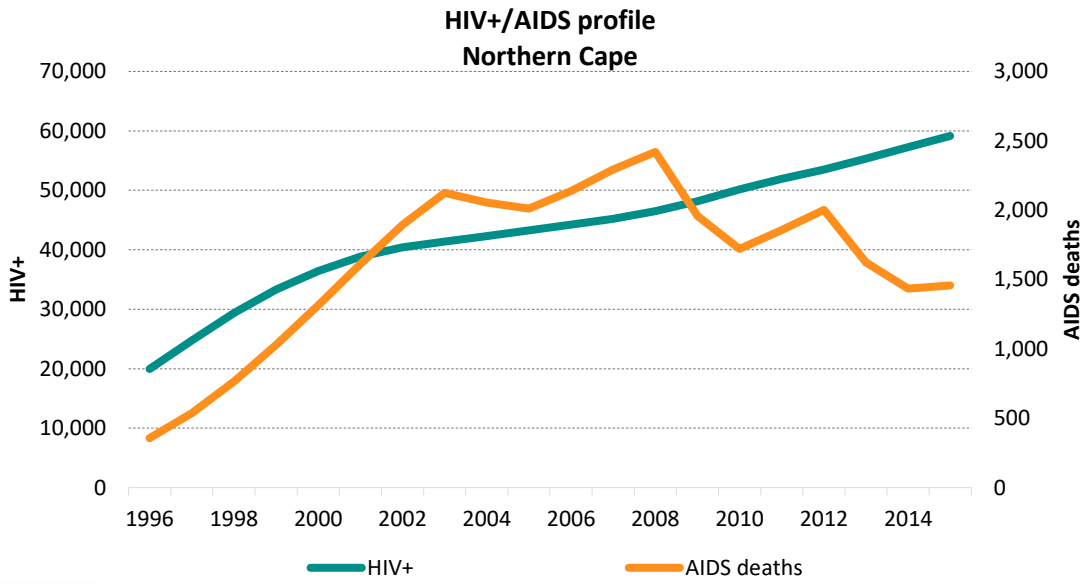
- Health facilities are mainly concentrated in the Springbok and Garies regions.
- The limited remaining health facilities are scattered through the Khai-ma, Hantam, Karoo Hoogland and Richtersveld municipal regions.
- The only district hospital is located in Springbok, which creates accessibility challenges for residents located in the southern parts of the district.
- Limited data is available regarding causes of death of females aged between 5 and 14.
- Gender roles play a part in the determination of the leading causes of death (main causes of death of young males: drowning, accidental threats to breathing and interpersonal violence, where the leading causes of death for young females are: TB and HIV/Aids)
- The leading death causes for the elderly are: chronic obstructive pulmonary disease (COPD), cerebrovascular disease, ischemic heart disease and hypertensive heart disease.

[50] *DHIS, 2016,Northern Cape District Profiles. DHIS is an open source software platform for reporting, analysis and dissemination of data for all health programs, developed by the Health Information Systems Programme (HISP)*



Graph 34: Summary of causes of death for Namakwa

4.1.2 HIV+/AIDS – Northern Cape Province



IHS Markit

Source: IHS Markit Regional eXplorer version 1029

Graph 35: HIV + and AIDS profile of the Northern Cape Province

5 SAFETY AND SECURITY

Safety and security can have a major impact on various socio-economic aspects of a region. Crime may significantly affect the tourism sector. Tourists and visitors may avoid areas with high crime rates, and this in turn affects the buying power and capital flow into an area. Crime also affects the social aspects and demographics of an area and may cause out-migration resulting in a decreasing population. This can have a negative influence especially where crime drives away skilled and educated workforce. Initiatives such as visible policing can be incorporated to regulate and prevent crime incidents. In total there are 88 police stations distributed across the Northern Cape. Out of the total 88 police stations in the province, 13 are located in ZF Mgcawu, 23 police stations in Namakwa, 26 in Pixley ka Seme, 13 in Sol Plaatje districts and 13 in Frances Baard district[51].

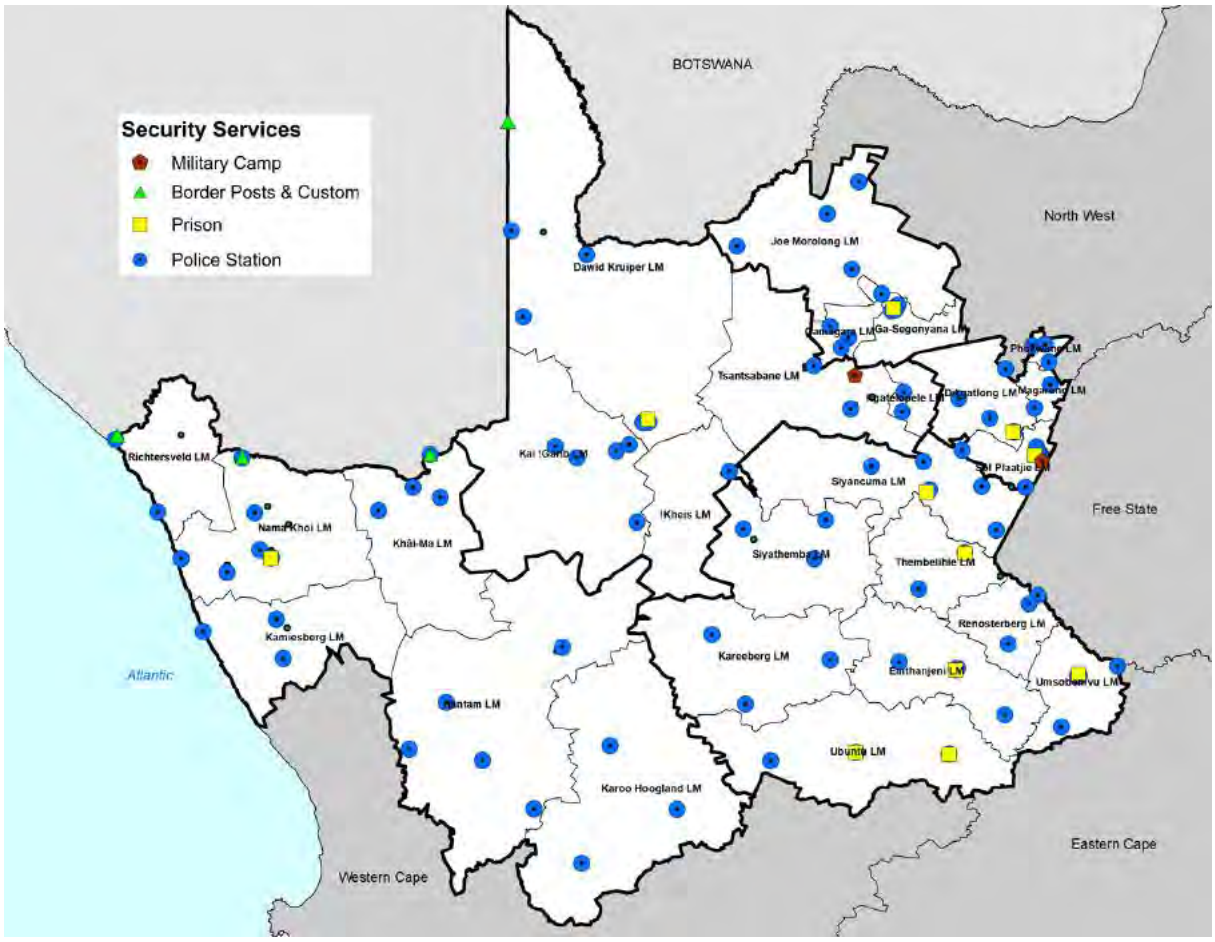
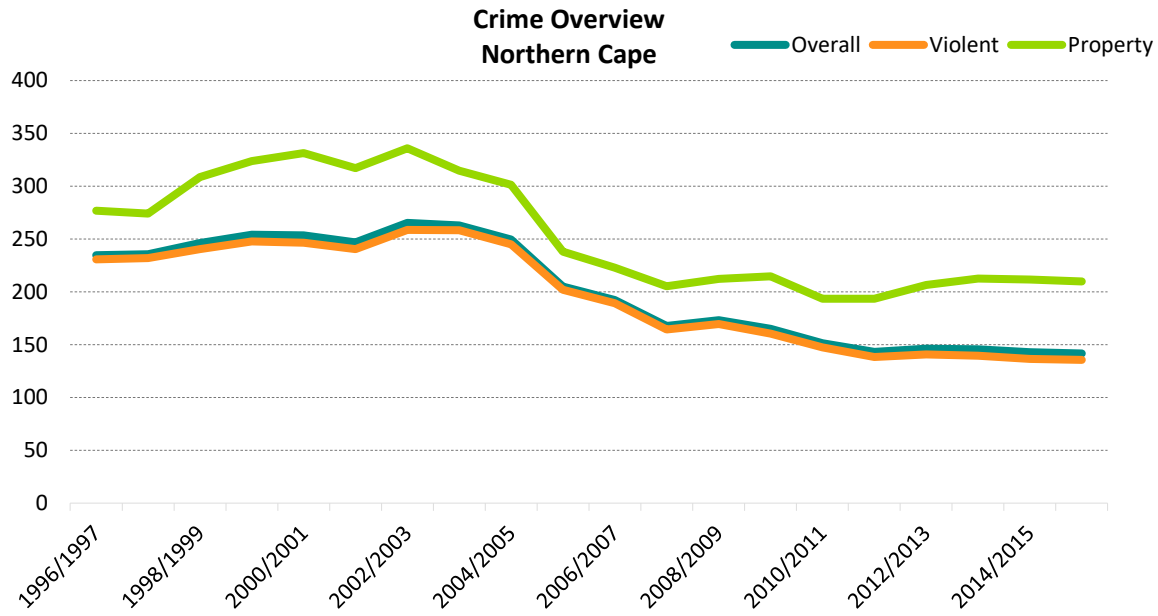


Figure 63: Safety and Security facilities – Northern Cape Province

[51] *DRDLR, 2017*

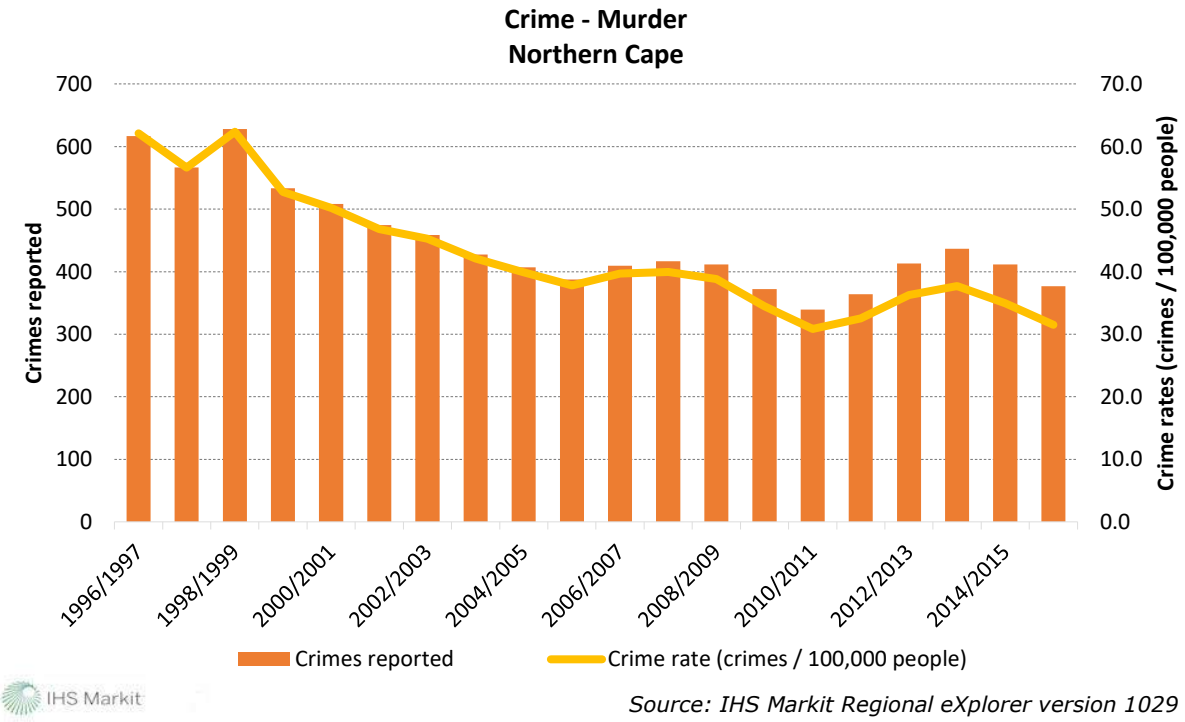
5.1 CRIME OVERVIEW



Source: IHS Markit Regional eXplorer version 1029

Graph 36: Crime –Overview of the Northern Cape Province (1996-2015)

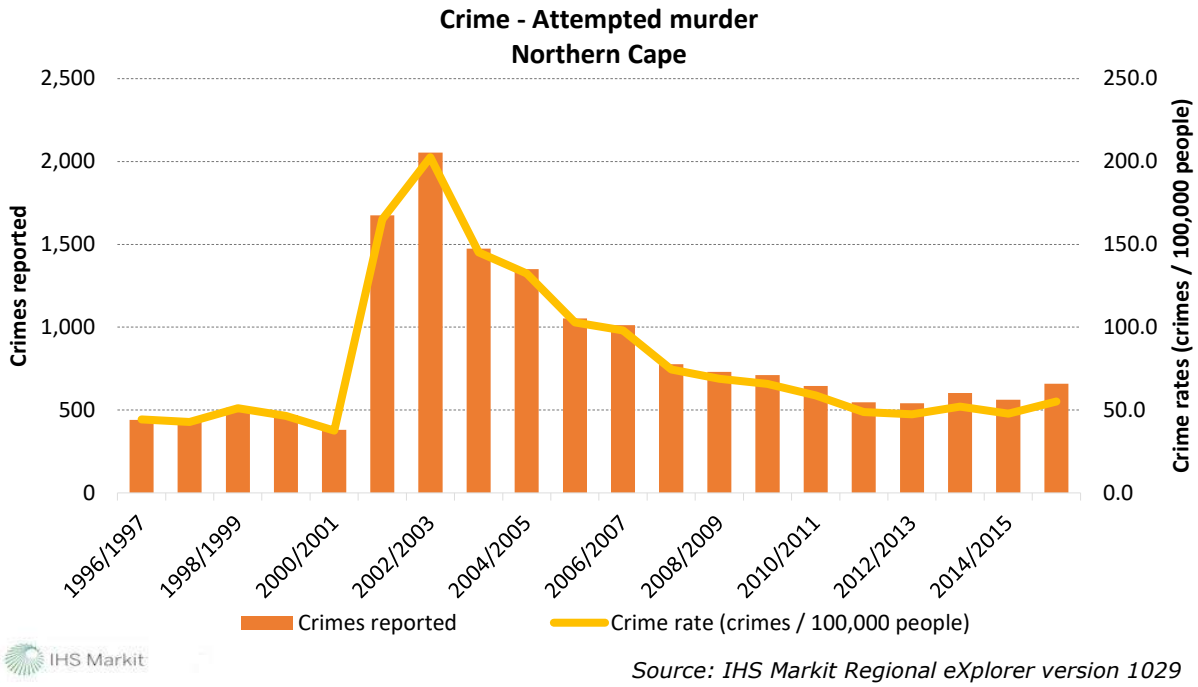
5.1.1 Murder



Source: IHS Markit Regional eXplorer version 1029

Graph 37: Crime - Murder overview of the Northern Cape Province (1996-2015)

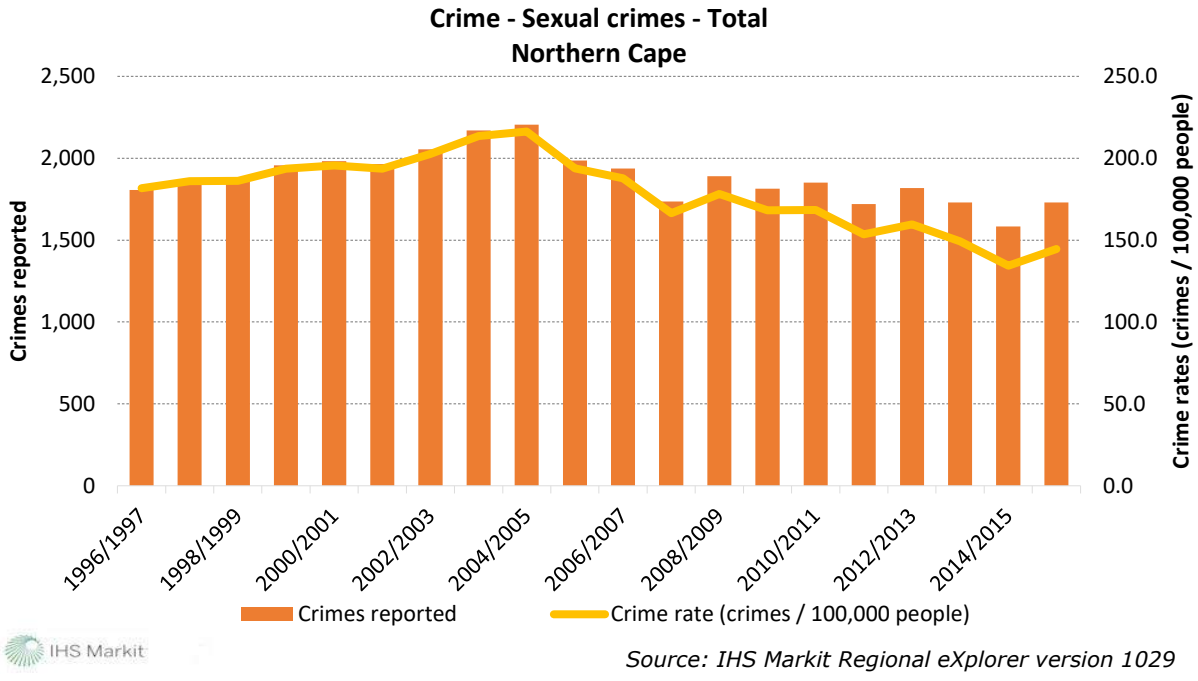
5.1.2 Attempted murder



Source: IHS Markit Regional eXplorer version 1029

Graph 38: Crime – Attempted murder overview of the Northern Cape Province (1996-2015)

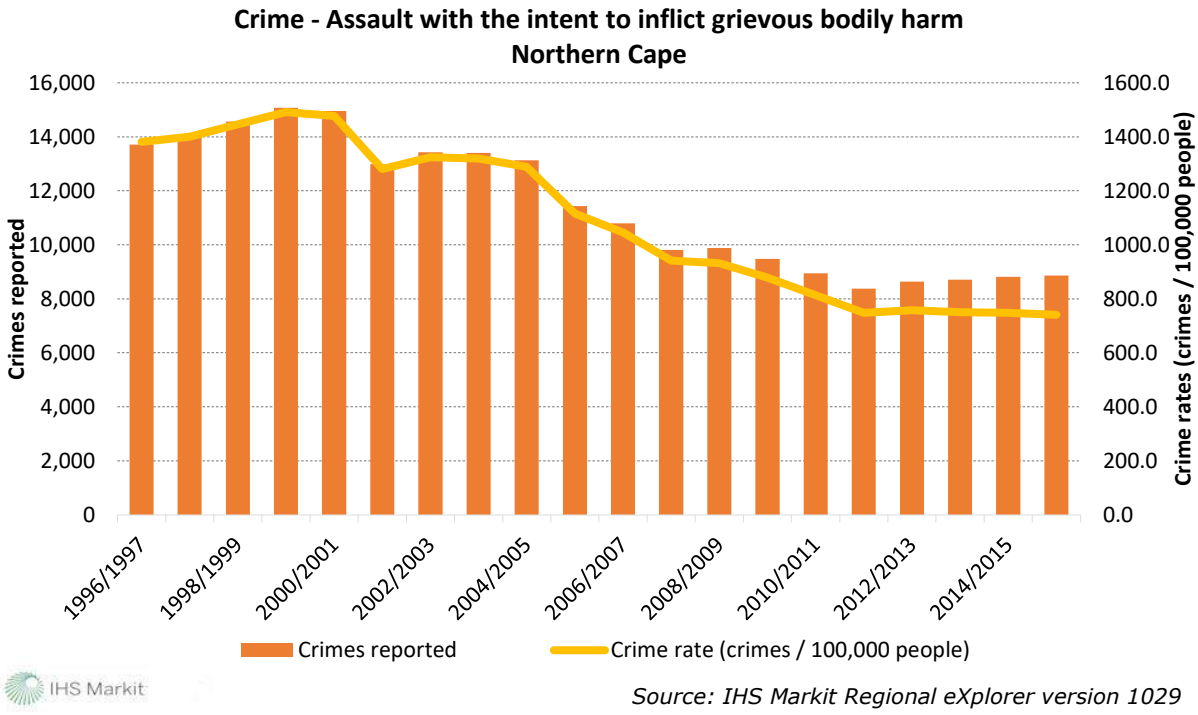
5.1.3 Sexual crimes



Source: IHS Markit Regional eXplorer version 1029

Graph 39: Crime – Sexual crimes overview of the Northern Cape Province (1996-2015)

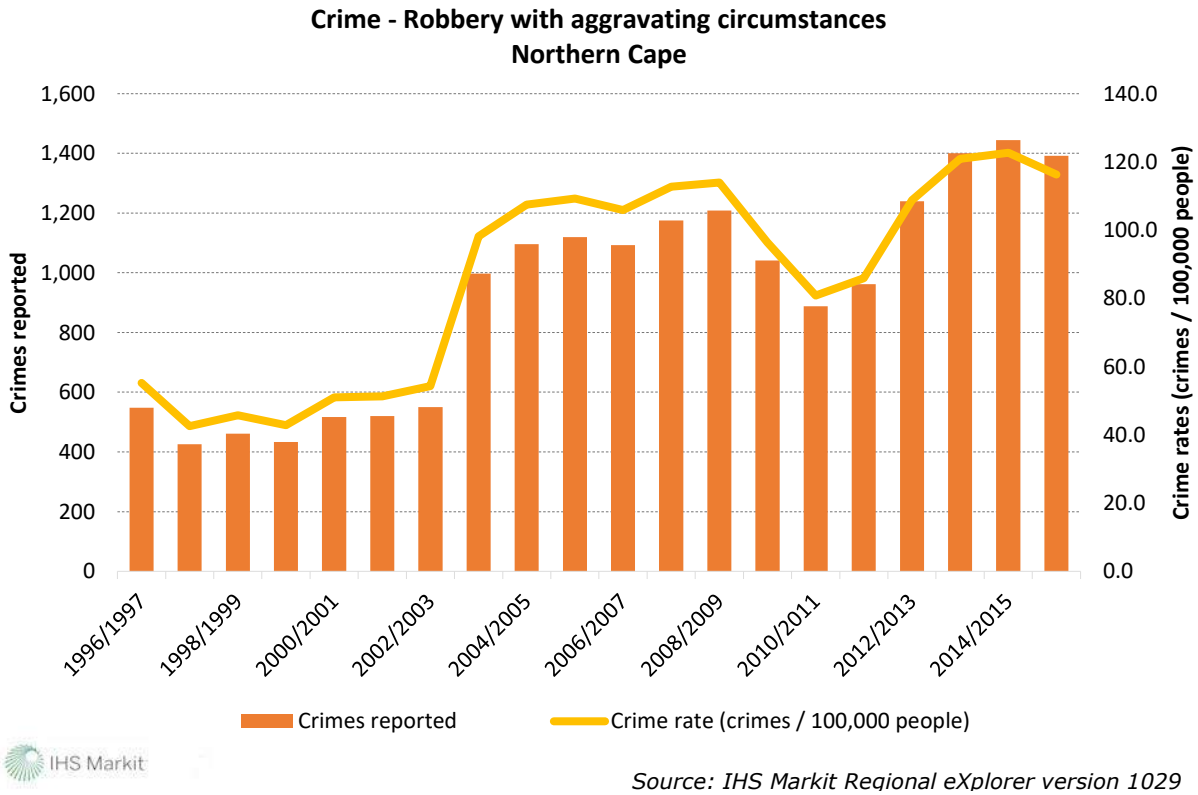
5.1.4 Assault with the intent to inflict grievous bodily harm



Source: IHS Markit Regional eXplorer version 1029

Graph 40: Crime – assault with the intent to inflict grievous bodily harm overview of the Northern Cape Province (1996-2015)

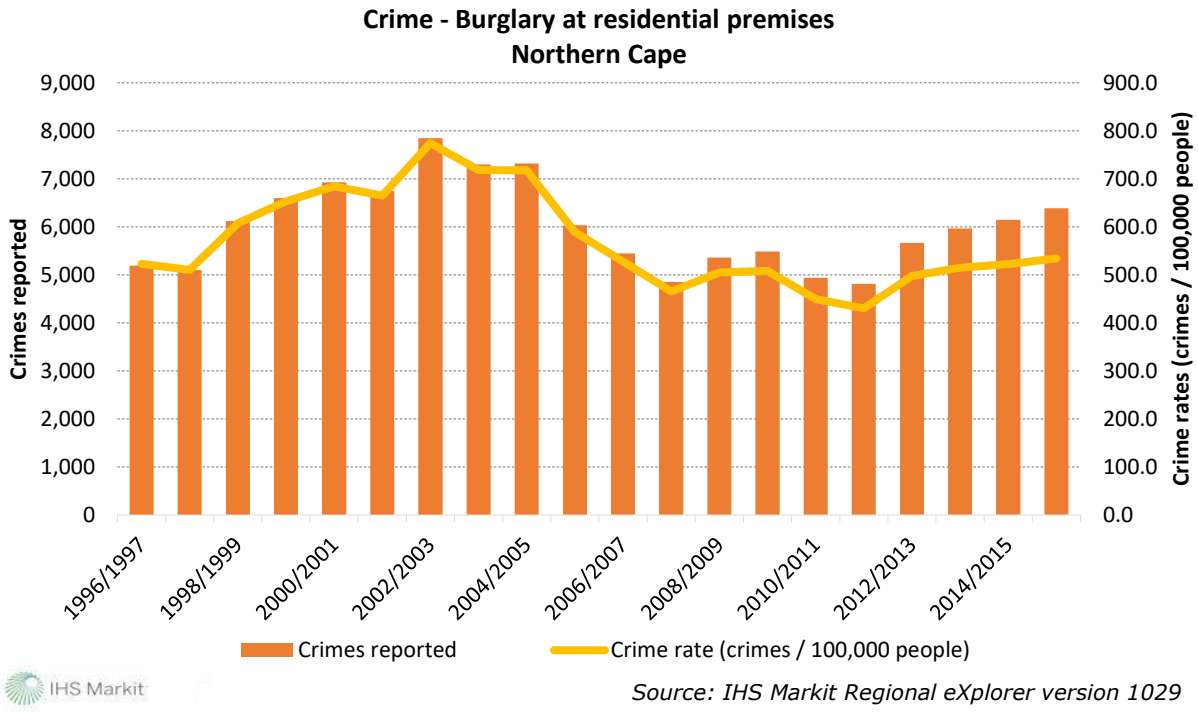
5.1.5 Robbery with aggravating circumstances



Source: IHS Markit Regional eXplorer version 1029

Graph 41: Crime – Robbery with aggravating circumstances overview of the Northern Cape Province (1996-2015)

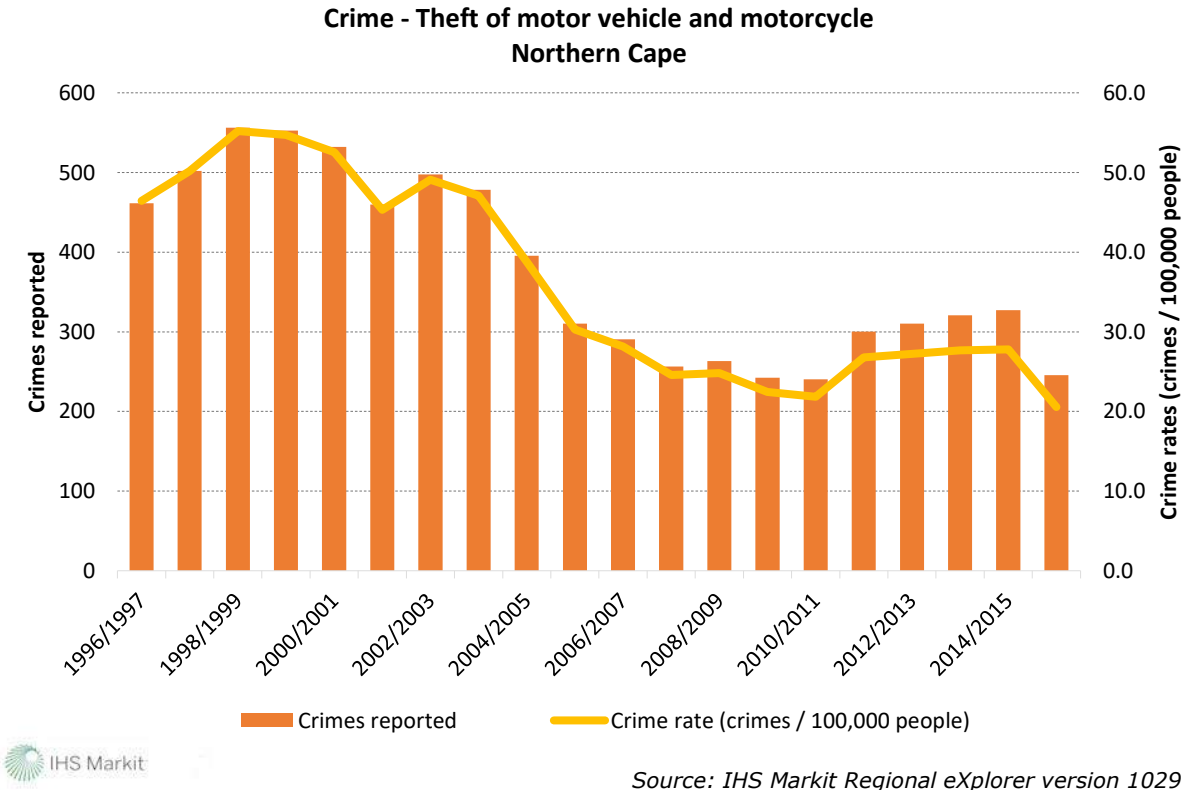
5.1.6 Burglary at residential premises



Source: IHS Markit Regional eXplorer version 1029

Graph 42: Crime –Burglary at residential premises overview of the Northern Cape Province (1996-2015)

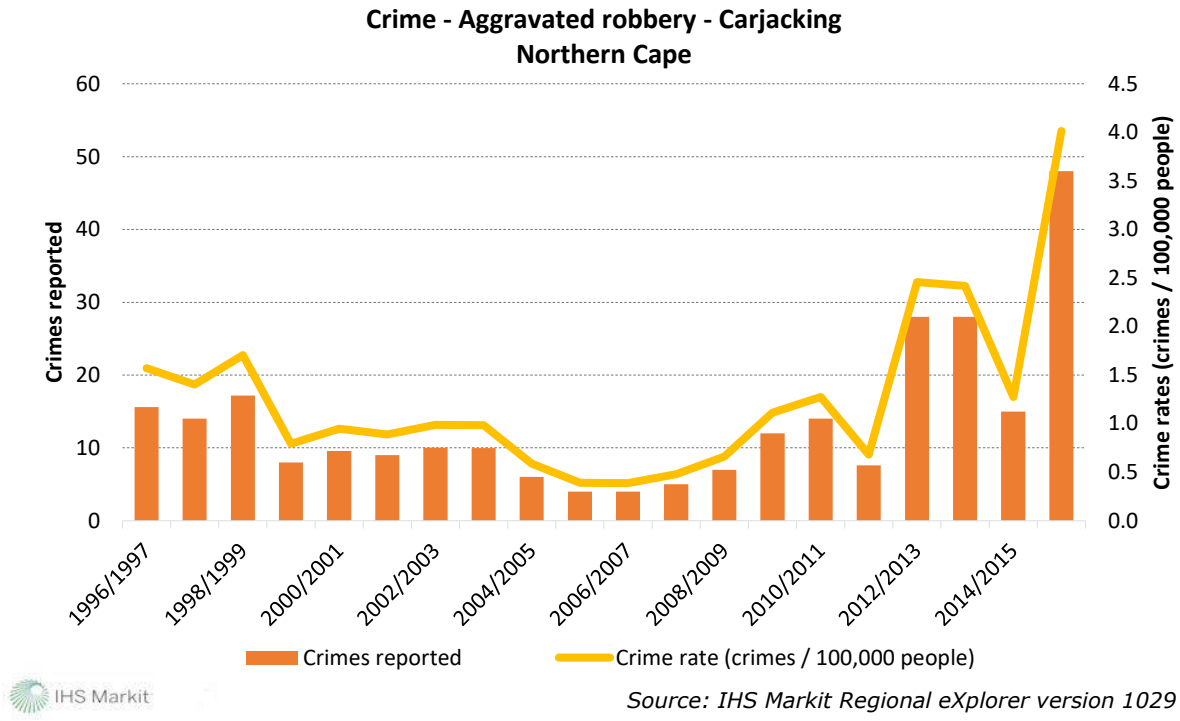
5.1.7 Theft of motor vehicle and motor cycles



Source: IHS Markit Regional eXplorer version 1029

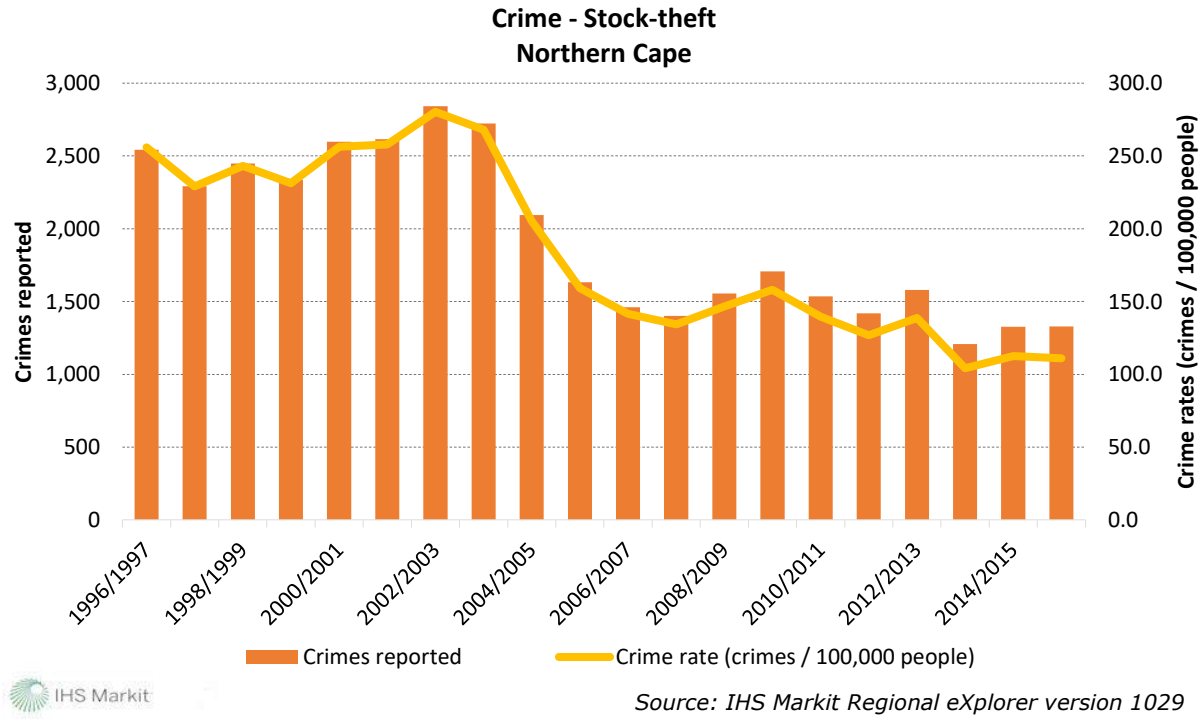
Graph 43: Crime –Theft of motor vehicle and motor cycles overview of the Northern Cape Province (1996-2015)

5.1.8 Car hijacking



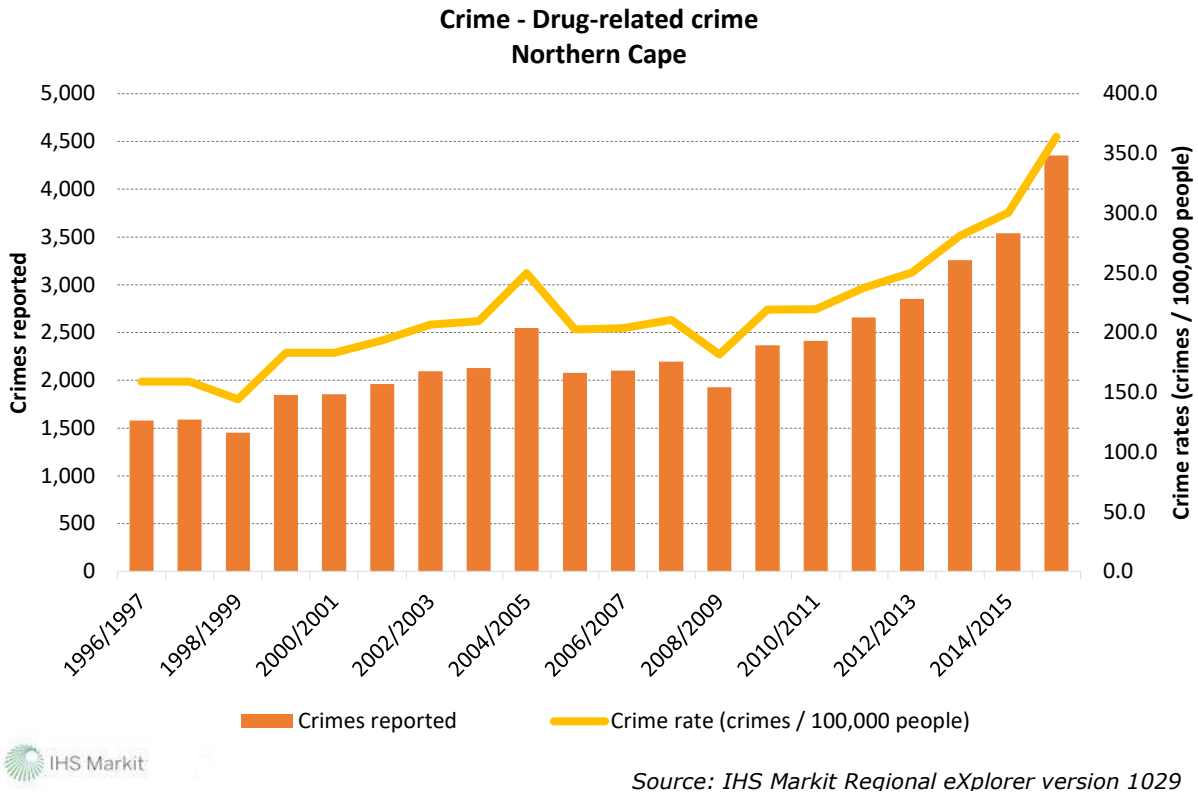
Graph 44: Crime –Car hijacking overview of the Northern Cape Province (1996-2015)

5.1.9 Stock theft



Graph 45: Crime – Stock theft overview of the Northern Cape Province (1996-2015)

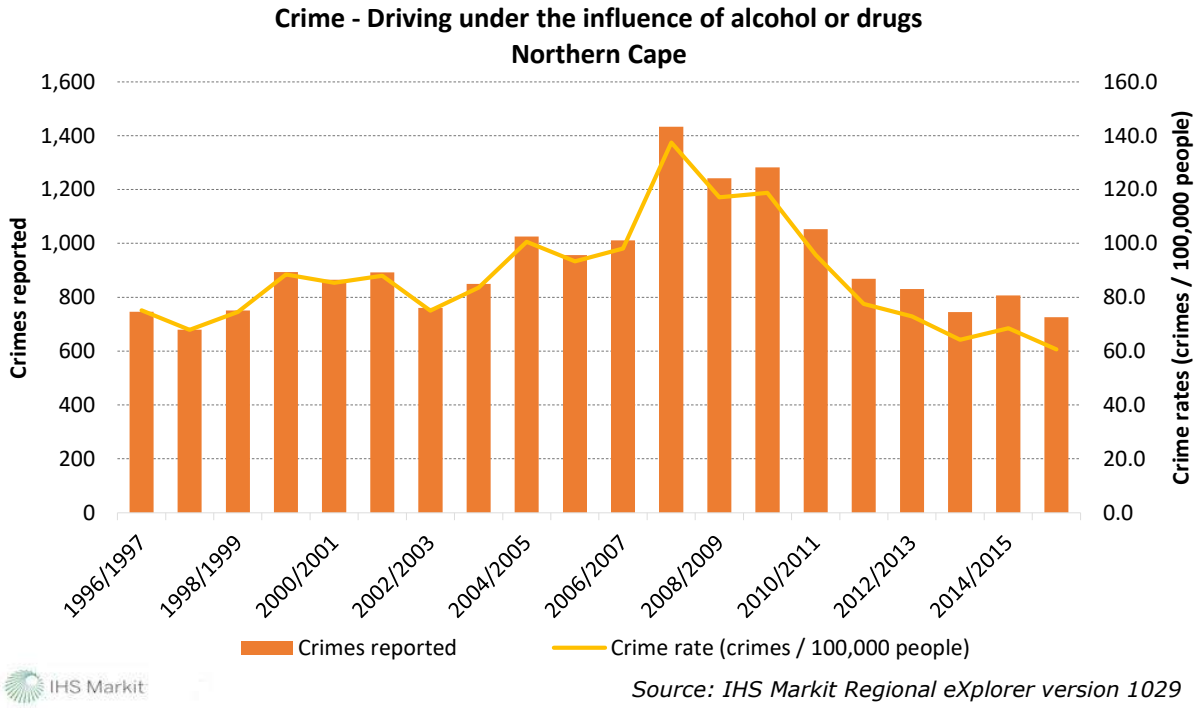
5.1.10 Drug related crime



Source: IHS Markit Regional eXplorer version 1029

Graph 46: Crime – Drug related crime overview of the Northern Cape Province (1996-2015)

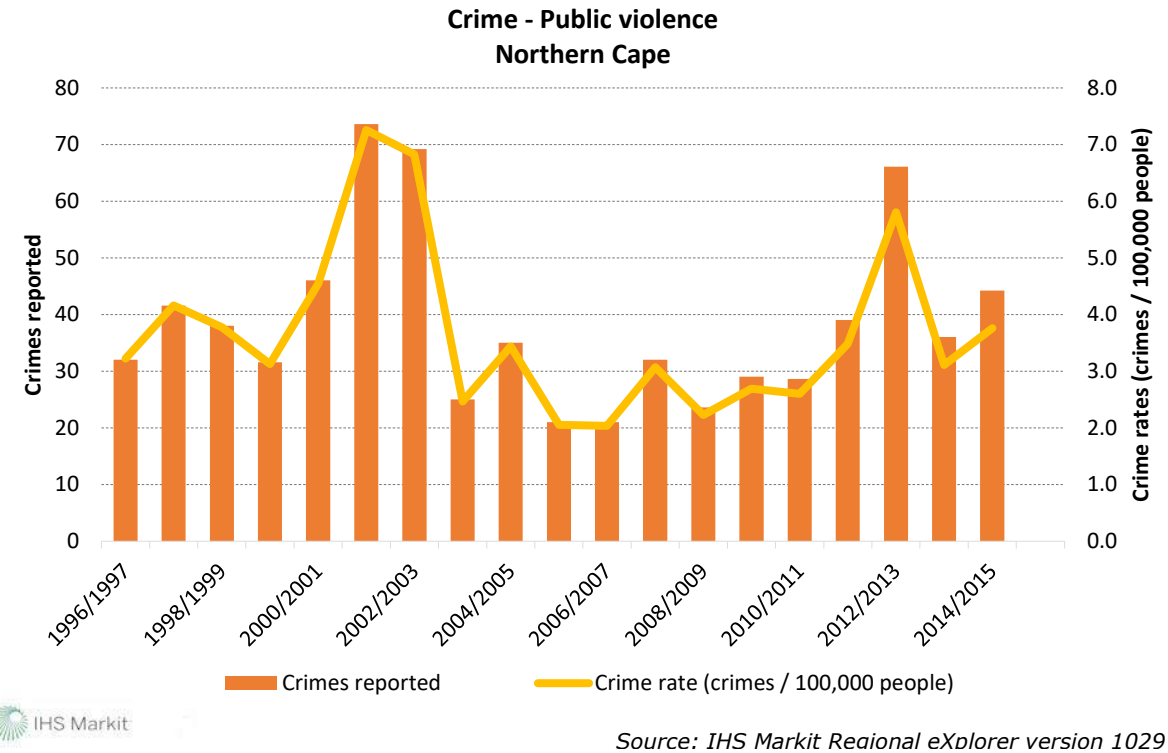
5.1.11 Driving under the influence of alcohol or drugs



Source: IHS Markit Regional eXplorer version 1029

Graph 47: Crime –Driving under the influence of alcohol or drugs overview of the Northern Cape Province (1996-2015)

5.1.12 Public Violence



Source: IHS Markit Regional eXplorer version 1029

Graph 48: Crime –Public violence overview of the Northern Cape Province (1996-2015)

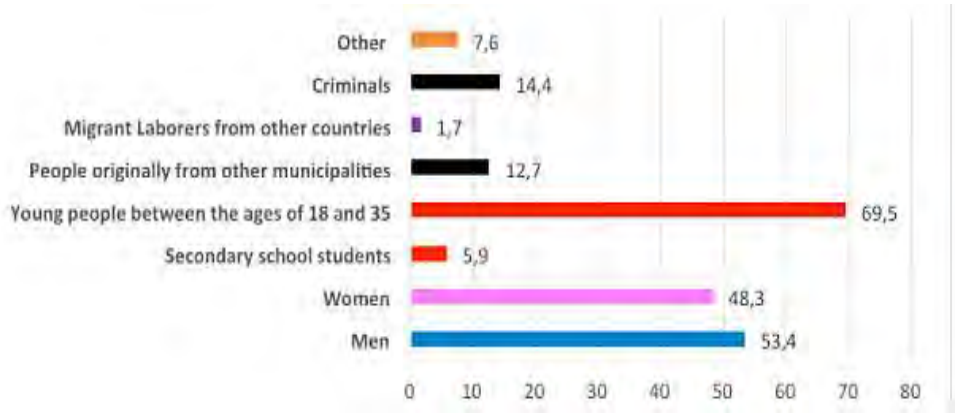
Key safety and security findings:

- Property theft is the most prominent within the province.
- Murder crimes have steadily declined (with some fluctuations) from 1996 to 2016.
- Attempted murder cases spiked in 2002-2004, where a steady decline has been observed from 2005-2013, from 2014 and onwards, it has been slightly fluctuating.
- Sexual crime act reached an all-time peak 2005, from where it has been steadily declining, although the sexual crime rate is still high (180/100 000 people).
- Assault crime rates have stabilised (although the rate stabilised, it is still very high (680/100 000 people)) from 2011 onwards, after a peak in 2000.
- A sharp increase has been observed (from 2011 to 2016) regarding robbery with aggravating circumstances.
- Residential burglary rates have seen a steady increase from 2012-2016.
- A steady decline in motor vehicle theft was observed from 2002-2011, where a slight increase or upswing occurred from 2012-2015.
- A sharp increase in carjacking incidents was observed from 2015-2016.
- A steady decline in stock theft is evident from 2004-2008, from there onwards the crime rate has fluctuated.
- A sharp increase of drug related crimes has been observed from 2008 to present.
- A steady rate of decline is observed regarding, drunk driving incidents, from 2009-present, after a peak in 2008.
- Public violence levels vary greatly from 2000-2015, as various aspects and factors drive public unrest.

5.2 PUBLIC PROTEST

The dictionary definition of protest as a noun is described as, "an expression or declaration of objection, disapproval or dissent, often in opposition to something a person is powerless to prevent or avoid (Dictionary. com)." According to this particular definition, one may infer that protest is driven by a claim to a capacity or power from a position of relational powerlessness. The Public Gatherings Act (205 of 1993) stipulates the conditions under which any public gathering may occur. A gathering is defined as an aggregation of '15 or more persons on a public road or any public space'. It is this definition that allows us to apportion a description to protest action, no matter how problematic that definition appears. For the purposes of this study, a protest is therefore described as 'a public gathering which is convened for the purposes of declaring an objection or expressing dissent.' This definition is further limited to public gatherings convened for the purposes of expressing dissent over the pace and quality of service delivery.[52]

5.2.1 Protest actors



Graph 49: Citizen categories – protest actors

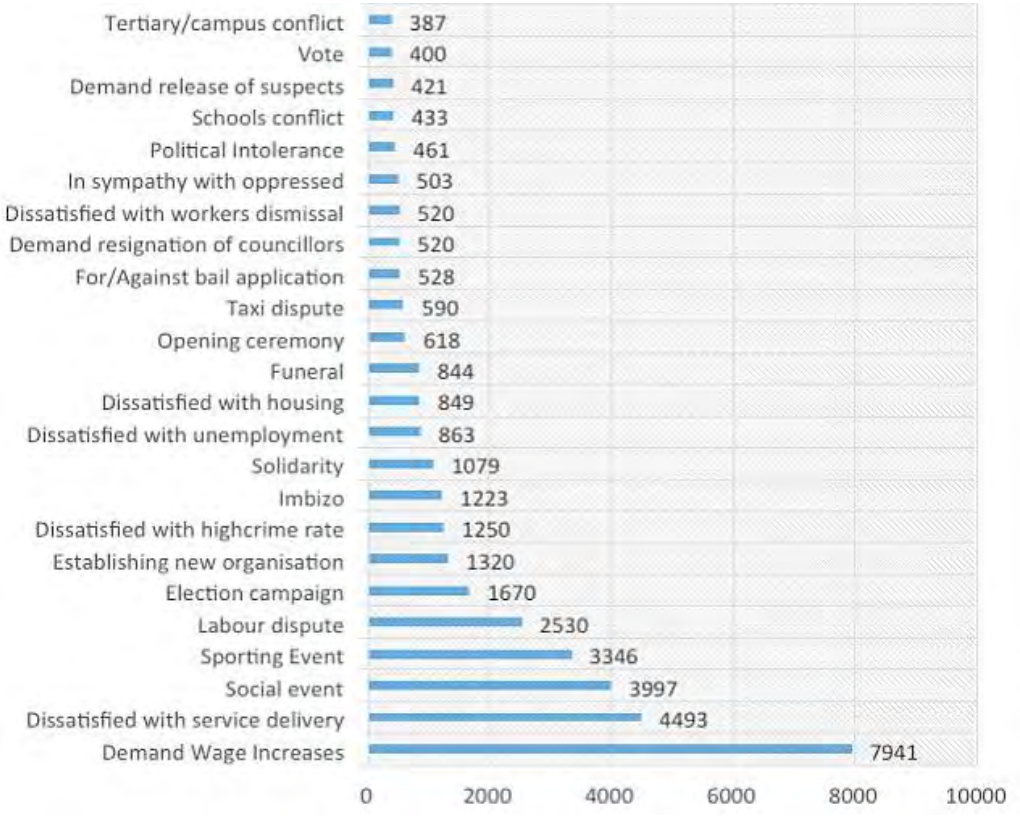
There have often been claims that councils are unresponsive to community grievances and memoranda. Data emerging from the Afrobarometer[53] supports this contention. Lavery (2012), utilising Afrobarometer data, claims that the willingness to protest is declining with more people claiming to be unwilling to protest over time as protests become more violent and met by public order policing repression. However, people who continue to protest are more likely to have contacted their councillors or government officials, have a greater belief that they are being heard and are more likely than non-protestors and infrequent protestors to use violence to advance their causes. From this account, one can deduce that claims made by Runciman (2015) that protestors target state property to gain the attention of senior government officials and politicians in a trade-off action are consistent with the human agency claims made by Lavery (2012). When communities burn down their clinic, for example, it is in the hope that they will receive a greater benefit from any further engagements with national government. Communities are therefore speaking to government officials through protest and yelling through disruptive and violent protest. The withdrawal of non-violent protestors from community mobilisations may also be the cause for the upward trend in violent protest action. It may

[52] *J Steyn, 2015 Community Protest: Local Government Perceptions, SALGA*

[53] *Afrobarometer (2012) South Africa Round 5. Available at http://www.afrobarometer-online-analysis.com/aj/AJBrowserAB.jsp accessed 4.11.2014.*

just be the case that the law-abiding or process observing people traditionally leading protest actions have been displaced by more radical community elements.

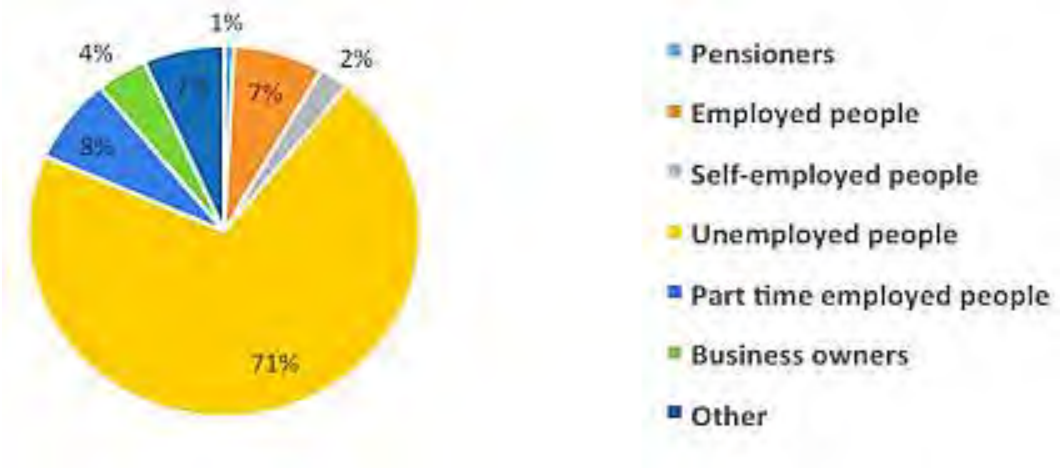
5.2.2 Protest motivations



Graph 50: Frequency of motivations for public protest and/or gatherings (2009 – 2013)[54]

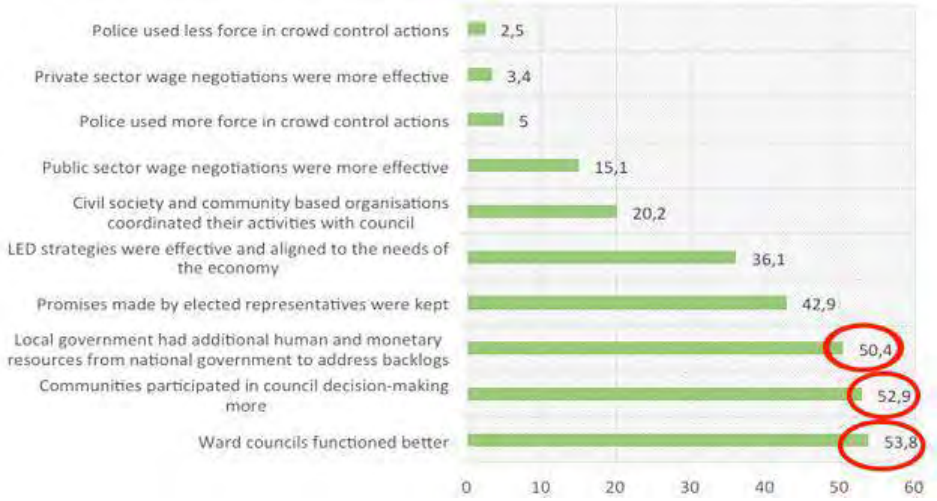
[54] Alexander, Runciman and Maruping derived from IRIS (2015)

5.2.3 Protest economic status



Graph 51: Perceived economic status of community protestors

5.2.4 Protest recommendations



Graph 52: Protest could be reduced - recommendations



Graph 53: Actions required from different spheres of government to reduce protest

Recommended actions:

- Comparative early response systems should be investigated as good practices and made available to municipalities to assist them to proactively manage community protests.
- Municipalities require assistance to improve debt collection systems to ensure that private individuals, private businesses and government departments pay their fair share of service delivery costs.
- Proactively identify issues that give rise to community protest action and use CDWs and Councillors to communicate with communities on what is being done about the conditions.
- Improve public consultation and communication processes so that communities are engaged in their own development.
- Active planning for migration in the IDP must occur through a mainstreamed approach. This will enable local government to address the issues generated by unplanned settlements more effectively by tracking settlements in order to accurately predict where services are most likely to be needed in future.
- Densification strategies should be actively pursued through urban planning instruments to ensure that an economy of scale is attained in service provision. This would assist in lowering the costs of providing services to communities, enabling more people to be reached.
- Assessing the effectiveness and efficiency of Local Economic Development (LED) and Expanded Public Works Programmes as part of job creation programmes, would assist in profiling the good practices in the local government sector.
- The current model of free basic services must be assessed for affordability and sustainability. It may even be the case that cross-subsidisation models would be well served by qualifying access to the free basic services.
- In order to assist local government to enhance Local Economic Development activities, tools enabling local government to identify and analyse economic growth points and to attract investment to fund job creation, may be developed on the strength of existing or additional local economic development maturity assessments.



Provincial Recommendations:

- A framework needs to be developed for protest action outside of the Gatherings Act that provides a method encouraging of proactive redress from all spheres of government.
- Local government participation structures must be the primary structures through which redress activities occur. National and Provincial spheres of government must assist to build capacity in public participation structures at the local level, contribute to improvements in coordination between spheres of government and ensure that all spheres of government are accessible to grassroots.

- Additional resources should be channelled into local government to enable it to perform its service delivery mandates in accordance with the subsidiarity principle.



6 POVERTY POCKETS

6.1 POVERTY OVERVIEW

Poverty lines are based on the costs and expenses required for basic needs. Three poverty lines have been established and these three poverty lines categorises the different degrees (or levels) of poverty. These three lines are categorised as:

- Food poverty line (FPL),
- Lower bound poverty line (LBPL),
- Upper-bound poverty line (UBPL).

The poverty lines are measured in rand per capita. The poverty lines for 2017 in the Northern Cape are classified as:

Table 38: Poverty lines

POVERTY LINE	RAND PER CAPITA
Upper-bound poverty line	835.2
Lower bound poverty line	1208
Food poverty line	721

Source: Quantec, 2017

Data from Stats SA was used to calculate the estimated percentages of the population living under the poverty line. Only the population that falls under the working age (15-64 years) was utilised.

The key findings are as follow:

- In the John Taolo Gaetsewe, approximately 8% of the population has no monthly income, and about 8% live under the UBPL.
- In the Namakwa district, about 8% of the population earned no monthly income, and approximately 11% lives under the UBPL.
- An estimated 8% of the population in Pixley ka Seme has no monthly income and 11% lives under the UBPL.
- In the ZF Mgcawu district, approximately 5% of the population has no income whereas 7% of the population are living under the UBPL.
- In Frances Baard's, approximately 8% of the population earn no monthly income and about 8% of the population lives under the UBPL (Quantec data, 2016).

While more than half of the citizens of the Northern Cape languish in poverty, the Province is still the fourth richest in the country – behind the Western Cape, Gauteng and the Free State. This is according to the latest "Poverty Trends in South Africa" report[55], released by Statistics SA. The report shows that more than half of South Africans were poor in 2015, with the poverty headcount increasing to 55.5 % from a low of 53.2% in 2011. In the Northern Cape 59% of the residents are classified as poor.

The Northern Cape's level of poverty in 2015 was 59% – down from 74.5% in 2006 and 69.2% in 2009, although it was slightly up from 58.2% in 2011. According to the report, the poverty levels tend to drop for adults, more so after the age of 55 years. The Northern Cape has one of the highest percentage of elderly receiving grants, with 94.7% of elderly poor residents receiving an old-age grant. (The Eastern Cape has the highest with 95.4 %). The Northern Cape (40.1 %) also had one of the highest percentage of poor households with children receiving child support grants compared to other provinces. A person's educational level was also found to be closely related to poverty as 79.2 % of individuals with no formal education were poor, as compared to only 8.4 % of individuals who had a post-matric qualification in 2015. The Northern Cape, which had a poverty gap of 26,4% in 2011 rose to 28,0% in 2015.

The South African economy in the last five years, notably between 2011 and 2015, has been driven by a combination of international and domestic factors such as low and weak economic growth, continuing high unemployment levels, lower commodity prices, higher consumer prices (especially for energy and food), lower investment levels, greater household dependency on credit, and policy uncertainty.

This period has seen the financial health of South African households decline under the weight of these economic pressures and, in turn, has pulled more households and individuals down into poverty.

Figure 64 represents households earning below R38 000 per year (regarded as poverty-stricken households) as extracted from Stats SA 2011 census enumeration area layer[56] dataset. Each point represents a household where 0 represents the lowest %age and 100 the highest possible %age. The

[55] *Poverty Trends in South Africa: An examination of absolute poverty between 2006 and 2015. Statistics South Africa, 2017*

[56] *Enumeration area (EA) – The smallest geographical unit (piece of land) into which the country is divided for census or survey purposes.*

values were then grouped per town to get the number of poor households per town. The relative value is calculated by taking the total number of households per town and dividing it by the number of poor households to get a %age of poor households per town.

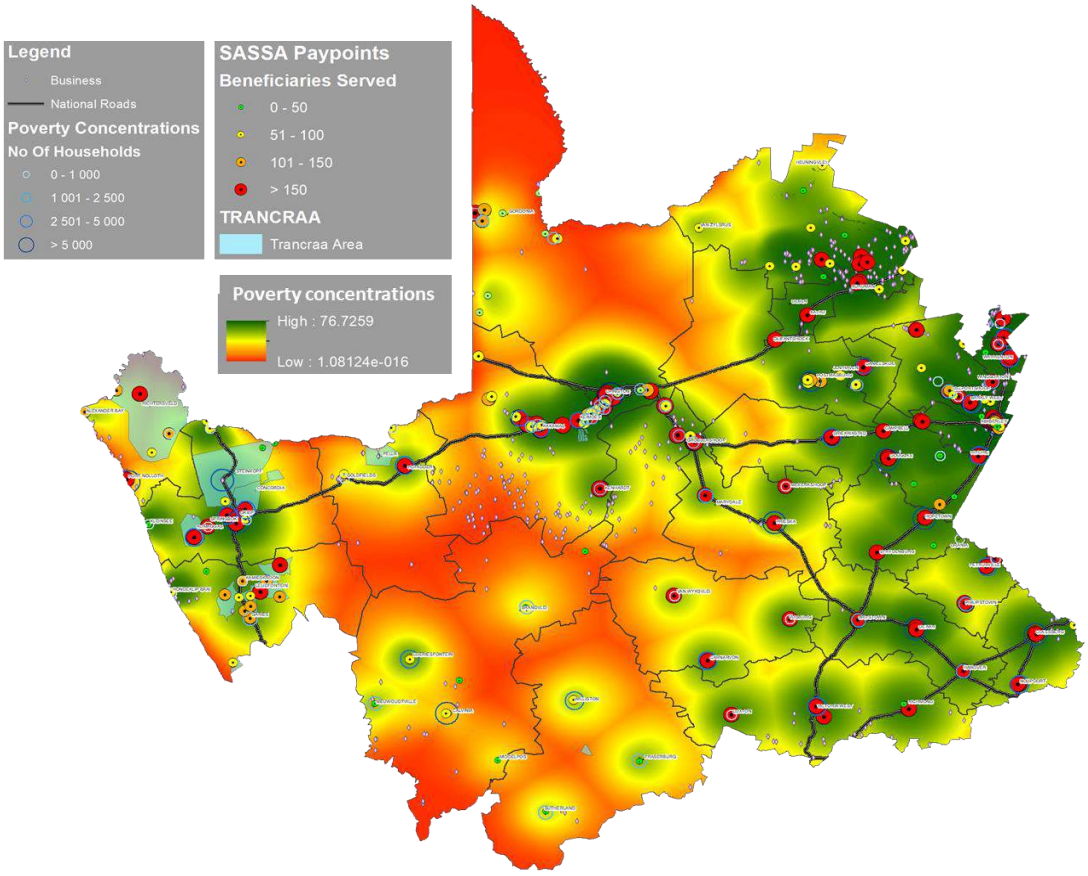


Figure 64: Spatial representation of households with an income below R 38 800 – 00, Census 2011

6.1.1 Poverty per local municipality

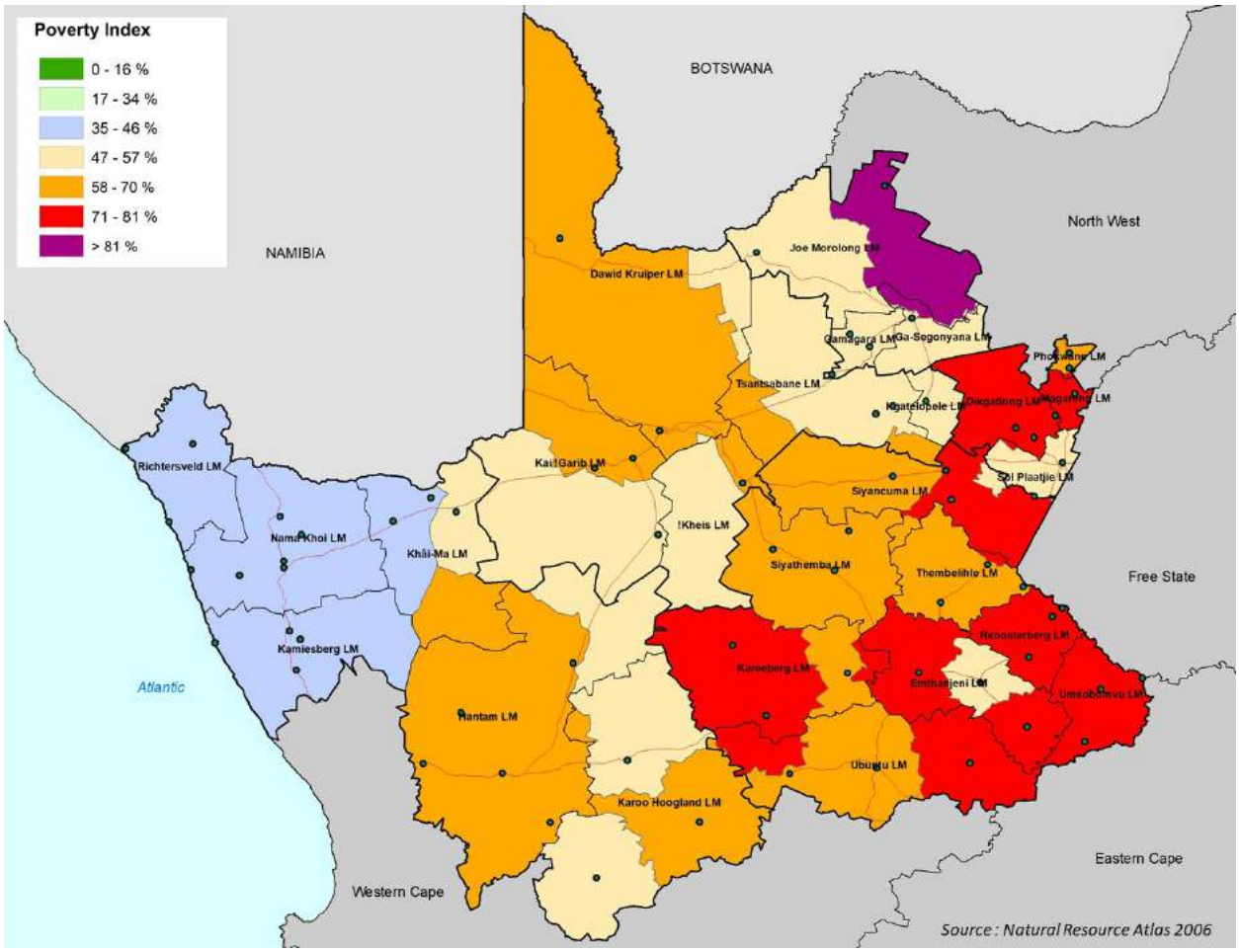


Figure 65: Poverty index for Northern Cape municipalities

The Joe Morolong municipality has the highest concentration of poverty, most likely due to the high concentration of rural tribal villages within vast open spaces, with limited land capability due to land degradation. The Pixley ka Seme district has the highest overall poverty concentrations, where Emthanjeni has the lowest poverty index, where 47-57% of the population is classified as impoverished. Al the other local municipalities poverty indexes range between 58-81%, which is extremely high.

6.1.2 Poverty by Settlement type

In 2006, 87,6% of people residing in rural areas were living below the UBPL; this was significantly higher than the 52,0% headcount for those living in urban areas (a 35,6 % point difference). For rural areas, the headcount increased slightly in 2009, reaching a high of 88,0% before dropping by 11,0 % age points to 77,0% in 2011. Unfortunately, the headcount increased to 81,3% in 2015. However, despite the increase, the 2015 estimate was still below 2006 and 2009 levels. Urban areas experienced a healthy decline between 2006 and 2011, followed by a small increase in 2015. It is interesting to note that rural areas seemed to have been hit harder by the 2007/08 financial crisis than urban areas. This might be influenced by people who had lost their jobs in urban areas during the crisis, resulting in them having to return to their rural areas of origin, and thus pushing up poverty levels in those areas. Another possible reason for the increase could be that remittances and other financial transfers from those in urban areas decreased (again a by-product of the financial crisis), putting additional

pressure on individuals in rural areas that depend on those resources to survive. Generally, while poverty decreased between 2006 and 2015 in both settlement types, urban areas benefited considerately more than rural area. There was a 21,9% reduction (an 11,4 % point drop) in poverty levels in urban areas compared to just a 7,2% reduction in rural areas (a 6,3% point change) over the period. Additionally, the gap between the rural and urban headcounts widened over this period, increasing from a 35,6% point difference in 2006 to a 40,7% point difference by 2015.

6.1.3 Poverty by population group

Across all the population groups, the incidence of poverty had decreased from 2006 to 2011; however, in 2015 it had increased. The incidence of poverty for households headed by black Africans has always been higher than the national rate. In 2006, six in every ten black African-headed households (62,4%) were living below the UBPL. This proportion decreased to 56,9% in 2009 and to 45,7% in 2011 before slightly increasing to 46,6% in 2015. Coloured-headed households had the second highest incidence of poverty in the country, reporting 46,4% in 2006; 36,1% in 2009; 29,9% in 2011; and 32,2% in 2015. The proportion of poor households headed by Indians/Asians increased slightly from 4,3% in 2011 to 4,6% in 2015. This is an interesting finding, given the overall improvement observed for the Indian/Asian population when measured at an individual level. Unlike individual poverty, there was an increase in all the poverty measures (the incidence, poverty gap and severity of poverty) amongst Indian/Asian-headed households in 2015. Meanwhile, the level of poverty amongst white-headed households has remained around 1,0% or less since 2006.

6.1.4 Food security

The measurement of food insecurity can provide some useful information about the economic and social situations that may lead to hunger. Food insecurity happens when people do not have sustainable physical or economic access to enough nutritious and socially acceptable food for a healthy and productive lifestyle. Malnutrition causes high rates of diseases and mortality, and also stunts the development of children. Low energy intakes can reduce productivity, creating a malicious cycle in which poor workers are unable to make enough income to obtain adequate calories to be productive. Thus, hunger can constrain the country's ability to develop economically and can cause social and political instability. Generally, women and children living in developing countries are most vulnerable to the broad and overwhelming impacts of hunger. One of the NDP's targets for 2030 is for South Africa to reduce poverty-induced hunger to 0%. This means reducing the proportion of people living below the FPL to zero by 2030. Another useful indicator that can facilitate the measurement of hunger is the estimation of the percentage of the population which is vulnerable to hunger which has been pursued in the General Household Survey (GHS) series since 2002.

According to the GHS results, between 2002 and 2007, the number of people vulnerable to hunger was cut in half, dropping from 29,3% in 2002 (roughly one out of every three people) to 13,7% in 2007 (roughly one out of every seven people). Between 2007 and 2011, there was an unfortunate increase in the number of people who are susceptible to hunger, and this period coincides with the global financial crisis and the ramifications of that event. By 2011, the number of persons susceptible to hunger had returned to pre-crisis levels at 13,1%. The 2011 data point was the lowest number ever recorded by the GHS since it began in 2002. However, progress since 2011 has been alarmingly slow and has since stalled, remaining at just above 13,0%. In 2016, the number of people susceptible to hunger was measured at 13,4% of the population.

6.2 SOCIAL GRANTS

A large portion (466 922) of the Northern Cape is grant dependent. There is merit to the underlying concern about the lack of growth, need for greater level of job creation and productivity enhancement expressed by many commentators, since these are the ultimate determinants of fiscal sustainability in any economy. Broadening the tax base through increased participation in employment and other sustainable livelihoods is absolutely critical.

The concern about the sustainability of the social grant system is at this stage unfounded, as the grant system is currently not a threat to fiscal sustainability. The growth in social grants spending has been driven by:

- Changes in policy (such as increases in age of eligibility and the value of the grant over time) and
- Growing take-up rates among eligible populations.

Given no foreseeable policy changes and as the pool of non-registered but eligible beneficiaries' declines, this growth is expected to stabilise and is unlikely to accelerate to the same extent in coming years. Discounting for inflation and taking into account the lower than anticipated population growth projections implied by the 2011 Census affirms this trend.

Despite the fairly widespread negative perceptions of grants, recent findings from a study completed HSRC proved that systematic economic evaluations are encouraging. Social grants do result in increased consumption of basics goods such as food and education. The direct effects of the change in grants have higher impacts on poverty and inequality, than the indirect effects. This is consistent with the fact that grants form a large part of the income of poverty-stricken households. Improvements are found in the welfare of households in rural formal, tribal authority and urban informal areas.

For households living in formal urban areas, poverty is hardly affected, but is reduced when the excluded children are included in the system. In addition, the study found that the consumption and production of education and nutritious food products increased. All indications are that social grant spending is an investment in human capital, underpinning future inclusive growth. There is no systematic evidence that child maintenance grants create dependency, since mothers receiving child grants are indeed empowered to access the labour market. A positive link was found between the grants and the probability of participating in the labour force. Furthermore, to the extent that the vast majority of the beneficiaries are vulnerable and not economically active people, such as the elderly, children and people with disabilities, labour market disincentive effects or dependency arguments may not be as relevant.

Previous studies have shown that social grants are exceptionally well targeted at the poorest of the poor. It was found that in the absence of the child welfare grants, the impact of the global recession of 2008 on child poverty in South Africa would have been much more severe. The analysis shows that the impact of the economic crisis had a limited influence on the children's poverty headcount, but that material welfare declined across large parts of the distribution. The latter impact on welfare exacerbated poverty depth, moving the already poor further below the poverty line, where they will now remain for much longer. This suggests that the major impact of the economic crisis was on the poorest, and that this is the most difficult to overcome.

The great danger confronting South Africa today is, that longer-term fiscal imperatives could be used as reasons to limit the necessary future growth due to spending on social grants. Notwithstanding enormous socio-political pressures on the national budget after social grants reform new analysis, shows that the overall fiscal position is still stable. At the economy-wide level, the results challenge the often-held view that these grants are squandered on non-productive consumption. Grants are not only consumption expenditure, used to enhance intergenerational equity, but also to promote productive efficiency and human capital. This suggests a compelling developmental state argument to preserve and protect current expenditure levels, even in fiscally austere conditions.

The analysis followed in the study has led to the recommendation that while fiscal prudence and consolidation are pursued in the medium term, social security spending should not be cut, especially in the wake of the prolonged global financial crisis, which is still being felt today. This must be coupled with decisive responses to the crises, in the public education and health systems, as well as effective job creation initiatives, to ensure that growing social grants do not unnecessarily become a permanent feature of the South African social landscape.

6.3 VULNERABLE GROUPS

The population of the Northern Cape Province consists of groups that are vulnerable to economic variability. According to StatsSA[57] the identified groups consist of children below the age of 17 years; youth between the age of 15 and 34 years; the female population; elderly residents aged 60 years and upwards; and persons with disabilities that experience various levels of difficulties in functional domains such as seeing, hearing, walking, memory or concentration, self-care, communicating and social interaction.

Key findings of vulnerable population groups:

- 28% of the children are orphaned, with either one or both parents deceased.
- Regarding the household structures, 32.4% of children reside in nuclear homes, were both parents reside, 65%, which include the nuclear families[58], reside with extended family members, 0.2% of the provinces children reside with a single parent, and 2.6% of the children live in complex household structures, where they live with non-family members.
- 78% of children reside within 30 minutes of a healthcare clinic, while 8.8% of the children suffer from acute diseases.
- 98% for the child population are actively participating within an educational institution, although 9.8% of children reside more than 30 minutes away from an educational institution.
- 21.6% of students aged 15 years, in 2015, had not yet reached the seventh grade of the schooling system.
- 2.2% of children in the Northern Cape Province reside in a household without an employed adult and 23.2% of all provincial household's report hunger.

[57] Vulnerable Groups Indicator Report: 2015; Report No. 03-19-02; StatsSA

[58] Nuclear family/homes: group of people who are united by ties of partnership and parenthood and consisting of a pair of adults and their socially recognized children.

- 14% of youth led households are single generation households, whereas 50.6% are comprised of double generation households.
- 20,6% of the youth led households are regarded as low-income households.
- 21.3% of the youth led households reported hunger. Overall, the 26.1% of the youth live in households without an employed adult.
- 55.5% of the youth are actively participating in the labour force wile, conversely, 45.5% are considered unemployed. 35.1% of youth attend educational institutions.
- 43% of households in the Northern Cape Province are headed by the female population, while 17.5% of the households are headed by a single woman.
- 49.3% of households headed by women have no employed members.
- 21.9% of the female led households report hunger.
- 54.8% of women are participating in the labour force, and 38,4% are unemployed.
- Of the female population over the age of 16 years, 2.1% reported being a victim of assault in 2015.
- The population of women over the age of 20 years, 77.8% are functionally literate, 68% have received a senior certificate, and 2.2% have graduated from a tertiary education institution.
- Only 17.2% of women in the Northern Cape Province have access to medical aid.
- 9.1% of the total population of the Northern Cape Province consists of members of the public aged over 60 years. 77.3% of these members are reliant of social grants, and 11.2% are actively participating in the labour force.
- 2.3% of the older generation are considered unemployed and 88.8% are economically inactive.
- 59.3% of the elderly members live with an unemployed adult.

6.4 SOCIAL COHESION

The Department of Arts and Culture (DAC) defines social cohesion as "the degree of social integration and inclusion in communities and society at large, and the extent to which mutual solidarity finds expression among individuals and communities."[59] The importance of recognising the disparities among the ethnic groups within South Africa led the department to develop a social cohesion plan, unveiled at the National Social Cohesion Summit in Kliptown, Soweto, from 4-5 July 2012. The plan was developed by consulting the wider South African society.

According to the DAC, nation-building is concerned with creating an enabling environment for a diverse society from various origins, histories, languages, cultures and religions together within the borders of a sovereign state with a national public education system, a unified constitutional and legal dispensation, shared symbols and values and an integrated national economy, as equals, to work towards eradicating the divisions and injustices of the past; to foster unity; and promote a countrywide conscious sense of being proudly South African, committed to the country and open to the continent and the world.

Table 39 illustrates the proportion of ethnic groups within each of the Northern Cape Province District Municipalities, according to the "Census 2011 Municipal report for the Northern Cape"[60].

[59] *"What is Social Cohesion and Nation-Building?" – Department of Arts and Culture*
[60] *"Census 2011 Municipal report for the Northern Cape"; StatsSA, Report no.: 03-01-51; (2012) ISBN 978-0-621-41461-5*

Table 39: Northern Cape Ethnic Groups 2011

	NAMAKWA	PIXLEY KA SEME	SIYANDA	FRANCES BAARD	JOHN TAOLO GAETSEWE
Black African	6.9	31.7	29.8	67.5	85.3
Coloured	83.8	59.6	61.2	24.7	9.3
Indian or Asian	0.5	0.6	0.7	1	0.4
White	8.8	8.1	8.3	6.9	5

Social cohesion will promote the alignment of values and goals of these diverse ethnic groups in order to unify the residents of the province and improve patriotism towards the South African cause.





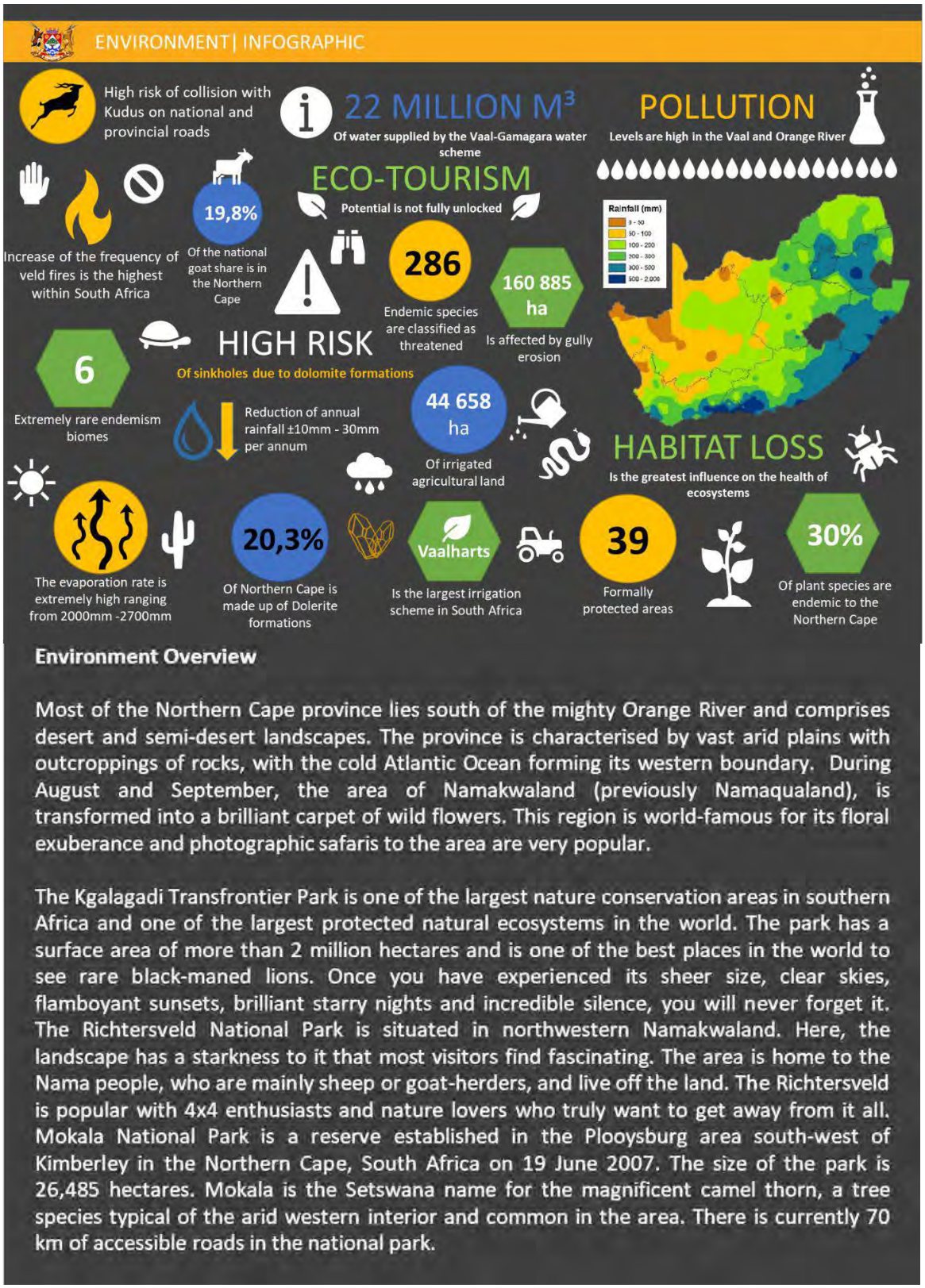
CHAPTER 6 – This chapter outlines the key environmental, sustainability, vulnerability and tourism, opportunities and challenges faced in the Northern Cape Province.

CHAPTER 6

Status Quo Analysis - Environment

CHAPTER 6 | ENVIRONMENT

1 ENVIRONMENT INFOGRAPHIC



Environment Overview

Most of the Northern Cape province lies south of the mighty Orange River and comprises desert and semi-desert landscapes. The province is characterised by vast arid plains with outcroppings of rocks, with the cold Atlantic Ocean forming its western boundary. During August and September, the area of Namakwaland (previously Namaqualand), is transformed into a brilliant carpet of wild flowers. This region is world-famous for its floral exuberance and photographic safaris to the area are very popular.

The Kgalagadi Transfrontier Park is one of the largest nature conservation areas in southern Africa and one of the largest protected natural ecosystems in the world. The park has a surface area of more than 2 million hectares and is one of the best places in the world to see rare black-maned lions. Once you have experienced its sheer size, clear skies, flamboyant sunsets, brilliant starry nights and incredible silence, you will never forget it. The Richtersveld National Park is situated in northwestern Namakwaland. Here, the landscape has a starkness to it that most visitors find fascinating. The area is home to the Nama people, who are mainly sheep or goat-herders, and live off the land. The Richtersveld is popular with 4x4 enthusiasts and nature lovers who truly want to get away from it all. Mokala National Park is a reserve established in the Plooysburg area south-west of Kimberley in the Northern Cape, South Africa on 19 June 2007. The size of the park is 26,485 hectares. Mokala is the Setswana name for the magnificent camel thorn, a tree species typical of the arid western interior and common in the area. There is currently 70 km of accessible roads in the national park.

Figure 66: Infographic – Environmental overview of the Northern Cape Province

2 ENVIRONMENTAL OVERVIEW

2.1 GEOGRAPHY

The Northern Cape is South Africa's largest province, covering 30% of the country's landmass on the dry western side of the country bordering the Atlantic Ocean, Namibia and Botswana. The provincial population of just over a million represents 2.2% of the country's population and the principal languages are Afrikaans (54%) and Setswana (33%). The iconic San population lives in the arid regions towards the north of the province. The province is well served in transport and communications, despite its vast size (361 830 square kilometres). Airports at Kimberley and Upington are quite substantial and many smaller towns, mines and game reserves have landing strips. Although the province has many roads, maintaining them is a challenging and expensive task. The Northern Cape does not have a major port, although Port Nolloth serves as an adequate fishing harbour. Investigations into the creation of a deep-water port are well advanced. Another project could see the province's small harbours and bays developed as well, as a unit within the national Department of Public Works aims to spark economic development in coastal areas.

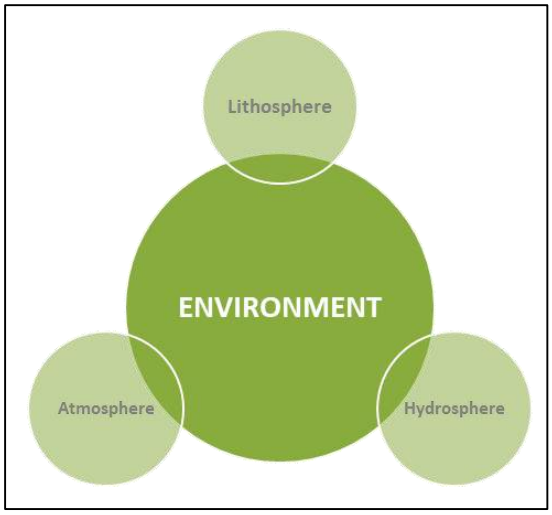
The Orange and Vaal Rivers are the most important geographical feature of the province, as they are the main sources of water for communities and industries alike. These features create an enabling environment for irrigation, to support a thriving grape, sultana and wine industry. One small hydro-electric power scheme has been approved, but the potential for more such schemes is immense.

Other crops such as lucerne, cotton, wheat, peanuts and maize are grown in the Orange River Valley and in other irrigation scheme areas such as the Vaalharts Irrigation Scheme in the eastern part of the province. Sheep and goats are the most popular livestock, and horse-breeding is a lucrative activity.

The Northern Cape is home to six national parks and five provincial parks and nature reserves. The Richtersveld Cultural and Botanical Landscape is a World Heritage Site, while the natural spring flower demonstration that appears in Namaqualand is one of the wonders of the world. In 2016 the well-respected international tourist book, Rough Guide, elected the stark beauty of the Richtersveld onto its Top 10 lists of places to visit.

Most of the province falls into the category of semi-arid (apart from the coastal strip) and it receives relatively limited amount of precipitation. Temperatures vary greatly throughout the year, where summers are characterised with scorching temperatures, and winter temperatures fall well below freeze point, due to the predominantly arid nature of the environment.

2.2 EARTH SYSTEM



Everything in Earth's system can be placed into one of four major subsystems: land, water, living organisms, or air. These four subsystems are called "spheres." Specifically, they are the "lithosphere" (land), "hydrosphere" (water), "biosphere" (living organisms), and "atmosphere" (air). Each of these four spheres can be further divided into sub-spheres.

These spheres coexist, and work together in diverse ways to help life on earth grow, prosper, and continue to be productive. It is important to learn about all of these spheres and know that the geosphere directly affects all of the other spheres on earth, which is why understanding it is vital. To start, we must define geosphere for what it is: any of the almost spherical concentric regions of matter that make up the earth and its atmosphere, as the lithosphere and hydrosphere.

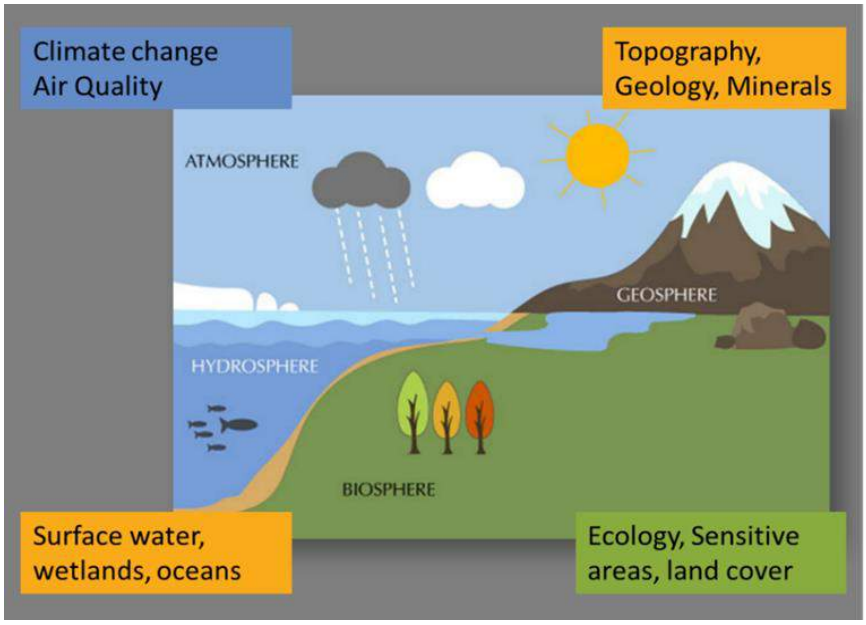


Figure 67: Graphic illustration of the Earth's System and composition of Spheres

The biosphere deals with the surface regions of the atmosphere, and hydrosphere on earth occupied by living organisms. In this way, the soil on the ground provides nutrients to plants, and the tectonic plates determine circumstances on earth that can either be harmful or dismissible. The two, thus work together to keep us healthy and safe. Within the biosphere, living things form ecological communities based on the physical surroundings of an area. These communities are referred to as biomes. Deserts, grasslands, and forests are some of the numerous types of biomes that can exist within a biosphere.

The atmosphere describes the composition and nature of gases of the atmosphere surrounding Earth. It extends from less than 1 m below the planet's surface to more than 10 000km above the planet's surface. The upper portion of the atmosphere protects the organisms of the biosphere from the sun's ultraviolet radiation, due to the presence of ozone layer between the Stratosphere and Troposphere. It also absorbs and emits heat. When air temperatures changes occur in the troposphere, weather changes or patterns occurs. As air in the lower atmosphere is heated or cooled (by sun rays or reflected

heat from the earth's surface), it moves around the planet. The result can be as simple as a breeze or as complex as a tornado.

The hydrosphere represents all the water sources on earth. The geosphere and hydrosphere work together through tectonic plate activity (the presences of tsunami's), and through the overall shape of the earth. Because of earths shape, it can dictate where and how water travels throughout, creating a harmony between the two spheres.

The geosphere is the crust and a part of the upper mantle, and the asthenospheric mantle is towards the bottom portion of the upper mantle, thus both form part of the geosphere. In addition, there is the lower mantle, and the outer core of the earth, all varying in degrees and thickness. This whole Environment section of the PSDF aims to give effect and guide the province on the various development methods and approaches that supports sustainability and resilience, which is indicated as an objective of the NDP.

Since the late 19th century, South Africa has exploited its mineral wealth with little or no regard for environmental well-being. Changes are needed in order to protect the natural environment while allowing the country to benefit from its mineral deposits. In addition to significant non-renewable mineral wealth, the country's natural resources include its adjacent oceans, soil, water, biodiversity, sunshine and a long coastline. From an environmental perspective, South Africa faces several related challenges, some of which are in conflict.

According to the NDP 2030, the country needs to:

- Protect the natural environment in all respects, leaving subsequent generations with at least an endowment of at least equal value.
- Enhance the resilience of people and the economy to climate change.
- Extract mineral wealth to generate the resources required to raise living standards, skills and infrastructure in a sustainable manner.
- Reduce greenhouse gas emissions and improve energy efficiency.

Three measures were proposed to protect the country's natural resources:

- Development of an environmental management framework.
- Development of disaster risk and climate change adaptation strategies.
- Developments that have serious environmental or social effects need to be offset by support for improvements in related areas.
- Target setting for the amount of land and oceans under protection (presently about 7.9 million hectares of land, 848km of coastline and 4 172km^2 of ocean are protected).
- A set of indicators need to be developed for natural resources, accompanied by publication of annual reports on the health of identified resources to inform policy (which includes pollution monitoring).

3 BIOSPHERE



3.1 ECOLOGY



The Northern Cape is an environmental focal area, as is demonstrated by *inter alia* the designation of the Square Kilometre Array (SKA) project and UNESCO's registration of the Richtersveld Botanical and Landscape World Heritage Site (Department of Cooperative Governance, Human Settlements and Traditional Affairs, 2012).

The biomes of the Northern Cape Province are the physical expression of the biotic responses (vegetation) to the abiotic drivers of the ecology of the region. The different biomes are mostly a result of varying climate patterns. These operate at a high hierarchical level in the landscape of which their influences are modified at a more local scale. It is the latter which results in the establishment of the vegetation types of the different biomes. The ecology of the region is not only affected by the amount of absence of rain, sunshine, etc., but also by the reliability of these variables, as well as the composition and condition of the soil. Organisms associated with wetlands have specific life cycles and physiological adaptions that enable it to survive in such a specialised environment (Mucina and Rutherford, 2006).



The same applies to the vegetation where many of the species have specific physical and biological characteristics that enable to prosper in harsh conditions, unsuitable for most. The latter is evident from the many unique species that are associated with the Succulent Karoo Biome of the region which is recognised as a centre of endemism (Mucina and Rutherford, 2006). It is a unique environment

where the predominant winter rainfall is supplemented by fog and dew, which has the uncharacteristic feature of maximum winter temperature exceeding those of the summer (Mucina and Rutherford, 2006). In contrast to the Succulent Karoo, the ecology of the Nama Karoo is not as diverse and the overall diversity and local endemism of this biome is considered to be very low (Mucina and Rutherford, 2006).

The latter is ascribed to a more homogenous abiotic environment. Although considered to be climatically more stable than the Succulent Karoo, the differences in extremes between e.g. rainfall seasonality and frequency renders it unsuitable for establishment of the array of succulent types associated with the succulent Karoo. Extremely low winter temperatures are also cited as a reason for the absence of such succulents. Local differences in abiotic environments, e.g. soil type, soil depth and moisture availability, and result in abrupt changes and high species turnover over very short geographic distances. Climatic extremes which have resulted in establishment of the desert or semi-arid biome, are the cause of the relative low diversity associated with this region. However, with this said, the desert biome of the Northern Cape Province, specifically the Richtersveld, boasts a diversity that is considered to be remarkably high when compared globally to other deserts of similar aridity. The latter is considered to be the result of the relative high age of the desert region as well as the close proximity of two centres of endemism which may have served as refuge areas during the last glaciation (Mucina and Rutherford, 2006).

Increased rainfall towards the eastern part of the province has resulted in establishment of the Savanna Biome. The latter is generally considered to be a relatively species poor region; when expressed as the number of species per area (Mucina and Rutherford, 2006). The higher summer rainfall, relative high evaporation and lack of frost collectively create favourable conditions for the establishment of grasses and trees, i.e. the vegetation of the Savanna biome. The latter differs from the grassland biome by Savana being characterised by higher minimum temperatures and lower number of soil moisture days. Having said this, the Savanna/Grassland boundary in the north-eastern part of the province is not considered to be not necessarily a climate driven division but may the result of other factors (Mucina and Rutherford, 2006). expressed as the number of species per area (Mucina & Rutherford, 2006).

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3.1.1 Threats

As taken from the Northern Cape State of the Environment Report 2004: Biodiversity Specialist Report (Neal, 2005):

- Habitat change



The loss, transformation and degradation of natural habitat is one of the most important causal mechanisms of biodiversity loss (UNEP, 2002). Conversion of natural habitat types by cultivation, grazing, urban developments, afforestation, mining, dams, and industry and alien plant invasions results in the degradation of ecosystems and species loss. Development of renewable energy (solar and hydro power) has a significant impact on the surroundings and requires to be monitored and managed. The impact on biodiversity has been substantial, and significant proportions of South Africa's flora and fauna are threatened (Wynberg, 2002).

It is estimated that about 16.5% of South Africa's land cover is transformed, and a further 10% degraded (Wynberg, 2002). Sensitive arid habitat such as the Succulent Karoo Biome of the Northern Cape Province is particularly prone to degradation as a result of over-grazing, alien invasive species and mining (CEPF, 2003). In addition, the aridity of the climate precludes rapid recovery of degraded areas. When examining veld degradation in terms of severity and rate of degradation, the Northern Cape emerged as the third most degraded province in South Africa, after the Limpopo Province and KwaZulu-Natal (Hoffman and Ashwell, 2001).

- Biodiversity protection

As both biodiversity and protected areas are not uniformly distributed in the landscape, substantial gaps appear in the protected area network (***see Figure 68***). South Africa strives to protect a representative proportion of each vegetation type within protected areas. Targets for this level of protection are set nationally and range between 15-35% of the total original extent of vegetation types. Therefore, if South Africa's protected areas network was effective then approximately 15-35% of the country would be under some form of formal conservation management.

The approach followed to assess the protection level of ecosystems is by looking at the proportion of the national target achieved. This is referred to as a gap analysis. Nationally, 6% of South Africa is conserved within protected areas. For the Northern Cape Province this figure drops to just under 5%. Therefore, biodiversity is on the whole poorly represented within the regions protected area network and there is significant room for protected area development in order to meet out national conservation targets.

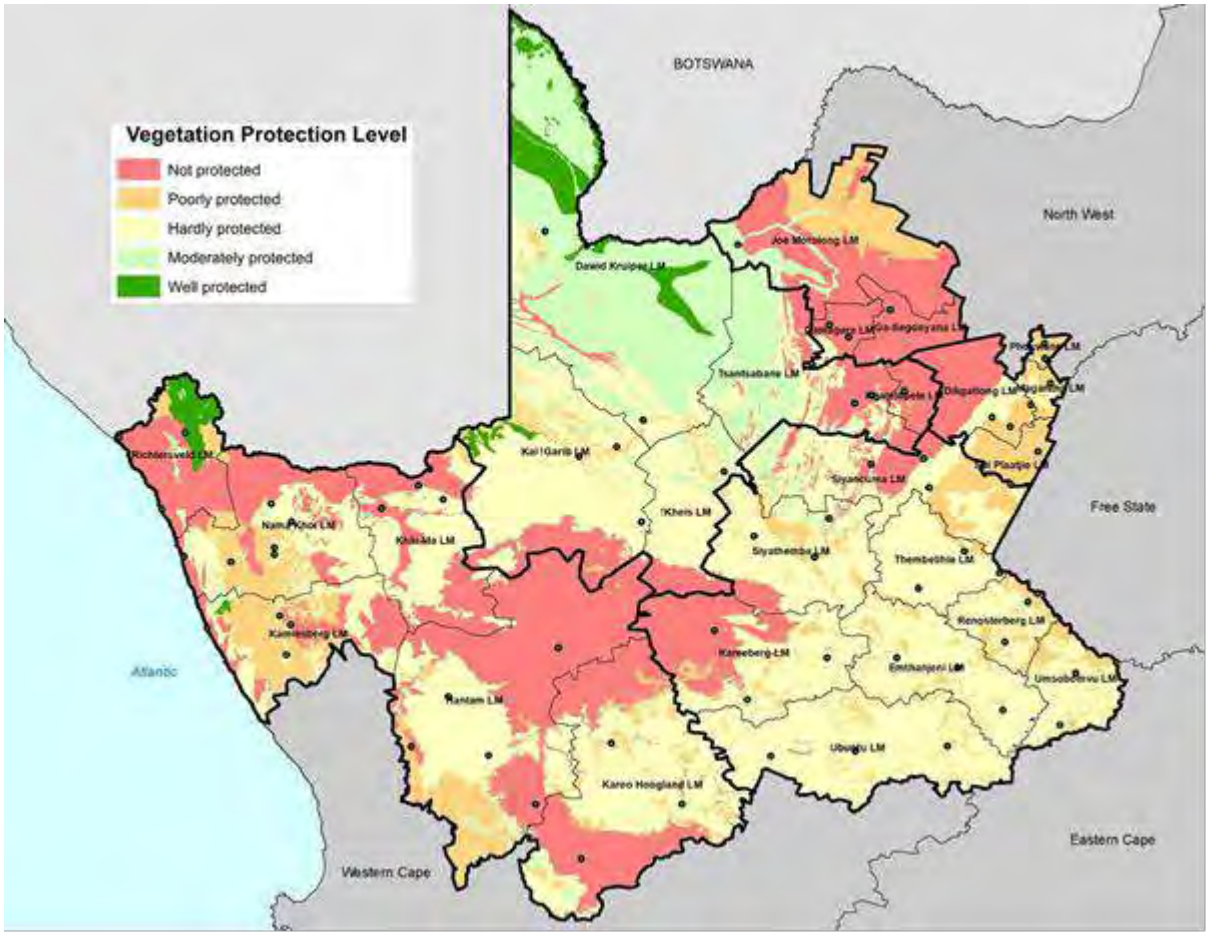


Figure 68: Vegetation protection status - Northern Cape Province

3.1.2 Opportunities

Restoration of degraded ecological features that provide eco-services and goods to mankind, may provide valuable job opportunities, enhance resilience and contribute to overall sustainability and resilience goals.

The restoration of linkages of ecological corridors in a fragmented landscape will contribute to the enhancement of the ecological systems as they are interlinked and movement can take place freely.

The fauna and flora of the Northern Cape Province is a product of amongst other, the climate of the region. In addition to it being characterised as low rainfall region, the seasonal variability of rainfall in summer and winter seasons further determines the viability and suitability of species within the various biomes.

3.2 FAUNA AND FLORA

The topography of the province, as informed by the geology, also has an impact on the vegetation. Several centres of plant endemism occur within South Africa. These are not randomly distributed and are closely associated with the Great Escarp which amongst others extends all along the western regions of South Africa (Cowling, Richardson, & Pierce, 1997). In the Northern Cape Province, this area is known as the Succulent Karoo centre of endemism, which makes up approximately 14% of the province. The remainder of the province is dominated by the Nama Karoo (50%) and Savanna (30%)

biomes. Other biomes of the Northern Cape are the Grasslands, Fynbos and Desert Biomes, each accounting for approximately 1%. of the surface area.

Although the remainder of the province is not considered to be a centre of endemism, it still contains a range of different habitat types. A total of 123 vegetation types occur within the province (Mucina & Rutherford, 2006) of which only one, the Bushmanland Arid Grassland, accounts for more than 10% of the surface area. The remainder accounts for less with 109 of the 123 accounting for less than 1% each. The fact that only 6 of the 123 vegetation types are considered to be threatened (SANBI BGIS, 2011) is testimony to the sparse extent of resource use currently being experienced by the province as is evident from land cover. Two vegetation types are classified as being endangered (Cape Vernal Pool and Lower Gariep Alluvial Vegetation; both Azonal) while four are considered to be vulnerable (Mafikeng Bushveld Namib Seashore Vegetation, Nieuwoudtville Shale Renosterveld and the Bokkeveld Sandstone Fynbos). Characteristic red data listed, and protected species include amongst others the Camel Thorn (Vachellia erioloba), the Quiver Tree (Aloe dichotoma) and the Bushman's hat (Hoodia gordonii).

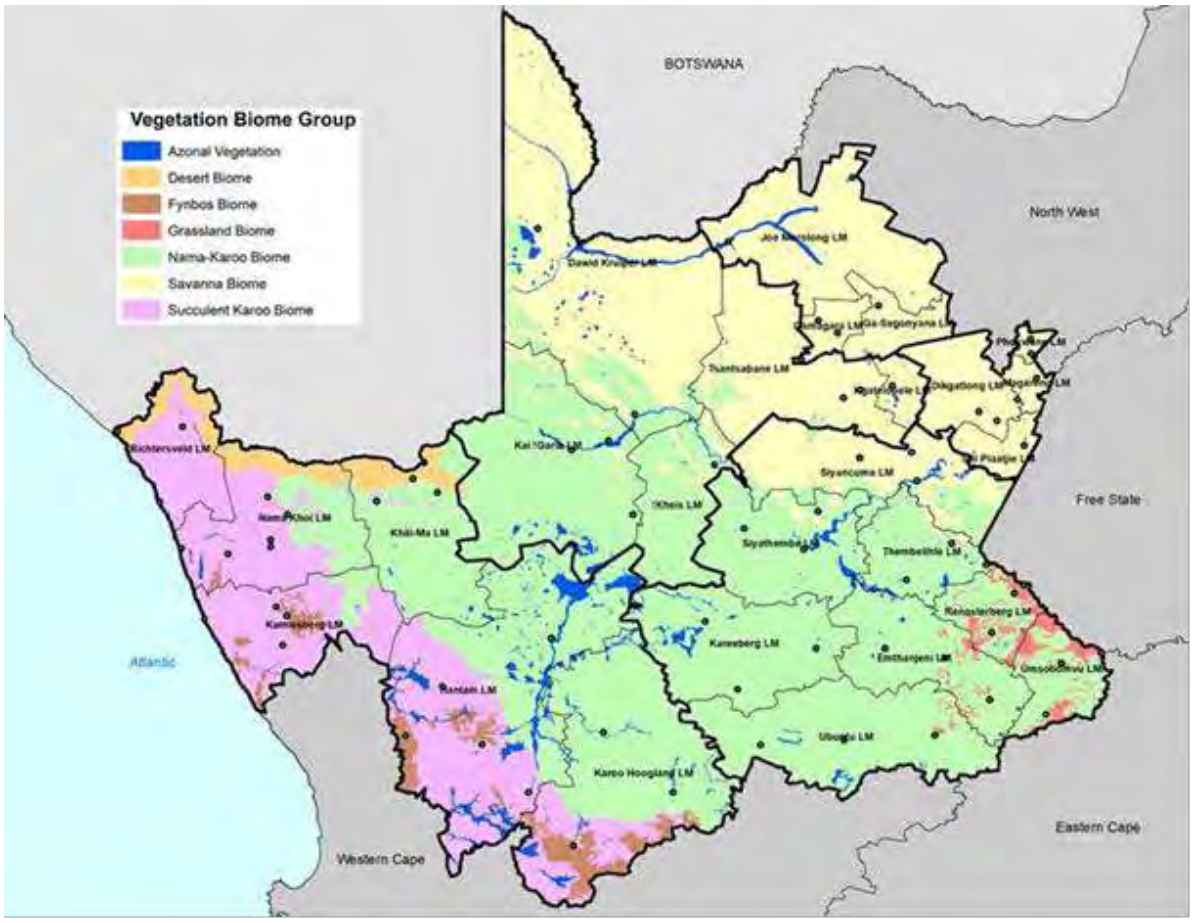


Figure 69: Vegetation biome regions of the Northern Cape province

As per the Northern Cape Provincial Development and Resource Management Plan/Provincial Spatial Development Framework dated 22 August 2012, the five biomes that occur in the Northern Cape are (see Error! Reference source not found.):

- Nama Karoo Biome;
- Succulent Karoo Biome;

- Savanna Biome;
- Grassland Biome; and
- Fynbos Biome.

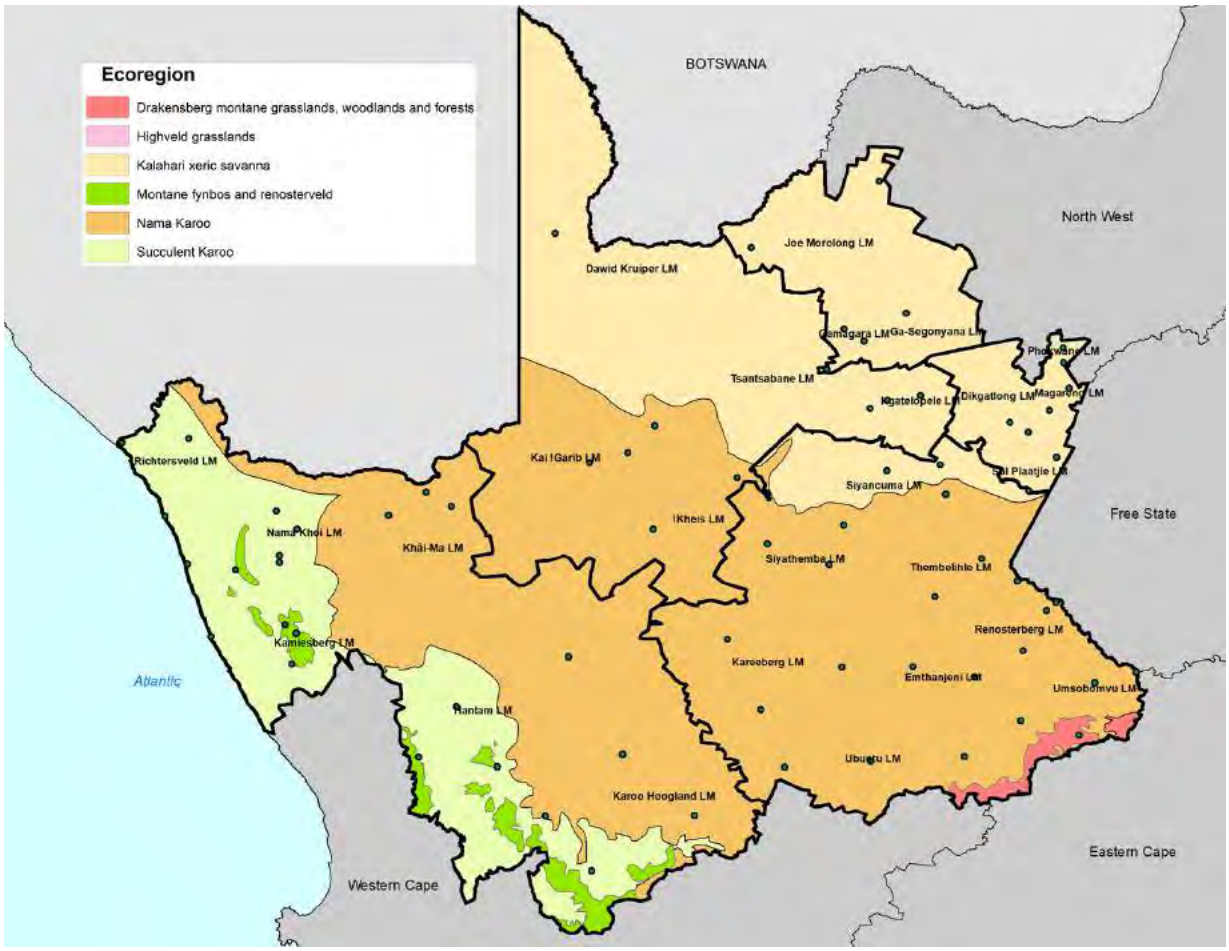


Figure 70: Northern Cape Province, Biome region distribution

3.2.1 Nama Karoo Biome

The Nama Karoo biome is dominated by grassy, dwarf shrubland and covers 25% of the land surface of South Africa and more than 50% of that of the Northern Cape Province. Within this biome grasses (hemicryptophytes) tend to be more common in landscape depressions and on sandy soils (as opposed to clay soils). Although not remarkably rich in species or endemism, the flora and fauna of this region are impressively adapted to the climate extremes.

Some of the more abundant shrubs in this biome include species of Drosanthemum, Eriocephalus, Galenia, Pentzia, Pteronia and Ruschia, while the principle perennial grasses are Aristida, Digitaria, Enneapogon and Stipagrostis spp. The more well-known species that occur in the Nama Karoo include Sweet Thorn (Acacia karroo), Three Thorn (Rhigozum trichotomum), Bitterbos (Chrysocoma ciliate), Stone Plant (Lithos ruschiorum) and Karoo daisy (Felicia austalis). The major large-scale disturbance to the Nama Karoo ecosystem has been grazing, previously by a variety of indigenous migratory ungulates and now by sheep and goats confined within farm boundaries. Very little of the Nama Karoo is formally protected (WWF, 2008).

3.2.2 Succulent Karoo biome

The Succulent Karoo Biome is recognised as an international biodiversity hotspot. It occurs along the western extremities of the Northern Cape Province and includes the Namaqualand and the Richtersveld regions. The Succulent Karoo Biome has the richest succulent flora on earth of which 69% are endemic. Plants in the Succulent Karoo are adapted to survive extremely dry summers. The typical vegetation of the Succulent Karoo is a dwarf shrubland dominated almost entirely by leaf succulents such as Vygies (Mesembryanthemacceae) and Stonecrops (Crassulaceae). Mass flowering (mainly Daisies Asteraceae) displays occurs annually (if the rainfall was sufficient) during the months of spring, often on degraded or fallow agricultural land. Notable plants species found in this hotspot includes the Botterboom (Tylecodon paniculatus) and the Halfmens (Pachypodium namaquanum), a stem succulent endemic to the Richtersveld, that can grow up to four meters tall. Clusters of Halfmens trees tend to face towards the north, giving the appearance of groups of people gazing northwards. The iconic quiver tree (Aloe dichotoma) occurs in the Richtersveld and is a keystone species in the region. The Succulent Karoo is also famous for its numerous species of lithops, tiny succulent plants which resemble small stones. They are amongst the smallest perennial plants in the world.

Another outstanding feature of the Succulent Karoo is the high diversity of geophytes or bulblike plants. Most of the 630 species of geophytes are petaloid monocots in the families Hyacinthaceae (Lachenalia, Ornithogalum), Iridaceae (Babiana, Lapeirousia, Moraea, Romulea), Amaryllidaceae (Brunsvigia, Hessea, Strumaria) and Asphodelaceae (Bulbine, Trachyandra). No other desert region has this diversity and splendour of bulbs.

The distinctive climatic characteristics of the Succulent Karoo make it different from all other deserts in the world. Rainfall is relatively reliable and predictable, falling mostly in winter and prolonged droughts are rare. Precipitation is supplemented by heavy dewfalls and fog generated by the cold Benguela current of the Atlantic Ocean. Another interesting feature is the prevalence of 'heuweltjies' which are raised mounds of calcium-rich soil, thought to have been created by termites. These often support distinctive plant communities. The Biome is threatened by overgrazing, especially on communal lands, and by mining activities (mining for diamonds, heavy minerals, gypsum, limestone, marble, monazite, kaolin, ilmenite and titanium) which continues to transform this landscape.

3.2.3 Savanna biome

The Savanna Biome covers the northern part of the Province. It is the largest biome in Southern Africa, occupying 46% of its area and over one-third of South Africa. It is characterised by a grassy ground layer and a distinct upper layer of woody plants. Where this upper layer is near the ground the vegetation may be referred to as Shrubveld, where it is as dense as Woodland in the intermediate stages are locally known as Bushveld. A major factor delimiting the biome is the lack of sufficient rainfall which prevents the upper layer from dominating, coupled with fires and grazing, which keep the grass layer dominant. Most of the Savanna vegetation types are used for grazing, mainly by cattle or game.

In the Northern Cape and the Kalahari, the most distinctive trees are the Camel Thorn (Acacia erioloba) and the Camphor Bush (Tarchonanthus camphorates). Other prominent trees are the Portly Baobab (Adansonia digitata) and the Candelabra tree (Euphorbia ingens). Much of the area is used for game-farming and can thus be considered effectively preserved, provided that sustainable stocking levels are maintained.

3.2.4 Grassland biome

As illustrated by the Biome region map, small parts in the southern-eastern region of the Northern Cape fall under the Grassland Biome. Grasslands are dominated by a single layer of grasses. The amount of cover depends on rainfall and the degree of grazing. Trees are absent, except in a few localised habitats. Geophytes (bulbs) are often abundant. Frosts, fire and grazing maintain the grass dominance and prevent the establishment of trees.

Grasslands are one of the most threatened biomes in South Africa and play an important role in water production. For instance, the Orange River has its headwaters in the biome. The Grassland Biome is a very old, complex and slowly evolved system with indigenous species diversity second only to the Fynbos Biome. Only one in six plants species in the Biome is a grass, the remainder includes bulbous plants such as Arum Lillies, Orchids, Red- Hot Pokers, Aloes, Watsonias, Gladioli, Ground Orchids and Underground trees. This biome is the mainstay of dairy, beef and wool production in South Africa and pastures may be augmented in wetter areas by the addition of legumes and sweet grasses.

3.2.5 Fynbos biome

Small portions of the Northern Cape fall within the world-renowned Fynbos Biome. According to the Namakwa District Biodiversity Sector Plan (2008) Bokkeveld Sandstone Fynbos and Niewoudtville Shale Renosterveld are found within the Hantam Local Municipality. Namaqualand Granite Renosterveld and Kamiesberg Granite Fynbos are found within the Kamiesberg Local Municipality. The Kamiesberg Protea (Protea namaquana) is endemic to the Kamiesberg area.

3.2.6 Centres of endemism

Eight of the 18 centres of endemism that exist in South Africa are represented in the Northern Cape. The Kamiesberg, Orange and Hantam-Roggeveld centres almost exclusively fall within the Province. The Succulent Karoo Ecosystem Plan (SKEP) has key information pertaining to ecosystem parameters, broad habitat units, and important individual habitats, especially those that are highly irreplaceable. The biodiversity priority areas and Critical Biodiversity Areas (CBAs) of the Northern Cape as designated by SANBI (South African National Biodiversity Institute). Critical Biodiversity Areas (CBAs) are defined as features critical for the conservation of biodiversity and maintenance of ecosystem functioning and should remain in a natural state as far as possible. The CBAs incorporate:

- Areas that need to be safeguarded in order to meet national biodiversity thresholds;
- Areas required for the continued existence and functioning of species and ecosystems;
- the delivery of ecosystem services; and
- Important locations for biodiversity features or rare species.

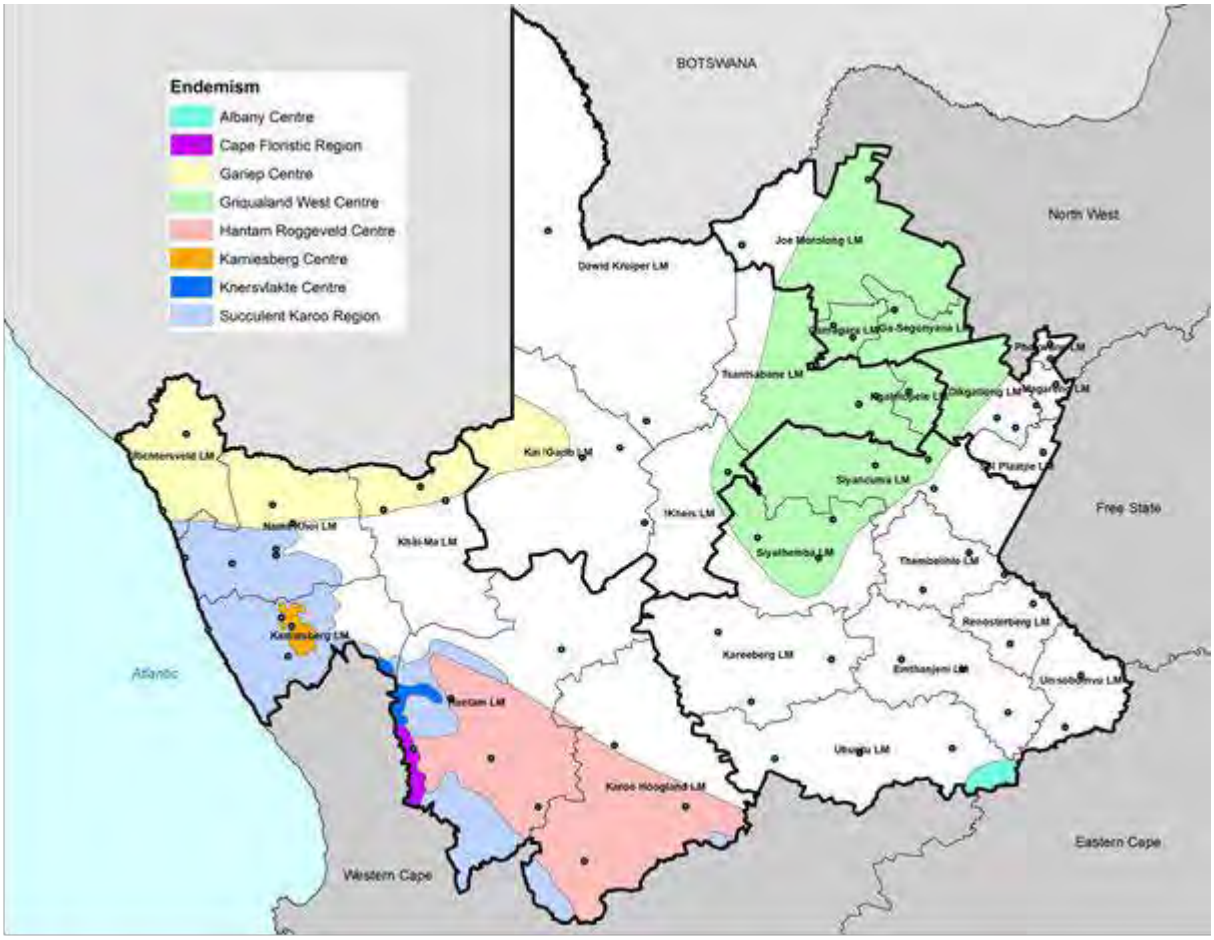


Figure 71: Centres of endemism, Northern Cape Province

In the mid and late 1800s, game migrations of millions of animals occurred across the Northern Cape, especially close to the Orange River. One account recalls a herd taking three days to pass through a small town. Springbok antelope, were by far the most prominent species involved in these migrations but they were often joined by Wildebeest, Blesbok, Eland, etc. (WWF, 2008).

Today a large variety of game species is found throughout the Northern Cape. Larger mammals such as Black Rhino, Buffalo, Giraffe and Eland along with numerous other species of plains game occur in formally protected areas and on game farms. The critically endangered and endemic Riverine Rabbit (Bunolagus monticularis) is found in limited habitats in the Southern Karoo. It is regarded as one of the world's rarest mammals with an estimated adult population of less than 250. In August 2003, the Riverine Rabbit Programme (EWT-RRP) was established to co-ordinate all conservation efforts of this species and its habitat.

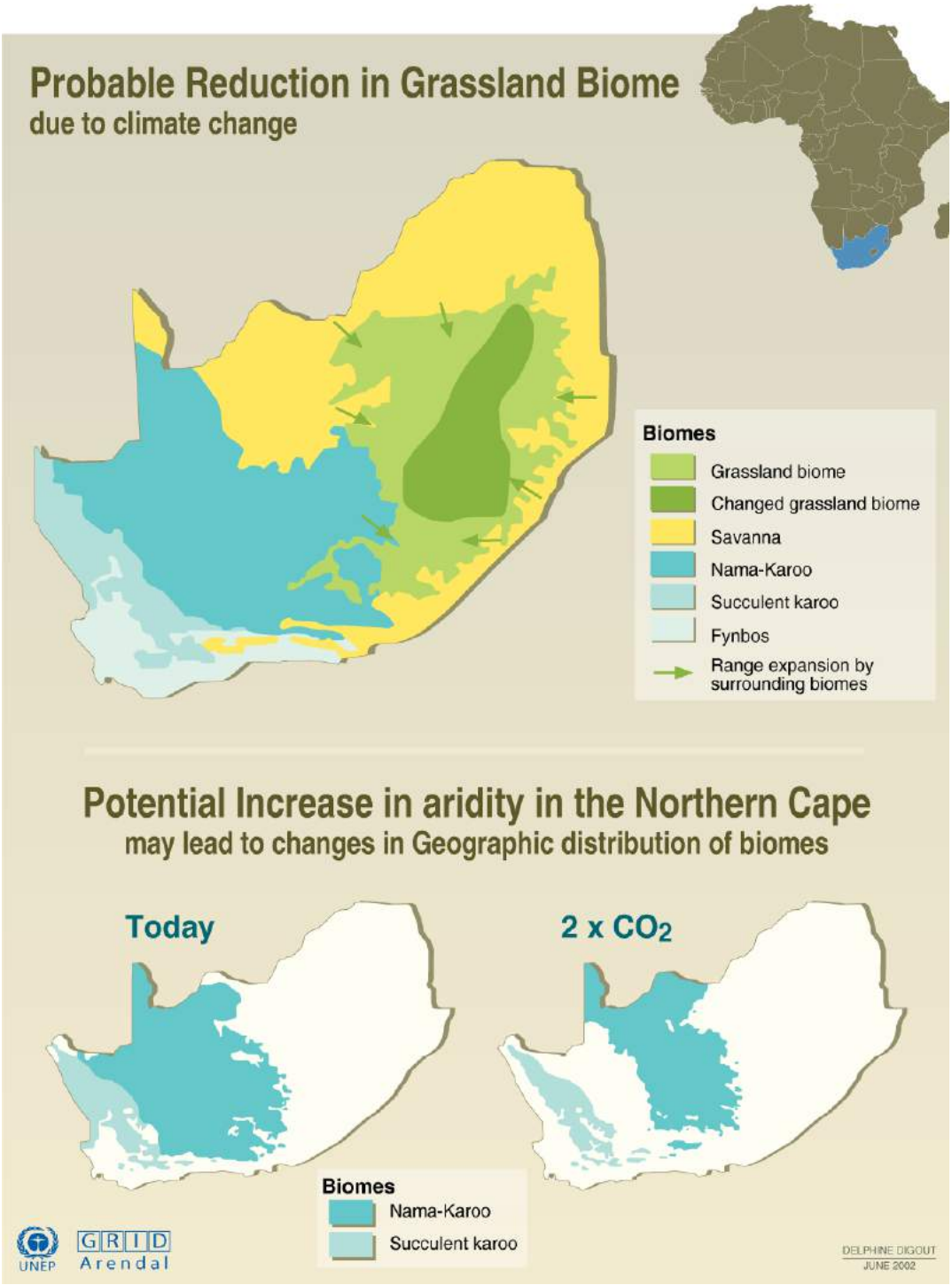


Figure 72: Effect of climate change on Grassland Biome regions (probability)

The vegetation types serve as habitat for a range of different animal species. Reptiles are incredibly varied throughout the province, as are the bird species. The latter ranges from the smaller and very notable sociable weavers to the more charismatic species such as the different species of vulture and the Kori Bustard, the latter being the heaviest flying bird in the world. This range of fauna along with the flora of the province, especially the stunning display of spring flowers, makes for a very diverse and international important region. The latter is evident from the fact that the Northern Cape Province

houses Africa's first transfrontier game park (Kgalagadi Transfrontier Park) which includes the Kalahari Gemsbok National Park with the Gemsbok National Park in Botswana.

3.2.7 Threats

- Land transformation

Land transformation (i.e. conversion from natural to man-made landscapes), is the primary cause of biodiversity loss and deteriorating ecosystems health. One threat is development of renewable energy infrastructure due to the high solar potential of the Northern Cape and the possibility of hydropower developments.

- Alien invasive species



Figure 73: Alien invasive species that are found within the Northern Cape

Invading alien organisms pose the second largest threat to biodiversity after direct habitat destruction (UNEP, 2002). Invasive species are a threat to indigenous species through the following mechanisms:

- displacement by direct competition;
- reduction of structural diversity;
- disruption of the prevailing vegetation dynamics;
- impacts on fire regimes due to increases in biomass;
- alteration of local hydrology; and
- modification of nutrient cycling (Van Wilgen and Van Wyk, 1999).

An estimated 10 million hectares within South Africa has been invaded by alien species (DWAF, 2002). All seven of the biomes are invaded by alien plant species to varying extents, and approximately 1900 of South Africa's 3435 Red Data Book species are threatened directly or indirectly by alien invading plants (Van Wilgen and Van Wyk, 1999). At current rates of expansion (5% per annum) the area of extent of alien invasive species could double in fifteen years (DWAF, 2002). Invading alien plants use about 3.3 million m^3 of water annually, severely reducing water availability (Wynberg, 2002), reduce farming potential, intensify flooding and fire risks, cause erosion, cause siltation of dams and estuaries, and poor water quality and can cause the extinction of indigenous flora and fauna (DWAF, 2002).

The Biodiversity Act confers a responsibility on local government to draw up plans for the monitoring, control and eradication of invasive alien species on municipal land. Thus, the performance indicators here are related to municipal land – and are not related to the invaded area in a municipality as a whole, or the clearing activity being carried out across a municipality as this will be taking place on land owned by various entities. Composite figures for this information will have to be obtained by DEA directly from Working for Water (WfW) (although in some cases, municipalities may keep such information).

Northern Cape Province has relatively low level of alien infestation. This is attributed to the arid climate, extreme temperatures and low densities of human settlements and disturbances. The greatest abundance and diversity of alien invasive species occurs close to human settlements and on the banks of water courses

The incursion of alien vegetation and fauna presents a major threat to the limited natural resources within the province. The threat presented by fauna is limited – the biggest threat coming in the form of alien fish that affect the population of indigenous and endemic species. The problem is significant throughout the region, but of especial import for the Oliphant's Doring river system, as it contains numerous endemic fish species that are threatened by the incursion of alien species. The problems of alien vegetation are that it is both widespread and of critical importance to the Province, as most alien species propagate in river systems – thus consuming significant amounts of water in this water scarce area.

Prosopis, Black Wattle and Poplar trees all present challenges to the integrity of water courses in the district. The Orange River system presents an excellent example of alien encroachment, where Prosopis is widespread along the river banks. One of the primary threats to biodiversity and ecosystem goods and services is alien invasive species. The following five alien invasive species are the most widely distributed within the Northern Cape.

- Atriplex lindleyi (Sponge-fruit saltbush);

- Atriplex nummularia (Old-man saltbush);
- Nicotiana glauca (Wild tobacco);
- Opuntia ficus-indica (Sweet prickly pear); and
- Prosopis glandulosa var. torreyana/velutina (Honey mesquite).

The five most prevalent alien invasive plants within the Northern Cape are all classified as major invaders. The Working for Water Programme, a multi-departmental initiative, led by the Department of Water Affairs and Forestry, the Department of Environmental Affairs and Conservation and the National Department of Agriculture, aims to sustainably control selected alien invasive plants within the Province.

- Unsustainable use of resources

It is mentioned in The National Development Plan – 2030 (NDP- 2030), that the Commission's Diagnostic Report, released in June 2011, set out South Africa's achievements and shortcomings since 1994. It identified a failure to implement policies and an absence of broad partnerships as the main reasons for slow progress, and set out nine primary challenges of which challenge 5 is stated as follows:

- Over grazing

Although livestock grazing is, in theory, a viable and biodiversity friendly land use in the region, in practice this is often not the case. Over grazing, especially considering the effects of climate change, constitutes the biggest threat to biodiversity within the province, mostly by virtue of it being the most widely practiced land use activity. Effective veld management plans and practices (especially around catchment areas) is critical for sustainable land use in the province. Goat and sheep farming is a major land use, and thus should be monitored in order to ensure that stock numbers do not exceed the environments' carrying capacity – which could render large areas unable to support its ecosystem functions. The resultant erosion and reduction in vegetation cover would not only affect the productivity of the land, but also affect water quality and wetland health – thus having a direct impact upon human wellbeing. It is advisable to review the grazing capacity policy/plan of the Province to adapt to the challenges caused by improved genetics (climate adjusted and resilient stock) and climate change.

- Harvesting of natural resources

The illegal collection of unique plant species – especially from areas such as quartz patches that are located near to roads- is a major threat to biodiversity in the Succulent Karoo. Endangered aquatic species such as abalone and crayfish are threatened due to poaching or illegal harvesting activities along the western coastline. The use of certain plants and animal species for medicinal usage has long been practiced in the area, and it is important to ensure that these resources are harvested in a sustainable manner. This issue, which extends into the proliferation of bioprospecting in the region, is pertinent not only to the local biodiversity, but also to cultural heritage, as respect for indigenous knowledge systems is here linked to the utilization of local plants. A good example of the effect of bioprospecting on local inhabitants and plant life is the uptake of Hoodia – a plant traditionally used by San hunters to stave off hunger on long trips – into the mainstream weight loss market. In this example, acknowledgement was not given to the local cultural heritage that enabled the product to

be generated until a much later stage, when royalties were eventually awarded to local San communities after an international outcry.

- Predator control

Predatory animals such as caracal, jackal and leopard have been known to effect stock numbers, thus impacting upon local livelihoods in the region. However, the hunting and trapping of predators can often lead to an increase in predator numbers because of the elimination of alpha males that restrict access of other predators within their territory. Thus, common methods of predator control can have the opposite effect to that which is intended. Practices such as the use of gin traps are also problematic for local biodiversity, as it is an indiscriminate method that usually serves to eradicate many more non- target animals such as tortoises, aardvarks, etc, than it does the predator in question. Therefore, the issue of predator management is a very pertinent issue with regard to land management in the region. Alternative strategies, such as the use of Anatolian dogs, should be encouraged, and effort should be made into researching other approaches, such as the use of distinctive collars on livestock, which is thought to be a deterrent to predators.

3.2.8 The economy is unsustainably resource intensive

Overutilization of the natural resources for example mining, can lead to a serious threat to the fauna and flora components and this n turn, will lead to a decline in the ecological system functionality. Mining relies on finite resources that will be depleted over time and although it contributes tremendously to the economic welfare, it is only for a set period, until the mineral is depleted or it cannot be mined economically. If not properly managed, this can lead to various disastrous consequences that may range from social problems, unemployment, derelict and ownerless mines with a long-term pollution threat to the existing intact ecological integrity of an area.

Careful planning and resource economics should be applied to the decision- making process whether for example a mine or other use of a finite natural resource should be authorised and this decision must be underpinned by the relevant policies and plans which specifically refer to the protection and future expansion of our CBA's.

3.2.9 Opportunities

Alien Invasive clearing can result in job opportunities, whilst lowering the impact on the natural environment (taking up land space for natural vegetation and over utilization of water resources). A further advantage is a decrease in fire danger as high levels of alien invasion can lead to high fire risks. A further advantage that poses itself is the use of the alien wood for various other purposes for example making of furniture etc. Careful consideration and planning of development and resource use- application may lead to opportunities after rehabilitation of utilised areas. Agro-mining need to be researched to mine "naturally" at the time when the mineral cannot be mined economically in the conventional manner. This will ensure skills- development and job opportunities and income from the mineral after its expected life-span of economical viable extraction.

3.3 CRITICAL BIODIVERSITY AREAS

As per Critical Biodiversity Areas of the Northern Cape: Technical Report (Dr Stephen Holness, Nelson Mandela Metropolitan University and Enrico Oosthuysen Northern Cape Department of Environment and Nature Conservation, 2016), the Northern Cape CBA Map identifies biodiversity priority areas, called:

- Critical Biodiversity Areas (CBAs) and
- Ecological Support Areas (ESAs),

Together with protected areas, they are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape as a whole. The Northern Cape CBA Map is also in line with existing provincial spatial plans e. g. Provincial Spatial Development Framework and Environmental Frameworks to avoid possible conflicts. Provincial Sector Departments were given extended opportunity for inputs. Presentations were made on the following platforms with the hope of reaching as many stakeholders as possible:

- National Biodiversity Planning Forum;
- Provincial Coastal Committee;
- DENC/Leslie Hill Succulent Karoo Trust Steering Committee;
- Wilderness Foundation Steering Committee; and
- Kimberley Biodiversity Research Symposium.

The Northern Cape Critical Biodiversity Area (CBA) Map updates, revises and replaces all older systematic biodiversity plans and associated products for the province. These include the:

- Namakwa District Biodiversity Sector Plan;
- Cape Fine-Scale Plan (only the extent of the areas in the Northern Cape i.e. Bokkeveld and Nieuwoudtville); and
- Richtersveld Municipality Biodiversity Assessment.

According to the Technical Report, the identification of Critical Biodiversity Areas for the Northern Cape was undertaken using a Systematic Conservation Planning approach (Margules & Pressey, 2000; Ardron et al., 2010). Available data on biodiversity features (incorporating both pattern and process, and covering terrestrial and inland aquatic realms), their condition, current Protected Areas and Conservation Areas, and opportunities and constraints for effective conservation were collated. Priorities from existing plans such as the Namakwa District Biodiversity Plan (Desmet and Marsh, 2008), the Succulent Karoo Ecosystem Plan (Driver et al., 2003), national estuary priorities (Turpie et al., 2012), and the National Freshwater Ecosystem Priority Areas (Nel et al., 2011) were incorporated. Targets for terrestrial ecosystems were based on established national targets (Driver et al., 2012), while targets used for other features were aligned with those used in other provincial planning processes. Marxan analysis (Game & Grantham, 2008) was used to ensure that the required representation of biodiversity features was achieved in a spatially efficient manner which avoided incompatible land uses and activities where possible.

The assessment approach and map categories are designed to be compatible with the Guideline Regarding the Determination of Bioregions and the Preparation and Publication of Bioregional Plans (DEAT, 2009). Where possible, all targets are met in the identified set of CBAs. Evident form the

provincial CBA map is the large extent of CBA2 areas relative to the CBA1 extent. The latter is not surprising considering the low levels of degradation as concluded from the land cover data. The latter implies that there should be ample options available for satisfying biodiversity features targets which in turn explains the large extent of CBA2 areas. The CBA map therefore indicates that numerous options are available for spatial planning purposes and that such an exercise will do well to consider the critical biodiversity areas per the CBA map to timeously avoid conflicting land uses.

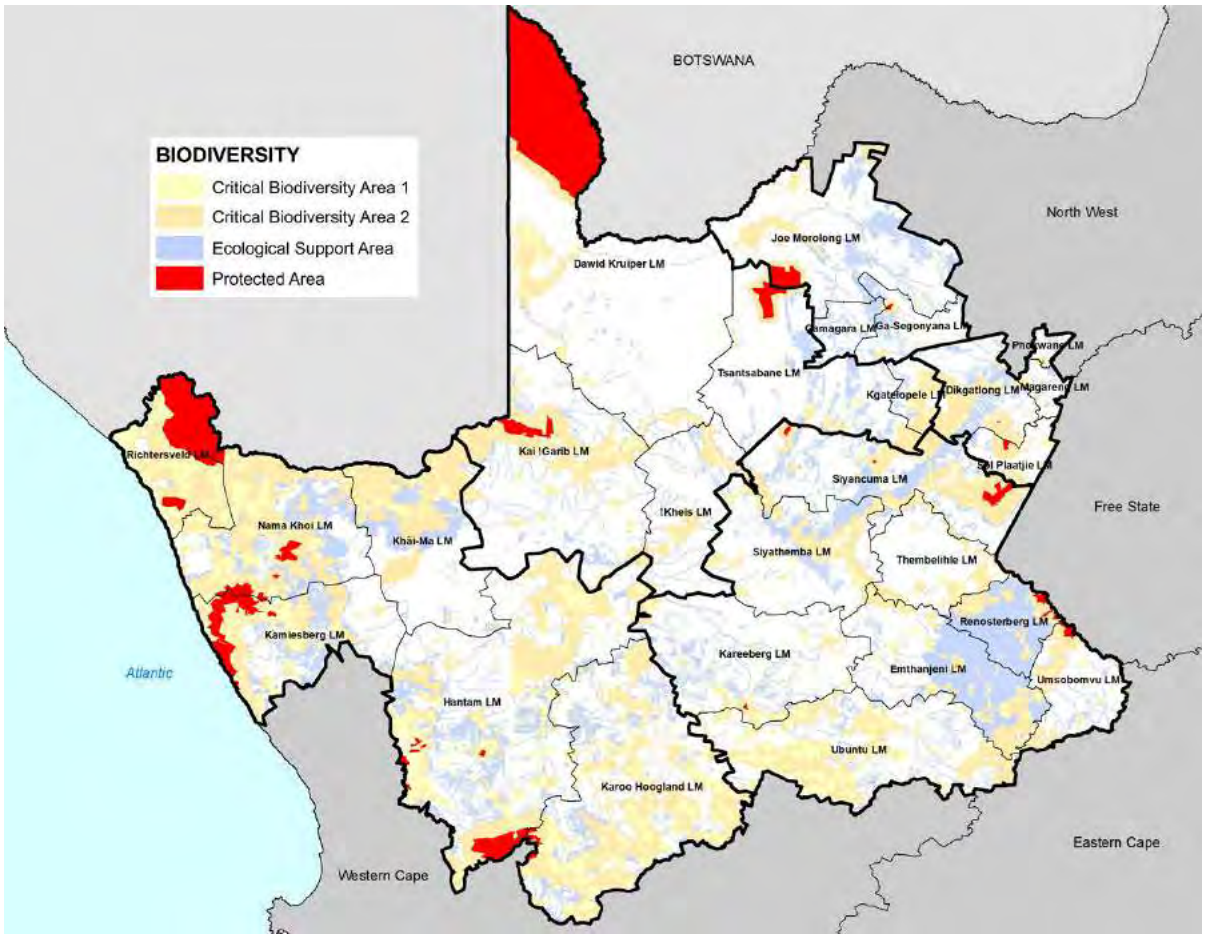


Figure 74: Biodiversity areas, Northern Cape Province

3.3.1 Biodiversity features and targets

Quantitative targets were set for both biodiversity patterns and process features indicating how much of each feature is required to ensure representation and persistence. Targets were set for all features included within the plan. Targets ranged from 16% to 36% of original area for particular vegetation types (with most targets being in the range 19-24%), or up to 100% of the known habitat for key threatened species (especially for critically endangered and endangered species with small known distributions). The target setting process, which is aligned with the processes used in other South African systematic plans. Targets for vegetation types were those used in the National Biodiversity Assessment (NBA) (Driver, et al., 2012).

Some additional targets were set for rare and threatened habitat types. 126 types were included individually as biodiversity features. Four additional, expert defined criteria, were applied when defining CBAs. This was based on the fact that while most ecosystem types are extensive and often the least threatened, while there are some types which are under significantly more pressure or where

a specific reasoning exists advocating for their inclusion. These areas cover a very small percentage of the Province:

- Ecosystem Threat status: The standard National Biodiversity Assessment (Driver, et al., 2012) method for evaluating threat status was used. The following ecosystem types triggered CBA status on this basis:
    - Alexander Bay Coastal Duneveld – Critically Endangered
    - Namib Seashore Vegetation – Endangered
    - Lower Gariep Alluvial Vegetation – Endangered with known under-mapped degradation and transformation.
- Rarity (under 5000ha in the province and not widely distributed elsewhere):
    - Cape Vernal Pools
    - Vanrhynsdorp Shale Renosterveld
- Extreme rarity and endemism (rare types with under 5000ha originally or remaining often at a single site which are not widely distributed outside the province):
    - Arid Estuarine Salt Marshes
    - Kamiesberg Granite Fynbos
    - Kobee Succulent Shrubland
    - Namaqualand Seashore Vegetation
    - Namib Lichen Fields
    - Vyftienmyl se Berge Succulent Shrubland
- Ecosystem process importance or high biodiversity value with significant loss underway:
    - Upper Gariep Alluvial Vegetation – evidence gathered by DENC suggests that degradation of this vegetation type is just as intense as the Lower Gariep Alluvial. Further, it has significant process value for maintenance of hydrological processes.
    - Richtersveld Coastal Duneveld – critical for coastal processes and evidence of significant loss with approximately 30% of complete loss already recorded with significant additional fragmentation issues.
    - Nieuwoudtville Shale Renosterveld – a vulnerable type with extremely high biodiversity value and limited extent within the province.

3.4 PROTECTED AREAS

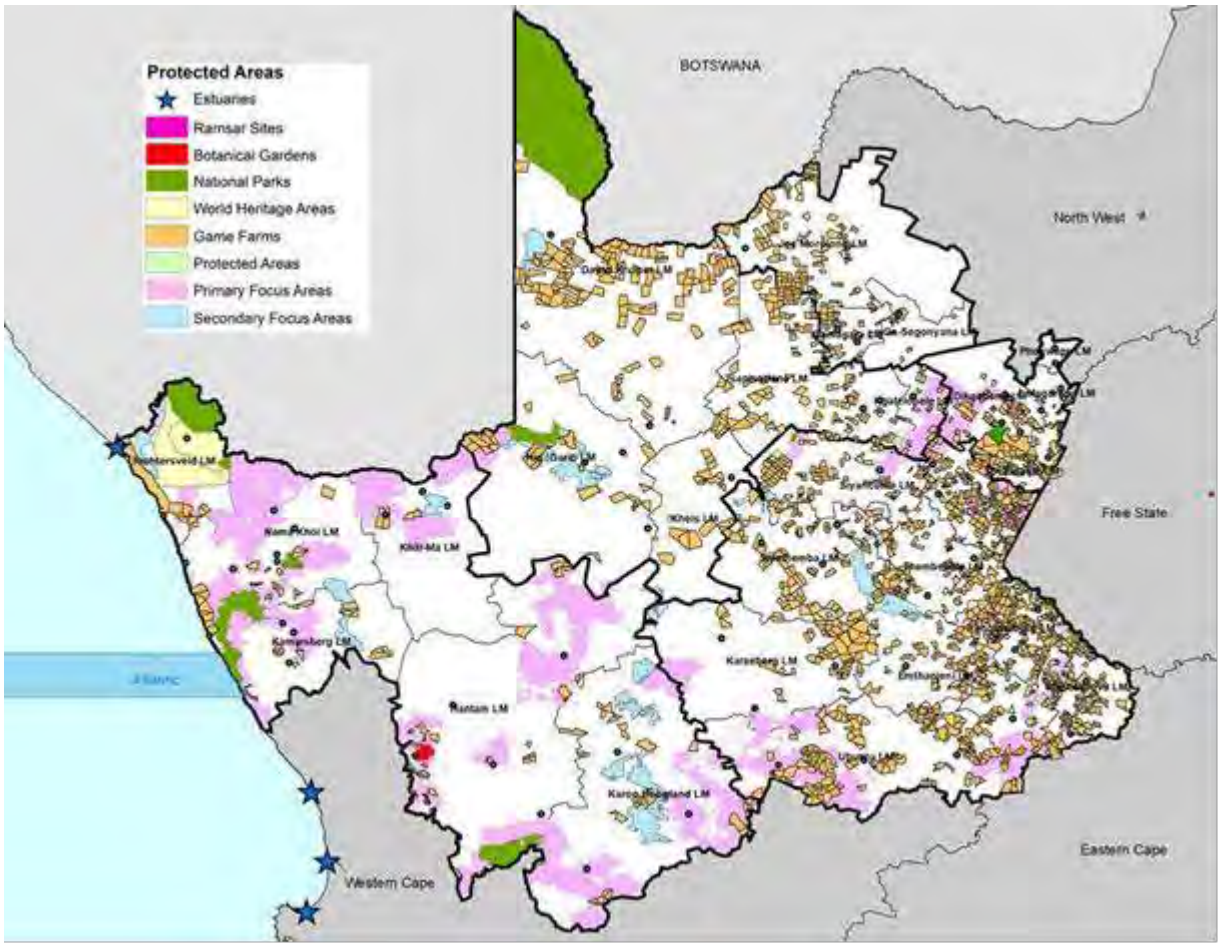


Figure 75: Formal and informal protected areas, Northern Cape Province

Protected areas, protected area buffers, conservation areas and protected area expansion priorities were included in the analysis. Other identified focus areas (including areas for species and priorities from previous plans) include:

- Important Bird Areas (IBA);
- SKEP expert identified areas;
- Threatened species (Plant, butterfly, key coastal species & colonies, riverine rabbits and reptile locations);
- Kathu Forest; Features from previous conservation plan in areas which were in Namakwa District. Areas to support ecological processes (including climate change adaptation); and
- Areas supporting climate change resilience.

The above-mentioned areas are characterised by high level of diversity, topographic diversity, strong biophysical gradients (e.g. altitude, rainfall or temperature), climate refugia (gullies & south facing slopes), and river corridors. Provincial Conservation plans were also included with CBAs and PAs in neighbouring provinces (Western Cape, Northwest, Free State, Eastern Cape) as alignment of priorities across provincial boundaries is crucial. Landscape structural elements were included such as Special habitats: (e.g. rocky outcrops, koppies, dolerite dykes, boulder fields, woody vegetation on outwash

plains etc.). A strong correlation was found between these areas and high value biodiversity features (e.g. kloofs, boulder fields, escarpment edges etc.).

Table 40: Northern Cape national and provincial protected areas (Source: Department of Environmental Affairs).

NORTHERN CAPE PROTECTED AREAS	AREA (KM²)
Kgalagadi Transfrontier Park (South Africa)	9 591
Richterveld National Park	1 610
Tankwa Karoo National Park	800
Namaqua National Park	686
Augrabies Falls National Park	554
Mokala National Park	196
Goegap Nature Reserve	148
Doornkloof Nature Reserve	119
Nababiep Nature Reserve	109
Rolfontein Nature Reserve	81
Oorlogskloof Nature Reserve	47
Witsand Nature Reserve	32
Total Area Formally Protected	**13 973**

It is estimated that approximately 16.5% of South Africa's land cover has been transformed, and a further 10% degraded (Wynberg, 2002). Sensitive arid habitat such as the Succulent Karoo Biome of the Northern Cape Province is particularly prone to degradation as a result of overgrazing, alien invasive species and mining (CEPF, 2003). The aridity of the climate precludes rapid recovery of degraded areas. When examining veld degradation in terms of severity and rate of degradation, the Northern Cape emerged as the third most degraded Province in South Africa, after the Limpopo Province and KwaZulu-Natal (Hoffman and Ashwell, 2001).

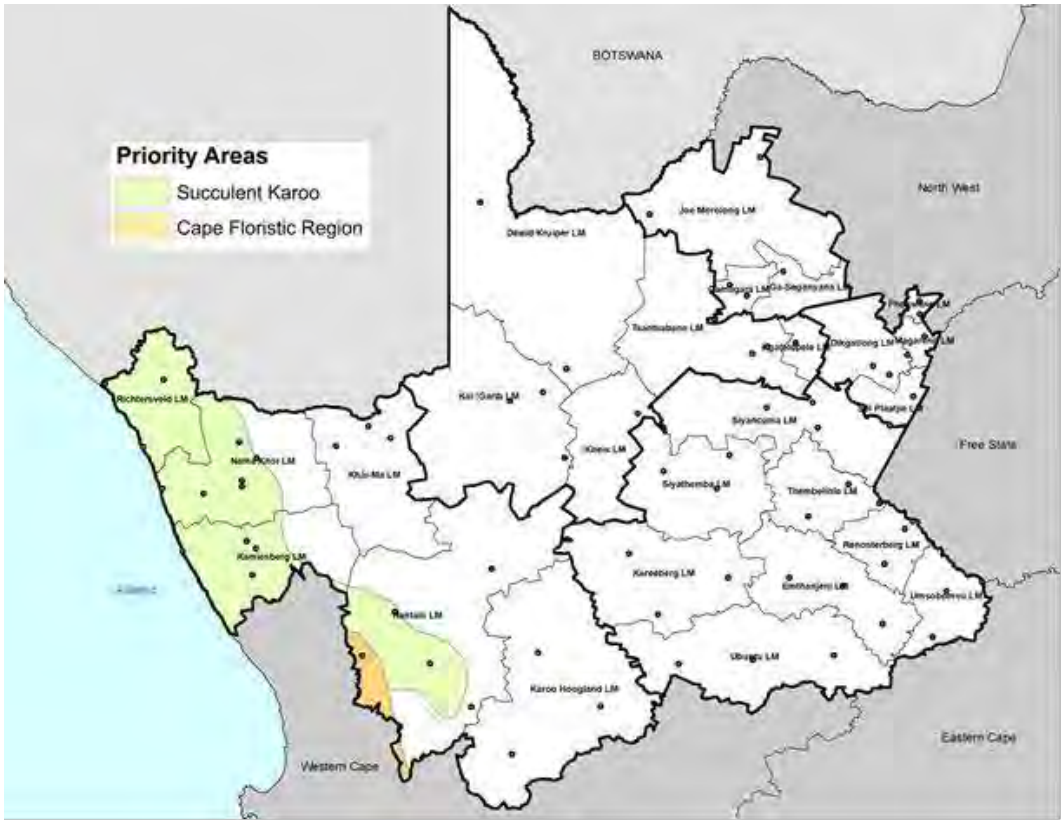


Figure 76: Priority conservation areas, Northern Cape Province

3.4.1 Aquatic features

Aquatic features included in the systematic conservation plan include:

- Rivers;
- Wetlands;
- priority catchments and
- strategic water source areas form a critical spatial backbone to the provincial plan.

The above-mentioned features, such as hydrological features play a key role in the overall functioning of landscapes. Further, the approach is necessary as terrestrial habitats are not finely differentiated and a few specific areas host specific threatened species. These include:

- Estuaries,
- FEPA Rivers (1:500 000) – Phase One FEPAs, Larger rivers (1:500 000), FEPA Sub quaternary catchments, FEPA Wetlands, FEPA Wetland Clusters,
- Other natural non-FEPA Wetlands,
- Other wetlands were included as ESA, and
- Intact riparian vegetation.

In addition to the above information, the 2017 -2021 Northern Cape Protected Area Expansion Strategy (D. Balfour & S. Holness ,2017) summarizes the existing terrestrial protected area estate in the Northern Cape, which includes 39 formally protected areas covering an area of 18,744km^2 and managed by 32 different agencies or private entities. The bulk of the protected area estate is managed by SANParks (8 National Parks covering 14,730km^2) followed by the privately owned and managed

protected areas (10 reserves covering 1,832km^2). A single protected area, the Richtersveld Cultural and Botanical Landscape World Heritage Site (1,421km^2), is under the control of a management committee, while the provincial government, DENC manages 7 reserves covering 624km^2. Local municipalities manage 12 areas covering 76km^2 and the SANBI manages the Hantam National Botanical Garden (60km^2).

3.4.2 Threats to critical biodiversity areas



According to the findings in NCPEAS, overall, the Northern Cape's current protected area network falls far short of sustaining biodiversity and ecological processes. Only 25 ecosystem types (20%) are well protected (i.e. have their targets fully met), while a further 11 types (9%) are categorized as moderately protected. These types are largely limited to the Richtersveld, Kalahari, Tankwa-Karoo and Augrabies regions. 68 of the types (or 54%) are not effectively represented in the protected area network at all. Most of these types are found in the central, north-east and south-east regions of the province. In addition, there is poor representation of other important components of biodiversity, such as priority areas in the Succulent Karoo, aquatic features like riparian habitats, estuaries, wetlands and rivers, such areas are important for ecosystem services and climate change resilience, and preservation of threatened species.

In the Succulent Karoo, which has been a focus for protected area expansion, the current protected area network still only includes 18% of expert identified priority areas from the Succulent Karoo Ecosystem Plan (Driver et al., 2003), and 29% and 11% of Critical Biodiversity Area One and Two from the Namakwa District Biodiversity Plan (Desmet & Marsh, 2008). Aquatic features are also poorly represented, with only 5 % of the intact riparian vegetation (Holness & Oosthuysen, 2016) and 4% of national priority estuaries (Turpie et al., 2012) being conserved. Other important aquatic features identified in the National Freshwater Ecosystem Priority Areas project (Nel et al., 2011) such as rivers, priority river catchments and wetlands are also poorly represented: overall, 4% of all rivers, priority FEPA rivers, and FEPA catchments are conserved, while 2% of all the natural wetlands, 2% of priority wetland clusters and 1 % of wetland FEPAs are incorporated. In terms of priority areas for key species only 1% of Important Bird Areas and 39% of other areas important for threatened species (Holness & Oosthuysen, 2016) are protected by the current reserve network. In terms of climate change, 31% of priority areas for supporting climate change resilience are included in the current protected area network (Driver et al., 2012). This NCPEAS identifies areas where, if protected areas are expanded, this situation will be improved.

The development of renewable energy may pose a risk, taking up valuable land and conservation worthy areas. According to the NDP 2030, one of the goals is to procure at least 20 000MW of renewable electricity by 2030, importing electricity from the region, decommissioning 11 000MW of ageing coal-fired power stations and stepping up investments in energy-efficiency. Furthermore, constructing of infrastructure to import liquefied natural gas and increasing exploration to find domestic gas feedstock (including investigating shale and coal bed methane reserves) to diversify the

energy mix and reduce carbon emissions may pose a serious risk, as shale gas fields are present in the Northern Cape, while the environmental impacts of shale and solar plants are not yet fully understood.

Hydropower development in the Northern Cape also present a threat to the scarce commodity of water in the Province. It may pose a threat to pollute and not necessarily contribute to lowering of Greenhouse Gases if the life cycle and the associated infrastructure impact are considered. It is advisable to take life cycle impacts as well as the impacts of the associated infrastructure (especially dams) into account.

The above two threats will cause tension, as both conservation and the development of utilization of renewable resources are commendable and will contribute each in its own right to principles of sustainability. Careful consideration must be given when these decisions must be made taking all 17 Sustainable Development Goals into consideration.

3.4.3 Opportunities (protection and expansion of CBA's)

- The CBA map indicates that numerous options are available for spatial planning purposes and that such an exercise will do well to consider the critical biodiversity areas per the CBA map to timeously avoid conflicting land uses.
- The Northern Cape's Protected Area Expansion Strategy: 2017 to 2021(Date: February 2017) was prepared by: D. Balfour & S. Holnes for DENC, this is referred to as NCPEAS. The NCPAES is designed to implement the objectives of the National Protected Area Expansion Strategy (NPAES 2016) in the province. The NCPAES achieves this aim through the following outcomes:
    - Providing for a representative network of protected areas on state, private and communal land;
    - identifying an explicit set of spatial priorities for protected area expansion; and
    - developing an action plan that can be implemented by DENC over the next 5 years.

The NCPAES sets protected area expansion targets, which are implementation targets that indicate how much of each ecosystem should be included in protected areas. Reaching of the targets, set by NCPEAS would significantly improve the protection of natural resources and with the resultant improvement of resilience of the Northern Cape Province.

If the target setting goals can be realized, protected area expansion in primary and secondary focus areas would significantly improve the representation levels of terrestrial ecosystems and other important biodiversity features.

The number of terrestrial ecosystems that are not protected would decline from 68 (54%) to 14 (11%) assuming that areas required to meet targets in both primary and secondary focus areas had been secured. The number of well protected ecosystems would increase from 25 (20%) to 86 (68%) Important biodiversity in the Namaqua, Richtersveld and Bushmanland regions would be also fully secured, while the previous significant gaps in the southern and eastern Karoo would be largely filled.

Other important biodiversity features would also be improved through securing the primary and secondary focus areas. This is particularly noticeable for aquatic features: protection of estuaries would improve from 4% to 86% of extent; FEPA Priority Rivers from 4 to 41%; wetland FEPAs from 1% to 56% and intact riparian vegetation from 5% to 48%. The critical areas for the Succulent Karoo would be far better protected, with coverage of Succulent Karoo expert areas increasing from 18% to 74%,

Namakwa Critical Biodiversity Area 1 from 29% to 81% and Namakwa Critical Biodiversity Area 2 from 11% to 64%. Areas important for threatened species would improve from 39% to 76%, and coverage of Important Bird Areas would significantly improve from 1% to 16%.

The 5-year Action Plan clearly sets out the current constraints and threat that may result in not achieving the objectives. These constraints and the achievability of reversing this situation are discussed and realistic goals are set. These goals should form part of the PSDF for the NC. The NCPEAS Action Plan identifies the following actions:

- Improving existing resources available for implementing protected area expansion – staff;
- Improving existing resources available for implementing protected area expansion – operational budget;
- Active implementation of all identified approaches to financing protected area expansion in the Northern Cape;
- Active implementation of all identified mechanisms for protected area expansion in the Northern Cape; and
- Institutional and cooperative arrangements for PA expansion need to be steered successfully. It is proposed that DENC establishes and chairs a Northern Cape Protected Area Expansion Coordination Committee as DENC have the primary responsibility for coordinating protected area expansion in the Northern Cape.

Another opportunity that present itself is the potential links that exist between PA expansion and sustainable tourism opportunities including community involvement. This need to be investigated to develop an action plan that give effect to the opportunity.

3.5 ENVIRONMENTAL SENSITIVE AREAS

Other Environmental Sensitive Areas will be informed by the primary set of data used to determine the CBA's, therefor close interaction with the developers of the CBA's will be necessary to determine what comprises of Sensitive Areas not included in the CBA's. This will be done in consultation with the Provincial Department of Environmental Affairs.

A typical example is the fact that not all wetlands are included as CBA's; but some are still identified as Environmental Sensitive receptors. As wetlands have an important role to play in the ecosystems, emphasis will be placed on this feature and it will be complemented by information gathered during interaction and consultation with the DENC and the Biodiversity Section.



The wetlands of the Northern Cape Province are perhaps the least understood of all wetlands amongst the different provinces. The latter stems from amongst other that the indicators and criteria used for identifying and delineating wetlands very often do not apply to the wetlands of the Northern Cape.

They very rarely, due to the general low relief and low rainfall, exhibit the required vegetation and soil characteristics required by an area for it to be considered a wetland. However, in spite of the fact that approximately 80% of the province is covered by only 2 biomes, the wetlands of this region are diverse. The depression wetlands (pans) can range from bare, shrubby, grass and/or sedge covered (in approximate decreasing order of salinity), which in turn seems to be associated with the levels of inflow and outflow as well as soil depth. Their ephemeral nature has also resulted in them being characterised by a unique assemblage of fauna that have adapted to the fluctuating levels of inundation.

Many of the rivers of the Northern Cape Province are also ephemeral in nature, with the central rivers having no flow for 26 – 27% of the time while the more northern systems can have no flow for up to 76% of the time (Seaman, 2010). Especially challenging with managing wetland habitats is accounting for their temporal nature. In terms of supporting bird life, the important wetlands, specifically pans, are the ones that are inundated. The variability in rainfall therefore results in different wetlands being important from the one year to next and accounting for this variability has proven to be a challenge for conservationists and land use planners alike.

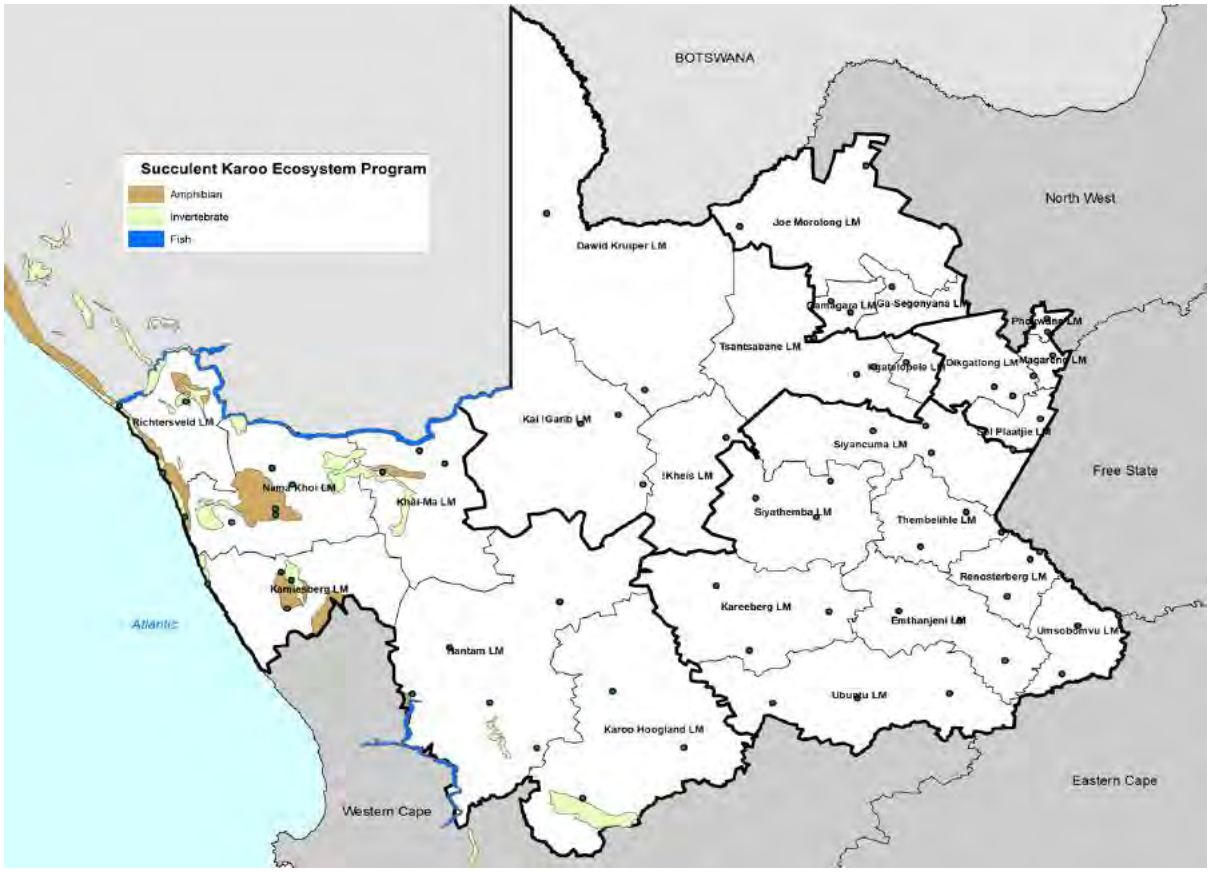


Figure 77: Succulent Karoo Ecosystem program - Amphibian, Invertebrate and Fish Sensitive areas

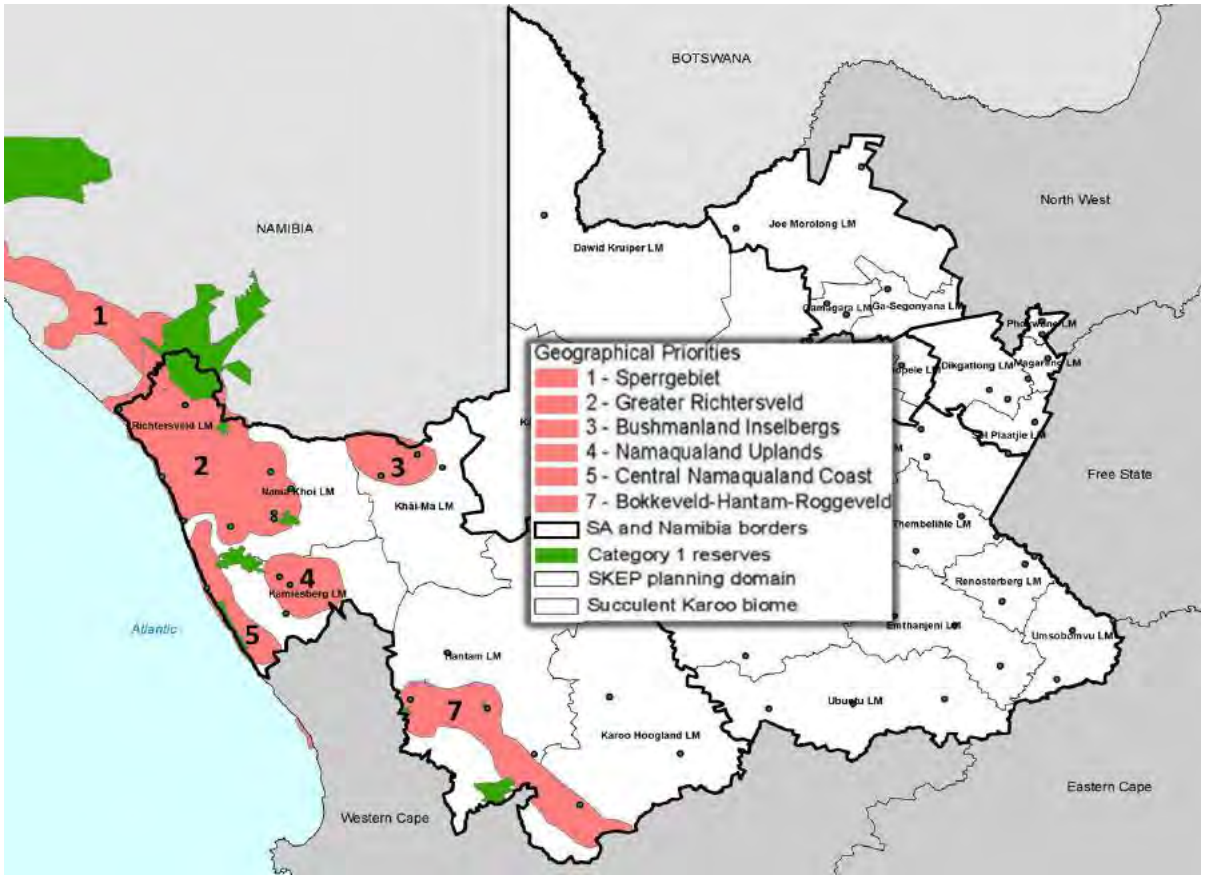


Figure 78: Succulent Karoo Ecosystem program - Protected and Priority areas (SKEP priority areas)

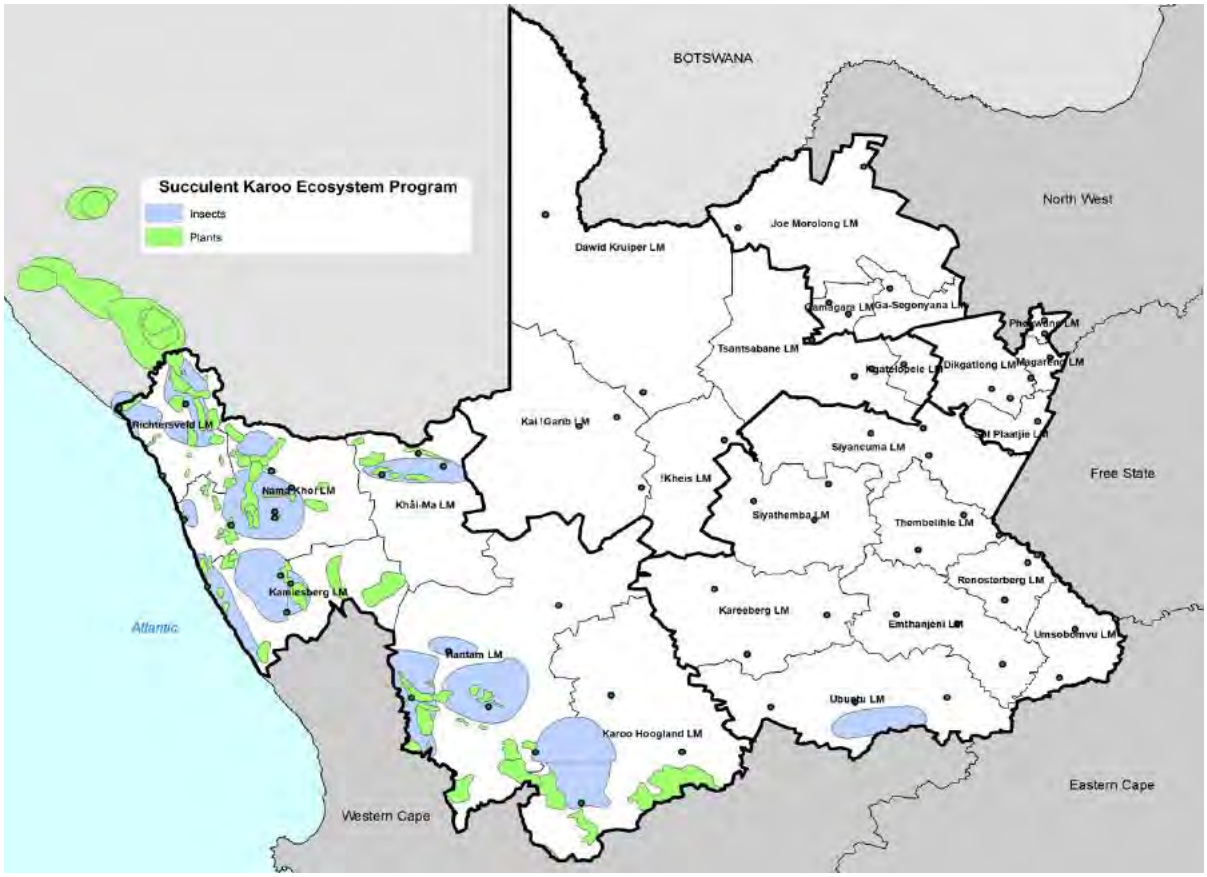


Figure 79: Succulent Karoo Ecosystem program - Sensitive insect and plants areas

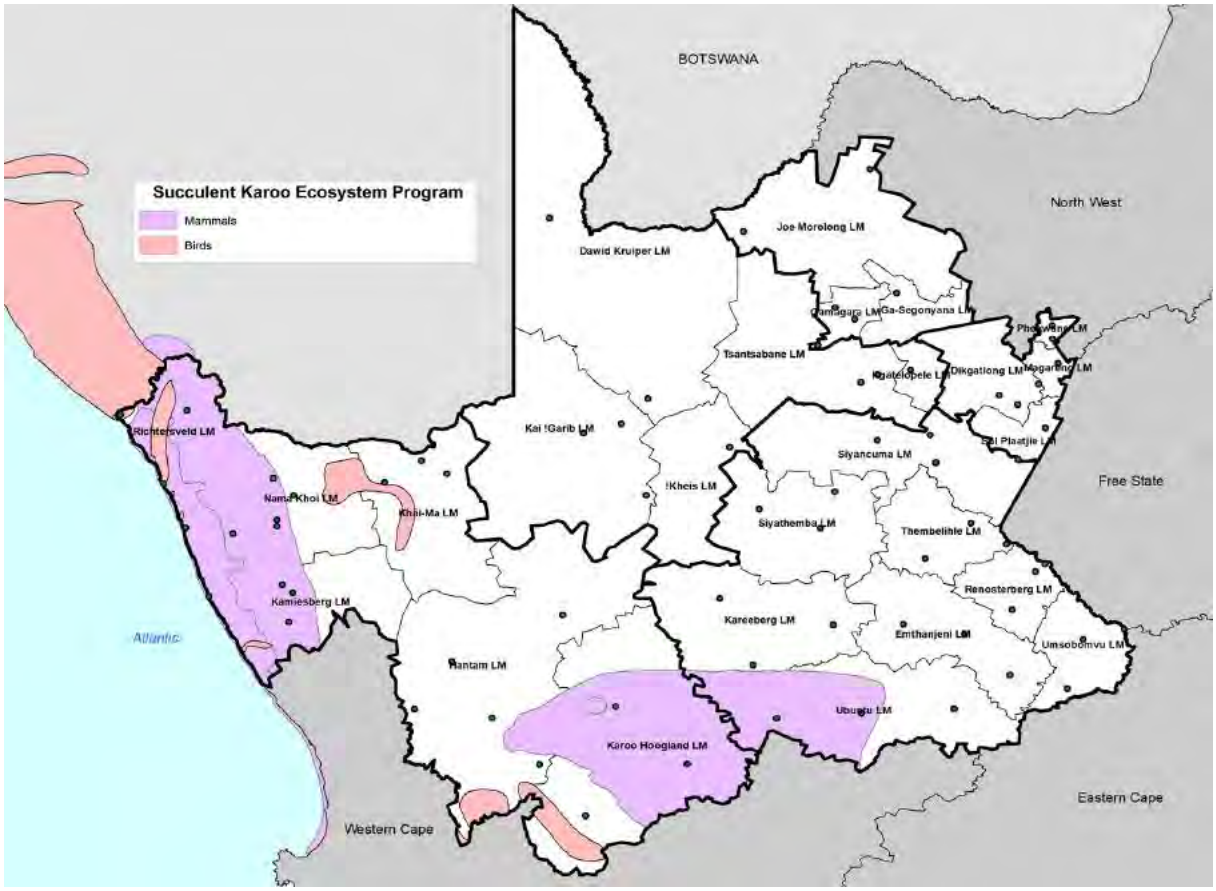


Figure 80: Succulent Karoo Ecosystem program - Sensitive mammals and bird areas

3.5.1 Threats

In a preliminary overview of key pressures on the Wetlands of the Northern Cape (Kotze, Milne and Nieuwoudt) key wetland "hotspot regions" in Northern Cape were identified, recognizing that different wetland "regions" are likely to be subject to different pressures. For each hotspot, the main land-use pressures (impact extent and intensity) were identified. The aim of this is to inform wetland conservation and rehabilitation planning which should be included as adaptation measures and resilience building.

3.5.2 Opportunities



Wetlands are important for the maintenance of ecology and biodiversity and it can provide useful eco-services to the community. A serious attempt to identify those wetlands with a higher level of functionality that are degraded and in need of restoration. This will enhance ecological functionality, build resilience and provide much needed work opportunities. There are current wetland rehabilitation projects that receive priority attention (Working for Wetlands (WfWetlands) an overview of projects and current priorities: Northern Cape – Heidi Nieuwoudt).

One such example is the WfWetlands' first ecological rehabilitation project in Kamiesberg, on such a large scale (2009) as the Kamiesberg wetlands are important for the maintenance of ecology and biodiversity and it provides useful eco-services to community.

Kamiesberg WfWetlands Project includes a wide range of different types of interventions. It Includes collaboration of secondary industries: Alien Invasive trees removed by Project used to make planks and to build bird hides and boardwalks in estuaries at coast – telling the story of source to sea.



The rehabilitation supports important corridors down to the coast and its primary focus is reducing the hydrological impact of drainage channels in abandoned lands and it is also addressing human induced erosion and alien invasive. On a Local level (as described in the 2012 PSDF) it is stated that any Open Space that is of value for conservation, it may also be seen as Sensitive Areas that require special attention in management. This is a local government matter under Schedules 4b and 5b of the Constitution – where local government is responsible for the provision and maintenance of municipal parks and recreational areas, which are forms of open space.



However, the provision and maintenance of these areas is not a core environmental activity – but is a planning and amenity issue, unless the open space is of value for conservation. Thus, the indicators developed for this area are not considered core environmental indicators apart from those which relate to spaces with conservation value. For areas with conservation value the greatest issue seems to be 'infilling' of such areas by development and so an indicator has been included to assess this.

To make this distinction, municipal parks and open spaces within a municipal area will have to be 'categorized' into those with conservation value (such as riparian areas and so on) and those that do not (for example, swing parks). Peripheral indicators are included below for information. They may be of use to municipalities for monitoring performance in provision and maintenance of amenity areas.

3.6 POLLUTION[61]

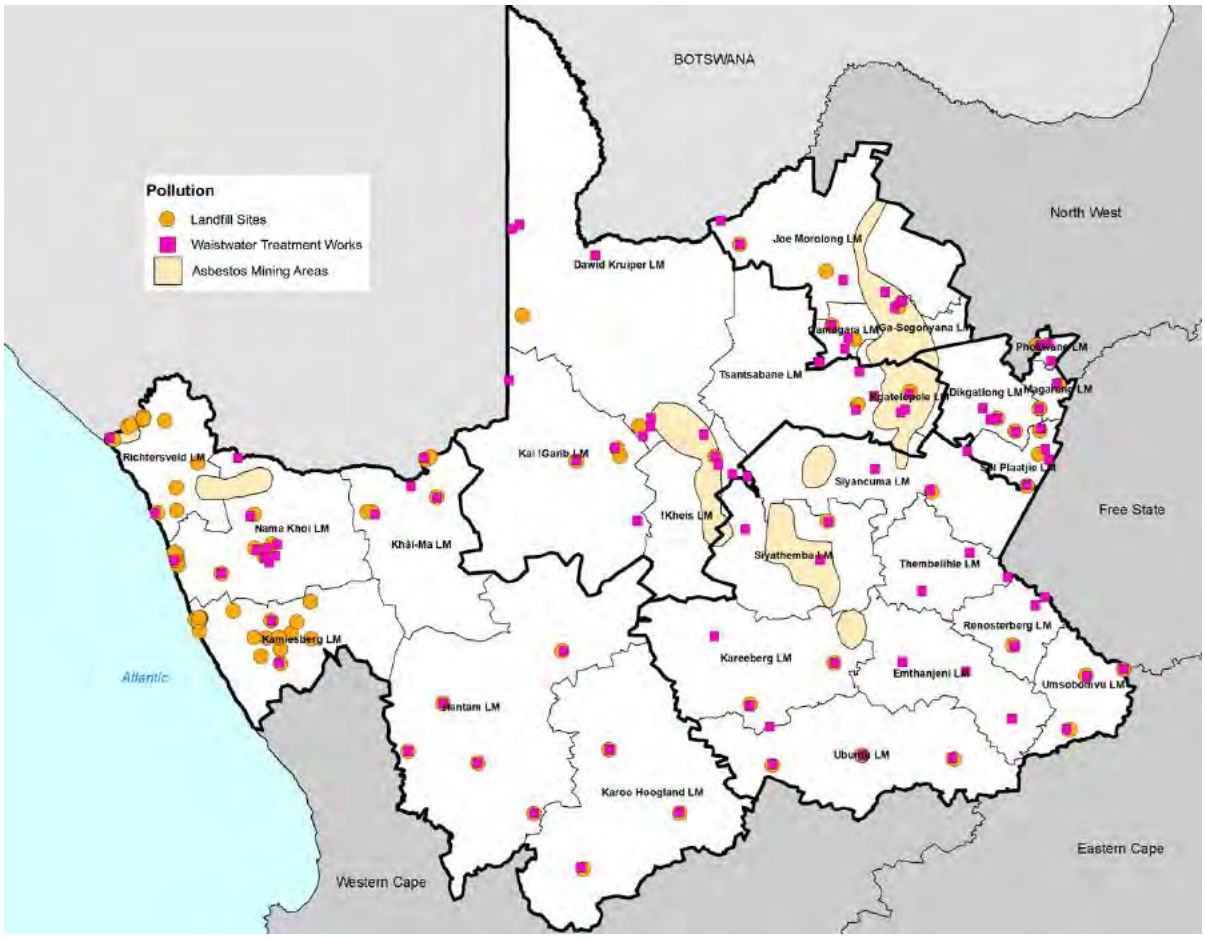


Figure 81: Areas that are affected due to Pollution in the Province

Pollution may be described as the presence of matter (gas, liquid, solid) or energy (heat, noise, radiation) whose nature, location, or quantity directly or indirectly alters characteristics or processes of any part of the environment and causes (or has the potential to cause) damage to the condition, health, safety, or welfare of animals, humans, plants, or property.

South African legislation are clear about pollution as seen in the following pieces of legislation:

Constitution of the Republic of South Africa, Act 108 of 1996 Section 24 (a) of the Constitution states that:

"Everyone has the right -

a) to an environment that is not harmful to their health or well- being; and
b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that -
   i. prevent pollution and ecological degradation;
   ii. promote conservation; and

[61] *(Source: 2004 NC SoER – Atmosphere and Climate Specialist Report 1 of 7)*

iii. secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development" (Republic of South Africa, 1996).

National Environmental Management: Air Quality Act (Act No 39 of 2004), standards and regulations.

The objective of the act is:

a) to protect the protect the environment by providing reasonable measures for

- the protection and enhancement of air quality in the republic;
- the prevention of air pollution and ecological degradation; and
- Securing ecologically sustainable development while promoting justifiable economic and social development.

It is a responsibility of every citizen of the Republic to ensure compliance with the set legislation:

- National Ambient Air Quality Standards;
- National Atmospheric Emission Reporting Regulations, 2015; and
- National Dust Control Regulations, 2013

National Environmental Management: Waste Act 59 of 2008

The objective of the act is to reform the law regulating waste management to:

- protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation, and for securing ecologically sustainable development;
- to provide for institutional arrangements and planning matters;
- to provide for national norms and standards for regulating the management of waste by all spheres of government;
- to provide for specific waste management measures;
- to provide for the licensing and control of waste management activities;
- to provide for the remediation of contaminated land;
- to provide for the national waste information system; and
- to provide for compliance and enforcement; and to provide for matters connected therewith.

Pollutants, once emitted into the atmosphere, recognise no geographical or political boundaries, and their destination will depend on their physical and chemical characteristics, together with the prevailing meteorological conditions (CEC, 1997).

Activities in the Province which might lead to increased air pollution include inter alia mining activities, industries, crop spraying and domestic fuel burning. Although there are currently no operational asbestos mines in the Northern Cape, and therefore no occupational exposure, environmental exposure is still a concern as fibres from unrehabilitated mine dumps can become airborne and may be inhaled by humans. The concentration of asbestos in ambient air is not known, as no monitoring is currently undertaken. Very little is known about the impact of asbestos (prevalence of asbestosis and mesothelioma) in the Northern Cape. The Provincial Department of Health does not keep any statistics on these diseases, other than those from occupational exposure.

Other pollutants may include waste derived from poorly managed landfill sites, visual pollution from mining and widely spread solar farms, noise pollution, stemming from mining and associated activities, water resource pollution caused by mining activities and the threat of fracking and its associated impacts.

As per the PSDF of August 2012, waste and waste management in general is seen as one of the core mandates of municipalities under Schedules 4b and 5b of the Constitution (this makes refuse removal, refuse dumps and solid waste removal a local government matter) and under the White Paper on Integrated Pollution and Waste Management and the Environmental Conservation Act. Provincial government also has responsibility for certain waste issues and therefore indicators to be reported on by the province have also been included. This performance area has been divided into three sub-areas, namely waste generation (data on amount of waste generated in an area), waste services (performance indicators for provision of services), and waste/reduction and management (which includes such issues as recycling, landfill sites, etc.).

3.6.1 Threats

The whole subject of pollution is a threat to ecological, biodiversity, sustainability and human- and animal life. This need to be investigated further, classified according to hazards and likelihood to have a detrimental effect on threatened ecosystems, biodiversity and human health. It is proposed that this need to receive priority attention as if it is left as is, it may further negatively impact on the inherent resilience of the livelihood of the Northern Cape.

3.6.2 Opportunities

Job opportunities can be created in terms of recycling. The increase of available land or then the slower rate of land occupancy by waste landfill sites, due to the reduced waste production and recycling on existing waste dumps.

3.7 LAND COVER

The management of any natural resource requires knowledge of what is where. Of particular value for spatial planning purposes is that land cover places features in relation to each other. The most recent and complete land cover map for the Northern Cape Province is the 2013 – 2014 national land cover dataset (Geoterraimage, 2015). All seventy-two land cover classes of the national dataset occur within the Northern Cape Province. The province can be considered to be relatively uniform in terms of land cover, with 86% of the surface area being covered by only two land cover classes, these being the 'Low shrubland' (61%) and 'Bare none vegetated' (25%) land cover classes. The dominance of these two land cover classes is not surprising considering the associated climate and vegetation types.

For broad scale planning purposes, it is best to simplify the multitude of land cover classes to a few classes that are more meaningful for such purposes. To this extent the seventy-two land cover classes were simplified to 2 classes, natural and transformed. A problematic land cover is 'Bare non-vegetated' which as mentioned accounts for 25% of the surface area and is described to be 'as a result of either natural or man-induced processes'. It is mostly considered to be either 'natural' or 'degraded' but can also include 'transformed areas. However, for the purposes of this report this class was considered to be mostly natural. Considering the latter, 98% of the province is therefore classified as natural with only approximately 2% being transformed.

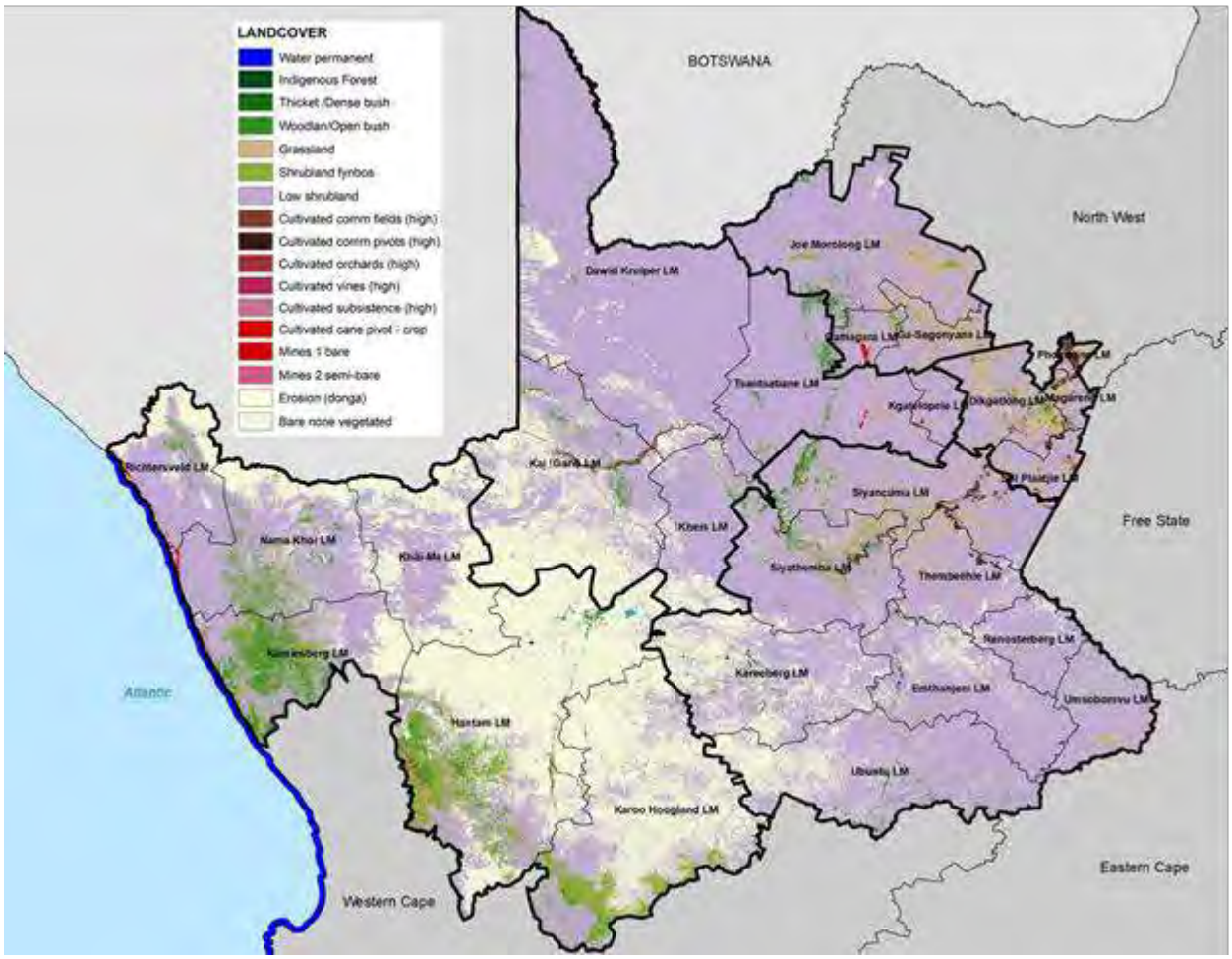


Figure 82: Northern Cape Land Cover, 2014

Table 41: Land cover distribution per group, Northern Cape Province

LAND COVER GROUP	NO HA	%
Forest and Woodland	106527,2	0,3%
Forest	66,50464	0,0%
Thicket & bushland (etc)	5861404	15,7%
Shrubland and low Fynbos	25280298	67,8%
Herbland	240229,2	0,6%
Unimproved grassland	4348711	11,7%
Improved grassland	2373,295	0,0%
Forest plantations	2488,088	0,0%
Waterbodies	60624,59	0,2%
Wetlands	298611,5	0,8%
Barren rock	156307,4	0,4%
Dongas & sheet erosion scars	64101,88	0,2%
Degraded: forest and woodland	0	0,0%
Degraded: thicket & bushland (etc)	365317,9	1,0%
Degraded: unimproved grassland	136492,7	0,4%
Degraded: shrubland and low Fynbos	75677,03	0,2%
Degraded: herbland	0	0,0%
Cultivated: permanent - commercial irrigated	34831,31	0,1%

LAND COVER GROUP	NO HA	%
Cultivated: permanent - commercial dry land	640,7055	0,0%
Cultivated: permanent - commercial sugarcane	0	0,0%
Cultivated: temporary - commercial irrigated	131095,1	0,4%
Cultivated: temporary - commercial dry land	100699,2	0,3%
Cultivated: temporary - semi-commercial/subsistence dry land	5575,498	0,0%
Urban / built-up land: residential	27242,3	0,1%
Urban / built-up land: residential (small holdings: woodland)	95,33274	0,0%
Urban / built-up land: residential (small holdings: bushland)	1129,366	0,0%
Urban / built-up land: residential (small holdings: shrubland)	568,1129	0,0%
Urban / built-up land: residential (small holdings: grassland)	0	0,0%
Urban / built-up land: commercial	1111,104	0,0%
Urban / built-up land: industrial / transport	3947,153	0,0%
Mines & quarries	28917,91	0,1%
TOTAL	**37 335 083,80**	**100%**

4 ATMOSPHERE

4.1 CLIMATE

The weather of the Northern Cape is typically that of desert and semi-desert areas. It is a generally hot and dry region with fluctuating temperatures and generally low rainfall. Evaporation levels exceed the annual rainfall which varies between 50mm and 400mm (the average annual rainfall over the province is 202mm). The western areas of the province, which include Namaqualand, portions of Boesmanland, and small areas of the Green Kalahari, receive rainfall during the winter months (April to September).

The Benguela current plays a very important role in Namaqualand's climate, with onshore winds blowing over the cold, up-welled waters of the Atlantic Ocean ensuring that summer temperatures are seldom extreme, ranging from 25-35°C. Along the coastline, temperatures reach 25°C in summer. Winter temperatures range between 5°C and 15°C. Frost occurs in the high-laying regions with snow occasionally falling in the Kamiesberg uplands region. The fog that blankets much of Namaqualand is a phenomenon that occurs frequently during the autumn months when onshore wind speeds are not strong enough to produce the turbulence that breaks up the fog. The fog is an important alternative source of moisture for the plants and various animal species and fulfils a vitally important function in the ecology of the Richtersveld

The central, northern and eastern parts of the province receive rain primarily during the summer months (December to February). Summer temperatures often exceed 40°C in most of the province. Temperatures as high as 48°C have been recorded along the Orange River. During winter (especially in June and August), average day temperatures are mild (approximately 22°C). Night temperatures often drop below 0°C. In winter, snow falls in the Kamiesberg, the Hantam and Roggeveld mountains and, in particular, at Sutherland. This town lies at an altitude of 1 500m above sea level and is one of the coldest settlements in Southern Africa with winter temperatures often being as low as -10°C. The portions of the Northern Cape that border on the Orange River and Namibia have the highest solar radiation intensity in the world (State of the Environment Report (SOER, 2005).

4.1.1 Northern Cape atmospheric conditions and pollution levels

Current atmospheric conditions within the Northern Cape, are relatively stable due to the sparse distribution of polluting industries. The main anthropogenic sources of ambient particulate matter (PM) in the Northern Cape, are the mining industry and the scheduled processes. The pollution 'hot spots' will therefore be associated with these activities. The industries that negatively impact the air quality levels and pose risks to inhabitants are as follow:

- Unrehabilitated asbestos mines;
- Active underground and surface mines (mainly due to dust etc, dispersed by wind); and
- Intensive agriculture (aerosol pesticides used on crops).

The main industries with scheduled processes in the Northern Cape are those indicated in Table 42**.** These industries reported directly to the dedicated pollution control officer at DEAT in 2004.

Table 42: Main industries with scheduled processes in the Northern Cape Province[62]

LOCATION	INDUSTRY TYPE	POLLUTANT TYPE
Ulco - on the road to Lime Acres	Cement factory	Emits mainly PM, Stack monitoring conducted by factory
Lime Acres and Daniëlskuil	Lime factories	Emits mainly PM, Stack monitoring conducted by both factories
Postmasburg	Foundries (2) Brickworks	Emits mainly PM, Emits PM, SO_2 and CO
Kimberley	Brickworks (closed oven) Foundry	Emits PM, SO_2 and CO, Emits mainly PM
Olifantshoek	Brickworks	Emits PM (Particulate matter) SO_2 and CO
Kuruman Warrenton	Medium incinerators	Emits mainly acidic gases and PM
Upington	Crematorium Medium incinerator Carcass incinerator	Emit mainly acid gases and PM
Near Mamatwan (about 60 km north west of Kuruman)	Sinter plant	Emits PM Sinter plants have bag filters to prevent emissions of PM

Accurate, up to date and detailed data is limited due to isolated, uncoordinated or non-existent air quality monitoring systems on municipal, district and provincial levels within the Northern Cape. A provincial wide air quality survey/study will be conducted in 2018 and will provide crucial information on the current air quality levels and the main contributors to air pollution within the Northern Cape, which may inform future policy regarding the regulation/mitigation of polluting industries.

4.2 CLIMATE CHANGE

Climate change as defined in the Disaster Management Act, 57 of 2002, is: "a change in the state of the climate that can be identified by changes in the variability of its properties in relation to natural systems, the process of adjustment to actual climate and its effects; that persist for an extended period, typically decades or longer."

[62] *(DEAT, 2005)*

As the Northern Cape climate is already defined as semi-arid to arid, it is increasingly vulnerable to climate changes which will result in greater risk of experiencing severe drought as well as negative implications regarding food security, water availability for agriculture and human use.

It is important to realise that climate change is not to take place only through changes in average temperature and rainfall patterns, but also through changes in the attributes of extreme weather events. The following forecast were obtained from EnviroTech (2016:3), which conducted a study regarding the influence of Climate change on the Northern Cape, through the use of the CCAM (*conformal-cubic atmospheric model developed by the CSIRO the Commonwealth Scientific and Industrial Research Organisation*). The model solves the hydrostatic primitive equations using a semi-implicit semi-Lagrangian solution procedure and includes a comprehensive set of physical parameterizations.

4.2.1 Temperature

For the near future (2020-2050), the projections are indicative of increases in temperature of between 1°C and 3°C under low mitigation. The north-eastern part of the province it is expected to warm the most with 3°C temperature increases being plausible.

- In association with a drastic increase in temperatures the number of very hot days in the Northern Cape is also projected to increase drastically;
- Under the low mitigation scenario increases in the number of hot days of between 30-60 days per annum are projected; with the highest increases projected for the northern parts of the province;
- Under high mitigation the number of heat-wave days is projected to increase by about 10 events per year. The largest increases are projected for the northern parts of the province; and
- Under the low mitigation scenario, the number of heat wave days may increase by as many as 20 events per year. Such a drastic increase in the number of heat wave days may have impacts on the health of people and animals in the province, through the increased occurrence of these oppressive temperature events.

4.2.2 Increase of fire risk days

- In association with the drastic increase in temperatures and heat waves in the area, the high fire danger days are also expected to increase significantly over the Northern Cape;
- Under low mitigation the period 2020-2050 is projected to experience an increase in the number of high fire danger days. The increase is projected to be between 30 and 60 days per year in the north-eastern parts of the province, where the burning potential is also the highest.

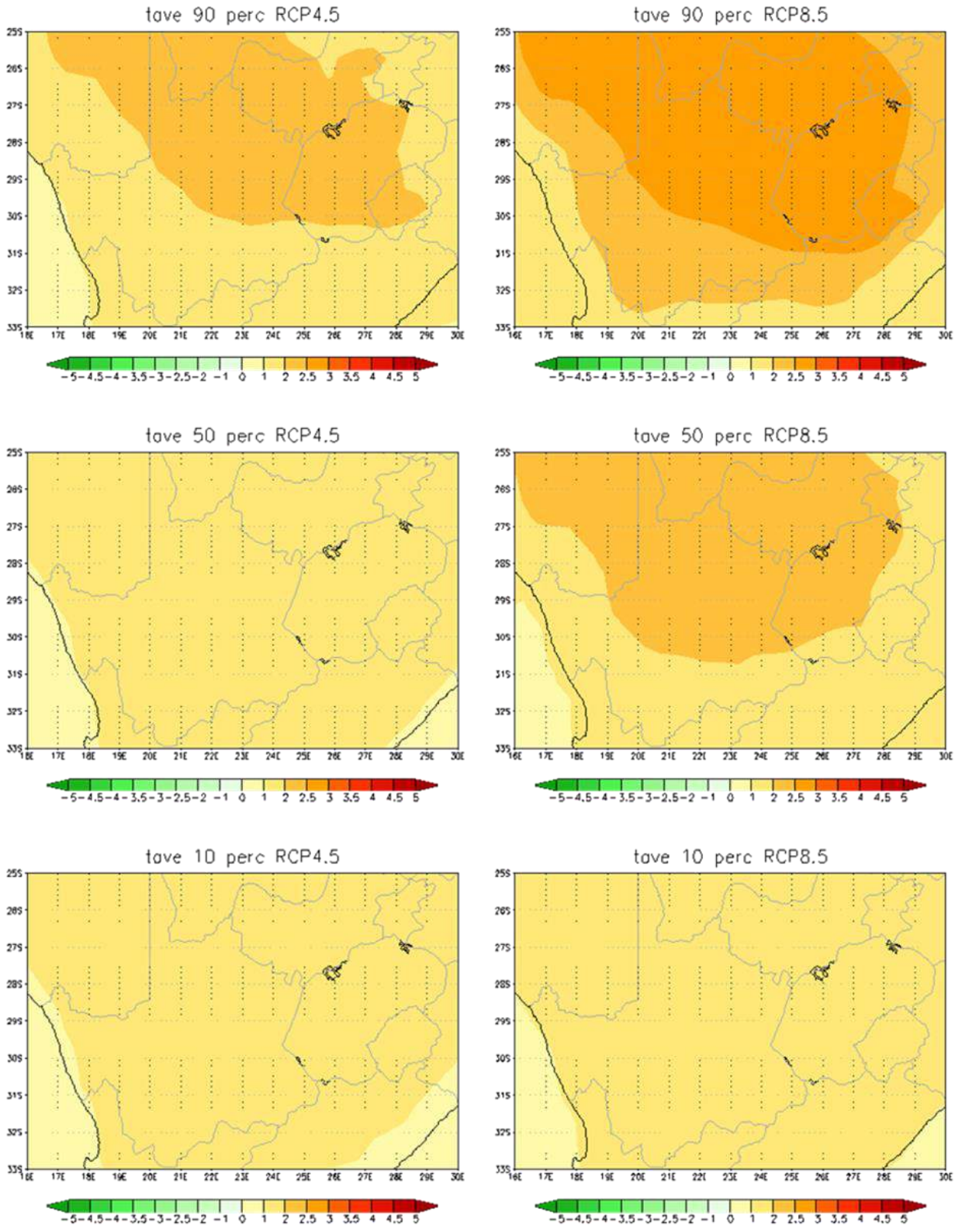


Figure 83: The CCAM projected change in the annual average temperature (°C) over the Northern Cape for the timeframe from 2020-2050

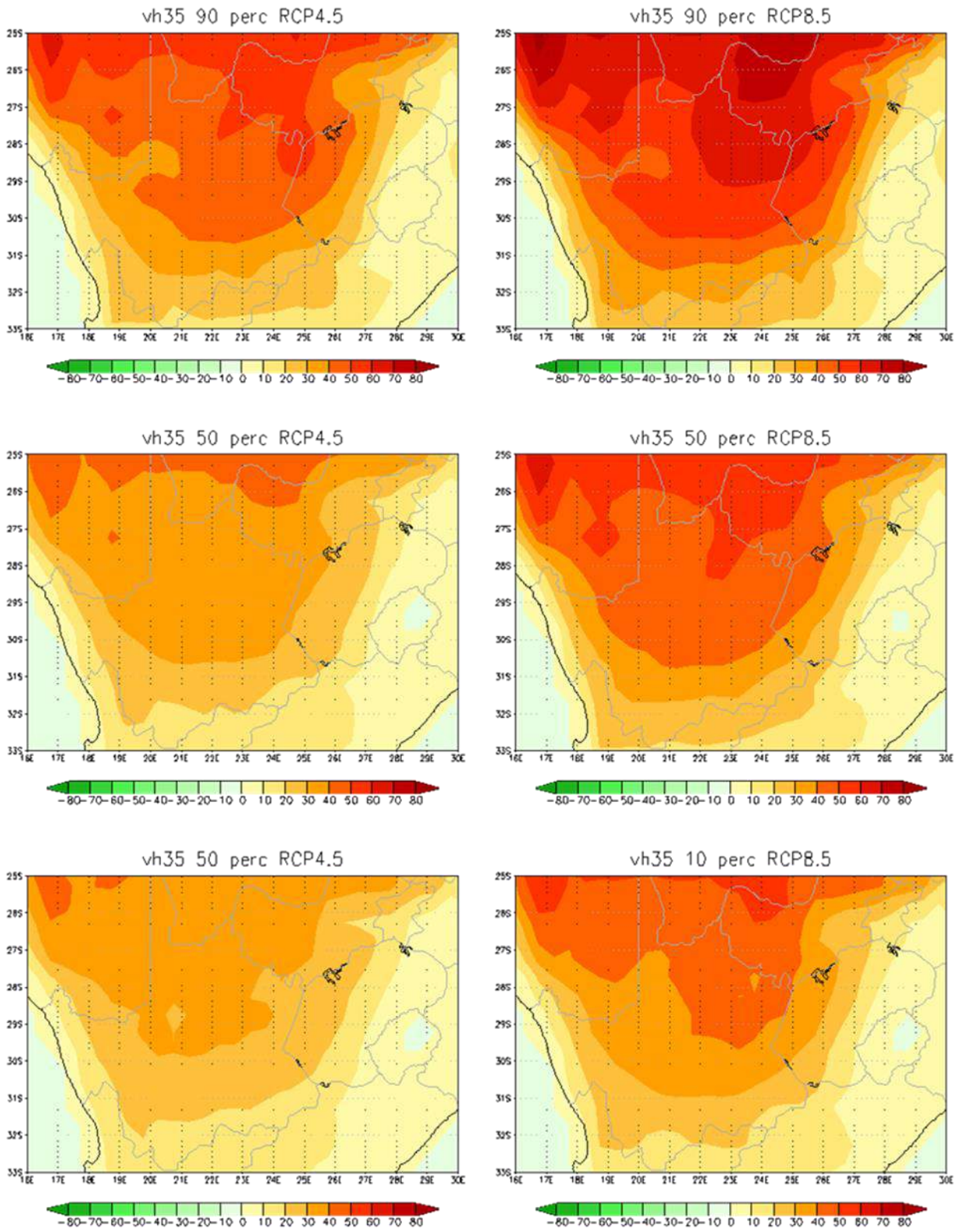


Figure 84: The CCAM projected a change in the annual average number of very hot days (units are days per grid point per year) over the Northern Cape

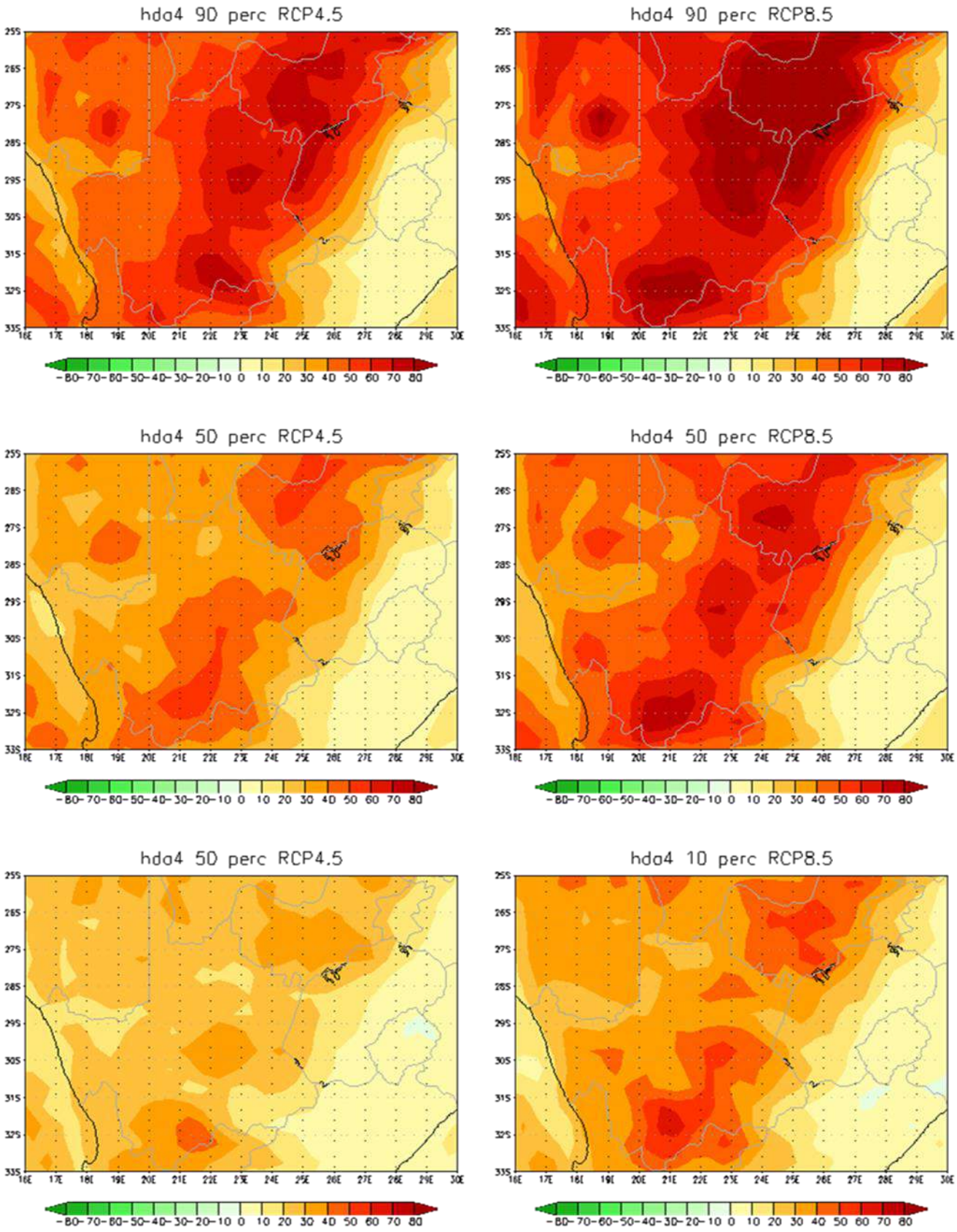


Figure 85: The CCAM projected change in the annual average number of high fire-danger days (units are number of days per grid point per year) over the Northern Cape

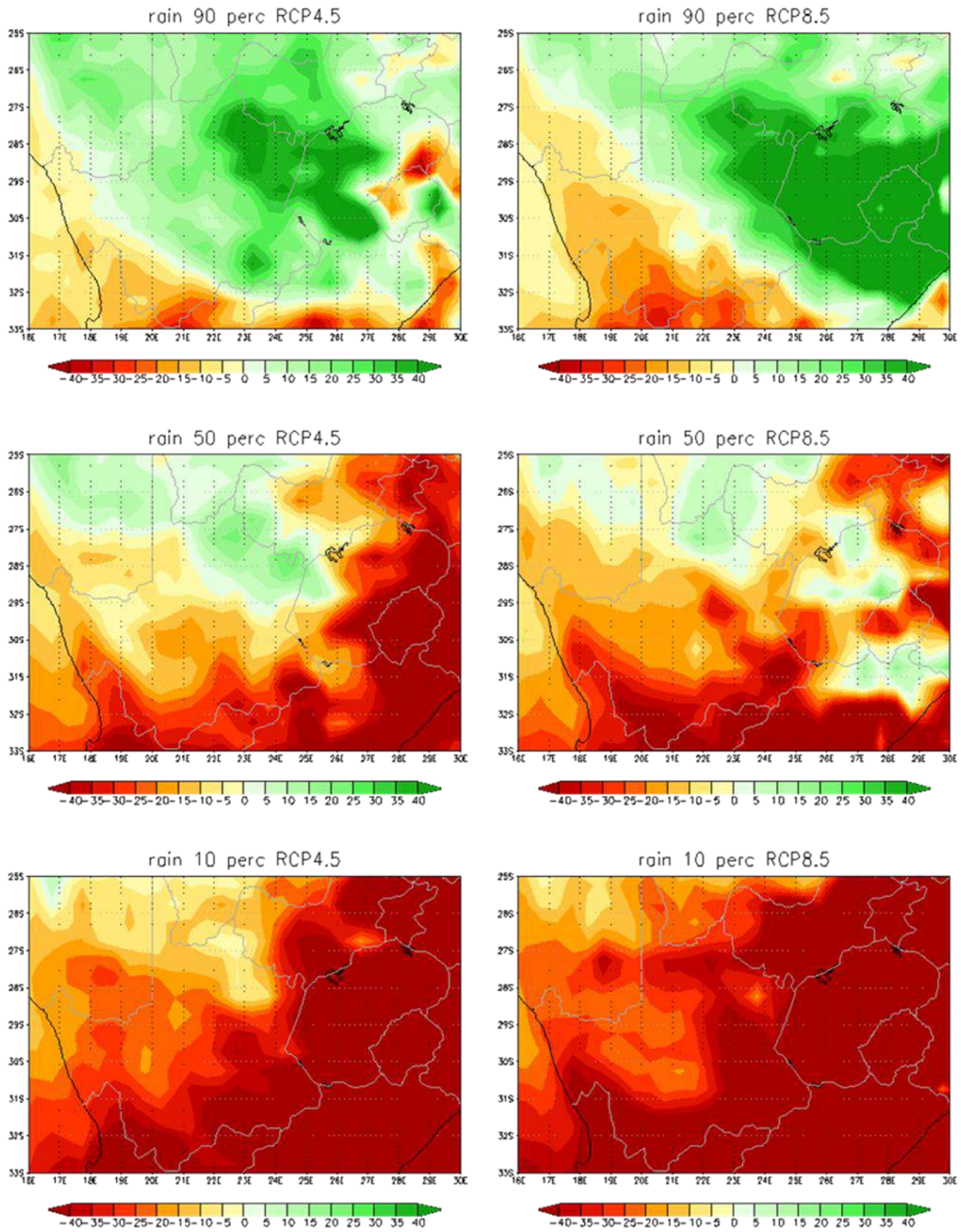


Figure 86: The CCAM projected change in the annual average number of high fire-danger days (units are number of days per grid point per year) over the Northern Cape

Error! Reference source not found. (see previous page) refers to the CCAM (conformal-cubic atmospheric model) projected change in the annual average temperature (°C) over the Northern Cape for the timeframe from 2020-2050 relative to 1971-2000. The 10th, 50th and 90th percentiles are shown for the ensemble of downscalings of six GCM projections under RCP4.5 (left) and RCP8.5 (right).

Figure 84 *(see previous page) refers to the CCAM projected through a change in the annual average number of very hot days (units are days per grid point per year) over the Northern Cape for the time-slab 2021-2050 relative to 1971-2000. The 10th, 50th and 90th percentiles are shown for the ensemble of downscalings of six GCM projections under RCP4.5 (left) and RCP8.5 (right).*

Figure 85 *represents the (see previous page) CCAM projected change in the annual average number of high fire-danger days (units are number of days per grid point per year) over the Northern Cape for the time-slab 2021-2050 relative to 1971-2000. The 10th, 50th and 90th percentile are shown for the ensemble of downscalings of six GCM projections under RCP4.5 (left) and RCP8.5 (right).*

Figure 86 *represents (see previous page) the CCAM projected change in the annual average rainfall totals (mm) over central South Africa, covering Northern Cape for the time-slab 2020-2050 relative to 1971-2000. The 10th, 50th and 90th percentiles are shown for the ensemble of downscalings of six GCM projections under RCP4.5 (left) and RCP8.5 (right).*

4.2.3 International policies and agreements

Various international agreements and frameworks have been developed in order to limit the effects of climate change and variability over the years, as indicated by the list below.

- **Paris Agreement**
- Kyoto Protocol;
- COP21;
- COP22; and
- Sendai Framework

These agreements have the following obligations and requirements for a country according to the Catholic Parliamentary Liaisons Office, (2016:2) and Grist (2017):

- Holding temperature increases to 'well below 2°C above pre-industrial levels' and further pursuing efforts to limit temperature increases to 1.5°C above pre-industrial levels;
- Increasing countries' ability to adapt to the effects of climate change and to foster climate resilience;
- Encouraging low GHG emissions development that does not compromise food production.
- Making finance flows consistent with a pathway towards low GHG emissions and climate resilient development;
- Reaching a peak in GHG emissions 'as soon as possible' while recognising that the timeframes for achieving this will differ between developed and developing countries;
- Achieving carbon neutrality from 2050 onwards;
- The mobilisation of financial resources and capacity building to implement nationally determined contributions (NDCs);
- Ensuring that there is institutional memory for various reporting cycles (reporting will be done every five years); and

- Ensuring that there are adequate institutional arrangements for planning, preparing and submitting NDCs every five years.

4.2.3.1 The Paris Agreement

The Paris Agreement is universally regarded as a seminal point in the development of the international climate change regime under the United Nations Framework Convention on Climate Change (UNFCCC). The Paris Agreement was adopted on 12 December 2015 at the 21st session of the Conference of the Parties to the UNFCCC CoP21, held in Paris from 30 November to 13 December 2015. The Agreement was adopted after four years of intense negotiations mandated by the 17th UNFCCC CoP held in Durban in 2011. The Agreement is a comprehensive framework which will guide international efforts to limit greenhouse gas emissions and to meet all the associated challenges posed by climate change. It signals the change in pace towards the low carbon development from 2020 onwards through commitments of countries in ambitious national plans called Nationally Determined Contributions. 30 This outcome recognises that climate change represents an urgent threat to human societies and the planet, requiring the widest possible cooperation by all countries and other stakeholders. The main objective of the Agreement is to limit the global temperature increase to well below 2 degrees Celsius, while pursuing efforts to limit the increase to 1.5 °C. South Africa is a signatory to the Paris Agreement and has an obligation to limit temperature increases to 1.5°C, above pre-industrial levels. The Paris Agreement is also an important tool in mobilising finance, technological support and capacity building for developing countries, and will also help to scale up global efforts to address and minimise loss and damage from climate change and increase climate resilience.

Table 43: Climate change adaptation obligations according to the Paris Agreement

ELEMENT	GOALS FOR THE PERIOD OF 2020-2030	APPROACHES
Adaptation objectives and planning for implementation	1. Develop a National Adaptation Plan, and begin operationalisation as part of implementing the NCCRP for the period from 2020 to 2025 and for the period 2025 to 2030	National Development Plan Vision 2030, sector plans and any future variants thereof are the underpinning foundation for sustainable development planning in South Africa. The NCCRP provides guiding principles and will form the basis for the integrative NAP focused on vulnerable sectors and geographic vulnerabilities.
	2. Take into account climate considerations in national development, sub-national and sector policy frameworks for the period 2020 to 2030	Integrate flexible adaptation sector policies and measures into national and sub-national policy frameworks to enable implementation of climate change adaptation programmes and projects. Sector adaptation plans will be integrated into broader sector plans consistent with relevant sector planning or regulatory legislation.
	3. Build the necessary institutional capacity for climate change response planning and implementation for the period 2020 to 2030	National and sub-national policy and legislation development and budget reprioritisation to enable institutional capability to plan and implement catalytic adaptation programmes and projects. Comprehensive adaptation related training of development planners, regulators and practitioners.

ELEMENT	GOALS FOR THE PERIOD OF 2020-2030	APPROACHES
		Specific adaptation planning at sub-national level, taking into account specific or unique geographical circumstances, will be integrated into sub-national development frameworks, land use schemes and the planning authorisation system in terms of provisions of and standards set in the Spatial Land Use.
	4. Develop an early warning, vulnerability and adaptation monitoring system for key climate vulnerable sectors and geographic areas for the period 2020 to 2030, and reporting in terms of the National Adaptation Plan with rolling five-year implementation periods	Development of national framework for early warning, vulnerability and needs assessment well before 2020. Develop and support a climate change early warning and vulnerability network with the involvement of relevant stakeholders, e.g. SA Weather Services, SA Earth Observation Network, the downscaling modelling and adaptation academic community etc.
Adaptation needs and costs	5. Development of a vulnerability assessment and adaptation needs framework by 2020 to support a continuous presentation of adaptation needs	Biennial study of climate related impacts and responses (detect through the early warning, vulnerability and adaptation monitoring system), with a view to determine cost effectiveness of responses and recommend improved or alternative responses. Damage costs associated with severe climate related events (wild fires, storms, droughts and floods), including both direct and downstream costs were estimated for the present-day climate and for the near future under low and moderate-high mitigation scenarios. Annual costs were estimated for 2020-2030 and 2020-2050 Sectors to be covered; Water, Agriculture, Forestry, Energy, Settlements, Biodiversity, Disaster Risk Reduction (DRR)
Adaptation investments	6. Communication of past investments in adaptation for education and awareness as well as for international recognition	Development and implementation of a climate change adaptation communication, education and awareness framework, with a view to drive behaviour change based on the early warning and vulnerability assessments and studies of response effectiveness. Specific indicators for tracking outcomes and scale of domestic investment and any international support will be developed and reported. Adaptation investments were gleaned from official annual reports. The years covered are 2010 – 2015.

Source: Department of Environmental Affairs, (2015: 6-8).

In order to measure the implementation and effectiveness of the adaptation strategies and mechanisms as required by the Paris Agreement, the table below provides insight to approaches of monitoring progress of the effectiveness of mitigation interventions.

ELEMENT	APPROACH
Reference and starting point	● Peak, plateau and decline (PPD) is an emissions trajectory after mitigation. ● The starting point for PPD is 2016.
Time frames and/or periods for implementation	● The time-frames are 2025 (firm), 2030 (indicative) and 2050 (aspirational). ● The trajectory range is consistent for 2025 with 42% deviation below business as usual emissions growth trajectory. By specifying that 2030 is an indicative range, SA retains flexibility to define a single number for 2030 in future. ● The INDC reflects SA‟s full mitigation potential. SA envisages five-year periods of implementation at the national level for policy instruments under development, including a carbon tax, desired emission reduction outcomes (DEROs) for sectors, and company-level carbon budgets. ● Implementation periods are expected to be 2016-2020, 2021-2025, etc. Currently South Africa's aspiration for the long-term is that total annual GHG emissions will be in the range of 212 to 428 Mt CO_2–eq by 2050, having declined in absolute terms from 2036 onwards. ● The long-term is important as a policy signal, but South Africa reserves the right to adjust the long-term goal in its national policy, as further information becomes available on, inter alia, the science, what others are doing, technologies available, socio-economic implications, opportunities in the low-carbon economy, as well as the outcomes of the 2015 Agreement.
Scope and coverage	● Economy-wide, all sectors, six greenhouse gases (GHGs), with a material focus on three GHGs: carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). IPCC identified the following major categories with regards to sources of the abovementioned emissions: energy, IPPU, waste and AFOLU (agriculture, forestry and other land use). Increased disaggregation over time enabled through reporting by the private sector.
Planning processes, assumptions and methodological approaches including those for estimating and accounting for anthropogenic greenhouse gas emissions and, as appropriate, removals	● Planning processes:The approach to the current INDC is based on national climate policy (NCCRWP) and national development plan (NDP). Legislation related to climate policy and a carbon tax that is under consideration and will require approval by Parliament.
	● Assumptions: The INDC assumes the finalisation of an ambitious, fair, effective and binding multilateral agreement under the UNFCCC and its Kyoto Protocol at COP 21 and CMP 11 in Paris that further elaborates these commitments. With this said, it also includes the assumption that developing countries will place more emphasis on economic and social development with the goal of poverty eradication. ● This level of effort will enable South Africa's greenhouse gas emissions to peak between 2020 and 2025, plateau for approximately a decade and decline in absolute terms thereafter.
	● PPD range: South Africa's national climate change response white paper (policy approved by Cabinet) "details the „peak, plateau and decline trajectory‟ used as the initial benchmark against which the efficacy of mitigation actions will be measured". ● This is the PPD trajectory range in the INDC. Values for key years are specified in the NCCRWP. Initial detailed studies of mitigation potential (2007) informed the above, with abase year 2003 for projections; these have been updated (2014; base year 2010), with the intention of on-going updating and improvement. ● On-going assessment of mitigation potential and its realisation will enable South Africa to move from mitigation potential to implementation.
	● Methodologies for Estimating Emissions: ● 2006 IPCC guidelines Metric applied: 100-year Global Warming Potential, as in the IPCC's 4thAssessment Report (AR4). Note that the current GHG inventory, consistent with the

ELEMENT	APPROACH
	2006 IPCC guideline reporting requirements used GWPs from the Third Assessment Report (TAR) and indicated that future inventories will use GWP values from AR4. ● Approach to AFOLU: Agriculture, forestry and other land use (AFOLU) is included as one of the major IPCC category. The greater uncertainty in AFOLU emissions should be noted, as well as the intention to reduce uncertainty over time

Source: Department of Environmental Affairs, (2015: 8-10)

The Northern Cape is a key stakeholder with regards to the Paris Agreement requirements and goals as discussed in the above tables, mainly due to two aspects:

- its high level of vulnerability with regards to climate change, and
- the suitability of the Northern Cape regarding the production of renewable energy as the high level of solar radiation is ideal for solar energy generation, as it will also aid the reduction of carbon emissions from energy production, thus aiding in the lowering of the overall national emission levels.

The Northern Cape will play a key role with regards to the implementation and monitoring of climate change adaptation and mitigation goals and targets, which will need funding and expertise to be provided from national government entities as well as from potential international partnerships as agreed upon with the signing and ratification of the Paris Agreement.

4.2.3.2 Sendai Framework for Disaster Risk Reduction 2015-2030

The Sendai Framework is a 15-year voluntary, non-binding agreement which recognizes that the State has the primary role to reduce disaster risk but that responsibility should be shared with other stakeholders including local government, the private sector and other stakeholders. It aims for the following outcome: “The 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”. The framework consists of seven targets and four priorities for action.

The Seven Global Targets

- Substantially reduce global disaster mortality by 2030, aiming to lower 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 average global figure per 100,000 in the decade 2020 -2030 compared to the period 2005-2015;
- Reduce direct disaster economic loss in relation to 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 to developing countries through adequate and sustainable support to complement their national actions for implementation of this Framework by 2030; and

- Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030.

The Four Priorities for Action Priority:

- Understanding disaster risk Disaster risk management should be based on an understanding of disaster risk in all its dimensions of vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment. Such knowledge can be used for risk assessment, prevention, mitigation, preparedness and response.
- Strengthening disaster risk governance to manage disaster risk Disaster risk governance at the national, regional and global levels is very important for prevention, mitigation, preparedness, response, recovery, and rehabilitation. It fosters collaboration and partnership.
- Investing in disaster risk reduction for resilience Public and private investment in disaster risk prevention and reduction through structural and non-structural measures are essential to enhance the economic, social, health and cultural resilience of persons, communities, countries and their assets, as well as the environment.

Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction the growth of disaster risk means there is a need to strengthen disaster preparedness for response, take action in anticipation of events, and ensure capacities are in place for effective response and recovery at all levels. The recovery, rehabilitation and reconstruction phases provide a critical opportunity to build back better, including through integrating disaster risk reduction into development measures.

4.3 SOLAR RADIATION

A key environmental phenomenon which represents an important potential comparative economic advantage is the high occurrence of sunny days and the regular occurrence of strong wind (especially the on-shore winds along the coastline) both of which could be source of energy. The wind region, especially along the coast, is suitable for sustainable electricity generation[63].

Currently the Northern Cape Province is seen as the preferred location for solar projects, as it receives the highest radiation levels within South Africa, as depicted in the figures below. The portions of the Northern Cape that border on the Orange River and Namibia have some of the highest solar radiation intensity in the world (State of the Environment Report (SOER[64], 2005) thus making it suitable for solar energy projects, which provides an enormous comparative economic advantage. Refer to Figure 87: Direct Normal Irradiation (DNI) – South Africa (page 232).

[63] *The upper limit of wind energy available to be captured in South Africa is estimated at 3 GW. Taking a conservative estimate of 30% conversion efficiency and 25% capacity factor, it is estimated that wind power could supply at least 1% of South Africa's projected electricity requirements (19 800 GWh) in 2002. This excludes the offshore wind energy potential which should also be assessed (White Paper of Renewable Energy, 2003).*

[64] *SOER – Refers to the Northern Cape State of the Environment Report 2004 - Atmosphere and Climate Specialist Report approved in 2005*

4.3.1 Solar energy potential

With the estimated increase in dry-spell days for the Northern Cape, as stipulated in the climate change study[65], by EnviroTech for the Department of Environmental Affairs in 2016, that it is to be expected that the radiation levels will increase which may increase the overall capability and feasibility for solar farming within the Province. Furthermore, it will also result in larger areas within the Northern Cape to be suitable for solar projects.

As the costs associated with renewable energy such as solar decreases, so does the potential for the Northern Cape Province increase to become the market leader and main market share holder regarding the production and provision of renewable energy for South Africa.

Table 44: Solar farms/projects in the Northern Cape Province

SOLAR PROJECT/FARM	CAPACITY	CLOSEST SETTLEMENT	LOCAL MUNICIPALITY
Kaxu Solar One	100MW	Pofadder	Khai-ma
Khi Solar One	75MW	Upington	Dawid Kruiper
Xina Solar One	100MW	Pofadder	Khai-ma
De Aar	90MW	De Aar	Emthanjeni
Bokpoort	50MW/h	Groblershoop	!Kheis
Jasper (Kathu Solar Park)	100MW	Kathu	Gamagara
Lesedi (Kathu Solar Park)	75MW	Kathu	Gamagara
Redstone (Kathu Solar Park)	100MW	Kathu	Gamagara
Droogfontein	50MW	Kimberley	Sol Plaatje

[65] *Climate Change Model Projections for the Northern Cape Province, prepared by Dr Chartiy Mbileni - NM Envirotech Solutions (Pty) Ltd for GIZ and Department of Environmental Affairs – 2016*

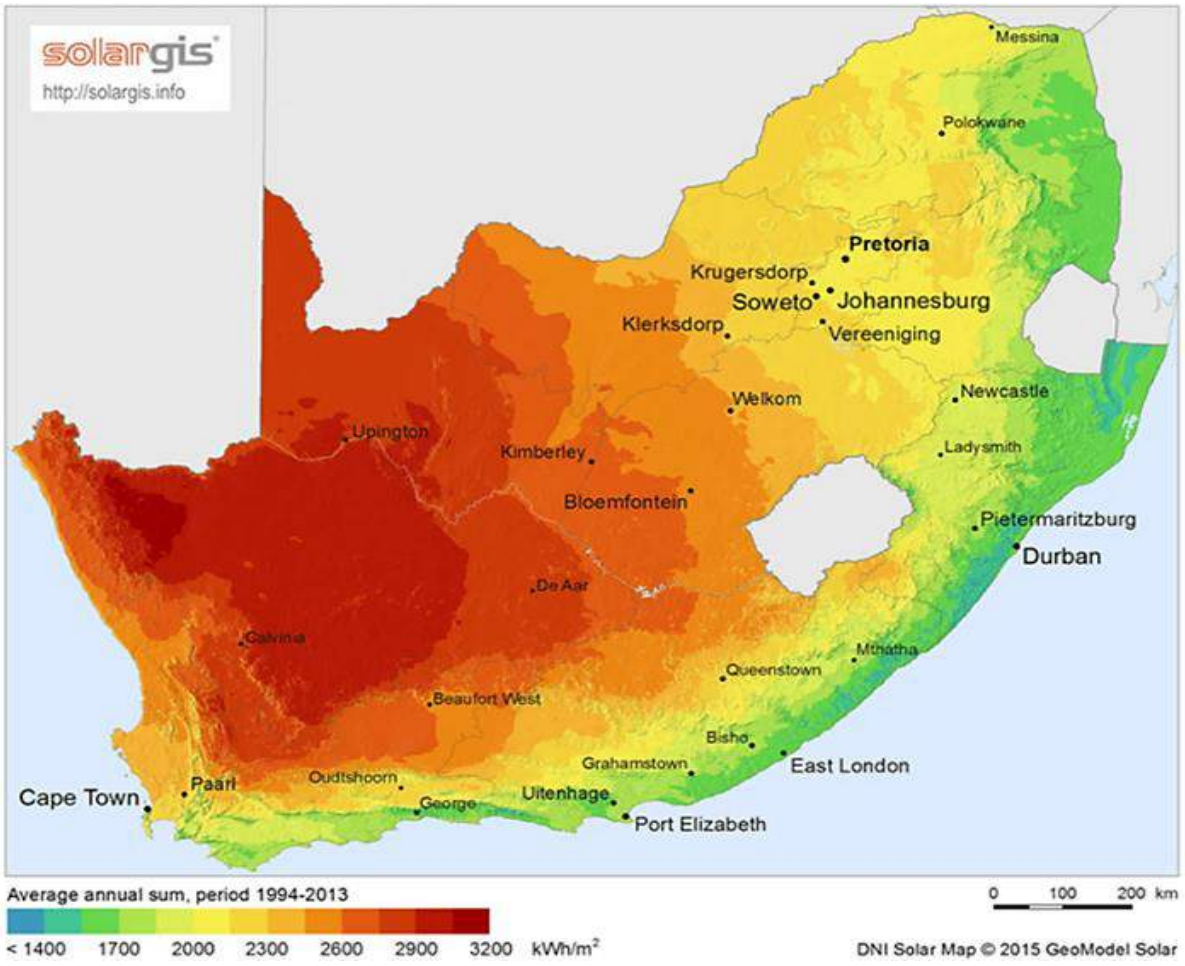


Figure 87: Direct Normal Irradiation (DNI) – South Africa[66]

The portions of the Northern Cape that border on the Orange River and Namibia have the highest solar radiation intensity in Southern Africa (SOER, 2011). The map above illustrates the measured annual direct and diffuse solar radiation of the Northern Cape in context of the country as a whole.

4.3.2 Health Risks associated with solar radiation

The increased radiation levels will also increase health risks associated with high levels of sun and radiation exposure. The higher levels of solar radiation will likely result in increased number of skin cancer cases, which may need more attention from the Health Department regarding awareness campaigns as well as other prevention methods.

4.3.2.1 Cancers:

Sun exposure is the major environmental risk factor for melanoma and for the non-melanoma skin cancers (NMSCs), basal cell carcinoma (BCC) and squamous cell carcinoma (SCC). The lifetime risk of

[66] source: www.solargis.com

these tumours is low in those with black skin and highest in those with fair skin, estimated at a difference of up to 60-fold.

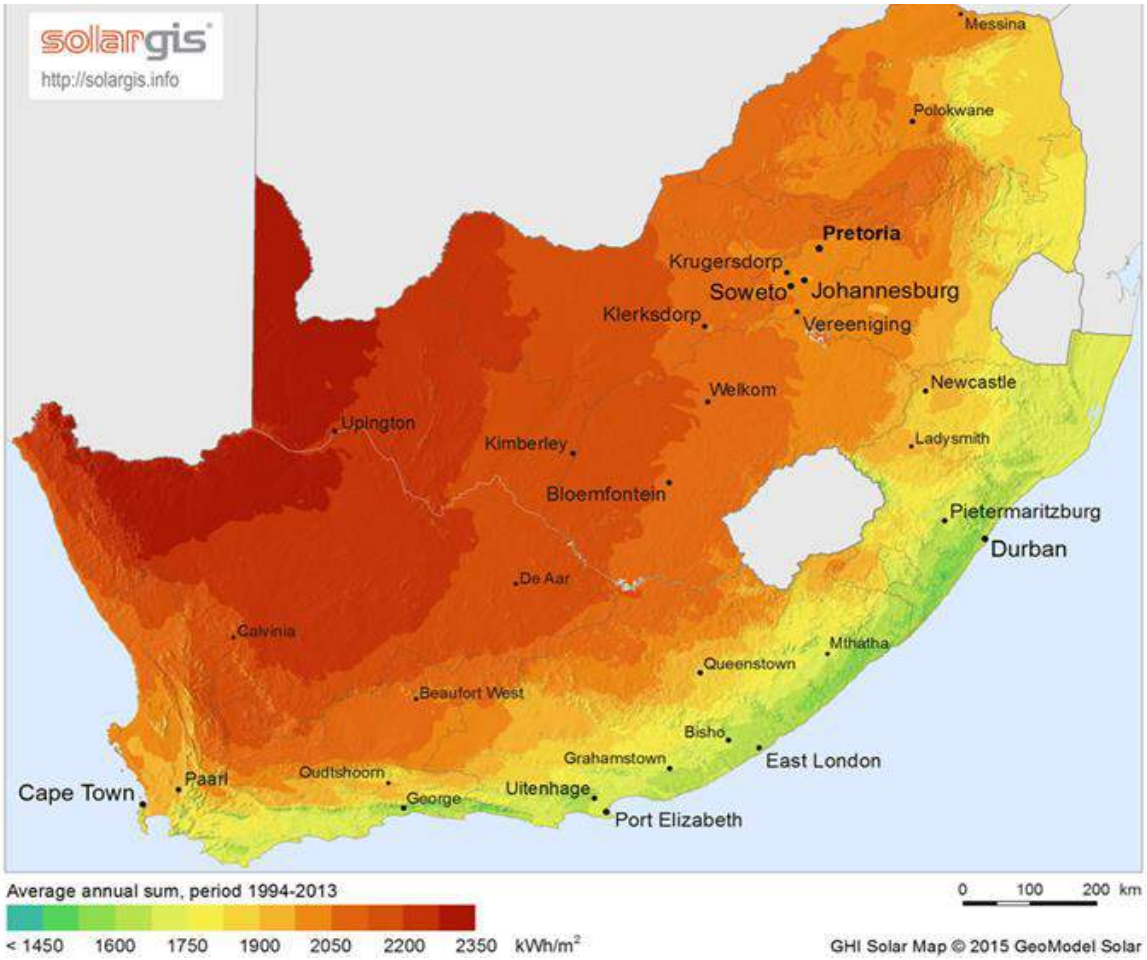


Figure 88: Global horizontal irradiation (GHI) – South Africa

4.3.2.2 Melasma:

Melasma is an uneven hyperpigmentation which appears as dark, macular, pigmented patches on the face. The cause of melasma is complex – genetic, hormonal, therapy and lifestyle-related contributions are implicated, as is sun exposure. For example, 51% of patients reported sun exposure as a triggering factor and 84% reported sun exposure as an aggravating factor in a study based in Tunisia, with a high lifetime sun exposure increasing the risk of severe melasma threefold.

4.3.2.3 Eye conditions:

There is a range of eye diseases associated with sunlight exposure – ophthalmohelioses. These diseases include photoconjunctivitis, photokeratitis and activation of ocular herpes simplex virus following acute exposure to solar UVR, and NMSCs of the lid and conjunctiva, ocular melanoma, pinguecula (local degeneration of conjunctiva), pterygium (inflammation, proliferation and invasive growth on conjunctiva and cornea), climatic droplet keratopathy (epithelial degeneration), age-related cataracts and possibly age-related macular degeneration following chronic exposure to solar UVR.

5 HYDROSPHERE

King et al (2009) states that 'water is considered one of the most essential natural resources. Due to the nature of water resources and the importance of water for the perpetuation of life, interventions through supply or demand management are required in order to meet social and economic goals such as economic efficiency, equity, environmental impacts, fiscal impacts, political and public acceptability, sustainability and administrative feasibility. The Northern Cape Province is the driest Province in South Africa with an average annual rainfall of about 200 mm. The scarcity of water resources is a defining feature of this arid environment. The Orange River with its tributaries is the main source of surface water in the Province. Ground water plays an important part in the region, especially in settlements far removed the Orange River and other small rivers, however, the quality and quantity of ground water varies. The western part of the Northern Cape borders on the Atlantic Ocean and these marine resources play an integral role in the economy, environment and climate of the Province.

Water of acceptable quality is necessary for the improvement of the quality of life and is essential for the maintenance of all forms of life. The availability of water for various uses is directly related to the management of water quantity, quality and/or the elimination of diseases. The Benguela current plays a very important role in Namaqualand's climate, with onshore winds blowing over the cold, up-welled waters of the Atlantic Ocean. Along the coastline, temperatures reach 25°C in summer. Winter temperatures range between 5°C and 15°C. Frost occurs in the high laying regions with snow occasionally falling in the uplands region. The fog that blankets much of Namaqualand is a phenomenon that occurs frequently during the autumn months when onshore wind speeds are not strong enough to produce the turbulence that breaks up the fog. The fog is an important source of moisture for the plants and various animal species and fulfils a vitally important function in the ecology of the Richtersveld. A key environmental phenomenon which represents a further potential comparative economic advantage is the regular occurrence of strong winds (especially the on-shore winds along the coastline) which could be a source of alternative energy. The wind regime, especially along the coast, is suitable for sustainable electricity generation.

5.1 COASTAL ZONE

The coastal region in the Northern Cape Province extends over 3 municipalities within the Namakwa District Municipality, namely Kamiesberg; Nama Khoi; and Richtersveld, and stretches over 313 kilometres of coastline. The two regional fishing nodes in the Northern Cape are at the towns of Port Nolloth and Hondeklipbaai.

The scarcity of fresh water is an obstacle to development, due to the low level of rainfall received by the coastal region. In addition, the soil along the coast is generally of a very poor quality and limits the potential for agriculture in the area.

The Northern Cape does not only have an abundance of diamond deposits onshore, but also in coastal and marine deposits. This has led to the development of a large diamond mining sector, which has become the dominant activity of the Northern Cape's coastal zone. Diamond deposits are so extensive along the coast that mining companies hold the mineral rights and diamond concession areas covering most of the coast.

The overall picture of the marine and coastal environment is one of a dry, sparsely populated area dominated by diamond mining activities. This picture does not reveal the potential of the area for significant fishing and mariculture development and eco-tourism opportunities. The Northern Cape coast is affected by the cold nutrient-rich Benguela Current system and thus has rich marine and coastal resources. As a result, alternative activities supported along the coast albeit to a limited degree include fishing, mariculture and tourism.

5.1.1 South Africa's Exclusive Economic Zone (EEZ)

The planning domain for this study covers the South African coastline (from the Orange River mouth in the west to Ponta do Ouro in the east), and that part of the Atlantic and Indian Oceans that fall within South Africa's Exclusive Economic Zone (EEZ). The EEZ is defined as "an area, not exceeding 200 nautical miles from the baselines from which the breadth of the territorial sea is measured, subject to a specific legal regime established in the United Nations Convention on the Law of the Sea under which the coastal state has certain rights and jurisdiction" (IHO Dictionary, S-32, 5th Edition).The Northern Cape coast line stretches 313km from the Namibian border up to the Western Cape provincial border.

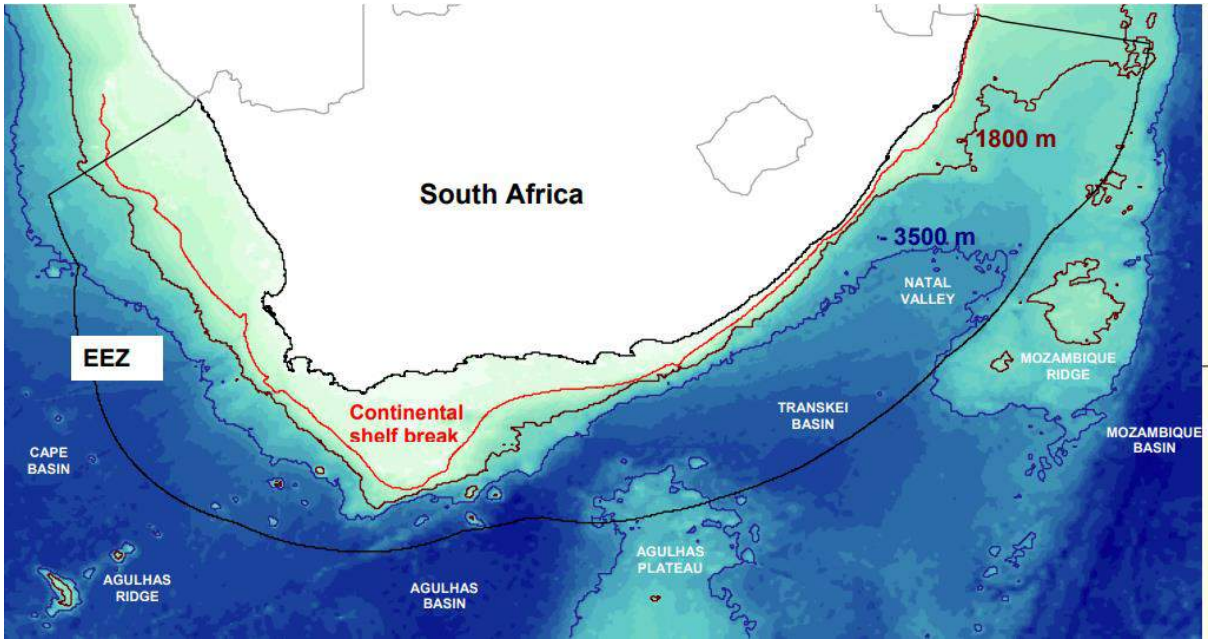


Figure 89: Offshore bathymetry of the South African EEZ. The continental shelf break is shown in red, and the 1800m and 3500m isobaths are shown in brown and blue respectively

5.1.2 Habitat classification

The marine environment is classified hierarchically in order to give clarity to the terminology used. The rationale behind the classification is as follow:

5.1.2.1 Bioregions

Subdivisions are based on large-scale biological variability and biogeography, plus large-scale habitat differences related to different current systems with different temperatures and productivity. Both inshore and offshore bioregions are covered under bioregions.

5.1.2.2 Tidal Zones

Subdivisions are based on a large-scale desiccation gradient. The supratidal zone is influenced by oceanic processes (such as sand movement and spray) but is not submerged; the tidal zone is sometimes submerged (and extends from mean spring high to mean spring low); and the subtidal zone is always submerged.

5.1.2.3 Topographic zones

Subdivisions are based on large-scale topographic variation e.g. rivers in the supratidal zone, estuaries in the tidal zone, and then the continental shelf, slope, and abyss in the subtidal zone.

5.1.2.4 Substratum types

Substratum types refer to the level of consolidation of the substratum, which can be unconsolidated (e.g. beaches, dunes, muddy sediments), or consolidated (e.g. rocky ledges or reefs), or mixed (e.g. mixed shore with rock and sand). Each of the depth strata can be divided into the substratum types shown in the Figure below.

5.1.2.5 Ecosystems

We divided ecosystems within each substratum type into plains, peaks and valleys. Examples for each of these are listed from 1 to 5 in the Ecosystems row in the figure below. These numbers also refer the depth strata (as shown in the Depth Strata row).

5.1.2.6 Habitats

Our habitats are subdivisions of ecosystems and occur at relatively broad scales. Different variables are used for the subdivisions. For example, we divided rocky shores according to wave exposure, and we divided subtidal sediments according to grain size.

5.1.2.7 Biotopes

Biotopes represent fine-scale biodiversity pattern (at the community level) and were not dealt with in this national-scale analysis.

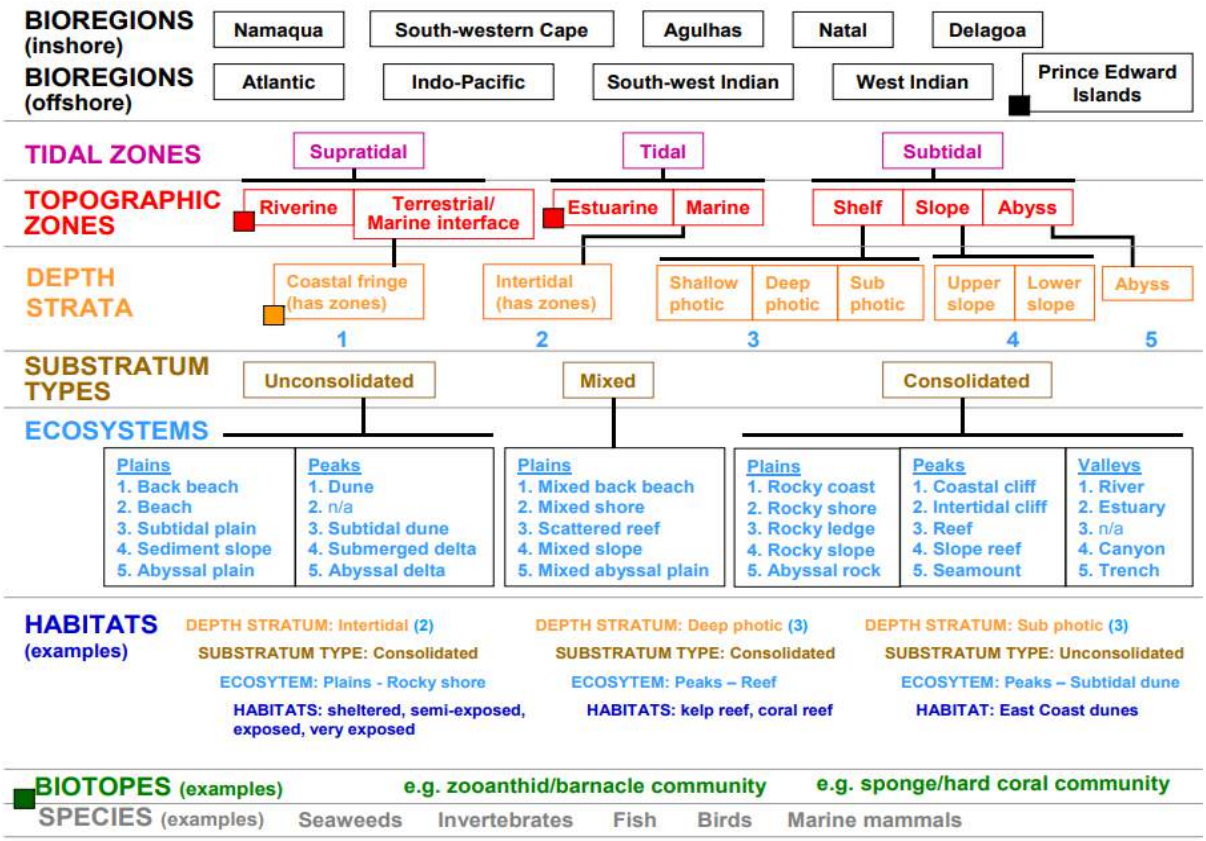


Figure 90: The hierarchical marine habitat classification

5.1.3 Marine Protected Areas (MPAs)[67]

The development of offshore MPAs is South Africa's first attempt at area-specific conservation of offshore habitats and ecosystems. It addresses one of the priority actions from the National Spatial Biodiversity Assessment and contributes to a representative MPA network for South Africa. Offshore MPAs are needed to avert the progressive degradation of offshore environments and resources, contribute to sustainable resource use, allow recovery of impacted habitats and fish stocks and meet international biodiversity commitments. The project draws together for the first time, managers and stakeholders from several government departments and industry sectors. It represents an important step towards integrated ecosystem-based management for our EEZ and maintaining future options for resource use.



[67] *South African National Spatial Biodiversity Assessment 2004, Technical Report Volume 4: Marine Component*

The Convention on Biological Diversity defines an MPA as: 'any defined area within or adjacent to the marine environment, together with its overlaying waters and associated flora, fauna and historical and cultural features, which has been reserved by legislation or other effective means, including custom, with the effect that its marine and/or coastal biodiversity enjoys a higher level of protection than its surroundings.'

(Attwood et al. 1997; Roberts & Hawkins 2000; Salm et al. 2000; Gell & Roberts 2003; Secretariat of the Convention on Biological Diversity 2004).

In South Africa, no-take MPAs (no marine living resource extraction is permitted) represent the highest level of protection that can be applied in the marine environment. By definition in the Marine Living Resources Act, MPAs can exclude fishing, removal of any living organisms, mining, dredging, pollution, construction and any other activities that may adversely impact on the ecosystems of that area. Legally, the only exceptions are activities permitted by the Minister for the purposes of proper management of the MPA.

The Marine Living Resources Act specifies that MPAs are proclaimed for three purposes:

- for the protection of fauna and flora or a particular species of fauna or flora and the physical features on which they depend;
- to facilitate fishery management by protecting spawning stock, allowing stock recovery, enhancing stock abundance in adjacent areas, and providing pristine communities for research;
- to diminish any conflict that may arise from competing uses in that area.

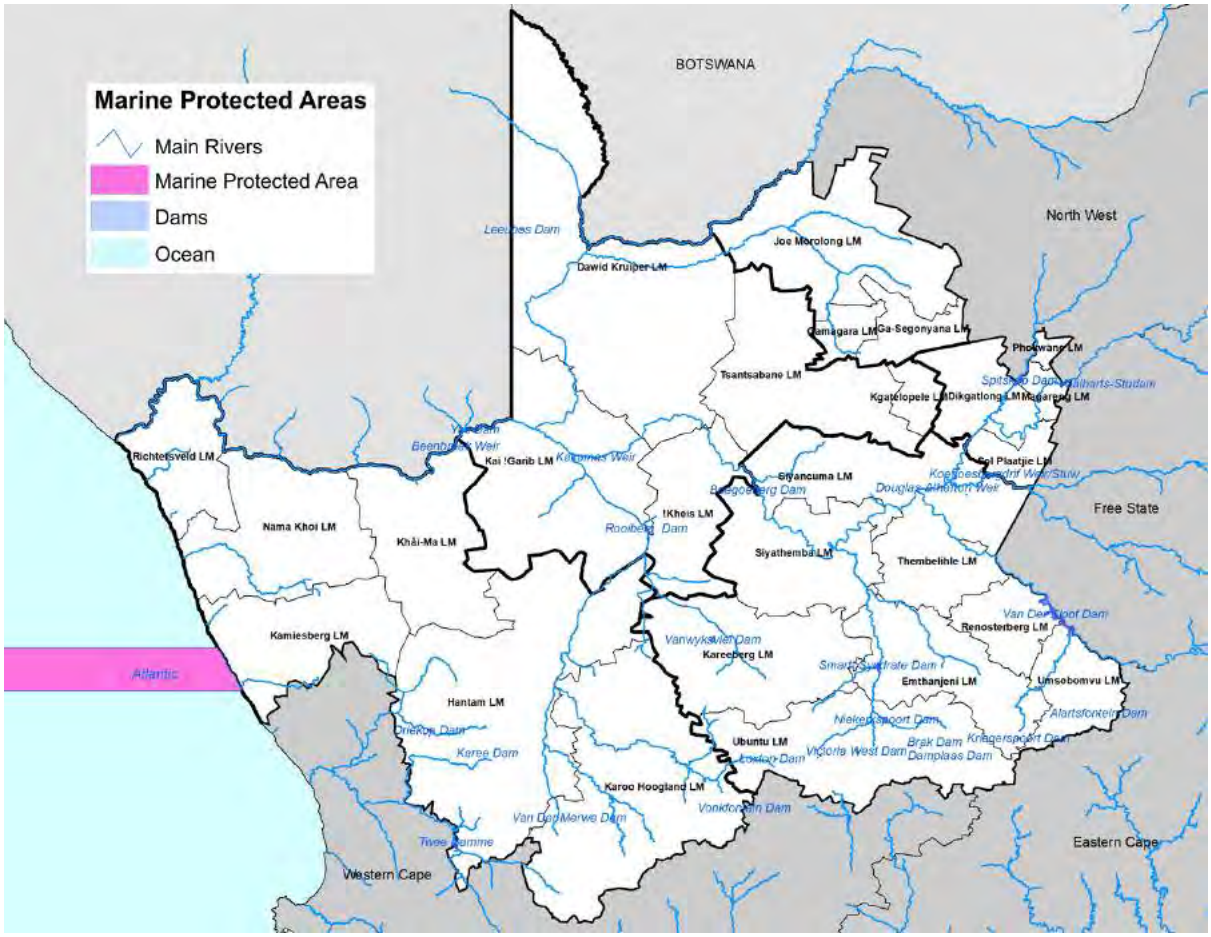


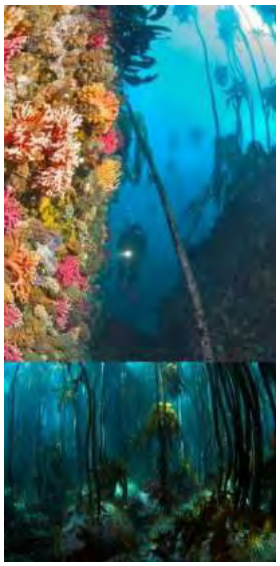
Figure 91: Namaqualand marine protected area

The major functions of MPAs therefore include:

- exclusion of threats and provision of refuge areas for marine life;
- preservation of representative communities in their natural state;
- provision of undisturbed sites for research and monitoring;
- contribution to sustainability of fisheries.

MPAs can also help to reduce user-conflict and may be important for education and tourism, and the popular and financial support of biodiversity conservation (Attwood et al. 1997; Roberts & Hawkins 2000; Salm et al. 2000; Gell & Roberts 2003; Secretariat of the Convention on Biological Diversity 2004).

5.1.4 Biozones



The offshore environment of South Africa was classified into 13 biozones in the National Spatial Biodiversity Assessment. This reflects the biogeography of South Africa and the different depth strata of the offshore environment. South Africa has high biological diversity in the marine environment because of the diverse large-scale oceanographic and topographic setting. Our EEZ (exclusive economic zone) spans the Agulhas and Benguela Current systems with cool and warm temperate and tropical bioregions.

Three main topographic environments occur offshore: the shelf, the slope and the abyss. The shelf is divided into several other substrata including the intertidal, shallow sub-photic (to a depth of 10m), deep photic (10–30m) and the sub-photic zone. The sub-photic component of the shelf is the area from the 30 m contour to the shelf break. The shelf break is the division between the continental shelf and the continental slope which occurs at different depths in different areas as it is defined by the slope angle. It varies from about 400m in the Namaqua bioregion, to 200m in the Agulhas bioregion, 100m off Natal, and is as shallow as 50m in the Delagoa bioregion. The upper and lower slope separate at 1 800m and the abyssal zone extends from a depth of 3 500m and below (Lombard et al. 2004). Biologically, more homogeneity was assumed around the South African coast at the greater depth, and consequently fewer bioregions were defined further offshore.

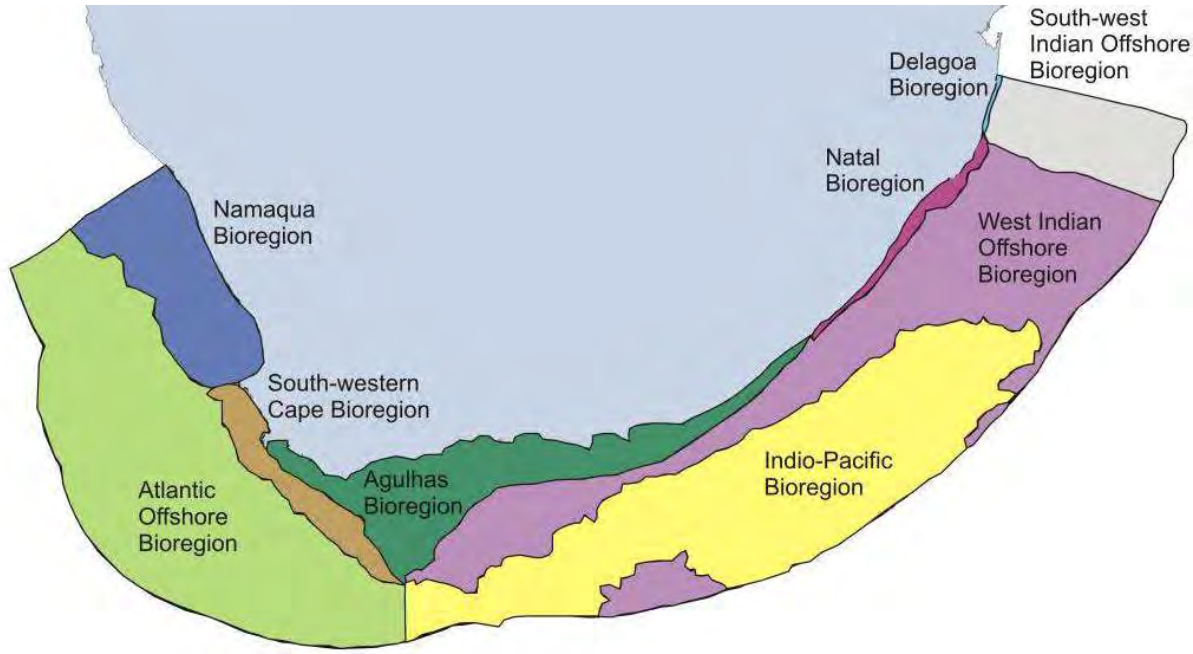


Figure 92: The five inshore and four offshore bioregions in the South African EEZ

The Namaqua marine bioregion is also not represented by any of the existing marine protected areas (MPAs) and a MPA adjoining the park would complete the representative conservation of the South African coastline. The Namaqua National Park as part of its conservation plan, is to allow for the conservation of the adjacent marine protected area, interacting with its terrestrial component. There is the intention of developing at a later stage an off-shore MPA given the biodiversity & economic importance of this area.

5.1.5 Depth strata

The variables responsible for biological variation along depth strata include many factors such as wave action and light attenuation, but these vary at different depths depending on geographical location. For example, light attenuates at a much deeper level on the east coast than on the west coast, owing to the less productive and thus less turbid waters on the east coast. Wave action also attenuates at different depths, depending on the bottom topography, wave amplitude and wind regime.

The shallow photic, from mean spring low to roughly 10m depth, is the area with constant light and turbulence. At about 10m depth, there is a split with the seaweeds (and herbivory) dominating from 0-10m, and filter feeders replacing them below 10m. For example, herbivorous abalone occur in beds mostly from 0-15m. There is also a shift in seaweed genera - Ecklonia dominates the shallows and is replaced by Laminaria below 10m (on the west coast). In addition, plunge-diving birds most frequently dive to 12-15m. The first 10m is also sometimes referred to as the surf zone, and is impacted both by wave action, and by exploitation, for example the lobster trade and shore angling.

The 30m division between the deep photic and sub photic strata was based mainly on the attenuation of light and loss of wave-generated water movement, but as previously mentioned, this depth varies according to geographical location.

Depth strata are subdivisions of the topographic zones according to depth. The map below illustrates the depth strata that affects the Namakwa Coastal areas.

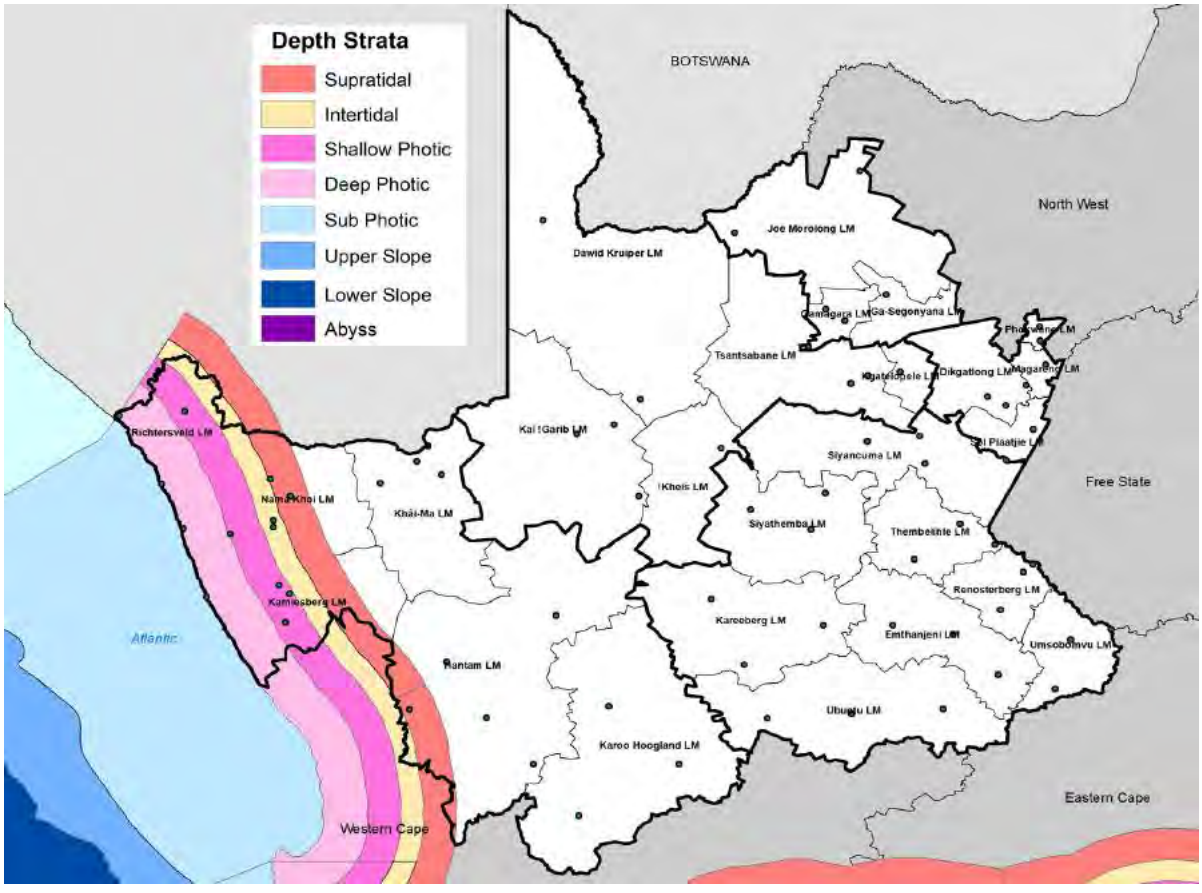


Figure 93: Depth strata within the EEZ. The shallow and deep photic zones are narrow bands along the coastline, with the sub photic forming most of the continental shelf

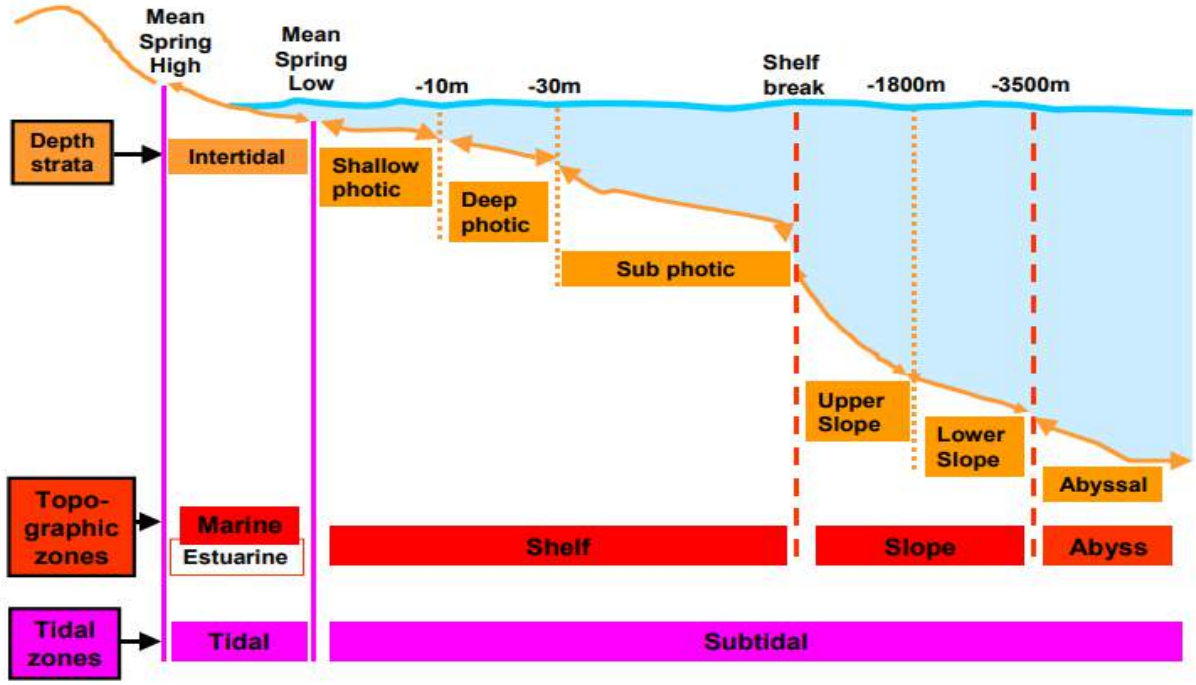


Figure 94: The subdivision of the subtidal environment into depth strata

Biological support for this depth is that there is very little macroalgae below 30m, and diving birds dive most frequently to 30m (e.g. penguins). In addition, the sardine runs occurs to this depth, and coral reefs occur up to about 25/30m (although non-reef corals do occur below this depth in deeper subtidal habitats).

The shelf break is the division between the sub photic part of the continental shelf, and the continental slope. Owing to the vastly different depths at which this break occurs, we refer to it simply as the shelf break, and do not attempt to place an actual depth value to it. It varies from about 400m in the Namaqua bioregion, to 200m in the Agulhas bioregion, 100m off Natal, and is as shallow as 50m in the Delagoa bioregion. It is most correctly defined by slope angle. The upper slope and lower slope meet between 1600-1800m, where there is maximum species diversity in all animal groups studied so far, with a mixing of the two zones' biotas. The upper and lower slopes are also referred to as the upper and lower bathyal zones, respectively. From 1800-3500m, diversity decreases, and the distinct fauna harboured by this area is currently not fished, although new fishing techniques are penetrating as far as 1600m. The abyss is defined as the area below 3500m, and abyssal species generally do not occur above 2500m. Biologically, we assume more homogeneity around the South African coast at this depth, and consequently have defined fewer bioregions offshore than inshore.

5.1.6 Marine Biodiversity threats

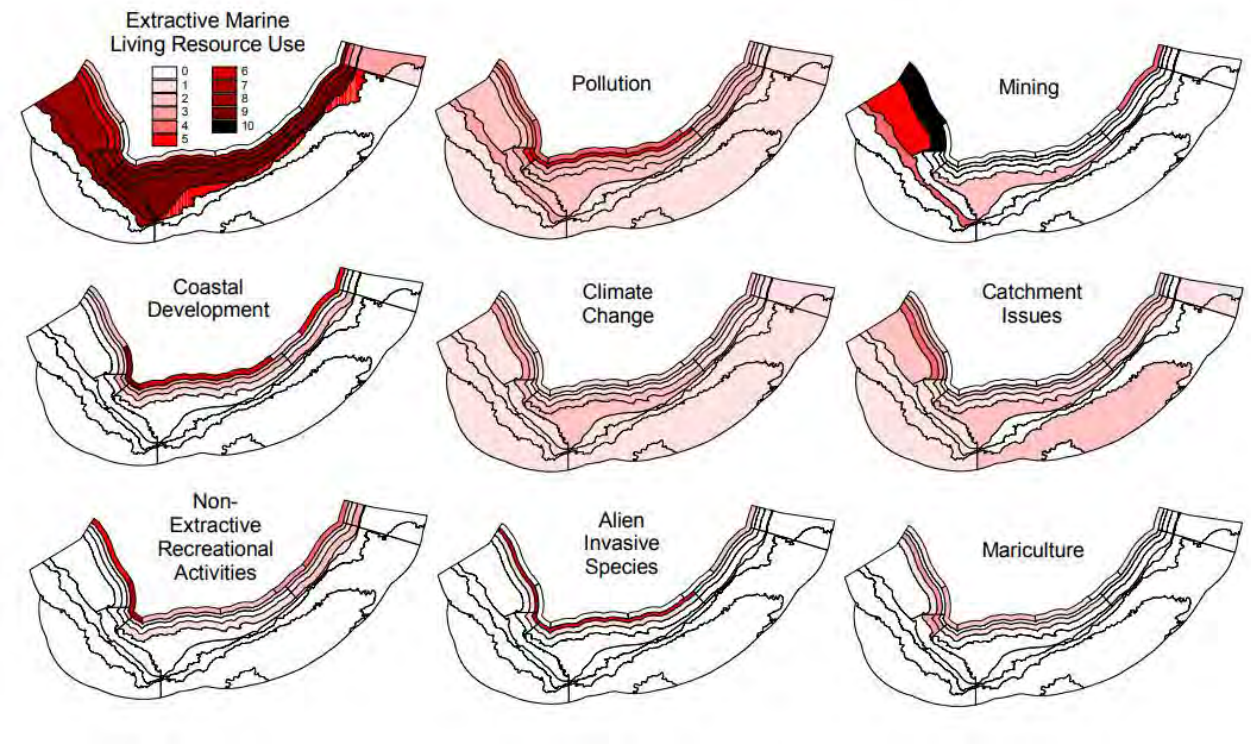


Figure 95: Expert ratings[68] (from 0-10) for each of the nine current threats, per biozone

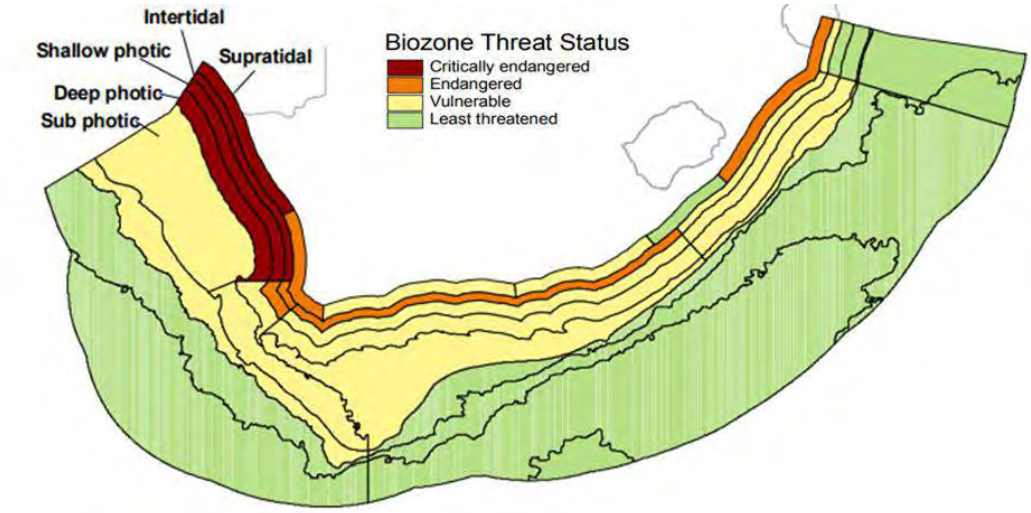


Figure 96: Summed expert ratings for all nine threats, per biozone, divided into four categories of threat status.

Extractive marine living resource use is the overriding threat to South African marine biodiversity, and it affects all bioregions and all depth strata. Pollution and mining are the next most serious threats, but mining is restricted to particular biozones, especially on the west coast. In fact, mining is the only current threat to be rated with the maximum score (ten) in any one biozone. It is responsible for the Critically Endangered status of the west coast biozones, from the supratidal to the deep photic (see

[68] *Driver, A., Maze, K., Lombard, A.T., Nel, J., Rouget, M., Turpie, J.K., Cowling, R.M., Desmet, P., Goodman, P., Harris, J., Jonas, Z., Reyers, B., Sink, K. & Strauss, T. 2004. South African National Spatial Biodiversity Assessment 2004: Summary Report. Pretoria: South African National Biodiversity Institute.*

figure above). All threats are predicted to increase in the next ten years, especially alien invasive species, and mariculture. Threats decrease as one moves offshore, with the decrease in human access.

Bioregionally, threats tend to decrease from the west to the east. This may be partly the result of the higher biomass (and exploitation) on the west coast, coupled with the presence of minerals (such as the diamonds, oil and gas). South Africa urgently requires an MPA on the west coast, to offset the problem that almost the entire region has been allocated to mining concessions (Clark et al. 1999).

5.1.7 River systems

The Orange and Vaal Rivers with their tributaries are the main sources of surface water in the province. Ground water also fulfils an important function, especially in settlements far removed from the Orange River and the other major rivers. Topographically, the Orange River System, which drains approximately 47% of South Africa's total surface area and approximately 22% of the country's mean annual rainfall run-off, is divided into an upper section (origin to Orange-Vaal confluence), a middle section, (Orange-Vaal confluence to Augrabies Falls) and a lower section (Augrabies Falls to Orange River Mouth). Approximately 98% of the runoff of the Orange River System is generated in the upper section. The Orange River System is the most developed transboundary river basin in Southern Africa, with a variety of water transfer schemes to supply water to municipalities, industries and farms inside and outside the basin. It has become highly regulated by virtue of 24 major impoundments (constructed within the catchment between 1884 and 1997), numerous minor impounding structures and 6 inter-basins as well as 5 inter-water transfer schemes. Furthermore, a new dam in the lower Orange River basin will be constructed in the Vioolsdrift area, which will unlock opportunities regarding irrigation farming as well as the potential to assist with the provision of drinking water to the rural municipalities within the Namakwa District. The Northern Cape falls within 4 Water Management Areas, namely (refer to Map B9): Lower Orange (WMA 06). Upper Orange (WMA 12). Oliphant's/Doorn (WMA 15). Lower Vaal (WMA 20).

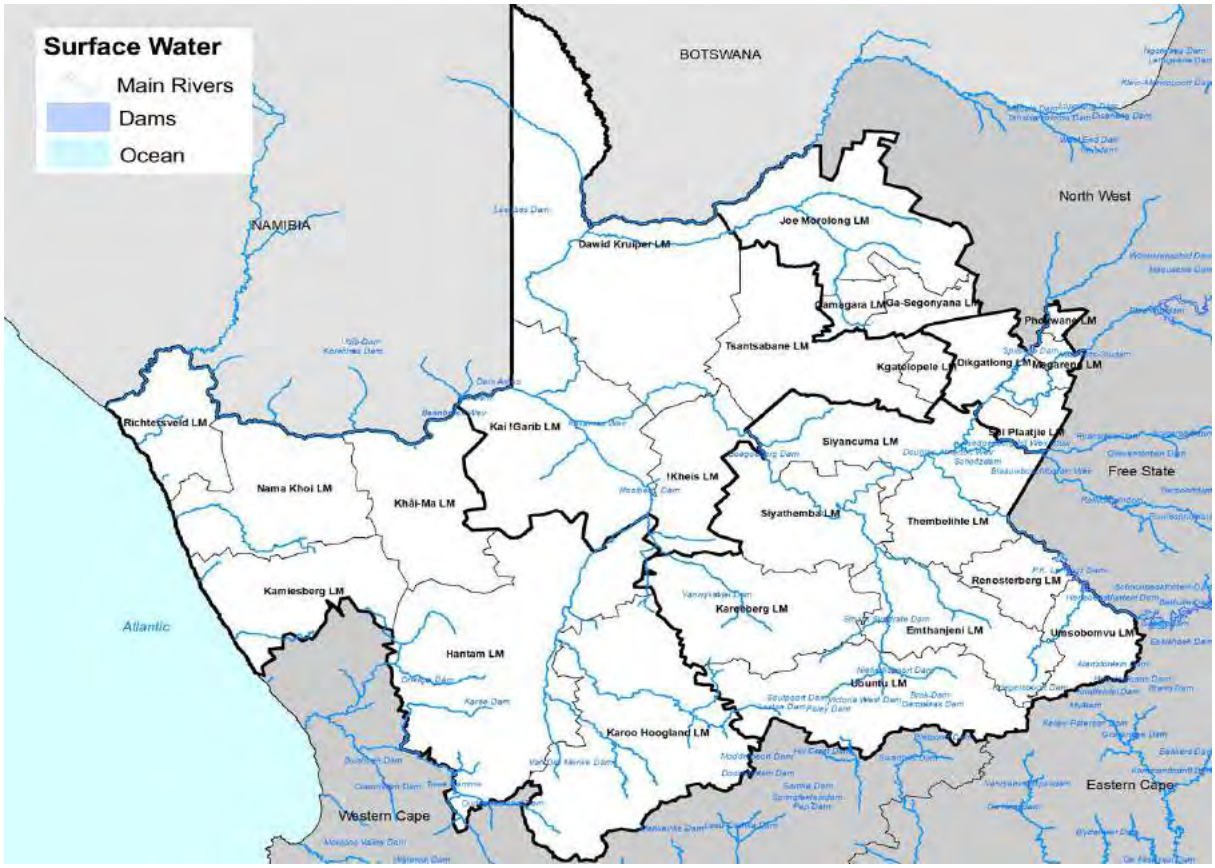


Figure 97: Surface water, Northern Cape Province

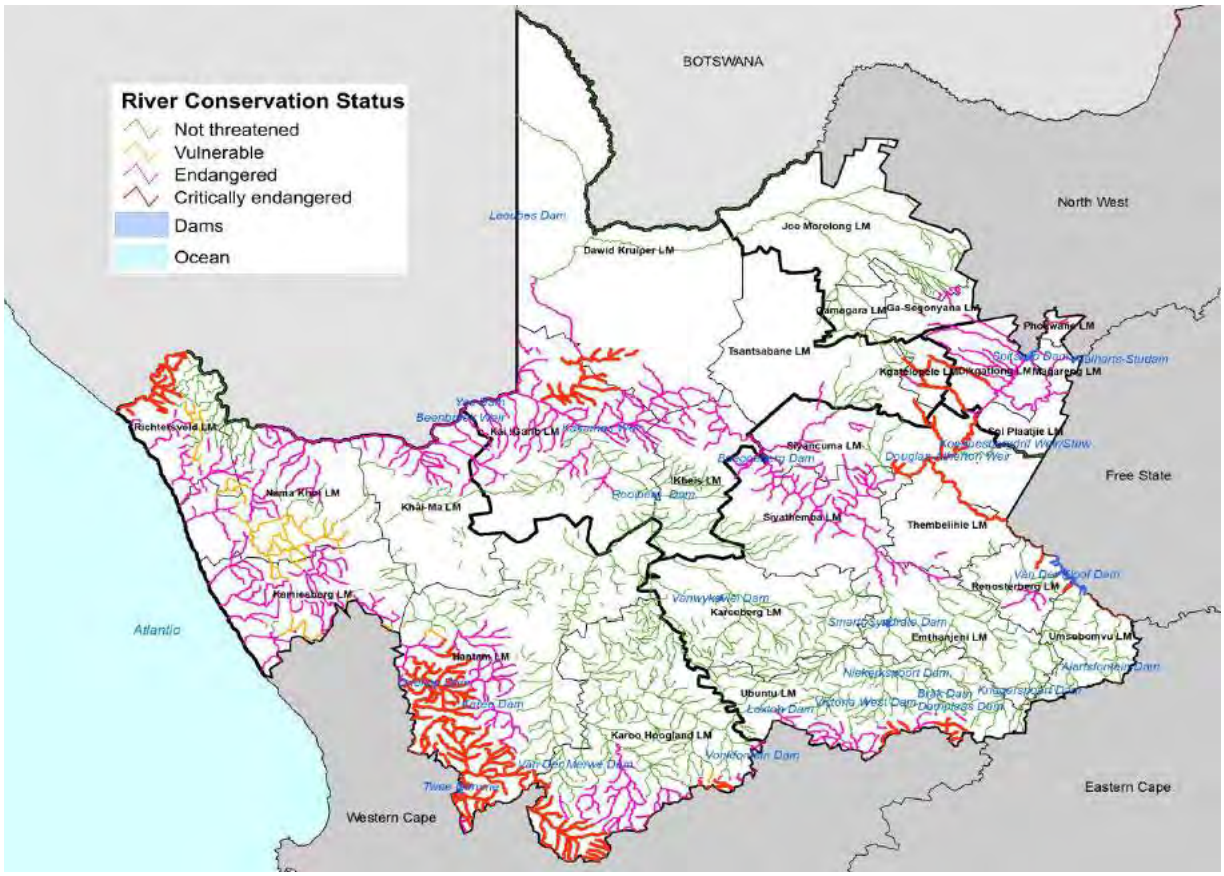


Figure 98: Northern Cape river conservation status

5.1.8 Rainfall

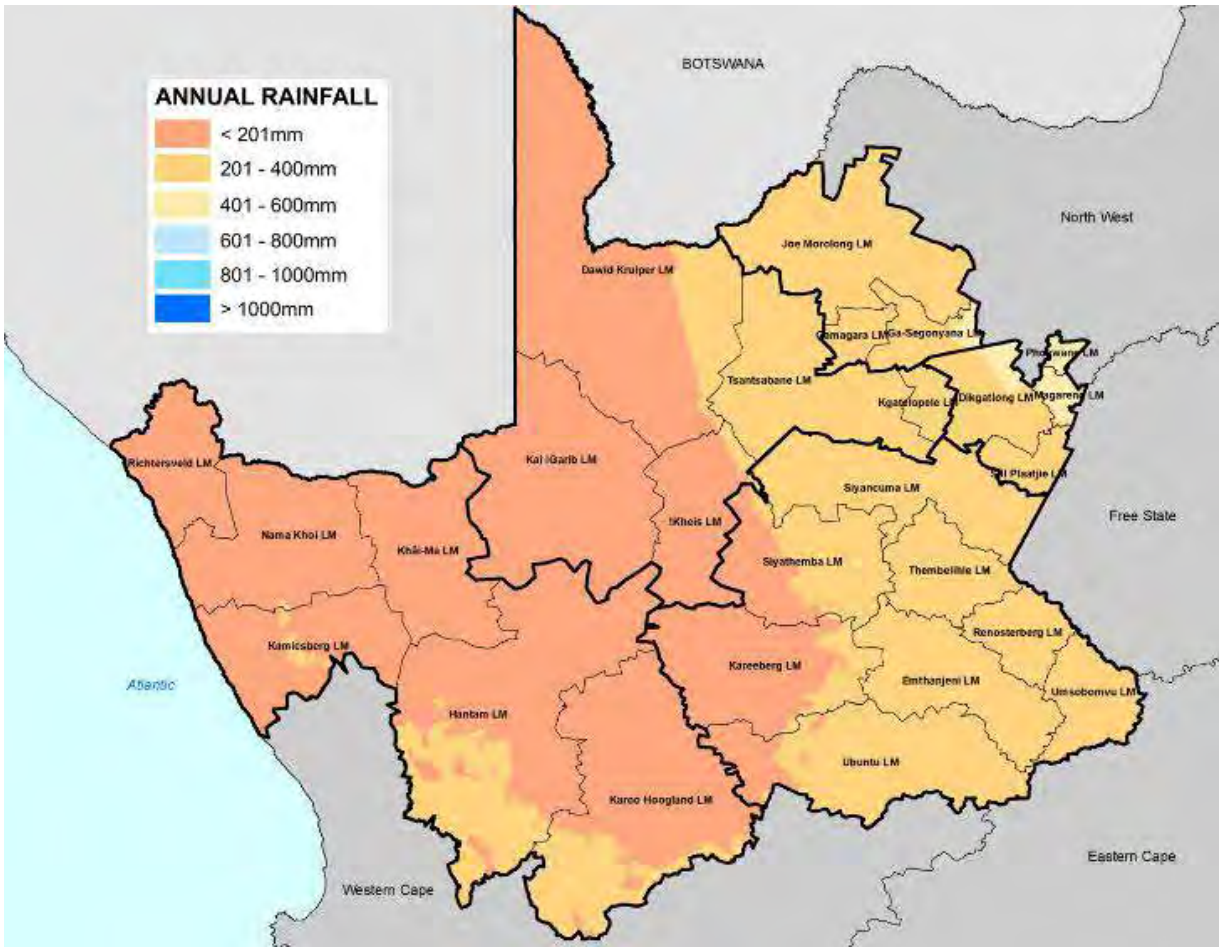


Figure 99: Provincial rainfall patterns

Mostly arid to semi-arid, few areas in the province receive more than 400mm of rainfall per annum and the average annual rainfall over the province is 202mm. Rainfall generally increases from west to east from a minimum average of 20mm to a maximum of 540mm per year. The west experiences most rainfall in winter, while the east receives most of its moisture from late summer thunderstorms.

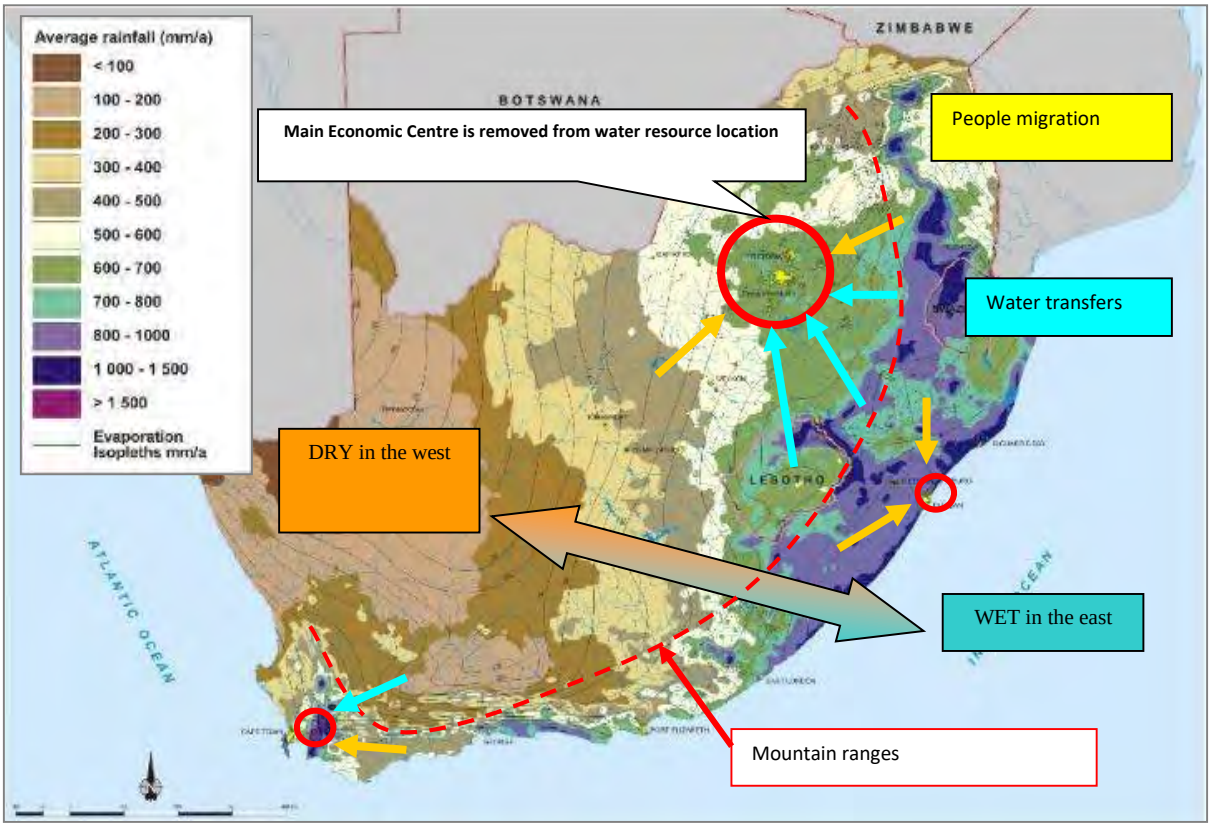


Figure 100: National Context of South African Rainfall Pattern

- General decreases in rainfall are projected for the Northern Cape under both high and low mitigation, by most ensemble members, for the period 2020-2050, relative to the present-day condition. However, most ensemble members project rainfall increases over the north-eastern parts of the province.
- Policy makers are advised to plan for the possibilities of both wetter and drier conditions over the eastern parts of the province, since climate model projections are indicative of both these regional features being plausible.
- For the 2020-2050 period relative to the present-day conditions the Northern Cape is projected to experience a decrease in the number of extreme rainfall events. Such decline is projected for both low and high mitigation futures.
- The overall number of dry spell days within the province will increase to 100 to 180 days per, indicating that the overall amount of rainfall will decrease.

Key implications of these changes for Northern Cape province may include an increased risk for veld fires to occur in the grasslands areas. The household demand for energy in summer is also plausible to increase, to satisfy an increased cooling need towards achieving human comfort within buildings. Under high mitigation, the amplitudes of the projected changes in temperature and extreme temperature events are somewhat less, but still significant. The projected changes in rainfall and related extreme events exhibit more uncertainty than the projected temperature changes. A robust signal of increases in dry-spell-day frequencies is evident from the projections.

It is of the upmost importance that emphasis be placed on the development of a climate change adaptation strategies to mitigate the potential impacts it may have on the Northern Cape inhabitants.

6 GEOSPHERE (LITHOSPHERE)

6.1 TOPOGRAPHY

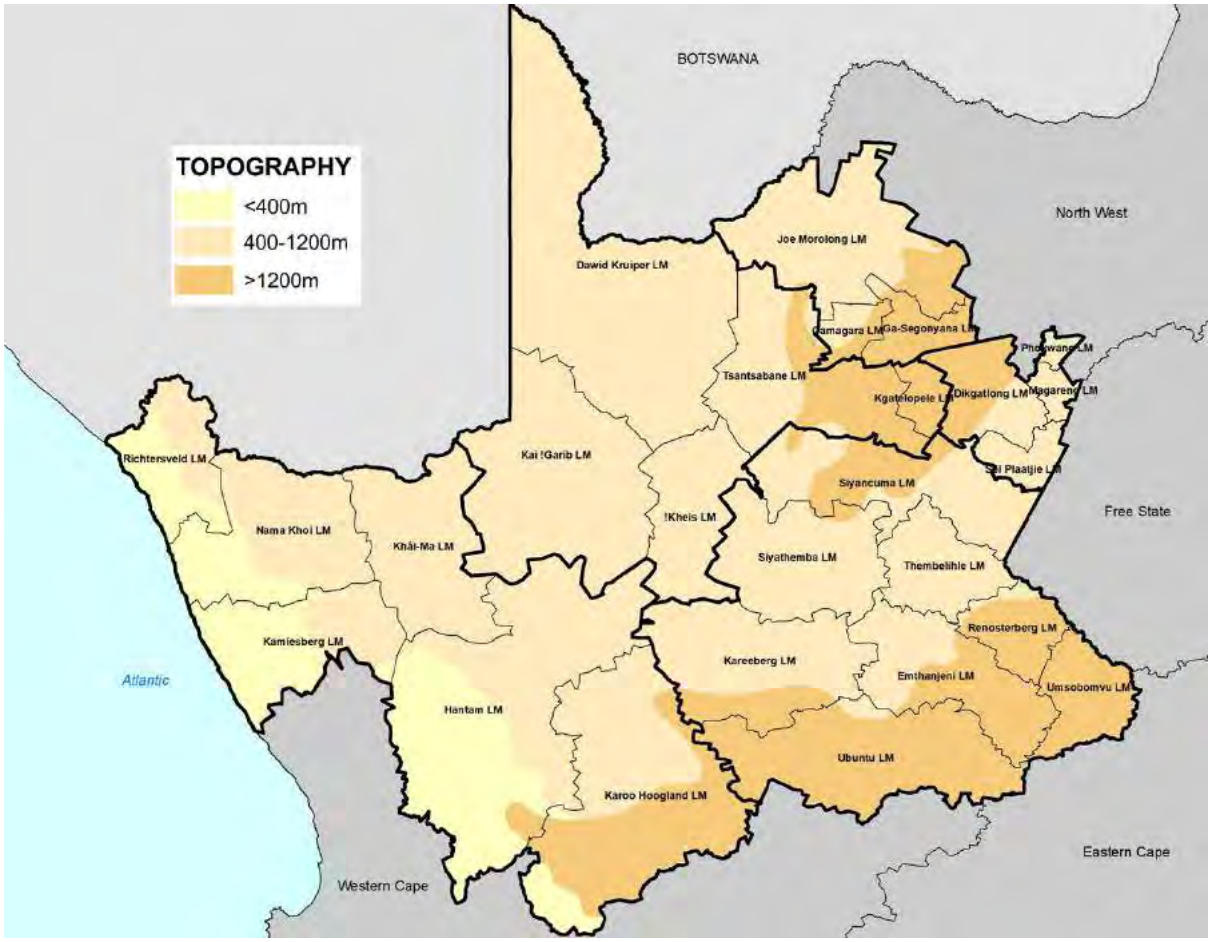


Figure 101: Northern Cape Topography

6.1.1 Topography overview

Northern Cape, province, western South Africa. It is bordered to the north by Namibia and Botswana; to the east by North West, Free State, and Eastern Cape provinces; to the south and southwest by Western Cape province; and to the west by the Atlantic Ocean. Northern Cape was administratively created out of northern and central Cape of Good Hope province in 1994. Kimberley is the provincial capital. Northern Cape's eastern half and southwest form part of the Highveld, an arid plateau that gradually rises to the Great Escarpment (more than 1 900m in elevation) along the province's southern border. To the northwest is desert, including the sand dunes of Kgalagadi Transfrontier Park, a conservation area jointly managed by South Africa and Botswana. The Orange River traverses the province from east to west and provides water for irrigation. The Orange is joined by one of its main tributaries, the Vaal River, near Douglas, in the east. In the west, near the Namibian border, the river plunges in a series of cataracts and rapids at Augrabies Falls, a total drop of more than 600 feet (183 metres). Thornveld is the natural vegetation of the province, and the climate is generally hot and arid. Annual rainfall increases from 4 inches (100 mm) in the west to about 14 inches (350 mm) in the east.

The Orange River System, which drains approximately 47% of South Africa's total surface area and approximately 22% of the country's mean annual rainfall runoff, can be divided into an upper (origin

to Orange -Vaal confluence), a middle, (Orange -Vaal confluence to Augrabies Falls) and a lower (Augrabies Falls to Orange River Mouth) section. Approximately 98% of the Orange River System's runoff is generated in the upper section. The Orange River System is the most developed transboundary river basin in the region, with a variety of water transfer schemes to supply water to municipalities, industries and farms inside and outside the basin. It has become highly regulated by virtue of 24 major impoundments (constructed within the catchment between 1884 and 1997), numerous minor impounding structures and 6 inter-basins as well as 5 inter-catchment water transfer schemes.

6.1.2 Pixley ka Seme District

The topography of Pixley ka Seme region is one of its main assets with vast open spaces and unspoilt panoramic visual vistas stretching over great distances. This asset makes for excellent scenic drives throughout the whole of the region from the flat plains to crossing the main rivers of South Africa. The topography is related to the geology and relief with altitudes ranging between 1000m to 1800m above sea level. Land reforms associated with plains, hills and lowlands cover approximately 80% of the region. Plains have slopes of less than 5 degrees (8%) and result in a gradual change of climatic conditions. Ridges have slopes of more than 5 degrees and therefore have more variable climatic conditions

6.1.3 Frances Baard District

The ridges and escarpment have significant potential in terms of aesthetic or visual appeal as well as habitat for rare and endangered plants and animals. These features occur mainly in the north and on the borders of the region. The general drainage pattern of the region is from the southeast to the north and northwest. The Orange and Vaal Rivers are the primary drainage channels in the area to which many other streams and rivers link. The Frances Baard DM service area consists mainly of the following dominant features.

6.1.3.1 The Ghaap Plateau

The Ghaap escarpment forms a dramatic barrier between the western and eastern section of the area. his plateau was created by higher lying Pre-Karoo surface with the main element being the surface dolomite which gives form to the plateau.

6.1.3.2 The western plateau

The western area is situated to the west of the Ghaap mountain series. The area rises to the west to be part of an escarpment that forms the eastern fringe of the Kalahari.

6.1.3.3 The eastern plains

This area is situated to the east of the Ghaap mountain ridge and the Vaal- and Harts River system. Morphologically it could be mentioned that this eastern section is part of the Free State Plains. This eastern section however, also co-insides with the Kimberley thorn veld before it transforms into the Free State plain area.

6.1.3.4 Visual amenity

The Ghaap Plateau/ Ridge as well as the Vaal River provides a visual amenity to the FBDM area. The Ghaap Plateau creates passes with major roads (N81 and R31) and also some minor roads. These

elements provide for scenic drives and extensive views. To the east the Vaal- and other Rivers cuts through the landscape which forms dramatic gorges and water elements. These cliffs and water features provide for tourism potential still to be fully developed. In conclusion it could be mentioned that the district consists of three very distinct morphological regions that provides their own individual tourism and agricultural potential.

6.1.4 John Taolo Gaetsewe District Municipality

The landscape of the district is predominantly level, with a ridge system bisecting the greater municipality along a north-south axis. This feature, the Kuruman hills, creates the only significant variation in the otherwise flat landscape of the municipality. The district area is situated in typical Kalahari surroundings. The topography alternates between elevated areas with poor developed soils to very deep developed soil type with poor differentiation between the different soil horizons in the plains. The biota of the area is closely interrelated with the parent rock, soil and land use and critically sensitive to unnatural disturbances. The district falls entirely within the Orange River Basin. Kuruman and Gamagara rivers are the main river systems within the district. The Kuruman hills also determine the drainage pattern of the Kuruman river system with the alignment of the ridge forcing the draining of water in the area northwards before turning sharply west. The Kuruman River is a tributary of the Molopo River which eventually converges with the Orange River.

6.1.5 Namakwa District

Topographically the region consists of three zones: the coastal Sandveld, stretching up to 50km inland and rising to about 300m; the broken mountainous 'Hardeveld', some 60km wide and lying at about 900m; and an inland zone, Little Bushmanland, lying at about the same elevation but level in nature, with a very ill-defined drainage system, mainly north to the Orange River. For the rest the drainage is mainly toward the Atlantic, with numerous watercourses rising in the broken range of mountains that runs down the centre of the district. This range forms part of the rampart separating the coastal strip from the inland plateau right round South Africa. The range contains some fairly high points, notably the Kamiesberg (1531m), 72km south of Springbok, and another peak 16km farther south, which rises to 1707m. The river with the largest drainage area is the Buffalo, which enters the Atlantic Ocean 50km south of Port Nolloth.

6.1.6 ZF Mgcawu District

The district falls within four topographical regions namely:

6.1.6.1 The Kalahari

The Kalahari basin stretches northwards from just north of the Orange River into Botswana and Namibia. It is a flat, sand covered, semi-desert area, on average between 900m to 1200m above sea-level. It is characterised by a number of large pans to the north of Upington, by dry river beds (such as the Kuruman, Nossob and Molopo Rivers) and by dunes which strike northwest to south-east. The region is underlain by Karoo rocks and rocks belonging to the tertiary Kalahari Group. Outcrops are rare.

6.1.6.2 Bushmanland

Bushmanland is an arid, level sub-region of the Cape Middleveld to the east of the Namaqua Highlands. It is underlain by granitic Precambrian rocks on the western and northern sides and by

Karoo rocks towards the south-east. It is characterised by numerous large pans and “vloers” and is on average between 900m to 1200m above sea-level.

6.1.6.3 The Griqua fold belt

The Griqua Fold Belt is a highveld sub-region that lies in a roughly triangular shape to the west of the Ghaap Plateau, to the south of the Kalahari Basin and to the east of Bushmanland. It includes the scenic Langberg/Korana Mountains. The low Gamagara ridge between Postmasburg and Sishen is economically important because of the rich iron and manganese deposits it contains.

6.1.6.4 Ghaap Plateau

A small portion of the south western corner of the Ghaap plateau occurs in the district. The Ghaap plateau is a higher lying, pre-Karoo surface with its main physiographic element being the surface of dolomite that gives the form to the plateau. The plateau is separated from the Postmasburg plain by the Langeberg-Koranna ranges which are made up out of Matsap quartzites that forms the boundary of the Kalahari to the west. The Ghaap plateau is a roughly triangular limestone area. There are strong limestone springs on the western side of the plateau that surfaces as “eyes” in places.

6.2 GEOLOGY

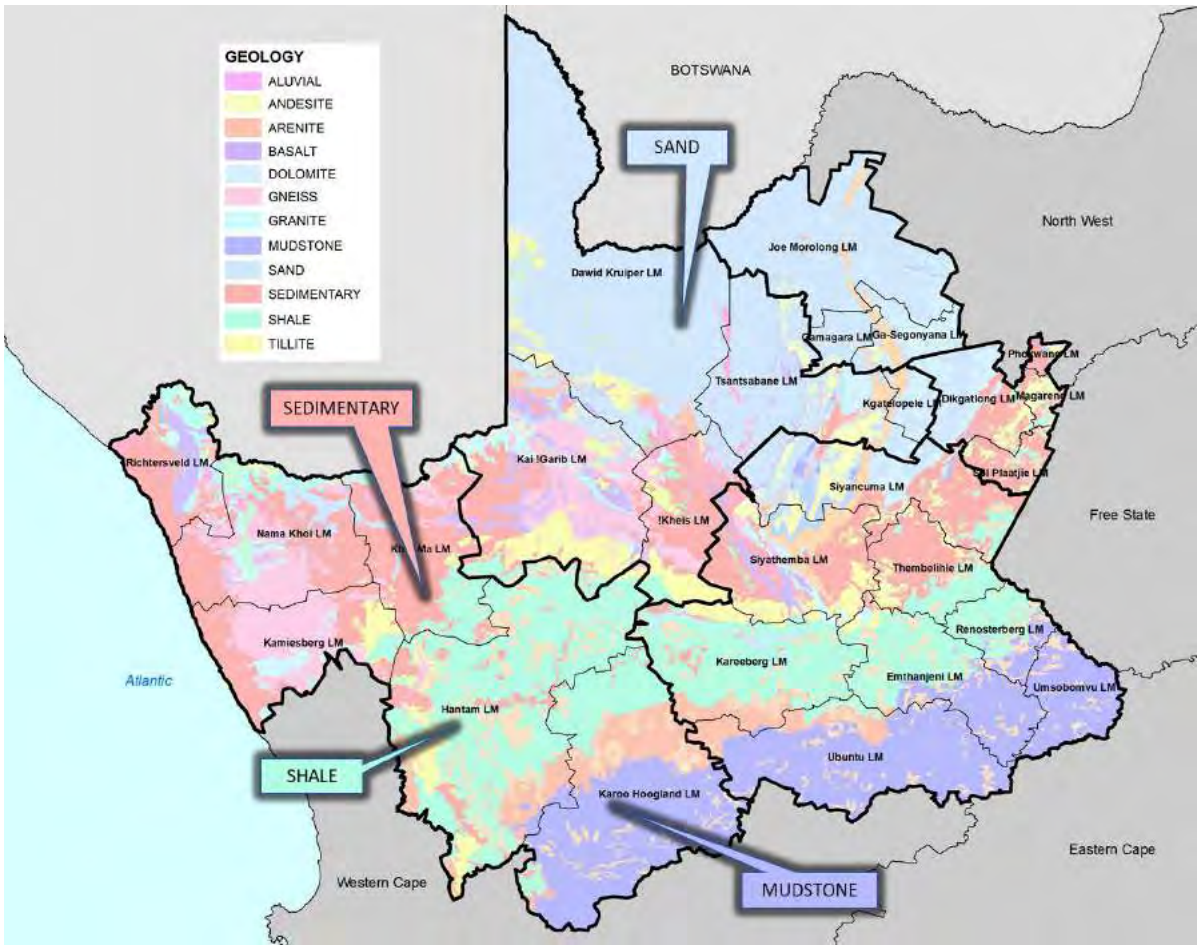


Figure 102: Detailed geology, Northern Cape Province

- **DOLERITE:** The clayey soils are expansive and may cause damage to foundations. The un-weathered rock is widely used as concrete aggregate and in road and dam construction. The general use of dolerite as a construction material has caused the widespread occurrence of quarries along roads and near towns and dams.
- **MUDSTONE:** The soils are highly dispersive and this results in deep donga's forming on many slopes in the Karoo.
- **SHALE:** The soils are usually highly erodible.
- **SAND:** The sands are sometimes too loose for normal foundations and settlements may take place. It is usually suitable for fine concrete aggregate. In the arid parts a major problem is the movement of these sands by wind.

Geology is the science that investigates the history of the crust of the earth, from the earliest times to the commencement of the historical period. Geology deals with the composition, arrangement, and origins of the rocks of the earth's crust, and with the processes involved in the evolution of its present structure. In the Province, Dolomite covers 1,76%, Mudstone 34%, Sand 17%, Sedimentary 10,5%, Shale 15,5% and Dolerite 3,3%.

6.2.1 Dolerite

6.2.1.1 Engineering Qualities

The clayey soils are expansive and may cause damage to foundations. Dolerite is an excellent construction material and especially the slightly weathered varieties in the west of the country are used as road stone. The un-weathered rock is widely used as concrete aggregate and in road and dam construction. Care should be taken against the rapid weathering types, which may break down rapidly (days/months).

6.2.1.2 Unique qualities

The general resistance to weathering of these intrusions has caused the distinct positive linear topographic features in the horizontal sedimentary rock strata of the Karoo. It is also generally regarded as a good aquifer in the dry regions. The general use of dolerite as a construction material has caused the widespread occurrence of quarries along roads and near towns and dams.

6.2.2 Tillite

6.2.2.1 Engineering Qualities

Slope instability may cause problems in exposed slopes and cuttings. It is a good construction material but, may break down. The soils are sometimes expansive and usually dispersive.

6.2.3 Sand

6.2.3.1 Engineering qualities

The sands are sometimes too loose for normal foundations and settlements may take place. It is usually suitable for fine concrete aggregate. In the arid parts a major problem is the movement of these sands by wind.

6.2.4 Andesite

6.2.4.1 Engineering qualities

The residual soils are expansive. Soils are only non-expansive in the early and late stages of weathering. Depth and stage of weathering vary significantly over short distances and may cause foundation problems. Large, un-weathered core stones in the soil profile cause problems with installation of piles as well as differential settlement. Damage to houses may be limited by using reinforced masonry work, flexible couplings in pipes and good site drainage with piled foundations or raft foundations in larger structures.

6.2.5 Quartzite

6.2.5.1 Engineering qualities

Quartzite is a very strong rock forming excellent foundations. It is fairly difficult to excavate in these rocks. The residual soils are usually strong, non-compressible and non-heaving. The rock is widely used as concrete and road building materials, although the high sulphur content due to the presence of pyrite cause some problems with salt blisters in roads and stains in concrete in the Witwatersrand.

6.2.5.2 Unique qualities

Quartzite is such an excellent aggregate that it is used as a reference aggregate.

6.2.6 Mudstone

Sedimentary rocks are built up of particles originating from the weathering of other rocks and deposited in one or another depositional basin. Clay-sized particles (mud) are transported in suspension in water and eventually settle in deep water marine or fresh water lakes. After compaction and cementing it is called mudstone. Clay refers to particles smaller than 0.02mm and may consist of the minerals illite, quartz, feldspar and a mixed layer of montmorillonite-illite and sometimes kaolinite. Mudstone occurs within a succession of coarse-grained sandstone alternating with fine-grained mudstone. The most widespread occurrence is in the Karoo strata, which cover 75% of the central subcontinent.

6.2.6.1 Soil profile

Mudstone weathers to a clayey soil, which may have expansive characteristics depending on the original mineralogy of the soils from which the rock formed. In some areas mudstone is weathered to great depths. The soils are usually highly erodible and dispersive.

6.2.6.2 Engineering qualities

The un-weathered rock is soft to very soft with properties similar to over-consolidated clay. The rock mass is impermeable and the rock may be of the rapid weathering (slaking) type, which break up after exposure to the atmosphere. If the rock mass is dipping at an angle, slopes are usually unstable and movement may take place along bedding planes. If the original clay was of the expansive types, then the rock and the residual soils will be expansive and may cause damage to structures. Weathered and un-weathered mudstone are used as brick-making material.

6.2.6.3 Unique qualities

The soils are highly dispersive and results in deep dongas forming on many slopes in the Karoo.

6.2.7 Shale

Shale is a sedimentary rock consisting of silt and clay sized particles and with visible layering (fissile) as opposed to a mudstone that is massive. Shale always occurs within a succession of coarse-grained sandstone alternating with fine-grained shale (mudstone). The most widespread occurrence is in the Karoo strata which covers 75% of the central subcontinent. Soil profile: Shale weathers to a clayey soil, which may have expansive characteristics depending on the original mineralogy of the soils from which the shale formed. In some areas the shales are weathered to great depths. The soils are usually highly erodible.

6.2.7.1 Engineering qualities

The un-weathered rock is soft to very soft with properties similar to over consolidated clay. The rock mass is impermeable and the rock may be of the rapid weathering (slaking) type, which break up after exposure to the atmosphere. If the rock mass is dipping at an angle, slopes are usually unstable and movement may take place along bedding planes. If the original clay was of the expansive types, then the rock and the residual soils will be expansive and may cause damage to structures. Weathered and un-weathered shale is the main source for brick-making material.

6.2.7.2 Unique qualities

The soils are highly erodible and this results in deep dongas forming on many slopes in the Karoo. Aesthetic and Scenic value: The shale layers form the shallower slopes in the Karoo where the sandstone beds or dolerite sills protect the softer shale below to form the typical table mountains.

6.3 GEO HAZARDS

According to the South African Geological Hazards Observation System (SAGHOS) Atlas, compiled by the Council of Geoscience, the geological hazards prominent in the Northern Cape can be summarised as follows:

6.3.1 Sinkholes

A significant area of the northern part of the Northern Cape Province is underlain by Dolomite. Kuruman and the surrounding area are synonymous with dolomite formations. Housing developments in the region cost considerably more due to the requirement of dolomite stability studies. In certain areas of the Northern Cape, the ground surface is prone to sudden and catastrophic collapse due to sinkholes. This has led to serious injuries and death in the past.



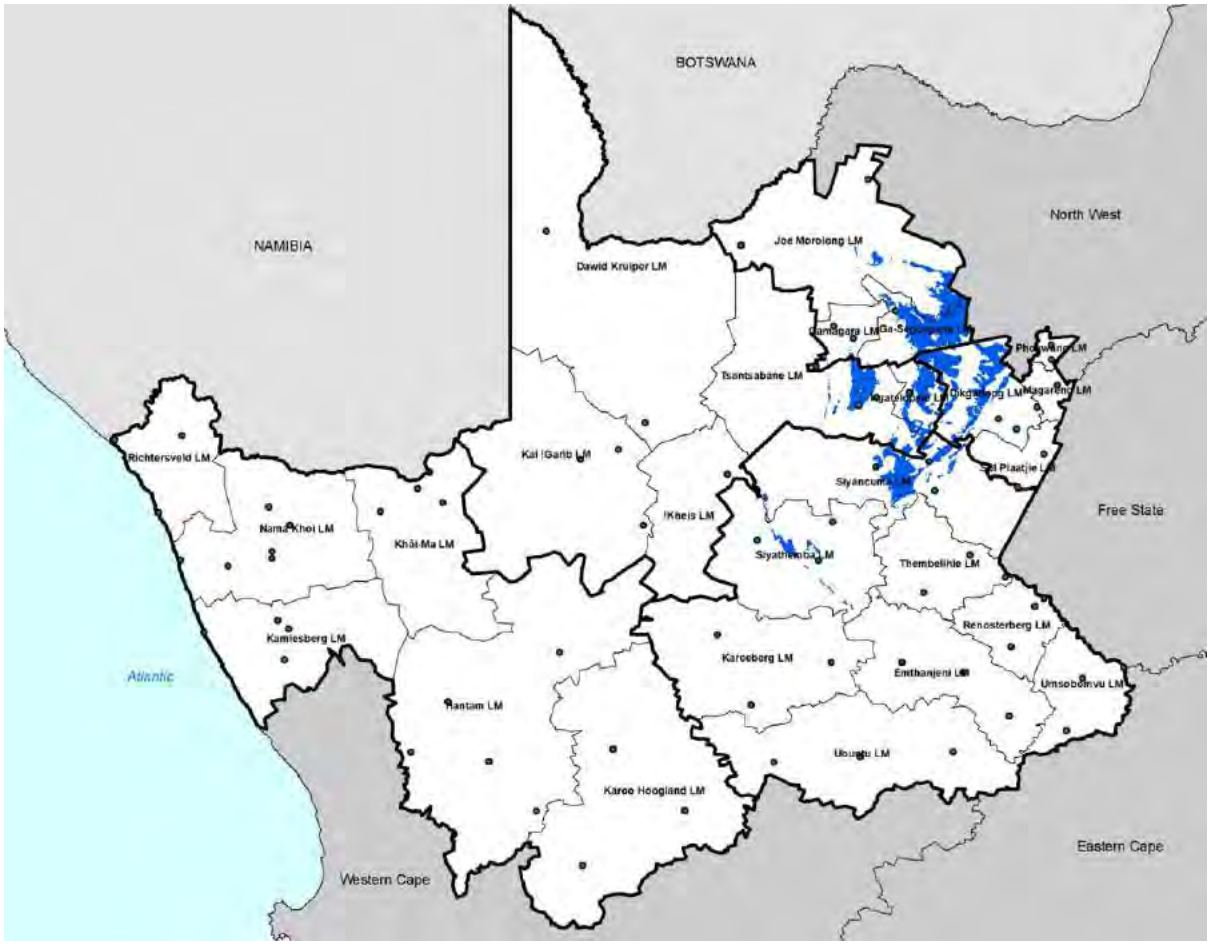


Figure 103: Dolomite areas in the Northern Cape

6.3.1.1 Contributing factors

- Ingress of water from leaking water-bearing services;
- Poorly managed surface water drainage;
- Groundwater level drawdown;

6.3.2 Subsidence

Subsidence has sparsely been recorded in the Northern Cape. A subsidence is an enclosed depression which forms as a result of the compression at depth of low density dolomite residuum (SAGHOS[69], 2015). Two types are generally noted: Surface saturation type subsidence and dewatering-type subsidence.

6.3.2.1 Contributing factors

- Topography;

[69] *South African Geological Hazards Observation System. The system aims to create an inventory and database of known geological hazards affecting South Africa and developing techniques for the assessment of geological hazards using remote sensing data. Geological hazards are naturally occurring or human induced conditions or phenomena that present a risk or are a potential danger to life and infrastructure. Potential geological hazards facing South Africa include coastal and beach erosion, terrestrial erosion, deformation due to mining activities and water abstraction, geochemical hazards (natural or anthropogenic), landslides, problem soils (including shrink/swell clays and acidic soils), seismic activity, sinkholes, tsunamis and groundwater related hazards.*

- Drainage;
- Leaking services;
- Engineering properties of soils;
- Origin of transported soils;
- Nature and topography of the underlying strata;
- The depth of and expected fluctuations of the water table; and
- The presence of dykes, faults or fractures.

6.3.3 Gully erosion



According to the SAGHOS Atlas, 160 885 hectares have been affected by gully erosion in the Northern Cape Province. Gully erosion is a process where surface (or subsurface) water concentrates in narrow flow paths and removes the soil, resulting in channels that are too large to be destroyed by normal tillage operations (Kirby and Bracken, 2009).

6.3.3.1 Contributing factors

- Rainfall: High rainfall typically initiates the formation of gullies (Rydgren, 1996);
- Lithology and pedological factors: The inherent erodibility of the parent material is the most dominant erosion risk factor (Laker, 2004);
- Topography: Gullies are commonly found on valley floors and footslopes. The topography will play a role in the direction, speed and magnitude of flow. Where overgrazing takes place, the formation of gullies typically follows (Descroix et al., 2008); and
- Land use and vegetation cover: Reductions in land cover and vegetation are identified as the main driving factor of gully erosion (Descroix et al., 2008).

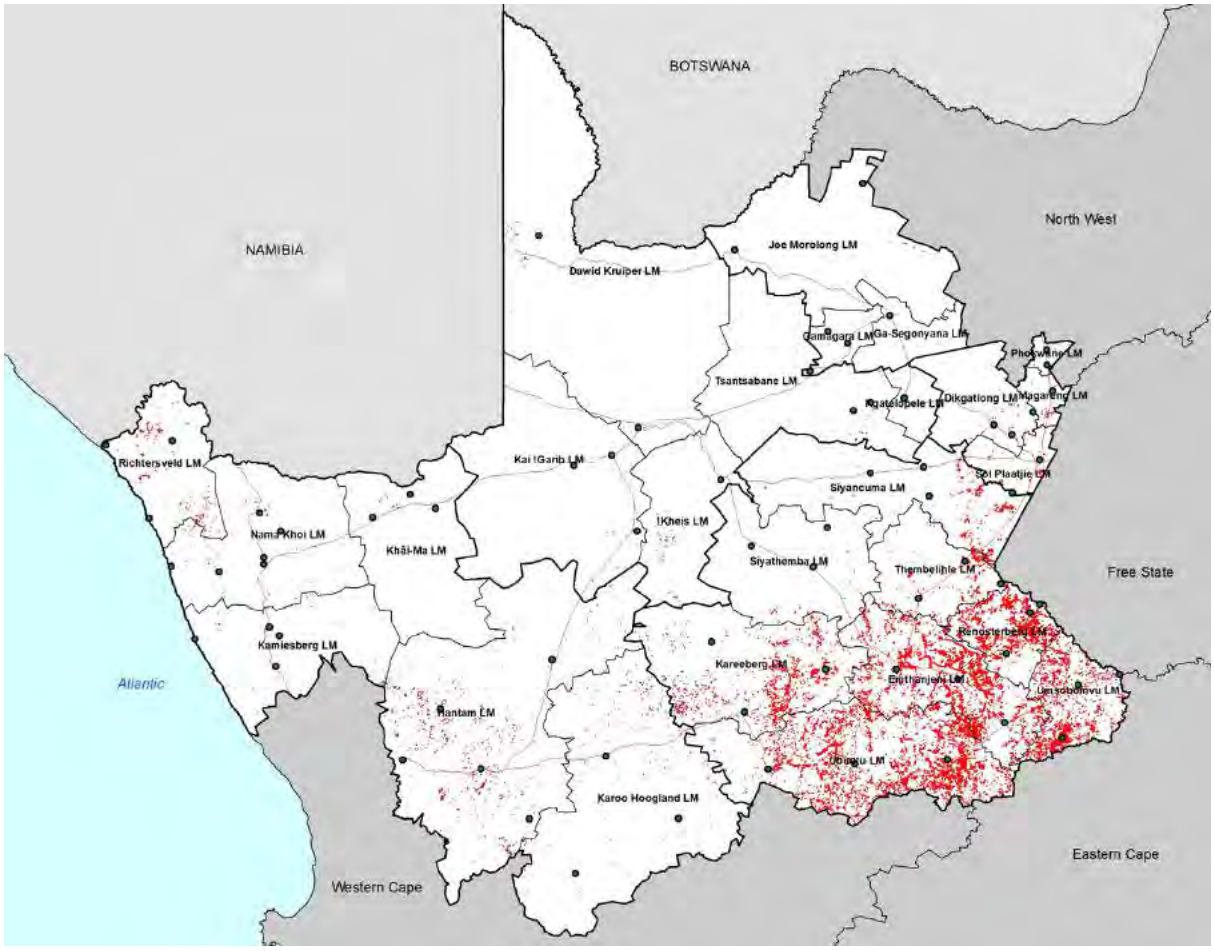


Figure 104: Gully erosion occurrence in the Northern Cape province

6.3.4 Water Erosion

According to the SAGHOS Atlas, 5 407 138 hectares have a moderate to high risk of water erosion in the Northern Cape Province.

Water erosion is the soil loss due to the surface flow of water transporting surface soils.

6.3.4.1 Contributing factors

- Rainfall: Higher rainfall will lead to increased water erosion.
- Climate erosivity;
- Soil erodibility: Silty sands are more likely to erode than gravel or clay.
- Topography: Erosion on valley floors or lower lying areas is more prevalent.
- Land cover and vegetation cover: Where land cover or vegetation exists, more resistance to water erosion is offered.

6.3.5 Groundwater Vulnerability

Based on the groundwater vulnerability map for South Africa, compiled by the Council for Geoscience, the Northern Cape's groundwater is some of the most vulnerable. Groundwater vulnerability is a measure of how easy or hard it is for pollution or contamination at the land surface to reach a production aquifer (SAGHOS, 2015).

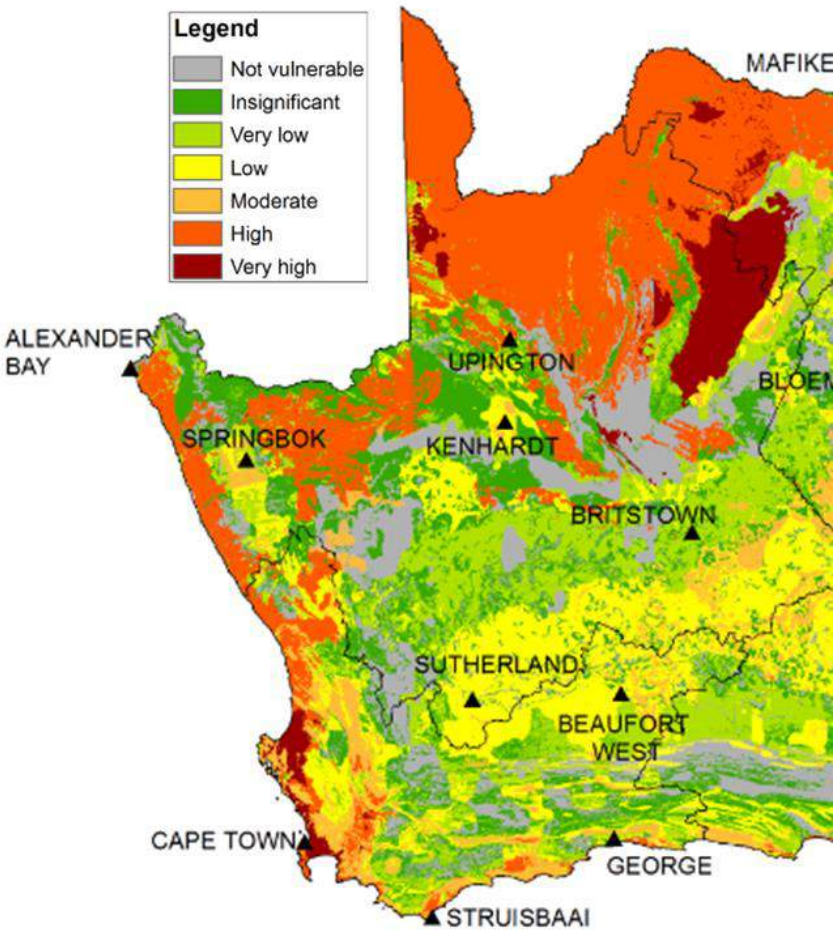


Figure 105: Groundwater vulnerability in the Northern Cape province

6.3.5.1 Contributing factors

- Depth of groundwater (depth to water table).
- Soil type and bedrock type: High organic or clay content reduces potential for contamination. The more fractured the bedrock, the more vulnerable.
- Rainfall: Higher rainfall will lead to more water permeating into the soil which may transport contaminants into groundwater sources.
- Hydraulic conductivity: The more, able an aquifer is to transmit water, the more able it is to receive water and pollutants. An increased hydraulic conductivity leads to an increased vulnerability to contamination.
- Net recharge: Recharge indicates the amount of water per unit area of land penetrating the ground surface and reaching the water table (Aller et al., 1987).
- Land cover: Irrigation water or agricultural chemicals lead to non-point source pollution. Mines and quarries, dongas and sheet erosion also significantly contribute to groundwater pollution.

6.3.6 Problem soils

Problem soils may be divided into four categories: Expansive clays, collapsible sands, soft clays and dispersive soils. The Northern Cape has a significant amount of transported sands, which is prone to collapse and shifting. Expansive clays are prominent in the areas surrounding Kimberly, Britstown, Colesberg, De Aar and the south-eastern parts of the Northern Cape Province.

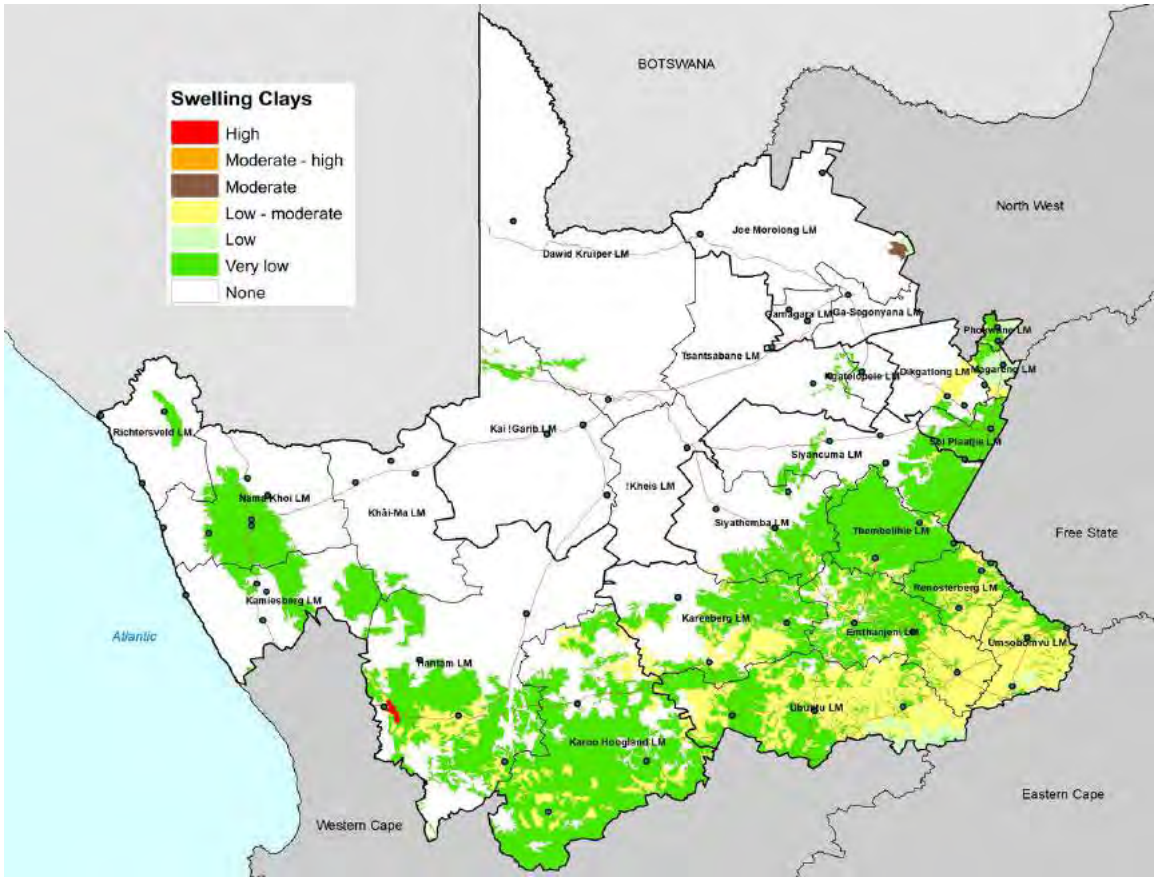


Figure 106: Swelling clay occurrence in the Northern Cape Province

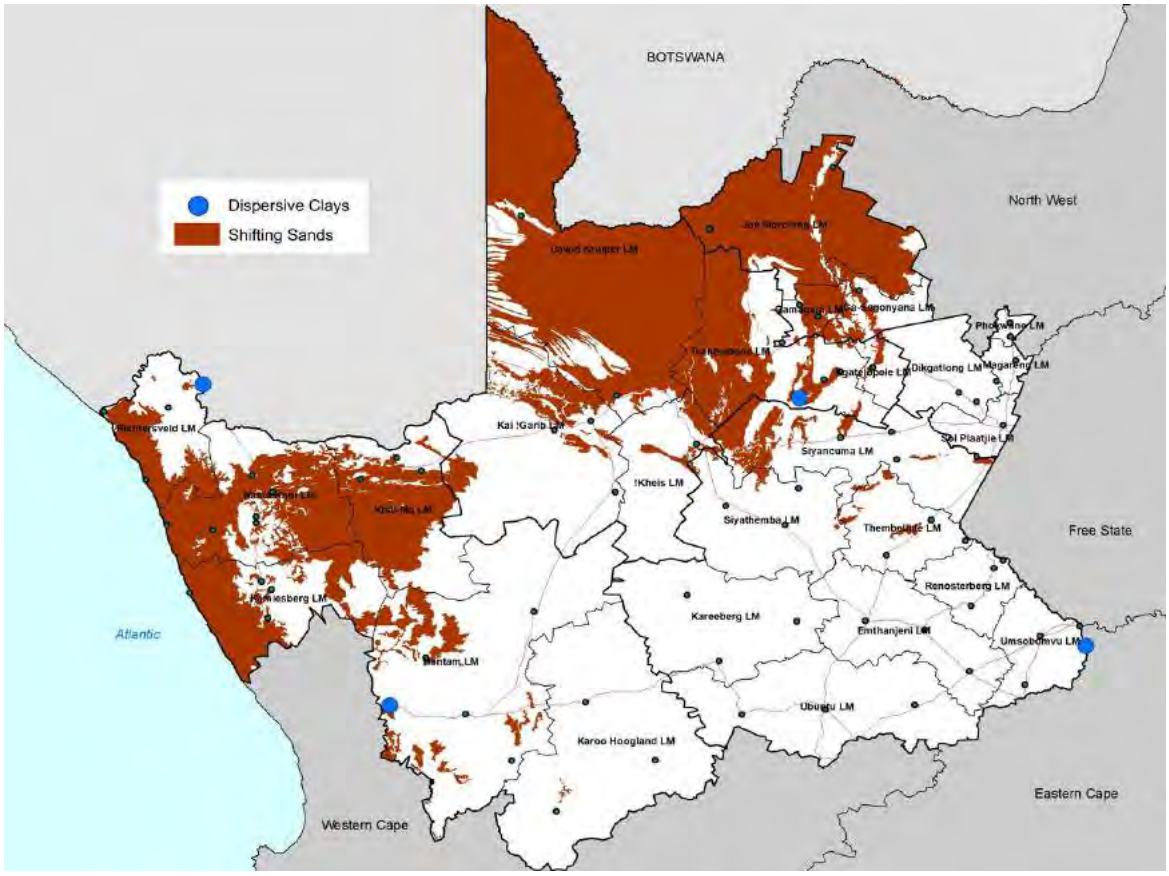


Figure 107: Dispersive clays occurrence in the Northern Cape province

Many low-cost housing developments in the province, notably Lerato Park in Kimberly, have never been occupied due to structural failures prior to being occupied by residents. Collapsing and shifting sands are a concern where the Kalahari sands form a deep transported profile.

6.3.6.1 Contributing factors

Typically, problem soils are affected by the soil properties, soil type and engineering properties of the soils. The climate of the Northern Cape is typically arid to semi-arid which leads to water table fluctuations that may cause expansive clays to heave, collapsible sands to collapse and dispersive soils to disperse.

The main contributing factors are:

- Soil properties, including particle size distribution and mineralogy of soils
- Climate
- Fluctuating water table
- Ingress of water into soil profiles
- Surface water flow

6.3.7 Mine related geohazards

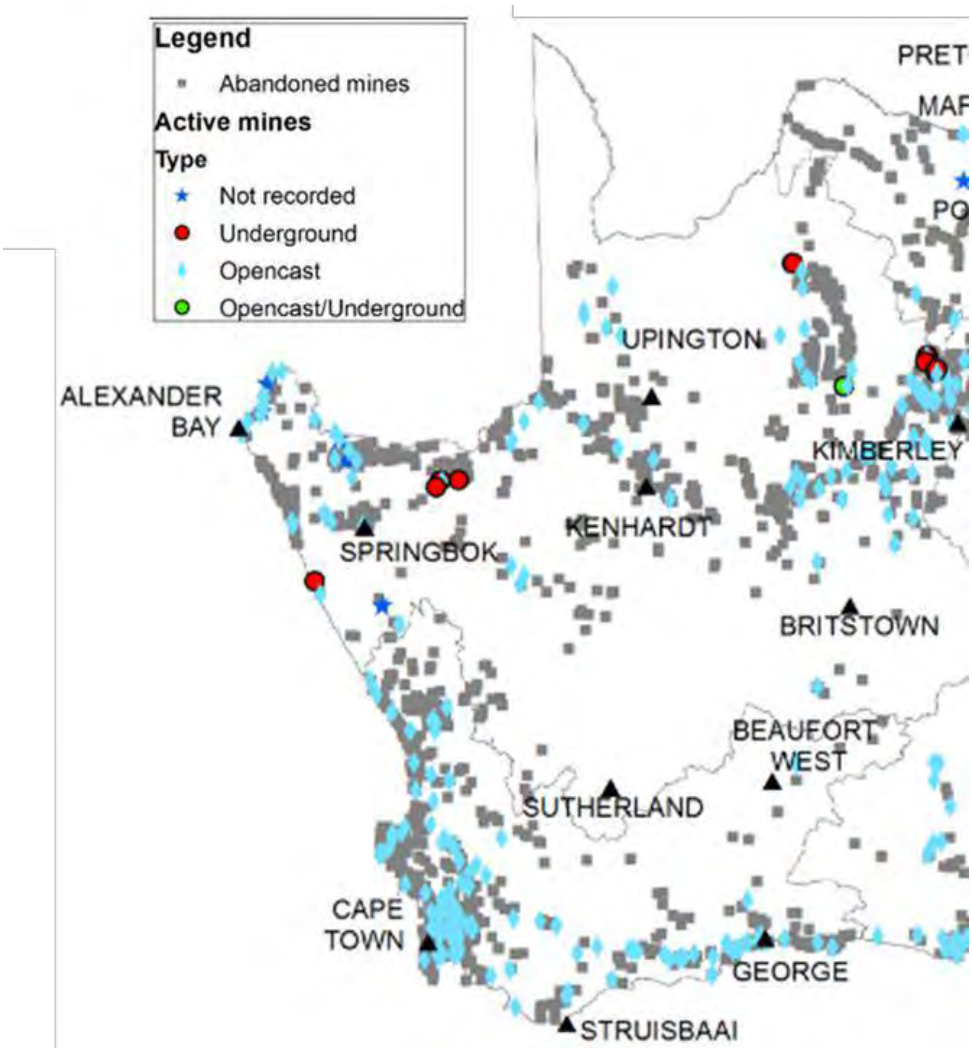


Figure 108: Occurrence of abandoned mines in the Northern Cape Province

A significant amount of mining activity takes place in the Northern Cape Province. Underground mining activities disturb the mechanical equilibrium of rock masses resulting in the accumulation of stresses which may result in deformation at the surface (Booth, 1987). The current challenge lies in rehabilitation, with the Big Hole in Kimberly as a prime example. The area surrounding mining activities are susceptible to sudden collapse and deformation.

6.3.7.1 Contributing factors

- The depth below surface of mining activity
- The thickness of the removed ore
- The composition of the overburden
- The mining techniques employed

6.4 MINERALS

The Northern Cape is rich in minerals, with the country's major diamond pipes found in the Kimberley district. Alluvial diamonds are found on the opposite, western, side of the province, washed westwards by the Orange River into the Atlantic Ocean, where they are extracted from the beaches and sea between Alexander Bay and Port Nolloth. The province accounts for some 7% of global diamond exports, 13% of all zinc and lead exports and more than 25% of the world's manganese exports. Mining giants such as Mittal Steel, Samancor, Gold Fields, PPC Lime, Alpha and Assmang operate in the Northern Cape.

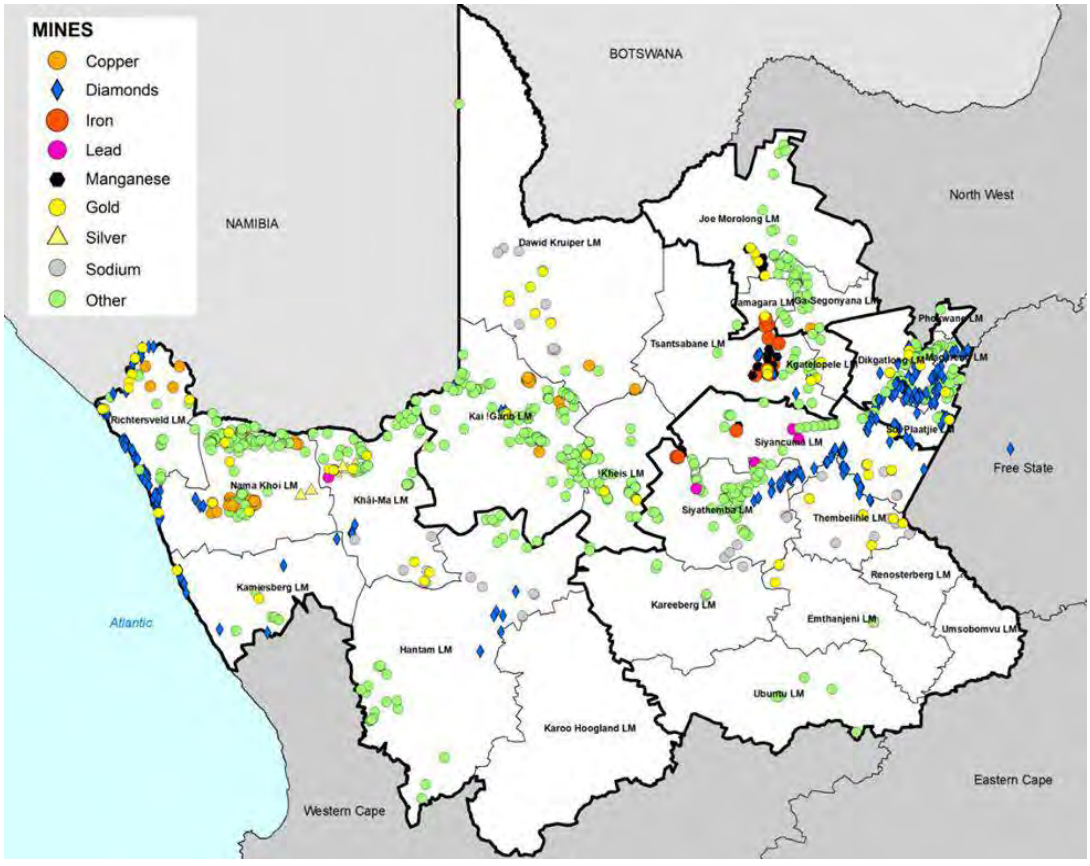


Figure 109: Mineral deposits and Mines in the Northern Cape Province

The region also supplies most of the country's iron ore production. Other important metals and minerals include copper, limestone, gypsum, rose quartz, tiger's eye, mica, verdite and semi-precious stones. These metals and minerals are mostly processed outside the province, so there are opportunities for investors to establish value-adding beneficiation plants inside the Northern Cape. South Africa is a fortunate country. We are situated on a stable tectonic plate and we boast mineral richness that few countries can compete with. Mining has been the driving force behind the South African economy for more than a hundred years and has an impact on all spheres of our economy, environment and our psychology. Mining has often been the centre of attention of labour disputes, pollution and economic concerns. It is a vital industry which may yield a net positive return or a negative return, depending on how it is managed in a South African context.

The Northern Cape Province is the largest of the nine provinces, with most of its mineral deposits concentrated along is northern region. Mining is one of the most prominent economic drives of the Northern Cape Province with several mines and abandoned mines located in the province. Kimberley is an internationally known city, synonymous with diamonds, with Sishen and Postmasburg known for iron ore. The Northern Cape Province is rich in minerals, particularly diamonds, copper, iron and other base metals, limestone and manganese. The iron ore industry is globally competitive, with South Africa being seen as a major role player. The iron ore industry has the potential to grow significantly with the improvement of logistics (rail and port), water resources, energy resources, a viable market and investment capital. The steel manufacturing industry proves to be limited. More than 85% of South Africa's steel is consumed in industry sectors with a very low export quantity. Due to the high cost of logistics and the economy of scale, it is hard to compete with the international steel trade.

The manganese industry offers opportunities in that manganese possess chemical properties that make it an ideal input into the making of alloys. Most of the manganese (94% of demand) produced are consumed by the steel industry who can be classified as integrated mills and mini mills. South Africa is home to approximately 80% of the world's manganese reserves. The diamond industry creates a pipeline that offers several stages in producing retail quality diamonds. The various stages offer many job opportunities and add a significant amount of value. Copper in its natural mineral form goes through a series of concentrating, smelting, refining and shape transformation before it is suitable for use. Unlike most other materials, copper can be 100% recycled over and over again, with no loss of performance. Other minerals mined in the Northern Cape include uranium, limestone, dolomite, Tiger's eye, dolerite (road stone), gypsum, salt, shale and clay.

6.4.1 Summary of primary minerals

The primary minerals present and extracted within the Northern Cape is summarised in the section below**.**

6.4.1.1 Iron Ore:

The Northern Cape produces more than 84% of South Africa's iron ore. The province has two major iron belts, from Postmasburg to Hotazel, and one belt running through Sishen and Kathu. The Sishen-Saldanha railway line takes ore to the coast.

- Sishen mine is located 30km away from the town of Kathu in the Northern Cape Province of South Africa. It is one of the largest open pit mines producing iron ore in the world. Mining at Sishen is carried out as part of Anglo American's Kumba Iron ore operation. The mine accounts for the

majority of Kumba's iron ore production. The mining operation at Sishen dates back to 1953. The first ore from the mine was exported in 1976. More than 900 million tonnes (mt) of iron ore has been produced over 60 years of the mine's operation. The life of Sishen mine is estimated to be 18 years. Expansion projects such as Sishen Lower Grade projects, SEP1B and the Sishen DMS concentrate project are in consideration to extend the life of the mine. everal brownfield expansion projects are in the pipeline for Sishen's operation. The projects include the Sishen lower-grade project phases 1 & 2, SEP1B, and the Sishen DMS concentrate project. The Sishen lower-grade project phase 1, which is in concept study stage, aims at producing 1.7mtpa or iron ore by processing the waste material from the Sishen jig plant. First production from the project is expected by 2019. The Sishen lower-grade project phase 2 is currently in exploration stage. The project aims at producing an additional 4.3mtpa of iron ore for 20 years with the use of advanced beneficiation technology from the lower grade Sishen resources previously classified as waste. The project is expected to begin production in 2019. The SEP1B project, which is under implementation, will process the 0.2mm to 1mm fraction of the jig plant ROM feed which is being currently discarded. The project is expected to be completed in 2013. It will produce an additional 0.73mtpa while increasing the product yield of the jig plant by 3% when completed. The Sishen DMS concentrate project is currently in feasibility stage. It will produce high-grade iron ore concentrate from the tailings of the DMS plant. It is expected to produce 1.1mtpa of less than 200 micron fraction or pellet feed by 2018, which will be blended with Sishen mine fines. The production from the project can be ramped up to 2.9mtpa by 2020 with treatment of the jig tailings.

- The Kolomela mine is operated by the Anglo-American group company Kumba Iron Ore through its subsidiary Sishen Iron Ore Company (SIOC). SIOC is owned 73.9% by Kumba and 26.1% by Black Economic Empowerment (BEE) shareholders. Anglo American holds a 69.7% stake in Kumba. Industrial Development Corporation holds a 12.9% stake and the minority interests account for the remaining 17.4% stake in Kumba. The Kolomela mine consists of seven open pits including Leeuwfontein, Welgevonden, Kapstevel and Klipbankfontein. The mine started commercial production in December 2011 and was awarded ISO 14001 certification in July 2013. Kolomela's life is estimated to be 29 years, with potential for further expansion.
- Khumani: Assmang is set to spend R5.5 billion on increasing production of iron ore at Khumani from 10 million tons per annum to 16 million tons per annum.

6.4.1.2 Manganese

The Northern Cape has the world's wealthiest manganese deposits and it is estimated that South Africa has approximately 80% of the world's manganese reserves. The overwhelming majority of the world's manganese comes from the Postmasburg and Kalahari regions of the Northern Cape. Most of manganese ore deposits are located in the John Taolo Gaetsewe district. Approximately 90% of all manganese consumed annually goes into steel as an alloying element. This is as silico manganese (SiMn), high carbon ferro manganese (HC FeMn) and refined ferromanganese (Refined FeMn). The balance is consumed in other applications such as chemical production, batteries and in other alloys such as aluminium alloys etc.

- Kalagadi Manganese (Pty) Ltd, a company that is held by ArcelorMittal (50%), Kalahari Resources (40%) and IDC (10%) has been involved in the exploration for Manganese in the Kalahari Basin. The three farms on which the company holds new order mining rights are believed to overly some

960 million tons of manganese ore. The recent exploration programme has identified 102 million tons of Mineral Resources. The African Development Bank (AfDB) has approved a €150m loan to finance the Kalagadi manganese mining project in South Africa.

- Tshipi é Ntle Manganese Mining (Pty) Ltd operates the open pit manganese mine, called Tshipi Borwa Mine, in the Kalahari Manganese Field (KMF) located in the Northern Cape. Tshipi é Ntle means "beautiful steel" in the local Tswana language. Waste development and infrastructure construction commenced in 2011 and the first ore was exported in 2012. The Tshipi Borwa mine is a modern low-cost manganese black economic empowered producer that has been setting the benchmark for how mines should be constructed, managed and operated in the New South Africa. Tshipi has a world class manganese deposit and is one of South Africa's four largest open-pit medium grade semi-carbonate manganese ore producers. Tshipi's ore body, which is contiguous to that of BHP Billiton's Mamatwan mine, has a total resource of 164.3 million tonnes of manganese. Tshipi's deposit is very homogenous when compared to that of both its new and existing competitors, making it easy to mine and produce a consistent grade.
- Assmang Manganese Mines, The Kalahari Manganese Field, located in Northern Cape Province, about 700km southwest of Johannesburg, contains around 80% of the world's known high-grade manganese ore reserves. The district yields about 4Mtpa, mined mainly by two companies: Samancor and Assmang. Originally established in 1935, Assmang is jointly owned and managed by African Rainbow Minerals and Assore. The company wholly owns Nchwaning and Gloria manganese mines, near the community of Black Rock. Nchwaning was commissioned in three phases. Nchwaning 1 was commissioned in 1972, Nchwaning 2 in 1981 and Nchwaning 3 in 2001. The Gloria mine, to the south, started production in 1978. Both the mines had processing plants nominally rated to treat 1Mtpa of ore. This capacity has gradually been increased over the years through a series of upgrades.

6.4.1.3 Copper

The largest copper mines are near Areachap north of Upington, and deposits also found in various locations in the Namaqua district, especially around Nababeep and Aggeneys.

6.4.1.4 Lead

The Namaqua District Municipality accounts for 93% of South Africa's lead production with the Gamsberg mine being one of the world's major producers of zinc. Furthermore, the Black Mountain mine near Aggeneys produces lead, copper, zinc and silver by mining various deposits in the area.

6.4.1.5 Zinc

The Northern Cape is responsible for approximately 18% of South Africa's total copper production, with the two most prominent mines in Nababeep and Aggeneys. The Carolusberg Mining Complex has copper reserves of 37.5 million tons, while the Nigramoep deposit has 15 million tons. Zinc is less abundant than the lead deposits, but the province is still responsible for approximately 43% of South Africa's overall zinc production. Various untapped mineral deposits of zinc is located at Gamsberg and Aggeneys.

6.4.1.6 Diamonds

In addition to the kimberlite pipes (i.e. Kimberley Big Hole) and frissures; river and coastal deposits are also present in the Northern Cape. Diamonds have been recovered along the Orange, Buffels,

Spoeg, Horees, Groen, Doorn and Swart Rivers in the province, while coastal deposits have been found at the Orange River Mouth to Lamberts Bay. The most important alluvial diamond mining activities take place on a 250 km stretch of the Namaqualand coast. The concession areas are arranged in numbered 30 km wide coastal perpendicular strips. The following are the most important mines along the coast:

- Koringnaas Complex between Micthells and Somnaas Bay;
- The Buffels Island Complex near Kleinzee;
- The Buffels Marine Complex situated at the mouth of the Buffels River; and
- The Alexander Bay area between Port Nolloth and the Orange River mouth.

Alluvial diamond mining occurs in the Pixley ka Seme district along the banks of the Vaal River, and one of the most prominent mines are found at Saxendrift. South Africa's second-biggest diamond mine, Finsch, at Danielskuil (165k m west of Kimberley) produced approximately 2 334 000 carats of diamonds in 2007, and it producers more diamonds that most other areas in the province. There are approximately five diamond kimberlite pipes extensively mined around Kimberley, i.e. De Beers, Kimberley, Bultfontein, Dutoitspan and Wesselton. Only Bultfontein, Dutoitspan and Wesselton are currently in operation. The Messina mine comprises various mining leases and free holdings on various farms approximately 60 km west of Warrenton (LED Strategy).

6.4.1.7 Limestome and Gypsum

Limestone and its derivative lime are important industrial minerals for the manufacture of Portland cement, as a flux for the production of pig iron and non-ferrous metals, and thirdly in agriculture where it is used primarily as a fertiliser and to neutralise acid soils. Limestone is also used in water treatment and purification as well as sewage treatment. The Northern Cape is a major producer of cement and lime. The major limestone resource in the Northern Cape occurs in a 150 km long belt only a few kilometres wide, that extends along the western edge of the Ghaap Plateau from Griquatown in the south to Kuruman in the north. Within this belt, the strata dips gently to the west and the limestone is present in large lenses up to 10 km long and 200 m thick (Northern Cape Mineral Strategy, 2003). The Bushmanland area in Namaqua has some of richest gypsum deposits in South Africa, especially the mine near Van Wyk's vlei.

6.4.1.8 Other minerals and associated products

Various other minerals are also mined in the province such as Kieselguhr, Wollastonite, Beyllium, Flouorspar, Molybdenum, Uranium, Feldspar, Mica, and Tantalum, and however these deposits are small. Silver is also mined near Aggeneys. Small scale mining of Kieselguhr takes place at Kuruman and Olifantshoek, and apparently some 10 000 tons of Kieselguhr deposits occur in the western part of the John Taolo Gaetsewe district. Untapped Kieselguhr deposits occur near Springbok. Salt is extensively mined at Groot Witpan and Witpan, northwest of Upington. The ZF Mgcawu district has various untapped mineral deposits throughout the district.

6.4.1.9 Semi-precious stones

Semi-precious stones such as Jasper and Suglite are mined at Kuruman and Hotazel. Blue tiger eye, Yellow tiger eye, Jasper and Rose quartz are mined at various locations in the Pixley ka Seme district.

6.4.2 Coastal Exploration

The coastal and marine regions of the Northern Cape's, western coast, is littered with mining activities as well as marine exploration sites. The mining activities, is mainly due to the diamond deposits, transported by river run-off to the coast. Numerous oil and gas fields are located off-shore, due to Orange River basin that has deposited nutrient rich sediments and alluvial over the course of thousands of years. Due to the presence of the oil and gas fields, various permits have been registered for the exploration of these areas, as indicated by **Figure 110**. Due to the potential of the Orange River basin gas and oil fields, the Petroleum Agency of South Africa (PASA), has proposed a pipeline to transport the oil or gas from Port Nolloth to Cape Town and finally to Mosselbay, as indicated by **Figure 110**. The pipeline might create temporary job opportunities, but the Northern Cape will benefit minimally from the exploration and extraction of oil and gas deposits, as the value adding processes will take place in the Western Cape.

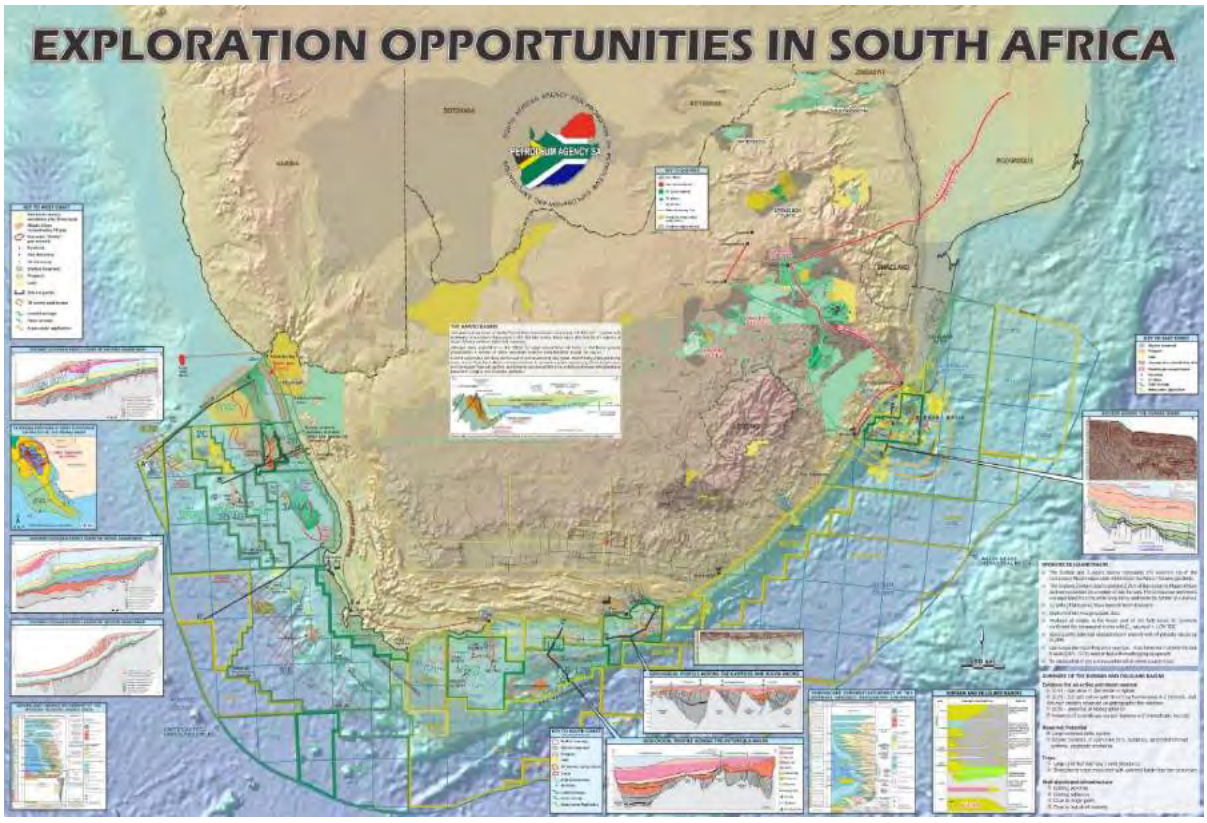


Figure 110: Marine and coastal exploration and production sites

6.4.3 Mining and Water

With the Northern Cape Province considered to be arid to semi-arid, the high-water rations required for mining is a major factor influencing groundwater depth and the contamination of groundwater. This has a profound effect on agriculture and other industries dependent on water.

The availability of water has a significant impact on the establishment of mining in the Northern Cape Province. The Orange River traverses a significant part of the mineral-rich area with infrastructure being developed steadily since the 1950's when the Sishen Iron Ore Mine came into production and was further stimulated by the discovery of substantial base metal ore bodies and the construction of the Sishen-Saldanha rail link.

Many mines in the Northern Cape are operating without water-usage licences and violating the National Water Act as they consume thousands of litres of water daily without being monitored. Of the 36 mines in the country that are operating without the water-usage licences, the Northern Cape has the highest number with 17 such mines, followed by KwaZulu-Natal with 14. The non-compliant mines pose a danger of contaminating water sources and domestic drinking water as government cannot keep tabs on them.

6.4.4 Mineral rights status

The figure below provides an overview of the current mineral rights status in the Province. There is a high concentration of applications within close proximity of the major river systems which can cause further environmental degradation in the Province.

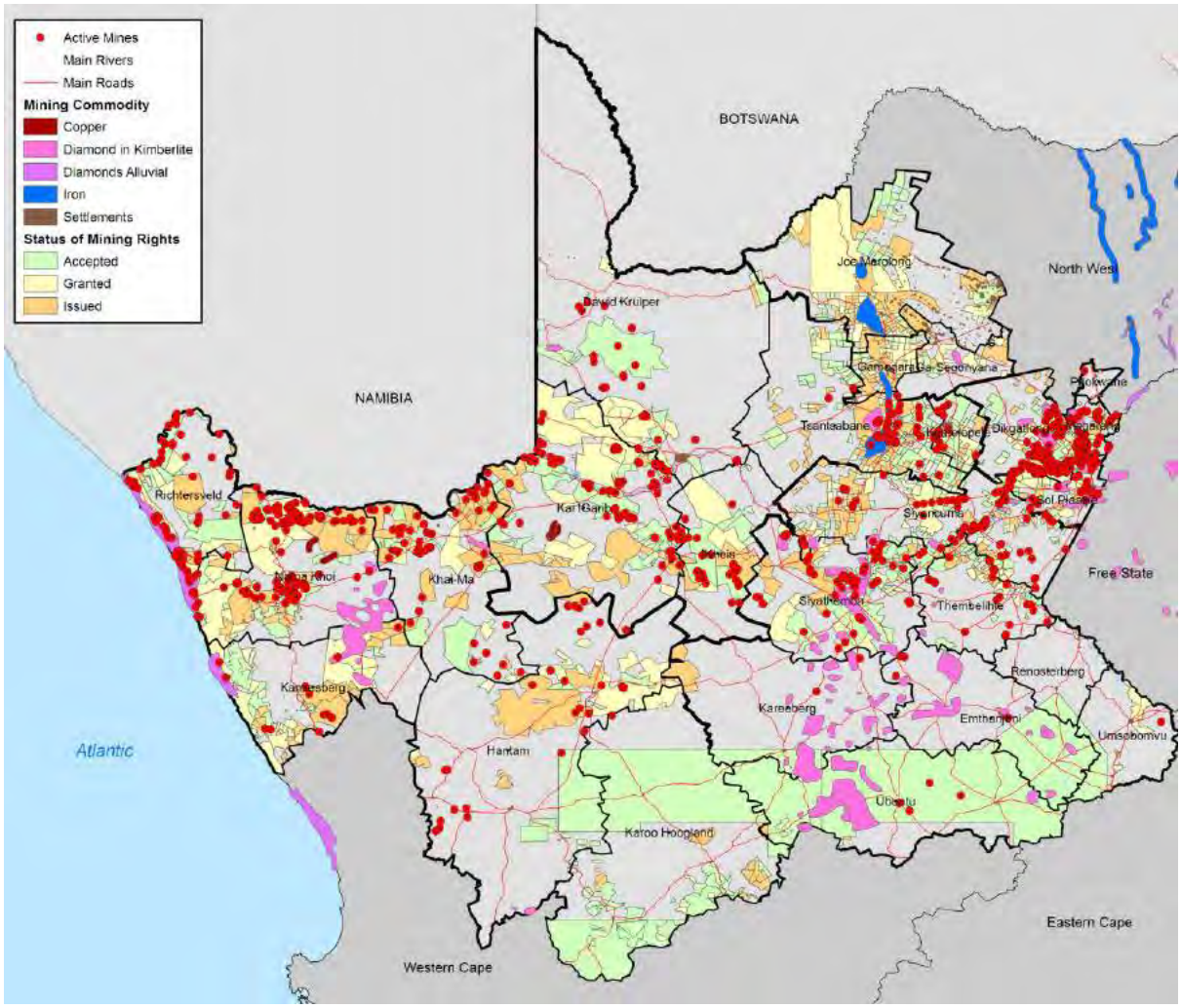


Figure 111: Status of Mineral Rights in the Province

7 SUSTAINABILITY

7.1 OVERVIEW

The Northern Cape Development Plan – Vision 2040 will offer a long-term perspective. It should define a desired destination and identify the role different sectors of society need to play in reaching that goal. The Provincial Development Plan strategic framework must ultimately form the basis of future government detailed planning. As a long-term strategic plan, it MUST serve four broad objectives:

- Providing overarching goals for what we want to achieve by 2040;
- Building consensus on the key obstacles to us achieving these goals and what needs to be done to overcome those obstacles;
- Providing a shared long-term strategic framework within which more detailed planning can take place in order to advance the long-term goals set out in the Northern Cape Development Plan – Vision 2040; and
- Identify Investment opportunities for the Northern Cape with regards to foreign direct investment and modalities to incentivise.

Accordingly, the PSDF will respond and give practical effect to the overarching objective stipulated in the Northern Cape PGDP to ensure integration of development processes and, in particular, to facilitate sustainable development throughout the province.

Sustainable development was defined by the 1987 U.N. World Commission on Environment and Development (referred to as the Brundtland Commission) as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. The International Institute for Sustainable Development (IISD 1995) states that sustainable development occurs at the intersection of three global imperatives, namely environmental integrity, human well-being and economic efficiency. The IISD contends that if these imperatives are not balanced sustainable development cannot be achieved.

Accordingly, the interactive model of sustainability described by Mebratu (1998) illustrates that sustainable development occurs where the three imperatives interact within an ‘interactive zone’. Development outside this ‘interactive zone’ will not be sustainable. The Northern Cape PSDF will strive to ensure and provide strategies that are to ensure that all land use in the province complies with the principle of sustainable development and gives practical effect to the concept.

With regard to the practical implementation of sustainable development the Northern Cape PSDF will be premised on the following principles:

- Sustainable development cannot be ‘delivered’ to passive recipients – it should be implemented in a participative and integrated manner. This requires positive interventions and active participation of all concerned in a spirit of partnership; and
- Sustainable development has to be ‘financed’ in an innovative manner.

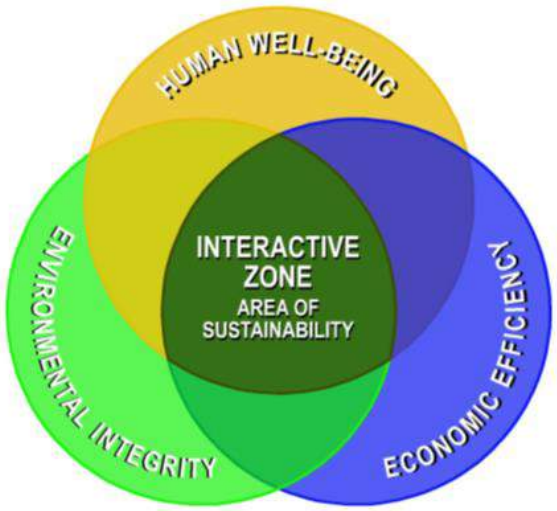


Figure 112: The interactive model of sustainability (Adapted from Mebratu, 1998

With regard to the latter, the shock waves of the current global financial crises are a sobering reminder that human aspirations (both needs and wants) cannot be sustained through money alone. Global environmental degradation resulting from, for example, climate change and collapsing of macro-ecosystems demonstrate that growing human demands cannot be supported through natural systems and processes that are not self-sustaining but dependent on money.

It is clear that monetary systems and Earth and its processes, as the key imperatives for sustained human life, are not infinite and that innovative and drastic intervention is required to halt and reverse the progressive cycle of deterioration. The logical solution is to institute an intervention that 'improves the state of life on earth'. Therefore, sustainable development is required which inter alia requires the efficient use of resources (capital in its various forms). Sustainable development cannot occur without a catalyst in the form of adequate resources, i.e. it must be 'financed'.

But how is sustainable development to be financed? Conventional thinking generally entertains a narrow view that sustainable development is financed by only employing the conventional form of capital, i.e. money. Conventional thinking also requires that any capital investment should produce an adequate return – in simple terms, it must be profitable. Investors across the globe are forever seeking investment opportunities that would return a healthy profit - often without due consideration of the ultimate sustainability of the developments upon which such investments depend. However, monetary investment into projects where long-term sustainability is the over-arching goal is a rare occurrence. Why is this so? Simply because such projects often do not return a profit considered adequate in context of conventional investment timeframes and standard practice.

Therefore, if sustainable development is an imperative for survival on Earth, and if adequate finance is required to enable and maintain such form of development, and if such form of development continues not to meet the conventional profit requirements, it stands to reason that other forms of capital would have to be used together with monetary capital to finance sustainable development. Such other forms of capital are natural capital, infrastructural capital and social capital. The Northern Cape PSDF will strive to combine the four forms of capital into a collective form of finance which is not constrained by conventional thinking on profit returns, etc. This unconventional form of finance is appropriately referred to as sustainability finance, which will be employed in an innovative manner to finance sustainability throughout the Northern Cape. The PSDF is to serve as a mechanism through which the various forms of inherent capital of the province will be enhanced and utilised in an integrated and innovative manner. The PSDF will not replace the functions of any department or functionary tasked with the management of the various forms of capital – it will provide a standard framework and protocol for appropriate execution and integration of departmental functions.

7.2 POLICIES ON SUSTAINABLE DEVELOPMENT

"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs"[70] - is a commonly accepted definition qualified of sustainable development by the three equally important fundamentals of sustainability namely social, biophysical and economic. Business and society cannot exist without a sustainable biophysical basis. Furthermore, political power, policy and decisions are recognised as a fourth critical aspect.

The focus on regional development to promote sustainable development is supported by Agenda 21 prepared by The United Nations Commission on Sustainable Development (CSD) emanating from the United Nations Conference on Environment and Development (UNCED), 1992. The United Nations Commission on Sustainable Development (CSD) is mandated to ensure the effective implementation of the outcomes of Agenda 21. This mandate includes the monitoring and reporting on implementation of agreements at local, national and international levels.

The objectives of Agenda 21 are the alleviation of poverty, hunger, sickness and illiteracy worldwide, while halting the deterioration of ecosystems, which sustain life. As such, CSD provides a forum for considering issues relating to the three core elements of sustainable development (namely economic, social and environmental). Agenda 21 focuses on partnerships involving the public and all relevant stakeholders to resolve developmental problems and to plan strategically for the future. It also tries to address the practicalities of applying sustainable development principles in human activity and development. In line with the goals set by Agenda 21, development goals are set for South Africa[71] of which the following are directly applicable to development in the Northern Cape Province:

- International cooperation to accelerate sustainable development in developing countries and related domestic policies (trade);
- Changing consumption patterns:
  - Changing consumption patterns in energy
  - Changing consumption patterns in transport
- Demographic dynamics and sustainability;
- Protecting and promoting human health;
- Promoting sustainable human settlement development;
- Integrating environment and development in decision making;
- Protection of the atmosphere;
- An integrated approach to the planning and management of land resources;
- Combating deforestation;
- Managing fragile ecosystems: combating desertification and drought;
- Managing fragile ecosystems: sustainable mountain development;
- Promoting sustainable agriculture and rural development;
- Conservation of biological diversity;

[70] *World Commission on Environment and Development: Report of the Brundtland Commission (1987), Our Common Future, Oxford University Press, March 1987*

[71] *United Nations Commission of Sustainable Development. (2002) World Summit on Sustainable Development, Johannesburg 2002.South Africa Country Profile, August 2002*

- Environmentally sound management of biotechnology and transfer of environmentally sound technology, cooperation and capacity building; and
- Protection of the quality and supply of freshwater resources.

At a local level the National Strategy for Sustainable Development (NSSD) promotes the development of effective tools, process and frameworks to manage the integration between social demands, natural resource protection, sustainable use and economic development. The objectives of the NSSD include the following:

- Protect the natural resource base as a priority in order to achieve a sustainable supply of environmental goods and services
- Ensure sustainable livelihoods and food security
- Align policy and legislation that integrates and gives effect to sustainable development at the levels/spheres where it matters most.

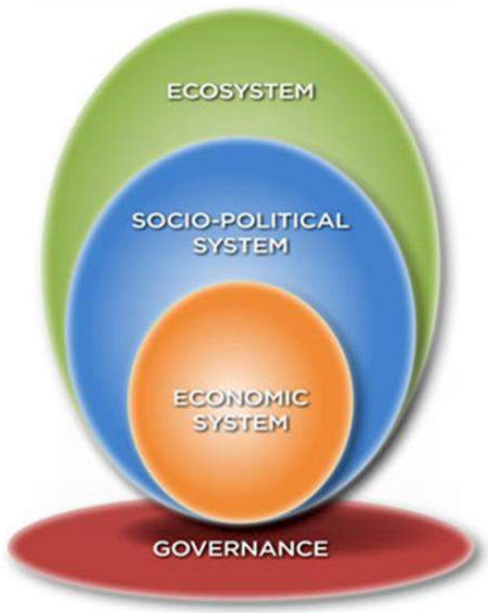


Figure 113: The Northern Cape PSDF and PGDP is based upon the systems approach to sustainability as advocated by the NSSD

7.3 APPROACH

7.3.1 Modelling Sustainability

Literature on sustainable development modelling dates mostly post 1980s. Research conducted on the practical side of sustainability is rather scant with the majority focused on defining theoretical frameworks. Some notable authors under European research such as Kelly (1998) identified tangible components in the attempting to model sustainable development following a systems approach. Various sources confirm the use of technological impact profiling through sustainable development indicators. Lesser and Zerbe (1995) convincingly argued that cost analysis is a worthwhile approach to sustainable development which can be subdivided under economic, social and environmental cost also known as the three primary dimensions of sustainability (Quaddus & Siddique, 2001, p. 90).

Furthermore, is modelling has to be conducted in the planning environment has proven to be very useful. Models accommodate multiple participants with their respective aims and possible trade-offs. Technology aided decision making through modelling is becoming more sought after to solve complex interrelated problems. Through a series of feedback loops, interconnected flows of material, energy and information, models are a robust means to simulate present reality or future trends. Sustainable development modelling must of necessity include multiple criteria, diversities, and preferences (Quaddus & Siddique, 2001, p. 91). Furthermore, another commonly used concept in models is hierarchy, popularized by Saathy (1980) known as “AHP”. The “AHP” comprise of different levels of detail, with the first being the overarching solution. Moving downward the model would define the overall solution through sub components. The lowest level is the individual actions or indicators used to derive the overall solution. Prioritization of input variables is crucial for assigning optimal weights

and typically done through a comparison matrix. The overall aim needs to clearly define the sub components to enforce the overarching goal. At the lowest levels best representatives of the whole need to be included and prioritized. Weighting indicators systematically against criteria speaking to the overarching aim is critical. Sensitivity analysis can be conducted to better understand inputs and answers derived (Quaddus & Siddique, 2001, pp. 93-95).

Modelling sustainable development has been done previously like Threshold 21 Sustainable Development Model which was intended to propose a different future for Bangladesh. Integrating economic production, demography, agriculture, energy, health, education, nutrition and environment is the systematically combined into a single model. Assumptions are inevitable for the Threshold 21 Sustainable Development Model such as expecting that eradication of poverty through economic growth would alleviate environmental degradation is not a viable assumption. Model outputs require a clear understanding of the structure and process and the behaviour produced from leveraging key inputs. The advantage of using modelling allows for improved mental models, better learning and intuition, risk free experimentation, logical expression of complex ideas (Kelly, 1998, pp. 459-463).

In South Africa the he Geospatial Analysis Platform (GAP2) is a set of tools designed to support decision making across borders, scales and sectors or disciplines and jointly developed by the Council of Scientific and Industrial Research and Department of Trade and Industry (Naude, Van Huyssteen, & Goss, 2008, p. 329). Internationally various development practitioners in the sphere of sustainable development has stressed the need for a harmonized and aligned decision-making mechanism to promote territorial cohesion. The concept of inter-regional planning has been well addressed by various academics in the European region and is influencing the broader sphere of developing countries. Apart from being multi-dimensional and highly collaborative in terms of shared inputs, inter-regional planning has much to offer for today's complex realm of planning. The promotion of cooperation between disciplines and sectors across scales and beyond borders is indispensable. Furthermore, the GAP2 model serves as a crucial intergovernmental coordination, integration and alignment mechanism to unify all less than one umbrella of sustainable development. Being faced with spherical governmental systems, strategic planning is essential since all spheres share the same progressive development objectives of eradicating past disparities, poverty, broadening service provision, human skills and economic growth. Although governmental spheres seemingly function interactively yet there often lack the fundamental need of coordinated directives and interventions (Naude, Van Huyssteen, & Goss, 2008, p. 331). The GAP2 model effectively overcomes three common hurdles in planning. First vertical alignment refers to the ability to "zoom in and out" enable synoptic understanding at higher level and more detailed site-specific answers at local level. Secondly, horizontal alignment to facilitate spatial interdependencies across borders. Lastly, integrating development across different sectors/disciplines will promote coordinated spending of public funds by clustering joint objectives (Naude, Van Huyssteen, & Goss, 2008, p. 333).

7.3.2 Sustainable Investment Model (SIM)

The following is a brief overview of the Sustainable Investment Model and the steps involve deriving scientifically acceptable outcomes for spatial development.

7.3.2.1 Phase 1: Data Collection

Sources of Data Collection:

- Geo Terra Image (National Land Use, built up areas, land cover etc data sets to be acquired);

- Existing Municipal and Provincial Spatial Development Frameworks;
- Sector Departments;
- SPISYS;
- AfriGIS;
- Satellite;
- Open Source Datasets;
- Stats 2016 Interpolated Datasets; and
- Propriety Datasets.

Suitable inputs for the model:

- Point, Lines, Areas and Raster's.

7.3.2.2 Phase 2: Conversion

Datasets used in the SIM Model needs to be converted under a single denominator to comparison and combination purposes. Here below are two examples of using point data which is converted spatially into a cost surface. On the left poverty pockets are mapped on the right income per town is mapped. The data can be derived from Stats SA.

The next example combines road data in the form of lines, where the proximity to the road is interpolated to derive a cost surface in terms of distance. Left is national roads, middle is provincial roads and the right is secondary roads. Through hierarchical analysis the three layers are combined into a single roads surface answer in terms of priority.

All aspects such as economic, demographic, environmental and infrastructure can be spatially modelled and address by the SIM by being converted spatially from existing datasets. Furthermore, because so much data can be encapsulated spatially and put into the SIM, a more cohesive spatial vision can be derived that is not only coherent but also scientifically accurate

7.3.2.3 Phase 3: Prioritization

Calculations using the model can be done within any context defined by the user. For example, the prioritization can be done per province, district or municipality. All input sets are reclassified under a single denominator. Such a denominator can represent high or low cost, potential, suitability, degree or probability. Through the use of Multi Criteria Decision Analysis (MCDA) all relevant factors can be strategically combined using the Analytical Hierarchical Process (AHP). These two methods ensure scientific correctness of derived answers in the planning sphere.

The nine-point plan from the NDP can be prioritized through the MCDA process and integrated into the SIM and reflected accordingly. All strategic infrastructure projects can be mapped and prioritized for importance.

7.3.2.4 Phase 4: Alignment

The SIM leaps ahead of traditional planning methodologies by applying GIS technology to accomplish:

- Integration
- Vertical Alignment
- Horizontal Alignment

Initially thee intend with SPCs was to facilitate vertical and horizontal integration of SDFs, however to ensure such an ideal is accomplish the NSDF propose a unique opportunity to accomplish this objective by combining all datasets across municipal and provincial SDFs into a single highly homogeneous output on national level. Furthermore, the SIM would be able to take advantage of all these datasets by strategic combinations through is Multi Criteria Decision Analysis and Analytical Hierarchical Process.

Having seamless correlation between National, Provincial, Regional, Municipal and Precinct in a single SDF is unprecedented. The ability to zoom in through the use of web-mapping the SDF comes alive with new relevance on all scales, as vertical alignment makes this possible.

Lastly the SIM facilitates horizontal alignment not only through the use of SPCs but only its unique ability to combine Biophysical, Socio-Economic and Built Environment Factors into highly accurate derived datasets reflecting all these relevant factors. With the use of modern technology, the SDF can take on a new dimension when these different spheres of importance can be dynamically combined for end users to enjoy. Thus, the SIM will coordinate and integrate provincial and municipal frameworks into its higher order deliverables.

Lastly the thematic reports can be spatially integrated into the SIM allowing further horizontal and vertical alignment. Other relevant datasets from the UN Habitat, UNDP and the World Bank can be subsequently integrated.

7.3.2.5 Phase 5: Land Use Management

The SIM also takes into account to bring practical land use and SDF integration closer through the use of GIS and spatial statistics. The outputs derived from the SIM can be joined to any cadastral dataset where the user can simply click on a land parcel and find the Land Use Zoning as Well as the SDF score. Having the ability to combine the two will make the SDF much more accessible for planners and future developments to make informed decisions. This enhances the process of integrating coordinated transformation in spatial development. The outputs from the SIM can be accessed by simply clicking on the parcel to get a profile of all its relevant SDF components pertaining to that piece of land. Thus, the SIM enhances spatial coordination of land development and land use management on national level.

7.3.2.6 Phase 6: Stakeholder Collaboration

The SIM makes adequate provision for stakeholder engagement where attendees will contribute toward the overall weight of each factor in the derived answers. This methodology ensures that public opinion reflects in the final deliverables. Another important aspect of the SIM, is its ability to be updated with new datasets and re-run, which can serve as a comparison with previous results to monitor implementation and progress. This gives it a long-term relevance for monitoring and evaluation. The MCDA ensures the public to participate in the formulation of the SDF deliverables when they get the opportunity to assign weights of importance to the various factors in the model. This would make excellent use of the proposed meetings and workgroups where their insights are taken into account for calculating the SDF deliverables.

7.3.2.7 Phase 7: Visualization

The SD Model is inherently spatial, meaning the outputs derived can easily be mapped and explained to the relevant beneficiaries. Visualization of results plays an important role to streamline strategic

planning outcomes and monitor progress. This gives the SIM the ability to visually indicate desired spatial development patterns at National Level. Another nifty feature is to visualize results in 3D ads to flare of planning adapting to the new technological standards of the day. Visualization is indispensable to understanding spatial development patterns. Phase 8: Evidence Based Planning

Aggregation of datasets from Local, Municipal, District, Provincial to National is indispensable to ensure national planning is streamlined with underlying factors. The SIM takes all underlying datasets into consideration in presenting its final deliverables. This feature gives the SIM a shared perspective that takes into account government, business and civil societies. This methodology of deriving answers from GIS datasets leads to evidence-based planning, where computational power and planning principles are integrated to present up-to-date answers in a fast-growing technological environment. The ease at which data is presented spatially makes is possible for flawless integration with other government policies such as the National Development Plan (NDP) and development initiatives into the final deliverables to give effect to all such plans.

7.3.2.8 Outputs from the SIM model can be:

- Mapped and illustrated
- Uploaded for online mapping applications
- Statistically summarized for any area specific datasets such as cadastre sets
- Tabulated and analysed using database queries.
- Made available on portable media devices where users can view and interact with the datasets

Furthermore, SIM was built to facilitate the answering of difficult questions such as identification of inequality, areas of opportunity and areas of environmental sensitivity which ultimately leads to more sustainable development. Below is an illustration where biodiversity is taken into consideration in the final answer giving it a different value.

The SIM answers can be converted and presented in any area format, which gives a quick in-depth report from the model. This greatly simplifies the SIM Model outputs for the average user to understand. Monitoring and evaluation of the SDF vision can be dynamically updated as underlying data is updated and the model re-run.

7.3.2.9 Phase 8: Sustainability

The SIM Model take a unique view on sustainability by aggregating datasets pertaining to the environmental, social and economic aspects and combining it in numeric form or colour bands to illustrate sustainability. With the use of the SIM Model sustainability is no longer a theory buy a tangible output of the model which can be illustrated and interpreted by the end user using colour. This method facility the use of datasets in calculating actual sustainability answers for the Northern Cape.

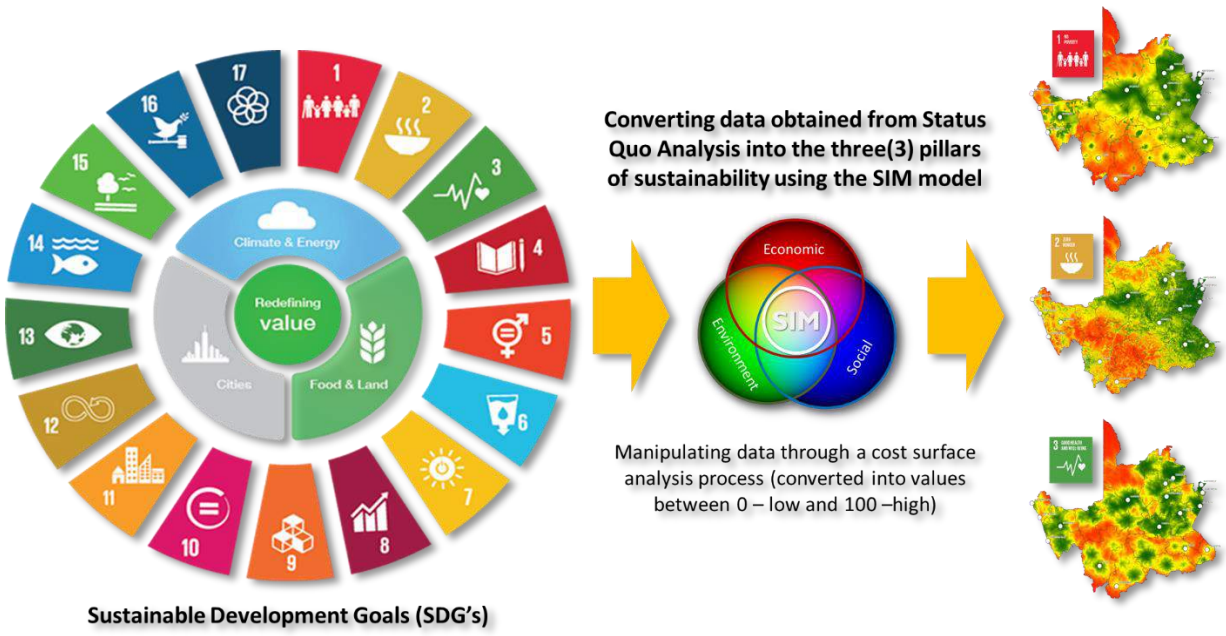


Figure 114: Data conversion process to visually represent each SDG

7.4 RESULTS

7.4.1 No Poverty

Poverty is more than the lack of income and resources to ensure a sustainable livelihood. Its manifestations include hunger and malnutrition, limited access to education and other basic services, social discrimination and exclusion as well as the lack of participation in decision-making. Economic growth must be inclusive to provide sustainable jobs and promote equality. The Northern Cape's poverty levels are concentrated in rural areas characterised by low economic potential due to the arid climate or vast distances too area with economic and employment potential.

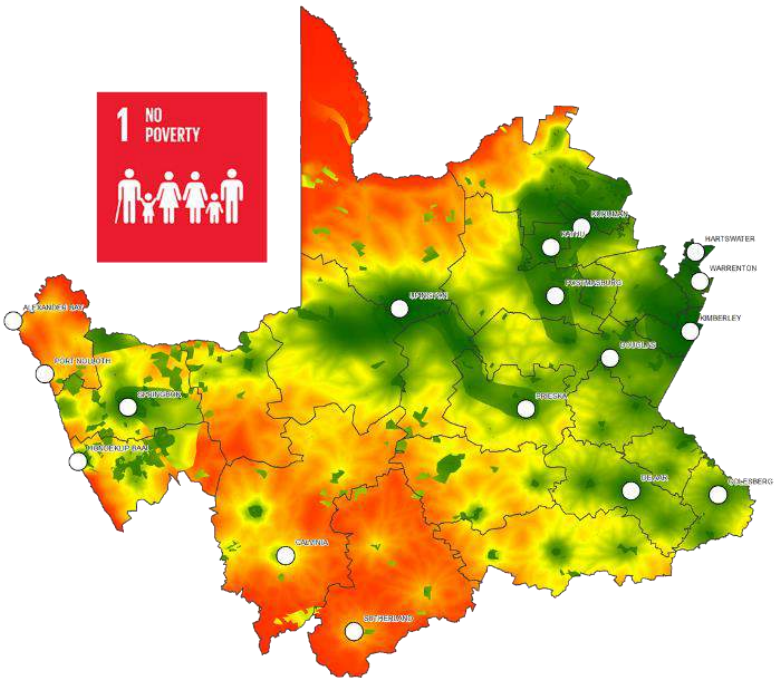


Figure 115: SIM results for SDG 1

7.4.2 Zero hunger

Right now, our soils, freshwater, oceans, forests and biodiversity are being rapidly degraded. Climate change is putting even more pressure on the resources we depend on, increasing risks associated with disasters such as droughts and floods. Many rural women and men can no longer make ends meet on their land, forcing them to migrate to cities in search of opportunities. A profound change of the global food and agriculture system is needed if we are to nourish today's 795 million hungry and the additional 2 billion people expected by 2050.

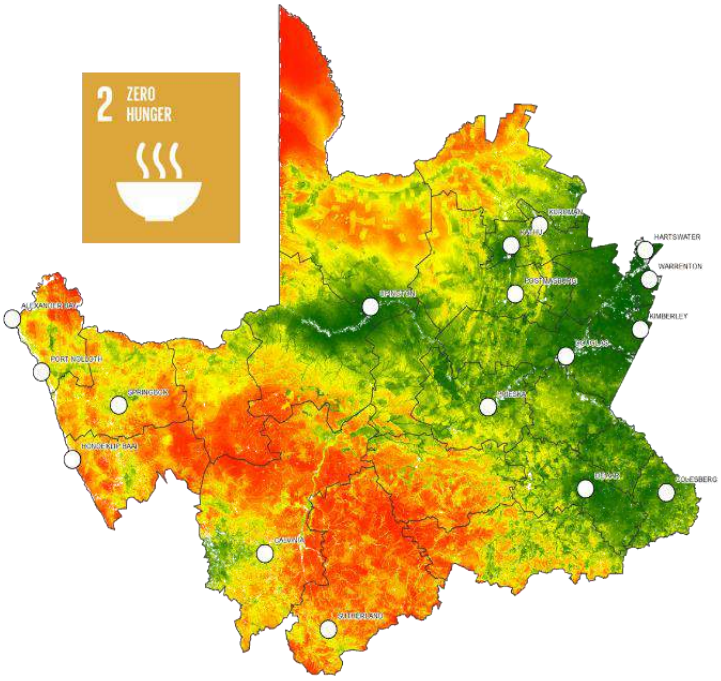


Figure 116: SIM results for SDG 2

Communities and agricultural resources that are situated towards the north and mid-western regions of the Northern Cape experienced the highest risk of food shortages due to the arid climate, and low land capability as well as due to the vast distances that need to be travelled to gain access to area with higher agricultural potential.

7.4.3 Good wealth and well-being

Ensuring healthy lives and promoting the well-being for all at all ages is essential to sustainable development. Significant strides have been made in increasing life expectancy and reducing some of the common killers associated with child and maternal mortality. Major progress has been made on increasing access to clean water and sanitation, reducing malaria, tuberculosis, polio and the spread of HIV/AIDS. However, many more efforts are needed to fully eradicate a wide range of diseases and address many different persistent and emerging health issues.

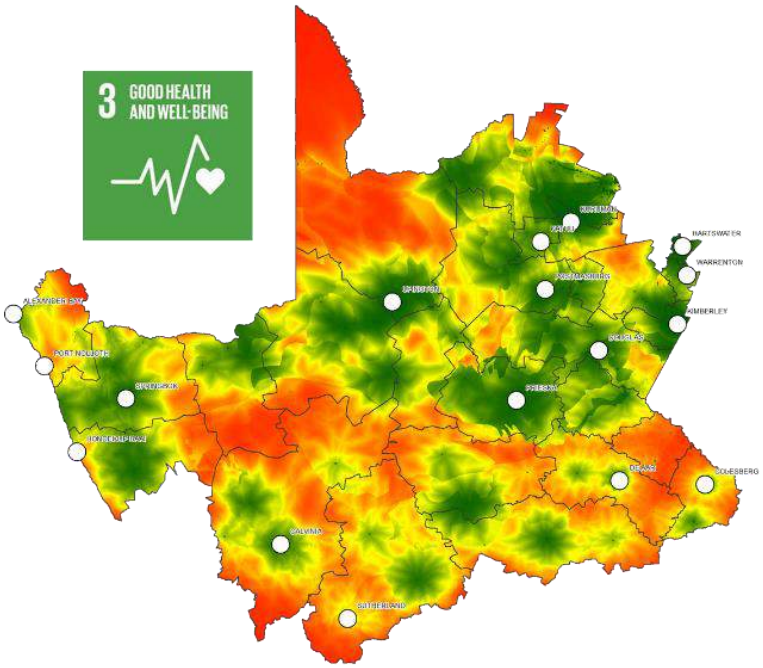


Figure 117: SIM results for SDG 3

The Northern Cape's areas with the highest potential to offer wealth and well-being are the towns and settlements with a greater level of access to services as well as economic opportunities.

7.4.4 Quality education

Obtaining a quality education is the foundation to improving people's lives and sustainable development. Major progress has been made towards increasing access to education at all levels and increasing enrolment rates in schools particularly for women and girls. Basic literacy skills have improved tremendously, yet bolder efforts are needed to make even greater strides for achieving universal education goals.

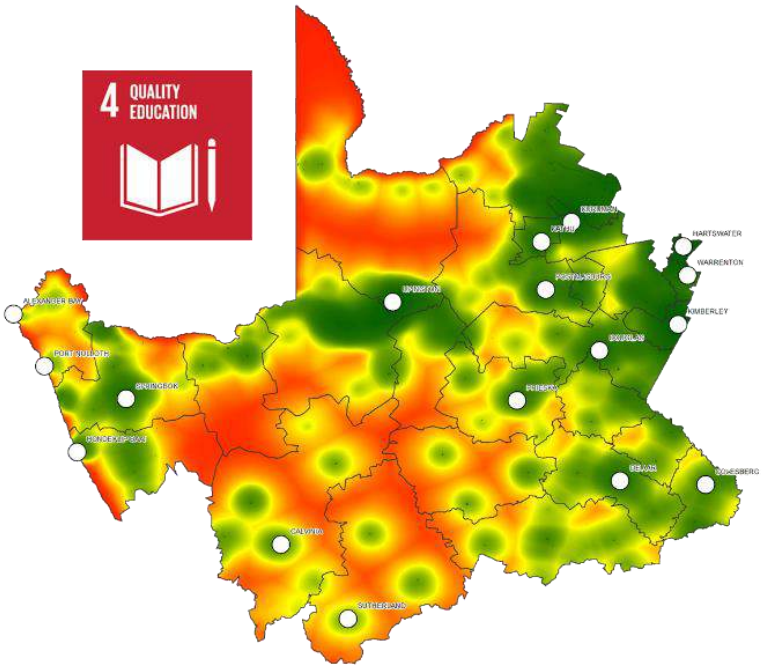


Figure 118: SIM results for SDG 4

For example, the world has achieved equality in primary education between girls and boys, but few countries have achieved that target at all levels of education. Quality education in rural areas such as towards the north and central parts of the Northern Cape is a prominent challenge, due to limited human and physical capital within these regions. Quality education is mainly concentrated within the urban areas within the Northern Cape.

7.4.5 Gender equality

Gender equality is not only a fundamental human right, but a necessary foundation for a peaceful, prosperous and sustainable world.

Providing women and girls with equal access to education, health care, decent work, and representation in political and economic decision-making processes will fuel sustainable economies and benefit societies and humanity at large

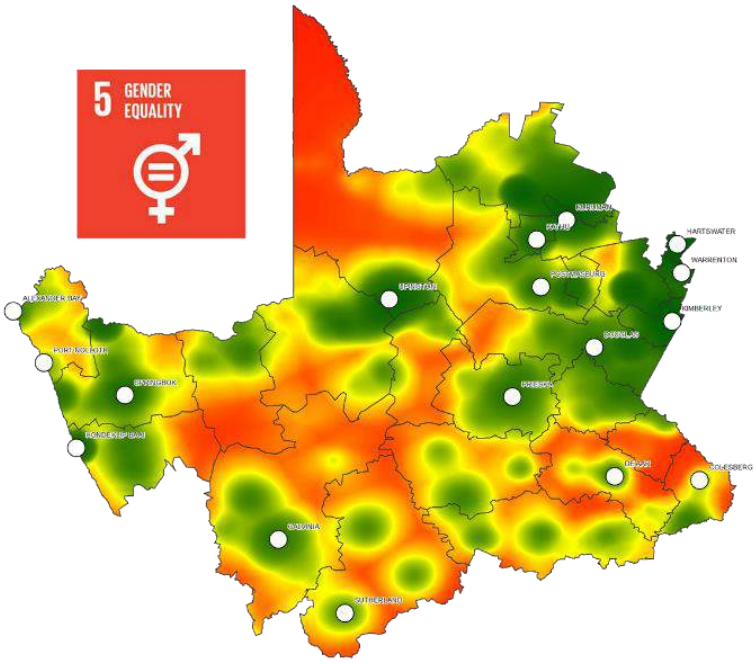


Figure 119: SIM results for SDG 5

Typically gender equality is greater or easier to obtain within urban settlement. In some cases, gender equality can also be obtained within rural or tribal communities, depending on the gender roles and functions, and underlying moral structure of the communities.

7.4.6 Clean water and sanitation

Water scarcity, poor water quality and inadequate sanitation negatively impact food security, livelihood choices and educational opportunities for poor families across the world. Drought afflicts some of the world's poorest countries, worsening hunger and malnutrition.

Communities with the highest levels of access to clean water are concentrated along the Orange and Vaal river systems, and to some extent water pipelines.

The greater level of access observed in the Springbok area is mainly due to the numerous boreholes, the community depends on.

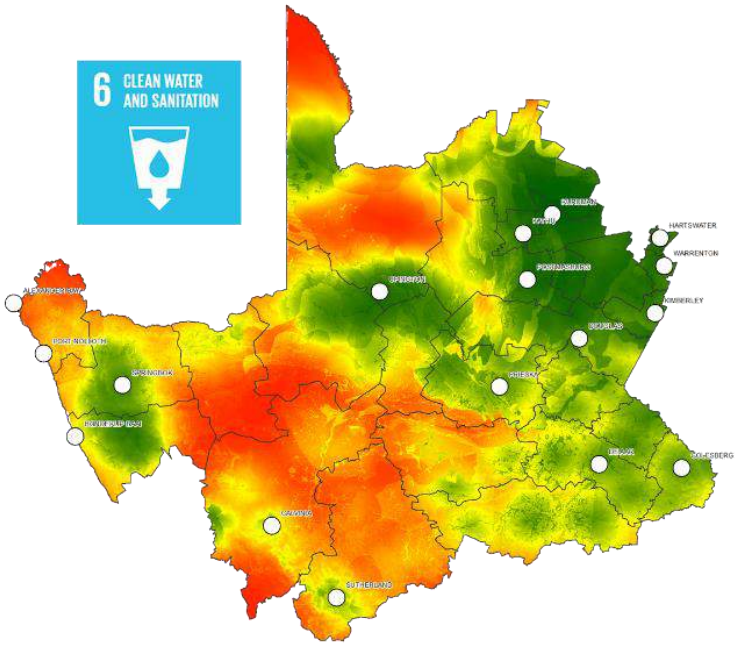


Figure 120: SIM results for SDG 6

7.4.7 Affordable and clean energy

Energy is central to nearly every major challenge and opportunity the world faces today. Be it for jobs, security, climate change, food production or increasing incomes, access to energy for all is essential.

Sustainable energy is opportunity – it transforms lives, economies and the planet. The Northern Cape has a large comparative advantage to provide clean energy (mainly solar) due to the high level of radiation and low levels of precipitation.

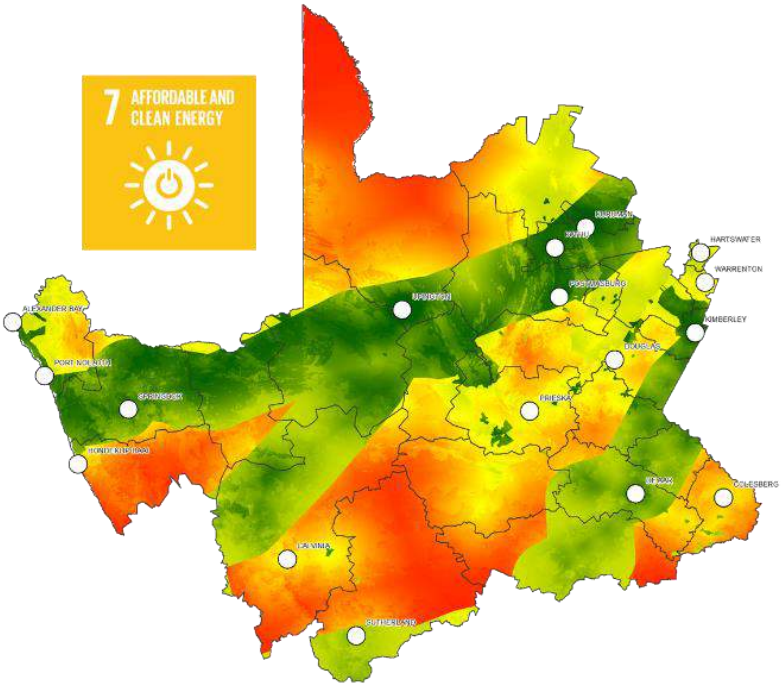


Figure 121: SIM results for SDG 7

The areas with the highest potential is situated toward the north-western parts of the province as well as the south-eastern corner due to the proximity to high voltage lines and infrastructure required to transport and distribute the energy.

7.4.8 Decent work and economic growth

A continued lack of decent work opportunities, insufficient investments and under-consumption lead to an erosion of the basic social contract underlying democratic societies: that all must share in progress. The creation of quality jobs will remain a major challenge for almost all economies well beyond 2017.

Areas with the greatest potential to provide decent work opportunities and economic growth is concentrated in areas with the highest land capability with regard to water access and rainfall as well proximity to large industries such as mining activities.

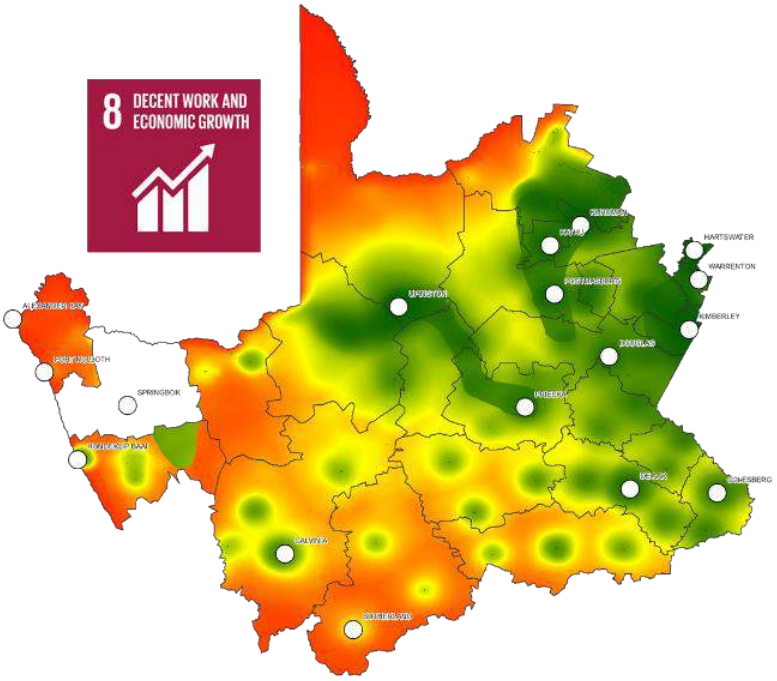


Figure 122: SIM results for SDG 8

7.4.9 Industry, innovation and infrastructure

Investments in infrastructure – transport, irrigation, energy and information and communication technology – are crucial to achieving sustainable development and empowering communities in many countries. Inclusive and sustainable industrial development is the primary source of income generation, allows for rapid and sustained increases in living standards for all people, and provides the technological solutions to environmentally sound industrialisation.

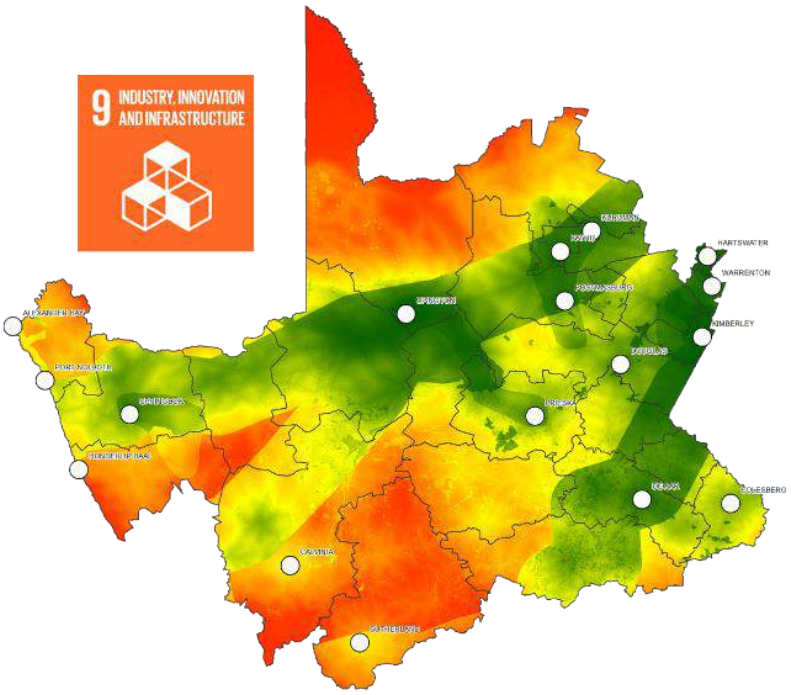


Figure 123: SIM results for SDG 9

Technological progress is the foundation of efforts to achieve environmental objectives, such as increased resource and energy-efficiency. Without technology and innovation, industrialization will not happen, and without industrialization, development will not happen. In terms of the Northern Cape infrastructure and innovation is concentrated along major transport routes. This is mainly due to that the higher accessibility and route of least resistance with regards to technology and innovation.

7.4.10 Reduced inequalities

There is growing consensus that economic growth is not sufficient to reduce poverty if it is not inclusive and if it does not involve the three dimensions of sustainable development – economic, social and environmental.

With regards to the Northern Cape, inequality is a major concern due to the high GINI coefficient. The map clearly illustrates the areas where income inequality is the

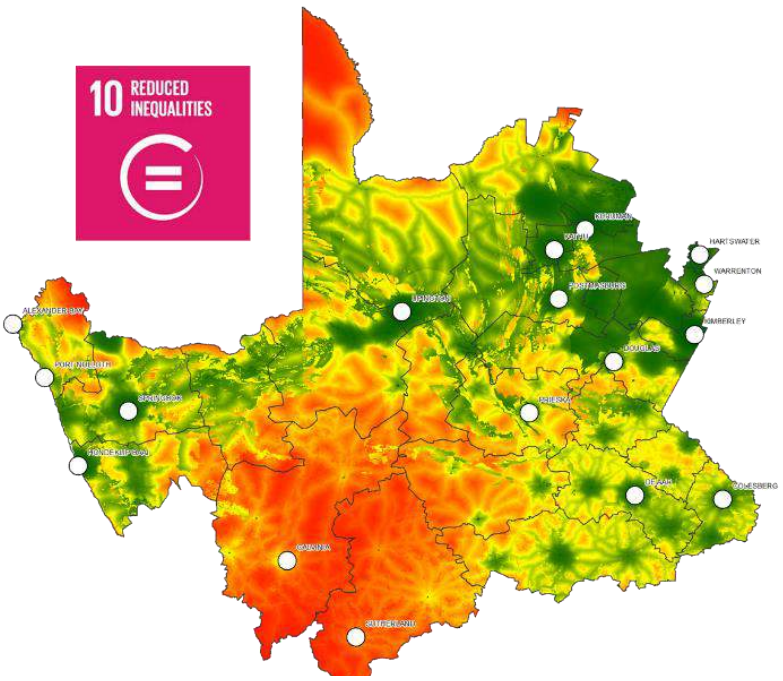


Figure 124: SIM result for SDG 10

highest, is also the areas with the least potential due to water accessibility, low land capability and overall accessibility to services.

7.4.11 Sustainable cities and communities

Cities are hubs for ideas, commerce, culture, science, productivity, social development and much more. At their best, cities have enabled people to advance socially and economically.

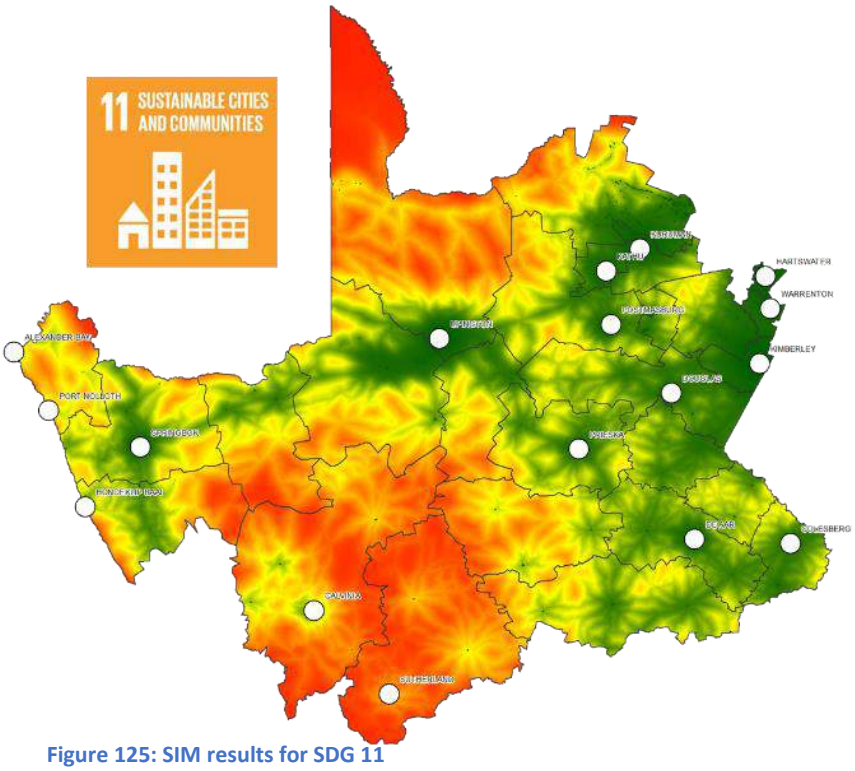


Figure 125: SIM results for SDG 11

The challenges cities face can be overcome in ways that allow them to continue to thrive and grow, while improving resource use and reducing pollution and poverty. The future we want includes cities of opportunities for all, with access to basic services, energy, housing, transportation and more. Cities and towns towards the eastern region of the Northern Cape have a larger potential to be sustainable due to the high level of interconnectivity between the cities and towns as well the higher level of access toward services and higher population densities which are able to justify the level of service provision

7.4.12 Responsible consumption and production

Sustainable consumption and production aims at "doing more and better with less," increasing net welfare gains from economic activities by reducing resource use, degradation and pollution along the whole lifecycle, while increasing quality of life. It involves different stakeholders, including business, consumers, policy makers, researchers, scientists, retailers, media, and development cooperation agencies, among others.

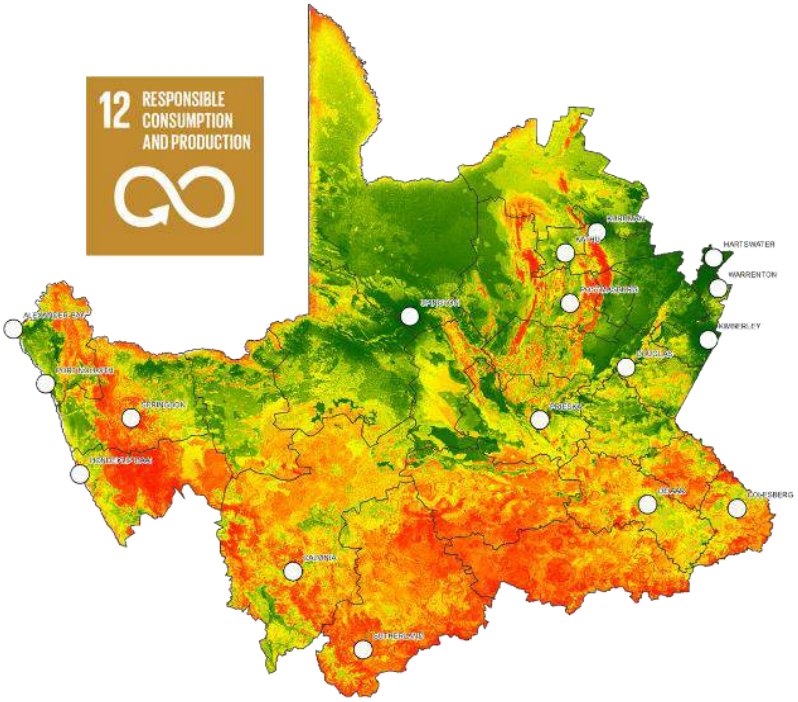


Figure 126: SIM results for SDG 12

Within the Northern Cape it will become crucial to effectively manage environmental resource in order to ensure overall sustainability. In some cases, economic potential of industries (such as the west coast marine resources) will need to be unlocked. Within the red areas of the illustration, resources management will be greatly needed.

7.4.13 Climate action

To address climate change, countries adopted the Paris Agreement at the COP21 in Paris on 12 December 2015. The Agreement entered into force shortly thereafter, on 4 November 2016. In the agreement, all countries agreed to work to limit global temperature rise to well below 2 degrees Celsius, and given the grave risks, to strive for 1.5 degrees Celsius.

Within the Northern Cape it will be crucial to invest in climate change adaptation within the areas illustrated in orange and red hues. As these areas and the livelihoods of communities within it, are at greatest risk with regard to climate change related issues.

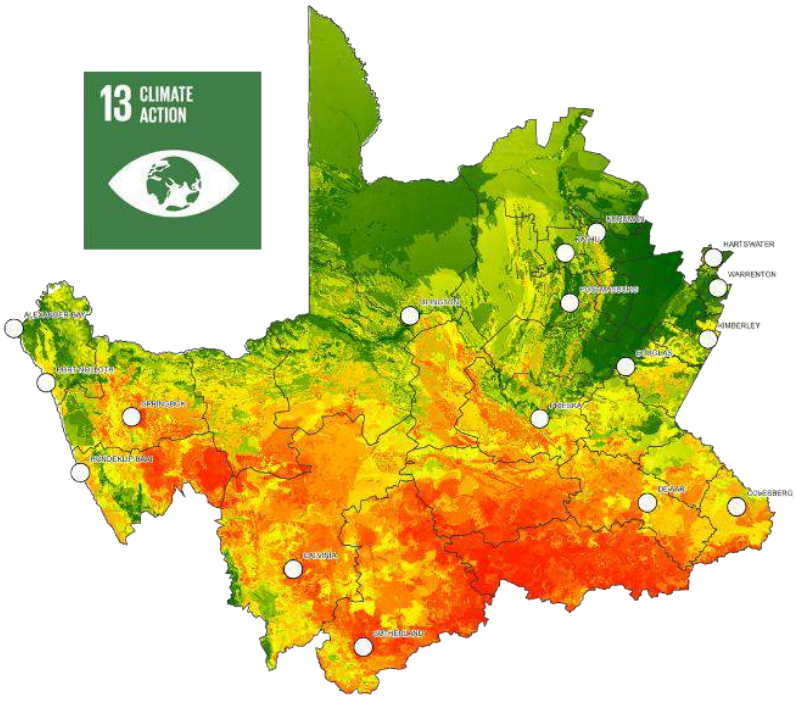


Figure 127: SIM results for SDG 13

7.4.14 Life below water

The world's oceans and rivers – their temperature, chemistry, currents and life – drive global systems that make the Earth habitable for humankind.

As the Northern Cape is a semi-arid region faced with water scarcity, the management of water resources is of the upmost importance. Areas indicated and red and orange hues, are at greatest risk to experience water shortages.

Area indicated in green and yellow hues are less vulnerable but will still require effective management in order to fully utilise the available water resources.

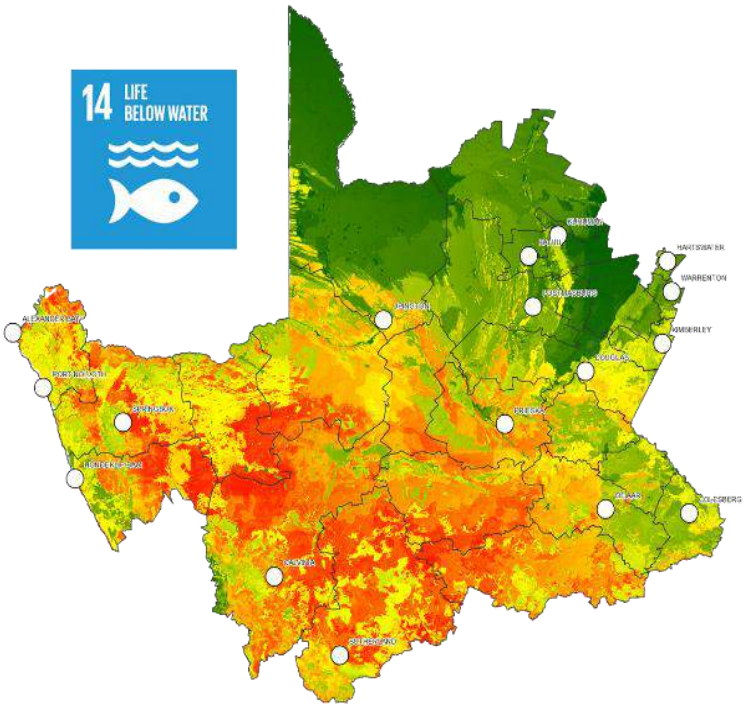


Figure 128: SIM results for SDG 14

7.4.15 Life on land

Deforestation and desertification – caused by human activities and climate change – pose major challenges to sustainable development and have affected the lives and livelihoods of millions of people in the fight against poverty. Efforts are being made to manage forests and combat desertification.

As the Northern Cape is already classified as a semi-arid region, it will be crucial to put measure in place to combat desertification and degradation of natural resources, in order to obtain the goal of sustainable consumption.

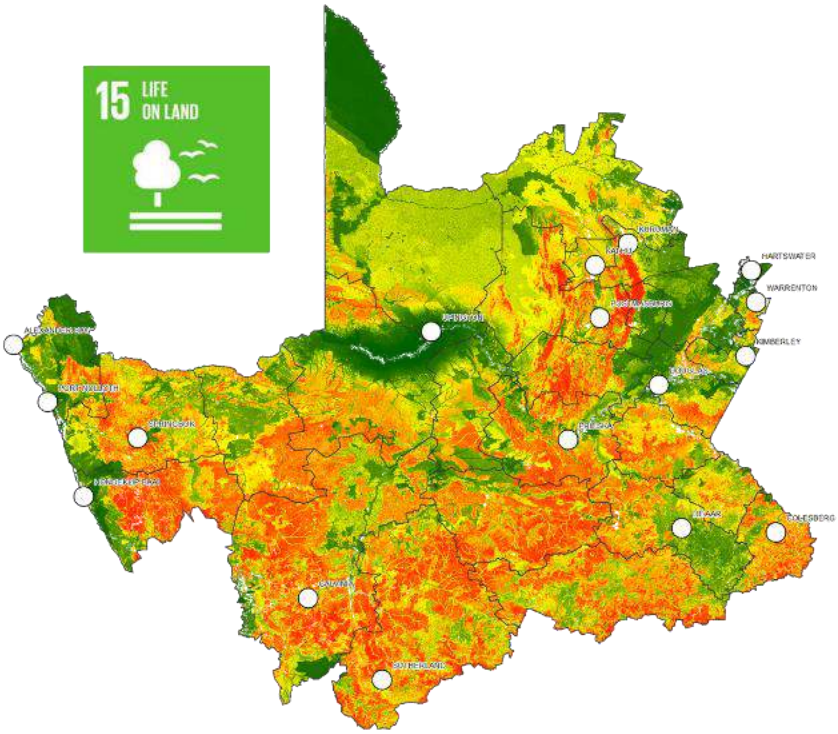


Figure 129: SIM results for SDG 15

7.4.16 Peace, justice and strong institutions

As competition for resources will increase, the need for peaceful, inclusive societies for sustainable development, the provision of access to justice for all, and building effective, accountable institutions will be crucial.

The presence of fair and strong justice institutions will be crucial within the rural areas (depicted in red and orange hues) as the competition for resources will be the greatest in these areas. Are marked in green and yellow hues have a relatively strong existing presence regarding peace and justice institutions.

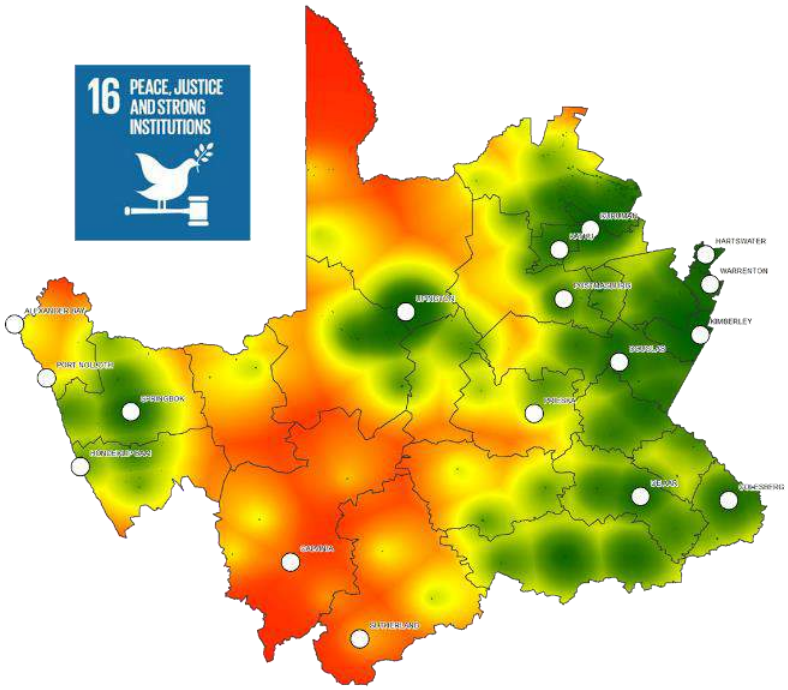


Figure 130: SIM results for SDG 16

7.4.17 Partnerships for the goals

A successful sustainable development agenda requires partnerships between governments, the private sector and civil society. These inclusive partnerships built upon principles and values, a shared vision, and shared goals that place people and the planet at the centre, are needed at the global, regional, national and local level.

Cooperation between the different spheres of government as well as the cooperation between public and private entities will be crucial to achieve the Sustainable development goals.

The illustration depicts which areas have the highest potential as well existing functioning of partnerships and interconnectedness within the Northern Cape.

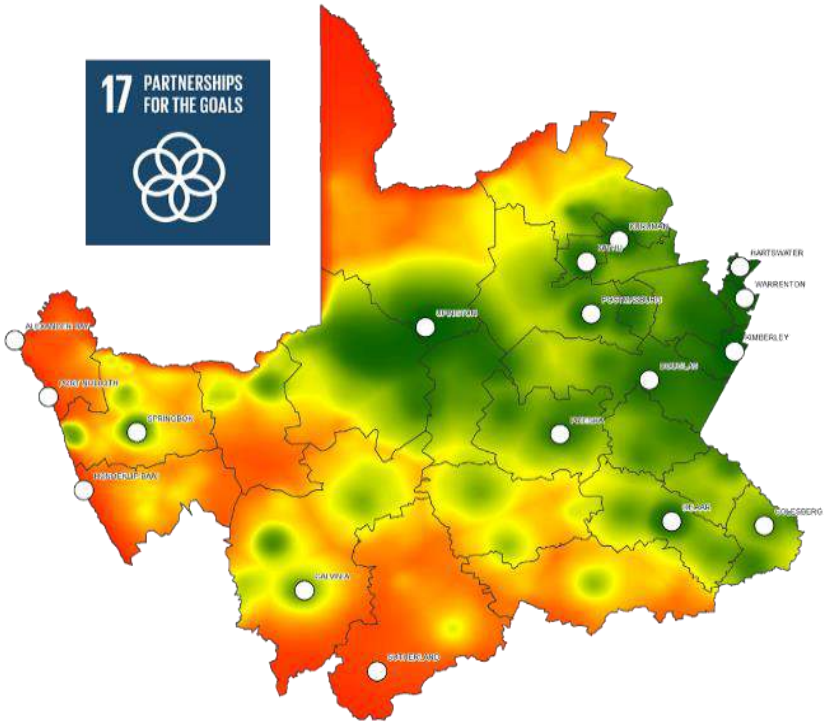


Figure 131: SIM results for SDG 17

8 VULNERABILITY

8.1 VULNERABILITY INFOGRAPHIC

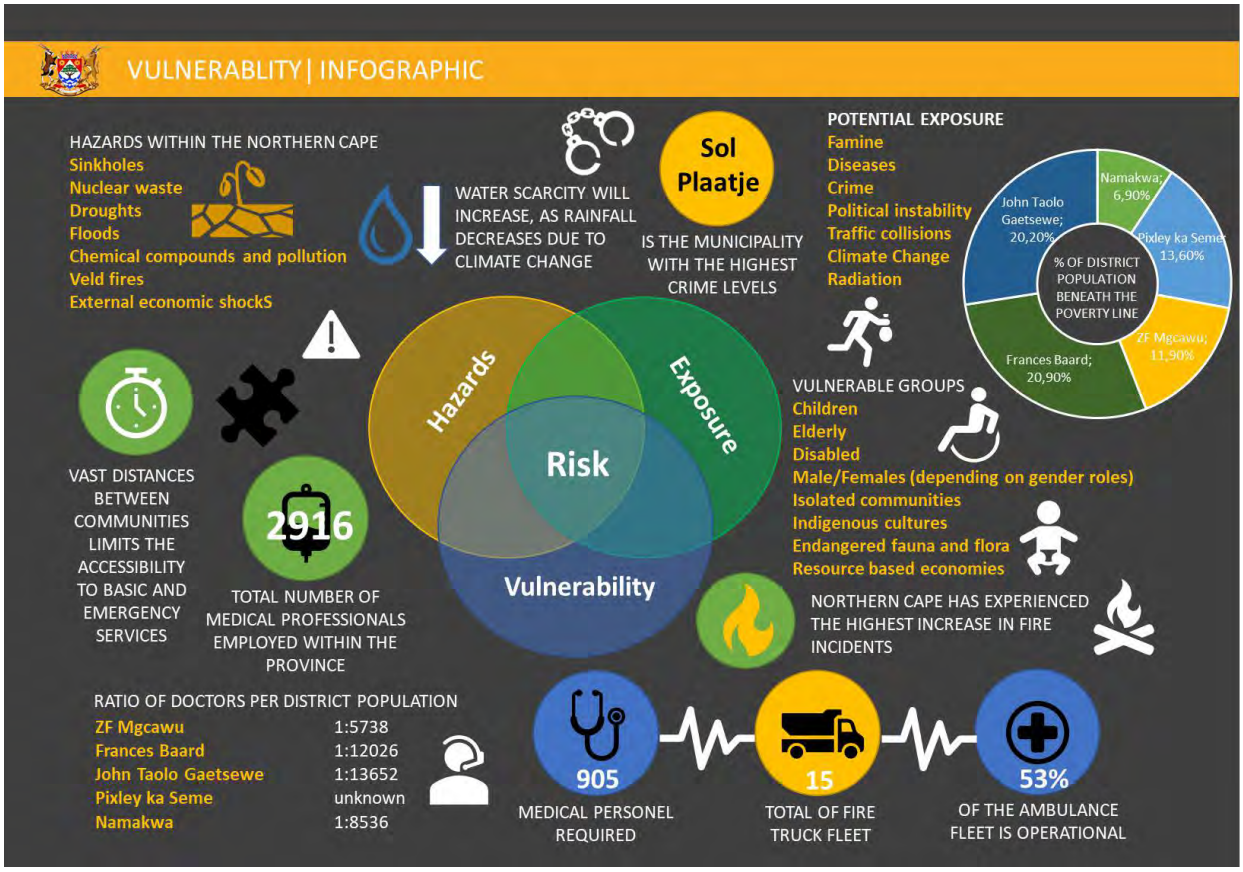


Figure 132: Vulnerability infographic for the Northern Cape

8.2 DEFINING VULNERABILITY

Vulnerability within the spatial planning context is a holistic term that describes the likelihood of adverse implication when various systems are exposed to man-made or natural hazards (OECD[72], 2001). Thus, the level of sensitivity or responsiveness (UNEP and WMO) to adverse effects play an increasingly large role when communities are faced with changing environments whether due to climate change or external economic/political fluctuations.

Error! Reference source not found. refers to the definition of Vulnerability[73]

Due to the increase in fluctuating circumstances, adaptability and the role thereof has become increasingly prominent in the publications of academic and public entities, as communities will continuously need to adapt too new circumstances (due to climate change/ exponential advancements in technology etc.) to sustain their livelihoods.

This greater need for adaptability of spaces and communities has given rise to the resilience orientated planning paradigm, in order to assist current and future inhabitants to adapt to the ever-changing landscapes by providing innovative and interchangeable infrastructure.

[72] *OECG. 2001. Glossary of statistical terms: Vulnerability. https://stats.oecd.org/glossary/detail.asp?ID=2886*
[73] *Adapted from Conservation in a Changing Climate https://climatechange.lta.org/get-started/plan/assess-vulnerability/*

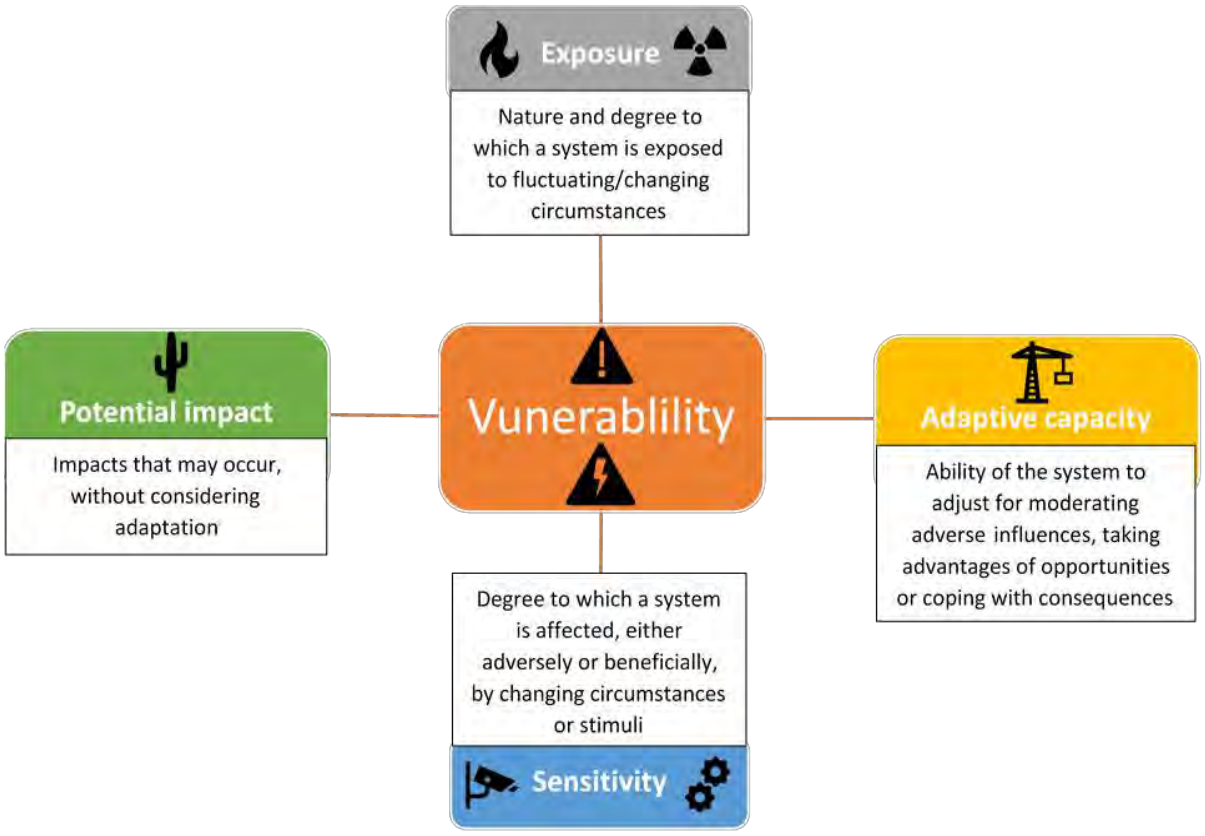


Figure 133: Overview and definition of vulnerability

8.3 VULNERABILITY WITHIN THE NORTHERN CAPE

As communities can be classified as vulnerable due to numerous aspects influencing their livelihoods, it is necessary to explore which aspects will have the greatest negative and positive influences on the population of the Northern Cape Province.



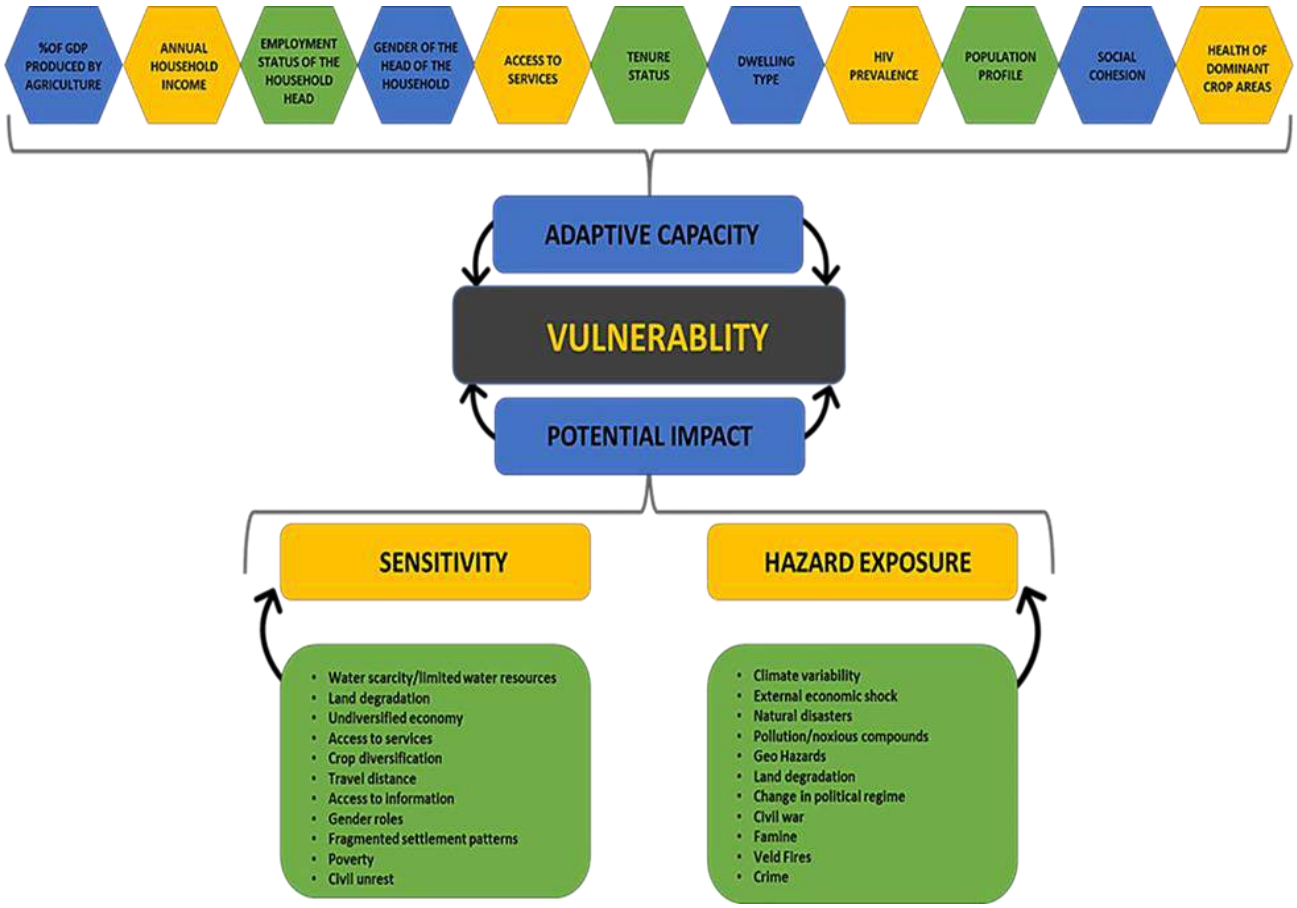


Figure 134: Main aspects that influence the livelihoods of the Northern Cape residents

Figure 134: Main aspects that influence the livelihoods of the Northern Cape residents depicts some of the main aspects that influence the livelihoods of Northern Cape residents. Some of the key vulnerabilities within the Northern Cape is as follows:

- Vast distances and isolation of communities;
- Water scarcity;
- Resource economy dependant;
- Dependence ratio;
- Dependence on social grants;
- Land degradation;
- Semi-arid climate;
- Quality education for rural communities;
- High cost of living;
- Limited public transport systems; and
- Fragmented settlements and ineffective land use management.

8.4 CRUCIAL RISK ASPECTS OF THE NORTHERN CAPE

8.4.1 Politics and governance

One of the key challenges faced by the Northern Cape is the overall functioning of the governance structure, that results in limited cooperation between provincial departments as well as between the different spheres of government. Strong political leadership is crucial in order to create an enabling environment for cooperation and integration of provincial planning by the various sector departments. Currently the performance of the Northern Cape's governance is hindered by political infighting, corruption and unwilling or insufficient political leadership at management levels within sector departments, and in some cases between branches within departments. Due to the unwillingness to cooperate, various efforts and resources are duplicated, limiting the overall effectiveness and impact of governmental projects and interventions.

Furthermore, the overall political climate within the province may also influence the risk profile. It will be crucial to create stability within the Northern Cape, by consistently implementing and endorsing long term strategies and objectives, regardless of the political organisation that is in power (or newly elected), in order to obtain the sought after social and economic transformation. By doing so, it will create a stable environment for investors as well as ensure sector departments that, regardless of the political climate, that the focus of the province will be placed on implementing medium and long-term strategies that are accessible to all stakeholders

8.4.2 Environment

The current state of the environment (water scarcity, land degradation etc) of the Northern Cape needs to be improved in order to improve the overall capacity and benefits of a healthy environment. The 2015-2017 drought serves as a clear indication that the province is highly vulnerable to climate variability and climate change indicating that a strong focus needs to be placed on water conservation and management. In order to foster a resilient environment, resources will need to be utilised more effectively, where in other areas rehabilitation will play a key role for rural and tribal communities that are dependent on the environment and land for their daily livelihoods. Land degradation is a crucial aspect, as it also impacts the overall food security of communities, which may cause rural and tribal areas to experience a heightened level of vulnerability in this regard.

Pollution and the impact thereof on the natural environment as well as on the health of communities needs to be addressed by introducing mitigation and monitoring strategies. This will be key in order to protect vulnerable areas as well as communities in order to ensure the integrity and livelihoods of all inhabitants and systems that are dependent on the natural environment and its resources.

8.4.3 Social

Various social issues are a result of economic and environmental factors relating to access to resources. Due to the vast distances between settlements of the Northern Cape, various communities have limited access to resources and economic opportunities. This contributes to the high unemployment rate in rural areas as well as a high level of inequality when comparing cities and towns to rural settlements. Due to the level of inequality various social issues arise such as the miss-use of drugs and alcohol which is further exuberated by the high dependency ratio.

Social issues typically originate due to various factors impacting or influencing the population, such as the political, economic and natural environment as well as the compilation required for the livelihoods

of residents. It is key to foster social cohesion on both a cultural level, as well as at a socio-economic perspective.

8.4.4 Economic

As the Northern Cape is largely dependent on a resource economy, the overall vulnerability rate increases as it is susceptible to external economic shocks such as a decrease in the value of raw mined materials, or droughts that impact agricultural yields. In order to promote an economy that is more resilient to external shocks, the economy base needs to be diversified with the focus on secondary and tertiary economic activities. Furthermore, primary economic activities employ a large segment of the Northern Cape population, further increasing the chances of job loss when faced with external economic shocks. The figure below illustrates how vulnerable South Africa, and specifically the Northern Cape is with regards to foreign economic volatility.

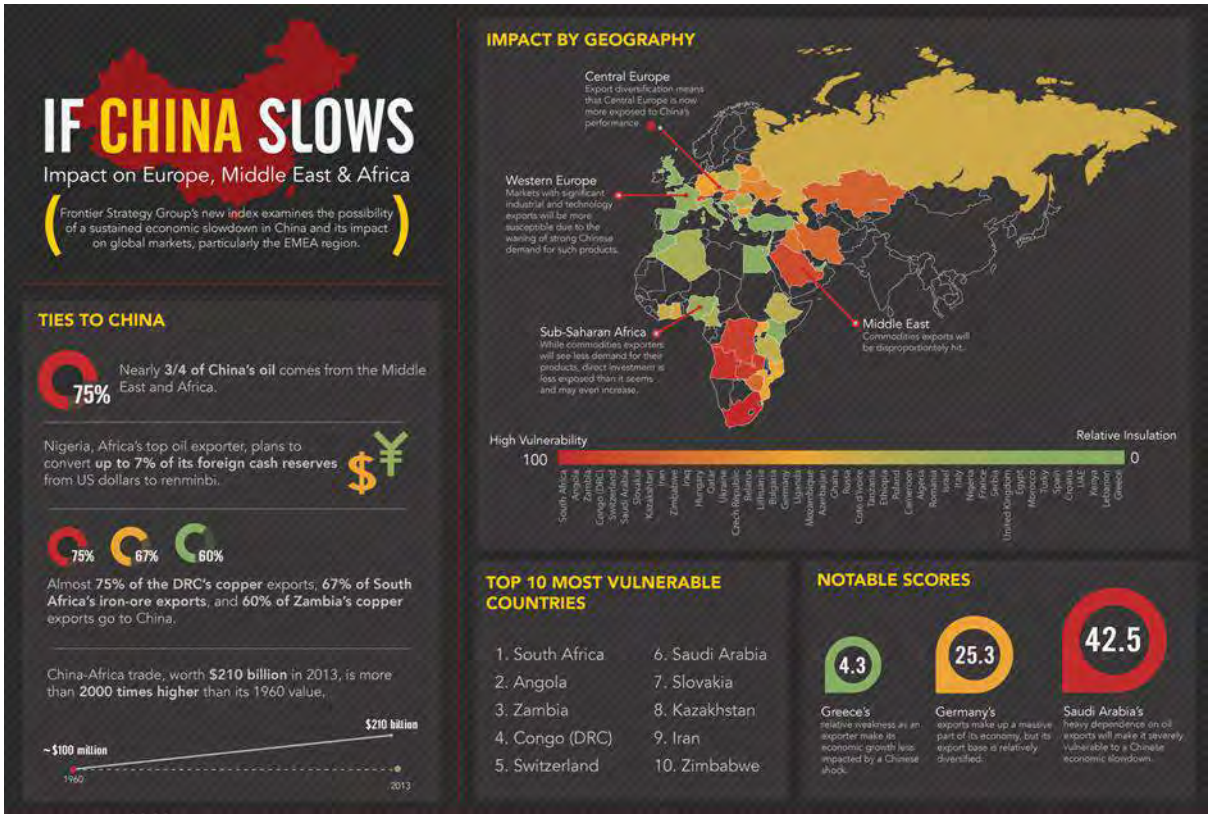


Figure 135: Potential influence on Northern Cape and South African economy if China's growth slows[74]

The overall political and environmental stability also plays a role, as it influences investor confidence and the overall lucrativeness of the Northern Cape for investors. In order to effectively promote investment within the Northern Cape a stable environment would be ideal where a relative certainty can be obtained regarding the return on investment.

[74] *http://blog.frontierstrategygroup.com/2014/09/china-slows-prepare-disruption-emea-business/*

8.5 RESILIENCE

Resilience in terms socio-geography is defined as the capacity of a social or environmental system to maintain its crucial functions while experiencing external disturbance or shocks (PennState[75], 2017). Typically, the method of measuring resilience, is the length of the recovery period required (when an external shock has disturbed the system) for the system to reach it's normal or "new normal" state. When communities are involved in such events, social cohesion, effective governance and disaster management plays a crucial role with regards to the length of the recovery periods as well as the limitation of injuries and death caused by such extreme events.

8.5.1 Disaster risk management

Effective Disaster risk management plays a key role in elevating a community's adaptive capacity by acting proactively with regards to perceived potential risk or hazard exposure. Some of the key mechanisms utilised within disaster risk includes the following (DRDLR[76], 2013):

- Promotion of the integration of disaster risk reduction considerations and measures in financial and fiscal instruments;
- Development and the implementation of disaster risk reduction strategies, policies, plans, laws and regulations with the appropriate budget allocations for implementation;
- Promotion of mechanisms for disaster risk transfer and insurance, risk-sharing and retention and financial protection, as appropriate, for both public and private investment in order to reduce the financial impact of disasters on Governments and societies, in urban and rural areas;
- Early warning systems;
- Enhanced building code standards;
- Effective land use management;
- Implementation of adaptive infrastructure, that has various potential uses, depending on the communities' need or requirements during adverse conditions;
- Effective cooperation of emergency services and public and private health care systems;
- Promote the sustainable use and management of ecosystems and implement integrated environmental and natural resource management approaches that incorporate disaster risk reduction;
- increase business resilience and protection of livelihoods and productive assets throughout the supply chains, ensure continuity of services and integrate disaster risk management into business models and practices;
- Strengthening the protection of livelihoods and productive assets, including livestock, working animals, tools and seeds.

Currently the overall effectiveness of disaster risk management within the Northern Cape is limited mainly due to the size of the province. This is due to the requirement of the Disaster Managements Act, No. 57 of 2002 (section 28(1)) that each province is required to establish a disaster management centre, which is to be supported by a disaster management framework aimed at providing an integrated and uniform approach to disaster management within the province. Furthermore, the Act requires each district municipality to establish a disaster management centre (43(1)), although the

[75] *PennState. 2017. Resilience and Stability. https://www.e-education.psu.edu/geog30/node/327*

[76] *DRDLR. 2013. Climate Change Risk and Vulnerability: Assessment for Rural Human Settlements. http://www.ruraldevelopment.gov.za/phocadownload/draftvulnerability_assessment_1204131_psc.pdf*

Northern Cape is compliant, the vastness of each district limits the overall impact and effectiveness of these centres to address the various potential adverse effects of climate change etc.

8.5.1.1 Disaster management facilities

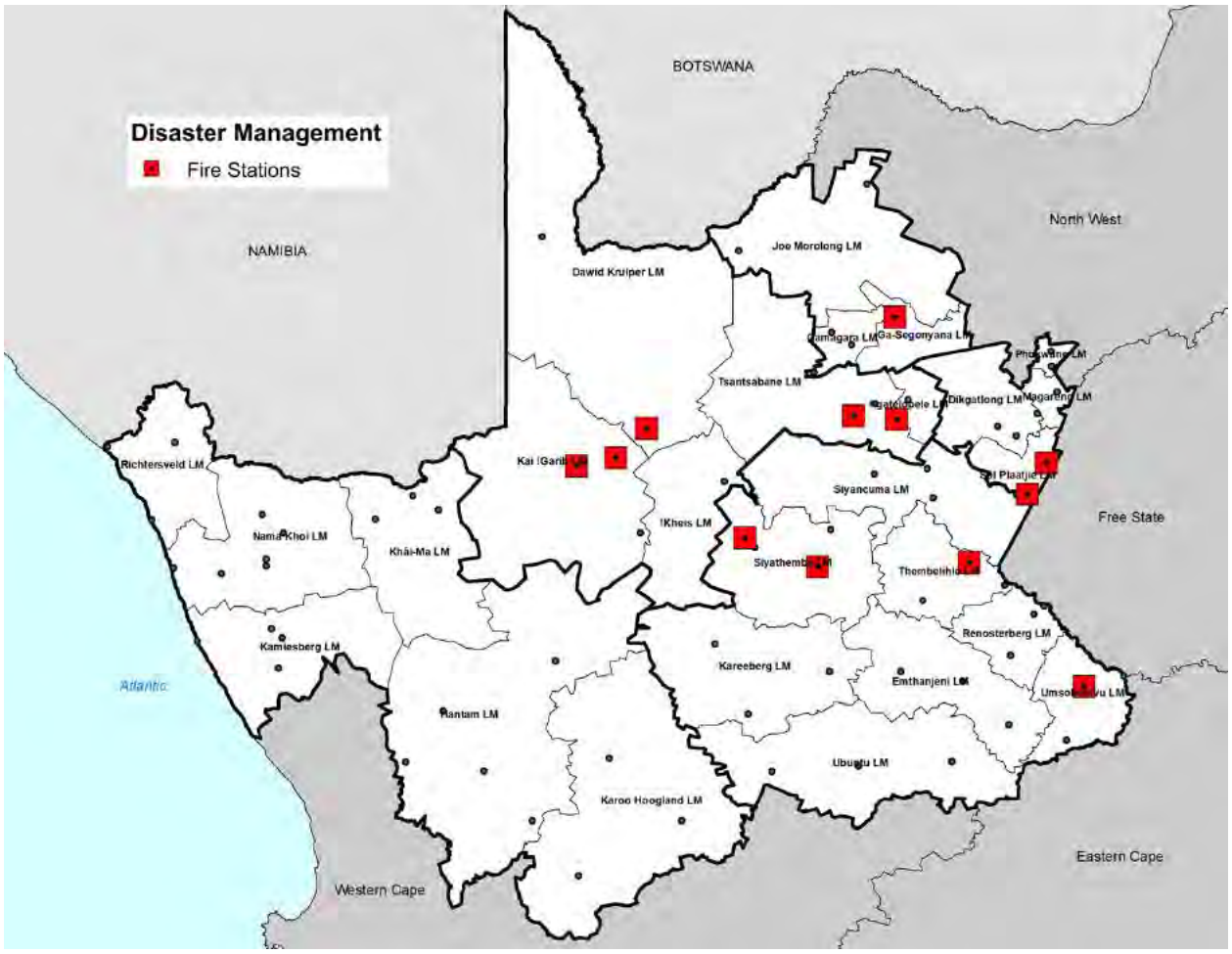


Figure 136: Overview of the key Disaster Management facilities in the province

8.5.1.2 Key climate factors

8.5.1.2.1 Last frost days

A series of analyses of trends in temperature and rainfall parameters over the period 1950 - 2000 was measured as part a study done for the South African Forestry Sector[77]. The study presents an analysis of annual means of both minimum and maximum temperatures, of cold spells, as well as of heat units. One of the distinct conclusions measured was the warming over the interior when analysing frost occurrences, with the Free State and Northern Cape provinces standing out in this regard. There appears to be a shift towards an earlier ending of the frost season, and a shorter frost season with fewer frost occurrences. As one moves from the frost free coastal areas of South Africa, the frequency of years in which heavy frost occurs increases from < 20% of years to frost occurring in every year on record (i.e. 100% frequency). Frost occurs every year over most of the Free State and Lesotho, as well

[77] Climate Change and The South African Commercial Forestry Sector an Initial Study,2006

as over significant parts of the Northwest province and along the southern and south-eastern escarpment areas. The mean number of days per annum on which frost occurs ranges from < 20 along the western, southern and eastern periphery of South Africa (including most of Limpopo province), to 40 - 60 occurrences over much of the central interior and up to 80 frosts per year in the Sutherland region of the Northern Cape and the higher lying areas of the Eastern Cape and Lesotho. Virtually all areas with > 20 frost days per annum have a standard deviation of frost occurrences of 8 and more days (Schulze and Maharaj,2004).

Frost occurrence in the recent past has however caused some disasters in especially the agricultural sector with the grape-growing region along the banks of the Orange River that was hit by a bout of frost in September 2014 of the likes the region has not experienced before. Table grape and raisin farmers suffered huge losses due to the extensive frost caused by night-time temperature plummeting to -8°C.

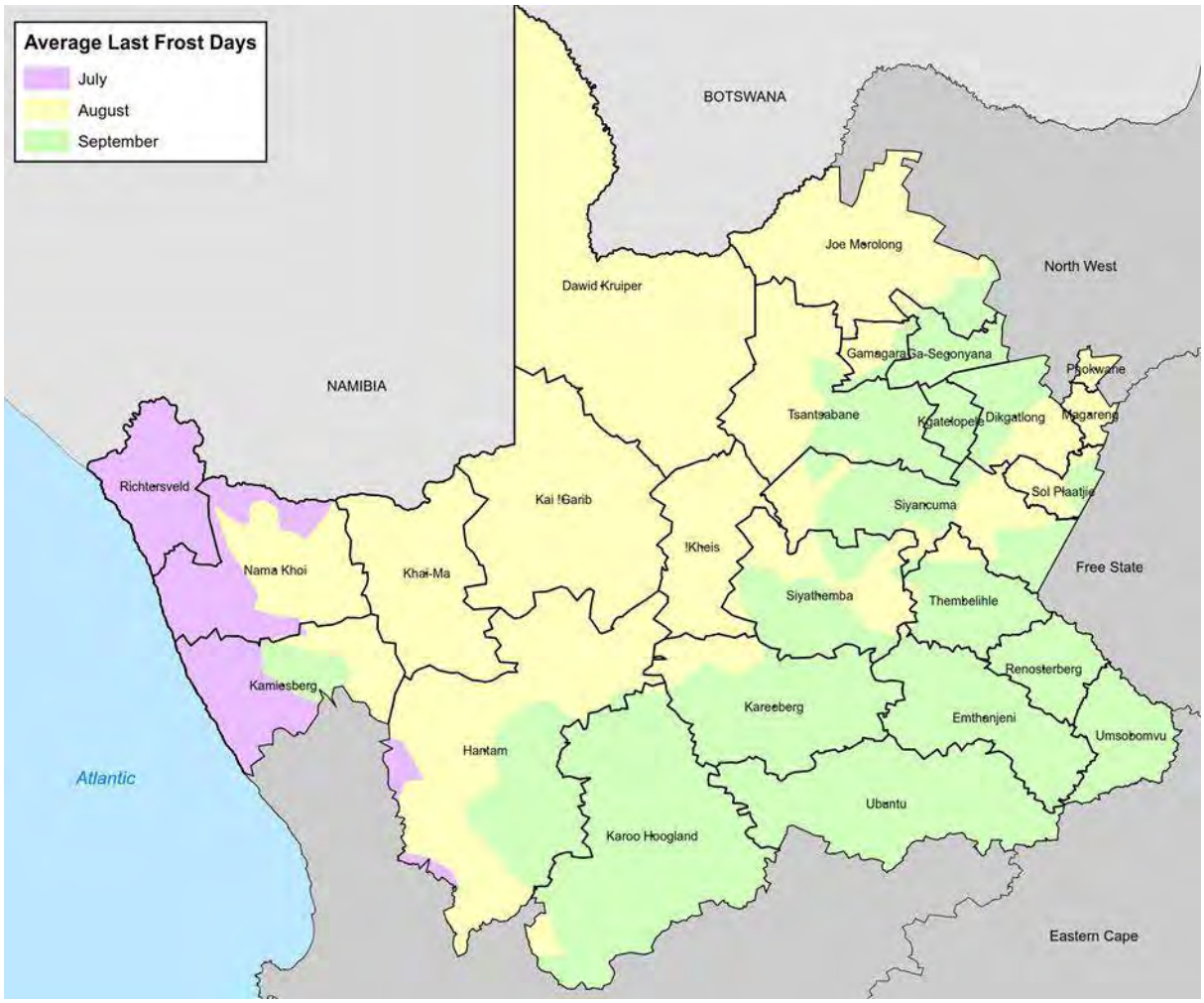


Figure 137: Climate factors - last frost days

1.1.1.1.1 Hail frequency

The occurrence of hail is very much sporadic. For this reason, it is quite difficult in the longer term to predict the possibility of hail at a specific point in time or for a specific area. In the short term, radar and satellite technology can determine the development and movement of hail storms reasonably

well, but the predictability is limited to very short periods like minutes up to perhaps an hour or two if it is a very strong developing storm. These short-term predictions may be of value to move, store or safeguard vehicles, animals and other assets, but it is of little value for planting.

The question is, however what can a grain, fruit or vegetable farmer do to limit hail damage or to better manage the effect of hail damage. One of the most important aspects to consider is to determine to risk of hail damage. In other words, how often they occur, the time of the year they happen, as well as the average but specifically maximum intensity of hail and hail damage. It is therefore also very crop specific and the effect of hail on various growth stages of different crops often differs significantly.

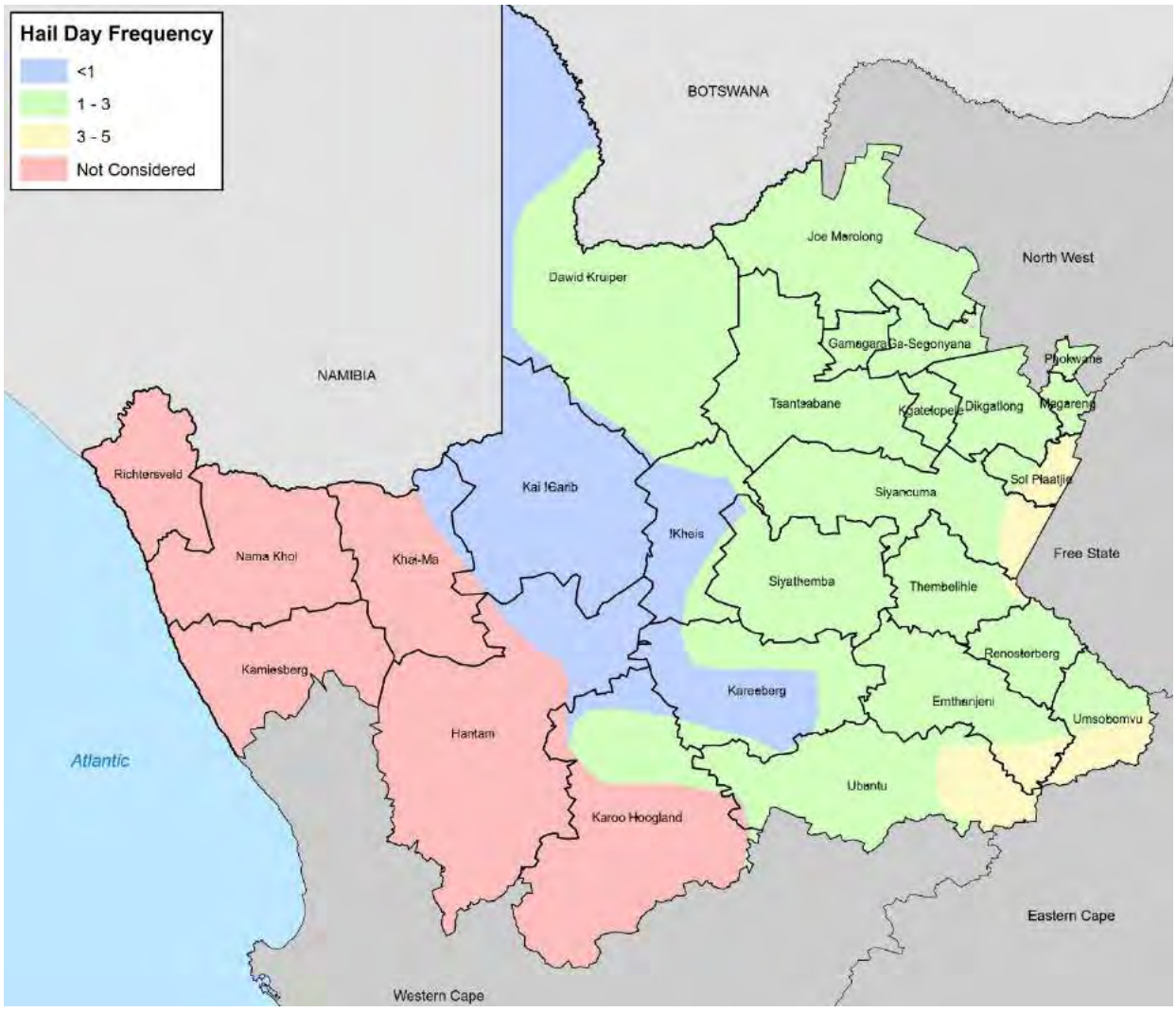


Figure 138: Climate factors – hail day frequency

The figure above represents annual hail occurrences within the Province. From a decision-making point of view grain, vegetable or fruit producers can therefore do very little to limit hail damage as the growth season determines when crops are exposed to the elements and risks like hail. However, it is important to be aware of the risk and to plan and make decisions accordingly. The question is whether the producer can carry the frequency of hail damage as well as the intensity of damages on his own or whether risk transfer should take place, as in the case of crop insurance. Can the producer recover and continue his operations if damages occur?

This decision is dependent on the exposure to risk and financial position of the producer. For example, the risk of a producer who produces mainly one type of crop is concentrated and he would probably take out insurance whilst another producer who produces more crops that are in the fields at different times of the year would decide not to take out insurance because his risk is spread throughout the year. If a producer can subsidise a large loss from other sources he would probably decide not to take out insurance.

8.5.1.2.2 Accumulative positive chills

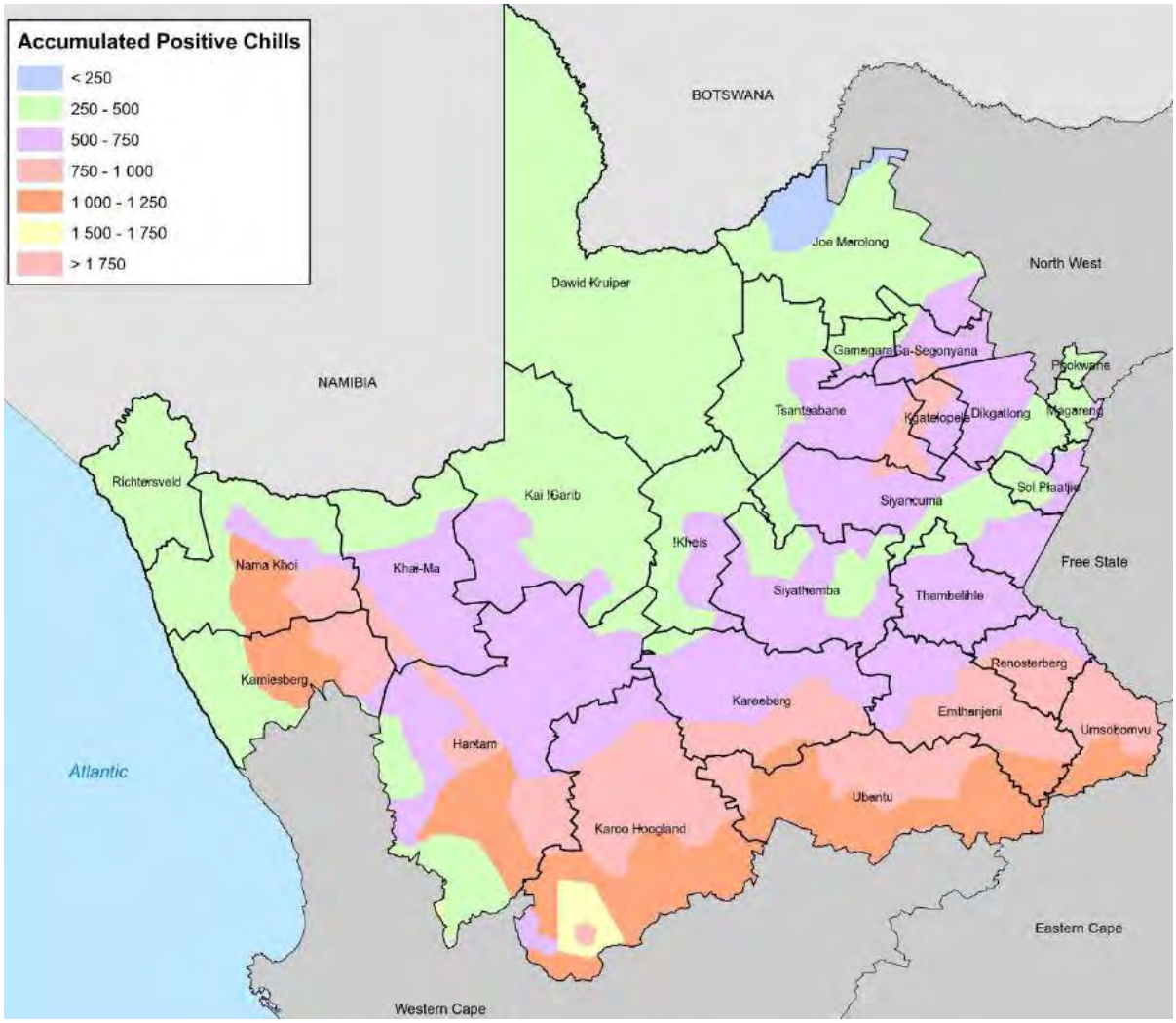


Figure 139: Climate factors – accumulative positive chills

Certain biennial plants which have a dormant (i.e. rest) season during winter may require a period of accumulated minimum temperatures below a threshold in order to stimulate growth, develop leaves, flower or set fruit. Deciduous trees, for example, need a certain period of winter chilling for completion of their seasonal dormancy. Insufficient winter chilling may result in delayed foliation, reduced fruit set (including fruits remaining small and being misshapen as they ripen) and reduced fruit quality (including reduced firmness, and/or greener fruit coloration). The required amount of chilling for completion of the rest period varies between species, cultivars and different locations. For

peaches, for example, temperatures between approximately 2.5°C and 9.0°C have been identified as optimum for contributing to rest completion (Schulze and Maharaj, 2004).

8.5.2 Overall Vulnerability

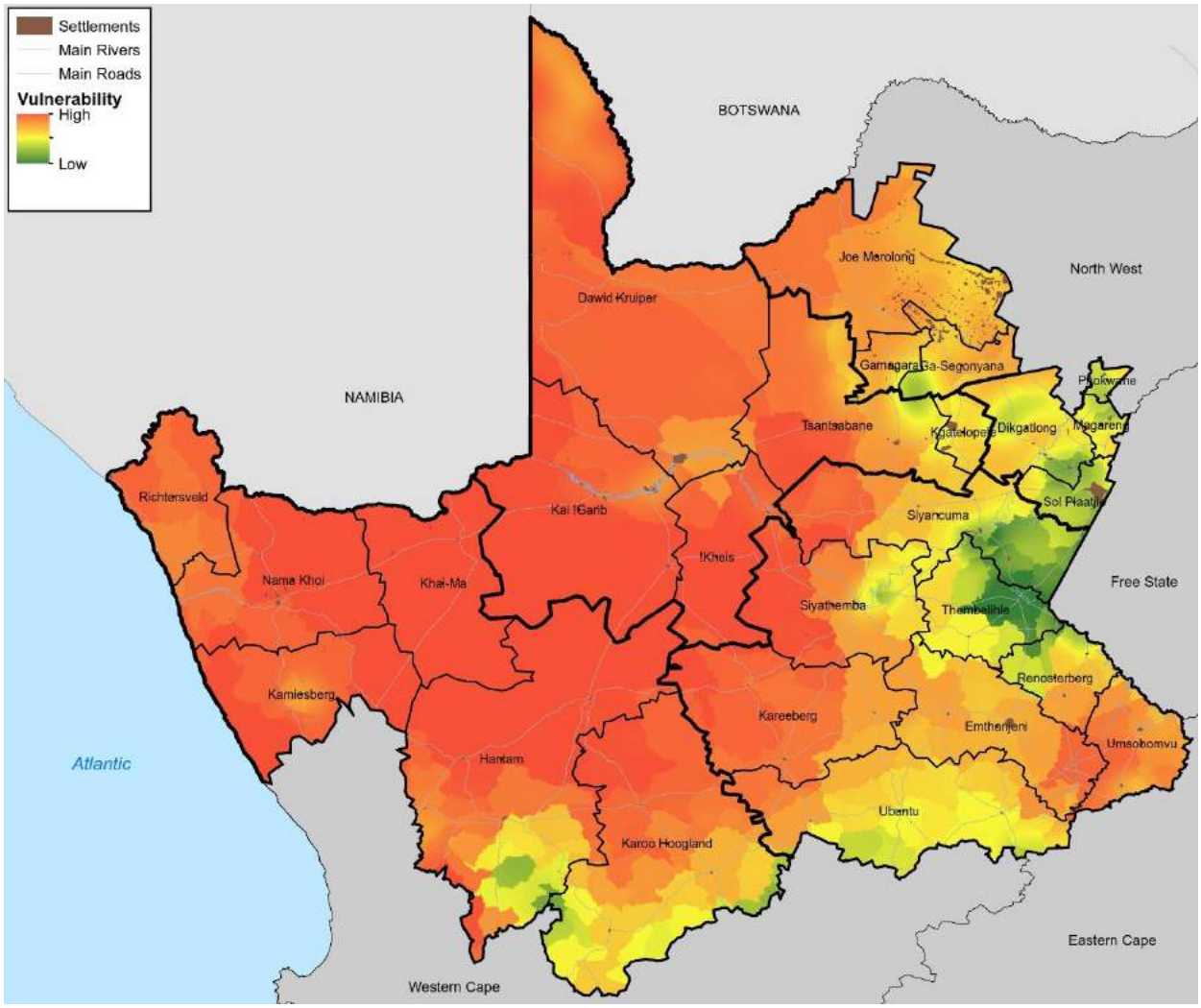


Figure 140: Draught and Fire vulnerability in the Province

The highest fire potential is located away from the perennial rivers and other water sources. The figure above clearly illustrates the highest risk for fire vulnerability are located towards the central, southern and western regions of the province. Because of the arid conditions and high temperatures within the Northern Cape the shrubs and grassland areas have a high fire vulnerability rating due to the dry conditions and lack of water resources.

Table 45: Fire Risk - Functional Region Classification

FIRE RISK	
Function	Fire risk areas are calculated from a field study conducted by DAFF where various attributes are taken into consideration and combined to calculate a fire risk score for each area based on a grid of 5 x 5 km squares.
Surface Classification	0 (highest potential) and 100 (lowest potential)
Attribute Classified	Risk Value
Weight (Score)	33,3%
Source	Department Agriculture Forestry &Fisheries

Drought vulnerability are lower towards the eastern and northern eastern regions of the province, due to the availability of water as well as the land cover located within those regions.

Table 46 :Drought - Functional Region Classification

DROUGHT	
Function	Drought areas are calculated per tertiary catchment area, derived from the 2015 annual rainfall per catchment. Areas with the least amount of rainfall are given a lower score and areas with more rainfall a higher score.
Surface Classification	0 (least amount of rainfall) and 100 (highest amount of rainfall)
Attribute Classified	Risk Value
Weight (Score)	66,7%
Source	Department of Water Affairs

There are various inherent adaptation measures and adjustments that farmers apply in order to be less vulnerable and more resilient in the face of climate change and variability. However, in those areas where agricultural systems are already under stress economically or biophysically, or where crops are nearing climate tolerance thresholds, or where multiple stresses exist, agri-businesses are at highest risk. Emerging, small-scale and resource-poor farmers are particularly vulnerable to climate change and variability because they have fewer capital resources and management technologies at their disposal. Subsistence farmers often do not have the ability to adapt nor sufficient means to deal with and recover from extreme events such as floods and droughts.

9 TOURISM

Northern Cape Tourism Master Plan 2005 Vision:

"Our vision is to be the preferred adventure and ecotourism destination in South Africa that is recognized for its cultural heritage and special interest tourism offering through the responsible development of natural and cultural resources."

(Northern Cape Tourism Master Plan: Revised 2015)

It is widely recognised that the tourism sector is one of the most significant contributors to export earnings in the South African economy. It is estimated that tourism's economic contribution represents approximately 8% of the country's gross domestic product (GDP), while the sector employs almost one million people, both directly and indirectly. As such, it has been identified as one of the key industries with the potential to accelerate economic growth in South Africa[78]. It is estimated that the tourism sector directly contributes 2% of the Northern Cape's total employment, compared to the 3% direct employment of tourism in South Africa; while the mining industry only contributing 4% to the employment number of the province[79]. The Northern Cape is blessed with a hive of iconic tourism product which offers visitors an exciting and memorable visitor experience. Each district with its unique tourism outlook and attributes provides an exceptional range of tourism products. These tourist attractions need to be packaged in order to create a seamless experience and to increase long stays in the province. The packaging of tourism products is essential to enhance overall tourism experience and contribute towards the province's value proposition and competitive positioning. Tourism is seen as one of the economic sectors that is not fully exploited in the province and would require further effort towards unlocking more opportunities.

9.1 OVERVIEW[80]

The Northern Cape Provincial Government Growth and Development Strategy targets tourism as one of the key sectors with the capacity to "grow, transform and diversify the provincial economy". The sector's direct contribution to provincial gross domestic product (PGDP) is about 6%. In addition to events, attention is also being given to the potential of niche tourism, a sector that is growing fast. Assets unique to the Northern Cape include a large number of arid areas (for lovers of deserts and desert life) and very clear night skies (for sky-gazers, a niche that already exists but has tremendous potential to expand).



[78] *Accelerated Shared Growth Initiative (AsgiSA), 2006.*
[79] *Northern Cape: Department of Economic Development and Tourism. The Development of the Northern Cape Coastal and Marine Tourism Strategy, 2016*
[80] *Global Africa Network, 2017. Northern Cape tourism overview and opportunities. A number of tourism investment packages are available to interested investors in the Northern Cape. https://www.globalafricanetwork.com/2017/03/01/investment-opportunities/tourism-investment-opportunities*



There are no fewer than six national parks in the province, each showing off distinct geographical and biological features with trees such as the elephant's trunk and the quiver tree proving endlessly fascinating to visitors. Most of the province lies in the Nama-Karoo Biome and the annual display of spring flowers is quite spectacular. Although the tourism offering is already well developed and there has been considerable investment in infrastructure in recent years, the potential for the Northern Cape to capture more of the domestic and international tourism market is immense.

Country Hotels recently invested heavily in the province, noting the upsurge in demand for beds driven by the province's concerted drive to attract more tourists – and the pressing need for accommodation on the back of investments in the mining and renewable energy sectors, particularly new solar plants.

Spanish and Chinese engineers are now a common sight in Northern Cape towns, to such an extent that local supermarkets are having to source spices such as saffron for fragrant paellas. The province's tourism strategy targets adventure tourism (4×4 trails, hiking, river-rafting) and desert tourism, which includes the stark delights of the Kalahari and the Richtersveld. The Northern Cape Tourism Authority (NCTA) has increasingly been focusing on adventure sports (with a brand of "Northern Cape Extreme") and the organisation and promotion of events, including festivals. The Tankwa Karoo Mountain Bike Challenge, which traverses the southern part of the Great Karoo from Ceres to "star-gazer's Central" at Sutherland, is a 240km marathon that typifies the type of adventure tourism of the province's brand. The Northern Cape is a nature-lover's paradise. It has five provincial reserves and six national parks, a stunning variety of landscapes and endless potential for adventure tourism, hunting, and observing stars, rock paintings and flowers. Diamond fields, diverse cultures, battlefields and the Orange River are some of the province's other major assets.

The decision by UNESCO to inscribe the Richtersveld Cultural and Botanical Landscape as a World Heritage Site (South Africa's eighth) has great significance for the tourism industry in the Northern Cape, and for the prospects for ecotourism in general. This 160 000-hectare landscape of mountainous desert is managed by the semi-nomadic pastoral Nama people. The Richtersveld Transfrontier Park achieved a major international accolade when it was included in the Rough Guide's Top 10 for 2016. What is more, this was the only spot in Africa to be showcased in this way. Although the park is very dry it also receives mists off the Atlantic Ocean and sustains almost 30% of the succulent plants in South Africa. The Verreaux eagle is a prized sighting for bird-watchers and many other mammals survive these harsh conditions such as the black-backed jackal, Hartmann's zebra, duiker, klipspringer and leopards. However, the stark landscape is the ultimate attraction of this park, which straddles the Orange River.

The 2012 opening of the 2 500-seater Mittah Seperepere Convention Centre was a boost to the Northern Cape events and conferences industry. It is located in the centre of Kimberley, near the Big Hole. With the town's biggest hotel situated in the same precinct, the Convention Centre it makes it much easier to sell the provincial capital as an ideal meetings, incentives, conference and events (MICE) destination.

Progress in that field was evidenced when Kimberley was chosen to host the 7th International Wildlife Ranching Symposium in late 2011, with delegates from 20 countries present. The Northern Cape is a very popular hunting and wildlife-ranching destination. The Northern Cape has its fair share of annual festivals. AfrikaBurn is now a regular in the Tankwa Karoo National park, attracting alternative types who are determined to "chill" in the heat.

The Vleisfees (meat festival) has been held in Calvinia in the heart of the Hantam region since 1990, and this is where the consumption of vast quantities of lamb and mutton compete for the attention of festival-goers, along with a vintage car rally and a Miss Vleisfees competition. Richmond has a festival called Boek Bedonnerd—a phrase that is not easily translatable, but which suggests that attendees are really excited about books! Kimberley's Gariep Arts Festival is gaining a reputation as the venue for outstanding performances and events. Upington's Kalahari Kuier (Visit) Festival has outgrown its focus on the raisin and has since become all-encompassing festival that includes a popular race, the Kumba Iron Ore Classic. More than 30 000 people have been known to attend the event, providing a welcome boost for the local economy.



9.1.1 Frances Baard District

Frances Baard is the administrative hub of the province with major business and financial institution located in the district. The city of Kimberley is renowned for the majestic Big Hole Mine Museum which attracts both local and foreign tourists annually. The international convention centre is well positioned to promote province as mega business and events destination. Cultural and natural heritage is in abundance and offers the tourist a wonderful journey into the history of diamonds and rock art paintings.

9.1.2 Pixley Ka Seme District

The district is home to the central Karoo which characterized by desolate valleys between flat tops hills. The district contains three of South Africa's major dams and is also the largest producer of wool in the country. It offers hunting, hiking, game watching and as well as water sport. Recreational activities and the Khoisan rock art engraving are worth exploring and experiencing.

9.1.3 Namakwa District

The district is proud to have a World Heritage Site status in the Richtersveldt Transfrontier National Park. The district is well known for its spread of wild flowers including many rare and unique endangered plants. The district offers a diverse range of tourism offerings including the Astronomical Observatory, parks and nature reserves, the only strip of coastline in the province and as well as numerous cultural festivals.

9.1.4 ZF Mgcawu District

The district boasts with Kgalagadi Transfrontier Park which borders Botswana and Namibia. The San community cultural heritage fuses exceptionally well the park to offer a wonderful stay and touring experience in Kgalagadi area. The Augrabies Falls is the 6th largest waterfall in the world and offers

excellent farming opportunities. Upington offers wildlife, luxury lodges, adventure activities (walking trails, water sport etc) and houses the second largest airport in the province

9.1.5 John Taolo Gaetsewe District

The district has largely an undeveloped tourism industry. The district is blessed with an array of tourism assets which includes The Eye, the biggest natural fountain in the Southern Hemisphere. Professional hunting, birding, cultural and heritage experiences is fortified by the booming mining industry in Kathu area. Tswalu private nature reserve is a sought after unique tourism products and offers an exceptional service to a niche market. The department is currently involved with key stakeholders unblock and enhance the tourism potential in the district and to develop tourism routes. The routes will be able to tap into and grow the domestic experience, increase on tourist spend and stay in the district.

9.1.6 Summary of key tourism assets[81]

Key Provincial assets include:

- Augrabies Falls National Park;
- The Big Hole;
- SKA Telescope;
- Namaqua Flowers; and
- National Parks.

The core tourism experiences have also been defined for each district in the province. These include:

9.1.6.1 Frances Baard District

- Big Hole & Diamond route;
- Mattanu Game Reserve;
- Barkley West – Good Hope Nature reserve;
- Cultural activities – Galeshewe township is attracting the interest of visitors; and
- !Khwa ttu and San Cultural Village in Kimberley.

9.1.6.2 John Taolo Gaetsewe district

- 3 Heritage Sites – Wonderwerk caves, Moffat Mission, Kuruman Eye;
- Truth tree – heritage site; and
- Hunting.

9.1.6.3 Namakwa District

- 4x4 routes;
- Wild flowers;
- Richtersveld National Park;
- Coastline; and
- Culture – Nama Culture.

[81] *Department of Economic Development and Tourism, 2015. Northern Cape Tourism Master Plan: Revised*

9.1.6.4 ZF Mgcawu District

- Augrabies;
- 2 National parks;
- Witsand nature reserve;
- Trans Boegoe Eco Resort;
- Boegoeberg dam;
- Wonderwerk caves;
- Kalahari-Oranje Museum;
- Spitskop nature reserve;
- Quiver tree / Kokerboom route;
- Wine routes;
- Red dune route;
- Hot air ballooning;
- Duin-in-die-Weg Guest Farm;
- Sakkie se Arkie;
- Riemvasmaak Ecotourism;
- Khamkirri Adventure Destination;
- Upington; and
- Toro Lodge.

9.1.6.5 Pixley ka Seme

- Colesburg Toverberg (Magic Mountain);
- Heritage buildings;
- Historic battlefields;
- Anglo boer war sites and graves;
- Museums;
- Concentration camp and Fort;
- Vanderkloof and Gariep Dam;
- Adventure tourism;
- Township tourism and historical tourism; and
- Carnarvon Astronomy & Stargazing.

9.2 TOURISM REGIONS

The Green Kalahari region is perceived to have adequate roads, water, electricity and telecommunications infrastructure. It has acceptable airports/airfields but is lacking in the water transport and related infrastructure, refuse removal and town cleanliness as well as rail infrastructure. Overall, the Green Kalahari region is perceived to have fairly decent levels of tourism support infrastructure.



The Kalahari region's tourism support infrastructure is not perceived to be of adequate quality and / or state. Although airports / airfields, refuse removal and town cleanliness as well as water transport and related infrastructure ranked among the highest in the infrastructure assessment, they were still among the lowest levels out of all regions. Infrastructure like rail, roads and telecommunications were ranked as barely acceptable. Bulk services like water and electricity were indicated as not being of acceptable standard.

The Diamond Fields region was indicated as having mostly acceptable levels of supporting infrastructure with the exception of electricity, rail and telecommunications. Water infrastructure and supply was indicated as being mostly acceptable while aspects like the airport refuse removal and town cleanliness as well as road ranked among the highest of all regions. It is expected of the economic and administrative hub of the province to provide adequate supporting infrastructure that is of high standard and well maintained.

The Karoo region is mentioned to have somewhat acceptable levels of supporting infrastructure. Refuse removal and town cleanliness as well as rail, electricity supply and water infrastructure were ranked as somewhat adequate to moderately adequate. Telecommunications and water supply was indicated as being barely adequate while roads and airports / airfields were indicated as being very inadequate.

The Namakwa region's highest rated supporting infrastructure is its roads, water supply and refuse removal and town cleanliness – albeit of moderate adequacy. Telecommunications, airports / airfields as well as water infrastructure was of moderately to barely adequate while rail and electricity supply was indicated to be inadequate.

9.3 TOURISM ROUTES

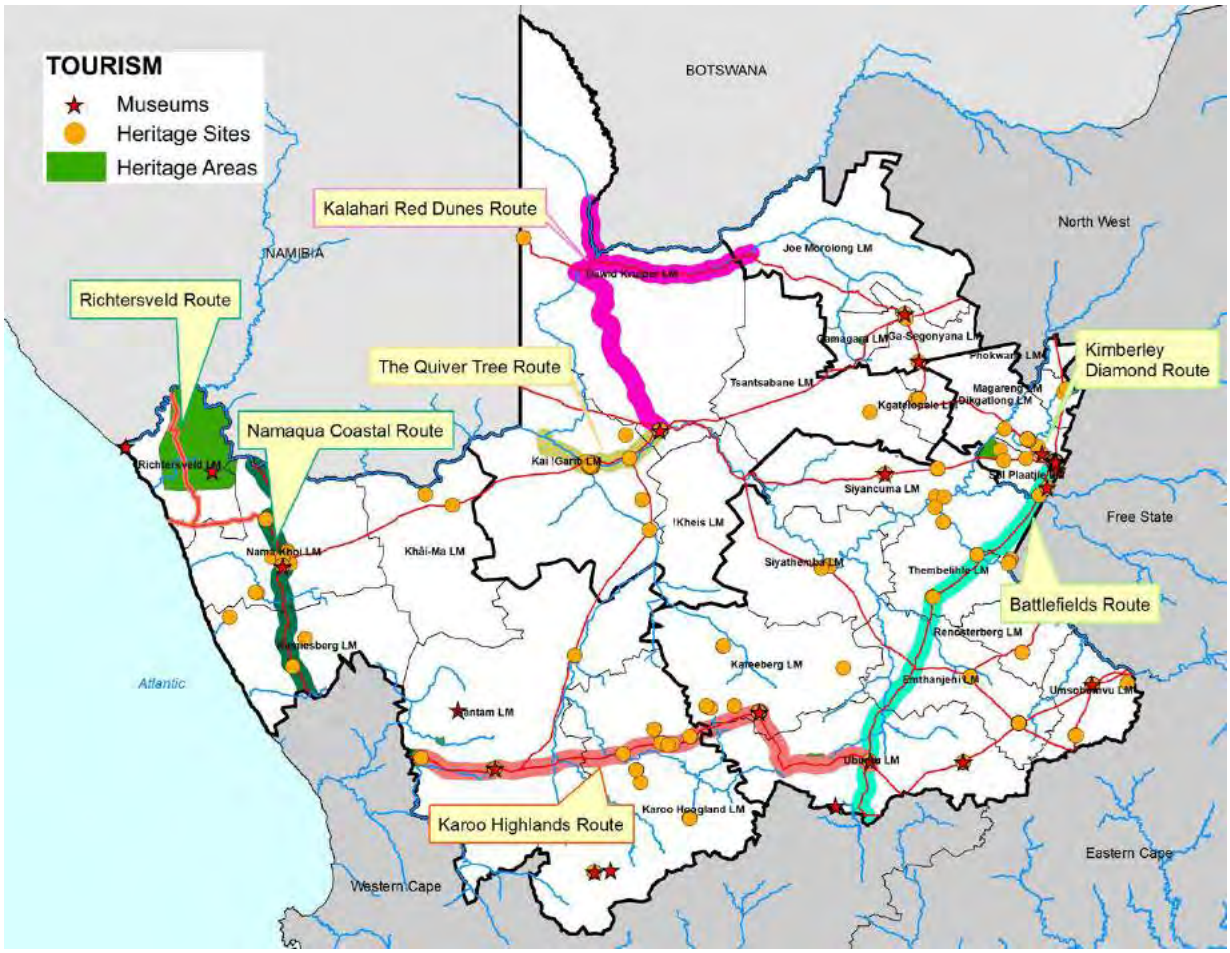


Figure 141: Tourism Routes and Heritage Sites of the Northern Cape Province

9.3.1 Existing Tourism Routes[82]

9.3.1.1 Kalahari Red Dune Route

Winding through the Kalahari, from just north of Upington all the way into the Kgalagadi Transfrontier Park, the Red Dune Route drifts from Guest House to Game Farm across a pleasurable combination of unlimited hospitality and arresting scenery. The locals say that once you've felt the red sand of the Kalahari between your toes, your heart will always return to this desert wonderland. The Kalahari Red Dune Route showcases the Kalahari through a wide range of activities including dune boarding, camel riding and 4x4 trailing for the adventurous, and game drives, guided walks, birding expeditions and other eco-inclined activities for nature-lovers. For visitors attuned to culture and history, the Kalahari Red Dune Route offers the opportunity to experience regional customs and folklore, sample traditional cuisine, and meet the warm and welcoming people of the Kalahari (a glossary of common local words and terms can be found below to assist you during your visit). Accommodation options are as diverse as the landscape and vary from camping to homely bed and breakfasts to luxury lodges. All in all, the Kalahari Red Dune Route offers something for everyone.

[82] *Weg Magazine, 2016. Cape of many routes. http://experiencenortherncape.com/visitor/routes*

9.3.1.2 Karoo Highlands Route

The Karoo Highland Route is situated in the southern part of the Northern Cape in South Africa. The route covers the small Karoo towns of Nieuwoudtville, Calvinia, Williston, Sutherland, Fraserburg, Carnarvon, Loxton and Victoria West and forms the heart of the Great Karoo. The Karoo is the home of peace and tranquillity where you can recharge your batteries, while exploring the wide-open plains dotted with koppies (hills). This is a place where a huge telescope allows you to look back to the beginnings of our Universe 13 billion years, and where pre-dinosaurs roamed the earth and the first people gazed up to the heavens. People have lived on this massive plateau, the largest of its kind outside Asia, for about 500 000 years. The Khoi and San people who left their legacy as art on the rocks gave the Karoo its name. The place's name comes from Karusa, a Khoi word which means dry, barren, thirst land. This aptly describes this region where water is scarce. It is an ancient, fossil rich land, with some important archaeological sites, as well as the largest variety of succulents found anywhere on earth, there are over 9000 plant species in the Great Karoo. The Route offers plenty of interesting attractions such as Sutherland's astronomical observatory, Carnarvon's Karoo Array radio telescope, Karoo architecture and corbelled houses, Anglo-Boer War sites, rock art, ancient Palaeo Surfaces, farm stays and medicinal plants.

9.3.1.3 Kimberley Diamond Route

The motive for the route's design is to rehabilitate and conserve six hectares of land for every hectare the company mines, as a way to redress the balance between the use of natural resources and sustaining the ecosystem. Combined the route makes up 250 000 hectares across South Africa and Botswana. These properties give people a chance to commune with the diversity of nature – from cultivated gardens to mopani woodlands and riverine forests to savannah grassland and the sandscapes of the Kalahari.

9.3.1.4 Namakwa Coastal Route

The Namakwa Coastal route is a rugged nature experience along the unexplored north-west coast of South Africa's Northern Cape. These shores have remained virtually unknown to the public at large as it is within the restricted and previously forbidden diamond mining areas. The route runs along the coast from "Groenrivier" mouth until Port Nolloth and is ideal if you are looking for peace, tranquillity and adventure. However, many of the roads on the route are not accessible to ordinary saloon cars and more suitable for 4x4. If coming from the south (Cape Town) the route starts in Namaqua National Park. Basic accommodation and/or camp sites are available all through the route. Breath-taking scenes of the Atlantic Ocean on the one side with occasional sightings of dolphins and whales and the endemic wildlife of the enraptured veld on the other side. North of the Namaqua National Park you will enter the previously restricted Namaqualand Mines area. The valuable mineral treasures hidden within its sands have made these restrictions necessary but diamonds are not the only treasures. This Sandveld has been jealously guarded and while still largely unspoilt and crime-free is home to many indigenous plants, animals and insects. The coastline, with its flowing dunes and mysterious shipwrecks, has been opened to the fortunate few who come in a 4x4 or can participate in organised guided tours.

9.3.1.5 The Quiver Tree Route

The Quiver Tree Route is a land of contrasts between stark fawn arid land and verdant green vineyards. The Great Gariep, known more commonly as the Orange River, winds through the landscape and

brings life to the surrounding parched earth. This river was once called 'God's gift to the Southern African thirst land'. The greenbelt along the river's banks contrasts sharply with the rising rocky cliffs. Irrigation schemes have stretched the greenbelt into the desert, making acres of vineyards and other agriculture possible. Ten percent of South Africa's vineyards are found in the Orange River valley and southern Kalahari. The route includes the towns and settlements of much of the Green Kalahari and include Keimoes, Kanoneiland, Kenhardt, Augrabies, Upington and Marchand. The Quiver Tree Route has something for everyone. In addition to visiting the popular Augrabies Falls visitors can relax in hot springs, river raft, go on 4x4 trips, hike, bird watch, sample local delicacies and wines, touch the unique Quiver tree (Kokerboom) and even take a leisurely donkey cart ride through town. The Quiver tree is a botanical symbol of this part of the world. Along the route one can experience dry, rugged mountains, desert adapted animal and plant life, red Kalahari dunes, stifling summer temperatures at day, and freezing desert temperatures at night.

9.3.1.6 The Richtersveld Route

The Richtersveld is a vast and unforgiving environment, stark and dramatic yet strikingly beautiful. This route is for the self-sufficient 4x4er only and it is highly recommended that you travel in a convoy as you traverse this largely uninhabited part of the Northern Cape. It is a mountainous desert situated in the north-west corner of South Africa. To its west is the cold and rough Atlantic Ocean while the remarkable Orange River, the largest river in South Africa, winds along its northern border. The Richtersveld has the highest diversity of succulent plants in the world (4 849 species, of which 1 940 are endemic), as well as eerie coastal mists, alluvial diamonds and truly indigenous cultures.

While many people already know about the Richtersveld National Park, few realise there is an equally large protected area to the south, previously called the Richtersveld Community Conservancy. This area is the last refuge of Nama people living what is known as the transhumance lifestyle - to migrate seasonally with their livestock from mountains to the river and so make sustainable use of the fragile succulent ecosystem. In recognition of this vanishing lifestyle, and of the rare botanical diversity it helps protect, the Conservancy has been declared the core of a new World Heritage Site - one of only eight in the South Africa. Each small village in the Richtersveld has distinctive features and characteristics. The traditional culture of the inhabitants should be explored and enjoyed. Visiting these hospitable and friendly people is an essential part of any trip to the area. The Ai Ais-Richtersveld National Park is unique in that it is a contractual park – jointly managed by the local community and South African National Parks. Stock farmers may continue to graze their livestock in the park, thereby maintaining a centuries-old tradition.

9.3.1.7 The Cape Namibia Route

The route meanders away from the N7 and includes small towns, each with its own local flavour and a story to tell. The N7 highway stretches from Cape Town all the way through the Northern Cape before heading into Namibia. Crossing from the Western Cape into the Northern Cape, visitors will encounter towns which capture the Nama heritage of the Province. Slow down and appreciate the unique stories of the people of Garies, Kamieskroon, Springbok, Okiep, Nababeep, Carolusberg, Steinkopf and Vioolsdrift. During springtime, this route takes visitors into the core of the floral kaleidoscope that is the Namaqua flower season.

9.3.1.8 N12 Treasure Route

The N12 Treasure Route is an exciting tourism development starting in the North West Province and running through the Northern Cape and the Frances Baard District. This route is created to open a wide range of wildlife, cultural, scenic, industrial and eco attractions to the visitor as well as numerous tourism investment opportunities along the route. The idea is a to have a diverse choice of types of accommodation available along the Treasure Route there is the opportunity to develop the N12 route linked to Anglo Boer War Sites. The notion of the treasure route is not to compete with the N1 but rather seek to be a specialist route that focuses on destinations and overnight traffic offering a more pleasant and varied experience than the N1. The District played a major part in the Anglo Boer War, this unexploited war sites could be viewed through an existing route that could be packaged for guided tours and include the other heritage and historic sites that are part of the N12 in the district. The route could be promoted as a tourism service route similar to Route 62 (R62) in the Southern Cape which is modelled on the legendary Route 66 in the United States.

9.3.1.8.1 Opportunities and Strengths

There is a number of existing Anglo Boer War sites in Kimberley as well as in Magareng LM which can be developed into attractions There is an existing Battlefield route which stars at the Hopetown located 120km south of Kimberley Untapped historical and heritage resources along the N12 Kimberley, the provincial capital boasts a modern infrastructure and a wealth of museums, monuments and other historic and cultural heritage attractions.

9.3.2 Other proposed Routes:

9.3.2.1 Diamond Coast Route

The Diamond Coast is rich in tourist attractions, such as the Orange River Mouth (a proclaimed RAMSAR site) and wetlands, the Kleinzee Fur Seal Colony (which is home to over one million seals), the Richtersveld and Namakwa National Parks, Buffels River Mouth and the Groenrivier, to mention but a few, which provide an anchor for the promotion of various experiences offered along the Diamond Coast. The Namakwa District has good a good road system leading to the main coastal towns which increases accessibility, however accessibility by air and sea are very limited and tourists have to drive for hundreds of kilometres before reaching the Diamond Coast. There are varied potential cross boundary linkages and marketing with Open Africa, including the Namaqua Coastal Route, the Kalahari Red Dune Route and the Richtersveld Route, which need to be integrated into the Diamond Coast Route to achieve a strengthened tourist system. The need for a coordinated and single Diamond Coast Route stems from the loose standing existing and potential routes that are evident in the Namakwa District Municipality and challenges associated with management, marketing, operationalisation etc. This has potentially occurred because of accessibility challenges.

9.4 TOURISM MARKETS

Nature-Based Tourism and Eco-Tourism Nature-based tourism Definition: Tourism that takes place mainly in natural environments, with the specific purpose of viewing and experiencing the natural features of a destination[83]

9.4.1 Avi-tourism

Birding is one of the fastest growing nature-based tourism activities world-wide and is experiencing similar growth in interest and popularity in South Africa. It has also been recognised that avi-tourism is an important part of the global growth in nature-based tourism. Birding is one of the fastest growing nature-based tourism activities world-wide and is experiencing similar growth in interest and popularity in South Africa. It has also been recognised that avi-tourism is an important part of the global growth in nature- based tourism. South Africa is a premier destination for avi-tourism, due to its large diversity of birds and endemic species, as well as a full complement of major bird habitats in Africa.

Key findings from a study conducted by the Department of Trade and Industry on Avi-tourism include:

- An estimated three million trips are undertaken internationally each year, specifically for birding purposes.
- South Africa has attractive core birding assets compared to competitor destinations – particularly concerning species diversity, endemism and rarity.
- The total size of South Africa's current avi-tourism market is between 21 000 and 40 000 avi-tourists annually, of which domestic avi-tourists number between 13 000 and 24 000 per annum.
- Avi-tourists' total spend was estimated to be between R927 million to R1,725 billion per year, of which domestic avi-tourists' spend was between R482 million and R890 million annually.
- Though domestic avi-tourism represents a major untapped market, foreign avi-tourists also represent an important area for future growth.
- The size of the international avi-tourism market is between 8 000 and 16 000 avi-tourists per annum, with an estimated spend of between R309 million and R618 million annually.
- Avi-tourism's potential contribution to GDP is in the range of R1,205 billion to R2,243 billion annually.
- Avi-tourists spend more per visitor than those in other niche market segments.
- Avi-tourists have higher than average income levels, longer trip lengths, and a greater tendency to visit multiple provinces than mainstream tourism market segments. They also spend a higher total number of days per year travelling for birding purposes.
- Domestic and international avi-tourist profiles correlate with priority market segments targeted by South African Tourism.
- Avi-tourism generally has positive environmental and conservation impacts.

In general, avi-tourists visit different places looking for species they have not yet seen, or bird behaviour they have not yet witnessed. Avi-tourists often make use of tour guides to advise them on the potential location and physical attributes of particular species. Bird-watchers require specific

[83] *Keyser (2009); The Nature Conservancy, 2009, www.nature.org*

equipment such as binoculars, cameras, tripods, spotting scopes, as well as specialised audio equipment, in order to identify and/or capture images and sounds of birds. They also make use of hides or observation towers to conceal themselves from birds, avoid disrupting their normal behaviour and improve viewing conditions.

9.4.1.1 Birding Hotspots

Domestic and international birders have different preferences in terms of where they like to go birding, at a regional and sub-regional level. International avi-tourists, either on self-drive or organised birding tours, tend to try to maximise the number of African or Southern African endemic species seen in a trip. Their itinerary is also influenced by other factors, such as other wildlife attractions and accessibility by road. Domestic and regional avi-tourists, on the other hand, are influenced by proximity and additional factors, such as wanting to see new places. In other words, different types of avi-tourists focus, to a different extent, on 'hotspots'. Key national birding hotspots in the Northern Cape Karoo includes[84]:

- Tanqua Karoo;
- Bushmanland: Brandvlei, Pofadder; and
- Kalahari: Kgalagadi Transfrontier Park.

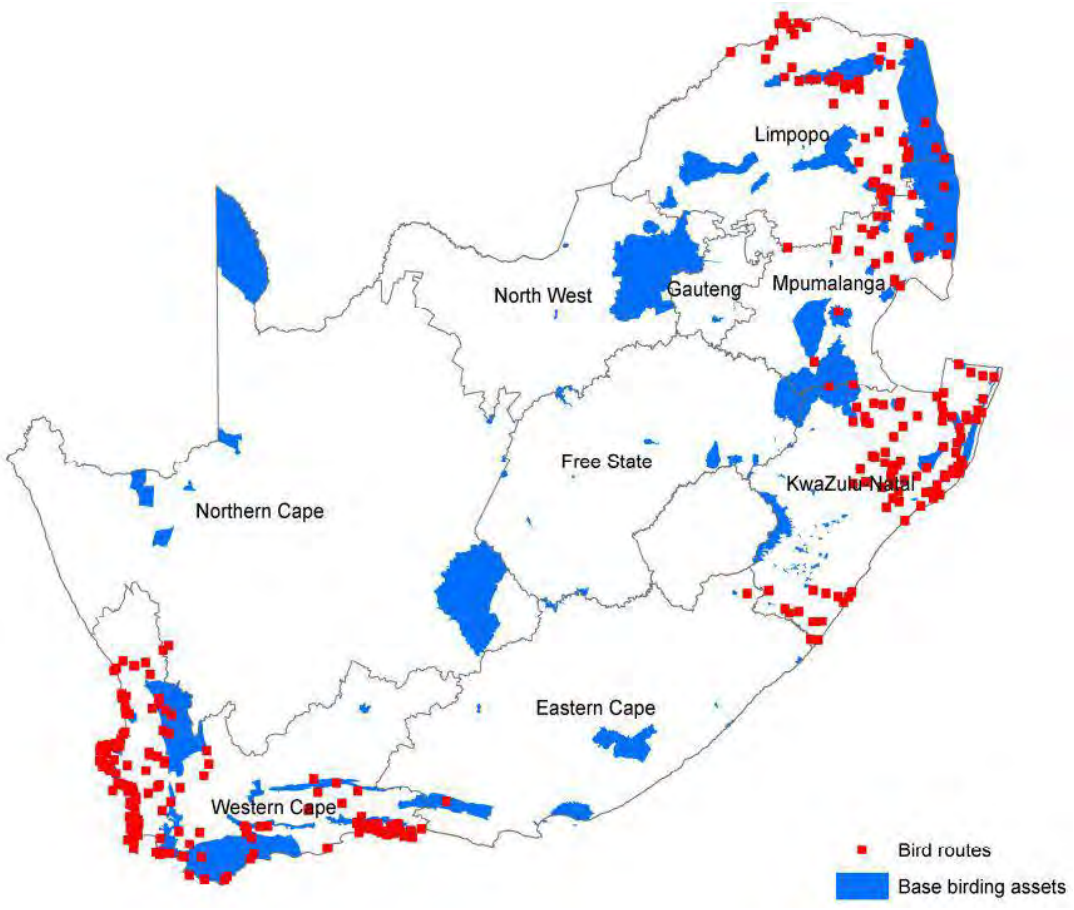


Figure 142: Geographical Distribution of Base Birding Assets[85]

[84] *The Department of Trade and Industry,2010. Niche Tourism Markets, Avitourism in South Africa*

[85] *BirdLife SA, UCT Animal Demography Unit and Tourism Grading Council of South Africa.*

The Northern Cape Province is known for high fynbos and Karoo endemics, world-class pelagic birding and the remote Kalahari Desert, making it attractive to avi-tourists wanting to add more range-restricted endemics to their lists.

9.4.2 Botanical tourism

South Africa's botanical riches are appreciated by wildflower enthusiasts all over the world. Many astute farmers earn a good income by offering tours and accommodation to these ecotourists[86].

Because South Africa has the richest and most varied flora in the world, thousands of overseas visitors each year come specially to see our wildflowers. The annual pilgrimage to view the spectacular spring flowers in the Western Cape and Namaqualand is a multimillion rand industry that benefits many sectors of the economy such as transport, hospitality, travel agencies and tour guiding, and also the landowners in the region. The Namaqualand region is one of the prime spots from which to enjoy this floral kaleidoscope. During the flower season parts of the Namaqua National Park are transformed into luxurious camping sites, and tents are erected amid the flowers. The views are nothing short of picture perfect.

Springbok, Okiep, Nababeep, Concordia and Kamieskroon are all top destinations for viewing the famous blooms and the Namaqua National Park near Kamieskroon is also a flower destination to include on your itinerary for every flower season. The town of Nieuwoudtville offers unique flower-viewing experiences because of its habitat. The town is often referred to as the "bulb capital of the world" for its large variety of indigenous bulbous plants, while further exploration can also be done at the Hantam National Botanical Garden.

A recent study[87] conducted on the economic value of the Namakwa Flower region showed the following interesting results:

- The average round trip distance of 1 844km is made by visitors to the Namaqua National Park (NNP) in 2002 reflects the relative remoteness of Namaqualand.
- There are no day-trippers to Namaqualand and the average duration of trips to the region was 7.4 days.
- However, all visitors to the NNP itself are, in a sense, day-visitors, as no accommodation is offered at the park.
- The average on-site time for 95 per cent of the respondents to the NNP was less than 5 hours. Thus, although nearly all the visitors to Namaqualand come to view flowers, and the prospect of visiting the NNP contributes significantly towards their trip decision, they spend a relatively small proportion of their trip time at the park.
- More than 95 per cent of the visitors undertake day trips from their base in one of the NNP's surrounding towns and spend an average of 4.7 nights in the region.
- The range in the total stated transport and accommodation expenditures for the trip to Namaqualand suggests that some people make shorter, cheaper trips, while others make longer, more expensive trips.

[86] Farmers Weekly, 2007. Botanical tourism, wildflower conservation. http://www.botanicalsociety.org.za/
[87] *The economic value of flower tourism at the Namaqua National Park, South Africa.* 2007.

9.4.3 Eco-tourism



Key Eco-Tourism destinations in the Province include:

- The Kgalagadi Transfrontier Park lies in a large sand-filled basin in the west of the southern African subcontinent, known as the Kalahari Desert. It straddles both South Africa and Botswana to create an enormous conservation area of over 3,6 million hectares and one of the very few of this magnitude in the world. The Kgalagadi Transfrontier Park is an amalgamation of the former Kalahari Gemsbok National Park of South Africa, which was proclaimed in 1931 mainly to protect migratory game such as Gemsbok, and the adjacent Gemsbok National Park in Botswana. Kgalagadi Transfrontier Park is characterised by vast arid landscapes with red dunes, sparse vegetation and camel thorn trees. Animals tend to gather in the dry river beds and waterholes. Herds of Gemsbok, Springbok, Eland and Blue Wildebeest follow the seasons, closely watched by prides of Black-Mane Lion. Other predators include Leopard, Cheetah, Brown and Spotted Hyena and birds of prey.
- The Tankwa Karoo National Park especially in flower season is a visual delight, but that is not all you'll discover. Surreal desert moonscapes and scenic landmarks define this Northern Cape nature reserve in South Africa. The soulful Karoo has long been a place in which to find peace and tranquillity. Tankwa Karoo National Park is also known for its spectacular birdlife. It's a regular stopover for bird watchers in search of at least 18 Karoo endemics, and a must do for birders visiting Southern Africa. This nature park hosts an abundance of reptile and invertebrate species and more recently antelope species have been introduced.
- Augrabies Falls National Park. Although this park is known mainly for its scenic attractions, viz, the Augrabies Falls, you will get the chance to see some game here. The birding, particularly along the river, is excellent and there is a good chance of seeing Springbok, Gemsbok and Black rhino. The local blue-headed lizard is fascinating and can often be spotted sunning itself on the rocks. The park's vegetation is fascinating, with a huge array of succulent plants, including the interesting, tree aloe (Aloe dichotoma) which goes by the common name of quiver tree, or kokerboom.
- Tswalu Kalahari is South Africa's largest private game reserve and home to rare game such as Desert Black Rhino, Kalahari Lion, Cheetah and Roan Antelope. This 100 000ha malaria-free Northern Cape game reserve is home to 230 species of birds and 70 species of mammals.
- Goegap Nature Reserve lies about 15 kilometres east from Springbok. The best time to visit the reserve to fully enjoy its splendour is from late July or August through to October, if you are wanting to see the spring flowers. (Depending on the rains the flowers may be earlier or later and this varies from year to year).

- Witsand Nature Reserve. The larger portion of the reserve was purchased in 1993 and the area gained nature reserve status on proclamation in April 1994. The nature reserve is approximately 3500ha in size, most of which comprises the unique dune system. Although, by comparison, Witsand is a relatively small reserve, it nevertheless has already gained popularity through its extraordinary splendour. Witsand has, since it's earliest times, been the hub of human activity because it was one of the few reliable sources of permanent water in the region. Archaeologists have found several Stone Age sites reflecting the changing lifestyles throughout many thousands of years.



- Mokala National Park. This is South Africa's newest Park, proclaimed as recently as June 2007, and is conveniently situated only 80km south west of Kimberley. Mokala is a Setswana name for a Camelthorn tree (Kameeldoring) (Acacia erioloba), and this Park is dominated by magnificent specimens of these picturesque gnarled and twisted trees. They vary from a small spiny shrub barely 2m high, to a 16m high trees with wide, spreading crowns. Mokala National Park's 27 500ha landscape varies between koppieveld (hills) and large open plains with the isolated dolerite hills giving the place a feeling of calm seclusion that contrasts with the large open sandy plains in the north and west of the Park. Mokala is an important area for the regeneration of valuable species and is home to, amongst other species, Black Rhino, White Rhino, Buffalo, Tsessebe, Roan Antelope, Sable Antelope, Mountain Reedbuck, Giraffe, Gemsbok, Eland, Zebra, Red Hartebeest, Blue Wildebeest, Black Wildebeest, Kudu, Ostrich, Steenbok, Duiker and Springbok. Situated in the transition zone between the Karoo and Kalahari biome, Mokala's thornveld savanna, dolerite outcrops and riverine vegetation attract a prolific number of bird species. Some of which include; the black chested prinia, blacksmith lapwing, melodious lark, cinnamon-breasted bunting, freckled nightjar, short-toed rock thrush, pygmy falcon and northern black korhaan.
- Namaqua National Park(NNP). The park was proclaimed on 29 June 2002 for the purpose of conserving the rich diversity of succulent plants. NNP is in the process of development, having grown to its current size of 141,000ha (including the coastal contract area between the Groen and Spoeg rivers) in nine years, thus expanding the park to include more succulent habitats and an important coastal section.
- The Ai-Ais Richtersveld – Transfrontier Park spans some of the most spectacular scenery of the arid and desert environments in Southern Africa. Bisected by the Orange River, which forms the border between South Africa and Namibia, it comprises the Ai-Ais Hot Springs Park in Namibia and the Richtersveld National Park in South Africa. Rugged kloofs (ravines), high mountains, dramatic landscapes and sandy planes form South Africa's largest mountain desert park, covering 160 000 ha, The harsh Richtersveld nurtures 30% of all South Africa's succulent species among which the famous "half man plant" and three quiver tree species. With less than 50mm of rain annually, the park is home to leopards, lizards, Hartmann's mountain

zebra, gemsbok, springbok, klipspringer, ground squirrel and suricate. It's the land for adventurers and the indigenous Richtersveld people. Some of the distinctive features on the Namibian side include the Ai-Ais Hot springs and the 2nd largest canyon in the world, the Fish River Canyon. Ai-Ais, which means, "burning water" in one of the local languages, refers to the sulphurous hot springs which are found in this area. The awe-inspiring Fish River Canyon measures 160 km in length, up to 27 km in width and reaches a depth of 550 m. Although the Park is not known as a game park, springbok, gemsbok, red hartebeest, Hartman's zebra, kudu, klipspringer and ostrich survive in this harsh land.

9.4.4 Adventure and outdoor activities



Adventure tourism, is generally seen as a combination of physical activity, cultural exchange, or interaction and an engagement with nature. Moreover, this niche tourism market is defined as recreational travel undertaken to remote or exotic destinations for the purpose of exploration or engagement in a variety of roughed activities. Adventure tourism is commonly categorised under nature-based tourism, with some elements of cultural-, sport-, or entertainment-related tourism.

South Africa is full of magnificent hotspots for adrenalin-addicts to explore, and the province of the Northern Cape is no exception. In fact, it's one of the favourite destinations in terms of adventure sports. Some of the natural resources that create real highlights for visitors are the Augrabies Falls, the entire Namaqualand region and the magnificent Orange River. These areas provide for opportunities for any adrenalin-inducing fun imaginable.

Because of the Augrabies and the Orange River, a number of water-based activities are based in the Northern Cape. These include kayaking, canoeing and river rafting. Fishing may not be considered an extreme sport, but it certainly appeals to many of those that love the outdoors vibe. In the Northern Cape's rivers and dams, there are plenty of fish for dedicated anglers to enjoy. These include massive barbel, as well as mudfish, carp and bream.

The dunes near Pofadder is ideal for thrilling 4 x 4 trails. It is also a fabulous destination for adventure motor-biking and quad-biking too. The sandy setting makes for heart-stopping twists, turns, ascents and descents. Some of the most prominent routes include the Aman Dune Trails, De Postjes Trail, Diamond Coast Shipwreck Trail and Kalahari Dunes, among many others. Game drives and walking safaris are the best ways to get the most out of the natural environment. Horse rides through the Kalahari are extremely popular, and allow all visitors to experience the countryside on horseback. There are a lot of lodges and private game reserves throughout the Province that cater and provide horseback experience for visitors.

Paragliding over the extraordinary landscapes of the Northern Cape Province is simultaneously adrenalin-inducing and eerily tranquil. Thermals soar from the baking earth to the cooler cobalt skies supplying an ideal lift for paragliders. Many of the world's records have been set in De Aar and Kuruman where flights of up to 350km have been recorded. Many of the visitors to the Northern Cape have a particular penchant for the outdoors and really enjoy spending time in the province, thanks to its rich abundance in fauna and flora.



9.4.4.1 Vehicle Testing facilities

The northern Cape Province is deceptive. At face value it appears to be a dry and desolate place with only a few towns of economic significance separated by vast distances. Yet in amongst all the dust of the Kalahari and arid environment lurk the ideal conditions for high speed testing, due to the excellent roads (long straight distances and smooth) and amenable weather many of the world's automotive manufactures often use the Province as a practical testbed for providing new models and technology.

The bloodhound project is a specialised project for high speed testing and setting of land speed records. The location is set in the breath-taking environment of the Kalahari at the Hakskeen Pan race track. There are private test circuits outside of Upington and a section of the N14 near Pofadder, where areas are designated for vehicle testing at speeds up to 250km/h. There are a number of off-road testing roads for Sport Utility Vehicles (SUVs) and bakkies that often do their testing on the Provinces dirt roads such as Goeraspan which is similar to conditions manufactures encounter in South America, which include lots of sand, loose gravel, and harp ups and downs all at high speed. See figure below that provides a spatial location to some of the vehicle testing facilities in the Province.

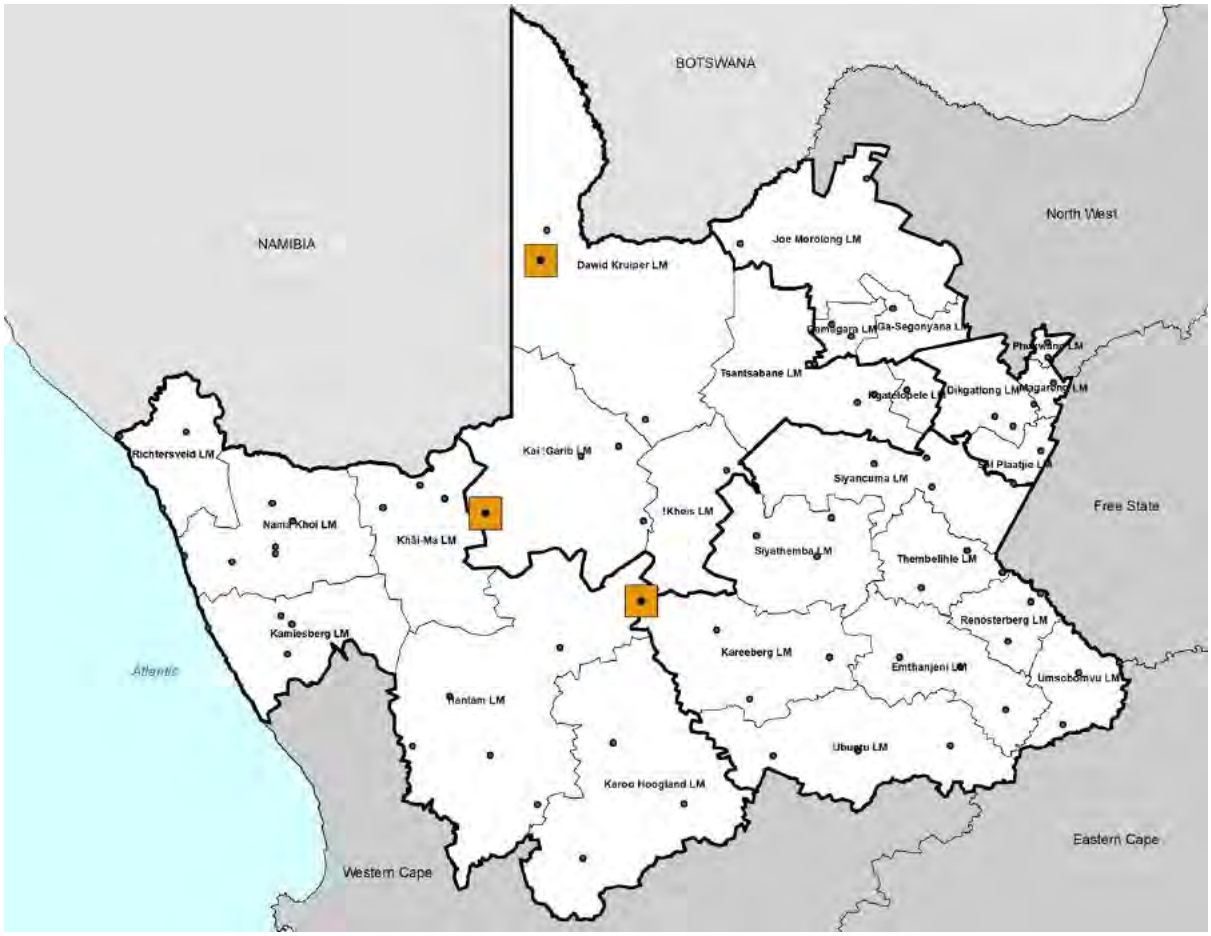


Figure 143: Key vehicle testing facilities in the Northern Cape Province

9.4.5 Agri tourism

9.4.5.1 Vaalharts Valley

This beautiful yet little known valley is only one hour's drive north of Kimberley. The surrounds are like a breath of fresh air with the lush green farmlands highlighted from the usual yellows and browns of the nearby countryside. Two mighty rivers, the Vaal and the Harts, feed an intricate irrigation scheme that supports more than 1 250 high production agricultural farms.

The development of an Agri-Tourism Route is currently taking place, which will allow the tourist to experience all the activities surrounding the harvesting and production of popular local farming products, such as olives, pecan nuts, peanuts, citrus, wine cotton and stone-fruit. Wheat, mealies and lucerne are also grown. Although agriculture is the mainstay of the valley there is plenty more to do and see.

You can cool off in our canals (or even ride down them); explore the region on a 4×4 trip or join the quad biking club for a different kind of fun on four wheels; enjoy a breath-taking view of the valley in a microlight; take a peaceful morning horse riding; watching the water birds on a shallow lake during late afternoon or reminisce about the one that got away on the banks of the Harts River. Hartswater and Jan Kempdorp are the two main centres in the irrigation area and have golf clubs, bowling greens, restaurants and accommodation to suit most tastes.

9.4.6 Marine and Coastal Tourism[88]

The development of the Marine and Coastal Tourism is identified as a key economic development opportunity the Northern Cape. The aim is to develop the coastal area of the nothing cape to ensure a sustainable socio-economic environment for the long-term as mining in these areas and the rest of the country starts to determinate. The Northern Cape coastal zone is commonly referred to as the Diamond Coast due to the abundance of alluvial diamond deposits, and other mineral deposits, found in this region. [89]

The tourism performance of the coastal area is relatively low with domestic trips fluctuating in the past nine months of 2015, thus the development of tourism is a necessity, not only for economic growth but also to build tourism recognition within the country and African regions. There is a great gap to the age group of travellers, thus the development of tourism needs to cater for a diversity of travellers mainly to also encourage the younger generation to grow interest to travel domestically specially the whole of Northern Cape.

Coastal and marine tourism has a potential to become a major source of economic growth and job creation, thus is it important for stakeholders to coordinate in terms of the development of coastal tourism. A destination with a long coastline and marine is considered more valuable because it has more space for coastal tourism development that will eventually contribute to the social and economic growth local and regional level of the destination.

The coastal region has potential for emerging niche sub-sector which are of primary importance for the coastline, such as:

- Marine life;
- Beach front;
- Nature;
- Business Visiting Friends and Relatives; and
- Leisure

Key attributes include:

- Alexander Bay (Mining history and museum tours, adventure activities, angling, Orange River estuary and wetlands, Lichen Hills, seal colony, Holgat, Spuitgat and Shipwreck – currently not accessibly due to mining activities). An airport is also available which is currently not operational. Alexander Bay has potential numerous outdoor activities including walking and cycling trails, bird viewing at the Orange River Mouth, mine tours, fishing and canoeing on the river and nearby points of interest e.g. the Lichen Hill field. There are opportunities to see Flamingos near Alexander Bay while Sanddrift is a town with biological and geological uniqueness, offering scenic walks along the Orange River, extensive bird life, cultural experiences and the Wondergat point of interest. The Ais-Ais/Richtersveld Transfrontier

[88] *Defined as: 'those recreational activities that involve travel away from one's place of residence, which have their host or focus on the marine environment, where the marine environment is defined as those waters, which are saline and tide-affected' (Orams,1999).*

[89] *Northern Cape: Department of Economic Development and Tourism. The Development of the Northern Cape Coastal and Marine Tourism Strategy, 2016*

National Park is a significant conservation initiative with the aim to establish large conservation and wildlife areas not only through the integration of vast landscapes and re-connecting ecological systems, but also thorough development of cross-border tourism linkages with Namibia.

- Port Nolloth is a Northern Cape coastal town which has small domestic sea port which is currently used by De Beers diamond mining company at Namaqua region. This town is situated on the North-Western coast of South Africa appproximately144 kilometres north west of Springbok and is accessible on the R382 from the N7. History of the town reveals that seaport was previously a transhipment point for copper from the Okiep mines, and diamonds from the Namaqua coast. There remains of the railway can still be found at the Willem Koegelenberg Park which within a walking distance from the Grazia de beer Beach Front. Today the town is a sleepy commercial hub with a number of holiday homes and a caravan park at the adjacent McDougall's Bay. It is also a gateway to the Richtersveld National Park, located approximately 160 kilometres to the north along the Orange River. A local museum presents an archive of the rich history of Port Nolloth and diamond mining.
- Kleinzee is currently under the stewardship of De Beers mining, with the town maintained by the mine. However, De Beers is in the process of handing over the mining area to West Coast Resources after which time the town of Kleinzee will become the responsibility of the Nama Khoi Local Municipality. There is a checkpoint to enter the town, but it is not used and access to the town and most of the tourism activities is uncontrolled. Furthermore, area surrounding the town does however have large areas that are being rehabilitated as the influence of the mining. The De Beers offices are also located to the north of Kleinzee with a number of mine employees working at the offices. There is a well-maintained museum, it covers the history of diamond mining, the natural environment and the history of man in the area. There are exhibits on shipwrecks, geological, palaeontological and archaeological finds. The Molyneux Nature Reserve lies just north of the town.
- Hondeklip Bay is on the southern parts of the Northern Cape Coastal region and falls under the Kamiesberg local municipality. The town is located west from Kammieskroon in the Northern Cape, just south of Kleinzee and Koingnaas. The Aristea Shipwreck, Spit Fire rock, Dog Stone and Light House are some of the tourism attractions.



9.4.7 Heritage[90] tourism

Cultural and historical resources relate to places that host communities conserve for future generation. Thus, these facilities and building represent the history and meaning of cultural value. Tourist trips are taken with a purpose to visit historical sites and learn about the host communities culture and values. The market is mainly people who are educated, have interest to culture and travel experience. Heritage tourism is the fastest growing industry as it plays a meaningful aspect to the destination, people between the age group 55 to 70 also known as baby boomers wish to visit site that represent significant events that occurred in the past which lead to the contribution of economic development.

Table 47: Typologies of Heritage and Cultural Tourism Products in South Africa[91]

NO	TANGIBLE[92]	INTANGIBLE[93]
1.	Historical Buildings and Places	Oral History and Traditions
2.	Declared Heritage Sites	Indigenous Knowledge Systems
3.	Cultural Objects and Collections	Rituals and Cultural Performances
4.	Artefacts and Crafts	Art Performances and Creative Arts
5.	Fine Art	Skills and Techniques
6.	Cultural Landscapes (including natural and cultural aspects of the environment)	Belief Systems
7.	Archaeological evidence	Cultural Festivals
8.	Geological Evidence	Popular Memory
9.	Paleontological Remains	Pre-historic history
10.	Sacred and Spiritual Sites	Cultural heritage

Currently, as a tourist destination, Northern cape is positioned largely around “safari-type” experiences and scenic natural environs which undisputedly constitute an integral part of the biodiversity of heritage resources. The Province, however, also has much more to offer as a cultural landscape endowed with a diverse wealth of exuberant heritage and cultural products in the form of the arts, crafts, festivals, oral history, storytelling and folklore, heritage sites, places of historical and cultural significance, archaeological remains, paleontological evidence and geological formations. Key Provincial heritage sites and areas include:

- The ǂKhomani Cultural Landscape which has been declared a World Heritage Site. The United Nations Education, Scientific and Cultural Organisation (UNESCO) World Heritage Committee inscribed the site on its prestigious World Heritage List during the 41st session that took place in Krakow, Poland, from 2 to 12 July 2017[94].
- The Richtersveld Cultural and Botanical Landscape.

[90] *According to the South African White Paper on Arts and Culture drafted by the Department of Arts and Culture (1996), heritage is the sum total of wildlife and scenic parks, sites of scientific and historical importance, national monuments, historic buildings, works of art, literature and music, oral traditions and museum collections and their documentation which provides the basis for a shared culture and creativity in the arts.*

[91] Department of Tourism, 2012. National Heritage and Cultural Tourism Strategy

[92] *Heritage and cultural tourism products with tangible and often physical characteristics, which are consistent with the definition provided for heritage resources, site, place and object.*

[93] *Heritage and cultural tourism products with intangible and often non-physical characteristics, which are consistent with the definition provided for living heritage and intangible cultural heritage.*

[94] *Northern Cape Tourism Authority, 2017. Northern Cape: ǂKhomani Cultural Landscape World Heritage Site. http://experiencenortherncape.com/visitor/news/northern-cape-ikhomani-cultural-landscape-world-heritage-site*

- The Khoisan Rock Art features throughout the Karoo and offers an exciting attraction.
- Kimberley, the diamond city, is also renowned for historical aspects, including phenomenal South African history
- The Great Karoo is popular for its Battlefields. Major wars were fought between the Boers and the Anglos. Many memorabilia and other aspects reflect the history and culture of this area.

9.5 STATE OF TOURISM INFRASTRUCTURE

The state of Tourism infrastructure is summarised as follow in the Northern Cape Tourism Master Plan:

- The Green Kalahari region is perceived to have adequate roads, water, electricity and telecommunications infrastructure. It has acceptable airports/airfields but is lacking in the water transport and related infrastructure, refuse removal and town cleanliness as well as rail infrastructure. Overall, the Green Kalahari region is perceived to have fairly decent levels of tourism support infrastructure.
- The Kalahari region's tourism support infrastructure is not perceived to be of adequate quality and/or state. Although airports / airfields, refuse removal and town cleanliness as well as water transport and related infrastructure ranked among the highest in the infrastructure assessment, they were still among the lowest levels out of all regions. Infrastructure like rail, roads and telecommunications were ranked as barely acceptable. Bulk services like water and electricity were indicated as not being of acceptable standard.
- The Diamond Fields region was indicated as having mostly acceptable levels of supporting infrastructure with the exception of electricity, rail and telecommunications. Water infrastructure and supply was indicated as being mostly acceptable while aspects like the airport refuse removal and town cleanliness as well as road ranked among the highest of all regions. It is expected of the economic and administrative hub of the province to provide adequate supporting infrastructure that is of high standard and well maintained.
- The Karoo region is mentioned to have somewhat acceptable levels of supporting infrastructure. Refuse removal and town cleanliness as well as rail, electricity supply and water infrastructure were ranked as somewhat adequate to moderately adequate. Telecommunications and water supply was indicated as being barely adequate while roads and airports / airfields were indicated as being very inadequate.
- The Namakwa region's highest rated supporting infrastructure is its roads, water supply and refuse removal and town cleanliness – albeit of moderate adequacy. Telecommunications, airports / airfields as well as water infrastructure was of moderately to barely adequate while rail and electricity supply was indicated to be inadequate.





CHAPTER 7 – This chapter outlines the key agriculture and rural development resources, opportunities and challenges faced in the Northern Cape Province. A strong spatial representation was followed

CHAPTER 7

Status Quo Analysis – Agriculture and Rural Development

CHAPTER 7 | AGRICULTURE AND RURAL DEVELOPMENT

1 OVERVIEW[95]

The Northern Cape produces some of the highest-quality agricultural products in South Africa. Produce ranges from grapes, lucerne, cotton, wheat, corn, carrots, potatoes, ground nuts and soya beans. The province is fast becoming a significant exporter of table grapes, raisins and meat. The establishment of fruit and vegetable processing operations would add value to the province's agricultural products. There are opportunities for the production and processing of dates, olives, rooibos tea and citrus products. Growth in agriculture-related industries would also create a market for related businesses such as fibre sack and cardboard carton manufacturing. The Northern Cape is also large producer of sheep and goats, with specialist products such as ostrich meat on the rise.

Port Nolloth is the hub of the fishing industry on this stretch of the west coast. Because most of the fish caught in the Northern Cape waters have until recently been landed and processed outside the province, development of the fishing industry has been slow. This is all set to change, with the increased quotas that will be awarded to land and process fish in the Northern Cape. Stricter enforcement of quota rules, as from 1998, means that at least 65% of the catch, which totals 7 085 tons (mainly hake), are landed in the Northern Cape. This opens up the possibility for more fish processing plants around the expanded harbour at Port Nolloth. A burgeoning mariculture industry with, among others, abalone being farmed for export to the Far East, is also being established in the region.



[95] *https://www.brandsouthafrica.com/investments-immigration/business/investing/opportunities/investing-in-the-northern-cape*

2 AGRICULTURE

2.1 OVERVIEW[96]

Occupying 36 million hectares, the Northern Cape is the largest province in the country, almost a third of South Africa's total land area. The province is a predominantly semi-arid region, prone to extreme temperatures. The distribution of land in the province is indicative of the nature of agriculture production – a large livestock-farming sub-sector and intensive-irrigated cropping. Cattle and sheep farming are located predominantly in the southeast and northeast of the province while game farms tend to be spread through the middle. Sheep farming is the second-largest agricultural sector in the Northern Cape while 4% of all South Africa's beef is produced in the province. Wool and mohair production are also strong industries in Northern Cape with 11% of South Africa's wool and 7% of South Africa's mohair. Crop farming takes place mainly in the fertile areas along the Northern Cape's main rivers, the Vaal and Orange rivers. Below are some of the key crops produced in the province.

Table 48: Key crops produced in the province

TABLE GRAPES	The Northern Cape is the second largest producer of table grapes in South Africa, producing 25% of the country's table grape output. The grapes are exported predominantly to Europe and the United Kingdom.
WINE	The Base Orange River Wine Cellars Cooperative, the second largest wine cooperative in the world with 740 wine-grape farmers and 445 juicegrape famers, is located in the Northern Cape. It supplies mostly the local market
DRIED FRUIT	Northern Cape produces 4% of the world's total dried vine fruit, and 90% of South Africa's total dried vine fruit. Approximately 80% of raisins are exported to Europe, Japan, Taiwan, Korea, Canada and the United States.
LUCERNE	This is one of the most important crops in the province at the climatic conditions are optimal for production of this high-quality hay.
FIELD CROPS	The province produces 18% of South Africa's wheat. With approximately 55 000 hectares of land under maize production, Northern Cape also produces approximately 4.6% of South Africa's maize, and approximately 20% of South Africa's groundnuts.

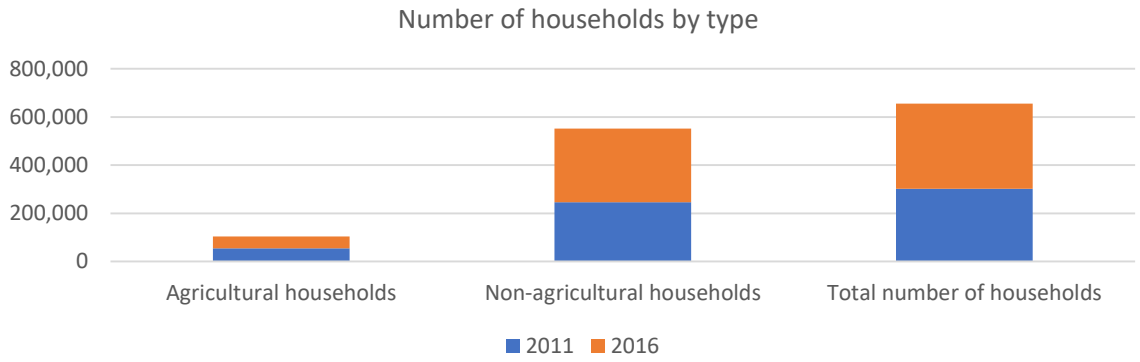
The Northern Cape is enjoying a tremendous growth in value-added activities, including game-farming. Food production and processing for the local and export market is also growing significantly. The economy of a large part of the Northern Cape, the interior Karoo, depends on sheep-farming, while the karakul-pelt industry is one of the most important in the Gordonia district of Upington. The province has fertile agricultural land. In the Orange River Valley, especially at Upington, Kakamas and Keimoes, grapes and fruit are cultivated intensively. Wheat, fruit, peanuts, maize and cotton are produced at the Vaalharts Irrigation Scheme near Warrenton.
The Provincial meat produce that include domesticated and wild animals render the best beef, mutton, pork, goat and venison that is ensured through several EU and Muslim approved abattoirs.

Potential Trade and Investment Opportunities in Northern Cape Produce:

- Extensive fruit, vegetables and nut production in near organic conditions
- Livestock production and meat which include: beef, mutton, pork, venison, goat, ostrich
- Wines, dried fruit, dates, olives, nuts.
- Fishing and aquaculture: Abalone, rock lobster, oyster, kelp, fish i.e. snoek. This also extends into potential aquaculture related to marine and freshwater species and ranching of abalone along the coastline.

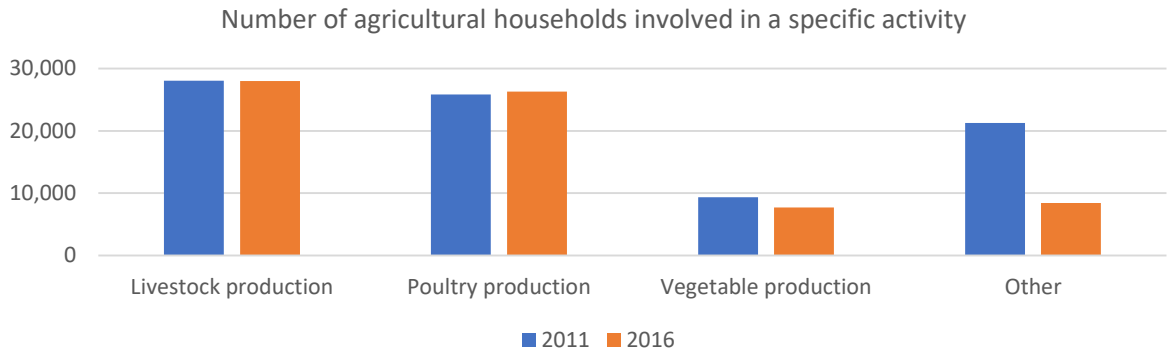
[96] *https://www.smesouthafrica.co.za/Agribusiness-opportunities-in-northern-provinces/*

2.2 DEMOGRAPHIC ANALYSIS[97]



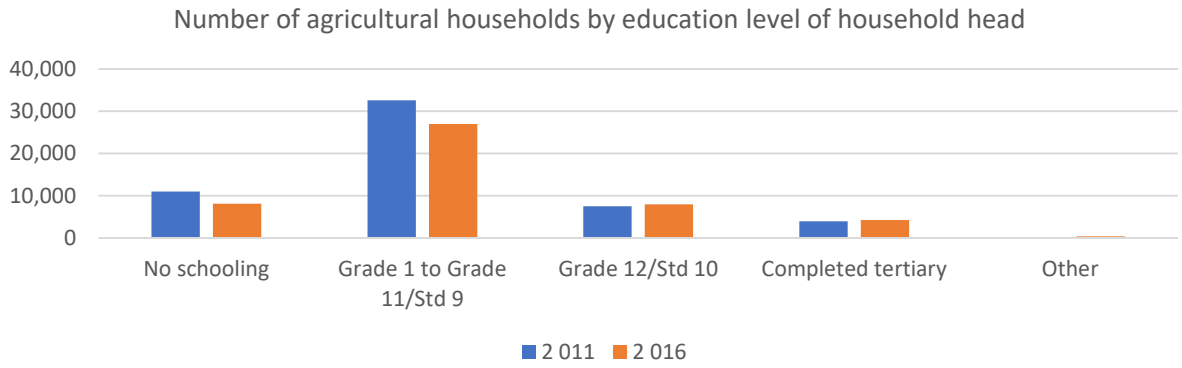
Graph 54: Number of households by Type – Active in the Agricultural Sector in the Province

The number of households engaged in agriculture was 48 798 in2016 compared with 55 150 in 2011. The decrease of 2.5% between the two years was mainly due to the drought experienced in the country during 2014/15. On a national level the Northern Cape reported the lowest numbers of households engaged in agriculture, with 2,1% of country's total.



Graph 55: Number of households by type of Activity in the Agricultural Sector in the Province

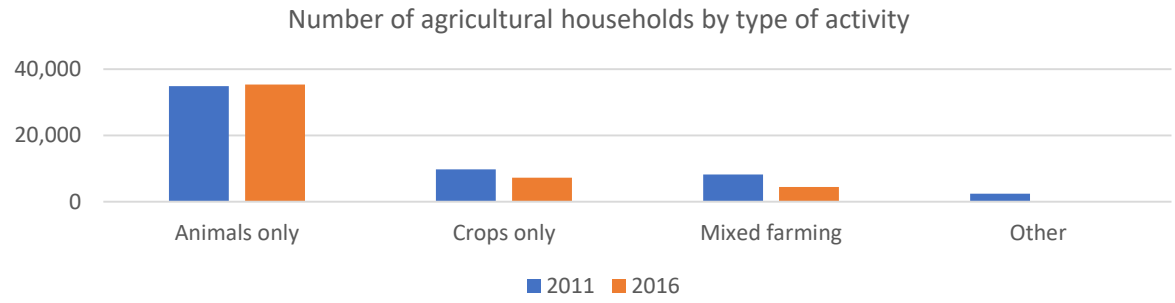
The Northern Cape accounted for 2.8% of the country's households involved in livestock farming in 2016, as well as 2.3% of households involved in poultry farming and 0.9% in Vegetable production.



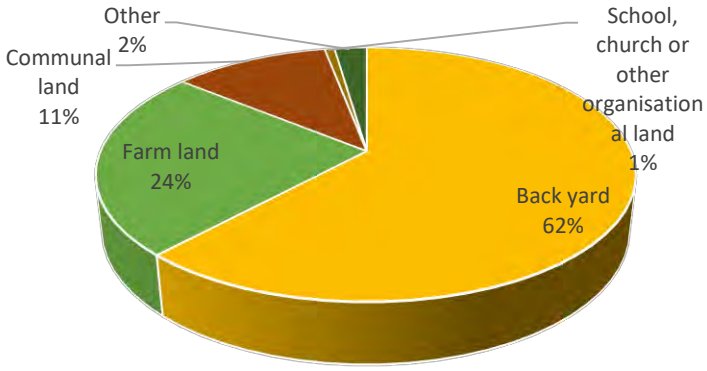
Graph 56: Number of households by educational level in the Province

[97] *Community Survey 2016, Agricultural households*

The largest proportion of agricultural households fall within the category, grade 1 to grade 9.

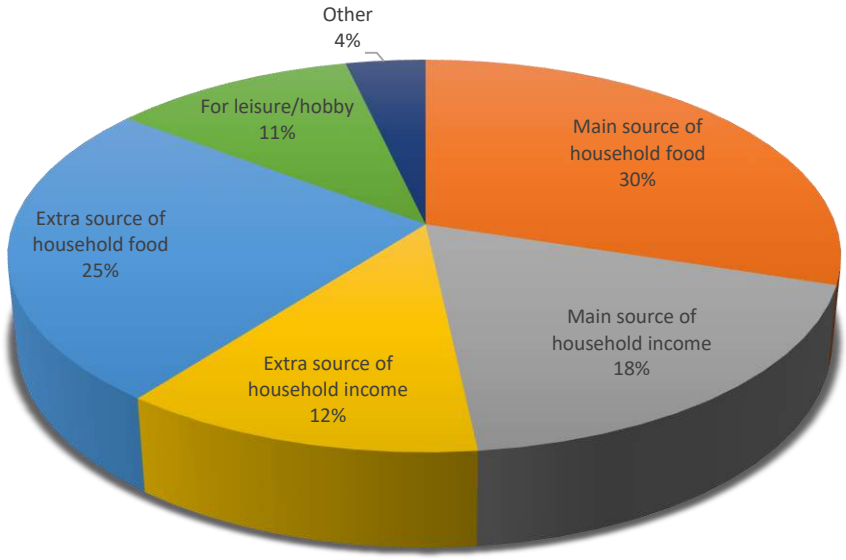


Graph 57: Number of households in the agricultural sector by type of main agricultural activity



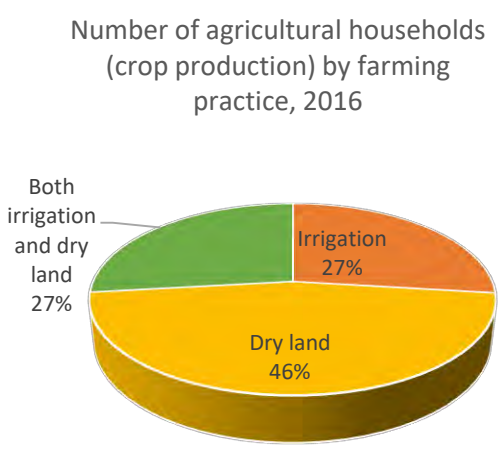
Graph 58: Distribution of agricultural households by main place of agricultural activity within each province (percentage), 2016

The graph above shows that 'back yard' (62%) was the leading main place of agricultural activity in 2016 provincially. 'School, church or other organisational land' recorded the lowest percentage at 1%.

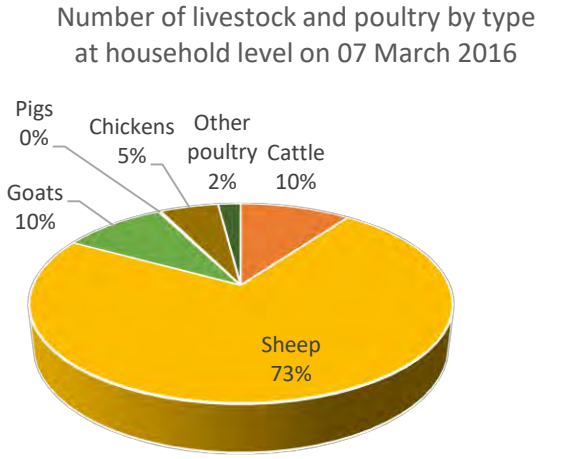


Graph 59: Percentage distribution of agricultural households by main purpose of involvement in agricultural activities within each province, 2016

The main reason why the Northern Cape Provincial households were involved in agriculture was 'extra source of household food'.



Graph 61: Number of households associated crop production



Graph 60: Number of households per livestock farming type

In the Northern Cape, 'dry land' was reported as the leading farming practice. 'Sheep' is the leading livestock farming type in the Province with 'Cattle' at 10% and 'Goats' at 10% respectively.

2.2.1 Namakwa District[98]

The Namakwa District Municipality (NDM) has an ocean and land-based economy, both with huge potential for growth and sustainable job creation in the district. Apart from this the District also has a large number of small scale and emerging farmers and fisher folk dependant on the land and the ocean for a living.

Commodities in the NDM were selected in two categories, namely:

- Dates; and
- Sheep (mutton)

These commodities have excellent investment, value adding, growth, export, wealth creation and job creation potential.

Small and emerging farmers produce a myriad of commodities in the district, without much support normally available to commercial farmers such as access to finance, production inputs, packing / processing facilities and marketing channels. This keeps them anchored in the cycle of dependence and poverty without the means to break out. The Agri-Park of the Namakwa District can change all that for the positive by way of much needed support where most needed through the Agri-Hub and Farmer Production Support Units. In order for this to be achieved the commodities produced by the small and emerging farmers, even though they might not be main commodities, must be included in the Agri-Park of the Namakwa DM with support services to achieve the aims of rural development and the Agri-Parks.

[98] *Department of Agriculture, 2016. Draft Provincial Diagnostic Report for the Office of the Premier*

These support commodities for inclusion into the Namakwa Agri-Park are indicated below:

- Crayfish;
- Fish;
- Red meat (mutton, goats, beef, pork);
- Lucerne;
- Vegetables (various);
- Rooibos Tea; and
- Essential oils and traditional herbs and medicines

2.2.2 John Taolo Gaetsewe (JTG) District [99]

The John Taolo Gaetsewe District Municipality is characterized by extensive tracts of land well suited to extensive, livestock-based agriculture. The rural land in the Municipality is used extensively for cattle, sheep, goat and game farming with limited intensive farming along some seasonal rivers. The area is also well known for its good commercial hunting in the winter.

No dryland crop farming is detected in the area. Secondary data sources note that the agro-ecological conditions in the area are not suitable to dryland crop production at all and that the area is considered to be completely non-arable. Consultations with local officials confirm that the area is best suited to extensive livestock production and that all activities in the area are currently aligned to these enterprises. Dryland crop farming is considered to be agro-ecologically infeasible. It is important to note that maize and grain are produced in very limited quantities. Due to the general lack of significant and lasting water sources in the District the development of irrigated agriculture is limited. The only significant area indicated as being under irrigation in the District is the farm Manyeding, 30km East of Kuruman. The area of roughly 125ha is reportedly being under centre pivot irrigation with water from a nearby fountain and a range of vegetables are cultivated. The particular property forms part of several government and private sector initiatives.

The District dominant commodity is Beef Cattle. Beef cattle are cattle raised for meat production (excluding dairy cattle used for milk production). Common beef cattle breads in South Africa include – Bonsmara, Afrikaner, Brahman, Boran and Nguni. This section analysis is solely based on beef cattle sub-sector and JTG Agri-Park. The chapter outlines the beef cattle subsector and industry forces, meat consumption and production, industry structure and links with the Agri-Park, and value chain players.

2.2.3 Frances Baard District Municipality[100]

Due to the existing ground conditions present in the District ± 70% of the agricultural land within the District is used for Cattle, Coat or Sheep farming, mostly in the central and western areas. The highest potential agricultural land falls within the Phokwane Local Municipal area, between the towns of Hartswater, Jan Kempdorp and Ganspan to the north of the District. The area is known as the Vaalharts Irrigation Scheme and is the largest irrigation scheme in South Africa.

[99] *DRDLR, 2016. Agri-Park Master Business Plan John Taolo Gaetsewe District Municipality Northern Cape Province*
[100] *DRDLR, 2017. Frances Baard District Rural Development Plan*

High potential agricultural land is also present along the banks of the Vaal river between Riverton & Barkley West. Scattered smaller pockets of irrigated land is present within the eastern side of the Dikgatlong Local Municipal area as well as to the south of the Sol Plaatje Local Municipal area, surrounding Ritchie. Most of the cultivated land falls within the Agri -Parks prescribed radius of 60km, which provides the opportunity for investment within the District to enable the rural communities to acquire land through the Rural Development Programme initiatives to uplift the quality of life of rural communities. Agricultural towards the north-western part largely make use of ground water through boreholes, and main activities in the region include livestock and game farming. The western part of Frances Baard does have good assess ability to the two main rivers running thru the District, the Vaal and the Modder Rivers. Unique product within the district include the following:

- Game farming – Dikgatlong & Sol Plaatje;
- Vegetables – Dikgatlong; and
- Pecan Nuts, Ground Nuts, Maize, vegetables – Phokwane.

The areas within the Vaalharts Irrigation Scheme (Hartswater, Jan Kempdorp & Ganspan) is categorized as high potential cultivated commercial pivots, with other isolated areas along the Vaal River, surrounding Warrenton, Barkley West, Delportshoop, and along the Modder River, surrounding Ritchie. The rest of the District can be categorised with in to two areas, areas with low shrub land and areas with grassland. Isolated areas are present in the Central of the District categorized as cultivated commercial fields.

The Frances Baard DM contributes largely to the production of the Northern Cape's fruit and vegetables. But as mentioned in the case of potatoes there are very little value adding processes taking place in the area. This results in the opportunity for the development of fruit and vegetable processing within the Frances Baard DM, such as:

- Potatoes (Chips)
- Carrots (Carrot Juice)
- Olives (Olive Oil, soap)
- Grapes (mainly wine grapes, raisins)
- Tomato (Tomato paste, dried tomatoes)
- Citrus, Sub Tropical and Deciduous Fruits
- Mushrooms
- Sweet Potatoes

The District contributes to the majority of the Field Crops produced in the Northern Cape. However very little is being done to add value to these field crops. Thus there is a further opportunity for the processing of these field crops, such as:

- Maize
- Wheat
- Sunflower seeds
- Dry beans
- Lucerne
- Ground nuts

There is an opportunity to expand the field crop production of the District with the production of pecan nuts. The District contributes greatly to the livestock of the Northern Cape, but as stated there is very little being done with regards to value adding to the livestock. The industry is thus concentrated in the primary sector. There is however opportunity for meat processing with in the area, such as:

- Beef Cattle
- Pigs
- Chicken
- Ostriches

The following four vegetable agro-processing opportunities present exciting opportunities for the Frances Baard District:

- Frozen vegetable processing (business plan already developed).
- Canned/bottled vegetable processing.
- Vegetable juice (carrot in particular as it is in high demand) processing.
- Dried vegetable processing

2.2.4 Pixley Ka Seme (PKS) District[101]

The arid nature of the district and the availability of suitable water recourses limits agricultural potential large portions of the District. Areas under irrigation can be utilised for double density maize planting which maximise the productivity and fertility of the land. By employing these methods local farmers increase the yield (tons per hectare) of products which in turn stimulates and lifts the economical income of the district.

Key insights include:

- The PKS District is divided into two main agricultural types. Two thirds of the area, southern section of the District is characterised by wool sheep. The area towards the north is characterised by predominantly sheep, for red meat;
- Isolated irrigation land is present, limited to the three main rivers, the Orange, the Vaal and the Riet Rivers;
- The Vanderkloof dam within the Orange River provides an abundance of cultivated (irrigated Pivot) land for farmers to produce crops on rich fertile land for both in the PKS District as well as cross border to wards to the Free State.
- Agricultural activities towards the north and south of the three rivers are largely dependent on ground water through boreholes. Distances from the rivers and high electrical costs limits the construction of water pipelines. Degraded land, scattered over areas, is also present in the areas towards the south;
- The areas with limited water resources area mainly focused on Sheep farming, (for wool and meat), and game farming, the sheep farming produces mutton and wool;
- Crop production is limited to the Orange and Vaal Rivers due the availability of water throughout the rest of the District. Extremely small isolated areas of low cultivation are

[101] *DRDLR, 2017. Pixley Ka Seme District Rural Development Plan*

scattered throughout the District, this is however linked to small Lucerne or crop production on private farms used for livestock feed.

- Grazing capacity is highest towards the Northern parts of the Siyancuma and Thembelihle Local Municipal areas with a capacity of 4-6 hectares needed per Livestock units. Similar areas with the same capacity is also situated towards the eastern side of the District. The capacity towards the western side of the District starts at a capacity of 7-9 hectares needed per livestock unit within the central western areas and with a capacity of 13-15 hectares needed per livestock unit towards the far west.

The district is suitable for a wide variety of produce namely:

- Red meat;
- Vegetables,
- Grain,
- Maize and
- Poultry

There are several abattoirs in the district with the largest located in the Emthanjeni Municipal Area with a capacity of 2000 sheep slaughtered per day. The huge potential for the region lies in adding value to the products within the area. At present products are leaving the areas in unprocessed form. The District also produces large quantities of wool that are processed in the Eastern Cape. The district is the largest wool-producing region in South Africa and provides the potential to expand and complete the value chain within the district to ensure all within the district benefit economically.

An abundance of high quality goats and sheep exist within the district and expanding the goat and sheep farming could become important due to the high demand for meat and once beneficiation processes in terms of value addition begins (dairy products, leather goods, wool etc.) within the district.

Irrigation farming is confined to the immediate surrounds of the two major rivers that flow though the District. Most of their Irrigation presently takes place in close vicinity to the rivers and canals. Irrigation farming forms a large part of the agriculture activities within the district with numerous products being cultivated along the rivers. The commodities or products being cultivated include grapes, Lucerne, peanut, maize, dry beans, olives, soya bans, potatoes, pistachio and cotton.

Soya bean farming is an excellent product for rotation farming with Lucerne and maize. The value addition opportunities with Soya bean farming are huge with very little wastage and these include, amongst others, bio-diesel, high protein health foods, multi-vitamin supplements and animal food.

The weather conditions, availability of land and water provide lucrative opportunity pistachios farming in the district. The global demand for pistachios is very high and the market price is very 82 high compared to other nuts. The value addition opportunities are in the chocolate and sweet market and this luxury goods market is steadily growing globally.

The region has a long history of game farming. Game farming industry provides possibilities of a reasonable income. There are also value addition opportunities such as biltong manufacturing, guest houses and taxidermy. The game farming industry opens the opportunity to attract visitors and investors to the district.

2.2.5 ZF Mgcawu (ZFM) District Municipality[102]

The District is the largest producer of agricultural commodities amongst all district municipalities in the Northern Cape - contributing 47% to the Northern Cape's total agricultural output - it has an excellent opportunity to focus on increased beneficiation of agricultural produce. Interestingly 33% of the Districts' imports consist of agricultural commodities. This number could be significantly reduced if more agricultural commodities were processed locally, helping to contribute not only to increased agriculture-based value addition, but also to job creation and environmental sustainability (lower carbon emissions from reduced transportation). Thus, the District could benefit to a large extent from an agro-processing hub, housing processors of various agricultural commodities so as to ensure that fewer commodities leave the district in their cheapest (raw and unprocessed) form.

The main breed of sheep being farmed in the region is the Dorper. The Dorper is a highly successful South African-bred mutton breed developed specially for the more arid areas of South Africa. The Dorper's excellent carcass qualities in terms of conformation and fat distribution, generally qualify it for top classification. The biggest issue for emerging sheep farmers is resources, with specific reference to water, land and livestock. Areas such as Mier have limited surface water and the sheep farmers in the area are predominantly reliant on ground water and boreholes.

The quality of ground water in many parts of ZFM DM, but especially in Mier, is brackish. The Department of Water Affairs is currently constructing a water pipeline between, the Orange River accounted for 33% (4 501 ha) of the total area (13 462 ha) planted to table grapes in South Africa. Some of the main producers in the region includes Karsten Group, fruits du Sud, Red Sun Raisins, Rekopane Estates, Die Mas, Carpe Diem Estate and many others. The Orange River Producers Alliance is a table grape industry that is renown as supplier of fresh table grapes to Europe with an output of more than 20 million cartons.

More than 90% of Africa's total dried vine fruit arm production is produced through 1250 sultana grape growers in the Northern Cape who produced more than 50,000 tonnes in 2010. The sultanas produced here comprise more than 80% of that which is exported primarily to Europe and other eastern countries.

Table and dry grapes are one of the most important deciduous fruit grown in South Africa, taking into consideration their foreign exchange earnings, employment creation and linkage with support institutions. Table grapes sold in the export markets generate a greater unit price than that achieved on the local market. For this reason, management orientation and understanding of the rules of the export markets are critical factors in the pathway to success in table grape production. Up to 90% of the total production is exported, mostly to Europe and the UK where South Africa enjoys preferential market access through the Trade Development and Cooperation Agreement (TDCA) between South Africa and the EU. Estimated turnover for the sector is estimated at over R1.5 billion per annum. The bulk of sales to the consumer are by means of contractual agreements via preferred category suppliers to the large supermarket chains. Furthermore, various export companies or agents conduct work on the basis of consignment sales on behalf of the growers or packers. The industry operates in a deregulated environment where prices are determined by the market forces of demand and supply.

[102] *DRDLR, 2017. ZF Mgcawu District Rural Development Plan*

2.3 AGRICULTURAL POTENTIAL

Agricultural potential is defined as a measure of potential productivity per unit area and unit time achieved with specified management inputs; and for a given crop or veld type and level of management, is largely determined by the interaction of climate, soil and terrain. Productivity is regarded as an indication of the agricultural potential for a given crop under a management level and for an identified portion of land as being dependent on precipitation, temperature, soil conditions, terrain and crop characteristics (Schoeman & Scotney, 1987).

Human impact and the harsh climatic conditions have resulted in more than half of South Africa 's land surface being under threat of desertification (see figure below). It is estimated that the annual soil loss due to erosion is 2.5 tons, which exceeds the rate of soil formation of 0.31ton ha/year by far (DoA., 2004).

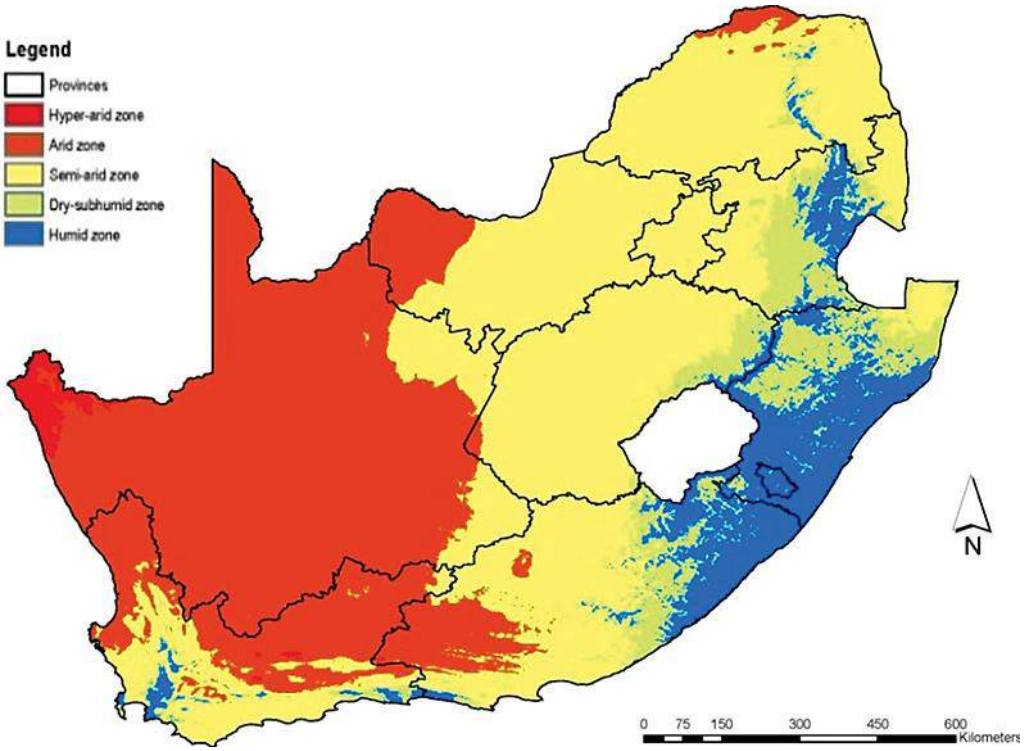


Figure 144: Northern Cape is predominantly defined as an Arid - Semi Arid area

2.3.1 Land capability

Land capability is defined as the most intensive long-term use of land for purposes of rainfed farming determined by the interaction of climate, soil and terrain[103]. The FAO (1976) stated that the process of assessment of land performance when used for specified purposes, involves the execution and interpretation of surveys and studies of land forms, soils, vegetation, climate and other aspects of land in order to identify and make a comparison of promising kinds of land use applicable to the objective of the evaluation. Land evaluation and land use planning evaluation include concepts such as land management, current land use, the characteristics of the land, land use requirements and the

[103] *Department of Agriculture, Forestry and Fisheries, 2017. National land capability evaluation raster data layer, 2017. Pretoria.*

improvement thereof. Van Niekerk et al (1981) stated that a land capability map should enable the user to attain the best long-term utilization of the land.

In 2014 the Directorate: Land Use and Soil Management (DLUSM) embarked on a process to refine the 2002 national land capability data set based on an in-depth researched and verified methodology where in the Gauteng and Limpopo provinces were initially used as pilot areas before being applied and adapted on a national level. This methodology was based on a spatial evaluation modelling approach wherein the key modelling issues include the delineation of geographic units, the specification of both dependant and explanatory variables, the formulation of the model, the testing of the statistical significance of the model and the interpretation of the results. The end result of the process was a newly derived agricultural-driven land capability evaluation model based on a spatial evaluation modelling approach and a raster spatial data layer comprising of 15 land capability evaluation values (with the value of 1 being the lowest possible value and 15 the highest possible value), usable on a scale of 1:50 000 – 1: 100 000.

As was the case with the 2002 approach the main contributing factors towards land capability in a "natural or unimproved "rainfed (dryland) scenario, were the soil, climate and terrain capabilities with a weighted reference of[104]:

- Soil capability = 30%;
- Climate capability = (40%) and
- Terrain capability = (30%).

As per figure below, Land Capability in the Northern cape is overall classified as low-moderate to very low, this is due to the arid climate conditions facing the Province. Land Capability is however improving from west to east. Small moderate areas are evident within the Vaalharts Irrigation scheme area. The Land capability assessment does not take irrigation schemes into consideration. The province is predominantly suitable for moderate grazing at best, with no arable potential (Schoeman et al., 2000). This is due to the combination of unfavourable climate and sandy soils.

Land capability, focuses mainly on the capability of the natural resources. Agricultural potential includes additional factors, such as level of management, economic factors and crop selection or suitability. Economic factors are nonetheless subject to a specific time and place and are dictated by demand and supply. The same subjectivity applies to management requirements and crop suitability. Land may have a low potential for a specific crop, but be highly suitable for another crop, pending on the capability of the land. Incorrect crop selection or farm management may also result in a limited agricultural potential. However, should the situation be rectified through correct land use planning, management of the resources and correct production practices, a completely different outcome may be achieved. However, the capability of the land remains the same (Collett, 2008).

[104] *Metadata – Land capability Evaluation 2017, Raster: RSA*

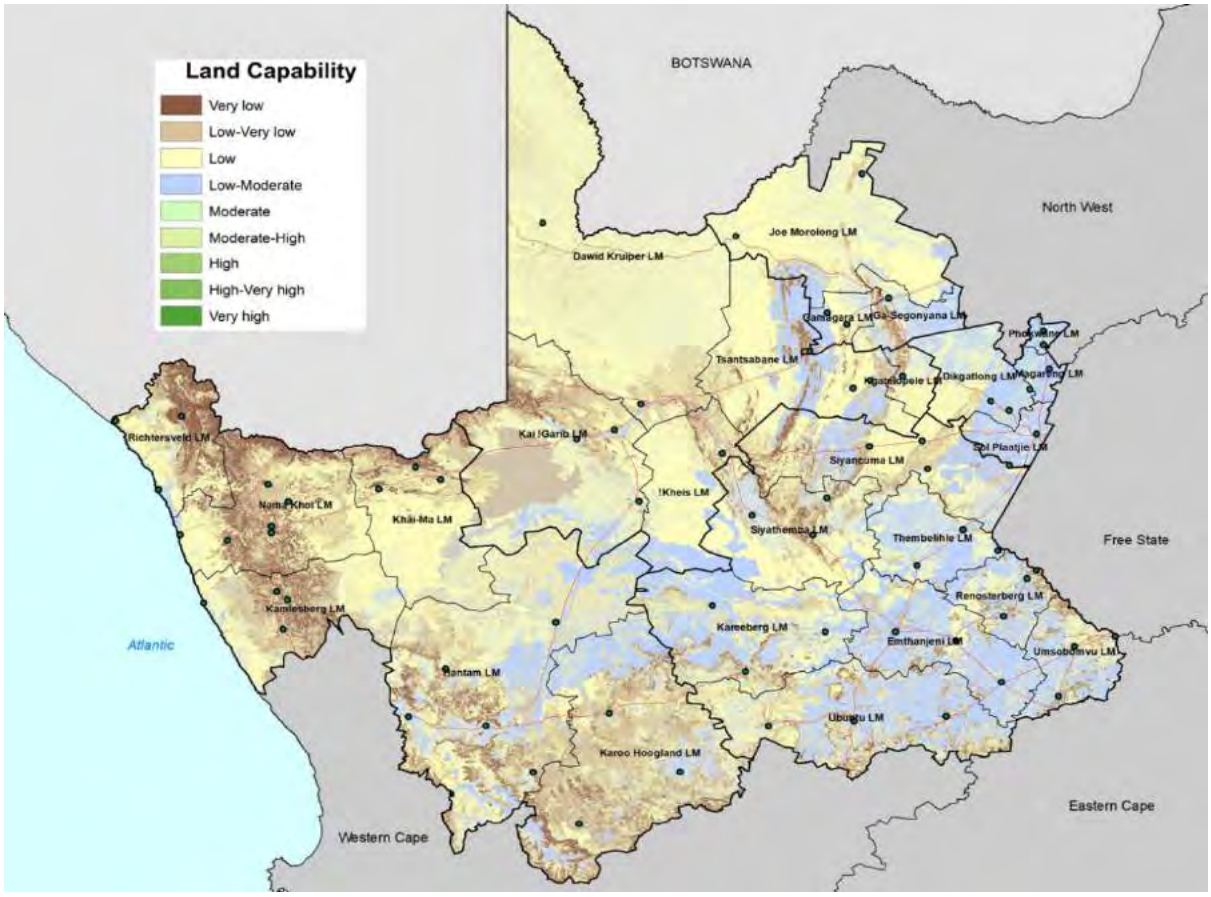


Figure 145: Land Capability assessment of the Northern Cape Province

2.3.2 Soil capability

Till date the outcome of this work has been used as the national norm for land capability demarcation. Results indicated that there are little or no soils in South Africa that are not subjected to limitations. Areas with a very good climate, such as KwaZulu Natal and the former Transkei had to be down-graded due to steep slopes and limited soil depth. It was determined that nowhere in South Africa do good soils and good climate coincide (Schoeman et al. 2002:35).

Agricultural soil suitability is calculated as a function of the potential of the soil to hold and supply moisture to the plant; the sensitivity of the soil affecting productivity and the inherent potential of the soil to be fertile. Soil capability takes into consideration all aspects pertaining to the characteristics of the soil and their contributions towards plant production.

Three databases were used a part of the soil capability modelling.

- Land type data modelled and mapped into topographical units. The data were modelled and rasterised form the original land type data base and the 90 m SRTM DEM[105]. All the soil attributes are linked to fixed boundary zones. The soil concerns, issues and data are therefore aimed at an attribute rather than a spatial level.
- The land type soil attribute data base (ARC)

[105] *Shuttle Radar Topographic Mission (SRTM) and Digital Evaluation model (DEM. The SRTM digital elevation data, produced by NASA originally, is a major breakthrough in digital mapping of the world, and provides a major advance in the accessibility of high quality elevation data for large portions of the tropics and other areas of the developing world. https://lta.cr.usgs.gov/SRTM1Arc*

- Soil fertility data (DAFF)

Three main modelling concerns formed part of the soil capability modelling:

- Plant available water
- Soil sensitivity
- Soil fertility

The final Soil capability data set is a raster-based data set derived through the spatial modelling exercise as discussed previously. The final data set consist of 9 possible evaluation values with the value of 1 being the lowest possible value and 9 being the highest possible value (as indicated by **Table 49**). Although a description has been added to the soil capability evaluation values, the reference should be the evaluation value and not the description as this is only for illustrative and clarity seeking purposes. As is the case with the land capability evaluation classes, the relationship of the 9 soil capability evaluation classes is not linear to each other; meaning a value of 4 is not one value more than the value of 3.

Table 49: Soil capability ratings

Value	Rating
1	Very Low
2	
3	Very low to Low
4	
5	**Low**
6	Low to Moderate
7	
8	**Moderate**
9	Moderate to High
10	
11	**High**
12	High to Very High
13	
14	Very High
15	

As per figure below the Soil Capability in the Northern Cape is overall classified between moderate and low-very low. The small areas south of Brandvlei, Port Nolloth, Klein Zee, Douglas and north of Van Wykslei have a soil capability of moderate-high. In general, most of the area has red, shallow to very shallow, often calcareous soils on rock.

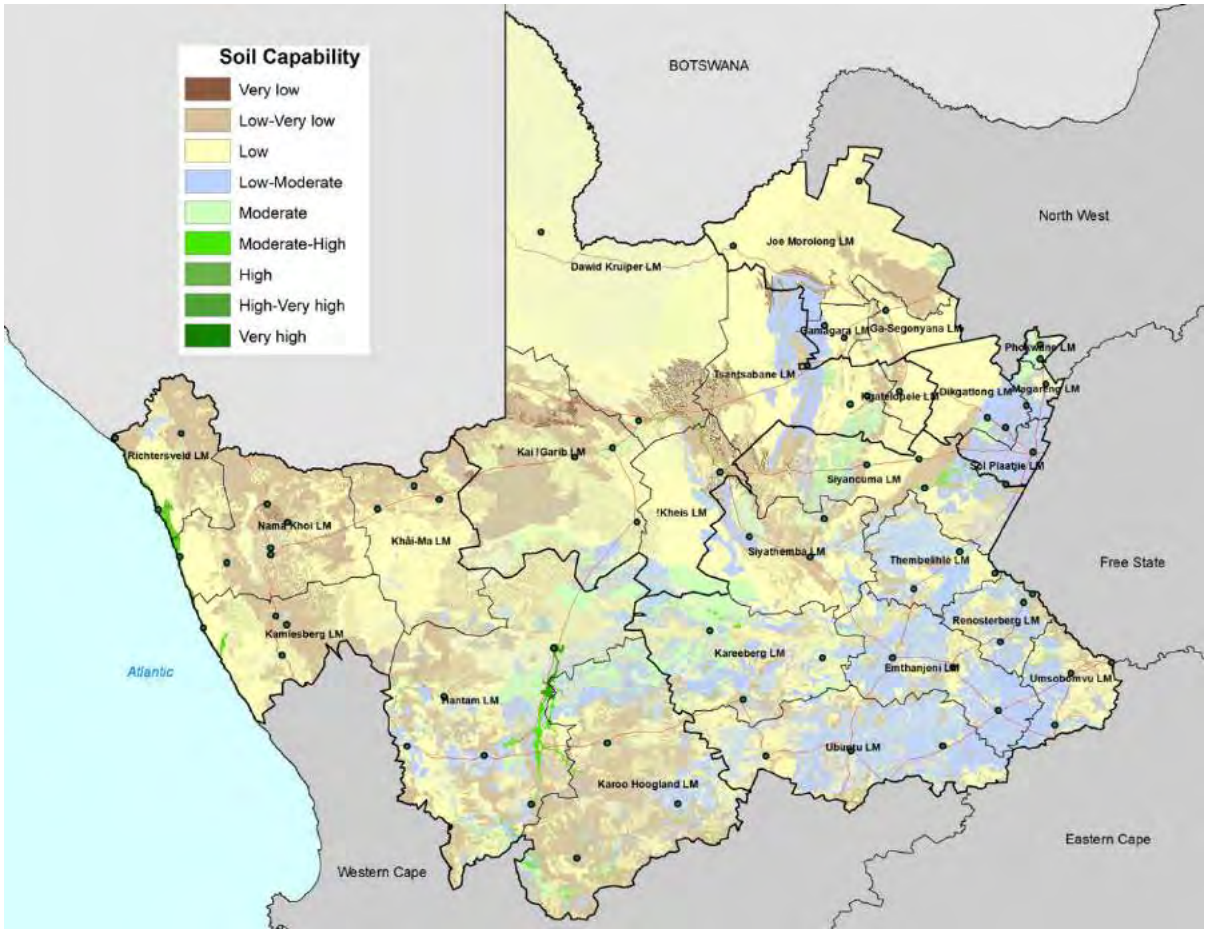


Figure 146: Soil Capability assessment of the Northern Cape Province

Aridity (limited climatic moisture availability) is the major factor that limits agricultural potential across the study area. As a result, differences in soil type and soil potential have very little influence on agricultural potential. Agriculture is almost exclusively sheep farming.

About 81% of South African surface is characterised by shallow soils with about 30% of the surface area regarded as sandy (less than 10% clay) and much less fertile. Almost 60% of the soils have a low productivity and are prone to land degradation due to the low organic content. Only 24% of the country has soils with a favourable top- and subsoil structure that, depending on the climate, is suitable for crop production (ARC-ISCW, 2004).

2.3.2.1 Improving Soil fertility

- Analyse both soil and crop samples to determine the exact amount and type of fertiliser required and aim to fill nutrient gaps rather than simply increasing the total Nitrate and Phosphor levels.
- Use precision agriculture to calculate the fertilisation regime based on a realistic estimate of potential yield.
- Time and target fertiliser application to coincide with maximum plant uptake periods and apply fertiliser in regular smaller doses rather than few large doses.
- Store synthetic fertilisers on an impermeable floor. Avoid interim storage in open fields, as this poses a high pollution risk.

- Fertiliser spreading machines should never be washed in rivers, lakes or near drinking water wells and springs.
- Where possible, use organic fertilisers that contain a carbon source (for example compost, manure and plant matter – especially from legumes).
- Use crop rotation and inter-cropping to increase soil organic matter and nutrients. Where possible, rotate between grains and nitrogen-binding legume crops.
- Maintain a permanent soil cover – use either cover crops or mulch.
- Avoid excessive irrigation and ensure good water quality.
- Reduce the use of pesticides and herbicides that cause a decline in soil micro-organisms.

2.3.2.2 Improving Soil structure

- Practice crop-appropriate minimum tillage.
- If tillage is required, till at the correct speed and only when the soil has the correct moisture content.
- If possible, avoid crops that require soil disturbance to harvest.
- Prevent soil compaction by limiting heavy machinery, especially in wet conditions. Where traffic is necessary, use radial-ply tyres with low tyre pressures to minimise soil compaction.

2.3.3 Climate capability

With reference to the natural resources patterns dominating the earth's environment (climate; plant distribution; soil), climate is perceived to be in principle the most dynamic component but also the obvious independent variable impacting on the other two components (Schulze, 2007). Climate is vital aspect for the selection of the correct crops per geographic locality. Therefore, the better one's knowledge is pertaining to detailed information on rainfall; solar radiation; evaporation; temperature etc. the better it will enable the land user to plan on a macro and micro scale level.

For the purposes of this study (land capability) climate was evaluated as its impact towards agricultural suitability. This is defined as the "capability of a geographic area to grow an agricultural crop under existing climatic conditions (Strydom, 2014). As part of the climate capability modelling aspects such as climatic agricultural risk factors were also part of the modelling exercise. Data use as input into the climate capability was extracted from the South Africa Atlas of Agro-hydrology and Climatology (Schulze, 2007). Three major climatic concerns were identified as part of the climate capability process namely[106]:

- Moisture supply capacity;
- Physiological capacity;
- Climatic hazards / constraints;
- Climatic hazards;
- Rainfall hazards; and
- Temperature hazards.

The final Climate capability data set is a raster-based data set derived through the spatial modelling exercise as discussed previously. The final data set consist of 9 possible evaluation values with the

[106] *Department of Agriculture, Forestry and Fisheries, 2017. National land capability evaluation raster data: Climate capability data layer, 2017. Pretoria.*

value of 1 being the lowest possible value and 9 being the highest possible value. There is however no evaluation value of 1 & 2.

Climate capability involves the impact of climatic factors per geographic area on the capability to grow an agricultural crop within a growth season. As per Figure below, the Climate Capability in the Northern Cape Province varies between low and low-moderate.

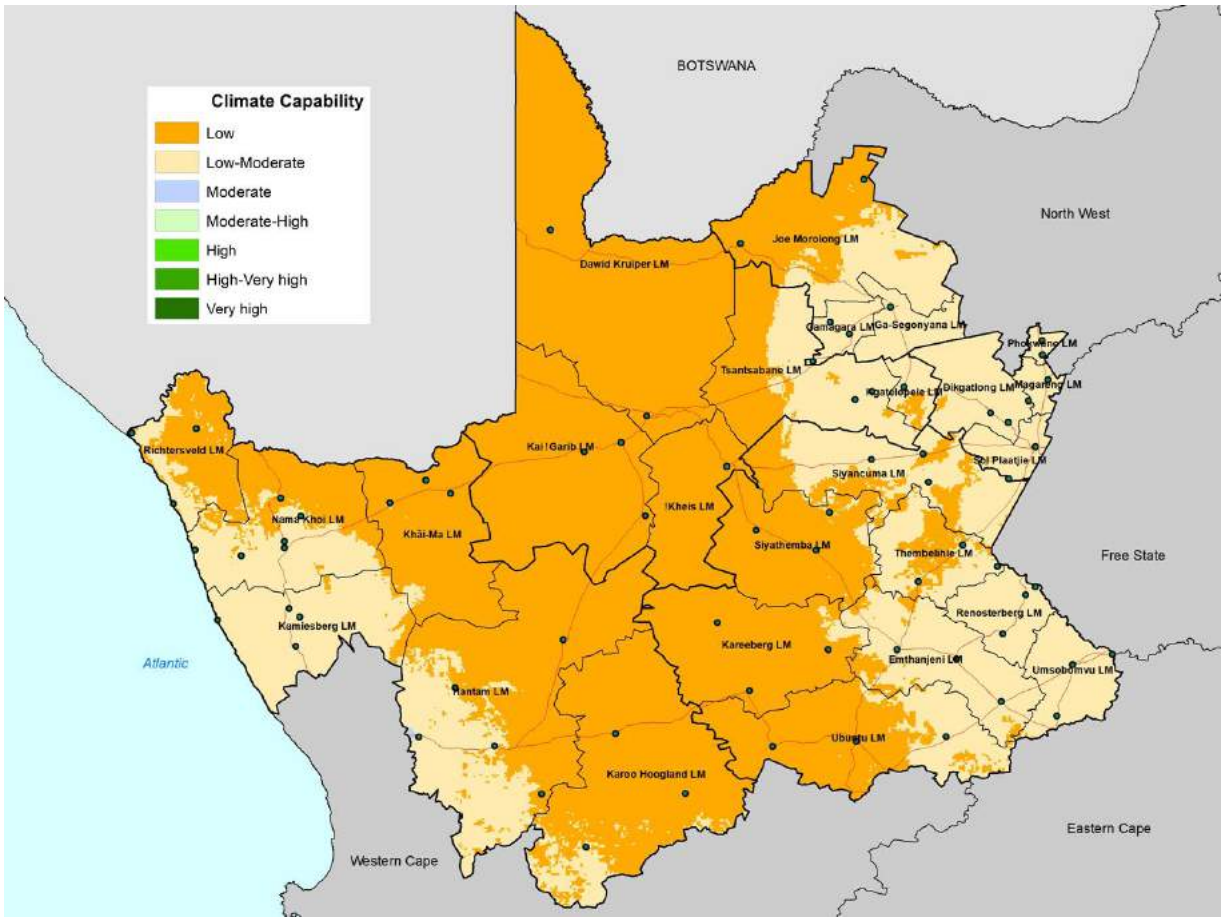


Figure 147: Climate Capability assessment of the Northern Cape Province

2.3.4 Terrain capability[107]

In land capability modelling terrain plays an important role not only from a plants' physiological growth requirements but also from a sensitivity and accessibility perspective. Two main terrain modelling concerns were included in the terrain capability modelling exercise namely:

- Plant physiology;
- Terrain sensitivity;

[107] *Department of Agriculture, Forestry and Fisheries, 2017. National land capability evaluation raster data: Terrain capability data layer, 2017. Pretoria.*

The final Terrain capability data set is a raster-based data set derived through the spatial modelling exercise as discussed previously. The final data set consist of 9 possible evaluation values with the value of 1 being the lowest possible value and 9 being the highest possible value. There are no values of 1 and 9 in the final data set as a result of the outcome of the modelling processes values. Although a description has been added to the terrain capability evaluation values, the reference should be the evaluation value and not the description as this is only for illustrative and clarity seeking purposes. As is the case with the land capability evaluation classes, the relationship of the 9 terrain capability evaluation classes is not linear to each other; meaning a value of 4 is not one value more than the value of 3.

As per figure below, the overall Terrain capability varies between high and low-moderate. A low terrain capability corridor is visible towards the far western parts of the Province along the N7 national road.

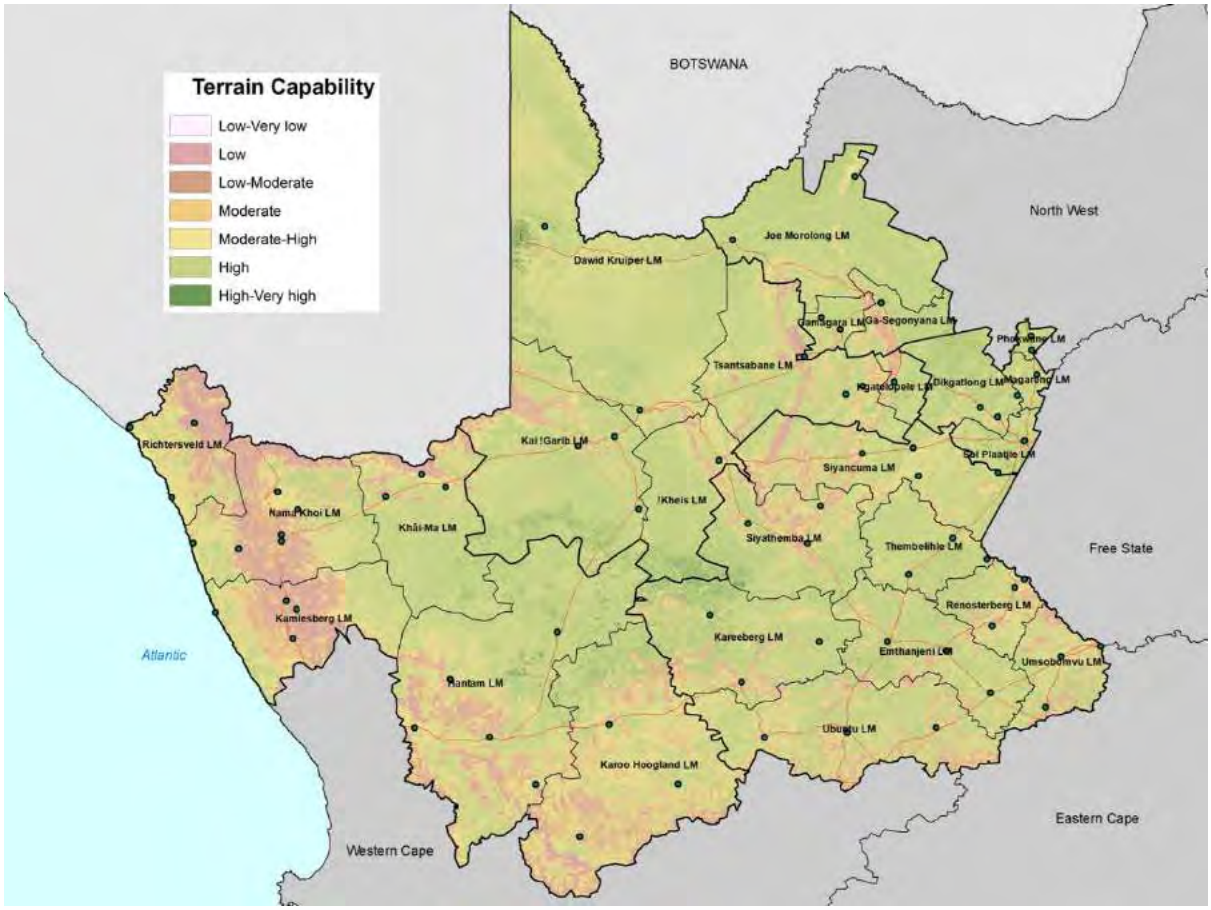


Figure 148: Terrain Capability assessment of the Northern Cape Province

2.3.5 Grazing potential

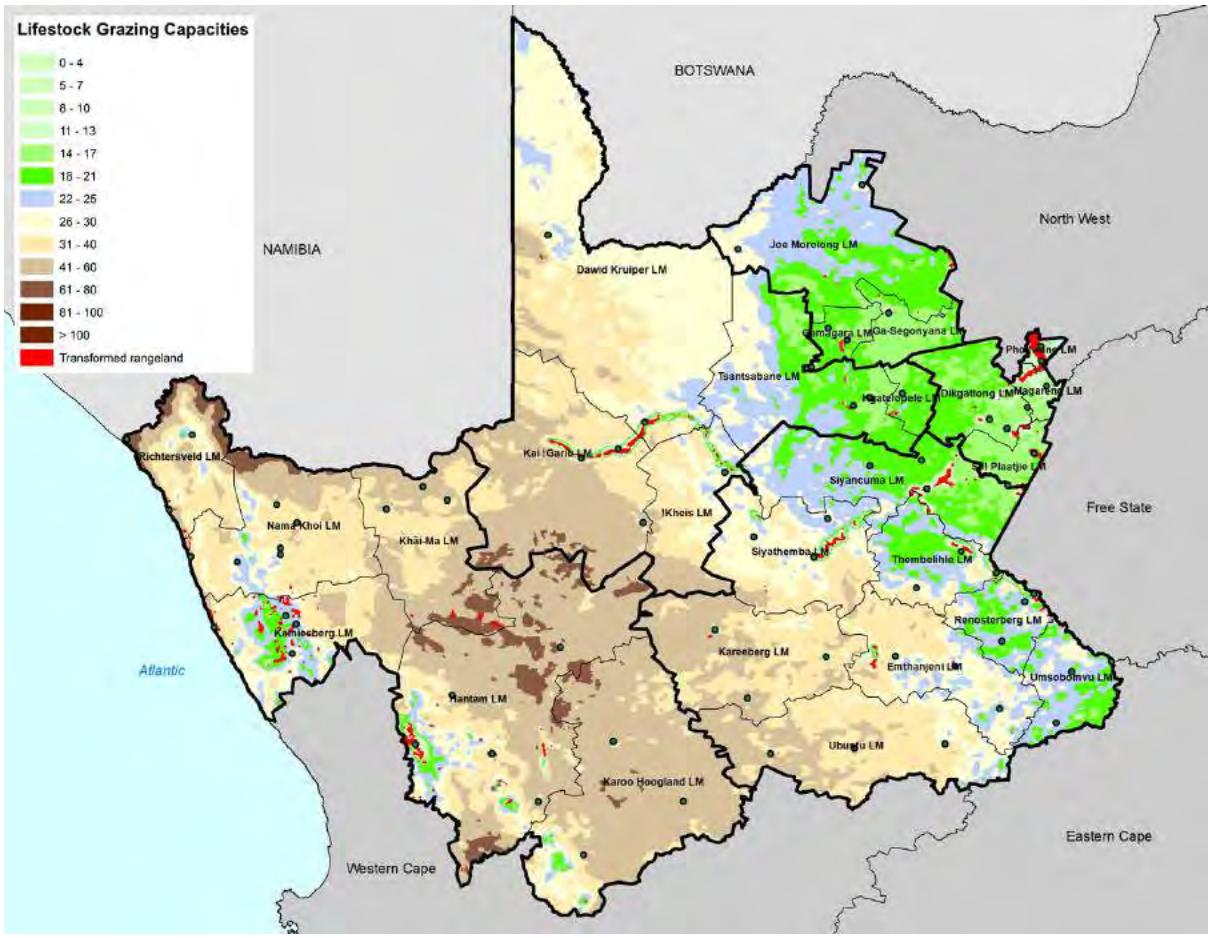


Figure 149: Provincial grazing capacity overview

The Long-term grazing capacity (ha/LSU[108]) of the Province varies from the 7 to 140ha/LSUE with a mean average of 33.3. Almost 28 000 000ha is available from grazing, consisting of almost 99% of the total area of the Province[109]. Grazing capacity is more suitable towards the eastern parts of the Province, more specifically towards the Frances Baard district and Southern parts of the John Taolo Gaetsewe District. Concentrations of good grazing potential is also evident in the Kamiesberg area, along both the Vaal and Orange rivers and areas surrounding Niewoudtville.

Grazing capacity has since the early eighties been based on a large stock unit (LSU) or animal unit. It has been defined as an ox which weighs 450kg and which grows at 50g per day on a grazing field which are 55% digestible. To reach this goal, the ox theoretically needs 75 megajoules metabolisable energy per day, which is more or less equal to 9kg dry feed on the grazing field which are 55% digestible. The intake of dry feed will be somewhat different if the grazing fields' digestibility is less than 55%. The value of the LSU definition is that all classes (young, adult, pregnant, lactating, etc.) within species, which have different energy needs and as well as between species, can relatively be expressed.

[108] *The values indicated on the map are ha/LSU (hectares per Large Stock Unit). This unit indicates the area (in ha) needed to maintain an animal of 450kg for a period of a year without degrading the natural resource. Utilize ±50% of the available biomass with an intake of 10kg DM per day. Average grazing capacity per biome; Grassland biome 4-6 ha/LSU, Savanna biome 10-15 ha/LSU, Nama-karoo biome 25-35 ha/LSU*

[109] *DAFF, 2017. Long Term Grazing Capacity norms for South Africa (Data, mapping and application). Extracted from National Land Cover data set 2013/14*

Replacement values can be calculated based on accountable energy needs. When this has been done, grazing capacity can be calculated. However, it should be kept in mind that species differ in their feed preferences. Some prefer grass, other shrubs, some prefer tree leaves, and some prefer to have a mixed diet. The quantitative occurrence of these plants must be calculated on each farm to determine how many of a species can be kept. The grazing capacity standards which has been determined in this way and which are officially enforced by the Department of Agriculture, Forestry and Fisheries (DAFF), are based on grazing field recordings with plant materials which has been physically cut in enclosed areas where animals can't graze. Furthermore, it is supported by photographs that have been taken over time. While this has been very handy, the time has come to re-evaluate these standards because 30 years has passed and grazing fields has changes, as well as techniques. It is also important to take note of the following. Over years, people made changes to LSU calculations to make it easier, or because they felt an approximate value is sufficient. In sheep areas, LSU values has been changed to small stock units, because the animal masses in the original publications were outdated, as animals became overall heavier. This practice is acceptable in certain cases, as long as people realize that an approximate value may work well in a specific calculation area, but not in another area (Meissner H, 2013).

Important considerations to improve grazing capacity:

- Ensure stocking rates are within the land's carrying capacity, based on the commercial stocking rates for a given area and the present veld condition.
- Monitor and manage veld condition for optimal productivity with minimal environmental damage.
- Maintain or improve veld condition and the health of the soil by ensuring appropriate rest periods after relevant grazing and/or fire events.
- Prevent overgrazing, trampling and soil erosion.
- Rehabilitate degraded veld.
- Ensure that veld improvement techniques are well understood and well managed to avoid environmental damage and a long-term decrease in productivity.

2.3.6 Irrigation potential

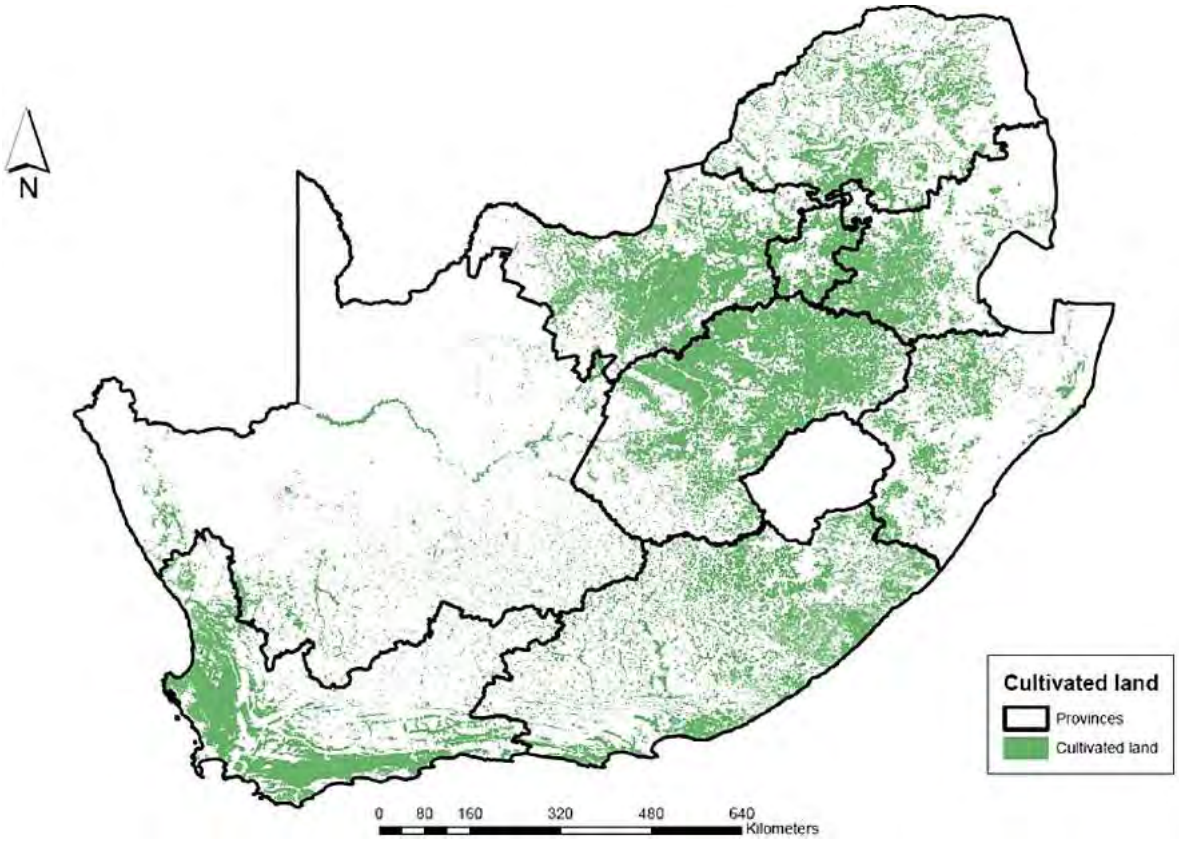


Figure 150: Cultivated land in South Africa showing a limited footprint in the northern Cape Province

As per figure above cultivated land is restricted along both the Orange and Vaal river systems as well as areas along the N7 corridor towards the western parts of the Province. Scattered cultivated land is further evident around Niewoudtville and Calvinia.

Key considerations towards future irrigation practise in the Northern Cape Province:

South Africa has no surplus water and all future development will be constrained by this fact. Farmers will have to double their use of water by 2050 if they are to meet growing food demands using current farming practices. To avoid a crisis, water supply needs to be enhanced and water use efficiency increased;

Land management on farms has a major impact on water availability and quality. Soil from eroded areas, for example, flows into rivers, changing their flow and reducing the storage capacity of dams. This results in the need for expensive water treatment/filtration systems before water can be used by industrial and domestic users. Poorly applied fertilisers run off into rivers, polluting water sources and causing algal blooms. These blooms deplete the water's dissolved oxygen and produce toxins, killing aquatic life. Pesticides from poorly managed farms are also a major source of water pollution, with devastating effects on the health and wellbeing of people and the environment. Often less than 0,1% of crop-sprayed pesticide reaches the target pest – the rest enters the environment (Pimental & Levitan, 1986). A 2004 water quality study of the Lourens River in the Western Cape detected high pesticide levels downstream of the farming area (Dabrowski *et al.*, 2002);

Invasive alien vegetation has a major impact on water – using more than twice the water of indigenous vegetation in some areas. Invasive alien vegetation is estimated to consume about 3 billion litres of water a year in South Africa. This is the equivalent of 26 large dams or 7% of total supply (Le Maitre *et a*l., 2000; Dye & Jarmain, 2004). Clearing alien vegetation is a cost-effective way of increasing water supply on the farm. The CSIR measured changes in stream flow in three Western Cape water catchments cleared of alien vegetation. In the dry summer months, stream flows increased by an impressive 9, 10 and 12m^3 a day per hectare cleared (Prinsloo & Scott, 1999);

Natural ecosystems in South Africa's catchments provide essential water services. Wetlands, for example, purify water, moderate water flow and provide flood protection by capturing and slowing the water flow. They also slowly release the water into the groundwater, providing resilience in times of drought. Restoration and protection of these natural ecosystems is essential to increase water quality and quantity on the farm. The National Water Act (No. 36 of 1998) recognises the essential benefits provided by natural ecosystems and has ascribed equal status to the requirements of aquatic ecosystems and humans;

Alien Invasive species management:

- Remove invasive alien plants and replace with indigenous vegetation;
- Restore and protect wetlands (remove alien plants, control burning and grazing, do not cultivate);
- Leave at least a 30–40m natural vegetation buffer zone between cultivated land and a river, and a 25–70m buffer around a wetland. Reducing demand;
- Build up soil organic matter to reduce evaporative water loss and maximise the soil's water-holding capacity;
- Use more efficient irrigation systems, such as drip irrigation;
- Ensure efficient irrigation techniques that take into account soil type, crop type, soil water status and weather conditions;
- Maintain irrigation systems regularly;
- Where necessary, register water use with the Department of Water Affairs;
- Record actual water use to compare against registered use;
- Implement water-harvesting and water-recycling techniques where possible; and
- Use drought-resistant crop and livestock varieties.

2.3.7 Overall potential

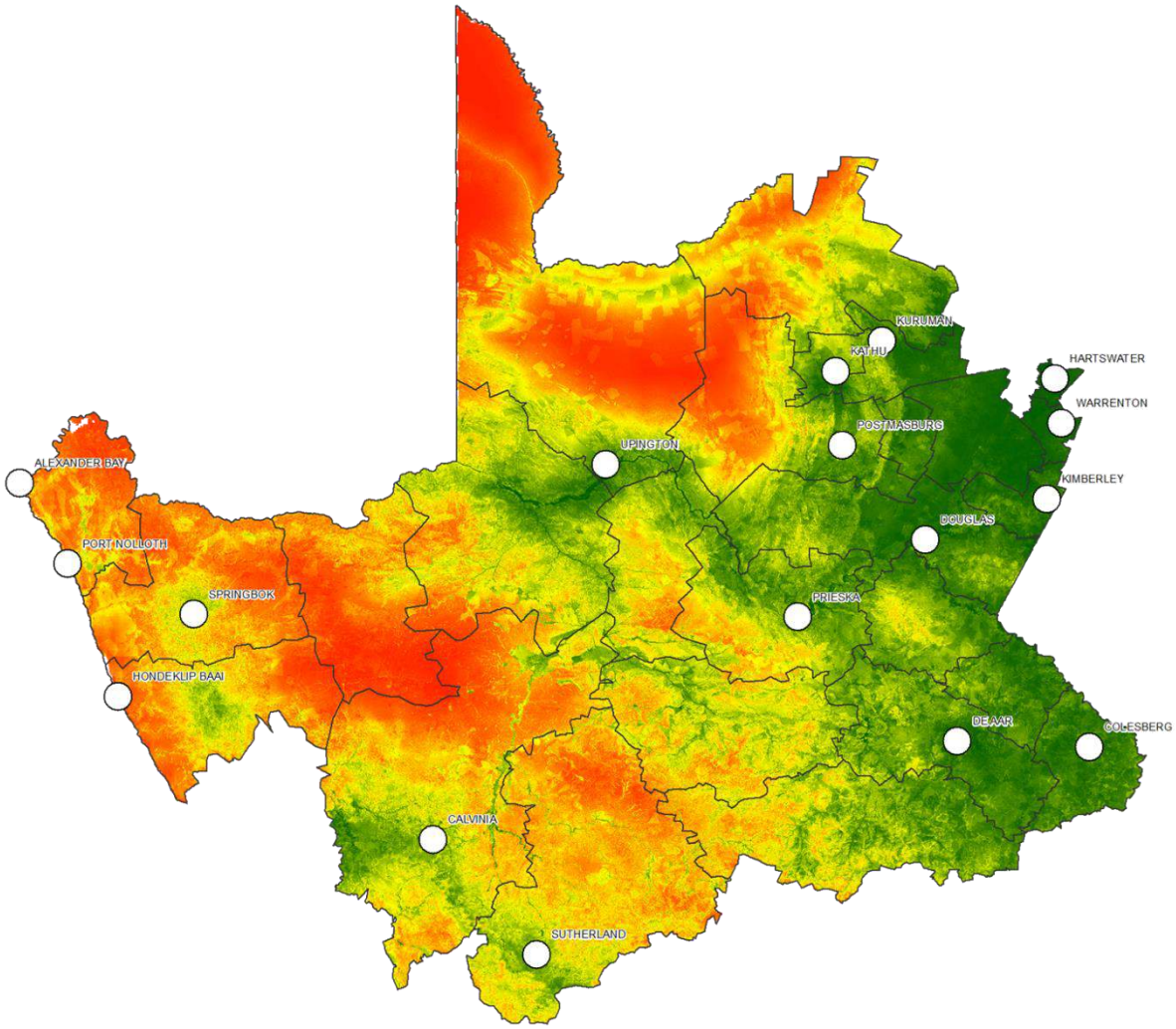


Figure 151: Overall assessment of agricultural potential in the Northern Cape Province[110]

As grazing is the overwhelmingly dominant agricultural land use, the most indicative measure of agricultural potential and productivity across the study area is the grazing capacity. The province is known as an area with a relatively low grazing capacity (within a national context) but is an area that is suitable for successful sheep, goat and game farming.

Areas that show potential include:

- Areas along the Orange and Vaal river systems (Upper and Lower Orange river);
- Kamiesberg region (Namaqualand);
- Eastern parts of the Province, especially towards the north-eastern parts of the Province; and
- The highest potential is visible in the Frances Baard District and immediate surroundings.

[110] *The results of all the data sets used in the Agricultural Potential section has been integrated using a data manipulation technique in ArcGis. The results provide an overview of the key agricultural areas that do show potential. The areas in green have more potential for agricultural production that the areas in red.*

These areas should as far as possible be protected and strict regulatory measures are required in terms of any land use change. According to the criteria by Schoeman (2004), land in the Northern Cape is only considered to be of high potential if it is under permanent irrigation.

2.3.7.1 Available agricultural land for production

The Department of Agriculture, Forestry and Fisheries (DAFF) has, as part of the development of a new policy on the "Preservation and Development of Agricultural Land", conducted a spatial analysis in 2012 of available agricultural land per the national land capability classification classes, to determine the current status of agricultural land per province and the availability thereof through the exclusion of permanently transformed areas. The analysis indicated that the surface area of arable agricultural land that had been converted to non-agricultural uses through urban and mining developments equals the size of the Kruger National Park.

Any change of land from agriculture to other forms of (unrelated) developments should be limited. Conflicting land uses impact negatively on agricultural production and the protection of the "right to farm" should be taken into consideration during the planning process. This includes limiting the fragmentation of agricultural land through sub-division, resulting in unviable, non-economical and unsustainable farming units. The key factors for the preservation and development of especially high potential agricultural land should be:

- Protection;
- Avoidance;
- Minimisation;
- Mitigation; and
- Productivity

2.4 AGRICULTURAL REGIONS AND KEY STAKEHOLDERS[111]

The province is sub-divided into 4 regions as shown below (also see figure below):

- Frances Baard (Diamond Field) – stretches over Kimberley and Vaalharts area;
- Karoo – stretches over De Aar, Colesburg up to Prieska area;
- Namaqua (including Namaqualand and Hantam) – stretches over Calvinia up to Springbok area; and
- ZF Mgcawu (Kalahari) –stretches over Upington including Mier area

These regions fall within 3 ecological zones/areas namely:

- Vaalharts Irrigation Scheme (Area 1) – situated in a valley between the Ghaapseberg to the west and the Marroccan ridges to the east. About 110 km away from Kimberley;
- Middle Region (Vaal/Orange) - covers Vaal River from Barkley West to Orange-Vaal confluence. Also cover Orange River from Van der Kloof Dam to Boegoeberg Dam (Area 2); and

[111] Provincial Report on Education and Training for Agriculture and Rural Development in The Northern Cape Northern Cape Department of Agriculture, Land Reform Environment and Conservation

- Lower – Orange River (Area 3) – stretches from Boegoeberg Dam to the West Coast.

The vegetation is sparse and consists of sweet-mixed grasses and shrubs. The average rainfall varies between 100-450 mm per annum. Temperatures vary from between 9°C (Calvina) to 39°C, which is typical of semi-dessert climate.

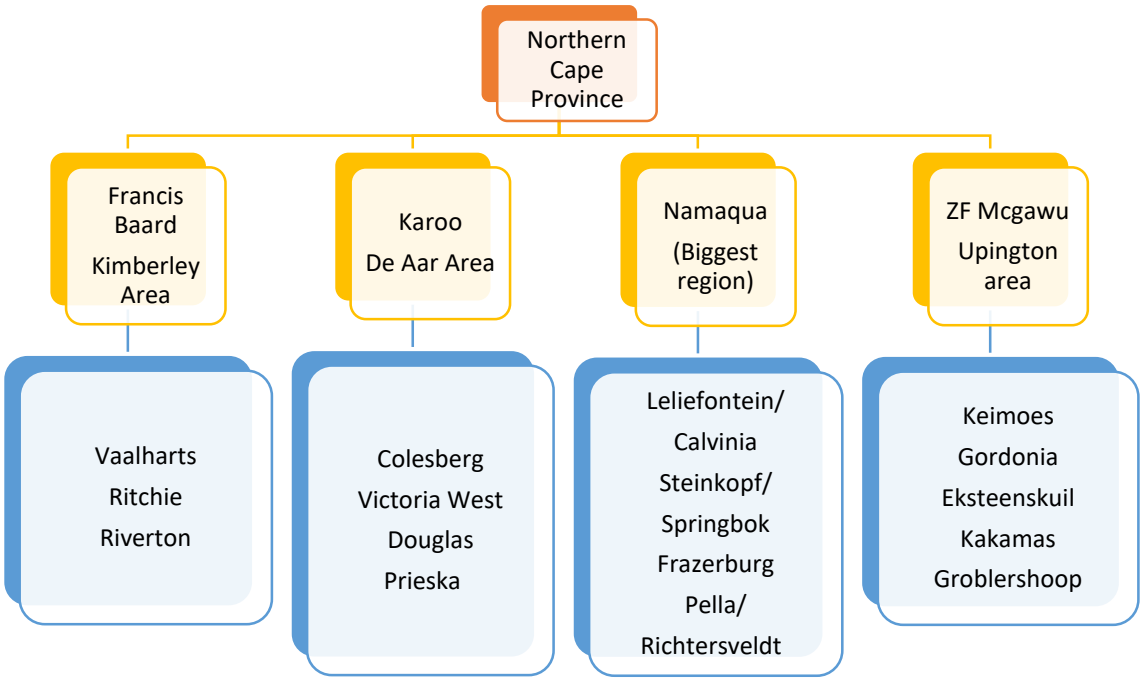


Figure 152: Key Agricultural regions and districts

Key Stakeholders in the regions reflected above include:

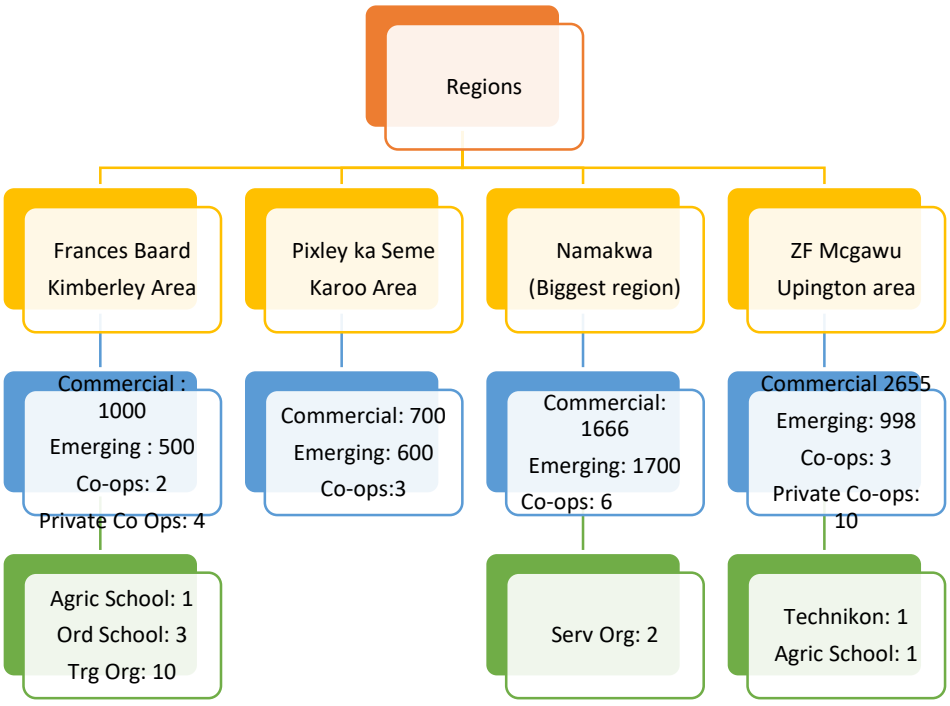


Figure 153: Provincial agricultural stakeholders per region

Since Hantam and Namaqualand form one region called Namakwa, the total number of commercial farmers is 1 666, resource-poor farmers are about 1 700 and co-ops are about 6. Learning institutions (providing agriculture) are found in two regions. The province has one agricultural high school and one technikon (satellite branch of Vaal Triangle Technikon). Most of the training organizations are located at the Frances Baard region even though they operate provincially or where the need arises.

2.5 COMMODITIES

South Africa has 2.76 million hectares of cultivated land, of which nearly 10.45 million hectares (82%) is used for commercial purposes. A total of 0.79 million hectares (only 6.19%) is permanently under cultivation, and more than 10.83 million hectares (85%) is rainfed. More than 0.7 million hectares of land are degraded and left bare by sheet and gully erosion. About 4.61 million hectares of natural vegetation are degraded, mainly in indigenous forests, woodlands, and grasslands; a further 0.19 million hectares are degraded by mine tailings, waste rock dumps and surface-based mining. Land use in urban areas comprises mainly formal residential suburbs and townships (1 million ha) and informal settlements (0.23 million ha). Savannas (woodlands and bush lands) and grasslands cover 25.70% and 19.92% of South Africa, respectively (Department of Environmental Affairs).

Although 80% of South African land is used for agriculture and subsistence farming, only 12% is arable, and the rest is used for grazing. The main agricultural activities are crop production, mixed farming, cattle ranching and sheep farming, dairy farming, game ranching, aquaculture, beekeeping, and winemaking (GCIS, 2010). South Africa is the largest producer of maize, the staple food in the Southern African Development Community (SADC) as well as the main ingredient for animal feed. The table below gives an indication of the geographic location of production of specific agricultural produce as well as the annual volume produced. Key contributions made by the Northern Cape Province is highlighted for ease of reference.

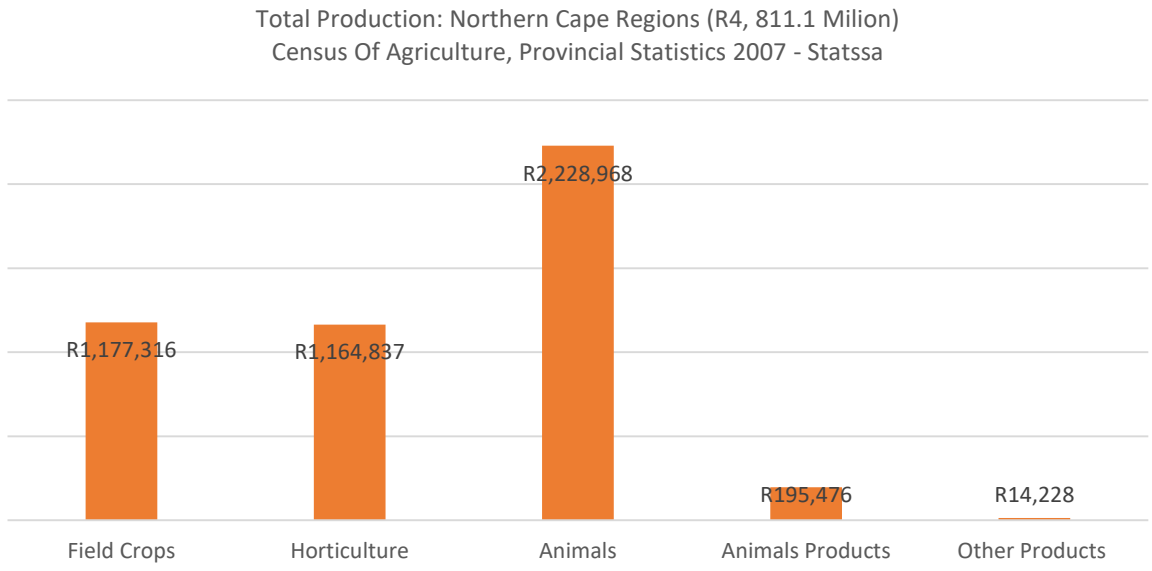
Table 50: Volume of agricultural production by product and location[112]

AGRICULTURAL	DOMINANT PRODUCTION LOCATIONS	AVERAGE ANNUAL VOLUME
Maize	North West; Free State; Mpumalanga	13, 2 metric ton
Wheat	Western Cape; Free State	2.1 metric ton
Barley	Western Cape	192 000 ton
Groundnuts	Free State; North West; Northern Cape	88 800 ton
Sunflower seeds	Free State; North West; Mpumalanga; Limpopo	872 000 ton
Soya beans	Free State; Mpumalanga; KwaZulu Natal	-
Sorghum	Free State; Mpumalanga; Limpopo; North West	255 000 ton
Canola	Western Cape; North West; Limpopo	30 800 ton
Dry beans	Mpumalanga; Free State; Gauteng; North West; KZN; Limpopo; Western Cape; Northern Cape	60 000 ton
Sugar	Eastern Cape; Mpumalanga; KwaZulu Natal	20 metric ton
Deciduous fruit	Western Cape; Eastern Cape; Free State; Mpumalanga; Gauteng	-
Wine	Western Cape	403.3 million litres exported in 2009
Citrus and subtropical fruit	Limpopo; Mpumalanga; Eastern Cape; KwaZulu Natal; Western Cape; Northern Cape	46 896ton subtropical fruit
Potatoes	North West; Northern Cape; KwaZulu Natal; Limpopo; Free State; Mpumalanga; Eastern Cape; Western Cape	1 853 000 ton

[112] *Department of higher Education,2010. Sector Analysis: Agriculture*

AGRICULTURAL	DOMINANT PRODUCTION LOCATIONS	AVERAGE ANNUAL VOLUME
Tomatoes	Limpopo; Mpumalanga; KwaZulu Natal; Eastern Cape; Western Cape	459 217 ton
Onions	Mpumalanga; Western Cape; Free State	417 579 ton
Cabbages	Mpumalanga; KwaZulu Natal	138 161 ton
Cotton	Mpumalanga; Limpopo; Northern Cape; KwaZulu Natal; North West	-
Tobacco	Mpumalanga; Limpopo; North West	10 200 ton
Tea	Western Cape; Eastern Cape	-
Flowers	Western Cape	-
Livestock	All provinces	Largest agricultural sector
Dairy	Free State; North West; KwaZulu Natal; Eastern Cape; Western Cape; Mpumalanga	3 129 metric litres
Beef Cattle	Eastern Cape; Free State; KwaZulu Natal; Limpopo; North West; Mpumalanga; Northern Cape	-
Sheep and goats	Eastern Cape; Northern Cape; Free State; Western Cape; Mpumalanga	-
Poultry and pigs	All provinces	930 000 ton broilers 2.6 million pigs slaughtered from August 2007 to August 2008
Fish	Western Cape; Eastern Cape	-
Game	Limpopo; Northern Cape; Eastern Cape; Western Cape	-
Beekeeping	Western Cape; KwaZulu Natal	2 000 ton

The 2007 census indicated that of total production of the Northern Cape, field crops contributed 25%, horticulture 24%, animals 47%, animal products 4% and other products <1% (see graph below). This reflects a fairly equal contribution from field crops, horticulture and animal husbandry and is quite unique when compared to other provinces[113].



Graph 62: Total production per commodity group in the Northern Cape Province

[113] *Department of Agriculture, 2017. Provincial diagnostic assessment formulated for the Northern Cape: Office of the Premier.*

2.5.1 Aquaculture and Mari-culture

Climatically, the Northern Cape coastline is suitable for farming a variety of marine fish species. It provides the coolest water along the South African coast, an important pre-requisite for fish farming. The kelp or seaweed beds along parts of the coastline afford a natural product for harvesting, not least as feed for abalone farming. Successful aquaculture experiments at Kleinzee (in abalone and oysters), at Port Nolloth (in abalone) and Hondeklipbaai (also in abalone), justify expansion of these species and experimentation with fin-fish farming. The holes or indentations caused by the mine along the inter-tidal areas should not be closed or rehabilitated as environmental legislation demands. Instead, they should serve as suitable pools in which on-shore aquaculture can take place. Current experiments prove their suitability. Interested parties believe that these pools are suitable for finfish farming also.

While aquaculture is associated with activity that takes place at low elevation and on land next to the shoreline, depending on the ready supply of seawater, the tidal waters themselves offer a further opportunity. Kelp (or seaweed) located on coastline is a suitable habitat for the seeding of abalone and, potentially, other molluscs. Experiments at Port Nolloth justify the expansion of such seeding in selected places in the inter-tidal zone. The principle of seeding has been accepted by Department of Environmental Affairs and Tourism (DEAT).

Species suitable for farming in the Northern Cape area include abalone (both farmed and seeded in the sea), oysters, mussels and finfish, such as kabeljou or cob, tilapia and others. With regard to markets, the global demand exceeds supply by about five million tons per annum. Global and domestic demand is growing and will continue to grow. South African abalone belongs to the most desired of its kind and the growth of the Chinese middle classes suggests continuing demand beyond what South Africa is able to supply. The export market, though, has been affected by Rand-dollar variations and localised supply issues, such as cheap imports from India and South-East Asia, yet demand and the prices of the aforementioned species have long term potential for strong demand.

2.5.1.1 Abalone

It is assumed that the current growth trend in abalone culture will continue, that the reputation of South African abalone as premier product is maintained, that the local industry remains cost-competitive, and that demand remains firm in China. This is a conservative projection, as it assumes that South Africa's share of the international market remains constant, and that total abalone production from aquaculture and fisheries remains the same. At present approximately 2 000 tons of poached South African abalone, enters the Chinese market per annum. This level of poaching is unsustainable, and in future, the illegal trade will decline as the resource becomes depleted. If managed correctly, abalone ranching (reseeding of hatchery reared abalone into the wild) could significantly boost production from the wild. It is thus entirely possible that South Africa could increase its market share. However, to do so, the industry must remain cost-competitive with other producers (DTI, 2007).

2.5.1.2 Catfish and Tilapia

Product acceptance, and a lack of distribution networks for fresh catfish and tilapia into the lower price urban markets currently limits the development of the sector. While more research into these markets is required, it is probably realistic to assume that production of these species will grow. Primarily this will be due to: 1) A demand for fresh fish, particularly by African immigrants who traditionally consume these species. 2) Locally produced, whole fresh tilapia could compete with fresh

marine line fish in restaurants and retail outlets at a significantly lower price. The European and USA markets have adopted tilapia as a new fish product relatively quickly. 3) The potential to distribute and sell live catfish saving processing costs and yielding a higher unit selling price. 4) The potential to produce these species at a relatively lower cost than marine line fish - due to the cheaper feed costs and production infrastructure.

2.5.1.3 Shellfish: Oysters, Mussel and Scallops

Oyster and mussel production is expected to grow organically, and production will primarily focus on the local market. Promising results have been obtained in the development of the technology for the production of the local scallop (Pecten sulcicosultatus), and limited commercial production is likely to develop to supply the local market. It is not anticipated that South Africa will become a competitive exporter of these products (DTI, 2007).

2.5.1.4 Seaweed

Production for abalone feed is likely to grow as it has been demonstrated to be a viable option. Seaweeds have the potential to produce various non-food products (health products, alginates, fertilizers, plant growth hormones, anti-bacterial agents and other biotechnological products). At present, production for these products is excluded from the projections, but an R&D initiative could precipitate the emergence of seaweed production in the next decade (DTI, 2007).

2.5.1.5 Aquaculture development zones (ADZs)

A strategic environmental assessment (SEA) was undertaken on behalf of the Directorate Sustainable Aquaculture Management: Aquaculture Animal Health and Environmental Interactions within the Department of Agriculture, Forestry and Fisheries- DAFF. The SEA, which deals with the entire South African coast, leads into a larger project that will entail undertaking Environmental Impact Assessments for two potential marine aquaculture development zones (ADZs) specific for fin fish cage farming in the sea off the Eastern Cape Province, the study completed assessments on all potential small harbours, where Port Nolloth was identified as a potential ADZ. Port Nolloth however was not deemed to be suitable due to the upwelling cells experienced in close proximity of the harbour. Upwelling cells are affected by temperature shocks that will negatively impact growth rate and health of cultured stock.

If further studies are conducted to investigate the suitability of especially fin-fish farming projects the following should be considered as based on the potential environmental impacts of sea-based finfish cage culture are briefly discussed and mitigation measures that can be partly addressed at the SEA level are identified. Potential impacts include:

- The incubation and transmission of fish disease and parasites from captive to wild populations.
- Mitigation relies on sound animal health management and biosecurity.
- Pollution of coastal waters due to the discharge of organic wastes. Mitigation includes the use of species and system specific feeds in order to maximize food conversion ratios, rotation of cages within a site to allow recovery of benthos, and sensible site selection (sufficient depth, current speeds and suitable sediment type).
- Escape of genetically distinct fish that compete and interbreed with wild stocks that are often already depleted. Mitigation measures include suitable design and maintenance of cages to

minimize escapes and use of sufficient brood stock with similar genetic structure to local wild populations.

- Chemical pollution of marine food chains (& potential risk to human health) due to the use of therapeutic chemicals in the treatment of cultured stock and antifouling treatment of infrastructure. Recommended mitigation includes the responsible storage and use of the minimum required quantities of (preferably biodegradable) chemicals.
- Fish cages pose a physical hazard to cetaceans and other marine species that may become entangled in ropes and nets. Mitigation measures include site selection that excludes important migration, feeding or aggregation sites; and the use of correct and durable cage netting that minimizes entanglements.
- Piscivorous marine animals (including mammals, sharks, bony fish and birds) attempt to remove fish from the cages and may become tangled in nets and damage nets leading to escapes and stress or harm the cultured stock. Farmers tend to kill problem predators or use acoustic deterrents. Effective mitigation may be achieved through the use of appropriate predator mesh, proper feed storage and feeding and removal of dead fish from cages.
- Localised habitat alteration and impacts (such as changes in wave action and sediment transport). Can only be mitigated through site selection and farm design.
- User conflict due to exclusion from mariculture zones for security reasons or negative impacts on tourism and coastal real estate value due to negative aesthetic impacts of fish farms. Can be partly mitigated by site selection and consultation with other users.

2.5.1.6 Conclusion

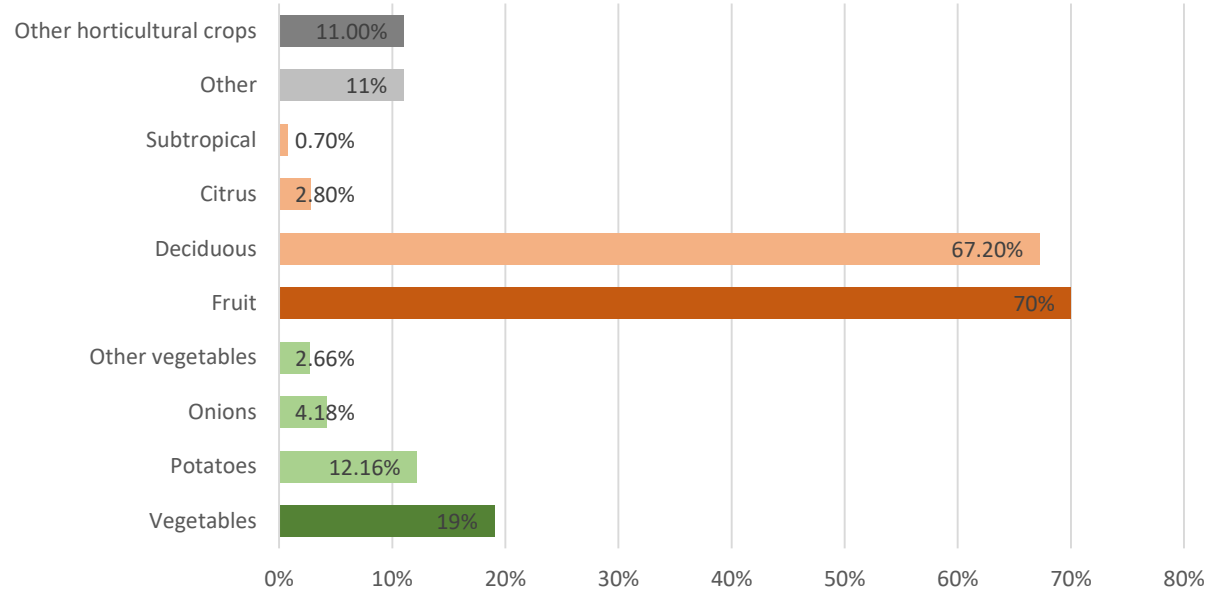


If aquaculture production is to grow to a level at which imports into the domestic market can be replaced, and export markets penetrated, certain state led interventions will be required to remove growth constraints and make South Africa's aquaculture sector internationally competitive. These include:

- Zoning areas of land and water for aquaculture.
- Providing infrastructure at development nodes.
- Assistance in complying with environmental legislation.
- Training of human resources to meet the anticipated skills demand.
- Access to a full set of industrial support measures.
- State veterinary services for aquaculture and the inclusion of aquaculture under the Animal Health Act.
- Facilitated access to finance.
- Project conceptualisation and packaging.
- A dedicated R&D technology development programme.
- Grants for joint industry actions to develop services and infrastructure.

2.5.2 Horticulture[114]

Horticulture production is dominated by fruit production in the Northern Cape. The graph below gives a breakdown of the importance of the following products to horticulture production within the Province.



Graph 63: Horticulture Production overview

2.5.2.1 Fruit

2.5.2.1.1 Grapes

The deciduous fruit production of the Province consists almost entirely of grape production for table (fresh) grapes, wine grapes and dried grapes (raisins). Some of South Africa's finest horticultural produce (especially grapes) is grown in irrigation schemes along the Orange River. In the early 1900s vineyards were planted in the Lower Orange valley for raisin production. It was later found that the Sultana grapes could be used for the production of distilling wine. This led to the establishment of the Orange River Wine Cellars Co-op Ltd on 23 December 1965. The organisation has six depots in the area (all of them on the banks of the Orange River at Upington, Kanoneiland, Grootdrink, Kakamas, Keimoes and Groblershoop). The wines from Orange River Wine Cellars are exported to *inter alia* Europe and the USA. The Upington area accounts for approx. 40% of South Africa's grape exports. The Orange River Wine Route consists of five wineries located in Upington, Kakamas, Keimoes, Grootdrink and Groblershoop respectively. Grape juice cellars operate from Kanoneiland, Kakamas and Grootdrink. The route includes regular wine tours that provides a comprehensive experience of the wine industry in Upington. The Northern Cape Wine Region is primarily a white grape producer although reds are being planted increasingly. Some of the wine grape varieties cultivated are Chenin Blanc, Colombard, Chardonnay, Pinotage, Shiraz, Cabernet Sauvignon, Merlot, Petit Verdot, Tannat, Muscadel (both red and white) and Muscat d'Alexandrie. Large trellising systems are employed in this region of which the hut, gable and T-trellises are the most in use. These create special micro-climates

[114] *Horticultural - Horticulture is the branch of agriculture that deals with the art, science, technology, and business of growing plants. It includes the cultivation of medicinal plants, fruits, vegetables, nuts, seeds, herbs, sprouts, mushrooms, algae, flowers, seaweeds and non-food crops such as grass and ornamental trees and plants;*

which protect the grapes, allowing them to ripen away from exposure to the direct rays of the sun. Specific meso-climates are created within vineyards located on the islands between the different streams of the Orange River where the close proximity to the water cools down the grapes to a considerable degree. The conditions contribute to creating climate pockets which are conducive to production of better quality wines (WOSA, 2007) Fresh fruit for export is transported via ocean cargo or air cargo[115]. Ocean cargo takes longer to reach destinations, but costs considerably less. Fragility of the produce and length of market window opportunity are considerations when air cargo as transportation is considered. Technology and improvement of containers have made the exports via ocean cargo from a perishable product more viable and the regularity of maritime routes has also increased.

2.5.2.1.1.1 Raisin and Sultana Industry

Raisin and sultana production is an important agricultural activity in the area. Most dried sultana grapes in South Africa originate from Upington's South African Dried Fruit Cooperative, which exports the produce in large volumes. The largest dried vine fruit processing and packaging plant (SAD Vine Fruit {Pty} Ltd) in South Africa is based in Upington. This plant is served by six intake deports located in Groblershoop, Mylpaal, Louisvaleweg, Keimoes, Kakamas and Vredendal (Siyanda EMF, 2007[116]). There are approximately 1 500 growers of vine fruit in South Africa with 90% of production clustered around Upington. Approximately 75% of the total crop is used for the cultivation of sultana grapes.

2.5.2.1.2 Apples

The highest suitable area for apples are located along the orange river from Keimoes to Straussburg where the trees could be irrigated at regular interval. The accessibility towards local markets are also good as the region is in close proximity to Upington. The commodity will only be produced for local markets and use as the quantity needed to export as well as the accessibility and timeframes don't make it feasible to export.

2.5.2.1.3 Peaches

The highest suitable area for peaches are located along the orange river from Keimoes to Upington where the trees could be irrigated at regular interval. Accessibility towards local markets are also good as the region is in close proximity to Upington. Potential exist that peaches along with other fruits can be exported as dry fruits to other regions and markets outside South Africa. Dry fruits can be exported from the Upington cargo airport to other parts of the country and internationally.

2.5.2.1.4 Citrus

Citrus represents one of South Africa's most important fruit groups by value and volume. Citrus production in South Africa is mainly aimed at the export market. Approximately 2% of all Citrus in South Africa are grown in the Northern Cape with the majority located in the ZF Mgcawu District along the Orange River. The main citrus fruits being cultivated within the region include Grapefruit, Pomelos, Lemons, Limes, Navel and soft citrus.

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[115] Department of Agriculture, 2017. Provincial diagnostic assessment formulated for the Northern Cape: Office of the Premier

[116] The Department of Environmental Affairs and Tourism (DEAT), the Northern Cape Department of Toursim, Environment & Conservation (NCDTEC) and the ZF Mgcawu District Municipality (ZFMDM) decided to jointly establish an Environmental Management Framework (EMF) for the ZF Mgcawu District municipal area to ensure that future development in the area occurs in a manner that is appropriate to the unique features and character of the area.

2.5.2.2 Pecan Nuts and dates

South Africa is one of the biggest producers of pecan nuts. These nuts are mainly produced in the Vaalharts area of the Northern Cape. This area is ideal for harvesting the best quality nuts in the world due to specific climate conditions. The semidesert area's cold winters and hot summers contribute to successful fruit growth. Pecan trees thrive in well-drained deep soil, which makes the area near the Vaal and Harts River the perfect location. Some of the popular cultivars are Wichita, Choctaw and Ukulinga. The Vaalharts Processing Plant is situated in the Hartswater area, where more than half of South African pecan nuts are grown. The main function of the Vaalharts Processing Plant is the sizing, grading and cracking pecan nuts. Nuts acceptable for in-shell exports are cleaned and sized accordingly, whereas pecan nut halves and pieces go through a more rigorous process of cracking and grading. After representative nut samples are drawn, they are analysed according to physical, microbiological and chemical specifications. Each shipment receives a detailed analysis sheet with pecan nut specifications to ensure conformity.

The highest suitable area for dates are located along the Orange River from Dyasonsklip to Straussburg, where the trees could be irrigated at regular interval. The climatic conditions are ideal for the growing of dates in the dry arid conditions with frost in the winters. Ramadan in the Middle East requires huge quantities of dates during their holy period which provides an ideal market for dates.

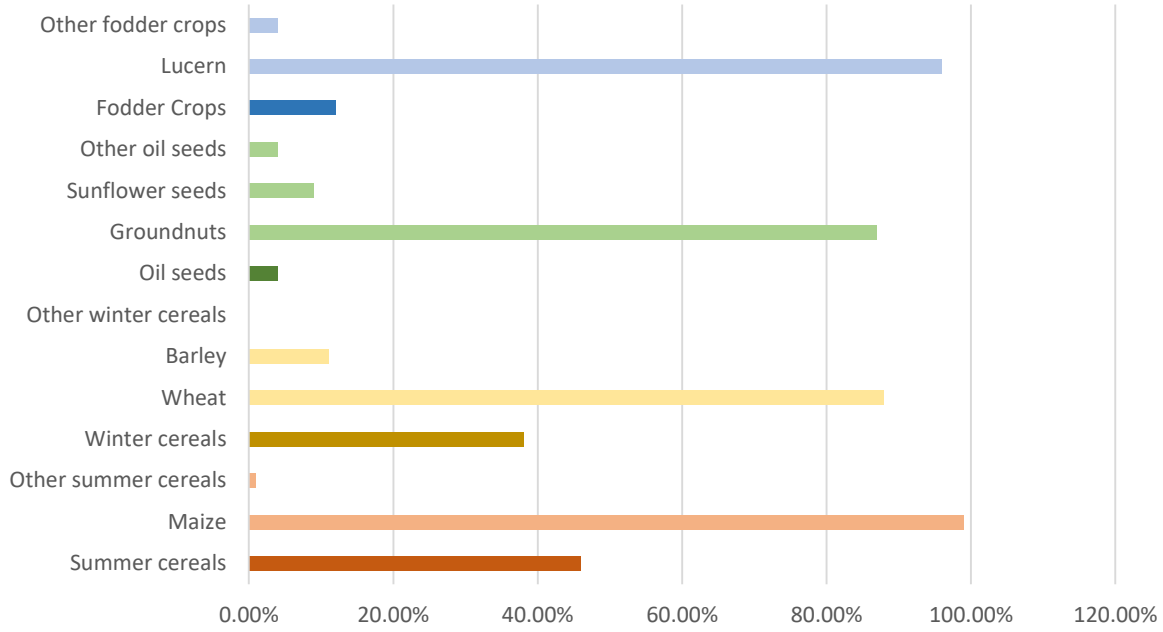
2.5.2.3 Vegetables

Vegetables is a local commodity and can be planted within certain areas within the province as long as enough water are available to irrigate the crops. It is highly recommendable that vegetables will be produced for local markets only, due to the water shortages and availability within the province. The bare un-vegetated regions of the province are not suitable even for subsistence farming because of the scarcity of water and the arid land. Fruit and vegetable production are critical for employment and the agro-processing sector in South Africa more especially in rural areas and peri-urban zones.

2.5.3 Field crops[117]

Field crops production is dominated by summer- and winter cereal production in the Northern Cape. The graph below gives a breakdown of the importance of the following products to field crops within the Province.

[117] *Department of Agriculture, 2017. Provincial diagnostic assessment formulated for the Northern Cape: Office of the Premier*



Graph 64: Field Crops Production overview of the Northern Cape Province

Table 51: Crop breakdown per Irrigation region, Northern Cape Province[118]

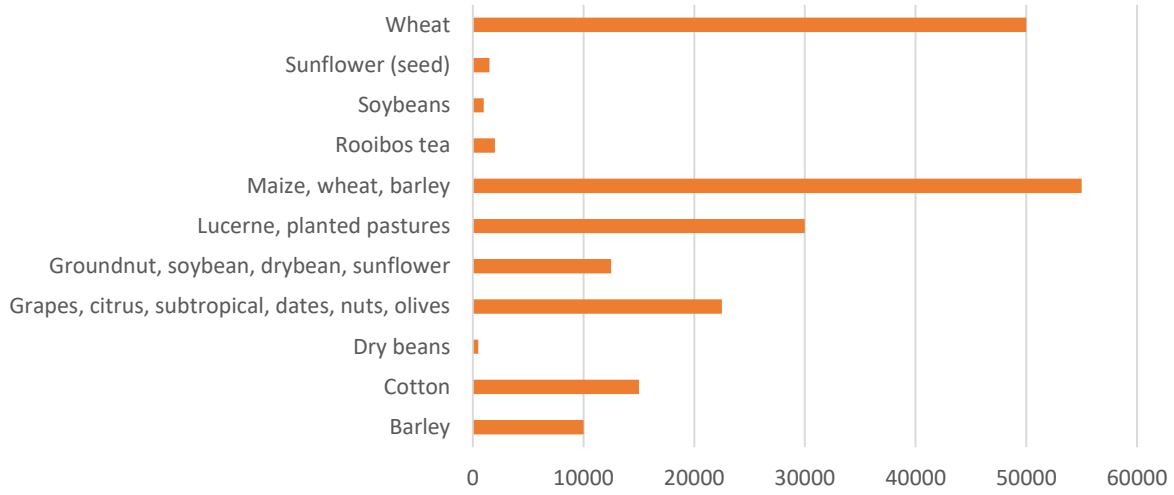
COMMODITY	VAALHARTS CROP BREAKDOWN	MIDDLE ORANGE CROP BREAKDOWN	LOWER ORANGE (BOEGOEBERG TO UPINGTON)	LOWER ORANGE (UPINGTON TO BLOUPUTS)
Barley	14%	-	-	-
Cotton	3%	-	4%	4%
Dry grapes	-	-	28%	28%
Groundnuts	12%	-	-	-
Juice grapes	-	-	6%	6%
Lucerne	7%	6%	9%	9%
Maize	25%	43%	-	11%
Pecan nuts	5%	-	11%	-
Table grapes	-	-	8%	8%
Vegetables	-	4%	-	-
Wheat	28%	44%	-	-
Wheat & Barley	-	-	14%	14%
Wine grapes	-	-	15%	15%
Other	6%	3%	5%	5%

Crop production research focuses on a number of field crops which are evaluated for optimal cultivars and these include, cotton, maize, wheat, barley, ground nuts, canola, soybeans and lucerne. Lucerne research also includes quality and management components. Alternate crops are being investigated in terms of their suitability and adaptability to conditions in the Northern Cape province. Other crop production research emanates from the development projects such as research on different aspects of rooibos production and related soil science aspects while the grape industry is supported by research on and surveillance of pests and diseases, specifically fruit flies. Examples of current research themes/ areas are the following:

- Selection of best adapted cultivars

[118] *Department of Agriculture, 2017. Provincial diagnostic assessment formulated for the Northern Cape: Office of the Premier*

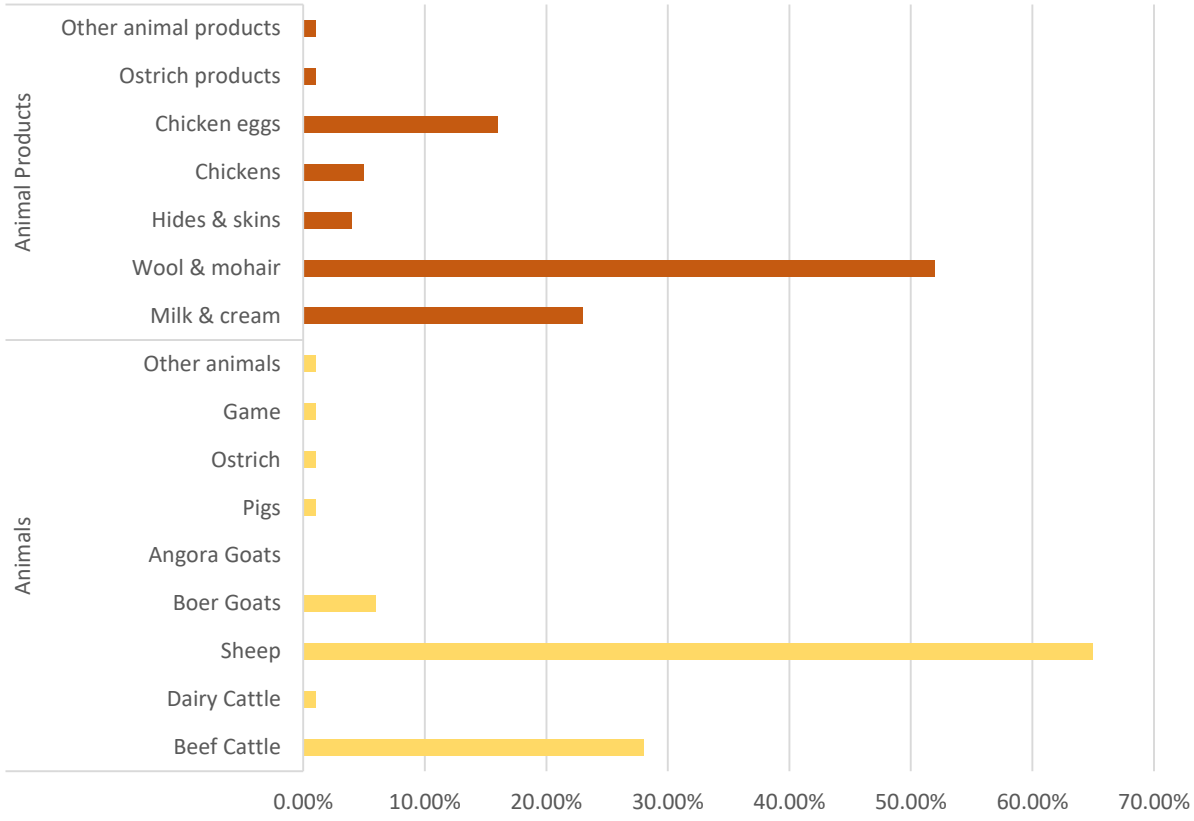
- Alternative crops
- Soil management and amelioration
- Optimizing production management systems
- Geographic indicators
- Development of early warning systems and disaster management systems



Graph 65: Number of hectares planted per commodity in the Province

2.5.4 Livestock

Within the Northern Cape the animal industry (selling of live animals and animals for meat) is dominated by the sheep industry and animal products by the wool & mohair industry. The graph below gives a breakdown of the importance of the following products to animal production within the Province.



Graph 66: Animals and animal products overview of the province[119]

Resource-poor farmers keep goats and mutton sheep (especially Dorper breeds), Karakul (for pelt), smaller amount of woollen sheep and Nguni cattle and also mixed breeds. Commercial farmers concentrate on mutton-woollen sheep, including beef cattle (especially Bosmara breeds). Dairy production is of less significance in the province. Livestock numbers in terms of percentages recorded during August 2000, from the livestock population in RSA, are as follows: Sheep 25,5%, Goats 6,7% and Cattle 3,5%.

According to DAFF (2012), the livestock sector was one of the best growing parts of the agricultural economy, driven by income growth and supported technological and structural change. This sector contributes 40% of global value of agricultural output and supports the livelihoods and food security of almost billion people. Beyond their role in generating food and income, livestock are a valuable asset, serving as a store of wealth, collateral for credit an essential security net during calamitous times.

[119] *Department of Agriculture, 2017. Provincial diagnostic assessment formulated for the Northern Cape: Office of the Premier*

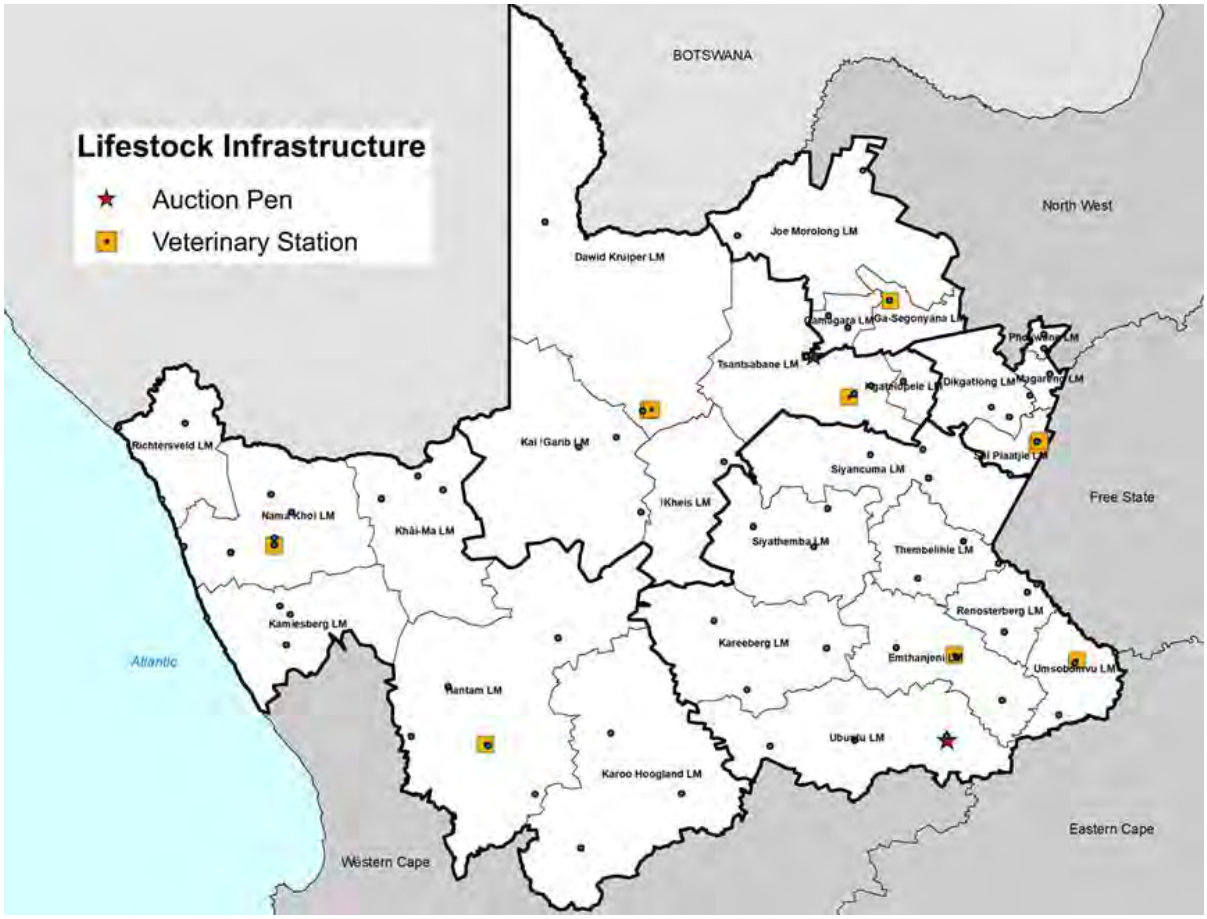


Figure 154: Key livestock infrastructure facilities in the Province

Globally, livestock contribute 15% of total food energy and 25% of dietary protein. In South Africa, stock farming is the only viable agricultural activity in a large part of the country. Approximately 80% of South African agricultural land is suitable for extensive grazing. Cattle production has increased by 37 000 heads (from 13.5 million in 2004 to 13.87 million in 2011) and areas for grazing declined due to expanding human settlements and other activities such as mining, crops, forestry and conservation. 80% of the total cattle heads are for beef cattle and the remaining 20% is for dairy cattle. Beef cattle producers vary from highly sophisticated commercial (who rely on high technology) to communal subsistence producers (who rely on indigenous knowledge and appropriate technology).

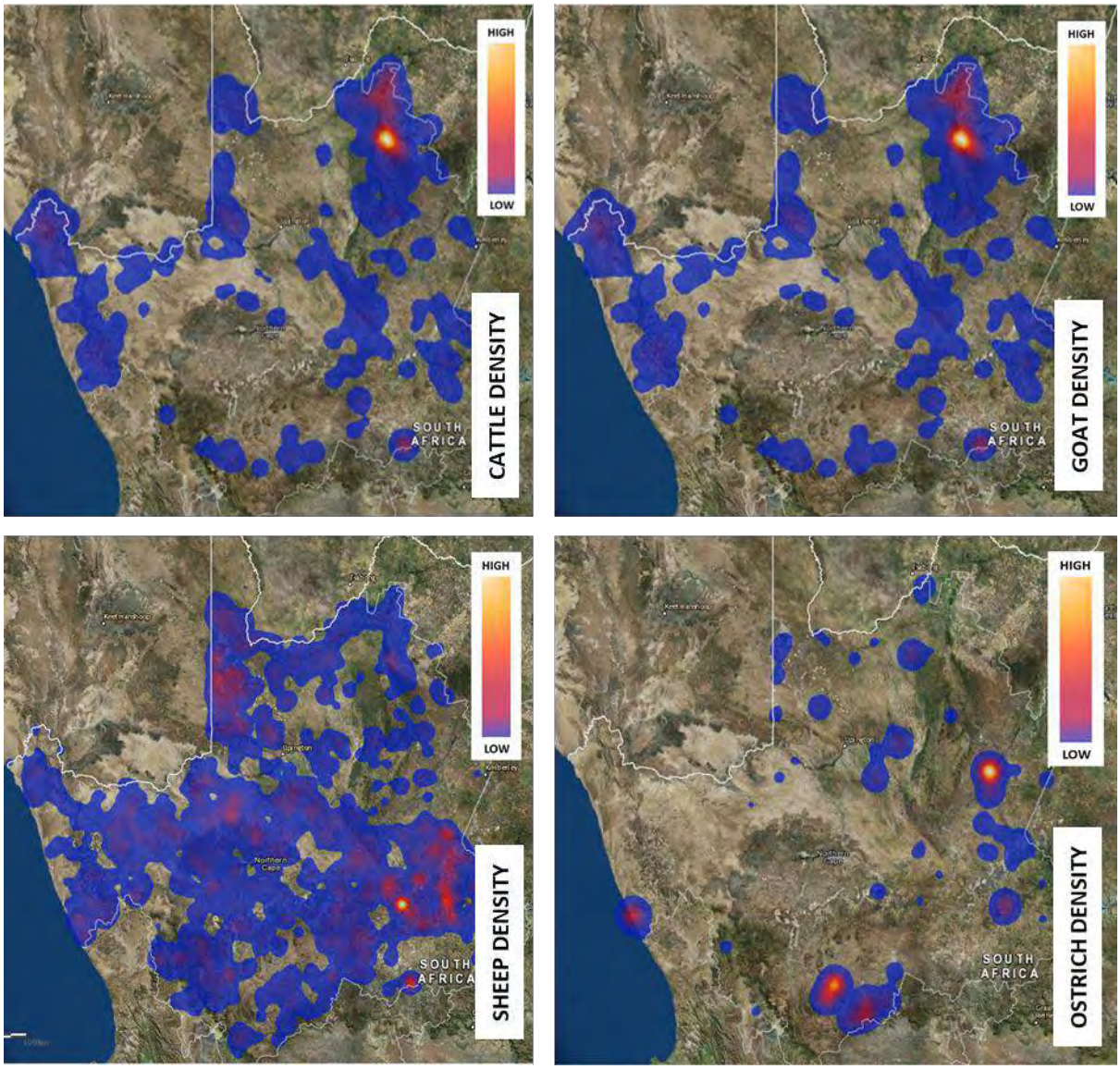


Figure 155: Livestock density overview in the Northern Cape Province[120]

Three major groups of beef cattle farmers co-exist in South Africa:

- The commercial beef producers, (mostly owned by white farmers) where production is relatively high and comparable to developed countries. Their production is generally based on synthetic breeds and/or crossbreeding, using Indicus/Sanga types and their crosses as dams.
- The emerging black beef cattle farmer who own or lease land (LRAD beneficiaries). Their cattle generally consist of indigenous crossbred or exotic type of animals.
- The communal beef cattle farmer who farm on communal grazing land. Their cattle are mostly of indigenous types.

Most of South Africa's grazing land is stocked beyond its long-term carrying capacity. Overstocking can cause trampling and crusting of the soil and denude the veld of vegetation. This leads to reduced

[120] Department of Agriculture Diagnostic Report

productivity, reduced soil fertility and erosion. As much as 98% of the province is defined as arid or semi-arid, and it is in these areas that land degradation (compounded by climate change) can lead to desertification and the irreversible loss of productive land (Gbetibouo & Ringler, 2009).

Some commercial farmers increase the carrying capacity of their land by adding fertilisers, planting additional palatable species (called 'reinforcement') and/or planting pastures. All these techniques require the application of fertilisers, which are costly and can pollute the environment. Poorly managed, fertilisation can also change the species composition and decrease the basal grass cover. This reduces productivity and increases water run-off and erosion. Veld reinforcement and pasture cultivation both require irrigation, which is limited by water availability and may lead to soil salinisation. In general, fertilising and irrigating non-arable land is costly and not a viable option for most farmers. 'Improved' pastures appear to have a significant negative impact on sensitive grassland bird and insect species because they alter not only the structure of the habitats, but also nutrient regimes and animal populations.

The carrying capacity (i.e. potential stocking rate) of land in South Africa increases eastwards, in accordance with increased rainfall. Cattle are concentrated in the eastern, wetter regions of the country, as well as in the North West Province and the Northern Cape, while sheep are largely farmed in the drier western and central areas of the country. The total area of grazing land has declined over time owing to expanding human settlements and activities (such as crop farming, forestry and mining). This decline is most notable in Gauteng and the Western Cape with their high rates of urbanisation, but communal districts in Limpopo, KwaZulu-Natal and the Eastern Cape have also lost grazing lands.

2.5.5 Game farming

The Province shows significant potential for game farming, especially the breeding of scare species due to the low fatality rate experienced compared to other provinces. This could potentially have various spin-off effects such as breeding game for the purposes of selling to other game farms or for meat processing. A study done at the wildlife centre at the University of Pretoria showed that an average sized game farm could generate 54% of its gross income from hunting, 21% from live animal sales, 18% from trophy hunters, 5% from eco-tourism and 2% from meat production. This sector provides more diversity compared to other agricultural sectors and could be a more sustainable use of scare agricultural land in areas with limited potential.

Due to the abundance of wild life, Taxidermist and Abattoirs located within the province, there lies a huge potential to develop this industry further. Some of the spin offs associated with game breeding and hunting include:

- Expansion of the Tourist section through the influx of international travellers;
- Foreign Investment into game as well as infrastructure within the District;
- Skills development and training for local rural communities;
- Employment opportunities for local residents especially rural communities; and
- Marketing and branding of the District as a wildlife/ game breeding location with excellent infrastructure.

Game ranching is the fastest-growing branch of agriculture in South Africa, with the majority of game ranches found in Limpopo, the Northern Cape and the Eastern Cape. The total area covered by these

privately-owned ranches now exceeds that of all national parks and provincial nature reserves put together. In terms of game ranching, game is considered to be an agricultural product as defined in the Marketing of Agricultural Products Act of 1996.

Venison is a meat product produced from wildlife (game) animals like antelopes such as, blesbuck, buffalo, duiker and springboks which lives in various grassland, savanna and biomes regions in and outside South Africa. Venison meat is used as an alternative red meat (beef, pork, and mutton) due to high red meat prices. Wild animals classified as game then also survives better under the dry Southern Africa conditions. Game are mainly browsers and eat woody plants for survival due to them not requiring large pieces of land per animal to survive. As such game have lower maintenance cost to maintain compared to their counter-red meat species for example beef and sheep.

Venison comprise different species that are adapted to various different feeding methods such as grazing; these are animals that depend on grazing (concentrate grazers are selective about their preferable plant species and bulk grazers' non-selective feeders). There is also game who is mixed feeders that are adapted to both leafy and grassy plants as feed, depending on the food availability, and then there are browsers, which feed selectively on leaves and the fruits and the flowers of plants. Venison is harvested for different purposes including for consumption as foods, as stated above, and can be used for generating income through tourism activities like safari outings and trophy hunting (Smith, 2006).

Currently, the economic contribution from the live game breeding and supported industries is estimated to be well in excess of R10 billion, notably more than the contribution from hunting (Cloete et al., 2015). The value of game animals sold on formal auctions alone has increased from R93 million in 2005 to more than R1,8 billion in 2014 – an estimated average annual increase of 26% over the past nine years. However, it is unlikely that the growth rate of the past will be repeated in the future. Current prices and the successive profitability of live breeding, especially in terms of higher value and/or colour and morphological variants, are likely to decline in future; once supply exceeds demand. Although live breeding will remain central in terms of economic contribution and the successive growth of the game ranching industry, it is expected that the growth rate and the successive contribution from the specific segment will be lower in future.

Notable growth was also reported by the hunting segment of the game ranching industry since the mid-2000s – growing from an estimated R3,1 billion in 2005 to R6,3 billion in 2013 (Van der Merwe and Saayman, 2005; 2013). From a local (biltong) hunting perspective, the growth in economic value was mainly due to an increase in related spending (i.e. food, fuel, accommodation and ammunition) and not so much as a result of an increase in animal prices or in terms of the number of animals hunted.

From 2005 to 2013, related spending by biltong hunters has increased threefold (300%) compared to an increase of 25% in terms of the spending on animals. On the contrary, the number of animals hunted by local hunters declined by 12% from 2005 to 2013. A similar trend was visible in terms of trophy hunting with a 37% decline in the number of animals



hunted from 2007 to 2012. The latter is coupled with a notable decline in the number of foreign hunters visiting South Africa, from just over 16 000 foreign hunters in 2007 (before the economic crisis) to around 9 000 foreign hunters in 2012 (Phasa, undated).

Factors such as the changes in the firearms act of 2004 and the successive growth in the Namibian hunting industry as well as the economic crisis all contributed towards the decline. However, it is unclear whether other factors such as perceptions and/or social pressure resulting from negative media attention and the shift in ranching practices had an influence on the decline. It is clearly something that needs the attention of the industry with a continuous decline in the number of foreign hunters that will hamper the growth potential of not only the segment, but the industry as a whole.

Game numbers are constantly on the increase and so is the number of hectares dedicated to game ranching. However, this emphasises the need for future development in terms of not only ensuring the growth of well-established consumptive markets, but also establishing new consumptive market opportunities to ensure game ranching remains an economically viable land use option.



Utilising the opportunities presented by game meat is most probably the key in terms of new market development and/or expansion in the quest to ensure the continuous growth and sustainability of the game ranching industry in South Africa. Although a notable percentage of the red meat consumed in South Africa is game meat, the market is largely undeveloped and many consumers consume game meat unknowingly. Future growth expectations rely heavily on developments in terms of game meat.

At the same time, cohesive growth and development will be central in terms of ensuring the future sustainability of the industry. The different segments of the game ranching industry cannot function in isolation and unlike the past, the success of the future will depend on how successful the industry can grow the different segments proportionally to each other. The latter will require that future growth and development be guided by the principles of long-term sustainability and not by potential short-term gains that may be at the cost of other segments in the industry.

Game ranching in South Africa is unique, not only in terms of species diversity, but also in terms of our institutional environment, i.e. South Africa is one of only a few countries in the world where condition ownership of wildlife is vested with private landowners, which presents game ranchers with a comparative advantage second to none – there is no reason why game ranching cannot become or remain one of the leading agricultural land use options in the years to come. With the aforementioned in mind, the growth potential of the industry is ample; however, it will be difficult to sustain the robust growth rates of the past. The industry is likely to report a more moderate growth rate in the years to come.

There is potential to develop greater biosphere reserves in the province as many privately-owned game farms are within close proximity of some of the key nature reserves in the province. This allows

for the possible extension of the nature reserve boundaries to allow for natural migration patterns of game, especially species such as Springbok.

2.6 INFRASTRUCTURE

2.6.1 Agro-processing

Agro-industrial development and agro-processing are vital instruments towards achieving economic diversification, value adding and employment opportunities. It is important to recognize the role played by its linkages and multiplier effects. Agro-processing creates linkages between primary agricultural production and the industrial processing sector thus, promoting value addition and labour absorption. The figure below provides an overview of the key agro-processing facilities in the Province.

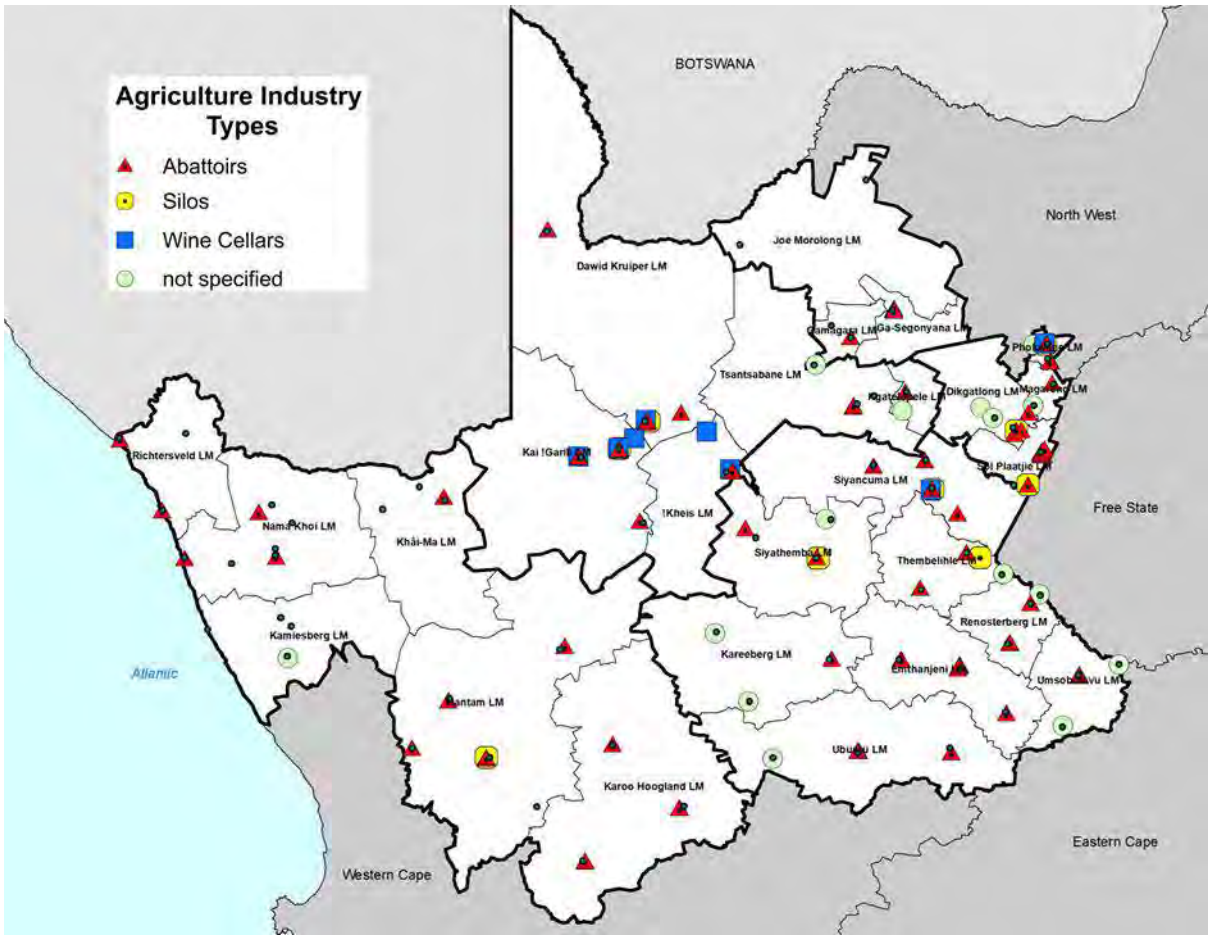


Figure 156: Overview of key agro-processing facilities in the Province

2.6.1.1 Abattoirs

Approximately 60% of the 14.1 million cattle available in South Africa are owned by commercial farmers and 40% by emerging and communal farmers. The gross value of beef production is dependent on the number of cattle slaughtered and the prices received by producers from abattoirs. The amount of red meat produced depends on the infrastructure such as feedlots and abattoirs, not necessarily by the number of livestock available in those areas.

South Africa has highly developed transport infrastructure that allows movement of cattle and calves from one area to another, even from other countries such as Namibia. There are approximately 488

abattoirs in total in South Africa ranging in slaughtering capacity from as little as 2 to 3 units a day to more than 1,500 units a day.

Most of the larger abattoirs are owned by the feedlot industry, thus backwards vertical integration. Abattoirs in South Africa can either be classified as high throughput abattoirs (21 to 100 units/day) or low throughput abattoirs (1 to 20 units/day) where one unit equals 1 cattle, 6 sheep, 5 pigs, 4 ostriches or 2 horses. In the North Cape Province high throughput abattoirs does 5 to 100 units/day, this is not competitive as compared to other high throughput abattoirs.[121]

The Northern Cape has 14 abattoirs registered for high volume red meat slaughtering and another 28 registered for low volumes (see the table below). Two abattoirs in Frances Baard are also registered to slaughter for cattle exports and another two abattoirs in Pixley ka Seme are registered to slaughter for sheep exports to SACU and the Middle East.

Table 52: Registered abattoirs in the Northern Cape Province[122]

REGISTERED ABATTOIRS IN NORTHERN CAPE								
Region	**Red Meat**				**Poultry**			
	High	**Low**	**Rural**	**AP**	**BP**	**CP**	**DP**	**EP**
Kuruman & Mothibistad	1	7					4	
Springbok	1	2	1					
Upington	2	2	1				3	
De Aar	5	7					1	
Calvinia	3	5	2					
Kimberley	2	5	2				6	
Total	14	28	6	0	0	0	14	0

2.6.1.2 Storage

The total maize crop is harvested in a relatively short period, but it is processed and used right throughout the year, which means that the majority of the crop needs to be stored directly after harvest. The producer has one of three options when harvesting, to deliver it directly to the processor/user, store it him/herself or deliver it to commercial off-farm silos. The processors have limited capacity and can only store about 10% of the crop. Because of the large capital outlay to create storage capacity, limited storage capacity exists on farms. New technology is increasing the on-farm storage capacity. More than 70% of the crop is stored in commercial silos. The three leading commercial silo owners, namely Agri, NWK and Senwes, own nearly 75% of the storage capacity in the grain market. Most of the storage capacity is in the Northern grain producing provinces with some capacity at the main harbours for importing and exporting. In the Northern Cape the silo owners with the largest storage capacity are GWK, Senwes and OVK. There are also a few smaller silos and silos that are privately owned. The larger silos are all situated next to railway lines which make rail transport for the bulk of the crop possible. Most of the silos in the Northern Cape are also used for wheat production and the time for storing maize is limited. This puts more pressure on logistical

[121] *Department of Rural Development and Land Reform, 2016. Agri-Park Master Business Plan, John Taolo Gaetsewe District Municipality, Northern Cape Province*

[122] *Department of Agriculture, 2017. Provincial diagnostic assessment formulated for the Northern Cape: Office of the Premier*

arrangements and negotiating contracts with buyers. Removal of surplus crop more than storage capacity in harvesting period always poses challenges to traders and road transport is often used.

2.6.1.3 Wine Cellars

Wine cellars is predominantly found along the Orange River, Orange River Cellars is the dominant co-op in the Province. Orange River Cellars was established on 23 December 1965, with Upington Cellars harvesting wine grapes for the first time in 1968. Since the early seventies, the wine production activities have been extended significantly with the addition of cellars at Groblershoop, Grootdrink, Kakamas, and Keimoes. Grape juice production is managed from a separate, specialised facility at Kanoneiland, and is also done at the wineries of Grootdrink and Kakamas. Orange River Cellars is the largest wine cooperative in South Africa and in the Southern Hemisphere, as well as the second largest in the world, according to the number of tons harvested. In the early 1900's vineyards were planted in the Lower Orange valley for raisin production. The intake of the cellars has grown from 5182 tons in 1968 to a record of 184 000 tons in 2004. Not much of the original distilling wine scheme survived. The production of good wine goes hand in hand with marketing and here Orange River Cellars had great success with its own products. Originally only three wines were produced, but the product list has grown to over 30 different products. The large number of awards over the last couple of years indicates the quality of these products. To date we have received national and international awards and recognition for our wines, the latest being 5 medals at the 1999 Veritas. With the growing demand for grape juice concentrate, Orange River Cellars established juice cellars at Kanoneiland and Grootdrink and in 1996. The wine cellar at Kakamas is also currently used for the production of grape juice.

2.6.1.4 Markets

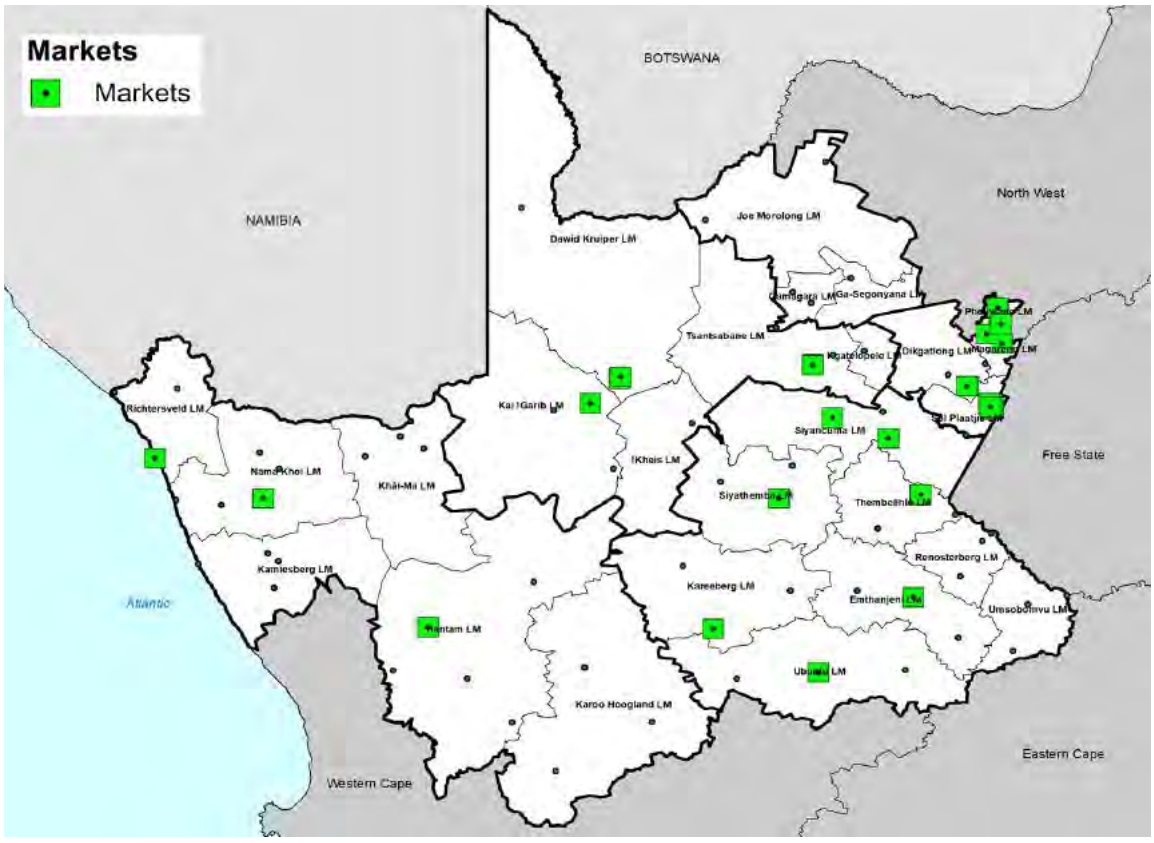


Figure 157: Overview of key markets in the Province

2.7 PROJECTS

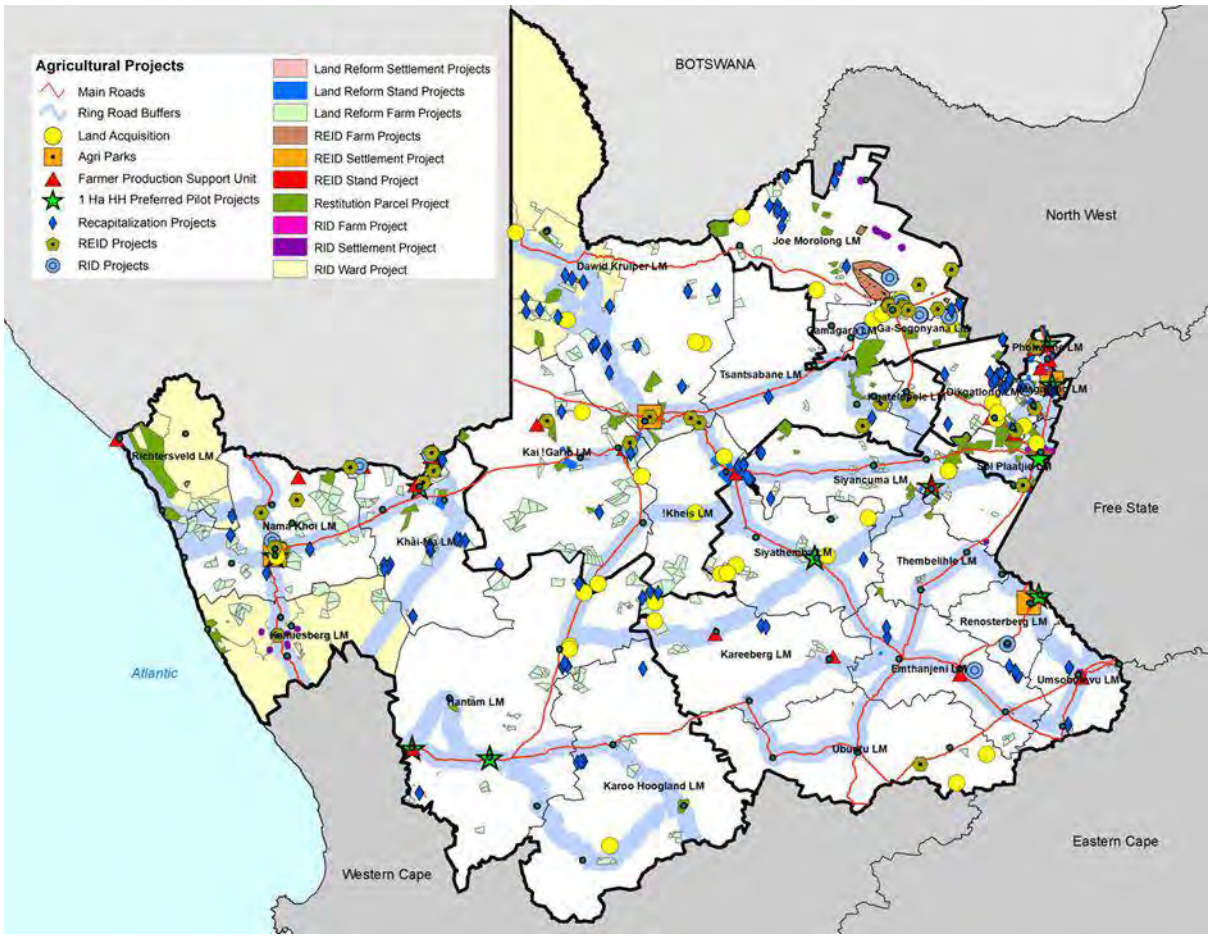


Figure 158: Overview of the Agricultural related projects in process, completed and planned in the Northern Cape Province

2.7.1 Department of Agriculture

2.7.1.1 CASP

To provide effective agricultural support services and to streamline the provision of services to targeted beneficiaries of land reform's restitution and redistribution; as well as to other black producers who have acquired land through private means and are engaged in value-adding enterprises domestically or involved in export.

2.7.1.2 Ilima/Letsema

To fight poverty through increased food production. The programme also focuses on unlocking agricultural production by investing in other strategic programmes that includes the rehabilitation of the irrigation schemes, and other value adding projects.

2.7.1.3 Fetsa Tlala: Integrated Food Production Initiative

Fetsa Tlala is an integrated government framework that seeks to promote food and nutrition security and to address structural causes of food insecurity, which continue to perpetuate inequality and social exclusion. The Initiative is aimed at implementing the food production pillar of the National Policy to maximize cultivation of food by putting 1 million hectares of land under production by 2018/19

production season. It is expected that beneficiation of One Million Hectares programme will in the main accrue to the indigent and vulnerable sections of the society (DAFF, 2014).

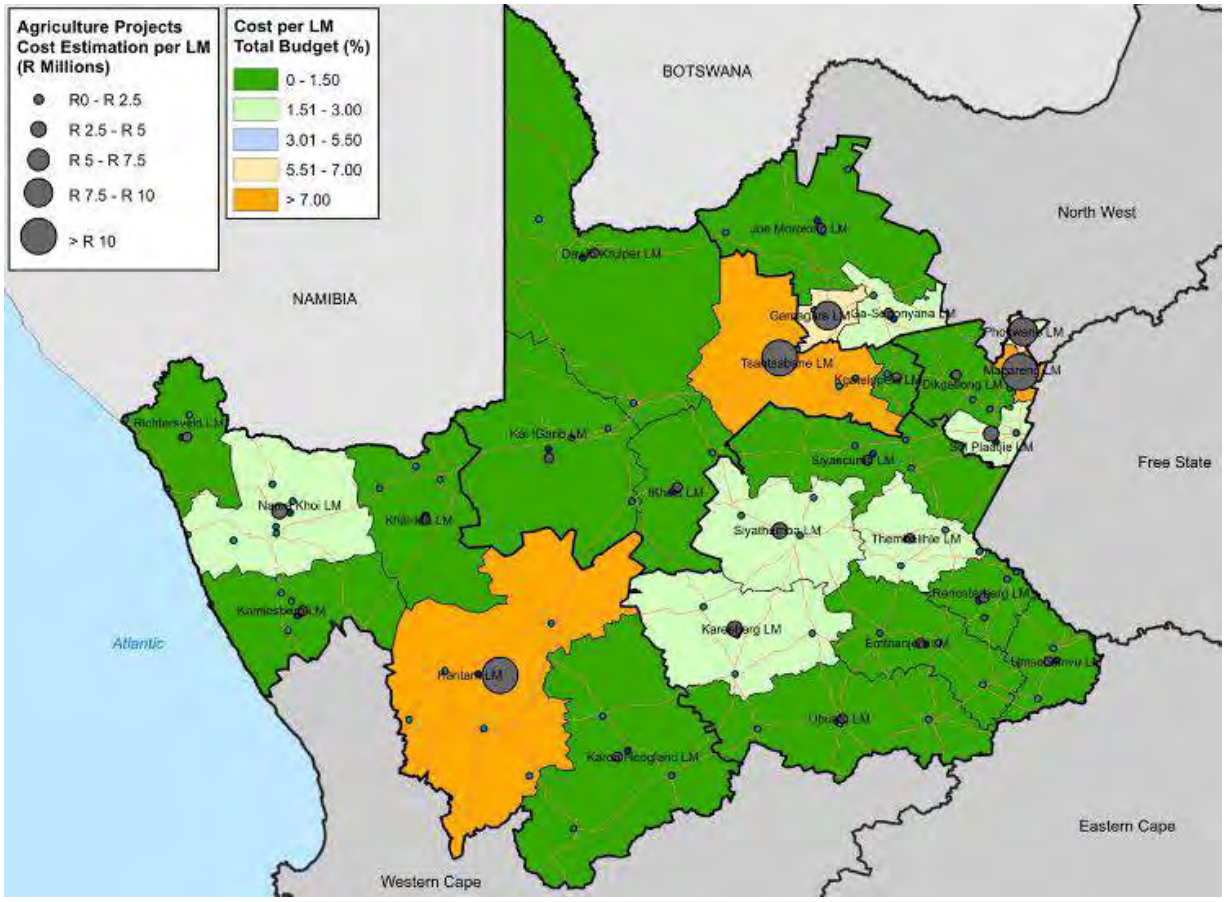


Figure 159: Overview of budget allocations of agricultural related projects in the Province

2.7.2 Department of Rural Development and Land Reform

2.7.2.1 Agriparks[123]

Agri-parks are supposed to be one stop shops for agro-production support, processing, logistics, marketing and training within district municipalities. Government believes that the initiative will contribute to developing 300 000 new small holder farmers and 145 000 jobs in agro-processing. The stated intention is to develop agri-parks in each of the 44 district municipalities, with 27 of the poorest district municipalities being prioritised (DRDLR, 2017). The Agri-park comprises three distinct but interrelated basic components:

- The Farmer Production Support Unit (FPSU) - a rural small-holder farmer outreach and capacity building unit that links farmers with markets. The FPSU does primary collection; provides some storage, some processing for the local market, and extension services including mechanization.
- The Agri-hub (AH) - a production, equipment hire, processing, packaging, logistics, innovation and training unit.

[123] *The first draft version of the Agri-Parks Policy (2015) defines an Agri-Park as: An Agri-Park is a networked innovation system of agro-production, processing, logistics, marketing, training and extension services located in District Municipalities. As a network it enables the growth of market-driven commodity value chains and contributes to the achievement of rural economic transformation.*

- The Rural Urban Market Centre (RUMC). The RUMC has three main purposes;
    - Linking and contracting rural, urban and international markets through contracts.
    - Acting as a holding-facility; releasing produce to urban markets, based on seasonal trends.
    - Providing market intelligence and information feedback, to the AH and FPSU, using the latest Information and communication technologies.

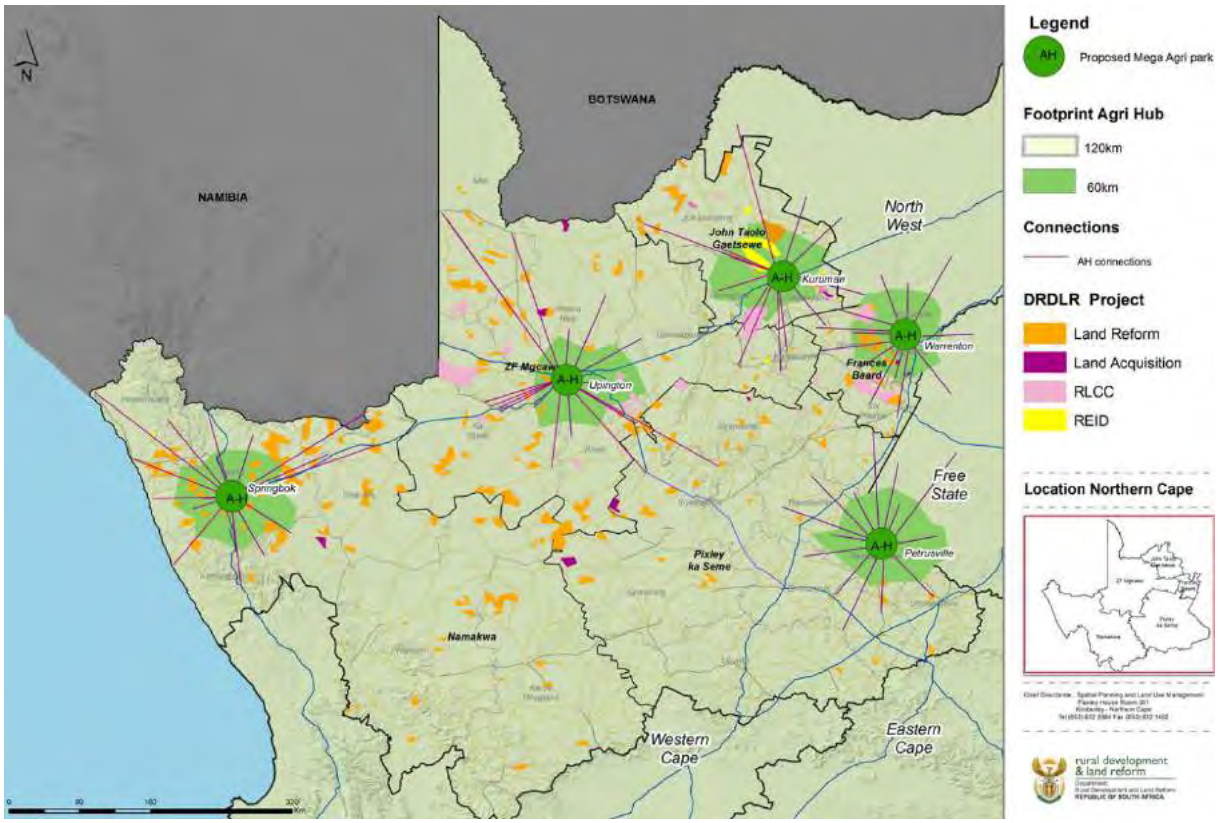


Figure 160: Overview of the Agripark rollout in the Northern Cape Province

Agri-hubs have been identified in each District, namely Springbok, Upington, Petrusville, Warrenton and Kuruman.

2.7.2.2 Rural Infrastructure and Development (RID)

The key purpose of the RID program is to facilitate rural infrastructure development strategies for socio-economic growth. Key functions include:

- Provide economic and ICT infrastructure development services;
- Facilitate social infrastructure, public amenities and facilitates development services;
- Facilitate access to additional funding to implement infrastructure project services;
- Develop and adapt innovative and appropriate technologies within rural areas;
- Integrate, coordinate and implement policies and disaster management frameworks with special emphasis on mitigation of disasters in rural areas;
- Provide project management functional specific support to RID in provinces;
- Provide financial and administrative support services;
- Provide service delivery coordination services; and
- Provide social organisation and youth development towards economic Upliftment

2.7.2.3 National Rural Youth Service Corps (Narysec)

The DRDLR established the Narysec Programme to complement the government's job creation model. Its chief aim is to assist young people in rural areas to become employment creators rather than job seekers, as well as to reduce the youth's dependency on social grants. The long-term programme also aims to uplift rural areas with services and infrastructure. Young persons are trained in various skills such as waste-water management, water purification, construction, electricity and agriculture in order to ensure their skills are marketable, thereby assisting them to develop their own entrepreneurial initiatives.

2.7.2.4 Rural Enterprise Infrastructure Development (REID)

The key purpose of the RID program is to facilitate poverty reduction, social organisation, youth development and the development of cooperatives, rural enterprises and industries. Key functions include:

- Reduce household poverty in accordance with CRDP;
- Promote rural businesses development and facilitate rural development financing;
- Facilitate establishment and support of primary cooperatives;
- Facilitate organisation of primary cooperatives into secondary and tertiary coops and provide support;
- Facilitate the development of rural enterprise and industries;
- Provide strategic management in the coordination of financial and non-financial service delivery;
- Provide social organisation and youth development towards economic Upliftment.
- The primary aim of REID is to create an enabling institutional environment for vibrant and sustainable rural communities.

2.7.2.5 Comprehensive Rural Development Programme (CRDP)

The CRDP's primary purpose is to reduce poverty by creating vibrant, equitable and sustainable rural communities. To achieve this vision, the department defined its role and mission as one of facilitating integrated development and social cohesion through partnerships with all sectors of society. It focuses on enabling rural people to take control of their lives, with support from government. The programme aims to effectively deal with rural poverty through the optimal use and management of natural resources. This is primarily attained through integrated, broad-based agrarian transformation and the strategic investment in economic and social infrastructure that will benefit rural communities. The Ministry of Rural Development and Land Reform has succeeded in assisting rural communities to create a more prosperous life for millions of residents in villages by providing food, stimulating local economies, creating job opportunities and lessening the scourge of rural poverty. The DRDLR has acquired numerous parcels of land throughout the country in an effort to improve the economy. To ensure sustained production on this government-offered land, small-holder producers were supported through various initiatives, including access to information. In addition, infrastructure development by the DRDLR has contributed to households acquiring access to clean and potable running water, sanitation and electricity.

2.7.2.6 Animal and Veld Management Programme (AVMP)

The AVMP offers relief for rural farmers who operate under challenging circumstances made worse by spatial congestion and environmental degradation due to overgrazing. The programme also assists with soil rehabilitation, spatial decongestion and re-greening of the environment. It is part of government's intervention towards reversing the legacy of the 1913 Natives' Land Act, which led to the majority of black people being confined to 13% of the land, resulting in challenges of overcrowding and overgrazing in communal areas. It is envisioned that the AVMP will reach and assist the country's 24 poorest district municipality areas.

2.8 AGRICULTURE AND FOOD SECURITY[124]

The direct contribution of the agricultural sector to the national and provincial GDP has declined steadily over the past few decades. However, this underestimates the sector's real contribution to GDP. Agriculture is traditionally understood to contribute to the economy through:

- Direct agricultural production activities (i.e. its contribution of about 3% to GDP) plus the processing of farm-produced raw materials into food, beverage and textile products. The food and beverages sector of the economy represents about 18% of total manufacturing production in South Africa, whereas the manufacturing sector contributes some 19% of GDP. Hence, this represents a further (maximum) contribution of 3.4% of GDP. While agricultural raw materials are also used in the production of clothing and textile products (wool, cotton, leather,) and other industrial products, these are more tenuously related to the agricultural sector. In addition, agriculture contributes to GDP directly through the purchase of inputs (both goods and services). The combined GDP contribution of the sector along with its forward and backward linkages is, therefore, larger than the recorded 3%, and is probably closer to 8%.
- Agriculture generates employment for a large proportion of the economically active labour force (between 8 and 9%, which is three times its GDP contribution).
- The purchasing power of farmers' incomes and farm workers' wages, which are the main source of the strong linkages between agriculture and the rest of the economy. Furthermore, these linkages are stronger in the rural areas, where this purchasing power represents a larger share of gross national expenditure than may be acknowledged.
- The agricultural sector has shifted in status from being a net exporter to a neutral position over the past decade, so it can no longer be counted on as a net earner of foreign currency. However, the sector does cover the exchange cost of importing basic foods into the economy, and in this way ensures that, at the national level, South Africa is not food insecure.
- The role that agriculture plays in the rural areas of South Africa, where its contribution to GDP is larger than in the whole economy. This also includes the important link to the tourism industry, a large and growing provider of employment in rural areas.
- The livelihoods that it provides for people in the informal economy through 'subsistence' production as well as through a wide variety of activities in the processing, distribution and retailing of food products in poor rural and urban communities.
- It is important to recall that agriculture, by its very nature, is an imposition on the environment, and that many farming activities cause environmental damage. However,

[124] *DBSA, 2009. The economic performance of agriculture in South Africa since 1994: Implications for food security*

agriculture also provides the basis for agro-tourism, in that it provides valued environmental amenities. Furthermore, changing production practices, specifically the introduction of minimum intervention practices in the production of grains, has resulted in less environmental damage and has allowed the release of more than 2 million hectares of land once ploughed to revert to natural grazing for livestock and game farming.

The contribution of agriculture to the broader economy forms the basis for examining the links between agriculture and household food security in South Africa. We concentrate on household food security because commercial agriculture has long been responsible for national food security. A relatively large proportion of households, and individuals within households, are food insecure, and at this level both commercial and 'communal' or small-scale farmers contribute most to food security.

The linkages between agricultural production and household food security can be analysed through two lenses. The first is agricultural production across the spectrum of farming types in the country, including the supply chains that bring inputs to the farm gate and the food processing, distribution and retail activities that are related to moving products off the farm to their point of final consumption (in the desired time, place and form). The second is the prices that farmers receive for their produce and that consumers pay for food. These two aspects are discussed in turn below, with a focus on policies to enhance household food security

2.9 OPPORTUNITIES IN THE AGRICULTURAL SECTOR

Several international and local factors impact on the productivity of the agricultural sector and its growth. Key amongst these are:

- Growth of the South African economy and rising consumer demand;
- International trade and trade agreements;
- The global recession and rise in food prices;
- The land reform programme;
- Reliance on imports;
- Water availability;
- Changing consumer patterns and demands (e.g. organic food stuffs);
- Technological changes and mechanisms;
- Quality standards;
- Farm safety and security;
- Broad-based black economic empowerment;
- Legislation;
- Skills demand and supply; and
- HIV/AIDS.

The recent ongoing national and even international experience in food security, have spurned governments to revisit the role agriculture plays both socially and economically. The fundamental role that agriculture plays in development has long been recognised by agricultural development scholars and practitioners. Agriculture has historically been seen as a source of contributions that helped induce industrial growth and a structural transformation of the economy (Byerlee, de Janvry, & Sadoulet, 2009; Timmer & Akkus, 2008).

However, industrialisation policies often taxed agriculture, while integrated rural development policies aimed at the alleviation of rural poverty were difficult to implement. The result was a decades-long neglect of agriculture, despite the experience of China, where the benefits of agriculture-based growth could be seen clearly. In addition, globalisation, integrated value chains, rapid technological and institutional innovations, and environmental constraints have deeply changed the context for agriculture's role. This strategy argues that agriculture's multiple functions for development in triggering economic growth, rural development, reducing poverty, and in providing national food security, must be recognised.

Despite broad acceptance of the structural transformation paradigm, recent studies reflect a need to rethink agriculture ‘s role in development for two reasons outlined by Byerlee, *et al*., (2009).

- First, the structural transformation models even with their more nuanced view of the role of agriculture still see agriculture as the —handmaiden of industrialization (Byerlee *et al*., 2009).
- Second, even within a broader paradigm of agriculture for development, the world in which agriculture operates has changed drastically due to globalisation, new technologies and institutions, and new more demanding markets has spurred rapid growth in the demand for agricultural exports, especially for higher value products, reducing developing countries ‘output of basic foods, and opening the potential to cheaper imported foods.

Some of these changes are favourable while others need to be guarded against. Expanded markets for labour-intensive non-traditional exports create new opportunities for farmers in developing countries, but they leave further challenges in the implementation of the development agenda, such as the dependence on global markets for cheaper imported foods, which left many countries that have chosen this route vulnerable to soaring, unstable global food prices. Furthermore, the competitiveness of agriculture in developing countries and the viability of the smallholder, subsistence farmer is called into question by restricted access to proprietary technological innovations, economies of scale in provisioning more demanding supply chains, and a declining role and capacity of the state in servicing the small farm sector.

The Northern Cape Province should seek to develop strict policy control which speaks to achieving the progressive realisation of the right to adequate food, within the context of agricultural production and food security. It is therefore recommended that policies be developed for Agricultural Production and Food Security, which speaks to:

- The right to food as a tool to mitigate potential trade-offs between different factors influencing food affordability, distribution and availability (e.g. differences between farm and retail prices, the importance of profitable production, climate coping strategies and food security needs);
- Policy is required that manages the interface between agriculture and food security;
- Knowledge and Information Management Systems on food security, crop yield and livestock production, and forecasting;
- Partnerships between national, provincial, and local research institutions, farmers and extension;
- The ability of the commercial sector to respond to increased market opportunities, which will ultimately determine any gains from global trade liberalisation;

- Community-based disaster risk reduction systems (e.g. national and sub-national early warning systems);
- Sustainable water management and
- Capacity-building and technology transfer.

3 RURAL DEVELOPMENT

3.1 UNDERSTANDING THE RURAL SPACE AND DYNAMICS

A clear definition of rural has not yet been determined for the South African context, creating a challenge for government and private stakeholders to define which areas are seen as rural. This creates challenges for mainly rural provinces such as in the case of the Northern Cape. According to StatsSA[125], rural areas are areas that are not urban, but this concept is lacking as there is not always a clear demarcation as there are transitional zones or peri-urban regions.

Due to this, the following section will focus on the activities and challenges typically faced within rural spaces and communities situated within them. Typical challenges faced in rural spaces are as follow:

- underutilisation and/or unsustainable use of natural resources;
- poor or lack of access to socio-economic infrastructure and services,
- public amenities and government services,
- lack of access to water or lack of water sources for both household and agricultural development;
- low literacy, skills levels and migratory labour practices decay of the social fabric (child-headed households,
- crime, family disputes and lack of Ubuntu);
- death of cultural progress; unresolved
- restitution and land tenure issues;
- townships not formally established thus hindering service provision and development; dependence on social grants and
- other forms of social security and unexploited opportunities in agriculture, tourism, mining and manufacturing.

South Africa has developed various rural orientated policies, of which the Comprehensive Rural Development Programme is the latest. The programme recognizes[126] value of land as a catalyst for poverty alleviation, job creation, food security and entrepreneurship. The revised land reform strategy will include mechanisms for the effective development and beneficiation of land reform beneficiaries and the categorization of beneficiaries through targeted allocation; facilitating secure access to land; protecting the land rights of farm workers, and addressing basic needs for farm dwellers, including

[125] StatsSA, 2001 Concepts and definitions

[126] South Africa Position Paper on Rural Development, A Model for the Comprehensive Rural Development Programme. 2010, p.12.

water, sanitation, electricity, housing, etc.; creating decent jobs on farm and establishing agri-villages for local economic development.

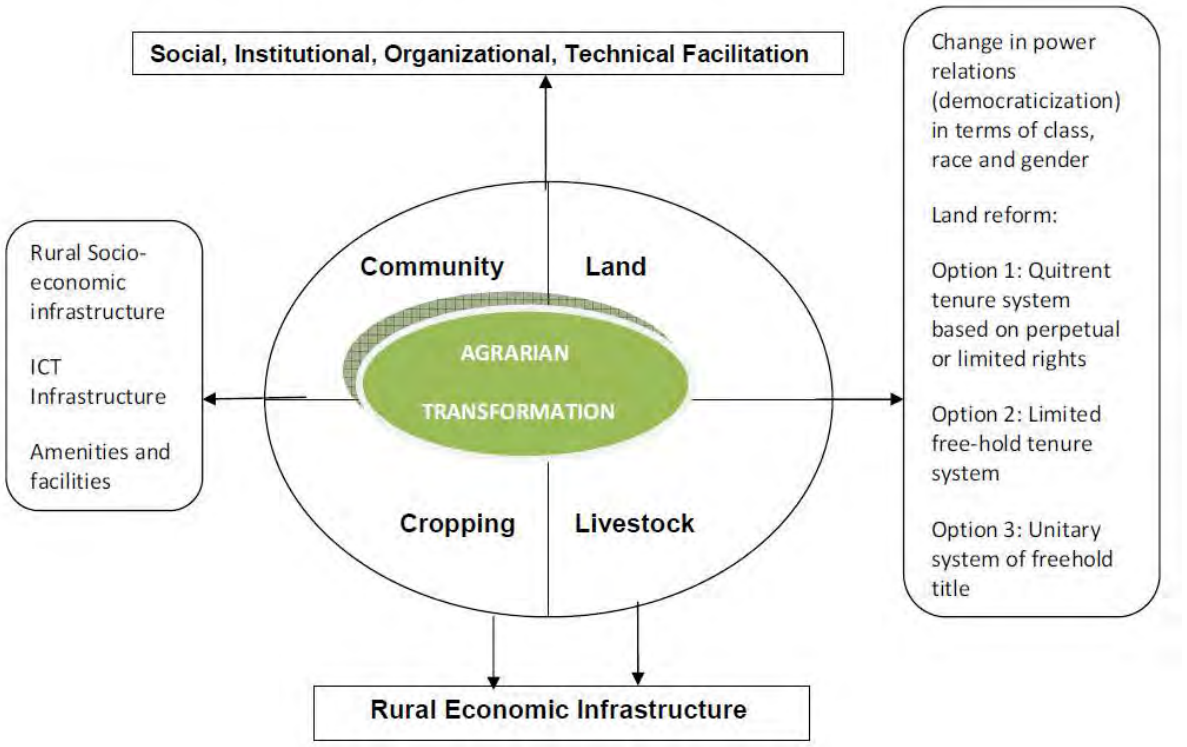


Figure 161: Comprehensive Rural Development Programme Concept

3.1.1 Rural livelihoods and poverty

Research studies highlight widespread decline in production by small scale and subsistence farmers and expanding participation in non-agricultural activities across Africa. Most households have a primary reliance on non-agricultural income sources. It has been argued that throughout Africa "rural poverty alleviation projects need to be aware of new signs of poverty based on non-agrarian rather than agrarian assets and that in this period of extremely rapid change targeting youth and children rather than adults may have more overall benefits."[127] This is an important consideration in the design of a rural development strategy and its articulation with the broader War on Poverty strategies being pursued by Government. If there is to be an accurate understanding of poverty it is of great importance to understand rural livelihoods and the characteristics of poor rural households. This will help to distinguish between those who are chronically poor and those who are transitorily poor. Poverty reduction programmes highlight that different measures are required to address the constraints impacting on these two groups of poor households. The design and targeting of these measures can be assisted through livelihoods analysis. Livelihoods approaches provide a framework which helps to conceptualise:

[127] Bryceson, D. (2002). The scramble in Africa: Reorienting rural livelihoods. World development, 30(No 5), 725 - 739.

How households operate within a vulnerability context that is shaped by different factors including shocks, stresses and seasonal or longer-term trends and change over time.

How household members draw on different categories of livelihood asset or 'capital', (human, social, political, natural, physical, financial); access to which is influenced by the vulnerability context and mediated by a range of policies, institutions and processes (PIPs) which form the governance environment that shapes local livelihood options.

How household members use their capabilities – rights, entitlements, health, labour power, education, skills, knowledge to optimise their social and material assets and engage in multiple livelihood activities to improve the quality of their lives.

How households are differentiated into different categories of wellbeing which require different types of support and intervention. The Northern Cape has experienced accelerated urban migration. Many rural people are heavily dependent on social grants.

3.2 INSTITUTIONAL LAND ANALYSIS

3.2.1 Role of Traditional Authorities in rural development

The vision of the Northern Cape Provincial House of Traditional Leaders is to ensure efficient and effective leadership and service delivery by the institution of traditional leadership for the advancement of the interests of traditional communities.

The Northern Cape House of Traditional Leaders therefore endeavour to[128]:

- Promote the development of rural communities
- Ensure that it operations in a manner prescribed in its statutory mandate
- Work together with other primary stakeholders in the execution of its mandate
- Participate effectively in legislative and policy processes
- Ensure that the status and dignity of the institution of traditional leadership is restored, enhanced and preserved in South Africa, Africa and the world
- Develop programmes to address its capacity related challenges
- Promote the preservation of language and culture of the African people in line with Section 30 and 31 of the Constitution In terms of the mission of the House, the institution of traditional leadership seeks to represent the aspiration of traditional communities by playing a meaningful role in cooperative governance. The House therefore must:
- Act as a custodian of cultures, customs and traditions
- Influence government policy and legislation in so far as it affects the institution of traditional communities
- Advise government on related matters
- Seek to be consulted at appropriate levels on policy and programmes that affect rural areas in general and traditional communities in particular
- Complement and support the work of government at all levels
- Form cooperative relations and partnerships with government at all levels in development and service delivery

[128] South African Institution of Traditional Leadership.

- Play an oversight role on programmes intended to uplift communities.

As illustrated by the above-mentioned objectives of the House of Traditional Leaders of the Northern Cape, Traditional Authorities play a key role in rural development as they (in collaboration with local municipalities) determines the distribution of activities and land uses, as well as determining which practices are to be allowed within these areas.

3.2.2 Communal Land

Communal farmers are concentrated in large areas such as John Taolo Gaetsewe District Municipality, Kgalagadi north of Askham, Richtersveld, Steinkopf, Pella, Leliefontein and other State land as well as on municipal land surrounding most towns. Areas of communal and State land in the Northern Cape Province are illustrated with the dark patches shown in **Figure 162**.

The province includes former homeland portions from Bophuthatswana. The Minister of Rural Development and Land Reform is the nominal owner of this land. The Communal Land Rights Act was meant to regulate tenure in such areas however the constitutional challenges to the Act which have led to its withdrawal. This coupled with inadequate capacity to administer land rights in the former communal areas has contributed to local and legal uncertainties concerning the allocation of rights and their day to day administration. Land rights management in former homeland areas is primarily regulated by the Interim Protection of Informal Land Rights Act (Act 31 of 1996). IPILRA provides interim procedures governing development decisions on this land. IPILRA as the name suggests was designed as interim legislation to protect rights while government developed more comprehensive tenure legislation. The Department of Cooperative Governance, Human Settlements and Traditional Affairs in the Northern Cape has taken responsibility for the Traditional Affairs Unit which was previously located in the Premier's Office. It has assumed responsibility for "ensuring an efficient and effective system of traditional leadership and governance"[129] in those areas where digosi play a role in local governance. Former homeland areas present a range of social, institutional, ecological and environmental challenges which needs to be addressed.

The consistent failure of market-based interventions to regenerate commercial agriculture in the communal areas despite numerous State and parastatal interventions, suggests a failure to understand the dynamics of rural poverty and how local economic strategies and multiple livelihoods of the poor are in turn shaped and constrained by the macro-economic environment. In certain TRANCRAA areas, particularly those close to marketing infrastructure, transport and towns, it is not a lack of access to markets that inhibits production of surpluses so much as an inability to generate surpluses. In part this can be attributed to the pervasive poverty and the risk avoidance strategies of the rural poor who perceive investments in agriculture as being insecure relative to the purchase of food or education, and accordingly only invest in agriculture as a last resort.

Communal farmers in the Northern Cape share the same world-wide problems which originate from limited access to land. It is a well-known fact that communal land in South Africa and most of the developing world is over-stocked and over-grazed because of competition amongst stock-owners for land. At the core the challenge of communal farming is the lack of well-defined property right systems, lack of proper land management principles, over-stocking and overgrazing and poor infrastructure

[129] Department of Cooperative Governance Human Settlements and Traditional Affairs, 2009.

(Chenimbiri, 1999; Fafchamps, 1999; Baker & Hoffman, 2006; Dercon, 2007; O'Farrel et al., 2009; Jordaan, Sakulski & Jordaan, 2011; Jordaan, 2012). These factors were all clearly evidenced on communal land in the Northern Cape province.

Without exception, all communal farmer groups interviewed during the research mentioned the lack of land ownership as one of the main problems of over-stocking and wrong agricultural practices. The Richtersveld farmers for example mention it as the root cause of all their problems. The fact is that too many people depend on available land for livelihoods and the attitude of farmers are that they must use what is available, since if they do not utilize the land, somebody else will.

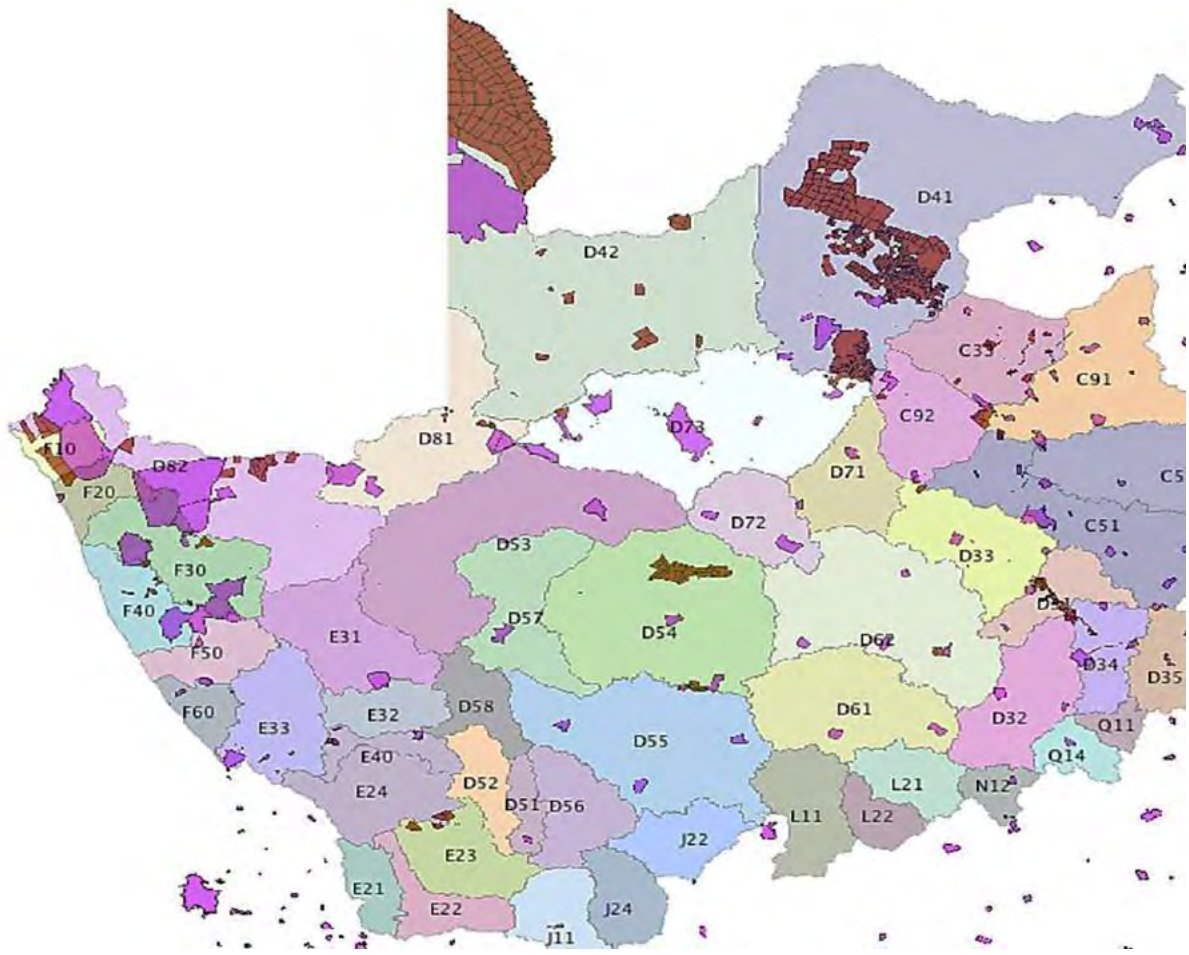


Figure 162: Distributional of communal land in the Northern Cape Province[130]

The challenges that increase the sustainable use of land for communal farmers are:

- No proper control over land management. The land-owner (municipality or State) does not enforce rules and regulations for land management. In most cases farmers acknowledge the presence of either a commonage management plan or a land management plan, but they agree that it is not enforced. People not dependent on livestock for a livelihood also utilize the land,

[130] Jordaan, A. J.; Sakulski; D.; Jordaan, A. D. 2013. Interdisciplinary drought risk assessment for agriculture: The case of communal farmers in the Northern Cape Province, South Africa.

which puts an additional burden on the available land. In this regard communal farmers mentioned that people such as business people, teachers, police and other government employees gain access to land through political connections and influence and they feel it is unfair considering the lack of land available. They argue that such people should not be allowed to keep animals on municipal land and recommend that they should lease land on the commercial market. Most land management plans indeed stipulate that allocation of grazing rights on commonages should be biased toward the poor and those without alternative income, but it is not enforced properly, as required.

- Maintenance of infrastructure such as fences, boreholes, pumps and water articulation are a major concern. The stock-owners expect the land-owner to maintain infrastructure, but the land-owners (municipalities in most cases) accuse the stock-owners of not paying rent for land; resulting in a catch 22 situation with increased land degradation as the result.

- The poor maintenance of infrastructure causes animals to walk longer distances to water. Grazing is then concentrated around water points with increased over-grazing and total land degradation near water points. Also, as a result of poor infrastructure, animals cannot utilize available grazing far away from water-points, which increases their risk to dry conditions. In the Richtersveld, for example certain farmers equipped boreholes with engines and pumps from own funds and they provide diesel and maintenance to those pumps themselves. Problem is that other farmers use the same water from time to time, and that creates internal conflict.

- The poor fences and lack of camping systems do not allow for proper veld management. The result is that certain areas, especially those near villages and water points, are grazed right through the year; with devastating effects on the grazing, resulting in serious land degradation and "man-made " droughts.

- Veld management is impossible on most communal land since stock-owners do not work together to provide for the necessary period of rest when needed.

- Overstocking is also the result of traditional beliefs regarding animal numbers and wealth in addition to the lack of land ownership and ill-defined property rights. Most farmers are more concerned about the quantity reflected in animal numbers than on quality.

Stock-owners on communal land do not have any reserve feed and fodder and they need to start feeding at an early stage during dry periods due to the poor veld condition. The lack of reserve feed and fodder banks for communal farmers increases their vulnerability. They experience drought more regularly due to the already poor condition of the veld and need to start with drought feeding long before the commercial farming sector, which is better prepared for droughts.

Feed and fodder are normally very expensive for communal and small-scale farmers since they do not have economies of scale and can only buy small quantities from local sellers who already add their own profit. In addition, transport cost for communal farmers are much higher since they buy small quantities and have to transport feed and fodder in small quantities on their LDVs. If one compares transport cost in quantities of 1ton with 24ton quantities normally transported by commercial

farmers, one realizes the disadvantages of small-scale and communal farmers in terms of final feed and fodder expenditure.

The products of communal farmers are more price-sensitive than those of commercial farmers simply because of the lack of access to competitive markets. Most communal farmers do not have the transport and means to sell their animals at main auctions where national supply and demand determine prices. As a result of that, communal and small-scale farmers depend, to a large extent, on individual buyers who offer them less than the market price because there is little competition between the buyers in communal areas. A common phenomenon is the "tuck shop auctions" held on a regular basis at pre-arranged places. Buyers normally have local "agents" who look for animals and potential sellers and arrange a date and place for the buyer together with all the potential sellers in the region to meet. During this meeting (tuck shop auction) the individual sellers and the buyer will negotiate prices for the animals offered for sale. If they do not agree on the price the seller will simply take his/her animal back home but the supply increases during dry periods; the buyers are well aware of the predicament of communal farmers during droughts with the result that in most cases, they buy animals at deflated prices.

In addition to the named market distortions, the condition of animals is normally poor during droughts and farmers get even lower prices for stock in a poor condition. Communal farmers do not have reserves to feed animals during dry periods and they start selling their stock when their condition has already deteriorated. A common occurrence is that communal farmers sell their stock at a too late stage when the condition is already poor and supply exceeds demand.

Access to credit is another stumbling block for communal farmers since they do not qualify for credit and have to sell animals once their cash flow is under stress. In most cases they do not have collateral because of the lack of title deeds to the land, and they cannot provide any security to banks or cooperatives and are therefore excluded from additional capital resources. The only exceptions are the part time communal farmers with other business interests such as shop and taxi owners and people that earn salaries. The result is that the ones with access to credit sometimes buy animals at cheap prices from the poorer farmers and end up richer after exogenous shocks such as drought. This concurs with what FEWS (1999) found in other African and Asian countries.

In most cases contamination of water-points during drought is a problem on communal land. Contaminated water-points during dry periods, for example cause numerous animal diseases during droughts. Some general constraints that increase vulnerability mentioned by communal farmers, extension officers and livestock health officials are the following:

- Poor communication between land-owners (Municipalities and State) and farmers. In most cases the lack of proper communication results in a stalemate between the two parties where farmers end up paying no rent and the land-owner refuses to maintain infrastructure.
- Distances to major markets are a huge problem since most communal stock-owners do not have own transport.
- The lack of economies of scale increases unit prices for inputs and has a negative impact on profit. Small-scale farmers mentioned, for example that they could not purchase medicines for animals since the quantities are too large.
- Past drought support and relief projects from the Department of Agriculture in terms of subsidies for fodder purchases were of great value.

- The time between drought application and support is too long. In most cases they receive relief too late after they had to sell animals or animals are already in a bad condition when relief is granted.
- Over-grazing is also the result of the many donkeys and horses on communal land. They are sometimes not included in the stock counts.

Considering all the above, it is clear that the coping capacity of communal farmers are much lower than those of the well-established commercial farmer. That increases the vulnerability of these farmers to drought and ultimately their drought risk. Drought risk in communal areas is therefore higher not only because of over-grazing; they are also extremely vulnerable with low capacity, and that ultimately increases their risk profile to drought.

3.2.3 Land reform[131]

The Northern Cape has a number of land restitution and land re-distribution cases that have been settled where people have moved back onto ancestral and other land. In addition, land tenure and ownership arrangements have changed in the former Act 9 areas. In most cases, this has led to the need to provide services in previously under or non-serviced areas. From a spatial development perspective, the locality of these areas will be a critical determinant of their future viability. Most of them are in areas in relatively close proximity to the Kimberley-Postmasburg and Upington areas. In so far as this provides proximity to economic activity, this is beneficial. However, in many cases the economic potential of the land in question is inadequate as a source of economic livelihoods and this will have to be addressed in any consideration of future infrastructure investment and development expenditure. The implication of this is that development priorities in these areas should be:

- Maximisation of local economic development opportunities;
- Promoting integration and linkages with the surrounding economy; and
- Provision of appropriate levels of services.

There is widespread recognition that nationally the land reform programme is performing poorly. At a recent media briefing the Minister of Rural Development and Land Reform was reported as saying that nationally 90% of the 5.9 million hectares of redistributed farming land had failed. The Minister announced that resuscitation plans will be developed for farms under distress. The plans will include on-off farm infrastructure, mechanisation, skills training and extension support and other much needed operational inputs, through various strategies such as mentoring, co-management and share equity.

However, it needs to be recognised that land reform projects which originate through the Restitution programme may involve much more than agricultural activities. The case of Schmidtsdrift highlights the complexity and scale of some projects. Over a 1000 people live on the property in five settlements, two of which are declared townships. The project combines a wide range of actual and potential activities as indicated in the graphic below. Specialised business, technical and institutional development support is required for projects of this nature.

[131] Northern Cape Provincial Growth and Development Strategy, p.84.

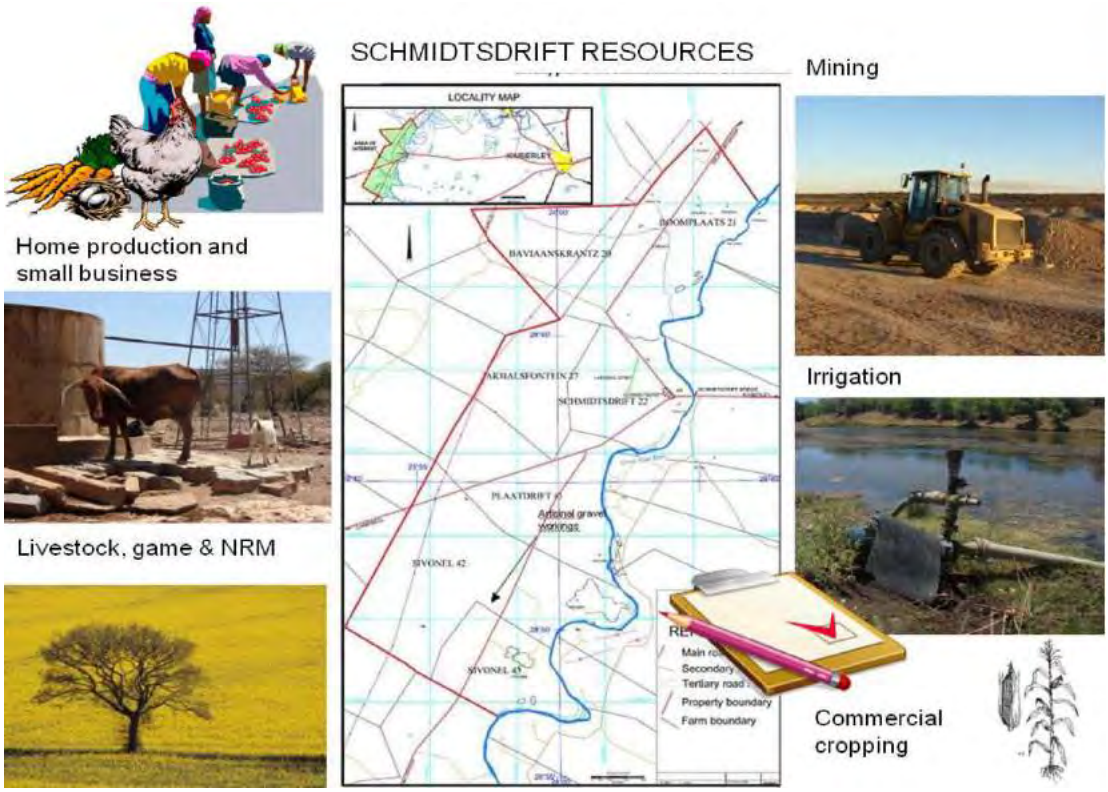


Figure 163: Complexities to be considered with Land Reform[132]

3.2.4 TRANCRAA/Act 9 Areas[133]

In Namakwa District there are six former Coloured Rural Areas Richtersveld, Komaggas, Steinkopf, Leliefontein, Concordia and Pella totalling 1,188,670 ha which make up 22.59% of the total land area in the District. It has been noted that "historically, Namaqualand is distinct from most of the rest of South Africa in that it is inhabited largely by descendants of indigenous Khoisan and Nama peoples, descendants of slaves imported from east Africa and Asia, and a variety of mixed-race communities that emerged along the expanding colonial frontier". The six areas have their own unique histories and vary significantly in terms of their relative access to resources. In Namaqualand a mix of "social, economic and environmental problems interact in a complex manner to influence the daily lives and decisions of more than 60,000 people living in the region". Archaeological evidence indicates that pastoralism has been the dominant land-use activity in this area over the last 2000 years. However, research indicates that increasingly livelihood diversification has been essential to enable households to survive6. Households depend on a mix of income streams from mining, migrant remittances, social grants and livestock production. In some areas like Richtersveld livestock makes an important contribution to the livelihoods of many rural households, although distribution is highly differentiated. The economic and social functions associated with livestock have to been set against uncertainty about changes in the future climate and projections of decreased rainfall which will put increasing pressure on livestock and cropping activities. At the same time there are conflicting perceptions about

[133] STRATEGY PAPER 3: Critical Success Factors for Effective Rural Development in The Northern Cape

appropriate land uses as these areas are also characterised by unique biodiversity and endemism, albeit with a high degree of spatial variation.

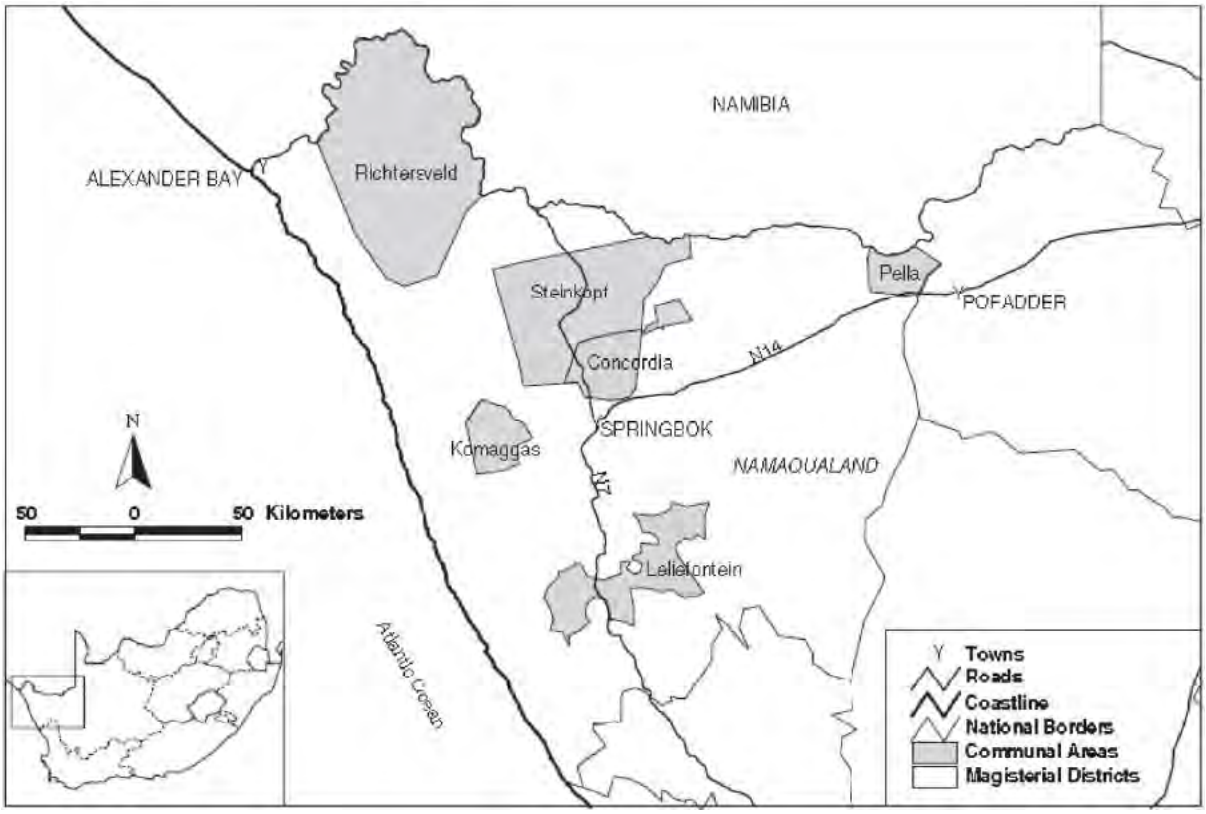


Figure 164: TRANCRAA regions within the Namakwa District

The case of Richtersveld, restitution of land and mineral rights were combined with the redistribution of additional land, tenure reform, township establishment, conservation efforts and equity sharing arrangements in mining, presents significant rural development opportunities.8 Key opportunities including a 'contractual park', to be co-managed by the community and the National Parks Board and a successful Restitution claim which gave the community the right to reclaim their land together with minerals. In 2007 the Department of Public Enterprises (DPE) signed an agreement, under which the community was to be paid R190-million compensation, in three instalments, and would own 49% of diamond-mine Alexkor.

3.2.4.1.1 Understanding rural development within TRANCRAA areas

Research suggests "the total returns from livestock (especially cattle) can be higher in communal areas production systems than in corresponding commercial farming systems under freehold or other forms of tenure" (Andrews et al, 2003). This concord with the work of Adriansen (1999) and Obu et al, (2000) who have shown that communal grazing regimes that permit high density grazing and high levels of mobility might be ecologically more appropriate in semi-arid regions than traditional, sedentary ranching practices.

Ainslie's research shows that livestock ownership, animal husbandry and marketing practices differ (sometimes markedly) across regions, pointing yet again to the great diversity of the communal areas and making it difficult to generalize. He found that people keep livestock for a range of, or combination of different purposes, the forms of which can change according to a great number of circumstances or variables, e.g. cultural values linked to generational characteristics (e.g. lobola - which in some areas

is changing to “proxy cattle” or cash), domestic developmental cycle priorities, distress-sales at the beginning of the year for children’s education expenses, etc.

The economic value of land-based activities in communal areas for self-provisioning or informal market activities has caught the attention of researchers. There is ongoing detailed research documenting the economic value of land-based products as a vital livelihood support, and as an alternative land use to those traditionally thought to be most important by policy makers. This research is premised on the problematic that land reform, planning and use have focused on cropping and livestock. Both research and implementation around land issues have neglected the fact that rural people make extensive use of wild resources. Land reform projects that ignore this and move people to areas where such resources are not available, or in lower abundance, result in poorer livelihoods for the recipients. The value of wild resources to poor rural households is sometimes greater than that for cropping and livestock and is typically more important the poorer the household, given that it is the poor households who are unable to access agricultural incomes (Shackleton, 2003).

Key projects identified:

Generally, the following key support areas have to be addressed in TRANCRAA areas:

- Development of agricultural land:
- Improvement of both urban and agricultural related infrastructure, e.g. water supply, drinking troughs, building of canals, fencing, access roads, fire belts
- However, the following projects could provide support in TRANCRAA areas through the Rural Development Plan – these projects are also linked towards the Implementation Plan Matrix:
- Development of small and large livestock banks to facilitate and support improved genetics in existing herds within the commonage regions
- Development of a commonage management plan that needs to determine the grazing capacity and potential for the TRANCRAA regions
- Development of storage or distribution storage for either goods collected or distributed in and from the respective TRANCRAA regions
- Improved access towards water supply for especially agricultural purposes, this would facilitate improved veldt management through thorough selection
- Development of food gardens and local fresh produce markets supported by the proposed collection and distribution routes
- Building of ABET centres to improve basic educational levels
- Development of Wi-Fi Towers to improve access to the internet, this would enable residents access to further education possibilities and facilitate product marketing opportunities
- Improved road infrastructure would assist with access towards markets





CHAPTER 8 – The **BUILT ENVIRONMENT** outlines the key infrastructure and resources, opportunities and challenges faced in the Northern Cape Province. A strong spatial representation was followed

CHAPTER 8

Status Quo Analysis – Built Environment

CHAPTER 8 | BUILT ENVIRONMENT

1 BUILT ENVIRONMENT INFORGRAPHIC

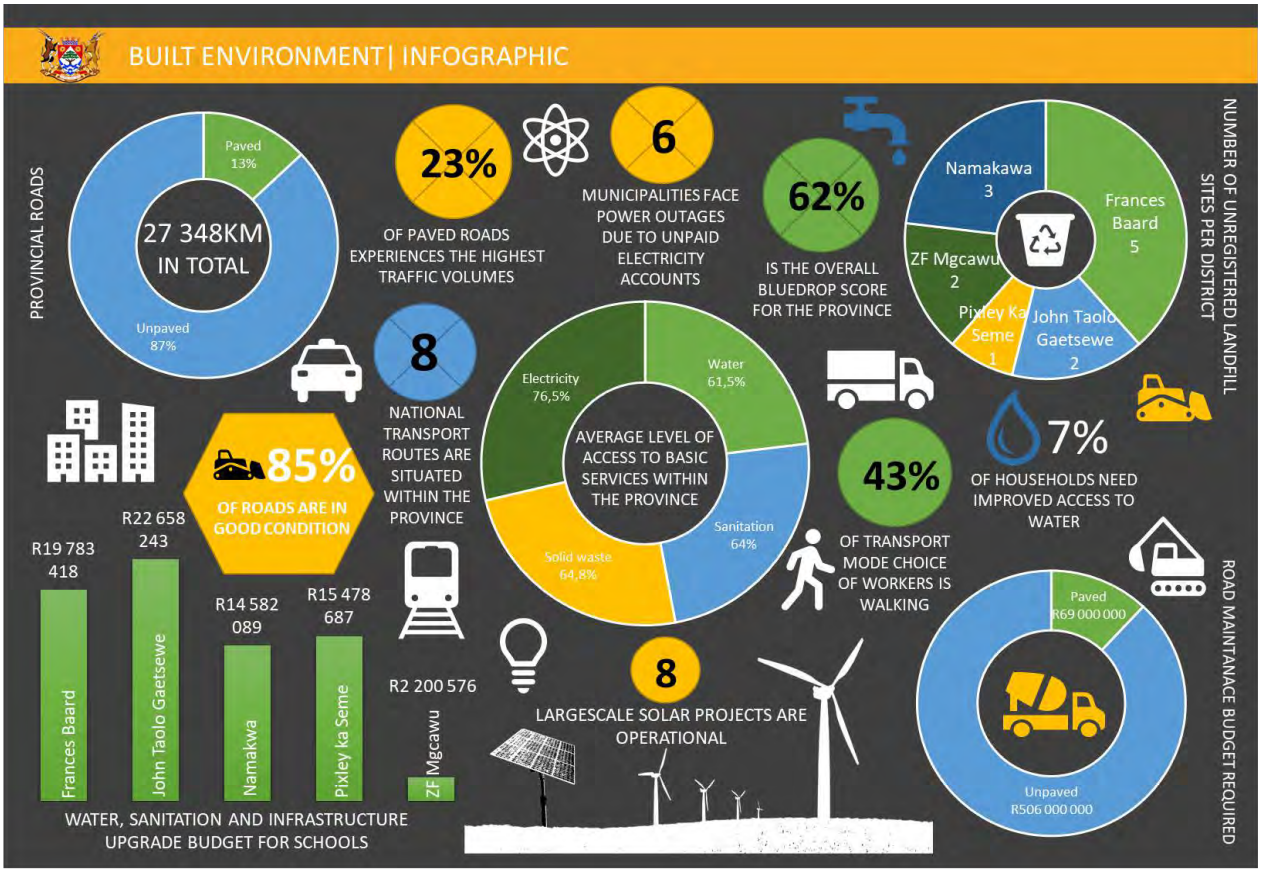


Figure 165: Built environment infographic of the Northern Cape

2 OVERVIEW[134]

- Energy

The renewable energy programme of the Northern Cape, has already received recognition far and wide as one of the country's most successful public-private partnership programmes dedicated to building much-needed infrastructure. The Northern Cape proudly takes centre stage as one of the prime drivers of this success. This sector includes:





- the supply of electricity;
- the production, collection and distribution of electricity;
- the manufacture of gas and distribution of gaseous fuels through mains;

[134] *Northern Cape Chamber of Commerce and Industries, 2018*

- supply of water; and the collection, purification and distribution of water.

The Northern Cape has prepared the Renewable Energy Strategy, to take advantage of the significant potential in the Province to develop renewable energy sources. More specifically, the Northern Cape has the largest prospects for harnessing solar energy, especially at utility-scale. This implies that, in line with the objectives set in the Province's Renewable Energy Strategy, a large number of advances will need to take place in the Northern Cape in terms of renewable energy development.

- Roads and Transport



Transport is a supportive sector which plays a key role in meeting objectives of economic growth, access to employment opportunities, and social integration. Transport, both public and private, is a primary spatial structuring element providing access and mobility to both urban and rural communities. One of the underlying success factors of any regional economy relates to the movement of goods, people and services. It is important that the role and functioning of the different modes of transport and the impact on the infrastructure are clearly understood in order to focus different investment on the areas of opportunity and need. Transport as an economic sector refers to activities concerned with land transport and logistics, railway transport, water transport, air transport, transport via pipelines, activities of travel agencies. The mining, agriculture and other related primary sector activities introduced an era of tremendous transport investment for the Northern Cape. This includes extensive projects like the Sishen-Saldanha railway line upgrade, Hotazel-Coega rail line to mention a few. This will further entail possible projects like the Northern Cape deep port harbour, De Aar rail cargo hub and the Upington airport but to mention just a few.



- Water



The Vaal river and Orange river are the primary water sources for the Northern Cape. Irrigation is a major water user, job creator and economic sector in the Northern Cape. This includes the biggest government water schemes in the country (Vaalharts, Boegoeberg, Upington-islands and Kakamas) totalling 44 658 hectares. The province is mostly regarded as an arid region with scare water resources. Optimal utilisation of water resources is required to stimulate further growth and development in the Province. Limited opportunities for further resource extraction are available to stimulate future growth, these opportunities include the building of the Vioolsdrift Dam, raising of existing weirs and dams as well as groundwater extraction.

- Communications and Technology



The knowledge-based economy in the Northern Cape is underpinned by the successful award of the SKA and the immense Solar Energy potential in the Northern Cape. These advanced technological events have spurred the establishment of the first University (Sol Plaatje University) and stimulated the necessity for a broadband telecommunications infrastructure to be rolled out across the province. The Northern Cape plans to be the global benchmark for astrophysics –the Square Kilometre Array serves as the anchor for an elaborate broad band and ICT roll-out for the province to benefit from the digital era. The milieu of advance technologies provides a platform for advanced technological development and will serve to advance our developmental economy into the digital era.

3 ENERGY

3.1 OVERVIEW

The Northern Cape is one of the largest provinces by landmass in South Africa. It consists of vast tracts of land with good sunshine and for that reason; it has attracted the most solar PV and CSP projects of all the provinces. There has been a lot of interest in increasing mining operations in the Kimberley area. Unfortunately, the province is supplied by radial lines and it has traditionally been a weak network. Kimberley is supplied by means of the 275kV network at Ferrum and Namaqualand by a radial 220 kV network supported by the newly commissioned 400 kV line from the North West province. The



introduction of Nieuwehoop substation will link the Aries and Ferrum networks in order to strengthen the transmission system in the province.

Other major transmission development plans in the province consist of the following projects:

- Upington Strengthening
- Aries SVC
- Juno-Gromis 400 kV line
- Gromis-Oranjemund 2nd 220 kV line constructed at 400 kV
- 2nd Aggeneis-Paulputs 220 kV line built at 400 kV
- Kimberley Phases 3 and 4



Aries-Nieuwehoop and Nieuwehoop-Ferrum Vanderkloof and Gariep Power Stations are hydro schemes straddling the provincial boundaries of the Free State within the Karoo CLN. Vanderkloof has a generating capacity of 240MW, with two units rated at 120MW each. Gariep has a generating capacity of 360 MW, with four units rated at 90MW each, evacuating its power directly onto Hydra 220kV busbar via 2 x 220kV lines. Gariep is located on the border of the Eastern Cape, Free State and Northern Cape and falls within the Eastern Cape border.

3.2 EXISTING INFRASTRUCTURE

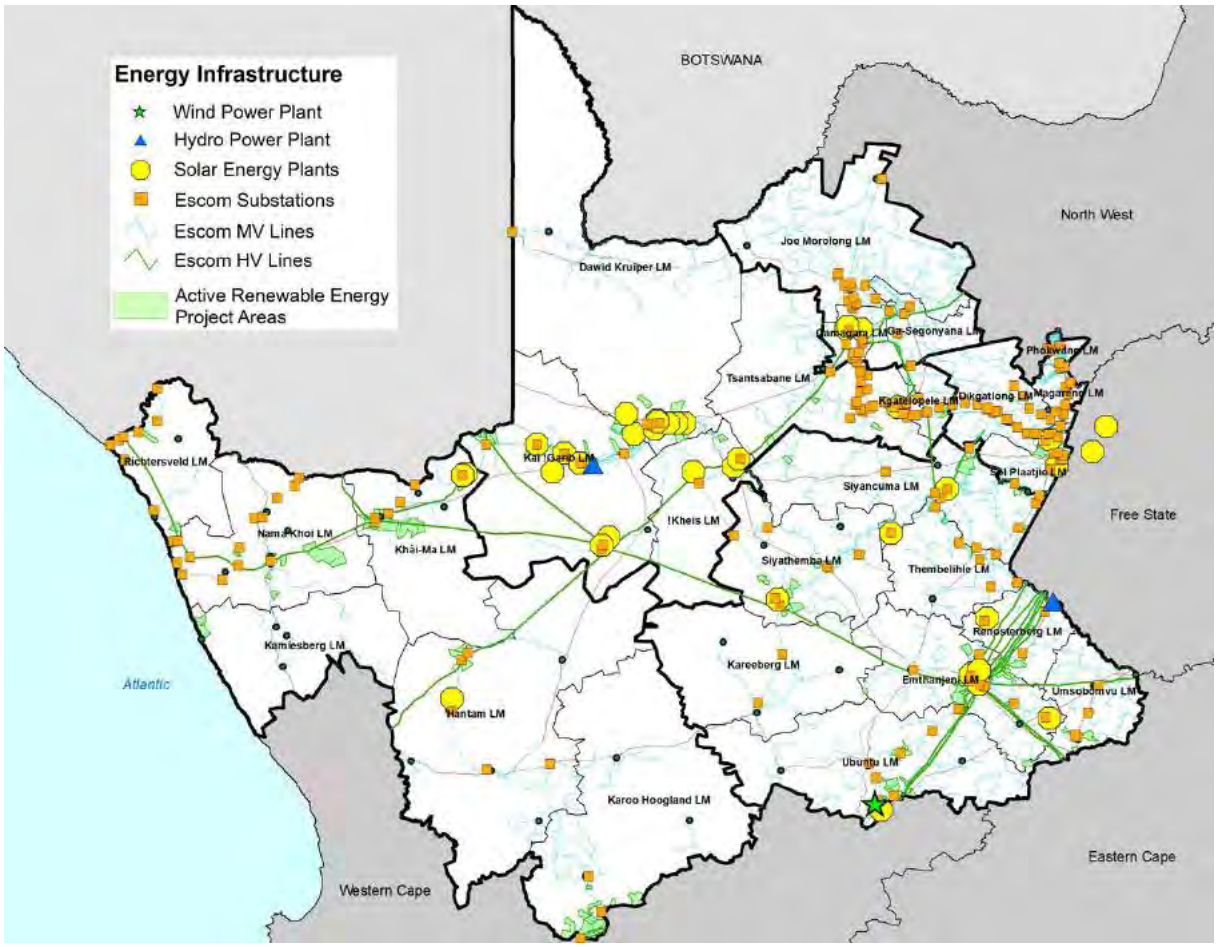


Figure 166: Existing transmission network, renewable energy projects and substations in the Northern Cape[135]

The provision of electricity is managed by the Department of Energy which is accountable for the Integrated Resource Plan (IRP). The IRP drives all new generation capacity development. The purpose of the IRP is the identification of the requisite investments in the electricity sector that will maximize the national interest, that allows the country to meet the forecasted demand with the minimum cost to the country. Eskom, licensed to generate, transmit and distribute electricity in South Africa, transmits electricity via a transmission network, which supplies electricity at high voltages to a number of key customers and distributors. Eskom Transmission holds the transmission licence as the transmission network service provider (TNSP). The Grid Planning Department in the Transmission Group annually updates the Transmission Development Plan (TDP), which represents the transmission network infrastructure investment requirements over a 10-year period, detailing the plans for the way that the transmission network will develop in the next five years and indicating associated financial commitments.

[135] *Eskom data, data sourced from various Eskom data sets*

3.2.1 Energy sources

3.2.1.1 Renewable energy

3.2.1.1.1 Solar

Renewable energy projects were built partly in response to the load shedding and frequent power outages the country experienced from 2008 and have effectively given Eskom the time and space it needed to conduct the required maintenance on many of its coal-fired power stations, thereby supporting the utility and the national grid at a time of crisis. It also now gives Eskom the opportunity to export surplus energy to South Africa's neighbours at unregulated prices. Recent projects completed include:

Table 53: PV Powered solar farms/projects in the Northern Cape Province

POWER PLANT	AREA	DATE COMMISSIONED (EXPECTED)	INSTALLED CAPACITY MW	ANNUAL OUTPUT GWH(EXPECTED)	CAPACITY FACTOR %	STATUS	OPERATOR
Kalkbult	Kalkbult	Sep 2013	75	146.5	(21)	Operational	Scatec Solar
Konkoonsies Solar	Pofadder	Mar 2014	9.65	(18.6)	(22)	Operational	BioTherm Energy
Aries Solar PV Energy Facility	Northern Cape	Mar 2014 (Jul 2013)	9.65	(18.6)	(22)	Operational	BioTherm Energy
Greefspan PV Power Plant	Douglas	April 2014	10			Operational	AE-AMD Independent Power Producer 1
Herbert PV Power Plant	Douglas	April 2014	19.9			Operational	AE-AMD Independent Power Producer 1
Mulilo Renewable Energy Solar PV Prieska	Copperton	1 October 2014	19.93			Operational	Gestamp Solar
De Aar Solar Power	De Aar	Apr 2014	48.3	(89.4)	(20.4)	Operational	Globeleq
Solar Capital De Aar	De Aar	Aug 2014 (2014)	75	(166.4)	(25)	Operational	Solar Capital
Solar Capital De Aar 3	De Aar	(Feb 2015)	75	(150)	(22)	Operational	Solar Capital
SA Mainstream	Kimberley	Apr 2014 (Oct 2013)	45.4	(89.4)	(20.4)	Operational	Mainstream Renewable

POWER PLANT	AREA	DATE COMMISSIONED (EXPECTED)	INSTALLED CAPACITY MW	ANNUAL OUTPUT GWH(EXPECTED)	CAPACITY FACTOR %	STATUS	OPERATOR
Renewable Power Droogfontein							Power South Africa
Lesedi PV Project	Postmasburg	May 2014	64	(150)	(26)	Operational	SolarReserve
Kathu Solar Energy Facility 1	Northern Cape	Aug 2014 (2014)	75	(179)	(27)	Operational	Building Energy
Sishen Solar Facility	Northern Cape	Dec 2014	74	(216)	(24)	Operational	Building Energy
Linde Solar Project	Northern Cape	June 2014	36.8	(87)	(25)	Operational	Scatec Solar
Jasper Solar Energy Project	Northern Cape	Nov 2014	75	175.8	(21.4)	Operational	SolarReserve
Upington Solar PV	Northern Cape	Jul 2014	8.90			Operational	
Adams Solar PV 2	Hotazel	(Aug 2016)	75	(167)	(25)	Operational	Enel Green Power
Mulilo Sonnedix Prieska PV	Copperton	July 2016 (Dec 2015)	75			Operational	Mulilo Renewable Energy
Mulilo Prieska PV	Copperton	(Nov 2015)	75			Operational	Mulilo Renewable Energy
Kathu Solar Energy Facility 2	Northern Cape	(2018)	(28)	(61.6)		Under Development	Building Energy
Sirius Solar PV Project One	Upington		(75)			Contracting	Scatec Solar
Droogfontein 2 Solar	Kimberley	(July 2018)	(75)			Uncertain due SunEdison bankruptcy	SunEdison
Dyason's Klip 1	Upington		(75)			Contracting	Scatec Solar

POWER PLANT	AREA	DATE COMMISSIONED (EXPECTED)	INSTALLED CAPACITY MW	ANNUAL OUTPUT GWH(EXPECTED)	CAPACITY FACTOR %	STATUS	OPERATOR
Dyason's Klip 2	Upington		(75)			Contracting	Scatec Solar
Konkoonsies II Solar Facility	Pofadder	(Feb 2017)	(75)	(208)	(27.8)	Contracting	BioTherm Energy
Aggeneys Solar Project	Pofadder	(Aug 2016)	(40)	(111)	(28.4)	Contracting	BioTherm Energy
Solar Capital Orange	Loeriesfontein	(March 2018)	(75)			Contracting	Solar Capital
Greefspan 2 Solar Park	Douglas	(Nov 2018)	(55)			Uncertain due to SunEdison bankruptcy	SunEdison

Table 54: Concentrated solar power farms/projects in the Northern Cape Province

POWER PLANT	AREA	DATE COMMISSIONED (EXPECTED)	INSTALLED CAPACITY MW (PLANNED)	ANNUAL OUTPUT GWH(EXPECTED)	CAPACITY FACTOR % (EXPECTED)	STATUS	OPERATOR
Khi Solar One	Upington	Feb 2016 (2014)	50	(190)	(43)	Operational	Abengoa
KaXu Solar One	Pofadder	March 2015 (2014)	100	(320)	(36)	Operational	Abengoa
Bokpoort CSP	Groblershoop	Dec 2015	50	(200)	(45)	Operational	ACWA Power
Xina CSP South Africa	Pofadder	(2016)	(100)	(380)	(44)	Under construction	Abengoa
Ilanga 1	Upington	(March 2017)	(100)			Under construction	Karoshoek Consortium

POWER PLANT	AREA	DATE COMMISSIONED (EXPECTED)	INSTALLED CAPACITY MW (PLANNED)	ANNUAL OUTPUT GWH(EXPECTED)	CAPACITY FACTOR % (EXPECTED)	STATUS	OPERATOR
Kathu Solar Park	Kathu	(2nd half 2018)	(100)	(383)		Under construction[195]	Engie
Redstone Solar Thermal Power	Postmasburg	(early 2018)	(100)	(480)	(54)	Contracting - Probably cancelled [200]	SolarReserve

The recently completed renewable energy, a concentrated solar power (CSP) plant, Xina Solar One (Xina) supplies clean electricity to 95,000 South African households. By means of Xina and two other plants Abengoa, a Spanish renewable energy company built earlier, Kaxu Solar One and Khi Solar One, the company provides electricity to almost a million people in the Northern Cape, especially during the early evening peak, when this power is needed most.

3.2.1.1.2 Wind

Table 55: Wind farm/projects in the Northern Cape Province

POWER PLANT	AREA	DATE COMMISSIONED (PLANNED)	CAPACITY MW (PLANNED)	ANNUAL OUTPUT GWH (EXPECTED)	CAPACITY FACTOR % EXPECTED)	STATUS	OPERATOR
Noblesfontein Wind Farm	Three Sisters	July 2014 (July 2014)	73.8	(219)	(34)	Operational	Gestamp Wind
Longyuan Mulilo De Aar 2 North Wind Energy Facility	De Aar	(Nov 2017)	(139)	(470)	(39)	Under construction	Longyuan Power
Longyuan Mulilo De Aar Maanhaarberg Wind Energy Facility	De Aar	(March 2016)	(96)	(300)	(35)	Under construction	Longyuan Power
Khobab Wind Farm	Loeriesfontein	(End 2017)	(140)	(563)	(46)	Under construction	Mainstream Renewable Power

POWER PLANT	AREA	DATE COMMISSIONED (PLANNED)	CAPACITY MW (PLANNED)	ANNUAL OUTPUT GWH (EXPECTED)	CAPACITY FACTOR % EXPECTED)	STATUS	OPERATOR
Noupoort Mainstream Wind	Noupoort	11 July 2016	80	(305)	(43)	Operational	Mainstream Renewable Power
Loeriesfontein 2 Wind Farm	Loeriesfontein	(End 2017)	(140)	(563)	(46)	Under construction	Mainstream Renewable Power
The Soetwater Wind Farm	Sutherland	(Q2 2019)	(139)			Contracting	Enel Green Power
Kangnas	Springbok		(137)			Contracting	Mainstream Renewable Power
Copperton Windfarm	Copperton	(late 2017)	(102)	(194)	(22)	Contracting	Gestamp Wind
Garob Wind Farm	Copperton	(Oct 2018)	(136)			Contracting	Enel Green Power

3.2.1.1.3 Hydro-power

The Kakamas Hydro Electric Power (KHEP) project in Northern Cape will make use of the river's kinetic energy to generate 10 megawatts (MW) of electricity. The project is a run-of-river design that will be constructed at the existing Neusberg Weir, which feeds water to the Neusberg Power Plant. Although the plant has an installed capacity of 12.57MW, the Department of Energy had limited its output to 10MW, which is in accordance with constraints placed on small hydroelectric power plants. The energy modelling for the project is estimated at 69.25 gigawatts per hour of net electricity generation per year. The output could light up as many as 5 000 homes.

The Vanderkloof station is of the few conventional hydro-electric power stations in South Africa. Eskom provides South Africa with 95% of its electricity and of this only 5% comes from hydroelectric generation. The remainder is generated by coal-fired power plants (Eskom 2007). The Vanderkloof Power Station is situated in the Upper Orange Water Management Area in the Northern Cape Province and is integrated into the Gariep and Vanderkloof Dams, on the Orange River.

Both Vanderkloof and Gariep dams supply electricity during peak and emergency demand periods—known as peaking stations. The power generated feeds into the Eskom National Grid in South Africa to cover emergency shortages. The power stations produce base-load energy during times of flood

risk to prevent the dams from spilling water and to take advantage of an opportunity for low cost energy production.

Table 56: Hydro-power projects in the Northern Cape Province

POWER PLANT	DATE COMMISSIONED (PLANNED)	INSTALLED CAPACITY (PLANNED) (MEGAWATT)	STATUS	OPERATOR
Vanderkloof Dam	Sep-1977	240	Operational	Eskom
Kakamas Hydro Electric	March 2015	10	Operational	Kakamas Hydro Electric Power

3.2.1.1.4 Impact of renewable energy projects in the Province

The total operational capacity through renewable energy projects in the Province (refer to Hydro-power, PV Solar Power and Concentrated Power) is estimated at 1500 Megawatt, already servicing almost 650 000 households in south Africa, this amounts to almost 2 million people, more than the provincial population.[136]

It is understood that the renewable energy independent power producer's procurement (REIPPP) programme as a whole has created approximately 15,000 jobs. This excludes the hundreds of indirect support jobs in industries such as logistics, accommodation, catering, construction material suppliers, warehousing and support services, which were created throughout the development and construction of these projects. Clean energy development under the REIPPP programme has become integrally linked with socio-economic benefits for the communities near to where they are built. Not only is more than enough clean energy provided by these projects to support the entire province, but the whole community has benefited as well. Many renewable energy companies have developed programmes which offer bursaries, internships, the funding of additional teachers at local schools, the construction of additional classrooms, general renovations of schools, etc. Social support included soup kitchens, food gardens, as well as other social programmes such as new housing developments, new medical and office equipment for a local clinic, and the building of an irrigation channel in Onseepkans.

3.2.2 Transmission

The majority of South Africa's base load electricity generation is derived from coal fired power stations located near the coal fields in Mpumalanga and Limpopo provinces in the northern and eastern parts of the country. Much of the electricity generated from these power stations is transmitted to the rest of the country which currently has limited generation capacity. There is thus a net north to south transmission of electricity which results in significant transmission losses. Any new generation capacity connecting in the south of the country would off-set this north to south flow of electricity and hence reduce the national transmission losses, while additional generation in the north of the country near

[136] *Own calculation, using total megawatts generated divided by 2,45 (average medium household electrical usage) , multiply by an average of 3 people per household.*

the existing power stations would increase such losses[137]. The net north to south transmission of electricity could be reversed when ageing coal power stations are decommissioned and replaced by either new coal stations in different locations near new coal mining areas, or the growing generation capacity of the Cape provinces which include renewable and potential gas or nuclear generators

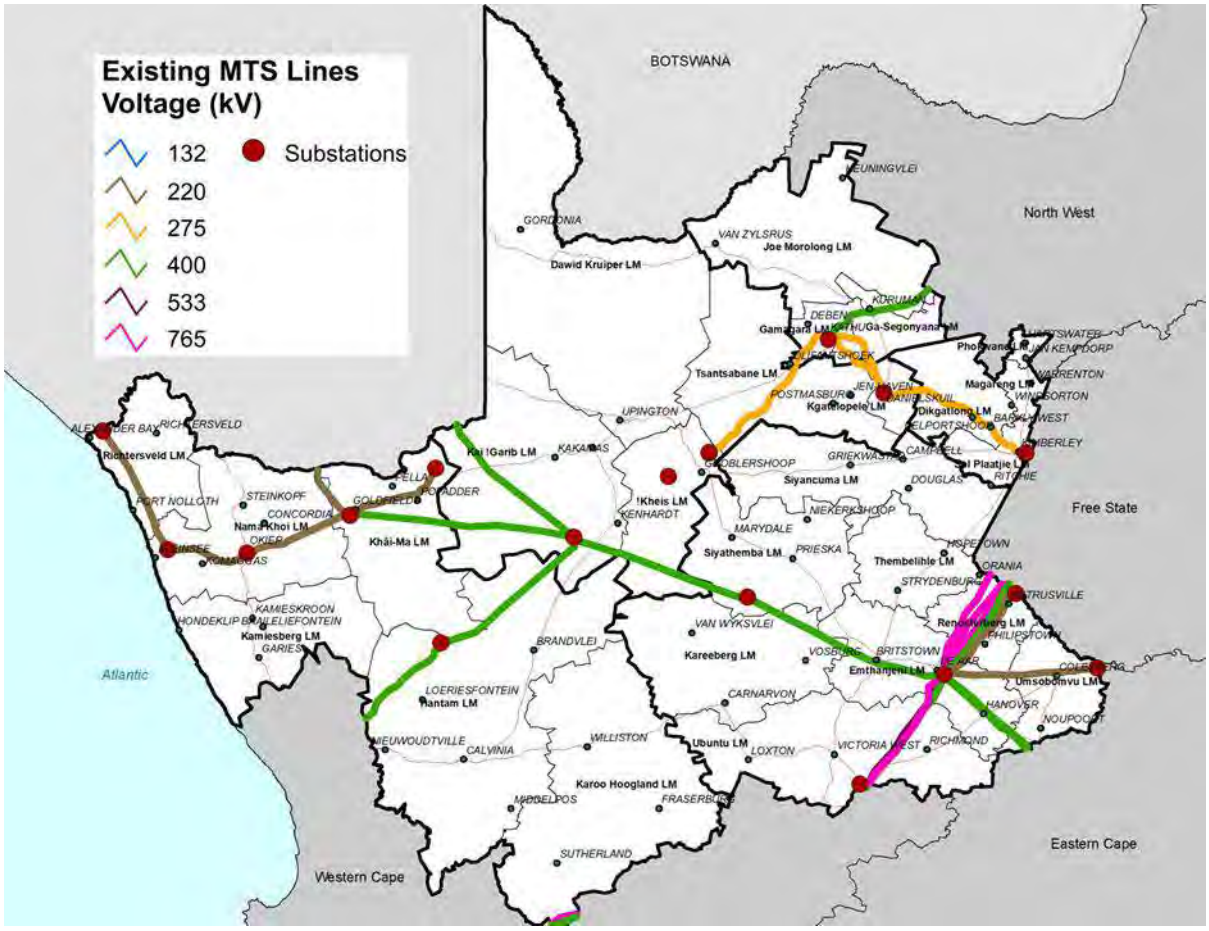


Figure 167: Northern Cape Current Transmission Network

The transmission network includes (*see Figure above*):

- Supply to Kimberley by means of the 275-kV network at Ferrum;
- Supply to Namaqualand by a radial 220 kV network supported by the newly commissioned 400 kV line from the North-West province;
- The introduction of Nieuwehoop substation that will link the Aries and Ferrum networks in order to strengthen the transmission system in the province;
- Other major transmission development plans in the province consisting of the following projects:
    - Upington Strengthening;
    - Aries SVC;
    - Juno-Gromis 400 kV line;
    - Gromis-Oranjemund 2nd 220 kV line constructed at 400 kV;
    - 2nd Aggeneis-Paulputs 220 kV line built at 400 kV;

[137] *Department of Environmental Affairs, Wind and Solar PV Energy Strategic Environmental Assessment, Unpublished Draft REDZs Database, Wind and Solar PV Energy Strategic Environmental Assessment- REDZs Database,2015*

- Kimberley Phases 3 and 4; and
- Aries-Nieuwehoop and Nieuwehoop-Ferrum.

Hydro schemes consist of:

- Vanderkloof has a generating capacity of 240 MW, with two units rated at 120 MW each
- Gariep has a generating capacity of 360 MW, with four units rated at 90 MW each, evacuating its power directly onto Hydra 220 kV busbar via 2 x 220 kV lines

Average loss factors for transmission-connected generators as used by Eskom[138] based on voltage and geographic location considerations were identified and include the Cape, Karoo, KwaZulu-Natal, Vaal, Mpumalanga, and Waterberg zones. The Cape Zone reflects a +2.9% percentile adjustment factor and the Karoo zone a percentile adjustment factor of +0.5%.

3.2.2.1 Kimberly strengthening project

The network runs from Mercury Substation near Orkney in the North West via a new substation called Mookodi, then to Ferrum Substation in the Kathu area in the Northern Cape. The total length of the line is 428km. The growing and future expected loads in the Sishen area are such that it has become necessary to construct a 400kV line from Mercury to Ferrum to strengthen 132kV and 66kV systems in the area. The proposed Mercury -Ferrum line will be approx. 428km thus requiring a line reactor at Ferrum with another reactor at Mookodi for the Mercury-Mookodi 400kV line.

Recent refurbishment includes:

- The development of the Mookodi Substation
- Construction of the 400kV Mercury – Mookodi line section A
- Construction of the 400kV Mercury – Mookodi line section B
- Construction of the 400kV Ferrum – Mookodi line
- Development of the Ferrum Substation

3.3 PLANNED INFRASTRUCTURE

3.3.1 Renewable Energy

There is an increasing move to utilise alternative and eco-efficient energy sources around the globe and South Africa isn't too far behind. The Northern Cape is implementing a renewable energy plan, with ongoing development of solar projects in the province. The Northern Cape remains one of the hottest and driest regions in South Africa, making it the perfect location for solar-energy projects. The climate in the Northern Cape is classified as semi-desert with annual rainfall across the province ranging from 100mm upwards. Temperatures in the Northern Cape can reach up to 50°C. The move towards a more integrated energy plan beyond just fossil fuels helps ease the reliance on finite resources and is a response to the load-shedding that occurred nationally from 2008 onwards. The Northern Cape is benefiting from clean solar energy and has seen an economic boost from these projects through temporary and long-term job creation. This is valuable as the province faces a high unemployment rate, especially among younger adults. In light of global climate change and

[138] *Eskom, Zonal transmission network losses for transmission-connected generators, 2015*

environmental awareness, the province is making great strides to ensure that clean energy is an everyday reality for its citizens.

The REIPPP programme is a real asset to the country. Additional electricity has been generated to meet urgent demand, without emitting harmful gases into the atmosphere. Much-needed skills have been transferred and new jobs created, while social projects have benefited the communities who live in the rural areas where these renewable energy power plants have been erected. By 2030 eight coal-fired plants are expected to close and applications for renewable energy projects have flooded into the Department of Environmental Affairs (Department of Environmental Affairs, 2017).

3.3.1.1 Wind

Loeriesfontein Wind Farm and Khobab Wind Farm have announced the commencement of their 20-year commercial operations. Collectively the wind farms will power circa 240,000 South African households, positively impacting the country's economy and its people, according to a company statement. The two Northern Cape wind farms have achieved this milestone on schedule, on budget and without a single lost-time incident. With a generation capacity of 140MW each, the duo comprises a total of 122 wind turbine generators, spanning 6,653 hectares. Both Loeriesfontein and Khobab were awarded under Government's Round 3 Renewable Energy Independent Power Producer Procurement Programme (REIPPPP).

3.3.1.2 Hydro-electricity

Eskom plans to build a series of hydroelectric plants along the Orange River, including one at the Augrabies Falls. South African National Parks (SANParks) has voiced its opposition to elements of the project, suggesting that the proposed R1-billion Augrabies scheme would disrupt the local ecology and have a detrimental impact on tourism. The 60m falls, the world's fifth highest, are among South Africa's most spectacular natural features. Also targeted for hydroelectric schemes are the Orange Falls (also known as the Ritchie Falls) near the towns of Pofadder and Onseepkans, as well as the Neusberg plant near Kakamas, which is already under construction, and the Boegoeberg Dam in Groblershoop. Boegoeberg Hydro Electric Power (Pty) Ltd (Boegoeberg Hydro) initially intends to construct a hydropower facility with an approximate capacity of 10 Megawatt (MW) on the Orange River in the Northern Cape. However, the proposed hydropower facility has a higher potential than initially calculated by the design team, whereby the capacity has been increased to a maximum of 15 MW to realise the facility's full potential. The proposed Hydropower facility is located approximately 26km south east of the town of Groblershoop in the Northern Cape and can be accessed via the N8[139]

3.3.1.3 Other Energy projects

3.3.1.3.1 Gas-to-power

South Africa is considering a gas-to-power programme to support a solar and wind fleet to address the variability of wind and solar power, by supplying power when the wind doesn't blow or the sun doesn't shine. Gas-to-power plants can be ramped up or down very quickly to meet any differences in electricity demand and supply resulting from the variable output of wind and solar power generation

[139] *Aurecon, 2013. Proposed hydropower station and Associated infrastructure at Boegoeberg dam on the Orange river, near Groblershoop, Northern cape*

plant. Although natural gas is a fossil fuel, it burns without emitting particulates and produces lower levels of harmful gases than the burning of coal.

3.3.2 Eskom's transmission development plan (TDP)[140]

The future generation of IPP customers to be connected providing new types of generation identified in the 2010 IRP, particularly renewable energy, distributed across wide areas of the country required a significant change in the approach to the planning and implementation of the development of the future transmission grid. The future generation will largely be IPP developments, which are connection customers. Development Plans The development plans for the transmission network must therefore be able to:

- Adapt to the uncertainty of future load and generation locations;
- Identify the critical power corridors and constraints on the transmission network; and
- Develop strategies to unlock and create a flexible and robust grid to be able to respond to the changing future needs of the country.

The 2040 Transmission Network Study[141] determined the development requirements of the future transmission grid to accommodate the expected load demand needs and the potential impact of future generation scenarios based on the 2010 Integrated Resource Plan (IRP)[142]. The study identified five main power corridors that would need to be developed under all the potential generation scenarios. The study findings were used as input into a number of studies on the location and integration of renewable energy resources, IPP coal projects and large volumes of natural gas generation. Renewable energy development zones (REDZ's) for the efficient and effective rollout of wind and solar PV energy as part of the government SIP 8 initiative were identified. A total of eight REDZ's have been identified.

Eskom's approach aims to strategically prepare the transmission grid for the creation of additional generation connection capacity provides:

- IPP connections and strategic plans for the medium-term period; and
- Securing of power corridors for the longer term to enable a faster response to change IPP generation programmes.

The Transmission Development Plan (TDP) in the Northern Cape is mainly influenced by the following aspects:

- The size and consistent sunshine attracted a huge influx of solar and wind IPPs in the province;
- Increased focus on mining operations in the Kimberley area due to the anticipated manganese and iron ore mining and smelter operations associated with these mines;

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[140] *Eskom. Transmission Development Plan 2016-2025*

[141] *The 2040 Transmission Network Study was undertaken to determine the development requirements of the future transmission grid to accommodate the expected load demand needs and the potential impact of future generation scenarios using the 2010 Integrated Resource Plan (IRP) as a baseline.*

[142] *The Integrated Resource Plan (IRP) 2010-30 was promulgated in March 2011. It was indicated at the time that the IRP should be a "living plan". Since the promulgation of the Integrated Resource Plan (IRP) 2010-30 there have been a number of developments in the energy sector in South and Southern Africa. In addition, the electricity demand outlook has changed from that expected in 2010. The document is currently under review.*

- The need to primarily increase the reliability of the network restricted by a traditionally weak network consisting of radial lines; and
- The need to increase capacity on the rail corridors that transports iron ore and manganese to the coastal areas.
- Included in the TDP is the future planned electricity export to Namibia via the 400 kV and 220 kV interconnections.

3.3.2.1 Renewable energy IPP Generation

The REIPPPP (also referred to as the REBID programme) has gone out for procurement, with Windows 1 and 2 already completed, Window 3 close to financial close and the Bid Window 4 shortlist about to be announced at the time the TDP studies were started. The REIPPPP allows IPPs to bid tariffs, with maximum tariff limits for the following renewables:

- Wind
- Small hydro
- Landfill gas
- Concentrated solar
- Photovoltaic (PV)

Windows 1 and 2 of the REIPPPP allowed for the renewable generation to be connected by the end of 2014 and at the end of 2016, respectively. It has been assumed that the successful IPPs for Windows 1 and 2 was in place, for the system peaks of 2015 and 2017, respectively. The Window 3 shortlisted projects have been assumed to be in service as per their bid submission dates between 2016 and 2017. The two CSP plants from Bid Window 3 of 100 MW each are connected at the Ferrum and Olien substations. The best estimate of the potential Bid Window 4 shortlist was made in January 2015.

27 renewable energy projects to be signed,

Submitted by South African Government News Agency on 9 March 2018, key remarks made by Energy Minister Jeff Radebe include:

- *"I am delighted to announce that the project agreements of the 27 Renewable Energy Independent Power Producer Projects (REIPPP), including the power purchase agreements with Eskom, will be signed on Tuesday, 13 March 2018, with the full support of the President and my Cabinet colleagues the Ministers of Finance and Public Enterprises as well as Eskom,";*
- *"This initiative will enable R56 billion of new investment in the economy over the next two to three years, which will immediately contribute to growth in the economy supporting the already positive achievement of 3.1% GDP growth in the quarter four;*
- *"In a nutshell, these projects will provide 61 600 full time jobs of which 95% is for SA citizens, mostly during plant construction specifically with a focus on youth employment;*
- *"Northern Cape will have 59% of the jobs created, followed by Eastern Cape with 15% and North West 13% of jobs created," the Minister said*

The Northern Cape has a high potential for renewable energy due to its climate and proximity to the coastal line. ***Table 57*** shows all the approved projects under REIPPPP 1 to 4 in the Northern Cape.

Table 57: Approved projects in the Northern Cape under the REIPPPP Rounds

REIPPPP ROUND	REIPPPP ROUND	CAPACITY (MW)
1	**CSP**	**150**
	Wind	**72**
	PV	**461**
	REIPPPP 1capacity	*683*
2	**CSP**	**50**
	Wind	**2**
	PV	**269**
	REIPPPP 2 capacity	**322**
3	**CSP**	**400**
	Wind	**590**
	PV	**225**
	REIPPPP 3capacity	**1215**
4	**Wind**	**794**
	PV	**545**
	REIPPPP 4 capacity	**1339**
NORTHERN CAPE TOTAL GENERATION CAPACITY		**3559**

Table below shows the installed capacity of Renewable Energy Independent Power Producers (REIPP) that is considered committed in this MTSAO. It includes projects from Bid Windows 1 to 3.5, excluding the 100 MW of CSP not yet signed from Bid Window 3.5.

Table 58: REIPPP committed capacity[143]

Year	2017	2018	2019	2020	2021	2022
Wind	1,470	1,982	1,982	1,982	1,982	1,982
PV	1,474	1,474	1,474	1,474	1,474	1,474
CSP	200	300	500	500	500	500
Landfill	11	13	13	13	13	13
Hydro	14	14	14	14	14	14
Biomass	-	17	17	17	17	17
TOTAL	**3,169**	**3,800**	**4,000**	**4,000**	**4,000**	**4,000**

In light of outputs of the July 2017 MTSAO (Medium-term System Adequacy Outlook) showing a surplus capacity for a moderate forecast, this study further determined the additional surplus as a result of connecting additional REIPPs. The additional REIPP capacities, as shown in the table below include a second 100MW CSP plant from Bid Window 3.5 and all projects from Bid Window 4 and exclude Eskom CSP. These projects were phased by one year from the publicly communicated dates to allow for delays in contract closure.

[143] *Eskom, Medium-term System Adequacy Outlook,2017 to 2022*

Table 59:REIPPP additional capacity

YEAR	2017	2018	2019	2020	2021	2022
Wind	-	9	607	1,264	1,264	1,372
PV	-	145	618	843	843	843
CSP	-	-	100	100	100	100
Landfill	-	-	-	-	-	-
Hydro	-	5	5	5	5	5
Biomass	-	30	35	35	35	35
TOTAL	-	**189**	**1,365**	**2,247**	**2,247**	**2,354**

3.3.2.2 The immediate to medium-term period

A Grid Connection Capacity Assessment - GCCA 2022[144] identified where there is available connection capacity across the entire transmission grid and a set of transmission projects outside the TDP list, that could be implemented within a relatively short period over a number of phases. The proposals include transmission works at existing and new substations that can be implemented as Phase 1 (less than two years), Phase 2 (three to four years), Phase 3 (five to six years), or Phase 4 (seven to eight years) projects, as required. The location and phasing of these projects are indicated on ***Figure 168***.

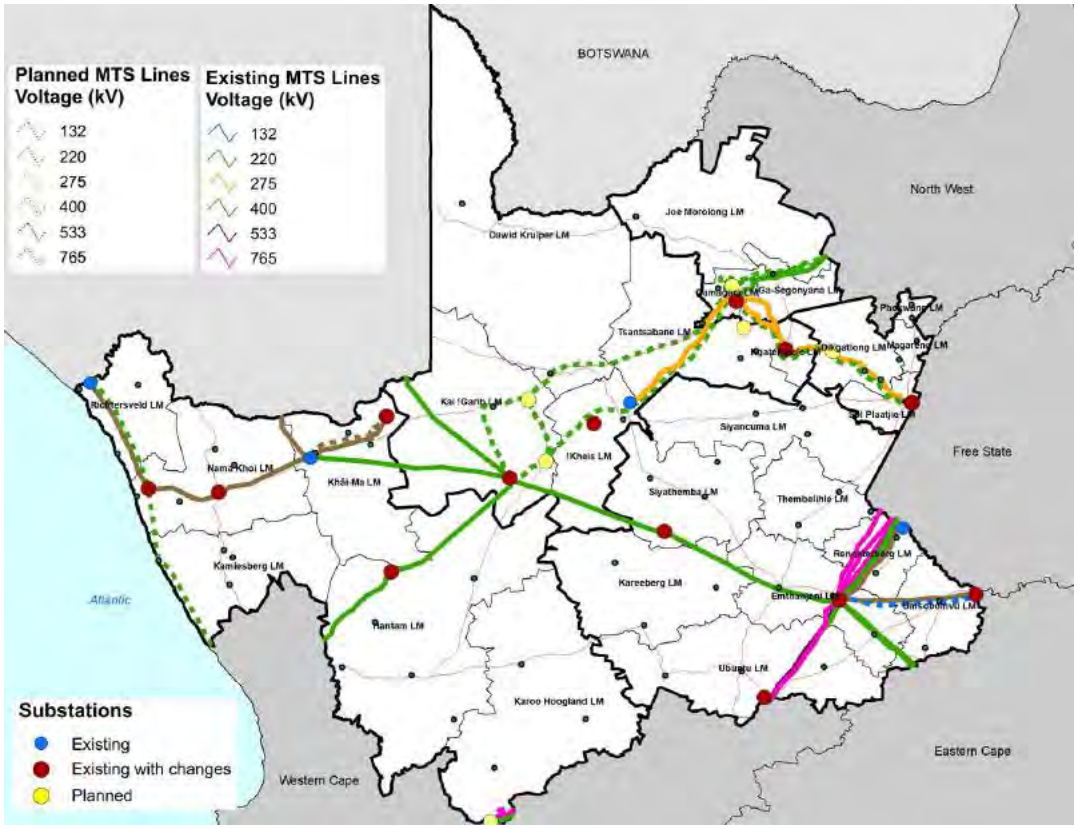


Figure 168: Eskom's Generation connection capacity for the immediate to medium term[145]

[144] *The intention of the Generation Connection Capacity Assessment of the 2022 Transmission Network (GCCA-2022) is to provide stakeholders with an indication of the available capacity for the connection of new generation at the main transmission system (MTS) substations on the Eskom transmission network that may be in service by 2022 based on both approved and proposed new transmission infrastructure projects.*

[145] Eskom, Transmission Development Plan (2016-2025), 2016

3.3.2.3 Power corridors for the longer term

The key to a flexible and robust transmission grid is to secure power corridor routes with most of the rights and approvals in place, so that new transmission lines can be constructed quickly as required when the actual generation is selected and confirmed for integration. The corridors will be 100 km wide and the secured approvals will be valid for extended periods in order to allow the acquisition of line servitudes and substation sites for strategic purposes. The five transmission power corridors are shown on **Figure 169**.

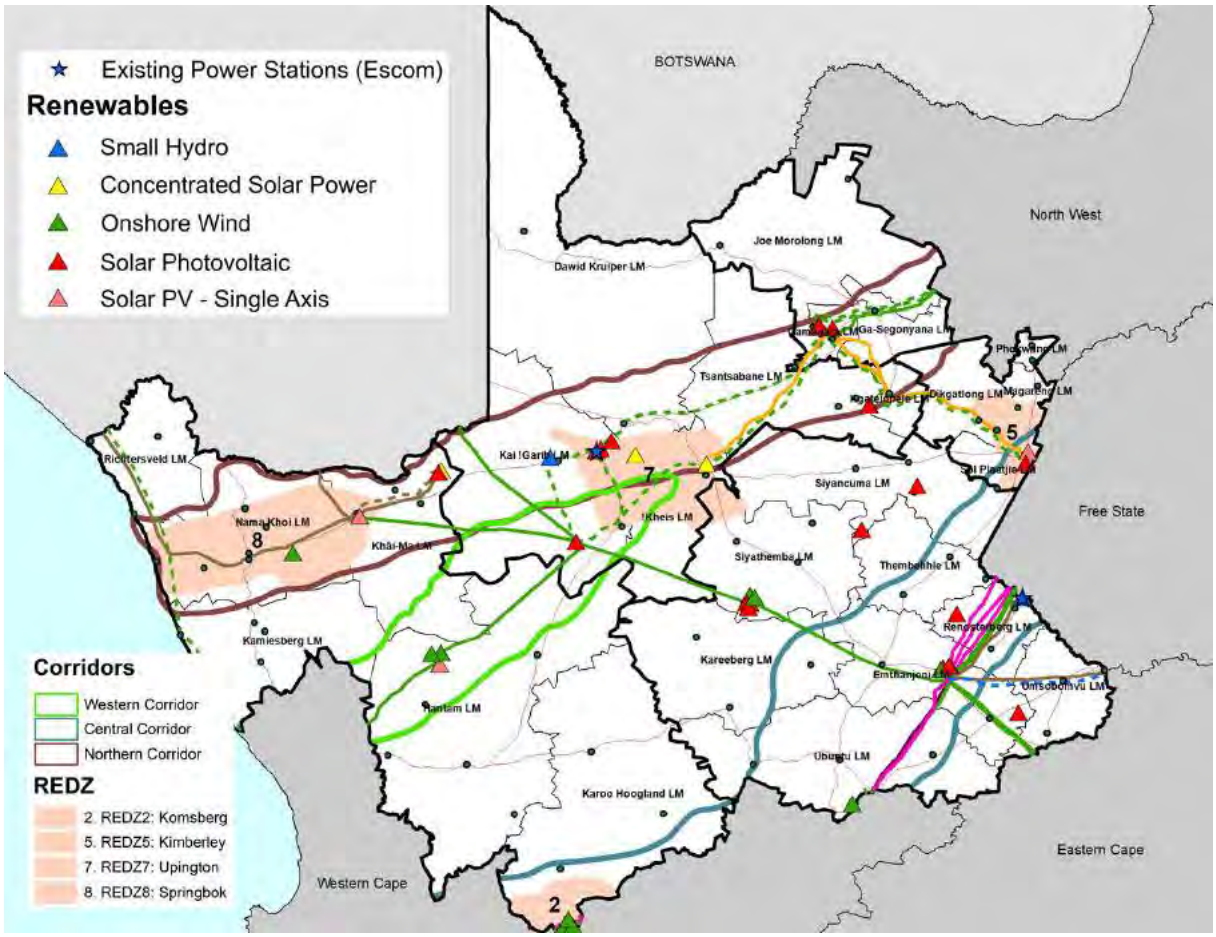


Figure 169: Eskom's Power corridors for the longer term – strategic transmission power corridors[146]

3.3.2.3.1 Renewable Energy Development Zones (REDZs)

Renewable energy development zones (REDZs) are gazetted geographical areas:

- In which clusters (several projects) of wind and solar PV development will have the lowest negative impact on the environment while yielding the highest possible social and economic benefit to the country That are widely agreed to have strategic importance for wind and solar PV development.
- Where the environmental and other authorisation processes have been aligned and streamlined based on scoping level pre-assessments and clear development requirements.

[146] *Eskom, Transmission Development Plan (2016-2025), 2016*

- Where proactive and socialised investment can be made to provide time-efficient infrastructure access.

Solar panels and wind turbines have sprung up like wild flowers across South Africa and by 2030 will be clustered into renewable energy zones known as REDZs. In the first eight of these zones, the renewable industry has already revitalised towns. A solar valley developed in the Northern Cape has brought billions of rand in investment, jobs, expertise and Spanish food to the province. The identification of REDZs allows for the pro-active funding of grid expansion. South Africa's renewable energy programme has been constrained by getting power into Eskom's grid. But now five electricity grid corridors will be created to expand access.

The first eight renewable energy zones are in Upington, Kimberley and Springbok (Northern Cape) , Overberg and Komsberg (Western Cape) , Cookhouse and Stormberg (Eastern Cape) , and Vryburg (North West).

3.3.2.3.1.1 Positive Mapping: Development Potential [147]

The CSIR developed a spatial representation of the most suitable areas for both Solar and Wind renewable energy resource development projects. The development potential base data used included all wind resource and solar resource data sets. The following key considerations was included in the mapping process:

- Normalization Criteria (pull factors):
  - Generator network losses;
  - DTI proposed renewable energy related Special Economic Zones (SEZs);
- Industrial ports;
- Solar and Wind corridors;
- Seat of local municipalities with high social need; and
- Network capacity (as per GCCA substation).

[147] *CSIR, DEA National Wind and Solar PV Strategic Environment Assessments. To facilitate the efficient and effective rollout of wind and solar PV energy in SA, 2014*

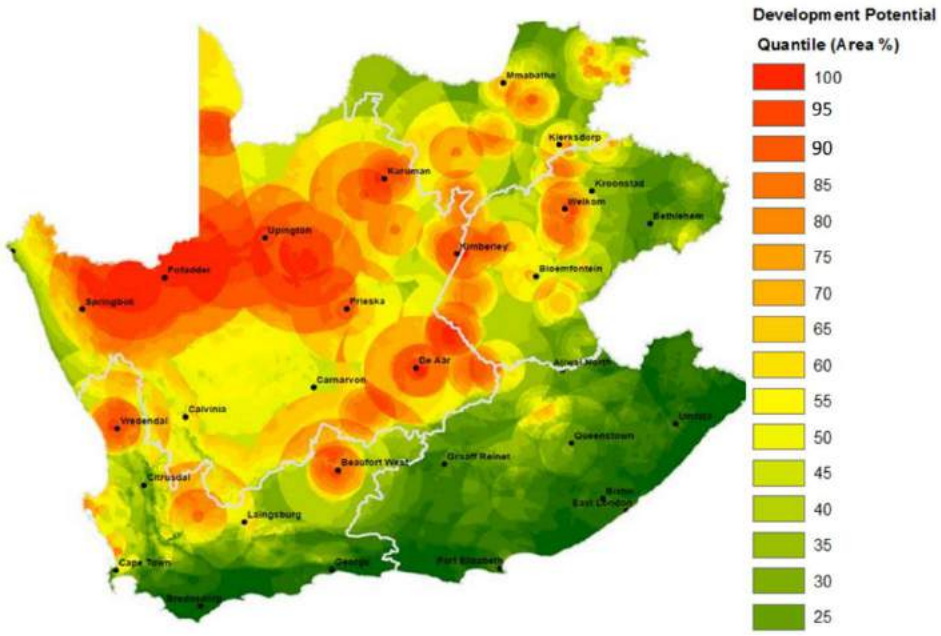
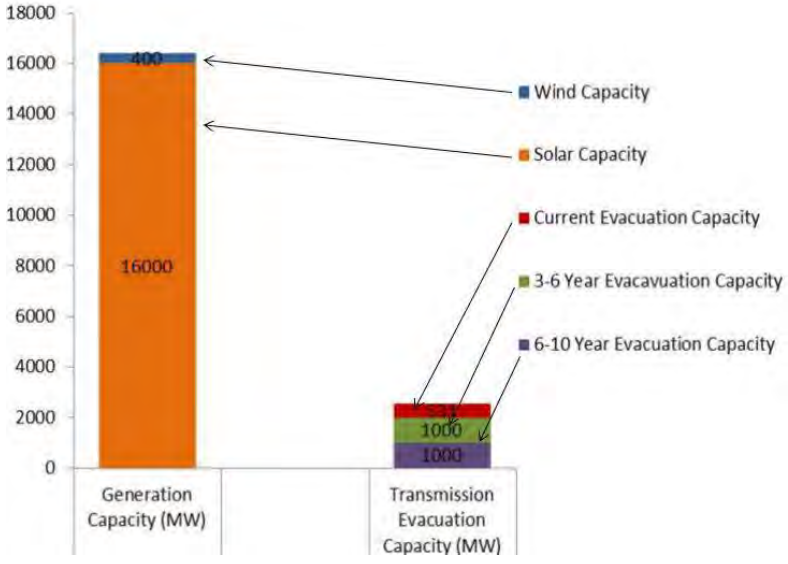


Figure 170: Solar and Wind renewable energy potential, CSIR, 2014

The results from the CSIR Positive Mapping model (see figure above) represents key development areas for future solar and wind related renewable energy projects. These areas include Upington (earmarked as a Solar park, De Aar, already known as an area with more potential to be generated, Pofadder as well as the Springbok, Kuruman and Kimberley areas. These high development potential zones should the key focus areas or zones towards the future growth and development of the renewable energy sector.

3.3.2.3.1.2 Upington solar park

"A Solar Park[148] is a concentrated zone of solar development that includes thousands of megawatts ("MW") of generation capacity. One or more parcels of land in close proximity are designated and pre-permitted as a Solar Park. Individual solar plants developed by multiple power producers are constructed on the land in a clustered fashion and on a predictable timeline, sharing common transmission and infrastructure. CCI[149] believes that a Solar Park could decrease the cost of solar power



Graph 67: Generation capacity of the Upington solar Park vs Transmission Evacuation capacity

[148] *Department of Energy. South African Solar Park Indicative Master Plan, South Africa,2011*
[149] *Clinton Climate Initiative, a program of the William J. Clinton Foundation*

significantly due to economies of scale and the use of locally-manufactured components. The Solar Park site was selected following the Pre-feasibility Study to be in the Upington area. The Solar Park can be regarded as an Industrial Development Zone reserved for a single industry, namely solar power generation. There are several similarities to an IDZ model included in the suggested model for the Solar Park.

The proposed site consisted of two farms 442 Droogehout and 451 Klip Kraal that are owned by the Dawid Kruiper municipality. The suitability of the existing 132 kV distribution system to evacuate power from solar plants installed on the site immediately following the establishment of the park was evaluated. The study, which was done at a high level to support the Indicative Master Plan, showed that up to 150 MW of power could be evacuated via the existing 132 kV line that crosses the southern end of Klip Kraal farm. The addition of a transformer to the existing substation in Upington would allow for an additional 20 MW to be handled giving a total of 170 MW. The Upington region does not have an established transmission network as the total electrical demand in the region is low and there are currently no power producers in the area. Eskom are responsible for developing the transmission network to support the Upington Solar Park and they executed a high-level study to consider the evacuation of 1 100 MW from the Upington site. The figure[150] above provides an overview of the proposed generation capacity versus the existing transmission evacuation capacity. There is clearly a need to upgrade the transmission network to match the proposed demand.

Upington is well served by its existing transport network which includes the N10 national highway, the N14, the railway line from De Aar via Upington to Keetmanshoop in Namibia and the Upington International Airport. There are also several smaller regional roads and a railway line that follows the Orange River from Upington to Keimoes and is used to transport agricultural goods (largely fruit) into Upington from the growing areas along the river.

The Solar Park Main Substation and Control Centre will be designed, constructed, owned and operated by Eskom Transmission (the future Independent System and Market Operator – ISMO). Installation of the substation and the associated 400 kV transmission lines will be done in a phased manner as identified in the Eskom presentation to the Investors' Conference in Upington (Dames 2010).

Connection to the national grid will be done through a network upgrade project that will link the Upington Solar Park substation to the grid. Eskom have proposed an upgrade to enable the evacuation of 1 100 MW of power from the Upington area which will handle Phase 1 of the Upington Solar Park (1 000 MW) and the Eskom Central Receiver project (100 MW). Eskom have noted that the proposed solution will be able to accommodate up to 1.5 GW from the substation.

3.3.2.3.1.3 Kathu Industrial Supplier Park (KISP)[151]

The KISP is an initiative of Kumba Iron Ore and it is in close proximity to the Sishen mines. The park will offer office space, warehousing, manufacturing, logistics, retail as well as skills training facilities. The Kathu Industrial Supplier Park is will service both SIP's 3 and 5. According to Petterson (2016: Internet) construction is set to begin on 100MW Kathu Solar Project. The solar park is situated in the Northern Cape, Kathu and it is expected to be operational in the second half of 2018. The Kathu Solar

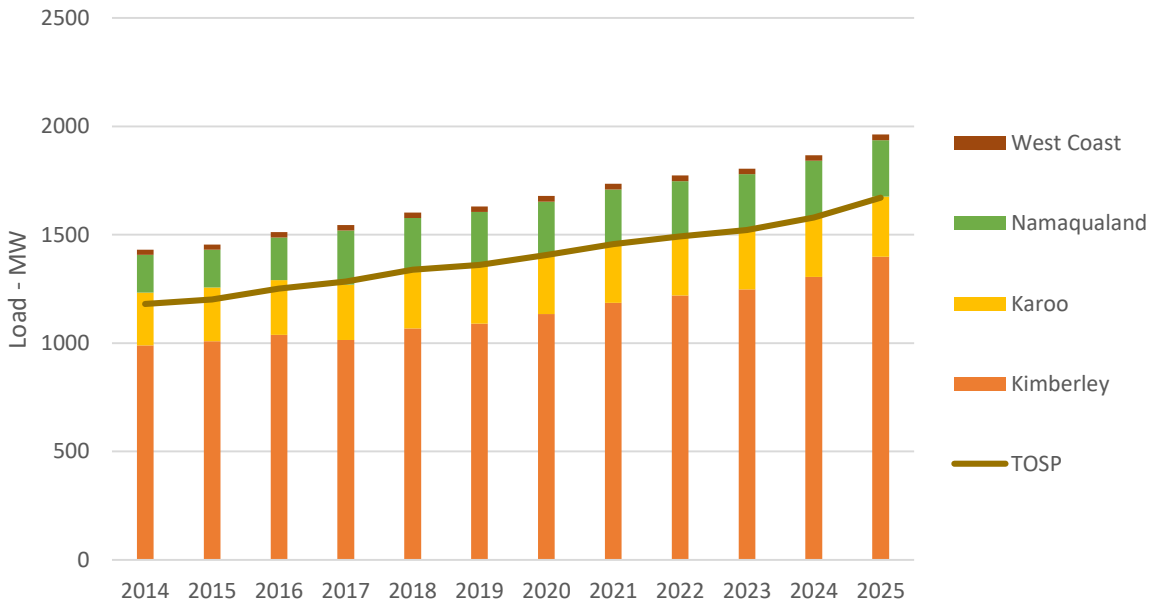
[150] *Department of Environmental Affairs and CSIR, 2015, National Wind and Solar Photovoltaic Strategic Environmental Assessment*

[151] *Department of Economic Development and Tourism, Economic Infrastructure Annual Report, 2016/2017*

Park is a Greenfield Concentrated Solar Power (CSP) project with parabolic trough technology and is equipped with a molten salt storage system that allows 4.5 hours of thermal energy storage and thus limits the irregular nature of solar energy. State-owned enterprise Eskom – South Africa's power utility has signed a 20-year Purchase Agreement with an ENGIE-led consortium which owns the solar park (Petterson: 2016, Internet). The solar park is estimated to create about 1200 jobs during its construction and is expected to promote local economic development through a number of projects such as a local community trust for the benefit of communities in the John Taolo Gaetsewe District Municipality which is located in the Northern Cape, according to a press release statement by Engie (2016: Internet).

3.3.2.4 Load forecast

The load forecast for the Northern Cape is shown in **Graph 68** It can be seen that the Kimberley area forms the major part of the growth in the province. This is due to the anticipated manganese and iron ore mining in the area as well as possible smelter operations associated with these mines. The projects for the Northern Cape province are primarily to increase the reliability of the network, which is mainly radial, to cater for the anticipated ferrochrome and iron ore mining loads in the Kimberley area and to accommodate a huge influx of solar and wind IPPs in the province. The Northern Cape also consists of a rail corridor that transports iron ore and manganese to the coastal areas. There are currently efforts to increase capacity on these rail networks. Included in the TDP is the future planned electricity export to Namibia via the 400kV and 220kV interconnections

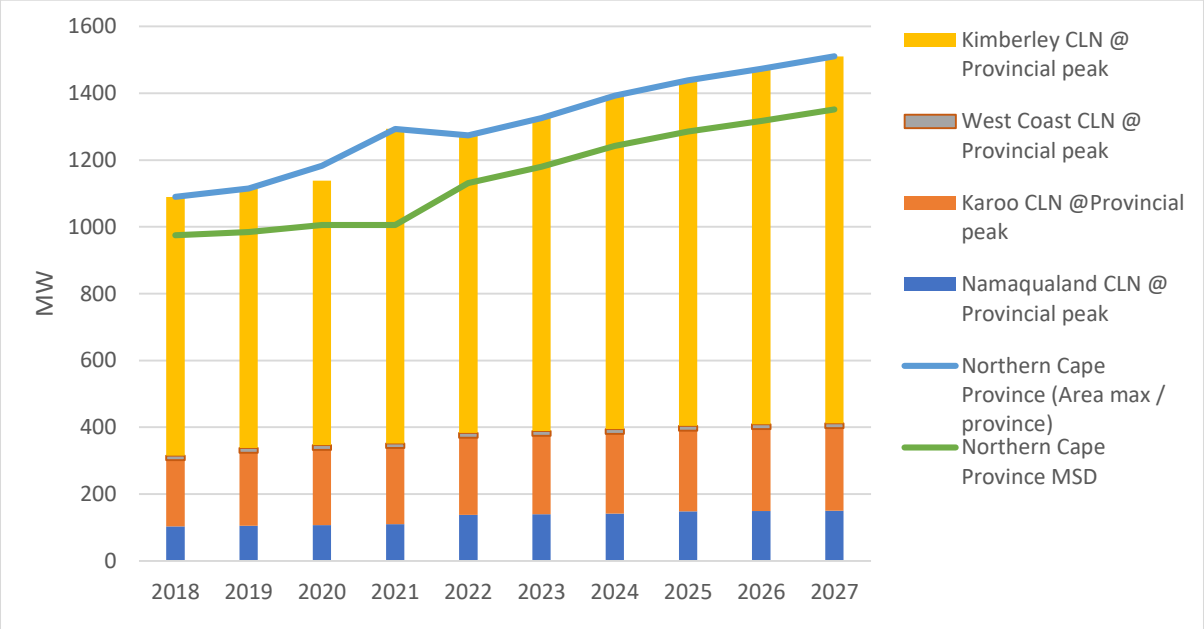


Graph 68: Northern Cape load forecast – Eskom[152]

The availability of sufficient transmission network capacity is important for economic growth in South Africa. The TDP seeks to meet the long-term requirements of the electricity consumers by maintaining the adequacy and reliability of the transmission grid. Load forecasting is a fundamental requirement in the transmission planning cycle. Grid Planning, in consultation with the relevant distribution

152 *Eskom, Transmission Development Plan (2016-2025), 2016*

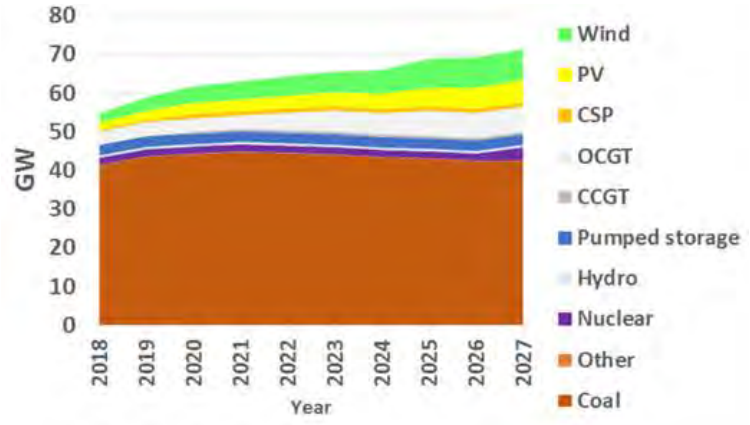
operating units, compiles a forecast per point of supply for the network model. **Graph 69** provides the demand forecasts, including the projected 2010 IRP load forecast



Graph 69:The Eskom transmission system demand forecast using a compound annual growth[153]

3.3.3 New generation summary

The expected generation of electricity over the period 2018 to 2027, distributed between the different types of generation is indicated in Error! Reference source not found.. The Map in **Figure 171** indicates the planned power station capacities for the 2025 network



Graph 70: Types of generation 2018-2017, Eskom, 2016

[153] *Eskom, Transmission Development Plan (2016-2025), 2016*

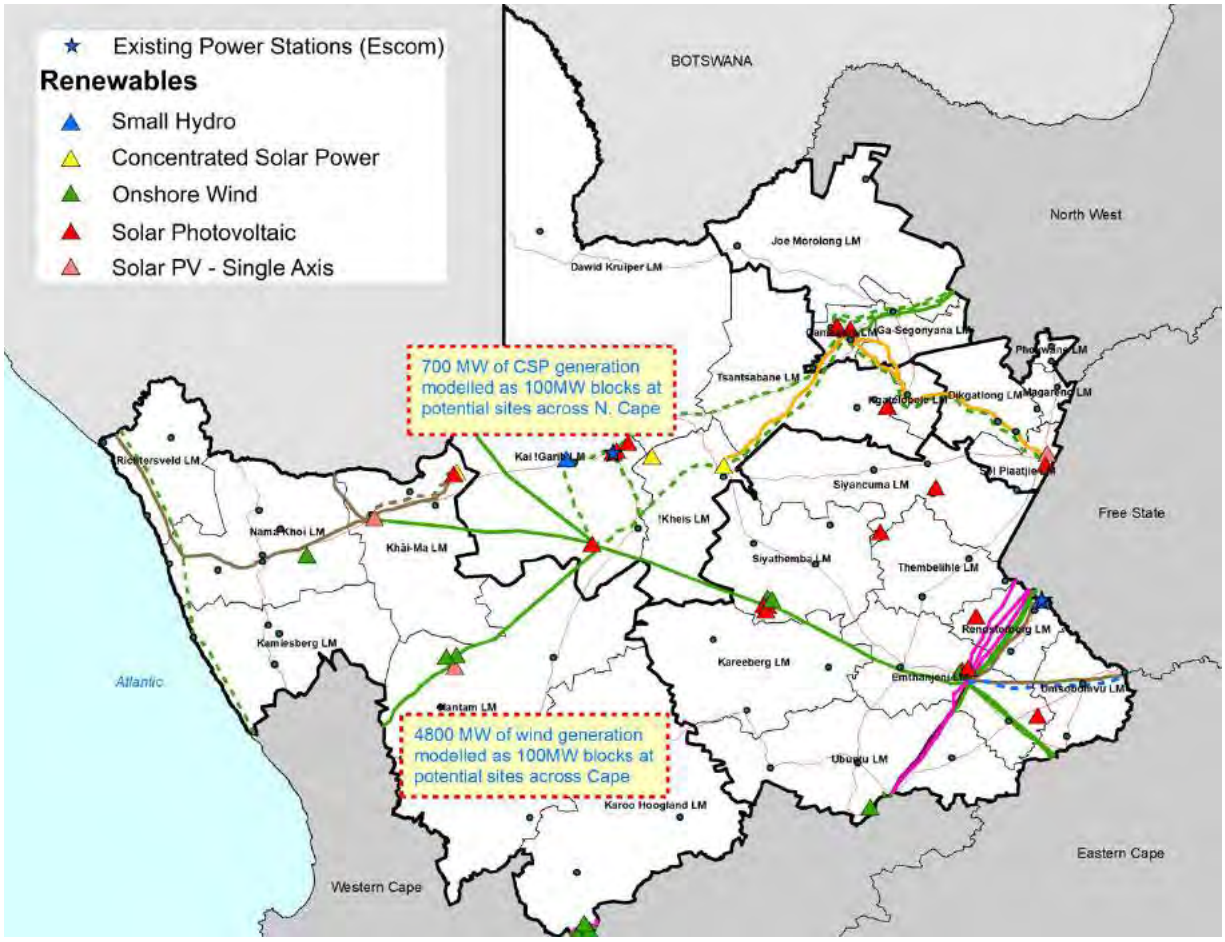


Figure 171: Planned Power Station Capacities 2025, Eskom[154]

3.3.4 Major schemes

Table 60: Major planned power schemes - Northern Cape Province

SCHEME	DESCRIPTION
Namaqualand Redundancy Evaluation Project	The Namaqualand Redundancy Evaluation Project entails building the Juno-Gromis 400 kV line, line-banked at Gromis substation to 220 kV and Gromis-Oranjemund 220 kV line (constructed at 400 kV).
Northern Cape Reinforcement – Aggeneis-Paulputs 2nd 220 kV and Paulputs Transformation Framework.	This project introduces the second Aggeneis-Paulputs 220 kV line built at 400 kV to meet the N-1 security standard for Paulputs area. It also provides a framework for future IPP connections at Paulputs.
Upington Substation Integration	The integration includes the construction of two Upington- Aries 400 kV lines and Upington-Nieuwehoop and Upington- Ferrum 400kV lines.
Kimberley Strengthening Phase 3	This strengthening entails the construction of Hermes (later Selemo)-Mookodi, Mookodi-Hotazel and Hotazel-Ferrum 400 kV lines.

[154] *Eskom, Transmission Development Plan (2016-2025), 2016*

SCHEME	DESCRIPTION
Kimberley Strengthening Phase 4	This is a strategic project to enhance the reliability and support to the existing 275kV network in the Kimberley area.
Kronos Transformation	Kronos is currently a series capacitor station but the yard will be extended to include a 250MVA 400/132kV transformer. Additional transformation that is required will be customer driven.
Paulputs Transformation	This project introduces a 220-kV busbar and a 250MVA 220/132kV transformer. This is required to accommodate IPP connections at Paulputs from round 4 and beyond.
Kudu Gas Power Station Integration	This project entails the integration of the 885 MW Kudu gas power station. It integrates into the Eskom network at Oranjemund substation. It introduces 400/220kV transformation at Oranjemund and the construction of Oranjemund - Aggeneis 400 kV line. This project is dependent on the Juno - Gromis and Gromis – Oranjemund

3.3.5 Substation firm capacity

The following projects will address the uniform substations:

- Kronos transformation 400/132kV under Garona Strengthening will address the Garona uniformness;
- Helios 1 x 20MVA 132/66 kV transformation will address the firmness of the 66-kV supply;
- Gariep Strengthening will address the overloading of the Hydra 400/220 kV transformer and mediocre performance of the existing Ruigtevallei-Hydra 220 kV line built at 132 kV;
- A 3rd 400/132 kV transformer rated at 500MVA is to be installed at Hydra to accommodate the REIPPPP 3 successful bidders; and
- A 2nd and 3rd 220/132 kV 250 MVA transformer is planned to accommodate future successful REIPPPs at Paulputs substation.

3.3.6 Underrated equipment

The following substations in the Northern Cape have been identified in the fault level analysis as having under-rated equipment:

- Aggeneys 66 kV will have underrated equipment due to the introduction of the 2nd Aggeneys-Paulputs 220 kV line. This will be addressed by the Aggeneys-Paulputs 2nd 220 kV built at 400 kV project;
- At Ferrum substation, equipment will be underrated due to Kimberley Phase 3 strengthening. The Kimberley Phase project will address this;
- The introduction of the Hydra 400/132 kV 500MVA transformer and IPP integration, equipment on the 400 kV and 132 kV will be underrated. The Hydra 400 kV and 132 kV equipment upgrade will address this; and
- With the proposed Kimberley Phase 4, Olien, Manganore and Ulco substations will experience underrating of equipment. The Kimberley Strengthening Phase 4 project will address this.

Table 61: Cumulative Transmission Development Plan (TDP) transmission assets for Northern Cape province[155]

ASSETS FOR NORTHERN CAPE PROVINCE	NEW ASSETS EXPECTED IN 2016-2020	NEW ASSETS EXPECTED IN 2021-2025	TOTAL NEW ASSETS
Power lines (km)			
765 kV	0	0	0
400 kV	*795*	*1260*	*2055*
275 kV	*0*	*94*	*94*
Total length (km)	*795*	*1354*	*2149*
Transformers			
Number of units	*16*	*27*	*43*
Total capacity (MVA)	*4770*	*9500*	*14270*
Capacitors			
Number of banks	*0*	*1*	*1*
Total capacity (MVar)	*0*	*36*	*36*
Reactors			
Number of banks	*0*	*5*	*5*
Total capacity (MVar)	*0*	*300*	*300*

The Cumulative TDP transmission assets for Northern Cape province are indicated in ***Table 61*.**

At Upington substation due to IPP integration will experience equipment underrating. The Upington substation is designed from the onset with a split busbar to mitigate for the anticipated high fault levels with great IPP penetration at that substation.

3.4 PROVINCIAL SUMMARY

The increase in transmission assets by the end of 2020 and the end of 2025 and cumulative total are shown in ***Table 62***. The following projects are planned for the 2016 to 2025 period:

Table 62: Northern Cape province – summary of projects and timelines[156]

SCHEME NAME	PROJECT NAME	EXPECTED YEAR
Garona Strengthening	Kronos 400/132 kV transformation	2016
	Kronos-Cuprum 1st and 2nd 132 kV feeder bays	
Upington Strengthening Phase 1A	Nieuwehoop-Upington 1st 400 kV line	2018
	Upington 1st 500 MVA 400/132 kV transformer	
	Upington 2nd 500 MVA 400/132 kV transformer	2021
Upington Strengthening Phase 1B	Aries-Upington 1st 400 kV line	2023
	Aries-Upington 2nd 400 kV line	
	Upington 3rd and 4th 500 MVA 400/132 kV transformers	
Upington Strengthening Phase 1C	Ferrum-Upington 1st 400 kV line	2024
	Upington 5th 500 MVA 400/132 kV transformer	
Kimberley Strengthening Phase 2	Ferrum Ext. 1st and 2nd 500 MVA 400/132 kV transformers	2015
	Ferrum-Mookodi 1st 400 kV line	

[155] *Eskom, Transmission Development Plan (2016-2025), 2016*
[156] *Eskom, Transmission Development Plan (2016-2025), 2016*

SCHEME NAME	PROJECT NAME	EXPECTED YEAR
	Mookodi-Mercury 1st 400 kV line	
Kimberley Strengthening Phase 3	Hermes-Mookodi 1st 400 kV line	2019
	Mookodi-Umtu 1st 400 kV line	
	Umtu 400/132 kV substation (1st and 2nd 500 MVA 400/132 kV transformers)	
	Umtu-Ferrum 400 kV 1st 400 kV line	
	Hotazel Ext. 132 kV 1st 36 MVar capacitor	2020
Kimberley Strengthening Phase 4A	Ulco substation 1st and 2nd 500 MVA 400/132 kV transformers	2023
	Beta-Ulco 1st 400 kV double-circuit line	
	Manganore substation 1st and 2nd 500 MVA 400/132 kV transformers	
	Ulco-Manganore 1st 400 kV double-circuit line	
	Manganore-Ferrum 1st 400 kV double-circuit line	
Kimberley Strengthening Phase 4B	Boundary Strengthening: loop-in Beta-Ulco 400 kV line into Boundary substation	2024
Kimberley Strengthening Phase 4C	Olien Strengthening: loop-in Ulco-Manganore 400 kV line into Olien substation 2024	2024
Garona Strengthening Phase 2	Garona substation 1st 500 MVA 400/132 kV transformer 2025	2025
Gariep Network Strengthening	Ruigtevallei-Hydra de-rating of 220 kV line to 132 kV 2016	2016
	Ruigtevallei 132 kV feeder bay to Dreunberg	
Ruigtevallei Transformation Upgrade	Ruigtevallei 132/66 kV transformation upgrade 2019/20	2019/20
Roodekuil-Hydra Strengthening	Re-template and modify the existing inter-tripping scheme to switch only one generator off when the Hydra – Roodekuil 220 kV line is tripped	2020
Hydra Wind Phase 2	Hydra 3rd 500 MVA 400/132 kV transformer	2018
Hydra 400 and 132 kV Equipment Upgrade	Hydra 400 kV and 132 kV equipment upgrade (fault level requirements)	2018
Hydra B	New Hydra B 500MVA 400/132 kV substation	2021
Kronos Transformation	Kronos 2nd 500 MVA 400/132 kV transformer	2019
Northern Cape Transformation	Helios 1 x 20 MVA 132/66 kV transformer	2019
Northern Cape Reinforcement	Aries 400 MVar SVC (Capacitive 250MVAr and Inductive 150MVAr)	2018
Namaqualand Strengthening	Juno-Gromis 400 kV line	2020
	2nd Gromis-Oranjemund 220 kV line	
Northern Cape Reinforcement: Ferrum-Nieuwehoop-Aries 400 kV	Aries-Nieuwehoop 400 kV line	2016
	Ferrum-Nieuwehoop 400 kV line	2018

SCHEME NAME	PROJECT NAME	EXPECTED YEAR
Paulputs Ext. 2nd 250 MVA 220/132 kV Transformer (Customer)	Paulputs Ext. 2nd 250 MVA 220/132 kV transformer	2016
Northern Cape Reinforcement: Aggeneys-Paulputs 2nd 220 kV	Aggeneys-Paulputs 2nd 220 kV line	2021
	Aggeneys 66 kV equipment upgrade (fault level requirements)	
Paulputs 3rd 220/132 kV 250 MVA transformer	Paulputs 3rd 220/132 kV 250 MVA transformer	2021
Nama substation Transformers Upgrade	Nama 2 x 20 MVA 66/22 kV transformers	2016
Northern Cape Voltage Unbalance	Northern Cape line transposition	2020

3.4.1 Northern Cape scenario - Impact of the DoE generation scenarios[157]

The TDP is based on the baseline generation assumptions however the potential impact of other generation scenarios as specified by the DoE were considered during the end of the TDP horizon in terms of high-level sensitivities. The year of consideration for these scenarios is 2025, as only the full impact was considered, not the phased roll-out of these scenarios. The purpose of this scenario is to determine the impact on the transmission network within the Northern Cape if 2 500 MW of wind generation is moved from the Eastern Cape into the Northern Cape. This includes some substations in the northern part of the Western Cape. The locations for new wind generation for this scenario are as follows:

- Nama: 400 MW;
- Gromis: 400 MW;
- Aggeneis: 400 MW;
- Oranjemund: 400 MW;
- Hydra: 300 MW;
- Kronos: 300 MW; and
- Gamma: 300 MW.

3.4.1.1 Impact of the scenario

There is a significant impact from this generation scenario on the Northern Cape province. The 220kV network in the Namaqualand area, running from Aggeneis-Nama-Gromis-Oranjemond will be overwhelmed with the generation to be collected and distributed out of the area. Accommodating this amount of additional IPP generation will require this network to be overlaid with 400 kV. This will entail the construction of the following as a minimum:

- Energising the new Gromis-Oranjemond 400 kV line;
- A new Oranjemond-Aggeneis 400 kV line (300 km);

[157] *Eskom, Transmission development plan 2016-2025*

- A new Gromis-Nama-Aggeneis 400 kV line (200 km);
- A new Aggeneis-Helios 400 kV line (150 km) or 2nd Aggeneis-Aries 400 kV line (150 km);
- A 2nd Aries-Ferrum 400 kV line;
- At least one new 400/132 kV collector substation in the Nama-Gromis area, plus the 400 kV lines to integrate it; and
- A new Ferrum-Olien-Perseus 400 kV line to reinforce the 275-kV link via Kimberley to provide an additional evacuation path for network security.

The Hydra/Kronos/Gamma generation will require the establishment of 400 kV/132 kV at Gamma, an additional substation in the Hydra area (Hydra B) and the extension of Kronos 400/132 kV. A second Hydra-Kronos-Aries 400 kV line (400 km) may be required. The new Hydra B substation may also require additional 400 kV lines for integration.

4 WATER

4.1 OVERVIEW

South Africa is a semi-arid, water-stressed country (the 20th most water scarce country in the world) which adds to the challenge of providing water and sanitation services. The country's average rainfall is about 450mm, well below the world average of about 860mm per year. Despite many interventions to increase water supply, reduce losses and encourage water conservation, the demand for water is expected to outstrip the supply within the next 10 years. The continual increase in population and industrial growth places more stress on water quality and the ecosystems. In addition to the above, the continued threat to water supply due to drought, illegal connections and water wastage need to be addressed. A number of water resource development and sanitation projects have been proposed and are currently being implemented by the Water and Sanitation Unit in order to mitigate these issues. The projects can be broadly divided into the following categories:

- Drought mitigation measures;
- Optimisation and augmentation of current water supply;
- Alternative water supply options;
- Sanitation projects;
- Management and financial aspects;
- Education and training; and
- Energy and carbon projects

4.1.1 District perspective

The following table provides some of the key insights per district regarding bulk water schemes within the specific district as well as irrigation schemes:

4.1.1.1.1 Namakwa District Municipality[158]

- Most of the rural areas within the Namakwa district obtains water from boreholes scattered through the landscape of the arid areas within the district;

[158] *Namakwa District Municipality, Integrated Development Plan 2017 – 2022*

- The Namakwa District receives water from the Namakwa Water Supply Scheme and Pelladrift Scheme. Raw water is abstracted from the lower Orange River for both the Schemes;
- The Namakwa Scheme provides water to the Nama Khoi Local Municipality, small scale mines and industries. The Pelladrift water supply scheme provides water services to the Black Mountain Mine, the Khâi-Ma Local Municipality, the Aggeneyes Township and surrounds;
- The Namakwa Bioregional Plan indicates that the high mountain areas in the south are the higher water yielding areas and provides significant amount of freshwater to the surrounding towns, the yields of these areas are being impacted by the "lack of efficient water management strategies."; and
- Sedibeng Water board is responsible for all potable water in the Namakwa District Region for both Urban and Rural Areas.

4.1.1.1.2 Pixley ka Seme District Municipality[159]

- Irrigation Canals are located at the Vanderkloof to help distribute water to intensive agricultural land located away from the river;
- By developing and maintaining the canals, the irrigation schemes could expand, providing more opportunities to local and emerging farmers within the district to cultivate on fertile land;
- The Vanderkloof Dam play an important role in providing water for irrigation to more than 100 000 hectares of productive agricultural land. The dam is also perfect for angling and water related sports including sailing, skiing and windsurfing. Building the dam gave birth to the beautiful town Vanderkloof, popular with holiday makers and travellers; and
- Middle Orange Irrigation Area – South Africa the Middle Orange Irrigation Area comprises riparian irrigators from Hopetown to Boegoeberg Dam. The area irrigated from Marksdrift to Boegoeberg Weir amounts to approximately 15 434ha. Irrigators in this area are not part of a formalized scheme with a common supply system. Irrigators abstract water directly from the Orange River on an individual basis and are supported with releases from Vanderkloof Dam.

4.1.1.1.3 Frances Baard District Municipality

- The main water resource is obtained from the Vaal, Modder and Riet rivers together with the Spitskopdam;
- The Vaal Harts Irrigation scheme provide the high agricultural land areas with water for irrigation purposes within the Phokwane municipal area;
- Boreholes is the main water resource within the northern parts of the Dikgatlong area; and
- Small scale agricultural schemes surrounding all the rivers are present. These farmers have water use licenses to utilise a certain amount of water out of the rivers to irrigate their crops and thus expanding the market potential within the district by producing more commodities.

4.1.1.1.4 ZF Mgcawu District Municipality

- There are no significant dams in the District, however there are numerous containment dams from which water is diverted for irrigation and urban settlements via canals, examples of these include the Boegoeberg Dam and Neusberg Dam;

[159] *Pixley Ka Seme District Municipality, Integrated Development Plan 2017 – 2022*

- Other Containment dams within the District include the Rooiberg Dam and Leeubos Dam, but both are sometimes empty due to the inconsistency of river flows into them;
- A lot of canals are visible and utilised for intensive irrigation purposes along the immediate surrounds of the Orange River; and
- Between Upington and the Augrabies Falls, irrigation is closely linked to river gradients and low flows. Flooding remains a danger especially to the numerous islands that occur in the river. Between Upington and the Friersdale rapids, the river valley and the islands, form a second distinct irrigation area. In this area the crops, in order of importance, include lucerne, grapes, wheat and much smaller crops of vegetables, cotton, deciduous fruits, maize and citrus.

4.1.1.1.5 John Taolo Gaetsewe District Municipality

- The District is not known for irrigated agricultural land due to the lack of water sources. The only significant area in the district where irrigation is taking place, is in Manyeding with water from a nearby fountain;
- Around 20 Villages has aging water infrastructure that needs to be upgraded and addressed to ensure no water shortage problems;
- Most settlements rely on water abstracted from boreholes (± 780) throughout the District;
- The settlements of Heuningvlei, Eiffel, Makhubung and Shalang receive water from local boreholes but are also connected to the Heuningsvlei Borehole Pipeline Scheme; and
- Hotazel receive water directly from the Vaal Gamagara Pipeline to ensure communities in the area have water, as no reservoirs exist within the area.

4.1.2 Value chain[160]

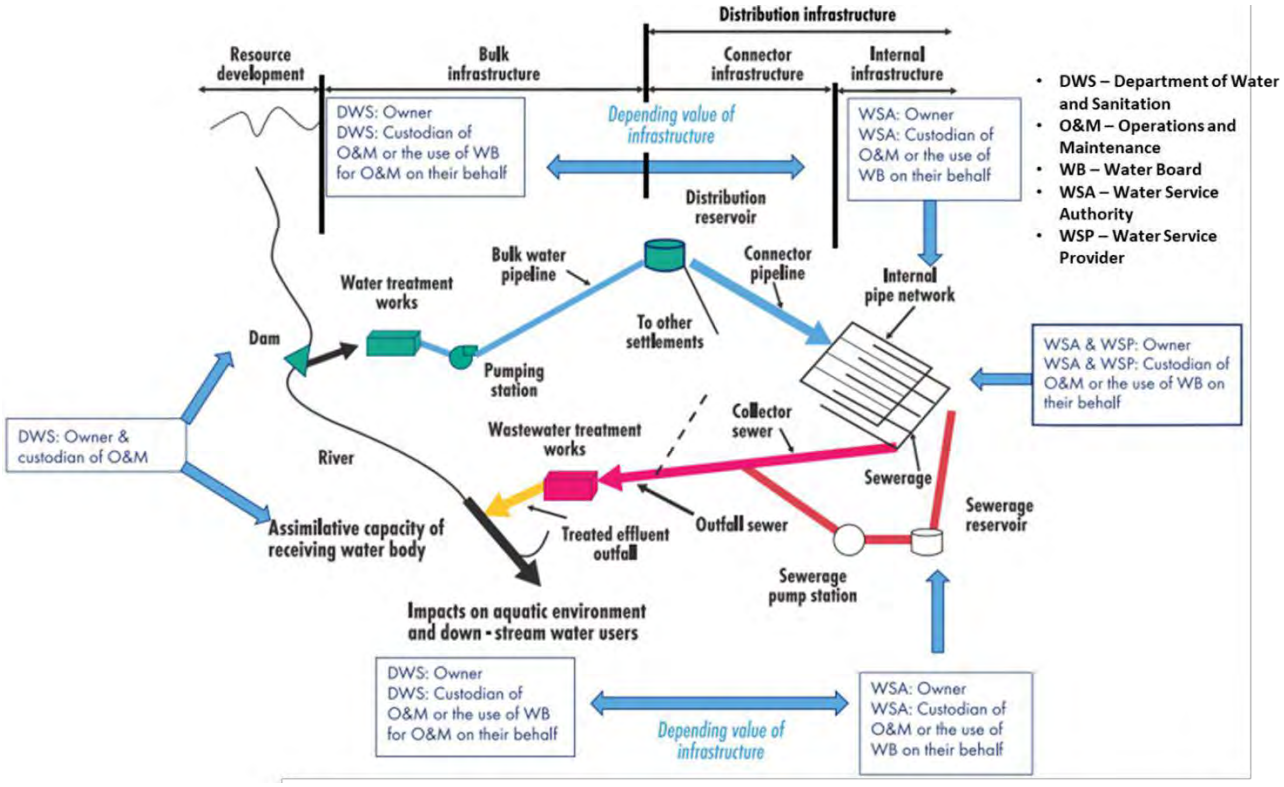


Figure 172: Water and sanitation value chain

Figure 172: Water and sanitation value chainFigure **172** provides a more detailed layout of the water value chain. It represents the South African water and sanitation value chain. Resource development shows that the DWS is the custodian of dams and rivers. The DWS is responsible for building new infrastructure and for ensuring that existing infrastructure is operated and maintained. Bulk infrastructure moves raw water from the source (dams and rivers) to reservoirs. The DWS finances the bulk infrastructure using various financing vehicles and structures.

Water services provision is a 24/7 business, "from source to tap and back to source", dependent on sequential delivery along a value chain. Rainfall runoff flows into rivers, is captured and stored in dams. This "raw" water, and water from other sources such as groundwater, is purified and piped to reservoirs for distribution to customers. Once the water is consumed, grey water, (wastewater from washing, laundry etc.), and sewerage is collected and passed through a network of sewers to a treatment works. Here the wastewater is purified and released back into rivers or dams where it once again becomes a water resource (Department of Water Affairs, 2015[161]).

Distribution infrastructure transports the raw water from reservoirs to reticulation networks in cities, towns and villages. The water boards obtain raw water from the DWS, purify and distribute it to municipalities under long-term supply agreements. They supply billions of cubic metres of water a year. The municipalities in turn distribute water to the citizens. Sewerage treats waste water and

[160] *Performance audit on water infrastructure at the Department of Water and Sanitation,2016*
[161] *Strategic overview of the water services sector in South Africa 2015*

returns it to a water source. The country has over 800 waste water treatment plants which need to be operated and maintained.

4.2 WATER RESOURCES

The Northern Cape is a semi-arid region dependent on both surface and groundwater resources. Three of the merged key Water Management Areas (WMA's) of the 9 water areas fall within the Northern Cape. [162](Previous demarcation included four of South Africa's 19 water management areas). Sewage pollution, fertilisers, pesticides, industrial wastes, mining and soil erosion can all cause a deterioration in water quality. Water is saline in large areas of the province, especially the Kalahari and the Karoo, where it is unsuitable for human consumption. High surface water toxicity has been measured in various places, particularly in the Vanderkloof, Molopo and Lower Orange areas. Given the low, variable rainfall of the 13 groundwater regions in the Northern Cape, two have total nitrites levels that present a health risk. The greatest water requirements are for transfers out of the area, followed by irrigation. Demand just about meets supply in the Doring, Knersvlakte, Coastal Orange, Orange and Molopo sub-WMAs, making them vulnerable to droughts. Only the Vanderkloof sub-WMA has more water available than required[163].

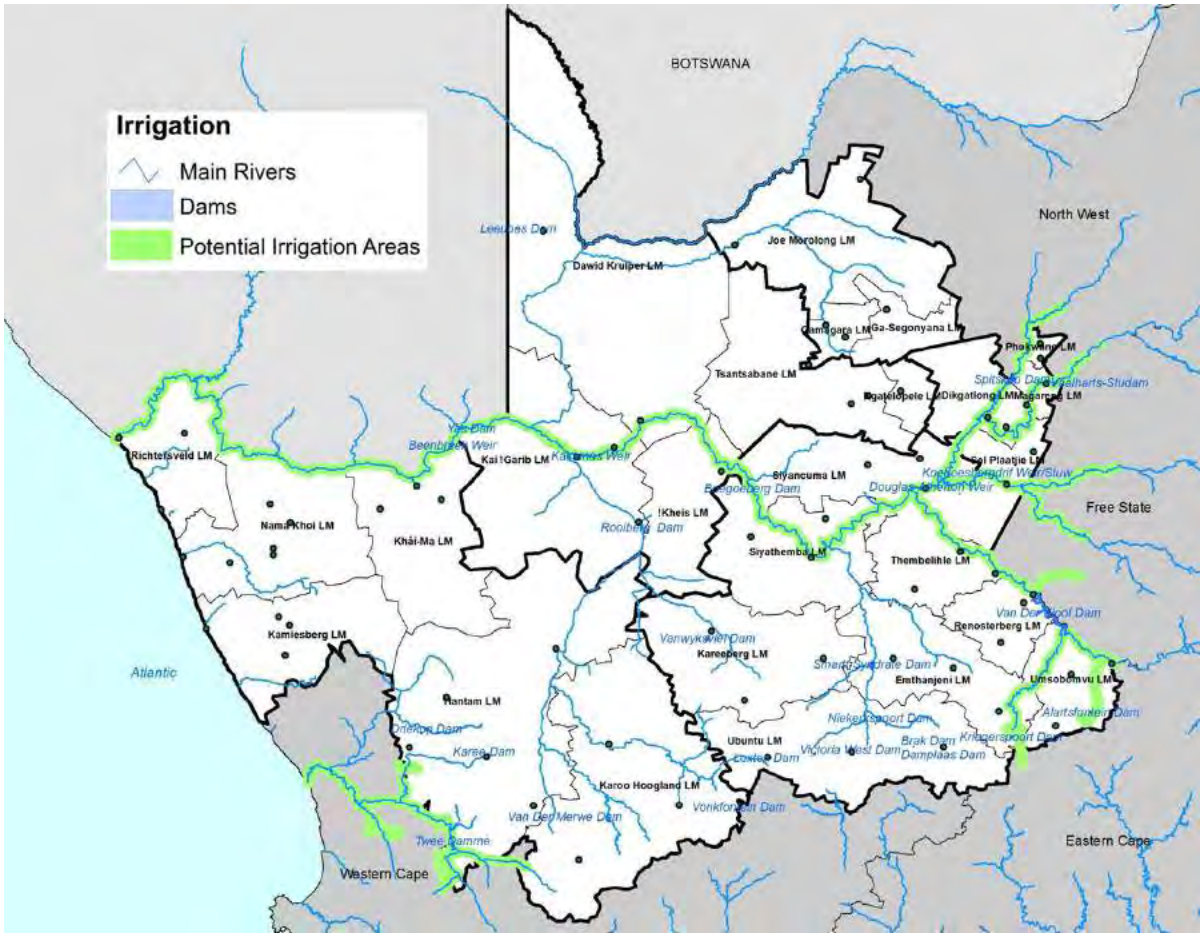


Figure 173: Provincial overview of key water resources[164]

[162] *Government notice no. 40279, Government gazette, 16 September 2016*
[163] *State of groundwater, Northern Cape Department of Tourism, Environment and Conservation, 2005*
[164] *Department of Agriculture 2008; Department of Water Affairs & Sanitation 2016*

4.2.1 River systems

The Vaal river and Orange river are the primary water sources for the Northern Cape. They serve towns and economic sectors along the water course as shown by the blue lines. Blue lines further represent the regional bulk distribution pipelines that bring water from the Orange and Vaal river to rural towns and mines. The orange colour indicates the proportional use of ground water, indicating that it remains a key resource in the southern and north-eastern municipalities.

4.2.2 Ground water

4.2.2.1 Overview

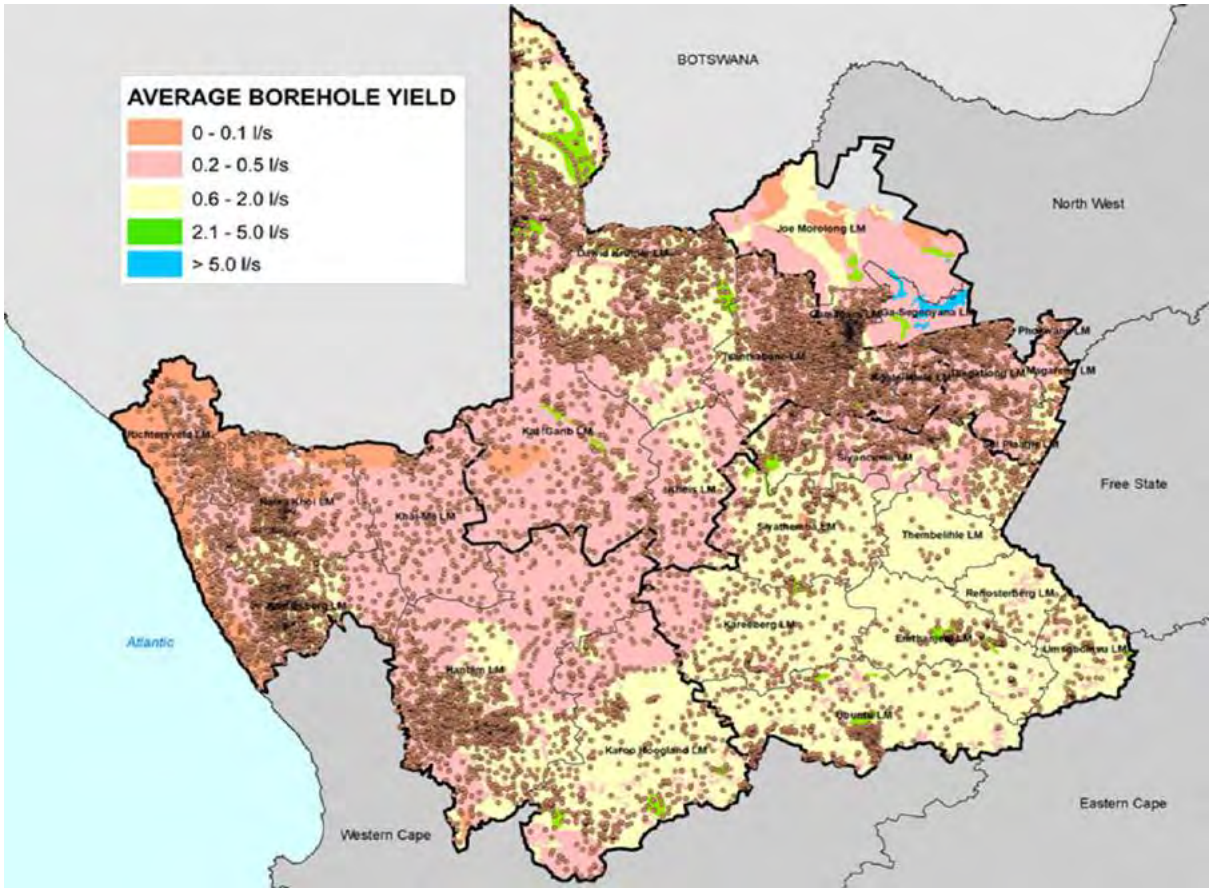


Figure 174: Average borehole yield and boreholes in the Province

Over a third of the rural population of South Africa is dependent on groundwater resources for household and agricultural use (Colvin et al. 2007). In all areas of the Northern Cape, except along the Orange and Vaal rivers, the population is dependent on groundwater. In the Orange River tributaries, more than fifty percent of the available water is supplied from groundwater sources. A very small component of the available water in the vicinity of the Orange River is groundwater. It, however, constitutes an important source of water for rural water supplies in this sub-area. A significant amount of groundwater is being abstracted near the river, where the ground water levels are replenished by means of induced recharge from the river. The present volume of groundwater use is estimated at between 2 000 and 3 000 million m/a. The total realistically accessable groundwater potential is approx. 4 500 million m^3/a of the estimated sustainable potential groundwater yield of around 7 500 million m^3/a.[165] Groundwater currently is an underutilised resource in South Africa. Most groundwater

[165] *Draft National Water and Sanitation Master Plan (NW&SMP), November 2017*

infrastructure for municipal domestic water supply was developed, and is operated and maintained by local authorities. Artificial groundwater recharge, whereby surplus surface water is transferred underground to be stored in an aquifer for later abstraction and use, is growing in importance in South Africa and internationally. Artificial recharge of groundwater needs to become a strategic focus in ensuring sustainable reliable water resources in future.

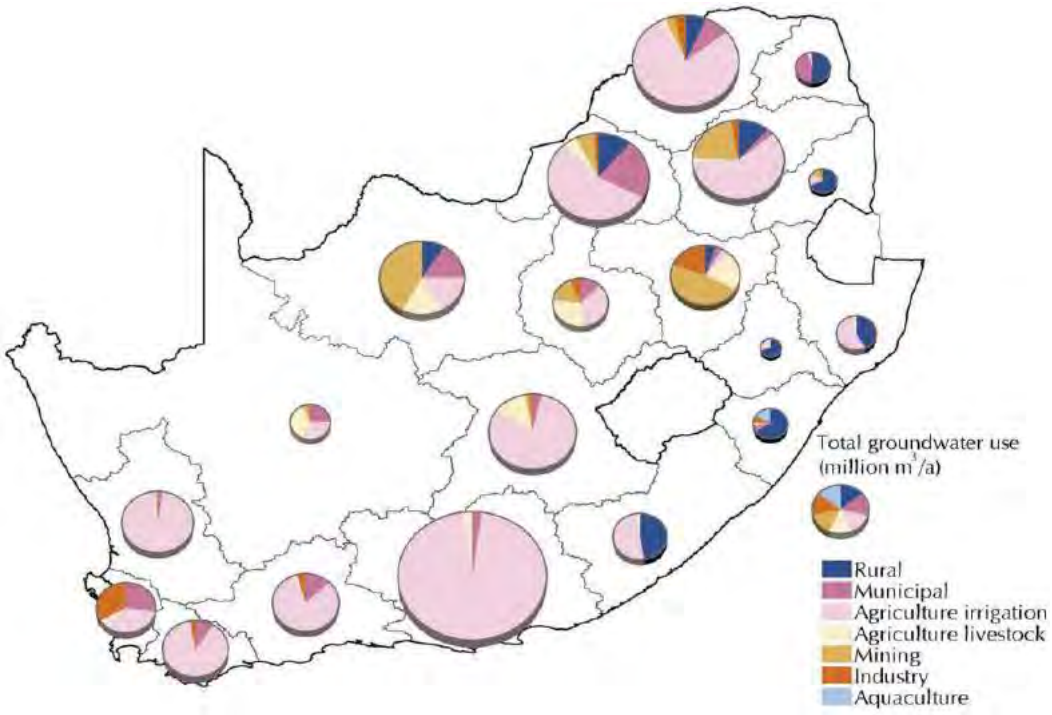


Figure 175: Sectoral groundwater use (million m3/annum) per water management area

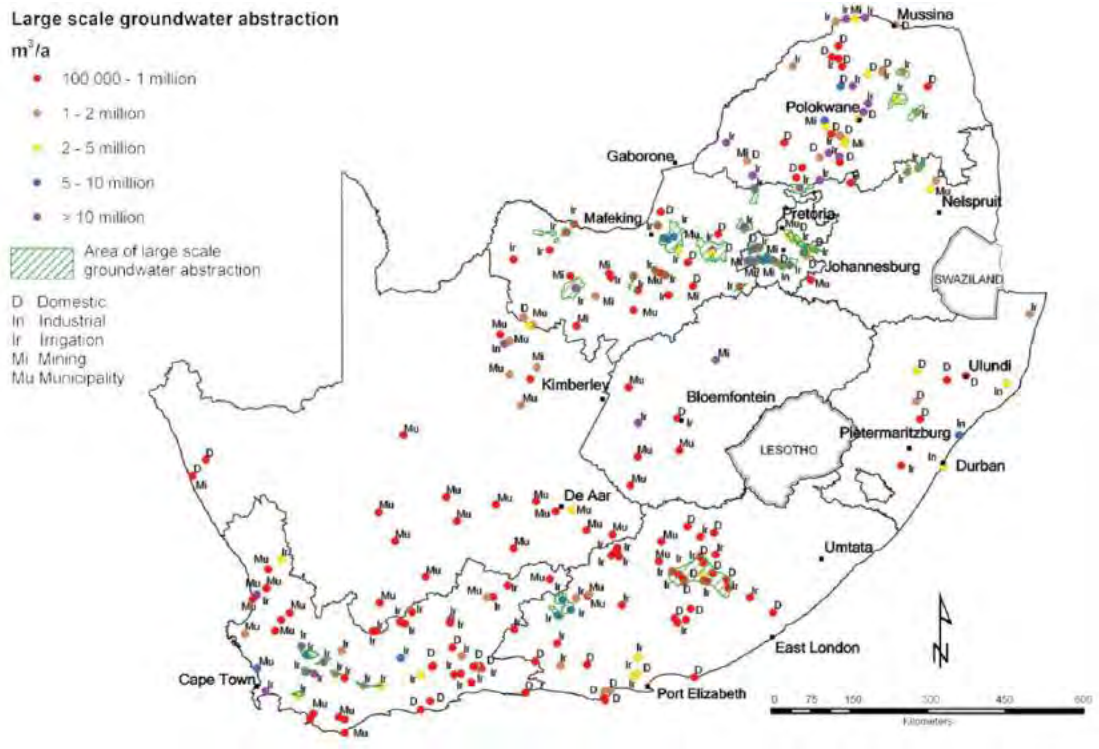


Figure 176: Large scale ground water abstraction in South Africa by type of use

As illustrated by the figures above, it is evident that mining sector is dominating underground water utilisation in the province. The mining sector is also one of the key causes of groundwater contamination which requires improved management practises.

4.2.2.2 Ground water quality

Groundwater contains dissolved "minerals" such as chloride, sodium, iron and others, in the same way as surface water. The natural dissolved mineral content of groundwater depends on a number of factors, including the aquifer material and the groundwater residence time. The figure below indicates natural groundwater electrical conductivity (mS/m) in RSA. In some cases, high levels of dissolved minerals cause groundwater to be brackish or even saline. In some (relatively rare) cases, naturally high levels of dissolved constituents like fluoride, arsenic or nitrate render groundwater unfit to drink, even though it may taste perfectly fresh.

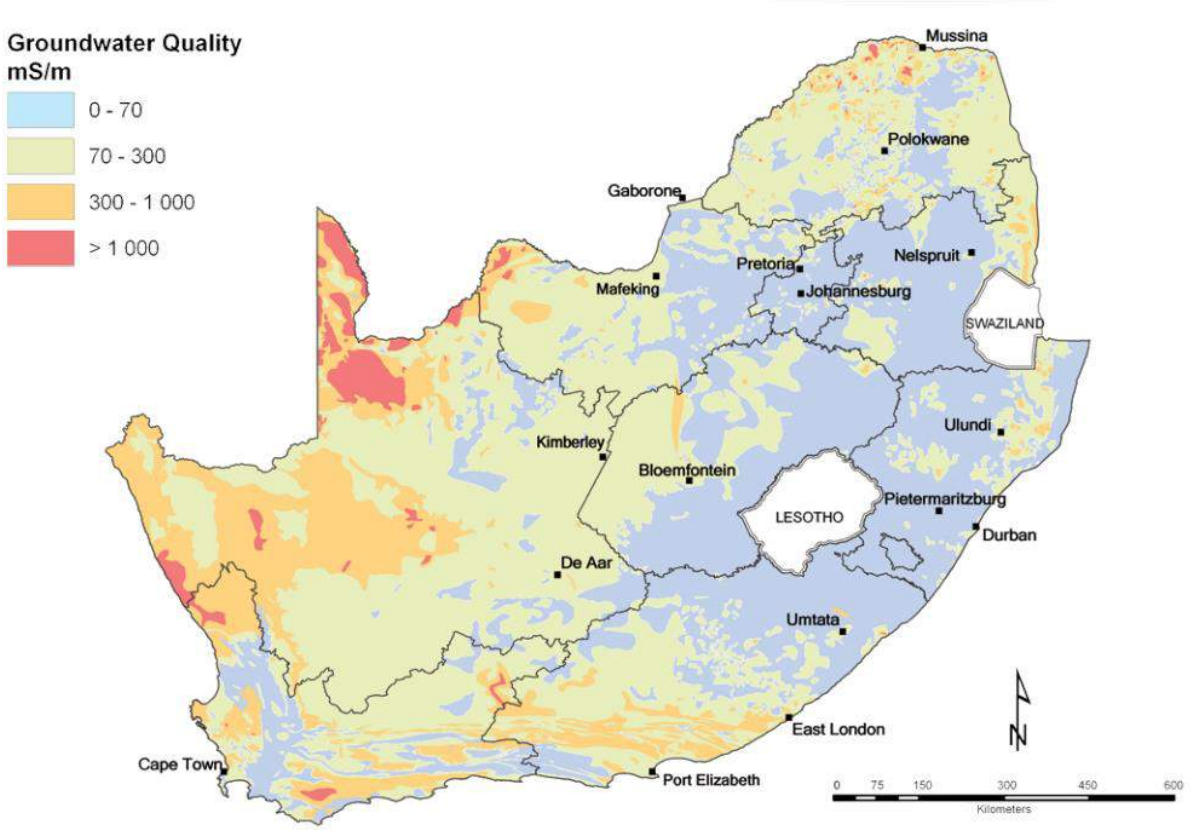


Figure 177: Groundwater Quality index for South Africa

The most recent scientific estimates place groundwater in South Africa in the same league, volumetrically, as our stored surface water resources: The total volume of available, renewable groundwater in South Africa (the Utilisable Groundwater Exploitation Potential, or UGEP) is 10 343 million m^3/a (or 7 500 million m^3/a under drought conditions). We currently use between 2 000 and 4 000 million m^3/a of this groundwater (3). Therefore, there is the potential to considerably increase groundwater supplies in South Africa. In contrast, the assured yield of South Africa's surface water resources is approximately 12 000 million m^3/a, but more than 80% of this is already allocated.[166]

Mining operations are expanding, but the locations of some of these new mines are in water scarce areas (affecting most parts of the Northern Cape Province as mines are also located in key water source areas) and this will put more pressure on the water resource. The water issues arising from mining operations are both serious and complex, and require agreements between different government departments, affected communities, and the private sector. The mining footprints undoubtedly impact on water sources whether it is surface or groundwater. Poor and deteriorating groundwater quality is widespread and can be attributed to diverse sources in various sectors such as mining. The discharge or decant of contaminated water and highly saline effluents from mining activities and/or abandoned mines (commonly referred to as acid mine drainage) is a serious environmental threat and social concern

[166] *Department of Water Affairs, Groundwater Strategy 2010*

4.2.2.3 Strategic ground water areas

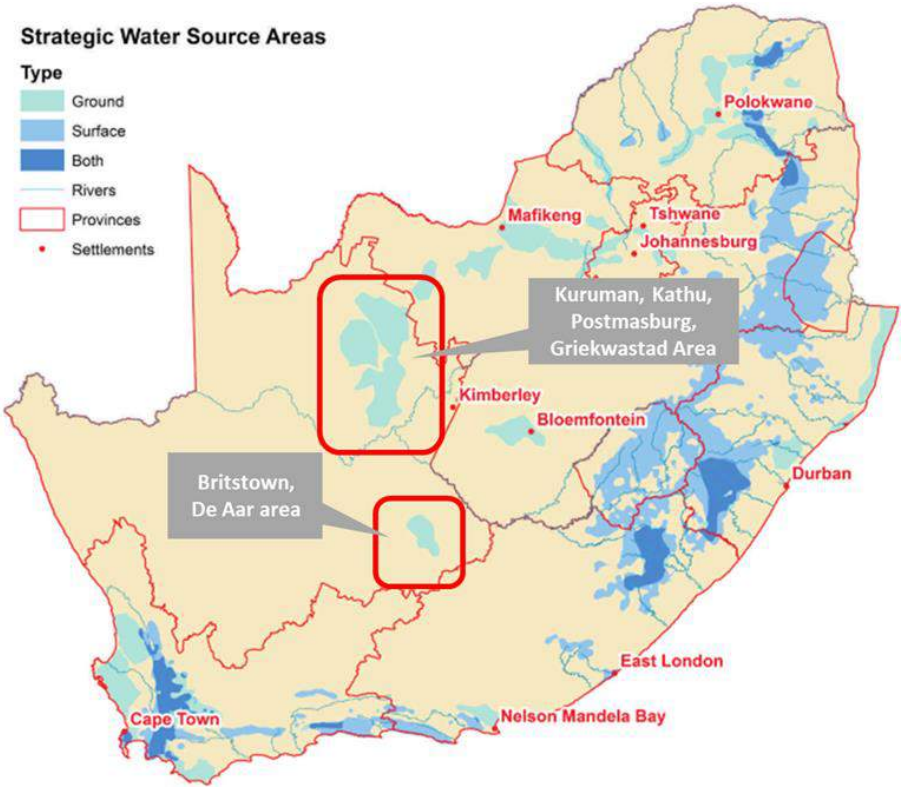


Figure 178: Strategic national source areas

As reflected in the figure above, there are two strategic underground water source areas that requires strict management to specifically address the following key issues:

- Mining activities (acid water) through sustainable mining practises;
- Over grazing;
- Irrigation practises (pesticides etc affecting salination of water);
- Alien invasive plant species; and
- Protecting the key water source areas (limiting development footprint and effective water management practise)

4.2.2.4 Proposed protection zone policy in South Africa[167]

A common method that is used world-wide to help protect groundwater quality is to establish areas or "protection zones" around groundwater abstraction points (and sometimes well fields and even whole aquifers) within which activities that may pollute groundwater are controlled. It is also obviously not enough merely to define a protection zone – of equal importance are the restrictions or rules that are made for activities within the protection zone, and the enforcement of these.

[167] *Department of Water Affairs, National Groundwater Strategy 2010*

4.2.3 Other water sources



Growing water shortages mean that municipalities will increasingly have to consider alternate sources. Chief amount these are desalination (of seawater or brackish groundwater) and water re-use. These can be energy intensive and thus expensive but are still generally less costly than inter-basin transfers. Already a number of desalination plants have been built, namely:

- A desalination plant commissioned and built by the Kamiesberg Local Municipality to assist during the drought, (not always functional, because of the drought causing low underground water levels).
- Volwaterbaai Desalination Plant and Associated Infrastructure situated near Abrahams Villiers bay (in process). The proposed plant would have a 7 Mℓ/d capacity and would supply potable and process water to the Zandkopsdrift mine
- A proposed desalination plant in Port Nolloth. The proposed project entails the installation of a 1.5 m/l p/day seawater desalination plant to supplement the potable water supply of Port Nolloth. Seawater will be abstracted through a collector well system at Stillbaai, and a submersible pump and underground pipeline will convey the seawater to the proposed desalination plant which will be located inside the Port Nolloth Mari Culture Park, about 3km's north of the town. Purified seawater water will be piped to the existing bulk water supply pipeline that is situated alongside the R382 at the entrance to the Park. Brine (seawater that contains high concentrations of salts and other impurities) will be returned to the sea, via a pipeline at North Bay.

Rainwater Tanks can also contribute towards to provincial water demand. Because of low, unpredictable rainfall, rainwater harvesting plays a negligible role as a water source. There are only about 150 000 rainwater tanks in South Africa at present.

4.3 WATER MANAGEMENT

The institutional landscape for the water sector is set out in the Water Services Act of 1997 and the National Water Act of 1998. The 1997 Water Services Act is the instrument that regulates the accessibility of water by domestic users. It secures the right of access to basic water supply and basic sanitation necessary to ensure efficient water and an environment not harmful to health or well-being as stipulated in the Constitution of the Republic of South Africa. In terms of the Water Services Act Water Services Institution is defined in the as a water services authority, water services provider, water board or a water services committee

Access to water is the most important resource to enable sustainable development. The Northern Cape Province is located in an arid landscape with limited access to natural water. It is therefore important for the Province to identify all possible agricultural land for irrigation purposes. The Province should also plan effective and efficiently to provide water through pipelines and channels to the possible agricultural land, and urban areas, thus unlocking the potential for rural communities and ultimately sustainable development throughout the Province. The Northern Cape Province is so vast that it expands over six different water management areas, which each provide different water schemes and irrigation schemes for human consumption and agriculture cultivation purposes. The six management areas are:

- Lower Orange Water Management Area;
- Lower Vaal Water Management Area;
- Upper Orange Water Management Area; and
- Olifants /Doorn Water Management Area.

4.3.1 Water Management Areas (WMA's)

4.3.1.1 The Lower Orange WMA

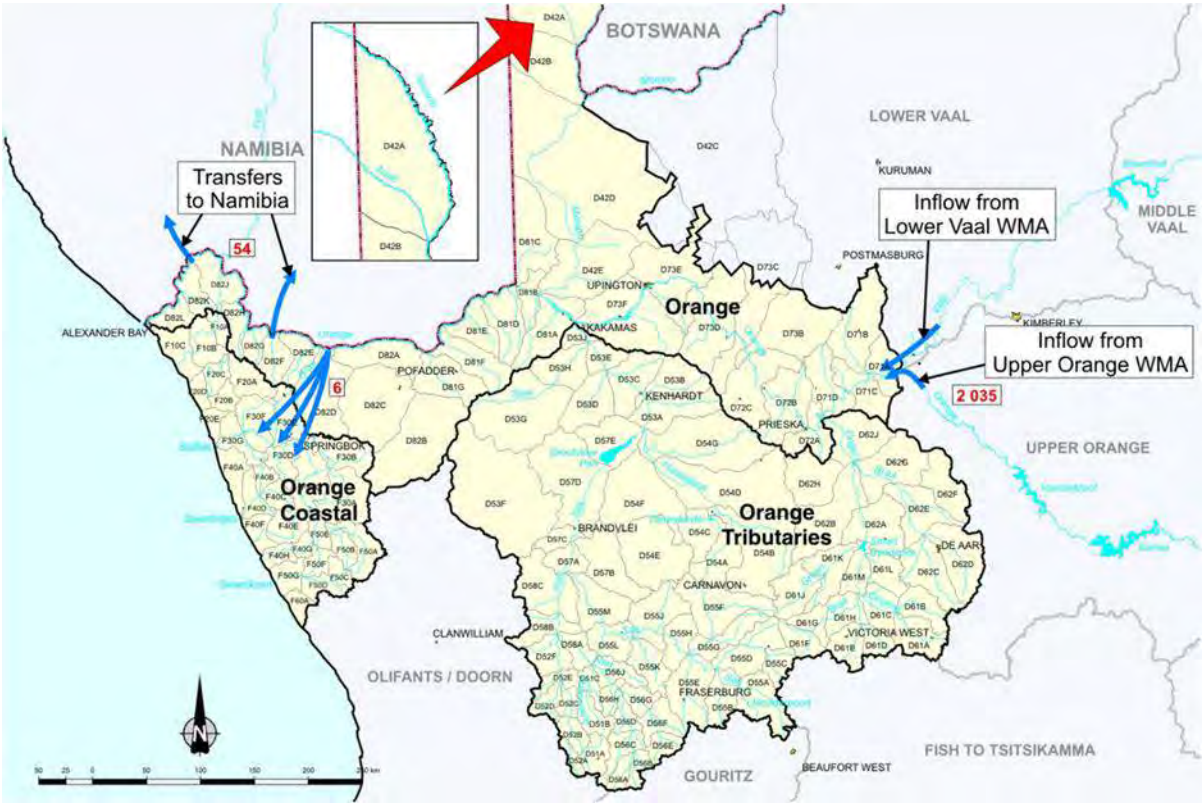


Figure 179: Overview of the Lower Orange Water Management Area (WMA)

The Lower Orange WMA forms the lower reaches of the larger Orange River Basin but excludes the Vaal River Basin. The Orange River originates in the highlands of Lesotho, where it is known as the Senqu River. The Lower Orange River is unique in that it is over 1000km long, from the confluence of the Orange with the Vaal to its point where it becomes and estuary at Alexandra Bay and eventually meets the South Atlantic Ocean. For about half this distance if forms the main border with Namibia. Near the mouth of the river is a wetland which was declared a Ramsar Site in 1991. It is home to a rich birdlife, including the endemic Barlow's Lark.

The Lower Orange Water Management Area is the largest of all the WMA's within South Africa, and for this purpose it has been divided into four sub-areas (see figure above):

- **Sub-Area 1**: Just upstream of the confluence of the Orange River with the Vaal River to Boegoeberg Weir (including just upstream of both the Orange and Vaal Rivers);
- **Sub-Area 2:** Boegoeberg Weir to Kanoneiland;
- **Sub-Area 3:** Kanoneiland to Pella; and
- **Sub-Area 4:** Pella to Alexander Bay.

The Orange River feeds several water supply schemes within the Northern Cape Province, which provide the livelihood for a range of activities in the catchment area, which would otherwise not be possible in such dry and harsh conditions. These include rural, domestic, industrial and mining activities. Furthermore, an extensive network of irrigation canals provides water for intensive agricultural activities for large sections along the banks of the Lower Orange River, which include areas of Douglas, Boegoeberg, Upington, Kakamas and Vioolsdrift. The unique landscape of the lower half of the LOWMA is home to three significant conservation areas namely the Augrabies Falls National Park, the Kgalagadi Transfrontier Park and the Ai Ais / Richtersveld Transfrontier Park.

4.3.1.2 Upper Orange Water Management Area:

The Upper Orange Water Management Area stretches from the origin of the Senqu River in Lesotho to its confluence with the Vaal River at Douglas. Land use in the Upper Orange area of the WMA is mainly under natural vegetation with livestock farming as main economic activity. Extensive areas under dry land cultivation, mostly for the production of grains, are found in the north-eastern parts of the Upper Orange. The Modder Riet catchment is dominated by agricultural activities, with limited mining, and a few urban centres. Two large hydropower stations were constructed at Gariep and Vanderkloof Dams.



Figure 180: Overview of the Upper Orange Water Management Area (WMA)

4.3.2 Lower Vaal Water Management Area:[168]

The Lower Vaal is less developed with agriculture being the predominant land use. The significant development within the system includes both formal and informal urbanisation, industrial growth, agricultural activities and widespread mining activities. The Vaal River is the only major river in the Lower Vaal WMA flowing across its south- eastern corner connecting it to the Middle Vaal and Lower Orange WMA's. The Harts River is the only significant tributary to the Vaal River as it enters the Lower Orange WMA. The largest part of the Lower Vaal WMA falls within the catchment of the Molopo River, a tributary to the Orange River. However, the Molopo is an endorheic river with its flow not reaching the Orange River. Intensive irrigation is practiced at Vaalharts and along the Vaal River. The Vaalharts Irrigation Scheme is the largest in the country and of its 35 302ha, 31 732ha is located in the Northern Cape. There are no distinct topographic features in the Lower Vaal WMA and most of the terrain is relatively flat with no climatic barriers. Climate over the Lower Vaal WMA therefore varies gradually according to the larger regional patterns. Annual rainfall ranges from about 500 mm in the east to as low as 100mm in the west. Potential evaporation can be as high as 2 800mm per year, which, as is the case with the Upper and Lower Orange WMAs, exceeds the rainfall.

[168] *Directorate National Water Resource Planning. Department of Water Affairs and Forestry, South Africa, September 2009. INTEGRATED WATER QUALITY MANAGEMENT PLAN FOR THE VAAL RIVER SYSTEM: Task 8: Water Quality Management Strategy for the Vaal River System. Report No. P RSA C000/00/2305/7.*

Olifants / Doorn Management Area



The WMA includes the Berg and Olifants catchment areas, and the major rivers, Berg, Diep, Steenbras, Olifants, Doorn, Krom, Sand and Sout. The WMA lies within the Western Cape and Northern Cape Provinces and includes Cape Town, the second most populous metropolitan area in South Africa. There are several large towns in the WMA, with economies based in tourism, education, agriculture and industry. Natural vegetation comprises large areas of Cape Fynbos, which represents one of the unique floral kingdoms of the world and is a recognised World Heritage Site. A number of conservation and heritage sites are found in the WMA. Large spatial variations in rainfall, water availability, level and nature of economic development, population density as well as potential for development for growth exists in the WMA. The Berg River catchment comprises the Upper Berg area which includes the Berg River catchment down to Misverstand Weir; the Lower Berg area, which includes the downstream reaches of the Berg River together with the endoreic areas along the west coast including the Diep River catchment and the Greater Cape Town area, the southern portion of the WMA with a number of smaller river catchments. The Olifants and Doring River catchment comprises the well-watered valleys of the Olifants River catchment, the arid Doring River catchment and the highly developed Sandveld area forming the western coastal boundary. The diversified economy of the Berg River catchment is dominated by industrial and other activities in the Cape Town Metropolitan area. Other significant economic sectors include irrigated agriculture, namely wine production, table grapes and deciduous fruit exports, and tourism. The Olifants area is dominated by extensive commercial agriculture (irrigated citrus, deciduous fruits, grapes and potatoes), but also includes tourism, livestock farming, some industries related to food processing and packaging, and limited forestry. The water resources of the WMA are fully developed and investigations are underway to assess options to

augment water supply, including water conservation and demand management, infrastructure development, re-use of water, groundwater exploitation and desalination.

4.3.3 Water Services Areas (WSA's)

Even though DWA sets national policy and strategy for water services and is the regulator, the Constitution states that local government has the executive authority in respect of the delivery and administration of potable water and sanitation services and therefor has the constitutional obligation to ensure that residents get access to water and sanitation services. The Water Services Act defines two different roles at the municipal level in terms of water services: Water Services Authority (WSA) and Water Services Provider (WSP). The WSA is in effect the local regulator, whereas the Provider carries out operation of the system on a day-to-day basis and reports to the WSA. The primary responsibility for the provision of safe drinking water rests with the Water Service Authority who has the legal responsibility to:

- Plan (through the Water Services Development Plan);
- Regulate (through the development of bylaws);
- Monitor the quality of drinking water provided to consumers; and
- Compare the results to national drinking water standards.

Communicate any health risks to consumers and appropriate authorities Although the Amendment to the Municipal Structures Act assigns WSA functions to the district municipalities (Category C), the service capacity rests with the local municipalities (Category B) and thus they continue to be the service providers. Section 78 of the Municipal Systems Act 32 of 2000, obligates all WSAs to undertake a strategic assessment to determine how to go about the water services provision function – whether the WSA can carry out the provision function by itself, or whether it can delegate it to a range of other suitable parties, be they in the public or private sector. In the Northern Cape, all local municipalities and district municipalities have been authorised as both WSAs and WSPs. No other South African Province has this situation.

On farms, the landowner provides water. In the case of the district municipalities, their authorisation is only for District Management Areas, which tend to be sparsely populated, which makes the role a relatively minor one. Most of the municipalities in the Northern Cape have capacity challenges in water services provision.

There are twenty-seven (27) Water Services Authorities (WSAs) within the province responsible for managing 173 water supply systems. Ten of the WSAs are assisted by Water Service Providers (WSAs) in 46 water supply systems with Sedibeng Water operational in 41 systems, and 5 private mines in 5 systems accordingly.

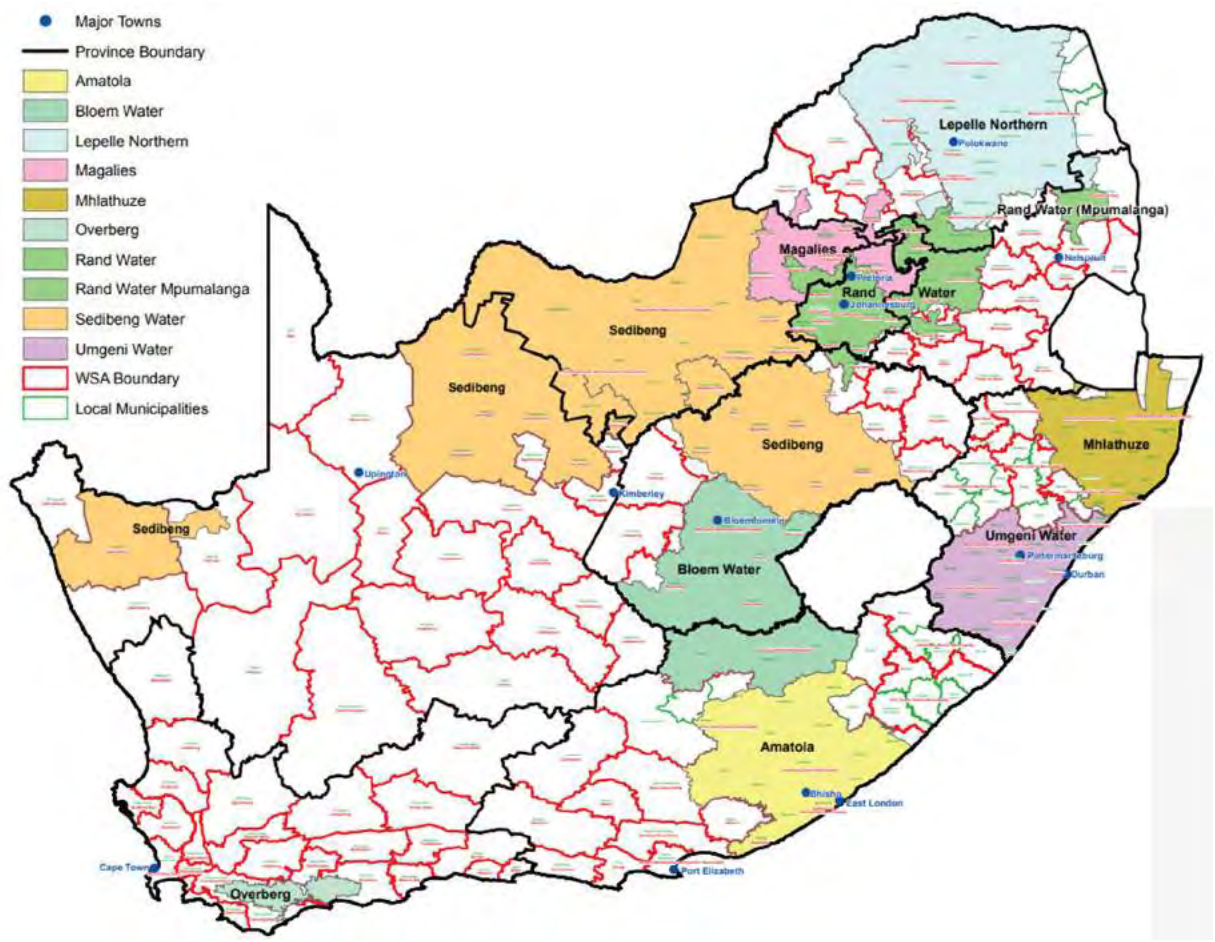


Figure 181: Water Services Areas and Water Boards (Sedibeng the only Water Board in the Northern Cape) in South Africa

4.3.4 Water User Associations (WUA's)

4.3.4.1 The Orange-Vaal Water Users' Association

Based in the Northern Cape town of Douglas, manages water use in one of the driest parts of South Africa

4.3.4.2 The Kakamas water user association



The Kakamas WUA with it offices in the town of Kakamas is situated 80 kilometres downstream of Upington in Lower Orange WMA. The area of operation stretches on both sides of the Orange River from Neusberg Weir in the east to just downstream of the Augrabies Waterfall in the west. The Kakamas WUA was established with the purpose of taking over the operations and maintenance of the Kakamas Government Water Scheme[169]. It was established in terms of Section 98 (6) of the National Water Act, 1998 by Proclamation No.516 in Government Gazette No.

[169] Development and Implementation of Irrigation Water Management plans to improve water use efficiency in the Agricultural Sector, Kakamas water user association (WSU) water management plan, 2013

22357 dated 15 June 2001 after approval of its constitution by the Minister. Certain powers and duties in terms of the National Water Act have also been delegated to the Association to enable us to perform the operation and maintenance functions of the scheme.

Table 63: A Summary of the Kakamas Water User Association infrastructure

TYPE OF STRUCTURE	TOTAL
Main canals (km)	75.4
Secondary canals/pipelines (km)	68.9
Storm water and subsurface drainage canals (km)	44.0
Sub surface pipe drains (km)	23.0
Tunnels	2
Aqueducts	4
Siphons	40
Flow measuring structures	12
Bulk water diversion structures	8
Property sluices	500
Reject structures	32

The main crops that are under irrigation include grapes (approximately 9 548 ha), and other crops such as lucerne, maize, cotton, wheat, peas and pecan nuts (approximately 1 061 ha). The towns of Kakamas, Marchand and Augrabies as well as the settlements of Lutzburg, Cillie and Aiheit form part of the Kai! Garib Municipality and abstract water within the borders of the WUA either through direct withdrawal from the Orange River by means of their own waterworks or from the canals or through a combination of both.

The average water losses have been 25.9% (8.3% unavoidable and 17.6% avoidable) of the released water from the dam into the canal system. This translated to an average of approximately 94.9 million m^3 /a water losses in the Kakamas WUA area of operation. In terms of volume, approximately 64.5 million m^3/a are avoidable losses.[170]

4.3.4.3 Vaalharts Water Use Association[171]

Situated at the confluence of the Harts and Vaal rivers on the border between North West and the Northern Cape, Vaalharts irrigation scheme was established by the government during the Great Depression years of the 1930's to curb poverty and unemployment and remains the largest in the country. The Vaalharts Water Association (Vaalharts Water) took over the water management of the government water scheme in 2003. Water for this scheme is sourced from the Vaalharts Weir which, in turn, is fed by water from the Bloemhof Dam on the Vaal River. Over 90% of the water Vaalharts water user association manages four sections supplied by Vaalharts Water is for agricultural use, with a small percentage being supplied to towns in the area. From the weir the water is diverted into two main canals which divide into smaller canals to bring water to consumers.

Apart from Vaalharts, the water user association also serves three other areas, each with its own water quota, namely Barkly West; Spitskop and Taung. There are about 1 873 abstraction points in the system. The largest served area is Vaalharts itself, which has a scheduled area of 29 181 ha. A total of

[170] *Development and Implementation of Irrigation Water Management plans to improve water use efficiency in the Agricultural Sector, Kakamas water user association (WSU) water management plan, 2013*
[171] *Water savings: Persistence pays off at Vaalharts, The Water Wheel Nov/Dec 2009*

1 120 km of main canal, feeder, community and drainage canals criss-cross this area, delivering water to hundreds of commercial and emerging farmers according to a set allocation.

Farmers grow mostly cash crops, including groundnuts, wheat and lucerne. A small number of farmers also grow pecan nuts, citrus and grapes for wine production. All major forms of irrigation are used, including flood irrigation, sprinkler and micro irrigation. Like many irrigation schemes in South Africa, Vaalharts works on the demand system, i.e. farmers only receive water once they order it. Farmers order water from Vaalharts Water through a 'segman' (spokesperson). This system is quite unique in South Africa. There are 240 such 'segsmanne' or spokespeople at Vaalharts

Table 64: Vaalharts Water User Association Infrastructure summary

AREA DESCRIPTION	VAALHARTS SCHEDULED AREA	KLIPDAM/BARKLEY WEST CANALS SCHEDULED AREA	HARTRIVIER/SPITSKOP DAM SCHEDULED AREA	TAUNG SCHEME SCHEDULED AREA:
Area	29 181 ha	2 396,7 ha	1 663 ha	6 424 ha (only 3 759 ha currently irrigated)
Allocation	Allocation: 9 140 m3 /ha/year	11 855 m3 /ha/a (mainly for grazing)	7 700 m3 /ha/year	8 470 m3 /ha/year
Main canal length	100 km	320 km	55 km	
Feeder canal length	180 km			
Community canals	540 km			
Drainage canals	300 km			
Max flow capacity	38,3 m3 /s		5 m3 /s	18 000 m3 /hour

4.3.4.4 Boegoeberg Water User Association[172]

The Boegoeberg Dam is effectively a concrete weir which was initially equipped with 68 sluices designed to allow sediment to pass through the structure. The original capacity of over 40 million m^3 has been reduced through sedimentation to the current capacity of approximately 20 million m^3 and appears to have reached some form of equilibrium. The sediment sluices have recently been closed permanently and the structure is now effectively a concrete weir which supplies water into a canal on the left bank. The canal was extended in the 1970's to be 172 kilometres long. Siphons were built to serve irrigation farmers north of the Orange River from the main canal on the southern bank with the 38km Gariep canal, the 8 km Rouxville West canal and the 40 km Northern Orange canal. The canal wall height had to be extended at some sections to accommodate the higher flow demand due to

[172] *Development and Implementation of Irrigation Water Management plans to improve water use efficiency in the Agricultural Sector, Boegoeberg water user association (WSU) water management plan, 2013*

these additions. The Boegoeberg water user association was established in 2003 and is an amalgamation of the Boegoeberg GWS, the Northern Orange IB, the Gariep IB, a portion of the Middle Orange Irrigation Area, and the Karos-Geelkoppan Water Board. The total area under irrigation is 9 198 ha. The Boegoeberg water user association supplies 306 irrigators. Nine livestock farmers are also supplied with water for domestic and animal use. The main crops that are under irrigation include grapes, lucerne and maize and other crops such as cotton, wheat, peas and pecan nuts.

4.3.4.5 Kalahari East Water User Association

The Kalahari West Scheme's water is pumped from the Orange River in Upington and then purified mainly for livestock and human consumption. The average water requirements amount to approximately 1545m^3/day. The scheme provides purified water to farms in the West Kalahari with a total area of approximately 600 000hectares. The Vaal-Gamagara Government Water Scheme, provide the Kalahari East Scheme with water that is purified in order to supply 256 livestock farms and settlements, with a total surface area of 1,4 million hectares. This water is sourced from Vaal River. Another 11 farms with a total surface area of 65 000 hectares are supplied with water from the Karos Geelkoppan Water Board. The scheme gets its water from the Orange River.

4.3.5 Water Tariffs

To sustain water and sanitation services it is essential to recover costs, thus cost reflective tariffs and payment for services are essential. Tariffs must however be affordable and cater for the indigent. The latter is achieved through the FBW (free basic water) and FBS (free basic sanitation) policies. FBW is most often applied through the use of a rising block tariff, with the first block being set at a zero tariff. An effective payment mechanism must also ensure water is used effectively and sparingly. Unfortunately, in most municipalities, water services tariffs are not cost reflective and the service runs at a loss. In future many municipalities will have to increase tariffs substantially[173].

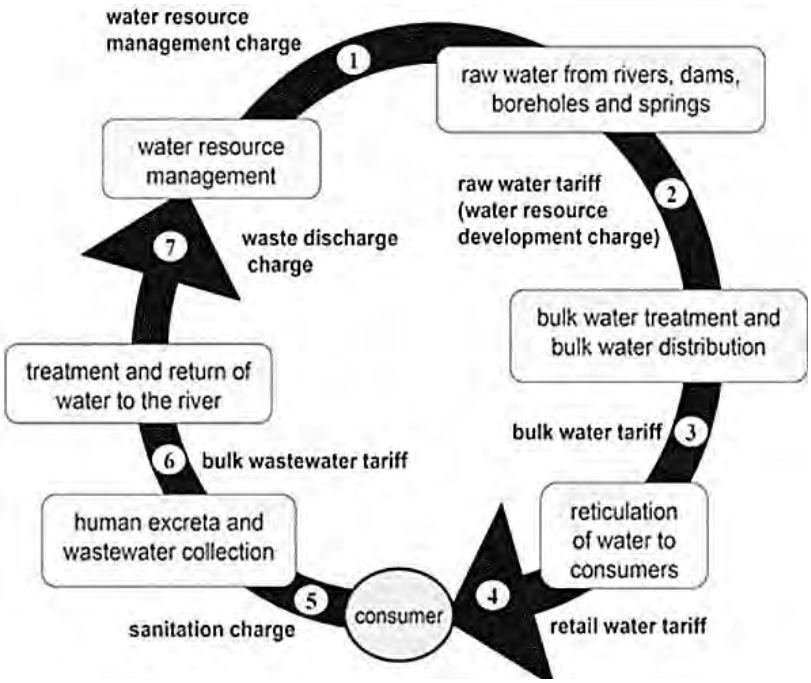


Figure 182: Processes determining water tarrifs

[173] *Strategic overview of the water services sector in South Africa 2015*



The Department of Water Affairs monitors all tariffs along the water provisioning cycle annually, including water management charges, raw water tariffs, water board tariffs and municipal tariffs for domestic, commercial and industrial users. All WSAs are required by legislation (WS Act and MFMA) to establish tariff policies and set tariffs annually. The tariffs must take into account the operational costs, capital repayments, refurbishment and asset management needs. There are three types of municipal water tariffs, namely residential, commercial and industrial. In general, residential tariffs are less than commercial and industrial tariffs up to about 60 kl/month, after which they equalise. Lower tariffs are associated with poorer areas, such as the Eastern Cape, Limpopo, Mpumalanga, North West and Northern Cape provinces. Rural tariffs are less than urban tariffs and generally flatter as there is less opportunity to cross subsidize from affluent customers.

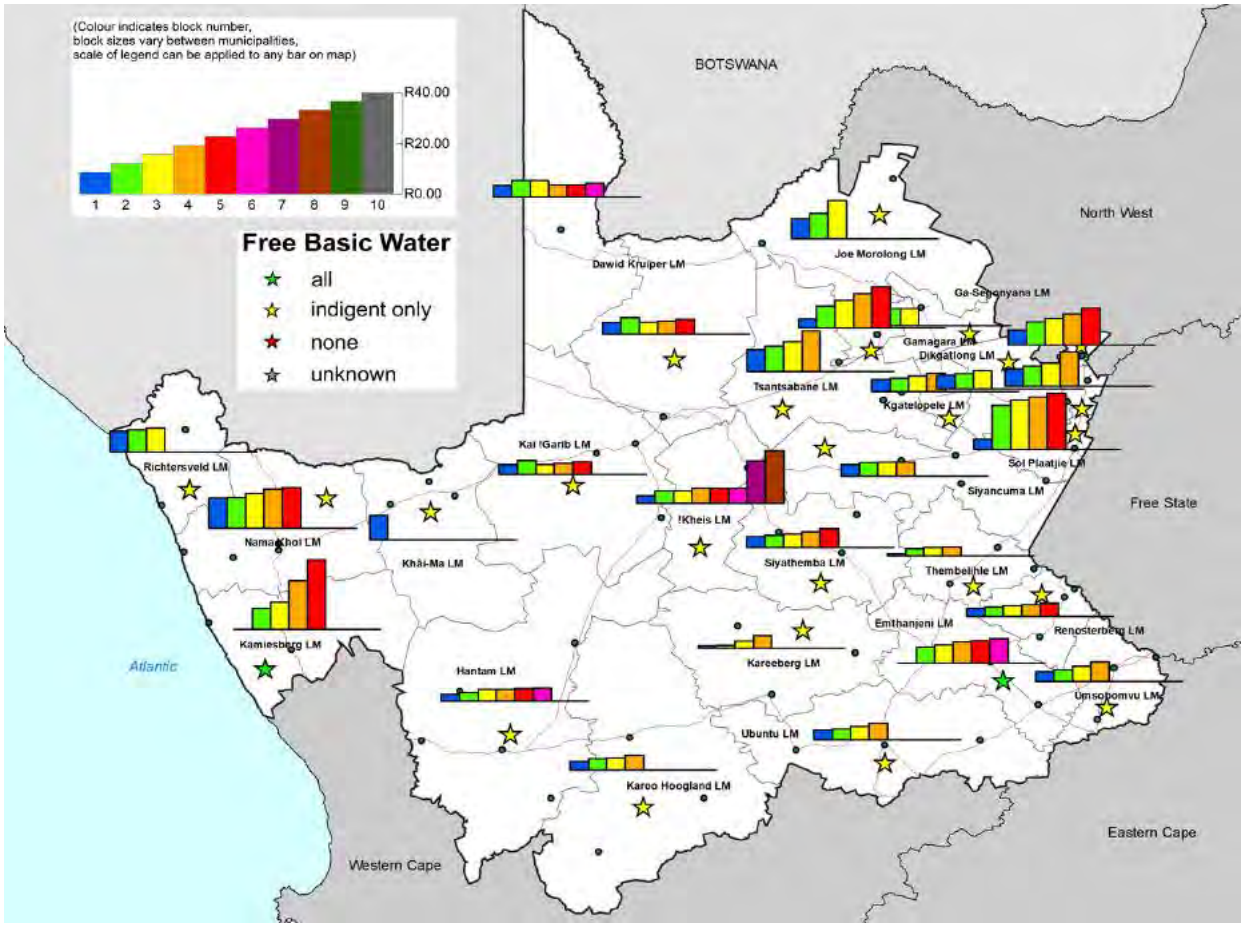


Figure 183: Overview of Municipal Water Tariffs per WSA, Northern Cape Province

Figure 183 shows the municipal water tariffs for municipalities in the Northern Cape which should reflect the accumulated tariff from source to tap. Most of the rural towns have very low water tariffs, which are not cost-reflective, and most likely subsidized from other services and equitable share. Kamiesberg LM has the typical tariff structure that is expected for sustainable water supply. Water

tariffs are not cost-reflective resulting in short-fall on cost recovery from users, which requires implicit subsidies from the fiscus. Irrigation tariffs benefit from under-priced water which places an increased responsibility on other sectors and the fiscus to balance the cost/revenue equation. The current inequality through water pricing policies must also be reviewed whereby some systems benefit from existing infrastructure (mostly historically funded by the fiscus) and have a large established user base, lowering the unit cost of water to those users through economies of scale. Areas that have been neglected previously in terms of water and sanitation infrastructure, needs to be developed at current cost of implementing infrastructure resulting in a higher unit cost of water.

4.3.6 Water Balance[174]

> *"South Africa will run out of water in 2030 unless there is a complete mind shift about the true value of water and a R899bn investment into the sector for the next decade, South Africa is currently investing in water and sanitation infrastructure, but this is not nearly enough to address the massive backlog in getting new infrastructure built and refurbishing the old. The plan said to make sure the country does not run out of water, the total estimated capital investment requirement was R899bn a year – R33bn a year more than was currently being spent, leaving a 37% funding gap."*

According to DWS's Water Authorization and Registration Management System database[175], the total registered water usage, (not to be confused with actual use), has already reached the estimated 2025 high water requirement of 17.3 billion m^3/annum. Current water usage already exceeds reliable yield and will mean that during a drought year it is likely that the country will experience water restrictions on a fairly large scale. Additional water resources need to be developed in order to provide for increased domestic water requirements. In future some Water Management Areas will need to develop additional local water resource bulk infrastructure. A National Bulk Water Services Infrastructure Programme has been established by the DWS to address this deficiency.

[174] *Department of Water Affairs, National Water and Sanitation Master Plan, first draft for public inputs, 2018*
[175] *Strategic overview of the water services sector in South Africa 2015*

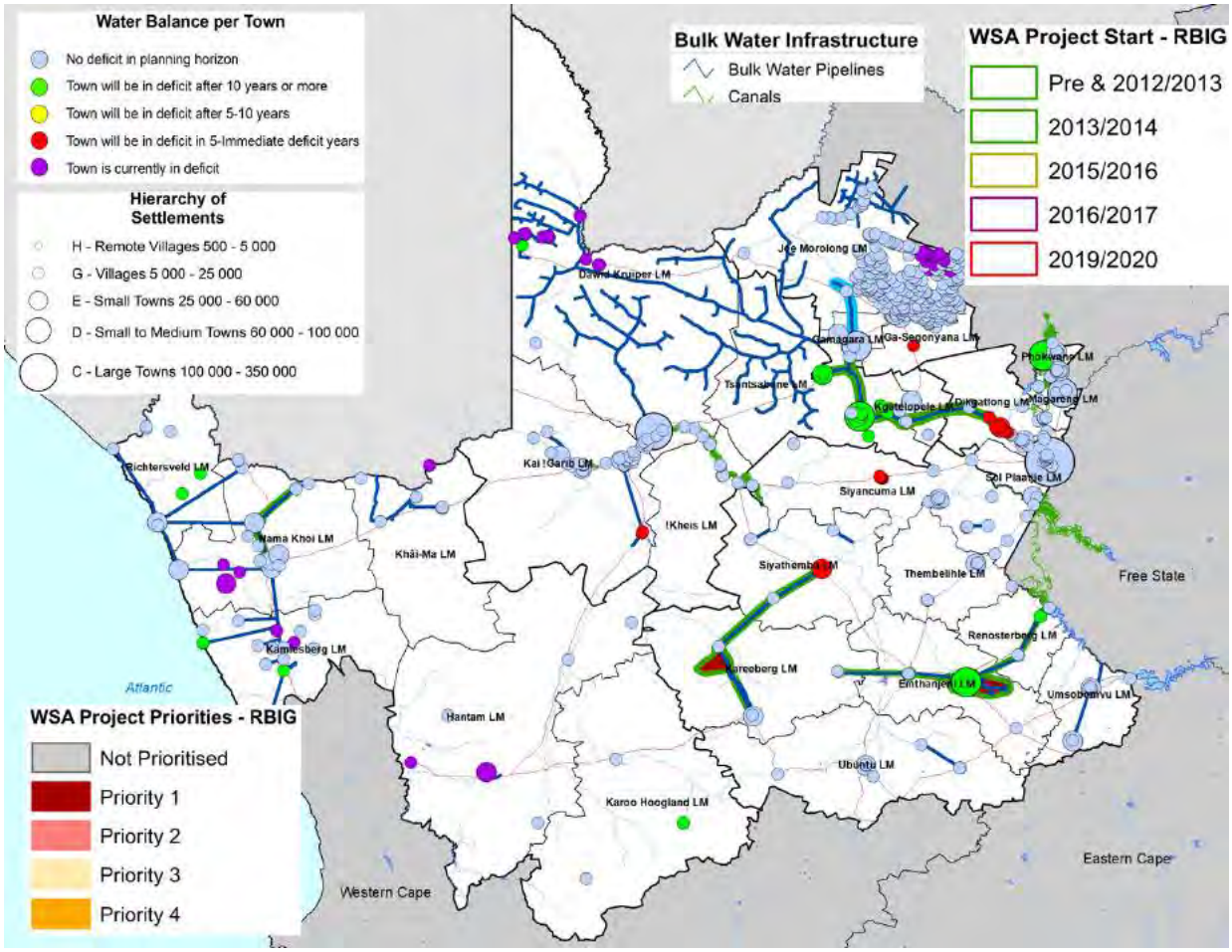


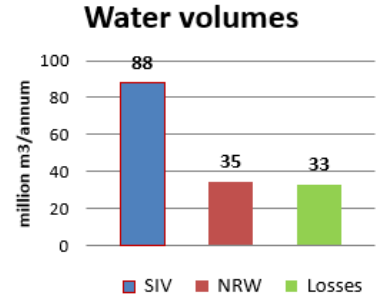
Figure 184: Overview of water scheme balance, water project priorities and regional water projects in the province

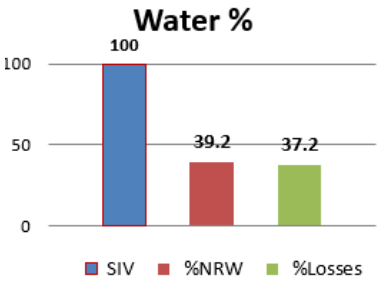
The current water balance of each water supply scheme is shown in Figure 184. The figure shows that most towns along the Vaal and Orange rivers, those in the vicinity of the Vaalharts irrigation scheme and those served by the Vaal-Gamagara scheme, do not have a water resource shortage in the planning horizon to 2030. Those in green are also in balance for a further 10 years, but the purple schemes are already in deficit and need urgent intervention. In the longer term, it is government's intention to ensure that all households receive 50 to 60 litres per person per day via an individual connection, either in the house or yard. Currently, high and medium levels of domestic water use about 4 billion m^3/annum (89% of the total urban and rural use), which is approximately 26% of the total water requirement. Unfortunately, South Africa's gross average consumption of 229 litres per person per day is too high for a water scarce country. This limits the potential to provide an increased level of service.

With South Africa being the 30th lowest country in per capita water availability, the situation is far more pressing for this country than others. climate change has received a great deal of attention, but an important additional consideration, which is often forgotten, is that possibly the most serious way in which climate change will manifest in South Africa is through the subsequent impact on our already scarce water resources. In the past, South Africa has invested heavily in water infrastructure and this is, in part, why the country has enjoyed a false sense of water security. Water supply issues cannot be solved by simply building more dams or creating more infrastructures, but relies heavily on

rehabilitating, maintaining and conserving the natural areas which form the critical catchments and "water factories" for the country. Without investing in the ecosystem, dams and other infrastructure will be rendered useless – water does not come from dams.[176]

4.3.7 Water losses





Non-revenue water (NRW), is the term used by the International Water Association (IWA) to represent the volume of water used by a municipality, for which no income is received. It assumes that water billed is paid for and excludes bad debt. The IWA water balance has been modified for the South African situation, (see overleaf). Municipalities currently use about 4500 million m^3/annum, of which 39% is NRW and 36% WL.

Average per capita consumption is about 230 litres, high for a water scarce country. Although the %NRW compares well with international norms, there is definite scope for improvement given the high per capita consumption. Halving water losses will mean an annual saving of over R2 billion, excluding the additional income from improved metering and billing, deferred capital costs and electricity savings.

The highest NRW and WLs are found in the smaller, more rural municipalities. Fortunately, their impact is not large. Category B4 municipalities only use about 17% of the national volume, whereas metros use about half. However, NRW and WL percentages are increasing fastest in the B1 and B2 category municipalities. This is most probably because they still have relatively complex systems but lack the skills and capacity to manage them. About half of the municipalities cannot, at any given time, provide reliable water balance data, said to be due to a lack of water meters and inadequate skills and capacity.

The percentage water losses for each municipality varies from 13,3% in Karoo Hoogland to as high as 73,8% in Dikgatlong. The total volume of water lost each year amounts to 33 million cubic meters which is equal to the storage capacity of a dam with dam wall height of 35-40m such as Koppies Dam in the Free State, Steenbras Dam in the Western Cape or Middelburg Dam in Mpumalanga. It is needless to say that such water losses are too high and must be reduced through dedicated water leak detection and repair programmes. The national average for municipal water losses was established in a 2012 report submitted to the Water Research Council by water engineering firm WRP (no updated report was released since 2012).

[176] *WWF-South Africa, Water Balance Programme,2012*

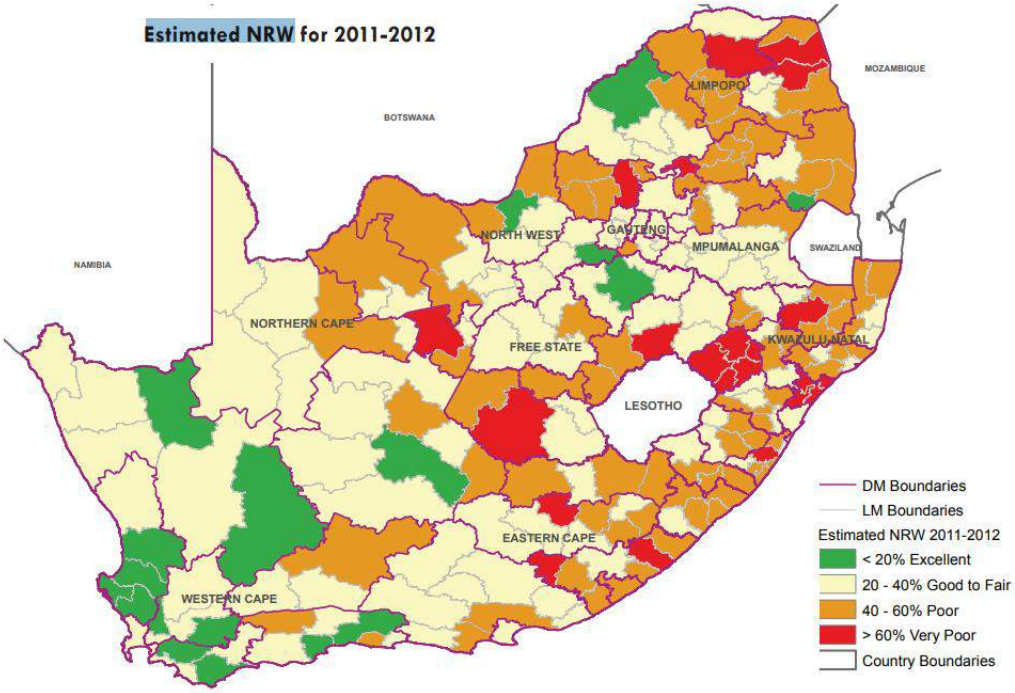


Figure 185: Non-revenue water (NRW) average for municipal water losses as established in a 2012

4.3.7.1 War on Leaks Programme

There are currently 759 youths in the Northern Cape training as Plumbers, Artisans and Water Agents. They are training at TVET colleges in various disciplines namely plumbing, instrumentation, fitting and turning, electrical and welding. There are 57 youths training as plumbers, 185 electrical workers, 82 fitters and turners, 24 instrumentation technicians, 36 welders and 320 water agents. Some trainees have been placed at various municipalities in the province, namely Sol Plaatjie, Ga-Segonyana, Dikgatlong, Emthanjeni, Joe Morolong, //KharaHais (now Dawid Kruiper), Magareng, Nama-Khoi and Umsobomvu Local Municipalities to gain the required experience.

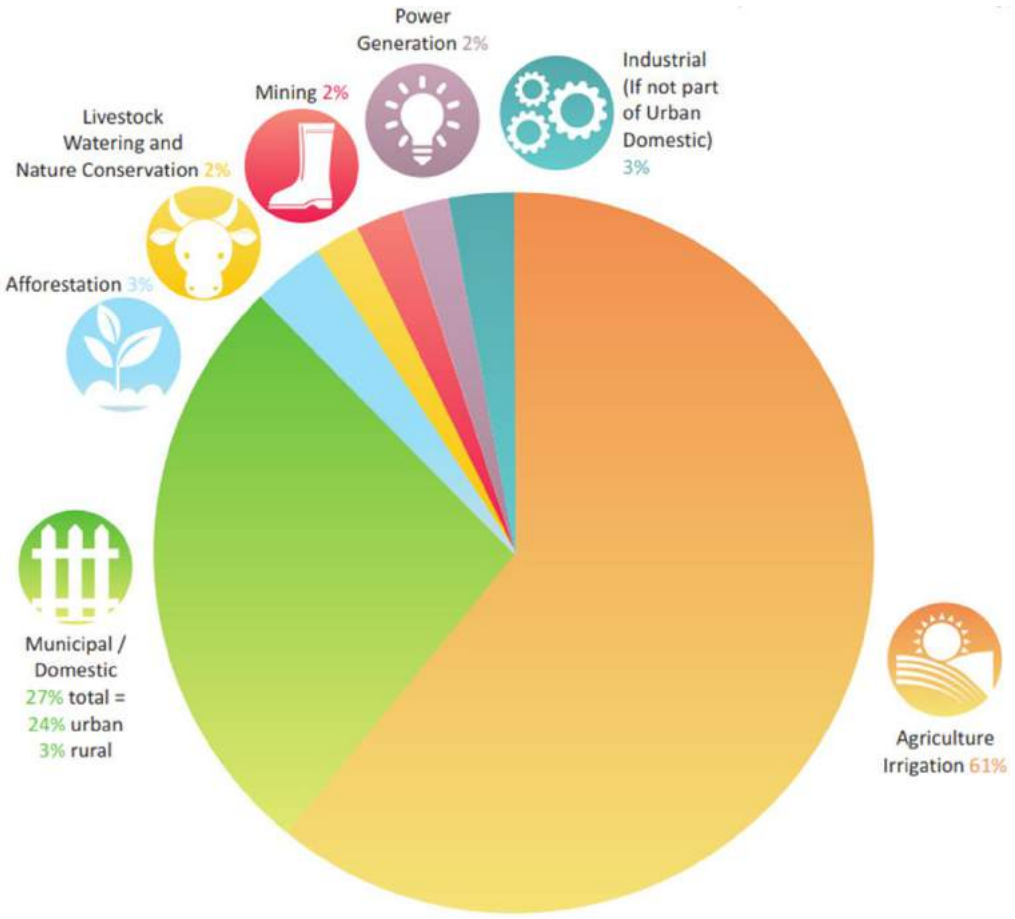
3.3 WATER USAGE

The distribution of water use by sector has been assessed with project future demand projections estimated for each of the respective sectors. The sector breakdown and future projections are presented in the table below:

Table 65: Projections of Water Use Requirements[177]

NO	USER SECTOR		
		(2015)	2030
1	Agriculture (irrigation and livestock watering)	9 000	9 700
2	Municipal (industries, commerce, urban and rural domestic)	4 447	5 800
3	Strategic/Power generation	362	430
4	Mining and bulk industrial	876	1 017
5	Ecology		
6	International obligations	178	178
7	Afforestation	431	434
TOTAL		**15 294**	**17 559**

[177] *Department of Water Affairs, National Water and Sanitation Master Plan, first draft for public inputs, 2018*



Graph 71: Distribution of water use by sector, 2017

It will be noted that Agriculture is the largest user at 61% of the total water use, followed by municipal and domestic use at 27%. Municipal domestic, commercial and industrial water use is about 30% of the total water use in South Africa. The domestic water use can further be split into urban use of 24% (metros 16%) and rural use 3%.

4.3.8 Water demand

The table below indicates how a range of infrastructure projects as well as demand management are needed if we are to build water security by 2030. Without demand management, currently planned infrastructure development and the broadening of the water mix will not be sufficient to balance supply and demand. However, if the targets of reducing physical losses in municipalities are reached, as well as a reduction in the per capita consumption to the global average, in addition to the surface and groundwater supplies, and desalination, re-use and treated Acid Mine Drainage, there will be a slight surplus available in 2030. It must be recognised, however, that achieving these targets will require significant investment and capacity. It must also be recognised, that these figures are national and do not address specific areas where even bigger interventions will be required to address local shortages

Table 66: South Africa water demand projection, towards 2030[178]

2030 DEMAND PROJECTIONS (MM3)			
	Without interventions	**With urban losses reduced from 35% to 15%**	**With domestic demand reduced from 237 l/c/d to 175 l/c/d**
Agriculture *(irrigation and livestock watering)*	9 700		9 700
Municipal *(industries, commerce, urban and rural domestic)*	5 800	4 941	3 696
Strategic/Power generation	430		430
Mining and bulk industrial	1 017	1 017	1 017
International obligations	178		178
Afforestation	434	434	434
Total Demand	**17 559**		**15 455**
Deficit	-939	-80	1 165
Total Supply	16 620		16 620
2017 total supply	13 000		
Increased surface water storage	1 400		
Increased groundwater use	1 500		
Desalination	365		
Re-use	300		
Treated AMD	55		
SURPLUS WATER AVAILABILITY	**-5%**	**0%**	**8%**

4.3.9 Future scenario[179]

A path to water security has been identified using a forecast of national-level water supply and demand in South Africa. The report uses the International Futures forecasting system housed at the Frederick S Pardee Center for International Futures at the University of Denver. The analysis culminated in the Closing the Gap scenario (See Figure below). This scenario includes both demand and supply side interventions. On the demand side, the country reduces total withdrawals by 1.2 km3 by 2035 (relative to a forecast where water use continues as usual). On the supply side, the scenario includes an increase in the amount of treated wastewater by about 0.72 km^3 and the use of an additional 0.3 km^3 of additional groundwater, relative to the supply forecast above.

In the Closing the Gap scenario, South Africa can again have a surplus of renewable water by around 2030. However, this scenario depends on the Department of Water and Sanitation implementing all of the planned reconciliation strategies on time and to specification.

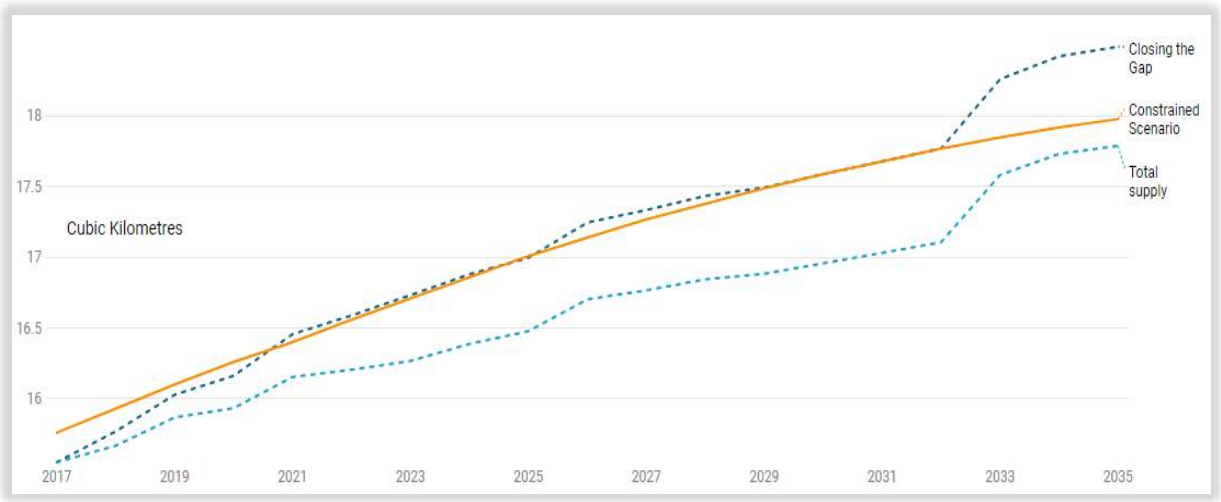
It will take a substantial financial investment, a commitment to effectively maintain and manage existing infrastructure, and a willingness to make tough decisions. But there are examples from around the world that indicate these targets may be within reach. In Israel more than 90% of wastewater is

[178] *Department of Water Affairs, National Water and Sanitation Master Plan, first draft for public inputs, 2018*

[179] *South Africa can balance its water system, but the clock is ticking by Zachary Donnenfeld, Senior Researcher, African Futures and Innovation, Institute for security studies(ISS), Pretoria. 2018*

treated, compared to less than 60% in South Africa. If South Africa is able to approach Israel's level of wastewater treatment, it could easily achieve the 0.72 km^3 target outlined in the ISS report.

There are similar lessons to be drawn in the area of non-revenue water. Australia has limited non-revenue water to roughly 10% of municipal demand, compared to 41% in South Africa. If South Africa were to match that effort, it could reduce demand by well over 1 km^3. Government must find policies to encourage the more responsible use of water throughout the country. Given the low price of water in South Africa, a more aggressive tiered pricing structure is an option. Many municipalities already employ tiered pricing, but the scales vary dramatically and may not effectively discourage heavy consumption. In the United States, tiered water pricing has discouraged high levels of consumption in many parts of the country. The city of Tucson in Arizona has reduced per capita consumption to the extent that today, total water consumption is roughly the same as it was in the 1980s, despite the population growing by more than 25% since then.



Graph 72:Water demand (solid line) and supply (dashed lines) forecasts for South Africa,2018

A tiered pricing structure could be an effective tool to sustainably reduce demand side pressure on the water system over time, without resorting to the kind of harsh restrictions currently in place in Cape Town. The idea behind tiered pricing is that water meant for essential human needs is as affordable as possible, while water used to maintain a luxurious garden is relatively expensive. Tiered pricing in South Africa is a delicate issue though. If South Africa does pursue tiered pricing, it must exercise extreme caution not to impede access for the nearly three million residents that do not currently have reliable access to a source of clean water. There are a number of strategies that could bring stability to South Africa's water system. The real question is what basket of incentives, deterrents and penalties policymakers choose to embrace.

Unfortunately, this naturally complex phenomenon is further complicated by a lack of reliable and publicly available information. The Department of Water and Sanitation used to publish an annual Blue Drop Report but stopped in 2014. These reports provided a regular public update on the state of water infrastructure. Its absence makes it difficult to say with certainty how bad the situation is. However, South Africa's water sector is unlikely to have improved significantly since that report was last published.

Whatever the ultimate strategy for restoring stability to South Africa's water system, demand management will be an important, and probably unpopular, component. It is important for national government to make the necessary long-term investments in bulk infrastructure.

"… it is also incumbent upon municipalities and provinces to help with maintenance and demand management, and for the average South African resident to start using less water"

4.4 WATER INFRASTRUCTURE

4.4.1 Existing infrastructure

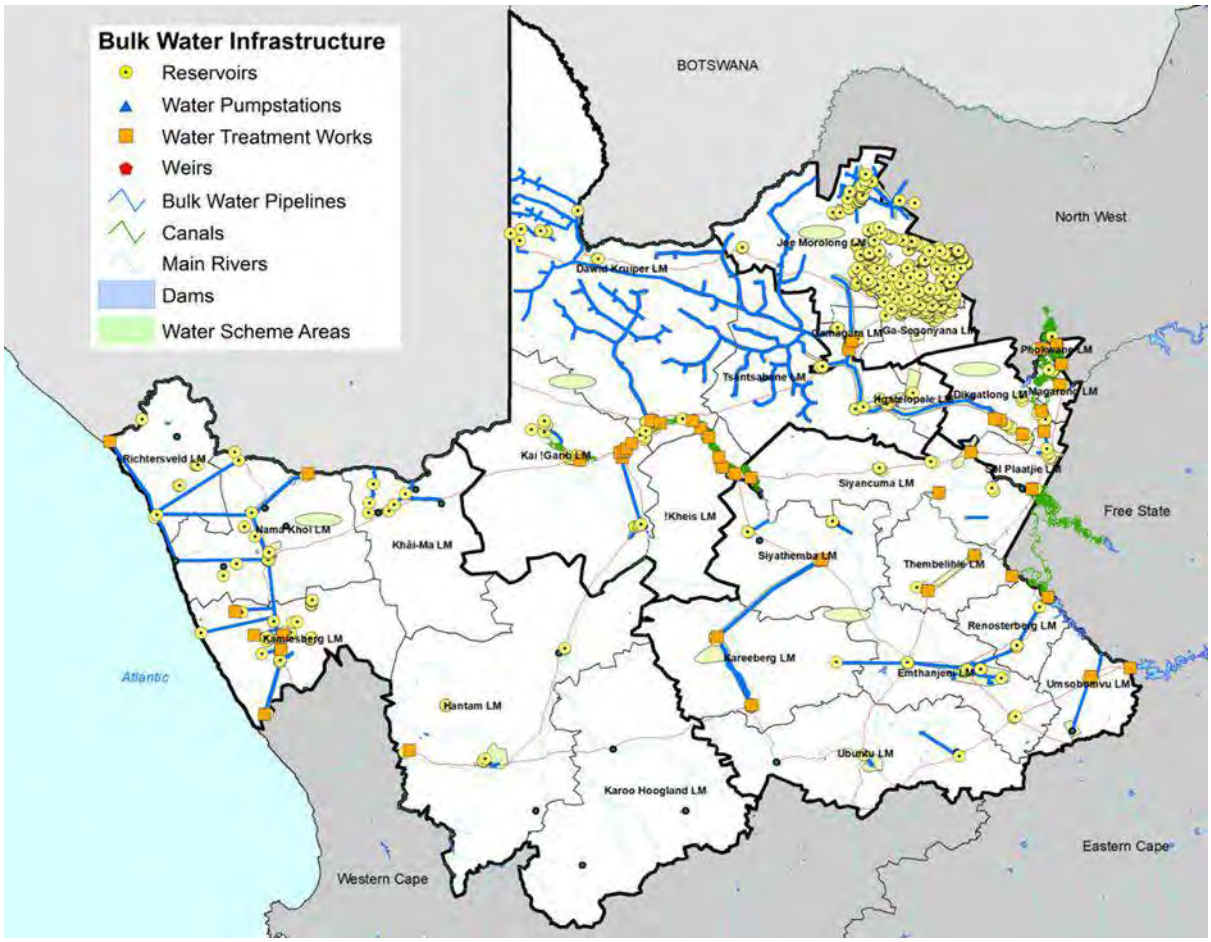


Figure 186: Existing water infrastructure network overview of the province

The figure above provides an overview of the key water infrastructure assets within the province. The Northern Cape Province has a well-established water infrastructure network that provides water to most of the drought-stricken areas in the province. Most of the infrastructure however requires urgent maintenance and refurbishment which is a cause of concern towards growth and development in the province.

4.4.1.1 Bulk water pipelines

Due to the arid climate within the Northern Cape, water is abstracted from the Orange River and supplied to urban centres and other initiatives via several different water supply and irrigation schemes throughout the management area. The main supply pipes include the following:

- **Kalahari West rural water supply scheme** where water is abstracted from Upington and supplies areas far north in the Dawid Kruiper Local Municipality through a pipeline network;
- **Karos-Geelkoppan rural water supply scheme** abstracting water from before Upington, supplying areas in the north via a single pipeline;
- **Pelladrift water supply scheme** where water is abstracted and transported by two pipelines, one supplying local farmers and the towns of Pofadder and Pella, and the other supplying domestic use for the small town of Aggeneys, but more importantly for industrial use for the base metals mine, Black Mountain at Aggeneys;
- **Springbok regional water supply scheme** which abstracts water at Henkriesmond and is transferred via a long pipeline to supply domestic use and small-scale livestock watering in the farming communities of Springbok, Steinkopf, Nababeep, Okiep and Kleinsee;
- **Namibian pipelines** before Alexander Bay, close to Sendelingsdrift, Karas, on the Namibian side, there are two pipelines leading from the main stem of the Lower Orange River that supply the mining activities of Rosh Pinah and Skorpian Zinc; and
- **Port Nolloth** is supplied by a pipeline leading off from the Orange River at Alexander bay for the purpose of domestic use, a small fishing harbour and small- scale diamond mining.

4.4.1.2 Water treatment works

A total flow of 93Ml/day is received at the 71 treatment facilities, which has a collective hydraulic design capacity of 150Ml/day (as ADWF[180]). This means that 62% of the design capacity is taken up by the current operational flows, leaving a 38.5% to meet the future demand without creating new capacity.

Table 67: Number and type of Water Treatment Works within the Northern Cape Province, 2014[181]

	MICRO SIZE <0.5 Mℓ/day	SMALL SIZE 0.5-2 Mℓ/day	MEDIUM SIZE 2-10 Mℓ/day	LARGE SIZE 10-25 Mℓ/day	MACRO SIZE >25 Mℓ/day	Undetermined	Total Mℓ/day
No of WWTPs	13	31	10	1	2	14	71
Total Design Capacity (Ml/day)	3.7	29.0	41.7	16.0	60.0	14	150.3
Total Daily Inflows (Ml/day)	1.0	7.0	35.4	13.0	36.9	40	93.3

4.4.1.3 Existing bulk projects

The following table list the current water infrastructure projects that are funded and managed by Department of Water Affairs within the Northern Cape Province:

[180] *ADWF = Average Dry Weather Flow.*
[181] *Department of Water Affairs, Northern Cape Province: Green Drop Assessment, 2013*

Table 68: List of current water infrastructure projects in the Northern Cape Province

PROJECT NAME	PROJECT CODE	ASSET TYPE	PHASE / READINESS
Heuningvlei / Moshaweng BWS[182] FS	NCR005	Unknown	Feasibility Study
Heuningvlei / Moshaweng BWS FS	NCR005	Regional Bulk	Construction
Vaal Gamagara pipeline investigation	NCR009	Regional Bulk	Feasibility Study
Richtersveld BWS FS	NCR001	Unknown	Feasibility Study
Refurbishment of Namakwa WTW	NCR012	Regional Bulk	Construction
Oranje River – Colesberg to Noupoort Bulk Water Supply	NCR010	Regional Bulk	Construction
Van Wyksvlei interim solutions	NCR006/1	Unknown	Construction
Riemvasmaak BWS	NCR013	Regional Bulk	Construction
Tsantsabane BWS	NCR011	Regional Bulk	Construction
Pixley Ka Seme BWS FS	NCR003	Unknown	Feasibility Study

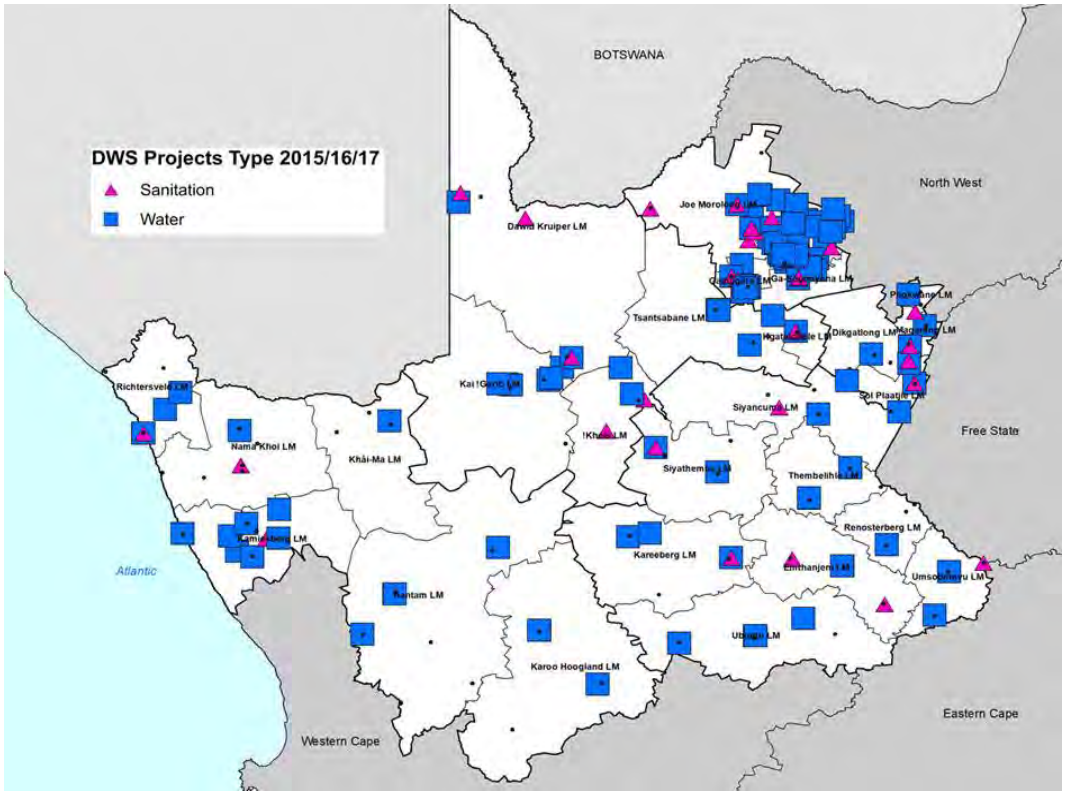


Figure 187 : Most recent DWS (WSIG and RBIG) projects by type in the Northern Cape Province, 2017

[182] *BWS = Bulk Water Supply*

4.4.1.4 Irrigation schemes

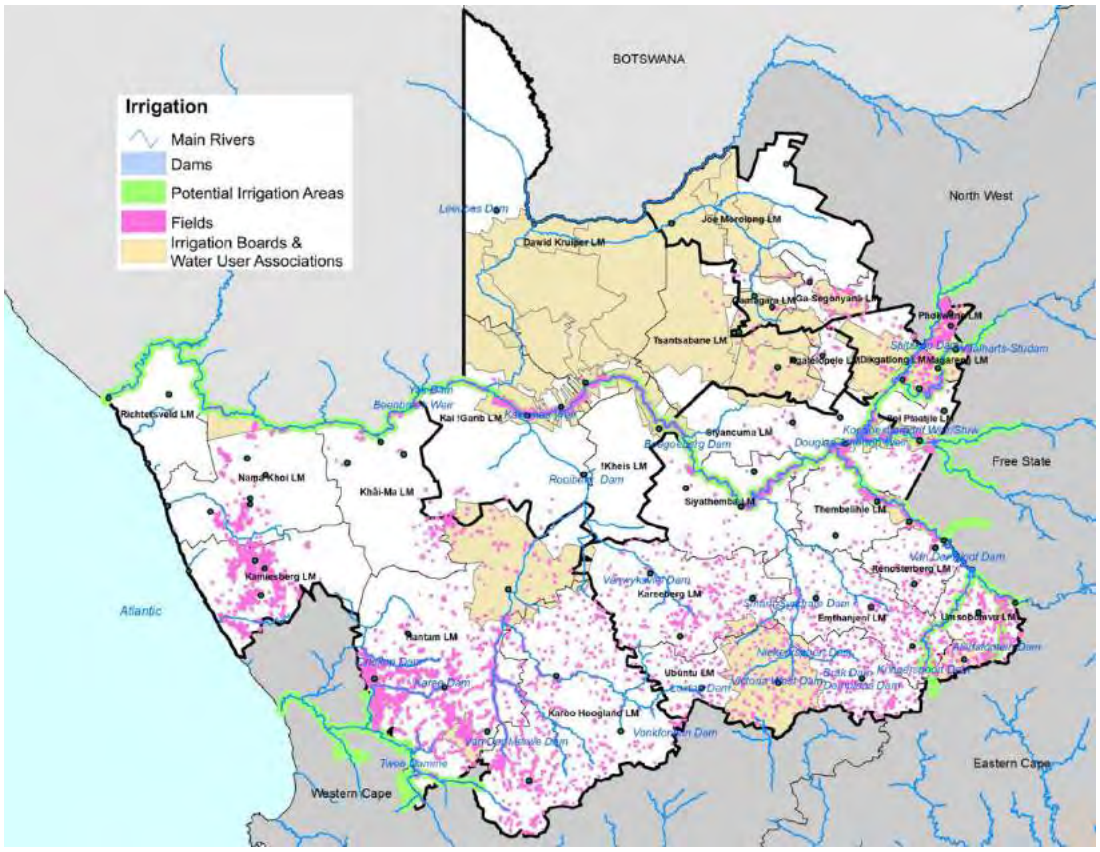


Figure 188: Irrigation schemes of the Northern Cape Province

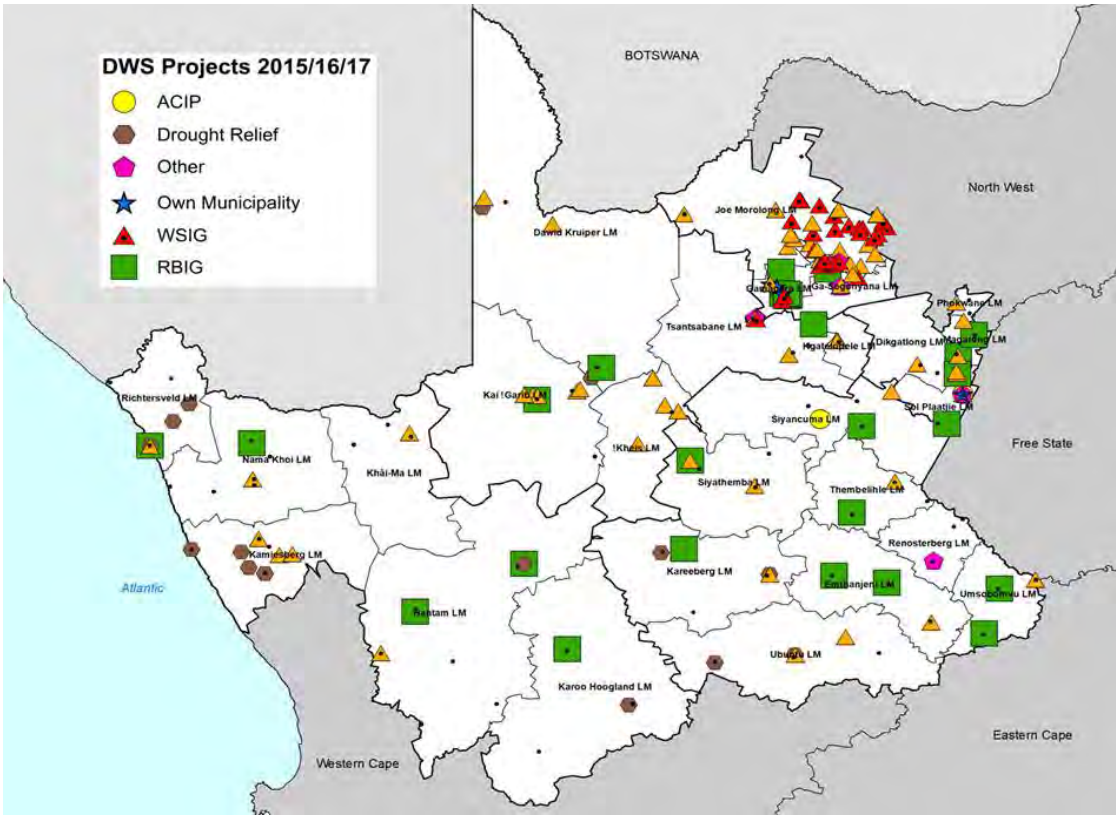


Figure 189: Department of Water and Sanitation Projects 2015-2017

Most of the surface water is used by the agricultural sector for irrigation purposes and as drinking water for livestock. The towns and settlements along the Orange River also utilised this source extensively. The total combined irrigated area for the Vaal and Orange basins in South Africa is approximately 300 000 ha (FAO 1997). Water use for that area is 2 779 Mm^3/yr and with a potential use of 4 300 Mm^3/yr irrigation potential was estimated for 2010 at 352 500 ha.

4.4.1.4.1 Orange Water Management Areas

The irrigation schemes in the Upper and Lower Orange WMAs mainly consist of a series of weirs and canals, providing water to riparian farmers on both banks of the Orange River. The main irrigation schemes in the Northern Cape are:

4.4.1.4.1.1 Middle Orange Irrigation Area

The Middle Orange Irrigation Area comprises riparian irrigators from Hopetown to Boegoeberg Dam. The area irrigated from Marksdrift to Boegoeberg Weir amounts to approximately 15 434 ha. Irrigators in this area are not part of a formalised scheme with a common supply system. Irrigators abstract water directly from the Orange River individually basis and are supported with releases from Vanderkloof Dam.

- **Modder/Riet Irrigation Scheme**

The Orange-Riet canal is supplied with water from Vanderkloof Dam via the Vanderkloof Canal. An area of approximately 21 750ha is irrigated and includes the Riet River settlement, developments along the Orange-Riet Canal, Scholtzburg and Ritchie Irrigation Boards and the lower Riet River Irrigation Board. The first 74km of the canal has a capacity of 16 m^3/s while the last 38km has a capacity of 13 m^3/s. Provision has been made to increase the capacity of the canal to 24 m^3/s.

- **Boegoeberg Scheme**

Boegoeberg Dam is located about 150km upstream of Upington in the Orange River, and is the major structure supporting the releases to the Boegoeberg irrigation area. Sedimentation has decreased the capacity of the reservoir from its original 34,7 Mm^3 to only 20,7 Mm^3. The Boegoeberg Canal is a 172km long canal on the left bank with a capacity of 9,76 m^3/s. Water for irrigation is supplied to the Noord-Oranje Irrigation Board as well as to the Gariep Settlement. The Boegoeberg Canal on the left bank also supplies water to the Rouxville West Scheme.

4.4.1.4.1.2 Kakamas Government Water Scheme

The existing irrigation scheme supplies water to 5 070ha of irrigation land located near Kakamas in the Northern Cape Province. The objective of the project was to increase the canal system capacity to 7m^3/s by upgrading and refurbishing the existing infrastructure. The project involved raising and relining 85 km of main and secondary canals and construction of an extensive network of storm water and sub-surface drains. As part of the project various existing canal structures had to be upgraded and many new structures were constructed including diversion works at the abstraction weir.

The scheme abstracts its water from the Neusberg weir on the Orange River. The canal system consists of 85 km of main and secondary canals with maximum capacity of 7m^3/s. Various types of structures were upgraded and where required new structures were constructed. These included numerous long

weirs, reject weirs, siphons, flow gauging structures, offtakes, super passages, drainage system along and across the canals, etc.

4.4.1.4.1.3 Keimoes Canal Irrigation Area

Keimoes irrigation area consists of various Irrigation Boards, each with its own diversions from the Keimoes Canal which obtains its water from the Orange River. The scheduled area for the Boards abstracting water from canals is 5 089ha and 296ha is scheduled with water abstraction from the river.

4.4.1.4.1.4 Onseepkans Irrigation Area

Onseepkans irrigation area is supplied through a canal on the left bank of the Orange River. The capacity of this canal is unknown, but it supplies water to 314ha of irrigation land.

4.4.1.4.1.5 Namakwaland Irrigation Area

The water for the Namakwaland Irrigation Area is abstracted from the Orange River. Water is released from VanderKloof Dam to supply users in this area. The scheduled area is about 2 439ha.

4.4.1.4.1.6 Vioolsdrift and Noordoewer Irrigation Area (RSA and Namibia)

Vioolsdrift and Noordoewer irrigation areas are supplied through a canal system fed by the Vioolsdrift Weir on the Orange River. The scheduled irrigation area for Vioolsdrift (RSA) amounts to 600 ha and for the Noordoewer (Namibia) area, 284 ha. This scheme has been transferred to, and is operated by, the Vioolsdrift and Noordoewer Joint Water Authority.

4.4.1.4.1.7 Lower Vaal Water Management Area

- **The Vaalharts Irrigation Scheme**

The Vaalharts Irrigation Scheme, the largest in South Africa, is the main user in the Lower Vaal WMA and is supplied with water from Bloemhof Dam. Water is released from Bloemhof Dam into the Vaal River, which is then diverted into the Vaalharts main canal at the Vaalharts Weir. Releases from Bloemhof Dam are also used to supply water to Kimberley, the Vaal Gamagarra Water Supply Scheme, and irrigation along the Vaal River between Bloemhof Dam and the confluence of the Vaal and Riet Rivers. Releases from Bloemhof Dam sometimes do not meet the requirements of the Vaalharts Scheme and other irrigators along the Lower Vaal. At such times Bloemhof Dam is supplemented by releases from Vaal Dam.

The Vaalharts canal system consists of a main canal of length 19km and capacity of 48m^3/s. This canal travels along the right bank of the Vaal River for about 13km before splitting, the main section heading northward into the Harts River catchment. The smaller branch, which continues along the bank of the Vaal, is called the Klipdam-Barkley Canal. The main canal splits again into the West Canal (length 21km, initial capacity 6m^3/s), and the North Canal (length 60km, initial capacity 39m^3/s). All these canals are concrete lined. The scheme also has an extensive drainage system to deal with return flows and storm water. Approximately 442Mm^3 is supplied to the scheme annually.

Based on studies conducted in the Lower Vaal WMA, it seems that a large portion of irrigation which utilises the Vaalharts Scheme is unlawful, and ought to be prevented through identification and license applications.

- **Spitskop Dam sub-system**

Spitskop Dam was constructed to supply irrigators along the lower Harts upstream of the Vaal confluence. The dam is downstream of the Vaalharts Irrigation Scheme and therefore substantial return flows seep into the dam. The dam is currently utilised only to supply irrigation along the Harts River downstream of the Dam. Due to the large volumes of return flows from the Vaalharts Scheme, the dam is currently under-utilised, and water is supplied to the downstream irrigators as required, but within their allocation of 7 700 m^3/ha/a. The total area under irrigation from Spitskop Dam is 1663ha with a total allocation of 12.8Mm^3/a.

- **Douglas Irrigation Scheme**

Douglas Irrigation Scheme is located at the downstream end of the Vaal River. This scheme receives water from the Vaal River, supplemented with releases from the Orange River via the Orange-Vaal Transfer Scheme.

4.4.1.4.2 Annual irrigation water demand for the Orange

Table 69: The irrigated areas and related annual irrigation water demand for the Orange River Basin are estimated as follows:[183]

DESCRIPTION	IRRIGATION DEMANDS (Mil m^3/a)	IRRIGATION AREAS (ha)
Douglas weir to Orange-Vaal Conf. (Orange water)	104.3	11 410
Orange - Vaal Confl. to Boegoeberg dam	174.0	17 236
Boegoeberg dam to Gifkloof weir	161.2	10 744
Gifkloof weir to Neusberg	222.8	14 855
Neusberg to Namibian border	180.2	12 016
Namibia border to Onseepkans weir	28.6	1 905
Onseepkans weir to Vioolsdrift weir	33.6	2 237
Vioolsdrift to Orange-Fish Confluence	9.0	600.0
Orange-Fish confluence to river mouth	8.3	553
TOTAL DEMAND (2014)	**922**	**71 556**

Key Irrigation inefficiencies that needs to be improved to sustain the demand for irrigation in the province consist of the following main elements:

- Over irrigation (irrigation water application in excess of crop water requirements);
- Poor in-field irrigation distribution (some areas in an irrigation field over-irrigated and other areas under-irrigated);

[183] *Department of Water Affairs, Development of reconciliation strategies for bulk water supply systems, Orange river, Irrigation Demands and Water Conservation/Water Demand Management, 2014*

- Inefficient irrigation systems resulting in excessive direct evaporation (before the irrigation water reaches the soil);
- Leaking bulk-water reticulation systems (leaking lined canals or unlined canals);
- Leaking farm dams and leaking on-farm water reticulation systems; and
- The excess water applied due to these inefficiencies is either lost to direct evaporation, to deep percolation into the groundwater system or makes its way back into the catchment river systems as a "return flow". This return flow forms an integral part of the river system's water resources downstream.

1.1.2 Planned infrastructure

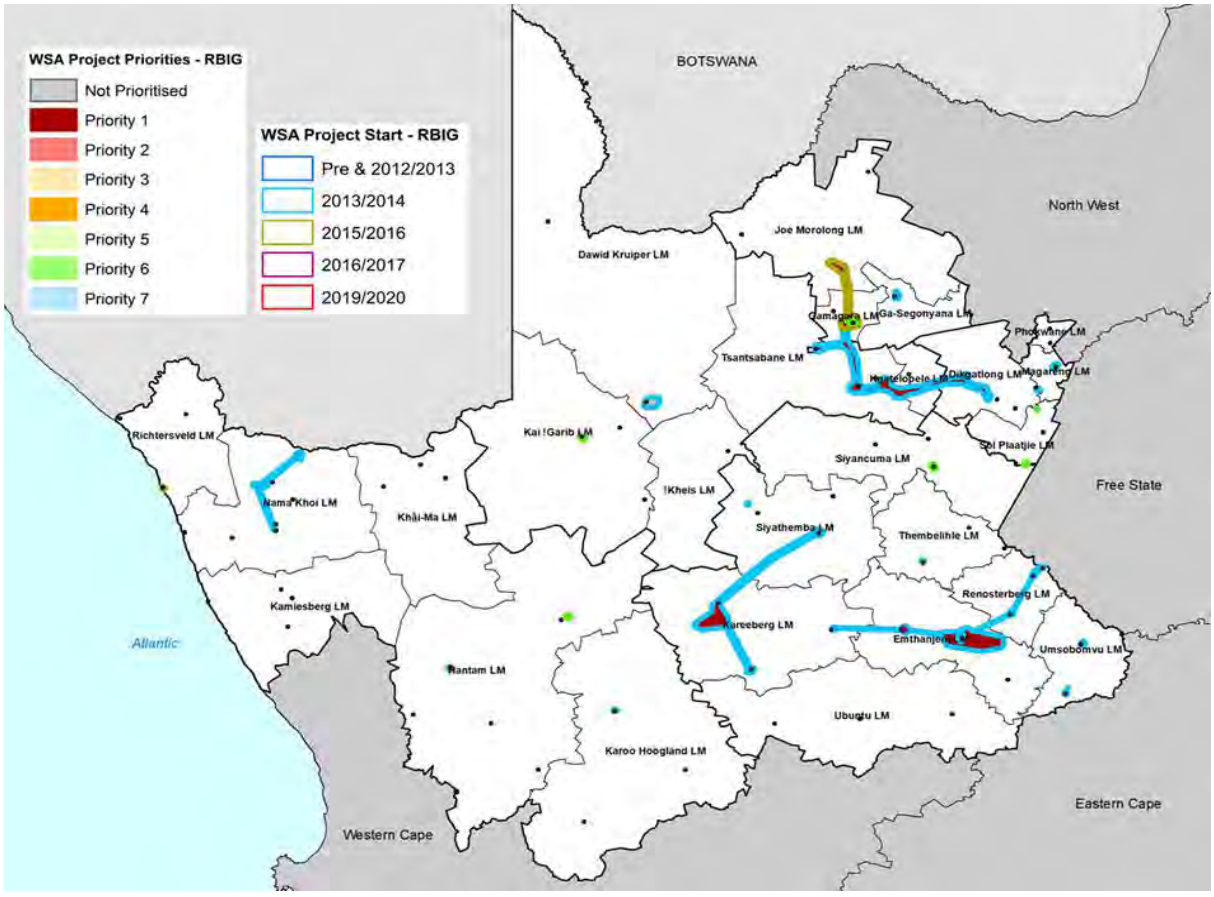


Figure 190: Overview of planned regional bulk water projects in the province[184]

4.4.1.5 Vaal Gamagara Water Supply Scheme

The Vaal Gamagara Water scheme project has been launched by the Minister of water Affairs in 2017 and should provide much needed bulk water support towards teh Gamagara area. The bulk major water project includes the refurbishment of the existing Vaal Gamagara Water Treatment Plant near Delpoortshoop, the upgrade of pump stations and the construction of a 430km long pipeline from Delpoortshoop to Black Rock. The project also includes the equipping of three borehole sites, located in Danielskuil, Groenwater and Hotazel, to augment water supplied from the Vaal River. Six municipalities will benefit from the Vaal Gamagara bulk water supply scheme which is critical to

[184] *Department of Water Affairs, Provincial Regional Bulk Water and Sanitation Infrastructure Master Plan, 2016*

ensure the continued sustainability of iron ore and manganese mining operations between Kathu and Hotazel, while also ensuring water supply to over 22 villages. On completion of Phase One, beneficiaries will include the mining sector, livestock farms, solar parks and the communities of Kathu, Olifantshoek and Hotazel, benefiting a populace of 23 500 and it is expected to be completed by August 2018. The Vaal Gamagara quality control laboratory, was completed in April 2016. The Vaal Gamagara laboratory is to assist municipalities in identifying and addressing water quality and wastewater effluent issues. The absence of an accredited quality control laboratory to perform this function has been one of the biggest contributing factors for the failure of municipalities in the Northern Cape to meet the Blue and Green Drop certification standards. Qualified laboratory staff have already been appointed by the Sedibeng Water board. The calibration of instrumentation has already been completed and the validation of the first five testing methods – pH, electrical conductivity, turbidity, heterotrophic plate counts and total coli forms/E coli – has commenced.

4.4.1.6 Proposed Vioolsdrift Dam

The possibility of a major dam at Vioolsdrift has been suggested and is currently being investigated by both Namibia and South Africa. It would obviously have to be a joint venture between the two countries and the main purpose would be to control spillage from the Orange River into the Atlantic Ocean. Currently there is no control structure along the Orange River downstream of Vanderkloof Dam - approximately 1 400km upstream. As a result, if more water than needed by the downstream users is released from Vanderkloof Dam, it will simply run into the ocean and be lost. Similarly, any local inflows or spillages from the Vaal River will eventually reach the ocean since there is no storage to capture them for use during periods of shortage.



A new dam and reservoir at Vioolsdrift would provide the needed storage with which to control the flows to the river mouth and in so doing, reduce the spillages through the river mouth to only those required for the environment. The pictures shown indicates one of the numerous possible dam sites upstream of Vioolsdrift.

Various options are being considered in terms of the size of the dam, with the recommended sizes of 35m to 73m for the height of the dam wall. The possible maximum storage capacity could be 2 800 million cubic metres, which is similar to the Vaal Dam. The construction camp for the proposed dam will be located in the vicinity of Noordoewer. The proposed dam will lead to the inundation of irrigated areas of approximately eight square kilometres. In addition, it will also inundate the town of Goodhouse, as well as a number of farms along both banks of the Orange River, the majority of which consist of established irrigable land.

4.5 WATER QUALITY

Water Quality refers to the chemical, physical and biological characteristics of water and is a measure of the condition of water relative to a water quality compliance standard, or relative to the water quality requirements of one or more biotic species or receiving water users. Although scientific measurements are used to define the quality of water, it's not a simple matter to say that "this water is good" or "that water is bad". The quality of water that is required for industrial purposes, for instance, is not necessarily the same quality of water that is required for drinking purposes. Therefore, water quality, should be compliant to a set standard, or suitable for its intended use, be it for agricultural, domestic, industrial, recreational or spiritual purposes, or its suitability to maintain a healthy aquatic ecosystem.

Currently, much of the water quality of the country's water resources is influenced by wastewater discharges and other land-based activities. Major impacting sources include agricultural drainage and wash-off (irrigation return-flows, fertilisers, pesticides and runoff from feedlots); urban wash off and effluent return-flows (bacteriological contamination, salts and nutrients); industries (chemical substances); mining (acids, salts, metals and radioactivity); and areas with insufficient sanitation services (microbial contamination). The quality of groundwater is influenced by mining activities, leachate from landfills, human settlements and intrusion of sea water.

Due to the low rainfall, groundwater is often high in salinity and may taste brackish. The water quality of the Vaal and Orange River is generally in good condition, but non-compliant wastewater treatment work discharges and return flows from intensive irrigation along the river banks are causing elevated nitrification of receiving waters and resulting algae blooms during low flows. Urgent intervention of non-compliant wastewater works is critical and farmers must practice responsible fertilizer application of fields.

Six "mega-trends" have been identified[185], which can be expected to unfold in South Africa during the next few decades and which could lead to new or accelerated Water Quality challenges in many locations across the country. These are as follows:

- climate change;
- hydraulic fracturing;
- renewable energy;
- the water-energy-food security nexus;
- rural-urban migration and growth of inadequately serviced densely populated settlements; and
- water reuse.

These trends will require new and adaptive policy approaches, will require increased levels of cooperative governance between sectors and will require ongoing monitoring.

[185] *Draft National Water and Sanitation Master Plan (NW&SMP), November 2017*

4.5.1 Water treatment works

Drinking water must comply with potable water quality standards as specified in SANS 241 (Class 1). Most water sources require treatment to comply with this drinking water standard. In South Africa there are estimated to be well over 1300 WTWs, mostly owned by WSAs, but also by water boards or privately owned. There are however still rural communities not served by a WTW, who are reliant on groundwater and/or other local water sources. Overall, South Africa's water purification works are operating at close to 80% of their collective capacity.

4.5.2 2014 Blue Drop Score

The 2014 Blue Drop Report provides information on the performance of Water Services Authorities (WSAs) with respect to drinking water management from January to December 2013. 1036 drinking water supply systems were audited. The Report not only provides audit details on drinking water quality compliance with respect to the South African National Standard for drinking water (SANS 241), but also include:

- assessment of water safety planning which is a risk-based approach in drinking water quality management dealing with associated risks and mitigation thereof,
- Asset management (operation & maintenance, design capacity, budgeting)
- Technical skills availability for operation of the plants, and
- Management support.

The best performing WSA was //Khara Hais Local Municipality (now Dawid Kruiper) whose Blue Drop score increased by 25% to 96%. This shows that all WSAs may achieve the Blue Drop status if concerted effort and best practices are implemented to manage drinking water provision. This is followed by Hantam and Ubuntu LM's. The Ubuntu municipality improved their score by 38%. An impressive improvement of 38% was observed in Umsobomvu Local Municipality whose score increased from 15.8% in 2012 to 53.9% in 2014. **Table 70** below shows the Provincial performance trends since 2009.

Table 70: Provincial performance trends, Blue Drop Score (2008 – 2014)

BLUE DROP TRENDS 2009 TO 2014						Status
Water Services Authority	**2009**	**2010**	**2011**	**2012**	**2014**	
//Khara Hais Local Municipality*	7%	38%	44%	71%	96%	Excellent
Hantam Local Municipality	0%	69%	75%	82%	82%	Good
Ubuntu Local Municipality	95%	67%	67%	73%	82%	
Sol Plaatje Local Municipality	0%	64%	84%	72%	81%	
Kgatelopele Local Municipality	38%	97%	54%	66%	77%	Average
Khai-Ma Local Municipality	0%	34%	47%	53%	77%	
Emthanjeni Local Municipality	29%	68%	60%	63%	75%	
Thembelihle Local Municipality	55%	55%	46%	73%	73%	
Kai! Garib Local Municipality	0%	0%	47%	69%	71%	
Phokwane Local Municipality	36%	33%	49%	60%	71%	
Tsantsabane Local Municipality	0%	75%	59%	66%	70%	
Nama Khoi Local Municipality	63%	22%	58%	63%	64%	
Siyathemba Local Municipality	31%	53%	41%	62%	62%	
Dikgatlong Local Municipality	0%	84%	67%	55%	61%	
Joe Morolong Local Municipality	0%	0%	60%	33%	58%	
Siyancuma Local Municipality	0%	55%	29%	20%	54%	

BLUE DROP TRENDS 2009 TO 2014						Status
Water Services Authority	**2009**	**2010**	**2011**	**2012**	**2014**	
Umsobomvu Local Municipality	0%	23%	36%	16%	54%	
Kareeberg Local Municipality	6%	62%	35%	39%	53%	
Gamagara Local Municipality	2%	42%	50%	40%	50%	
Karoo Hoogland Local	0%	39%	51%	40%	49%	Very poor
Richtersveld Local Municipality	0%	26%	36%	37%	42%	
Ga-Segonyane Local Municipality	0%	25%	37%	72%	41%	
Kamiesberg Local Municipality	24%	29%	53%	36%	41%	
Renosterberg Local Municipality	0%	29%	25%	18%	38%	
Magareng Local Municipality	40%	54%	66%	73%	29%	Critical
!Kheis Local Municipality	42%	46%	53%	50%	28%	
Mier Local Municipality*	24%	25%	26%	25%	22%	

**Merged to become Dawid Kruiper Local Municipality (with the highest and lowest scores)*

82 of the 173 water supply systems in the Northern Cape received scores below 50% in the Blue Water Services Audit, with 58 systems were found to be in the High Category Risk, and 4 systems [both 2 systems for Khai-Ma (Onseepkans/Melkbosrand/Viljoensdraai and Witbank) and Mier Local (Swartkop Dam and Andriesvale) Municipalities] are in the Critical Risk Category. One water supply system had lost the Blue Drop status within the province at Kgatelopele local municipality. The loss of Blue Drop status could be attributed to lack of full implementation of the water safety planning to manage drinking water quality. The Department is concerned that almost halve of the water supply system within the Province achieved Blue Drop score below 50% during the 2014 Blue Drop Audit. The bottom three municipalities are Magareng, which moved from one of the best municipalities which achieved 73% in 2012 and decline by 29% in 2014 followed by !Kheis and Mier municipalities with scores of 28% and 22% respectively. The Department through Provincial operations should work with those municipalities to turnaround the performance on the Blue Drop performance to these municipalities.

4.5.3 Water treatment works

Drinking water must comply with potable water quality standards as specified in SANS 241 (Class 1). Most water sources require treatment to comply with this drinking water standard. In South Africa there are estimated to be well over 1300 WTWs, mostly owned by WSAs, but also by water boards or privately owned. There are however still rural communities not served by a WTW, who are reliant on groundwater and/or other local water sources. Overall, South Africa's water purification works are operating at close to 80% of their collective capacity.

4.5.4 Wastewater treatment works

Wastewater treatment is a critical performance area, as it impacts directly on human health and on the environment as well as indirectly on downstream drinking water purification systems. Of the 1363 registered WWTWs, 897 are municipal owned, 393 privately owned and 73 Department of Public Works or Department of Health owned. The breakdown of WWTW capacity per process type is shown in the adjacent figure

4.5.5 Municipal Services Strategic Assessment (MuSSA) for South Africa

The Municipal Strategic Self-assessment is used to determine the overall business health of a WSA. By identifying key municipal vulnerabilities across a range of business attributes, it allows municipalities to effectively plan and direct their resources and the DWS to provide more focussed support.

MuSSA assesses 16 key business health attributes by asking senior municipal officials 5 questions per attribute. Answers provide strategic vulnerability flags. The scores are translated into percentages and a "Spider-Diagram" of the 16 attributes, that presents a municipal WS vulnerability snapshot, created.

All WSAs were assessed in 2016. Only 5% were rated as having a low vulnerability, while 31% had a high vulnerability and 47% were extremely vulnerable. Regular cross-checking with quantitative assessments, (Blue Drop, Green Drop, NRW etc.), has shown a very high correlation. In order to address the identified municipal shortcomings, the DWS develops Municipal Priority Action Plans (MPAPs) for selected municipalities.

The key objective of these plans is to guide the WSAs to prioritise actions and allocate budget in accordance with their identified areas of greatest need. 18 key Business Health Attributes were identified in consultation with domain specialists and stakeholders:

1. Water Services Planning
2. Management Skill Level (Technical)
3. Staff Skill Levels (Technical)
4. Technical Staff Capacity (Numbers)
5. Water Resource Management (WRM)
6. Water Conservation and Demand Management (WCDM)
7. Drinking Water Safety and Regulatory Compliance
8. Basic Sanitation
9. Wastewater/Environmental Safety and Regulatory Compliance
10. Infrastructure Asset Management (IAM)
11. Operation and Maintenance of Assets
12. Financial Management
13. Revenue Collection
14. Financial Asset Management
15. Information Management (IT)
16. Organisational Performance Monitoring
17. Water and Sanitation Service Quality
18. Customer Care (CRM)

The municipal vulnerability ranking index is a very useful aid where WSAs are able to compare how well they are performing their water services function in relation to other municipalities. The vulnerability ranking sees no WSAs doing well with a low vulnerability score, while nine (9) WSAs (33%) are noted as being extremely vulnerable (Siyancuma, Renosterberg, Phokwane, Mier (now included in Dawid Kruiper LM), Kai! Garib, Siyathemba, Karoo Hoogland, Richtersveld and Kgatelopele). These WSAs are similar in nature to big corporations having large asset registers managing substantial resources, which are geographically spread over a large area which brings its own challenges, however, the positive is that some of the WSA's are able to delivery acceptable water services despite the difficulties confronted by the many obstacles they have to overcome. Feedback received from these vulnerability rankings can assist the DWS to share the successes of those doing well and render targeted support to those who are not.

A summary of the vulnerability status of the province is noted below (also see figure below):

- 6 WSAs were identified as being Extremely Vulnerable namely: !Kheis, Tsantsabane, Sol Plaatje, Umsobomvu, Emthanjeni and Thembelihle.
- 5 WSA's were identified as Highly Vulnerable namely: Tsantsabane, Gamagara, Hantam, Ga-Segonyana and Joe Morolong. *(2013 results reflected that 13 WSAs were identified as Highly Vulnerable namely: Kamiesberg, Magareng, Kareeberg, Khai-Ma, Ubuntu, Nama Khoi, Dikgatlong, Tsantsabane, Gamagara, Hantam, Ga-Segonyana, Joe Morolong and !Kheis).*

- 6 WSA's were identified as Moderately Vulnerable namely: Nama Khoi, Kamiesberg, Khai-Ma, Kareeberg, Ubuntu, Dikgatlong and Magareng.
- 9 WSAs were identified as having Low Vulnerability, namely: Karoo Hoogland, Richtersveld, Kai! Garib, Siyathemba, Siyancuma, Renosterberg, Kgatlopele and Phokwane *(previously 1 WSA – //Khara Hais, 2013).*

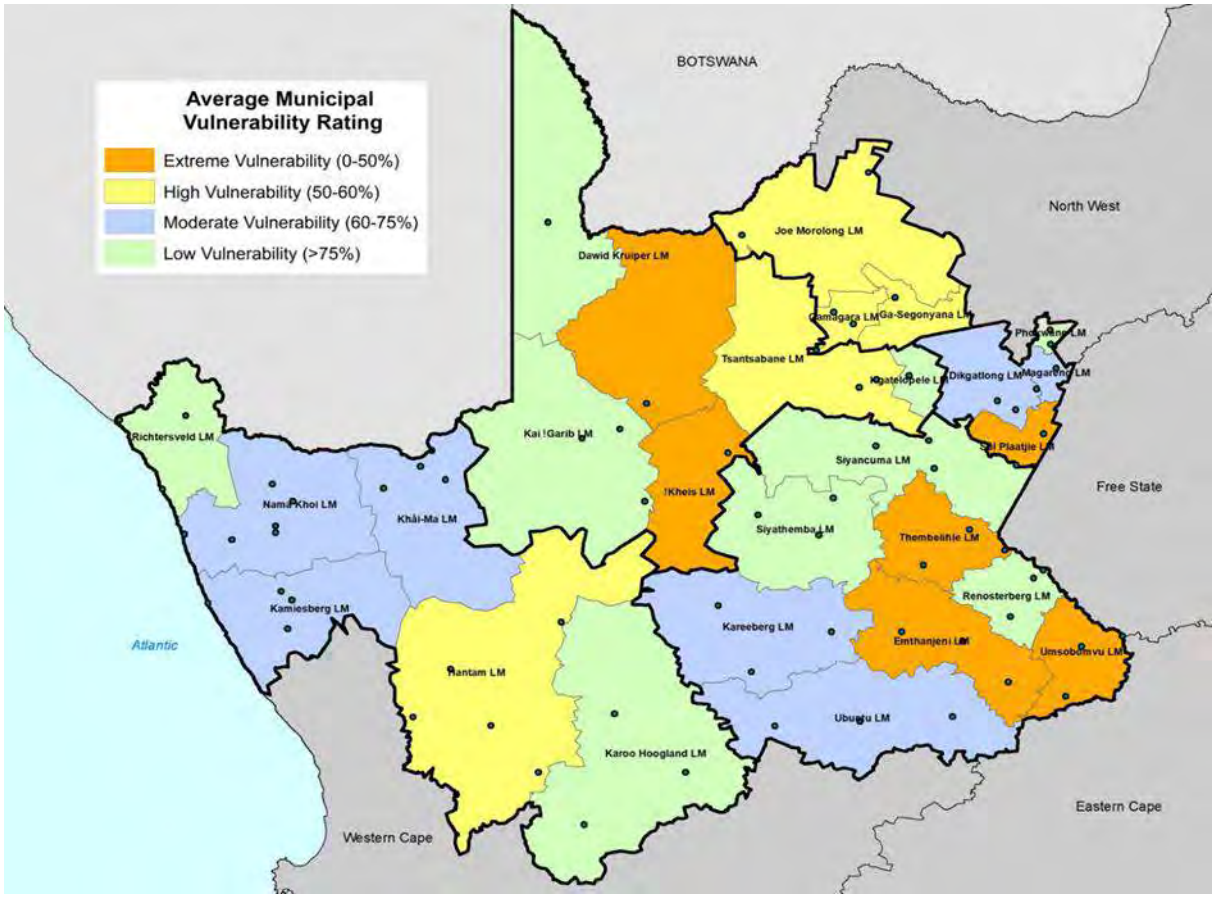


Figure 191: Average municipal vulnerability rating (MuSSA, 2016)

It is advisable that the development and implementation of the MPAP[186] process be considered for all Northern Cape WSAs and that once MPAPs are developed, the required actions arising from the MPAP process be closely monitored to ensure that increased vulnerability to sustainable water services delivery is effectively mitigated. The overall results indicate that although Northern Cape is performing better than last year, WSAs with high water services vulnerability requiring proactive intervention still occur, and there is an urgent need to ensure that agreed upon MPAP approach and associated actions are implemented as a priority to rectify this situation.

[186] *Municipal Priority Action Planning, The MPAP Provides input into a Municipal Priority Action Plan (MPAP) to redress water service vulnerabilities. The MPAP in turn links to the Municipal Water Services Development Plan (WSDP) and the associated Master Plan, the Integrated Development Plan (IDP) and Service Delivery and Budget Implementation Plan (SDBIP). Municipal Services Strategic Assessment (MuSSA) for South Africa, 2016*

4.6 STRATEGIC OVERVIEW

Key strategic elements to consider towards strategic planning in the water sector for the Northern Cape Province:

- High unemployment with low economic growth rate indicates an increased potential for social unrest, which could affect service delivery and increase the incidence of protests. Job creation is thus very important.
- The high household growth rate, (relative to the population growth rate), inflates delivery needs. The influx of illegal immigrants is likely to continue, as is the migration to urban areas. Service provision needs will shift to urban areas, where it is fortunately usually easier and more cost effective to provide services.
- Unless housing provision is accelerated, informal settlements, with their own challenges, will continue to grow.
- Water will become scarcer, particularly with climate change. The latter will increase storage requirements, yet there are limited suitable dam sites and opportunities for further water transfer schemes.
- Lack of appreciation of the value of water is partially due to low tariffs which are not cost reflective. This, together with poor O&M and lack of metering, contributes to wastage, high consumption, high NRW and financial loss. If not addressed this will continue to threaten municipal viability.
- Lifecycle costing minimises scheme lifetime costs. Should an infrastructure focused approach continue, this will lead to higher than necessary O&M costs, scheme non-functionality and an increase in the service backlog.
- Many WWTWs operate above capacity, are in poor condition and deteriorating due to inadequately trained operators and a lack of maintenance. Growing water scarcity will mean that effluent discharge standards become more important.
- Funding will remain inadequate unless municipalities generate more own revenue through better financial management.
- Lack of municipal capacity, especially technical, will reduce their capacity to provide sustainable services.
- Services in some areas, will most likely continue to be problematic. Unreliable information, which leads to bad planning, will continue unless the current fragmented monitoring problem is addressed.
- There is a need for proactive strategies at local, provincial and national level to deal with the impacts of drought and climate change on water resources rather than the current reactive strategies, such as providing water by tankers.
- Emphasis should be placed on demand side management given the finite amount of water. This is reinforced by the fact that the top three strategies rated by the stakeholders were all on the demand side. However, that is not to reduce the responsibility for better management by the water service providers to reduce wastage and losses in the delivery systems
- Strict groundwater management systems should be put in place, with early warning mechanisms to report depleted groundwater reserves. Continual monitoring of the aquifer against climate conditions will provide some knowledge of the future potential under projected climate conditions. Groundwater protection zones should be considered as part of the future development zoning in the province.

- In order to successfully implement any of these strategies, the lack of personnel and financial capacity at local level must be addressed.
- Strategies that are finally identified not only need to be social, environmentally and economically acceptable, but they need to have long-term applicability if they are to provide adequate resilience to climate change impacts.
- A climate change awareness programme should be developed that is targeted at local government officials to equip them with the necessary tools to engage with this issue and implement the strategies that are identified.
- The climate induced impacts on water resource should be integrated into local integrated development planning (IDP) so that adequate strategies are identified to reduce potential risks

5 INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

5.1 OVERVIEW

Information and communications technology in its broadest form pertains mainly to the internet-enabled domain, the mobile environment and to a lesser extent landline telephones, radios and televisions. It is an environment that is diverse and constantly changing with new and better technology enhancements that grows as the requirements grow and the demand for access and communication through the different spheres evolve. One of the principal factors for the growth and roll-out of these technologies is demand and the provision of access to the areas where the demand necessitates upgrades and installation of hardware to cater for the demand as well as future growth. This factor plays an enormous role in the information and communication technology landscape for the Northern Cape Province.

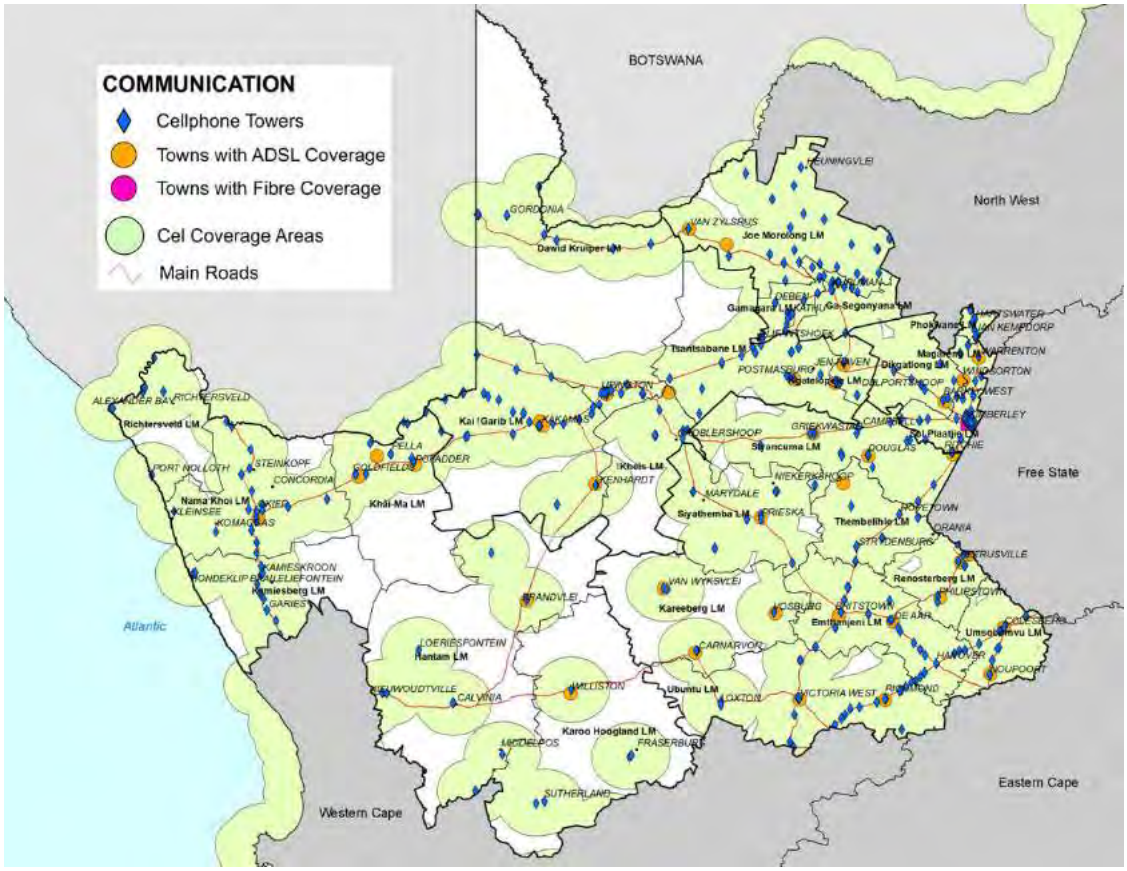


Figure 192: Information and Communication infrastructure in the Northern Cape Province

Figure 192 provides an overview of the communication and technology footprint, many areas within the province don not have any coverage or access to the internet. The main towns and cities are however well serviced.

ADSL (Asymmetric digital subscriber line) is focused on the bigger towns in the Northern Cape, due to the demand, that are predominantly alongside the main roads. Although the ADSL lines are more stable than Wi-Fi the speed of the line and the number of users accessing the line has a huge effect on the experience. Telkom indicates a maximum of 10 Mb lines for the towns but the average range between 2Mb and 10Mb.

ADSL lines are however being replaced as an option throughout South-Africa with Fibre lines that are fast, stable, reliable and has less latency and provides better bandwidth. The option, irrespective of the fact that it is better, entails and requires dedicated infrastructure that is expensive to roll-out which in its own creates a problem in the Northern Cape due to lesser demand and the fact that the towns are so far apart from each other. It is not as cost effective as other options provided and available. Areas that do have fibre are restricted to Kimberley and in most cases to a very dedicated area within the Southern parts of Kimberley. The service providers installing fibre in Kimberley include Open Serve as well as Vodacom Fibre. Both the service providers cover the same areas spatially in Kimberley but Vodacom has at this stage a smaller footprint.

When it comes to mobile and Wi-Fi coverage and access in the Northern Cape the landscape is however different than that off the fixed line coverage with good coverage in all major towns. **Figure 193** provides a summary of the distribution of signal masts, and where the strongest signals are

present per network. For Vodacom 3G coverage is in most of the towns but they also provide LTE, which is their fastest data network speed, in many of the main towns. This also applies for Broadband Connect Wireless where data or the internet can be accessed via a Wi-Fi router installed. For MTN the footprint is larger and wider range of towns are covered, thus reaching more rural communities. According to the latest coverage maps of Cell C, they do provide 3G coverage in many of the major towns but they do not provide LTE services in the Northern Cape. This also applies to Telkom and their coverage.

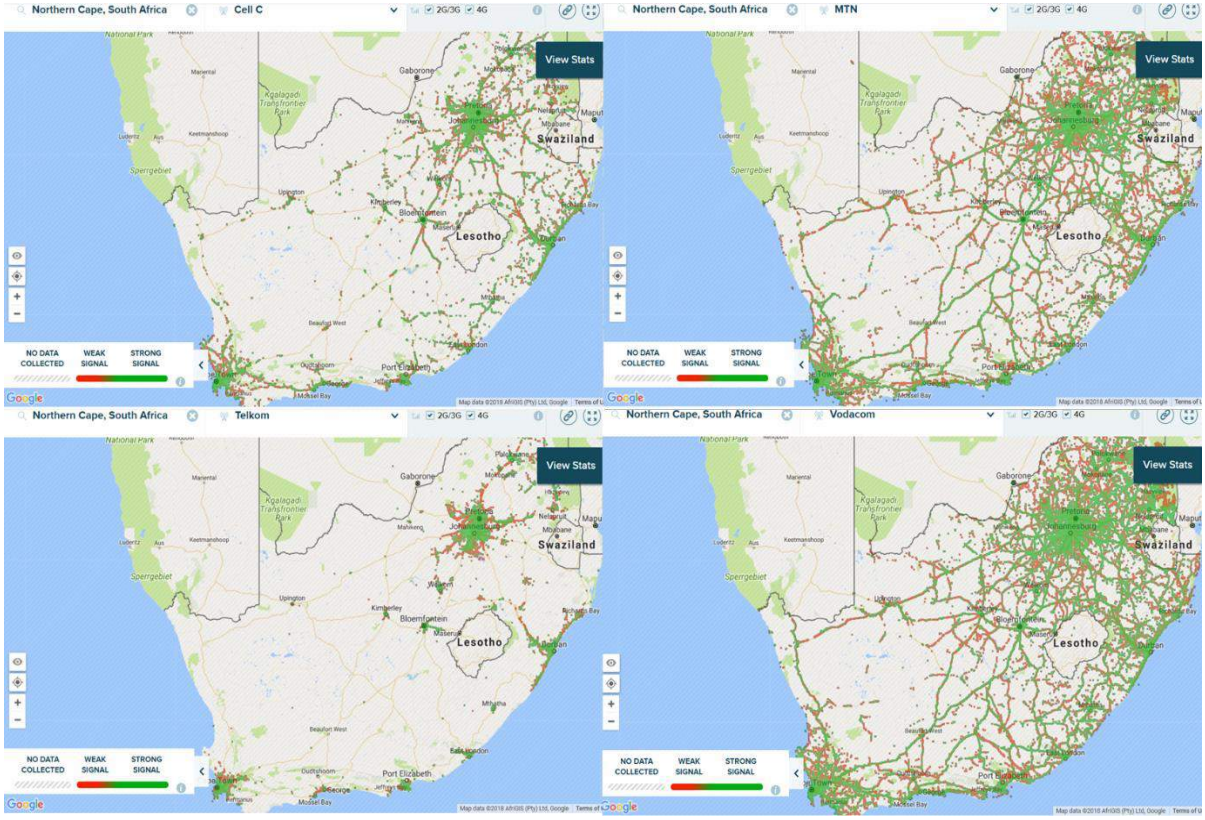


Figure 193: 3G Coverage within the Northern Cape per service provider

When it comes to radio coverage the radio stations include “Radio sonder grense” and “SA FM” that covers most parts of the Northern Cape. 5 FM and Lesedi FM are only restricted to the Kimberley area with Motsweding FM catering for the towns North of Kimberley. Large areas within the central areas between Calvinia in the West, Pofadder in the North, Marydale in the East and Sutherland in the South have poor to no radio reception due to sparse population and lack of terrestrial broadcasting infrastructure. The SKA (Square Kilometre Array) project in the same central parts of the Northern Cape also impacts the national implementation of digital terrestrial television (DTT) coverage in the Northern Cape where areas within the SKA will not be transferred to DTT but will only have access through DTH (Direct-to-Home Satellite). This is due to the fact that UHF radio frequency emissions for terrestrial television services can result in interference with the highly sensitive receivers utilised for SKA.

The focus of information and communication technology in the Northern Cape is understandably in the areas and towns where there is a large enough footprint and the demand negates the installation of any hardware and infrastructure. The emphasis is on towers and Wi-Fi and fast access through these mediums for both phones as well as data access. ADSL lines are an option, but bandwidth and speed

are low even though it is supposedly more stable. Fibre access at this point in time is earmarked for mainly Kimberley. As mentioned earlier the area of ICT is diverse and is constantly changing and with newer technology and lower installation cost the landscape in the Northern Cape pertaining to this environment might change in the future.

5.1.1.1 Overview of access towards internet services in the Province[187]

USE OF INTERNET				
For Communication				31,00%
For Social networking				24,90%
For Information				23,70%
For Entertainment				22,10%
For Email				16,10%
Internet penetration in the Province				32.90%
Internet Access at Home				6%
Access at Work				11%
Access using mobile connections				32%
Internet Cafes				3%
ACCESS BY DISTRICT				
District Name	Access to Internet	% Access	No Access	% No access
John Taolo Gaetsewe	18005,00	7,58%	219403,00	92,42%
Namakwa	13649,00	11,89%	101179,00	88,11%
Pixley ka Seme	13861,00	7,14%	180192,00	92,86%
ZF Mgcawu	28848,00	11,58%	220189,00	88,42%
Frances Baard	40654,00	10,73%	338056,00	89,27%
Total	**115017,00**	**9,80%**	**1059019,00**	**90,20%**

[187] *Stats SA, Community Survey, 2016, Dark Fibre Africa (DFA) and Web Africa (https://www.webafrica.co.za/blog/general/latest-statistics-south-african-internet-penetration/*

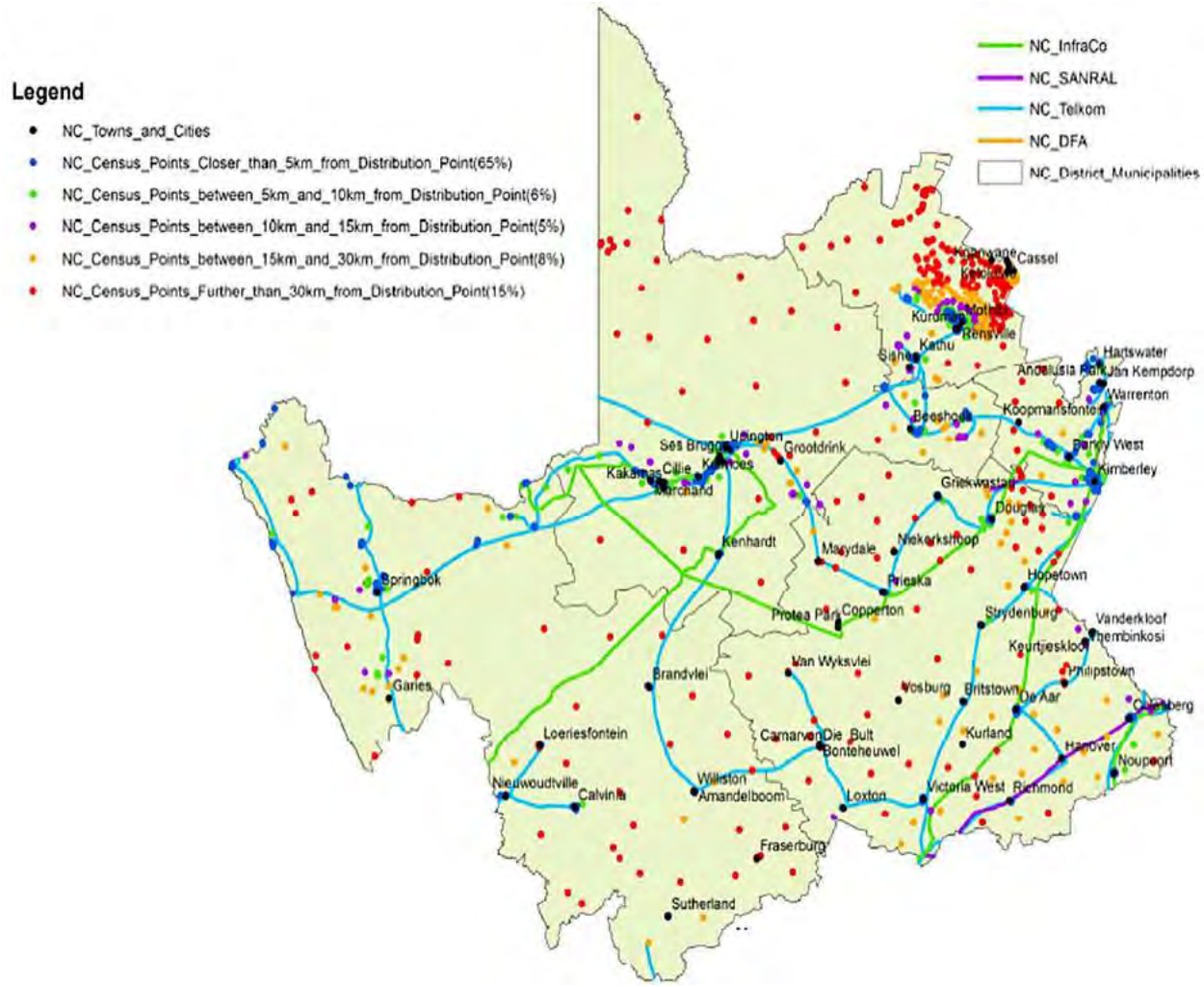


Figure 194: Telecommunications Infrastructure coverage in The Province

5.2 EXPANDING ACCESS TO COMMUNICATIONS TECHNOLOGY

SIP 15 in the National Infrastructure Plan focuses on expanding access to communication technology. It commits to providing for broadband coverage to all households by 2020 by establishing core Points of Presence (POPs) in district municipalities, extend new Infraco fibre networks across provinces linking districts, establish POPs and fibre connectivity at local level, and further expand the network into deep rural areas. While the private sector will invest in ICT infrastructure for urban and corporate networks, government will co-invest for township and rural access, as well as for e-government, school and health connectivity. The school roll-out focus is initially on the 125 Dinaledi (science and maths-focussed) schools and 1 525 district schools. Part of digital access to all South Africans includes TV migration nationally from analogue to digital broadcasting.

The SIP 15 strategic goals are as follows:

- Expanding access to communication technology through broadband infrastructure roll-out;
- Establishing national backbone infrastructure, this will inter alia include establishing core Points of Presence (POPs) in district municipalities, extending fibre networks across provinces linking districts and rural and under-served areas;

- Coordinating and integrating communication infrastructure activities within state-owned enterprises, private entities, provinces and local government; and
- Prioritising connectivity to rural and under-serviced areas including e-health, e-schools and e-government.

Table 71: Current Capital Projects Infrastructure rollout (fibre rollout) in South Africa with specific reference to the Northern Cape Province[188]

PROVINCE	COMPLETED FIBRE ROLL OUT KM (APRIL – DECEMBER 2015)	COMPLETED FIBRE ROLL OUT KM (JAN – AUG 2016)	COMPLETED FIBRE ROLL OUT KM	IN PROGRESS (KM) , 2016
Eastern Cape	31.96	52.64	84.60	28.50
Western Cape	313.05	7.25	320.30	10.50
Gauteng	253.59	0	253.59	0
Limpopo	63.59	5.71	69.30	0
Mpumalanga	119.16	4.74	123.90	8.0
North West	99.07	2.63	101.70	11.70
KZN	140.37	6.80	147.17	0
Free State	0.43	4.87	5.30	4.90
Northern Cape	2.43	5.50	7.93	3.50

Provincial Commitment:

To utilize the SIP 15 Broadband roll out of Pixely ka Seme, that will link all the government offices with fibre optic technology to achieve Broadband & Wi-Fi Access to create downstream strategy implementation for the youth development initiatives. The following areas in the Northern Cape are where the Broadband Infraco Long Distance network can be accessed:

- Kimberley;
- Upington; and
- Onseepkans.

5.2.1 National Broadband Policy targets

The targets indicated below have been derived from consideration of existing baselines and benchmarking against the kind of targets being set in other countries.

Table 72: National Broadband Policy Targets:

TARGET	PENETRATION MEASURE	BASELINE (2013)	BY 2016	BY 202	BY 2030
Boradband access in Mbps user experience	% of population	33,7%	50% at 5Mbps	90% at 5Mbps and 50% at 100Mbps	100% at 10Mbps and 80% and 100 Mbps
Schools	% of Schools	25% connected	50% at 10Mbps	100% at 10 Mbps and 80% at 100Mbps	100% at 1Gbps

[188] *South Africa Connect: Creating Opportunities, Ensuring Inclusion South Africa's Broadband Policy, 2013*

Health facilities	% of health facilities	13% connected	50% at 10Mbps	100% at 10Mbps and 80% at 100Mbps	100% at 1Gbps
Government facilities	% of government offices		50% at 5Mbps	100% at 10Mbps	100% at 100Mbps

Taking the vast distances and quality of internet access into consideration, the province still has a long way to go in order to meet the targets set by the National Broadband Policy. Key opportunities to improve the status quo will lie in the effective utilisation of projects such as the SKA initiative and looking at promoting broadband infrastructure projects through the mining houses, this ought to be done through the social responsibility programs.

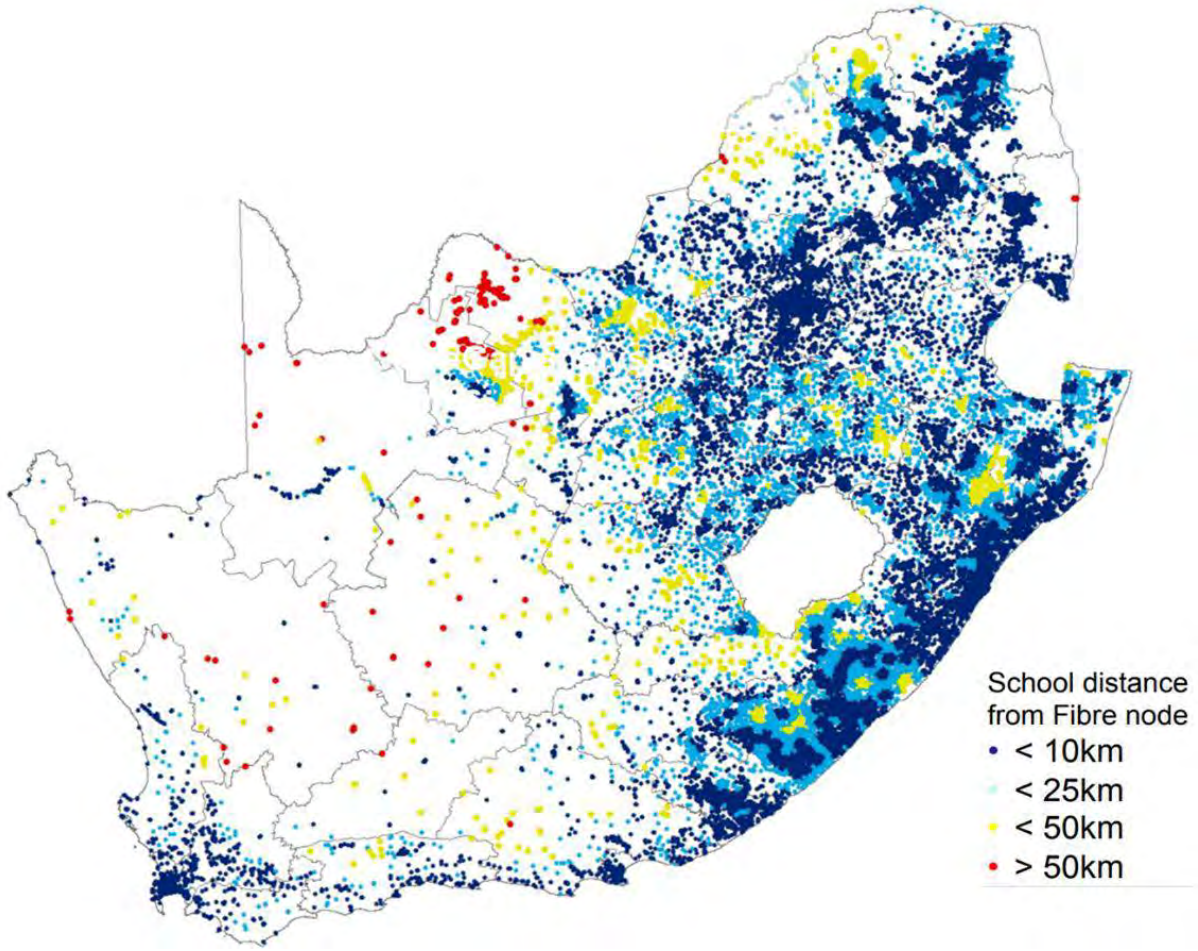


Figure 195: Access to Fibre, Schools in South Africa

According the National Broadband Policy, about 86% of the South African population resides within 10km of a fibre node.

5.2.2 Broadband capacity[189]

According to the DST Strategic Plan the roll-out of a gigabit per second (Gbps) capacity broadband network through the South African National Research Network will continue to enable data transmission to all research and academic institutions. The national backbone and its points of

[189] Department of Economic Development and Tourism Economic Infrastructure Annual Report, 2016/2017

presence will be upgraded to increase the average bandwidth per South African National Research Network site per year from 3 500 megabits per second (Mbps) in 2014/15 to 8 000Mbps in 2018/19. The achievement of this target will also increase the number of network users, contributing to the goal of expanding access to communication technology (SIP 15) to 100% broadband penetration by 2020.

International capacity will also be increased from 10 Gbps to more than 100 Gbps. This is necessary for the successful implementation of national interest projects such as the MeerKAT/SKA project, the Southern African Large Telescope, the African Very Long Baseline Interferometry Network and the Big Data Project, will allow researchers to participate in competitive research.

5.2.3 Data storage and management

Two petabytes of data storage, shared between the primary Centre for High Performance Computing site in Cape Town and the disaster recovery site at the CSIR in Pretoria, are available through the Data Intensive Research Infrastructure South Africa (DIRISA) initiative. This capacity is used to host a CERN (European Organisation for Nuclear Research) tier 2 data node, an international astronomy data mirror site and data from the Applied Centre for Climate and Earth Systems Science. To store, curate and manage the growing data from these projects and new ones, especially the radio-astronomy data that will soon be generated at MeerKAT, it has become necessary to expand the DIRISA initiative.

5.3 INSPIRE[190]

INSPIRE is an inter-provincial collaboration programme between Northern Cape and Limpopo, funded by Finnish and South African Governments. The Programme's goal is to create an integrated, comprehensive and feasible inclusive provincial information society strategy and development models which will harmonise the National ISAD Plan and Provincial Growth and Development Strategies/Plans and Municipal District Growth and Development Strategies. The inclusive provincial information society strategy in both provinces will be implemented through pilot projects approach focusing on the following key priority development areas for ICT applications:

- e-Government;
- e-Health;
- e-Education;
- e-Infrastructure;
- e-SMMEs;
- e-Agriculture;
- e-Tourism; and
- Local Content development.

INSPIRE Overview in the Province:

- Provincial Government developed the Northern Cape Information Society Strategy (NCISS) to stimulate economic growth and social development utilising tools of the digital era;
- ICTs serve as the technical backbone to the knowledge economy, which is epitomized as the Fourth Industrial Revolution;

[190] Information and Communication Technology Apex Priority Projects and Programmes, http://wirelessafrica.meraka.org.za/wiki/images/b/b7/Overall_brochure_content_final.doc

- Main medium for this Revolution and transition to the knowledge economy, is the Internet;
- However, ICT services in NC are currently too low to satisfy the requisites;
- Internet access: at provincial level is 6.6% compared to 15.7% at national level;
- Gap in high-capacity backbone infrastructure is greatest in rural areas;
- In high demand metropolitan areas there is considerable duplication of infrastructure, but outside these areas, ADSL is limited;
- High cost of building out broadband next generation networks to low demand areas, mean that substitution of mobile broadband for ADSL is not as prevalent as it is in metropolitan areas;
- Northern Cape Provincial Broadband Steering Committee has been established;
- Represented by OTP, NCPT, DoE, DoH, State Information Technology Agency, South African Post Office, SPU, Pixley Ka Seme DM, DRPW, Government Technical Advisory Centre and the DTPS;
- Pixley ka Seme DM Broadband Steering Committee has also been constituted;
- Bid adjudication for appointment of the broadband roll-out service provider is currently underway;
- To address challenge of high cost of building broadband next generation networks to low demand areas two projects have been implemented to test solutions for last-mile connectivity;
- Wireless Mesh Network (WMN) Project, through the Meraka Institute (CSIR) to connect all schools in JTG. Due to budget constraints, only phase 1 was completed with donor support from Kumba Iron Ore;
- Connected 52 schools, a clinic and 2 District offices of NCDOE;
- WMN is currently non-operational due to no funds within the NCDOE for subscription, maintenance and support services fees to the Meraka service provider, Tedaka;
- Universal Services and Access Agency of South Africa (USAASA) has implemented rural connectivity for citizens in Joe Morolong in JTG providing 50MB free Wi-Fi access to all citizens within 500 meters of the schools, clinics and the 28 primary towers;
- This implementation has connected:
    - 10 schools and provided 190 Tablets for matriculants, 30 Tablets for teachers and 10 Printers delivered.
    - 27 Clinics has also been connected and provided with 2 Laptops, 1 Printer and 1 Tablet for each clinic.

5.3.1 Square Kilometre Array (SKA)[191]

SKA site in the Karoo consists of two farms (Losberg and Meysdam) and covers 13,406ha. Here pathfinder and precursor radio telescope dishes have been erected. The Kat-7 project, a test bed of seven dishes, was completed years ago. The MeerKAT project comprises of 64 dishes, a technology demonstrator for South Africa's bid to host the Square Kilometer Array, forms part of SKA phase 1. The SKA telescope will be the most sophisticated of its kind, on earth. On site development includes internal roads, expansion of the dish sets, and completion of the airstrip and the upgrading of the Karoo power station. Onsite buildings include the development of a bunkered computer processing centre. Defining and finalising SKA work packages is on-going. The first phase commences in 2016. The

[191] *http://www.ska.ac.za/about/location/*

project is to be completed at a cost of R23 billion by 2024. The SKA will be one of the largest scientific research facilities in the world and it is envisaged that it would consolidate the Southern African region as a major international hub for astronomy and cutting-edge technology. Construction of the project has commenced, with the target date for completion is set in 2024.

Thousands of SKA antenna dishes will be built in South Africa (in the Karoo, not far from the small town called Carnarvon), with outstations in other parts of South Africa, as well as in eight African partner countries, namely Botswana, Ghana, Kenya, Madagascar, Mauritius, Mozambique, Namibia and Zambia. Another part of the telescope, the low-frequency array, will be built in Western Australia. Radio telescopes must be located as far away as possible from man-made electronics or machines that emit radio waves that will interfere with the faint radio signals coming from the distant Universe. The site should also be high and dry, because some radio waves are absorbed by the moisture in our atmosphere. South Africa already hosts the KAT-7 telescope array, an important testing ground for the MeerKAT telescope array, a 64 dish system which will form a precursor to the full SKA telescope. In SKA Phase 1, the 64-dish MeerKAT precursor array which is currently under construction and expected to come online in a few years time will be integrated into SKA1 MID, with the construction of another 130 dishes. In total, SKA1 MID will count almost 200 dishes spread around the Karoo[192]. The SKA is a global mega science project, building an advanced radio-telescope facility linked to research infrastructure and high-speed ICT capacity & provides an opportunity for Africa and South Africa to contribute towards advance science.

[192] *Department of Economic Development and Tourism Economic Infrastructure Annual Report, 2016/2017*

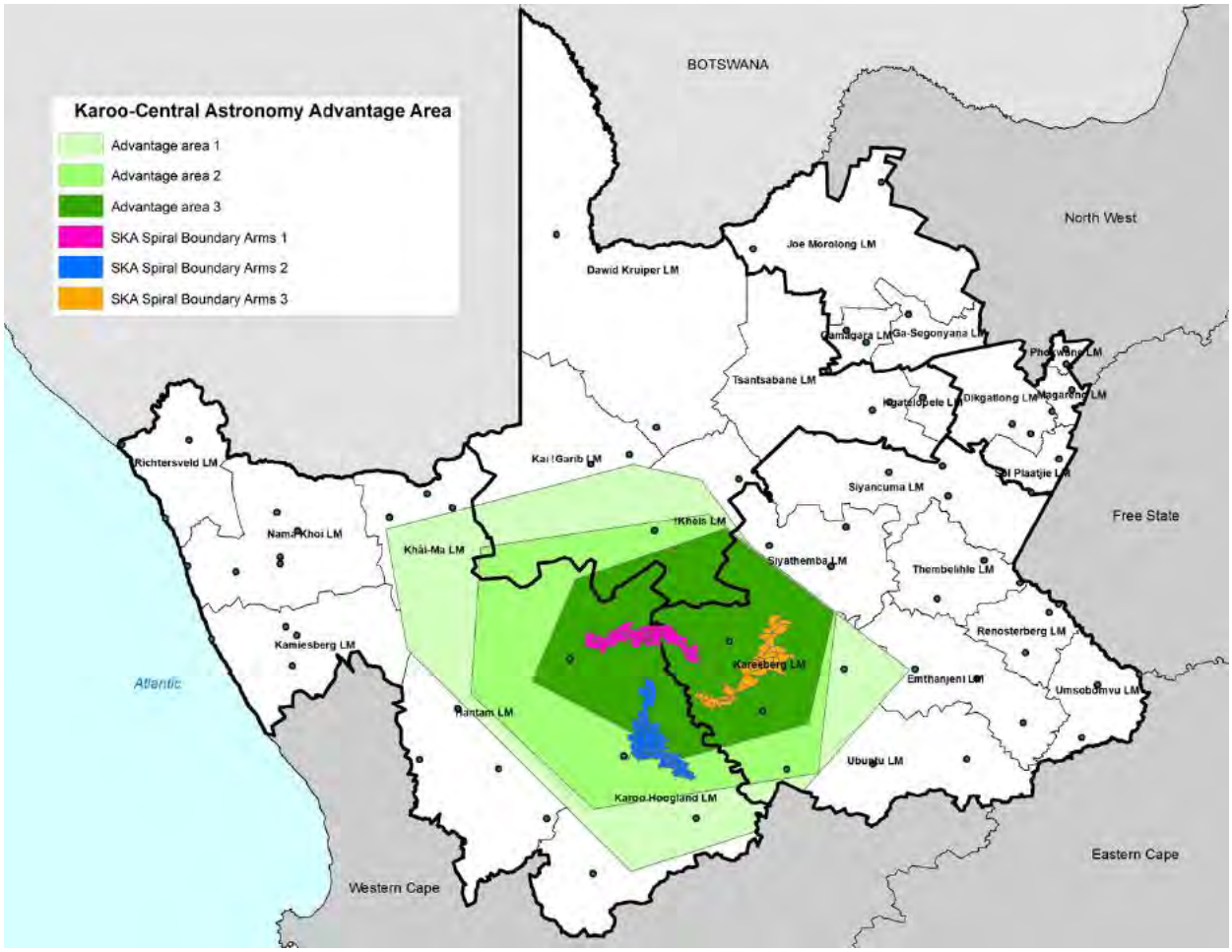


Figure 196: Footprint of the Karoo-Central Astronomy Advantage Area (SKA)

The following activities are declared activities in core or central astronomy advantage area:

- Prospecting or mining activities;
- The construction, expansion or operation of any fixed radio frequency interference source;
- Harmful industrial processes;
- The construction and development of new business or residential areas or recreational facilities;
- The construction or expansion of road or rail transport networks or parts thereof;
- The construction or expansion of any airfield or airport;
- The operation, construction or expansion of facilities for the generation, transmission or distribution of electricity;
- Activities capable of causing light pollution, including the installation or operation of street lighting, outdoor security lights, laser promotional lights or self-lit billboards;
- Activities capable of causing radio frequency interference, including bringing into the area or operating any interference source, mobile radio frequency interference source or short-range device;
- Activities capable of causing air pollution; and
- Any other activity which may detrimentally impact on astronomy and related scientific endeavours, or the astronomy advantage of any core or central astronomy advantage area.

The core area (red outline on the map below) consists of 38 farms. The three spiral arms (blue outline on the map below) consist of 131 land parcels.

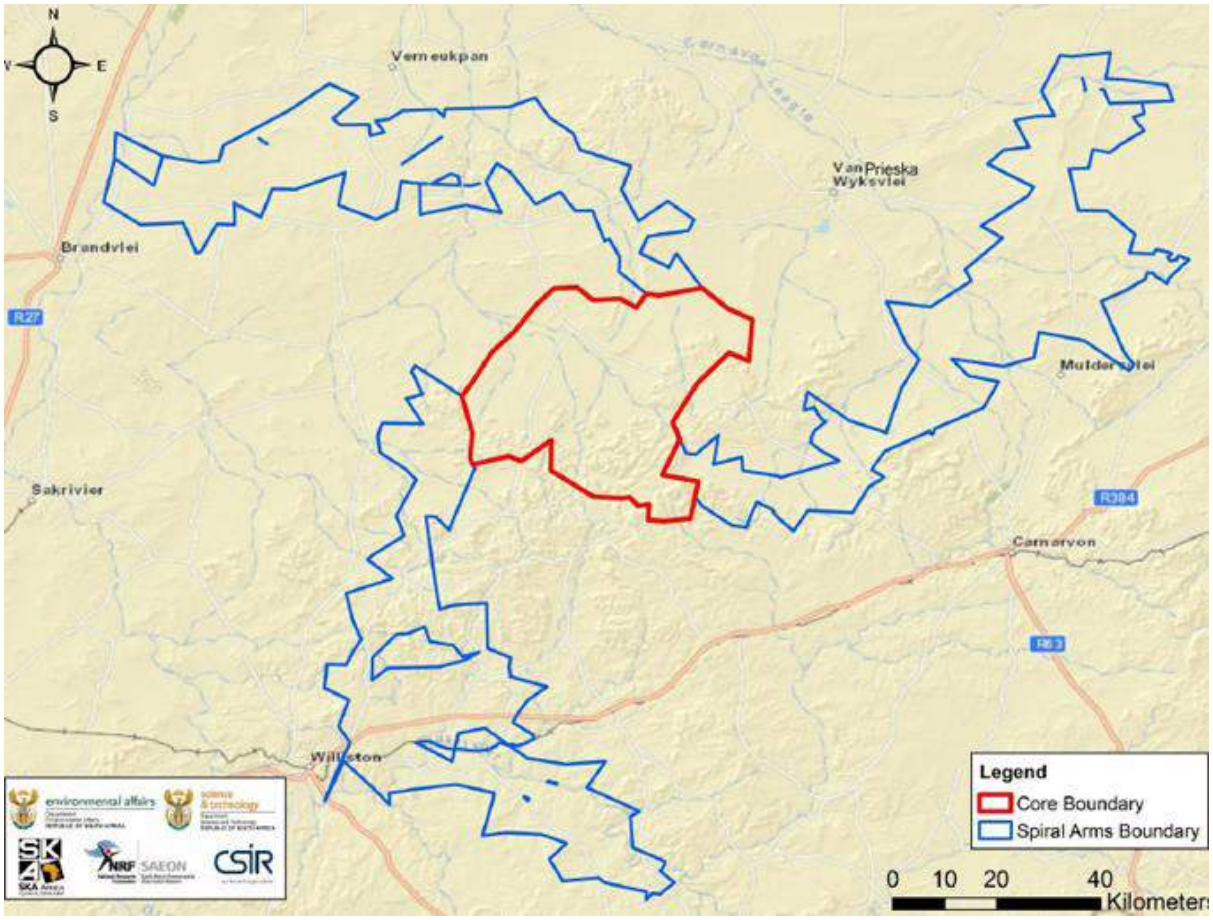


Figure 197: SKA land parcels affected

About 131,500ha of land surrounding the telescope's 176-dish core needs to be free from radio-frequency interference. The project acquired 13,500ha of this land in 2008. In 2016 it embarked on a process to acquire another 118,000ha comprising 36 parcels of land close to the core as well as access rights to servitudes that will hold another 21 dishes. The SKA SA project office has acquired 14 parcels of land, comprising 61,000ha and needs to buy another 18 parcels of land totalling 57,000ha. Four parcels of land originally earmarked for purchase no longer needed to be bought but would provide access rights to servitudes[193]. The land-acquisition project is one of three SKA processes under way in SA. The Department of Science and Technology has been driving the implementation of legislation to protect the site from radio interference.

[193] *Business Day, Telescope project makes progress on radio-quiet zone, 2017. https://www.businesslive.co.za/bd/national/science-and-environment/2017-04-18-telescope-project-makes-progress-on-radio-quiet-zone/*

5.3.1 Karoo array telescope (MeerKAT)



South Africa has built the Karoo Array Telescope (MeerKAT) which is a precursor instrument for the SKA but is in its own right be amongst the largest and most powerful telescopes in the world. MeerKAT has been built in the same radio astronomy reserve near Carnarvon where the SKA is situated. Consisting of 64 dishes, each 13.5m in diameter. The MeerKAT radio telescope, will be integrated into the mid-frequency component of SKA Phase 1. The first seven dishes, KAT-7, are complete and have already produced their first pictures; more than 500 international astronomers and 58 from Africa have submitted proposals to work with MeerKAT once it is complete.

5.3.2 Southern African Large Telescope (SALT)

The Southern African Large Telescope (SALT) is the largest single optical telescope in the southern hemisphere and among the largest in the world. It has a hexagonal primary mirror array 11 metres across, comprising 91 individual 1m hexagonal mirrors.

Sutherland is home to the Southern African Large Telescope (SALT) which has a hexagonal mirror array that measures 11m across. This is the largest facility of its type in the southern hemisphere and one of the top 10 facilities in the world. SALT is an international collaboration that includes scientists and academics in Germany, India, Poland, the UK and the USA. It allows astronomers to examine the scale and age of the universe, the life and death of stars and the earliest galaxies. The site was established in the early 1970s at an altitude of 1 759m and the night skies are among the world's clearest and darkest. Furthermore, the weather conditions are good and stable which enhances its viewing opportunities (Northern Cape Business 2011/2012). The SALT facility is operated under contract to the South African Astronomical Observatory (SAAO).



6 ROADS AND TRANSPORT

6.1 OVERVIEW

Transport acts as the vascular system of modern society and the heart of the economy on all scales. Without it, the logistics of everyday activities and economic enterprise would be impossible. Innovations in transport have allowed activities to transpire in different places, enabling space-based specialisation and the subsequent mass advances in economic output and employment since the period of the Industrial Revolution.

The Province has a good network of national roads that links all areas of current economic interest. Nevertheless, access too many parts of the Province is difficult because of the wide spacing of the infrastructure network. The areas between national roads are covered mainly by gravel roads, of which the condition varies greatly. The cost of transport is a major factor affecting business activities in the Province.

The Province manages a total of 27,348km of provincial roads (of which 13% is paved) under jurisdiction of the Department of Roads and Public Works (DR&PW). Traffic volumes on the paved network are predominantly low, with 60% of these roads carrying less than 500 vehicles per day, and only 23% carrying more than 1,000 vehicles per day. For unpaved roads, 70% carry less than 50 vehicles per day, and only 3% more than 250.

The De Aar Logistics Hub will be developed into a major materials supply depot to serve as a supply and storage facility for Transnet for the rails and sleepers required during the upgrading of the railway line from Kimberley through De Aar to Ngqura.

The major airports are situated at Kimberley, the capital, and Upington. Smaller airports served by scheduled services include Springbok and Port Nolloth. Most of the larger regional towns have airstrips that can be used by small aircraft.

The Province is served by one harbour, Port Nolloth. It has a shallow draft (<3.5m) and can only handle small vessels. Its main role is as a base for fishing and small boat marine diamond mining activity.

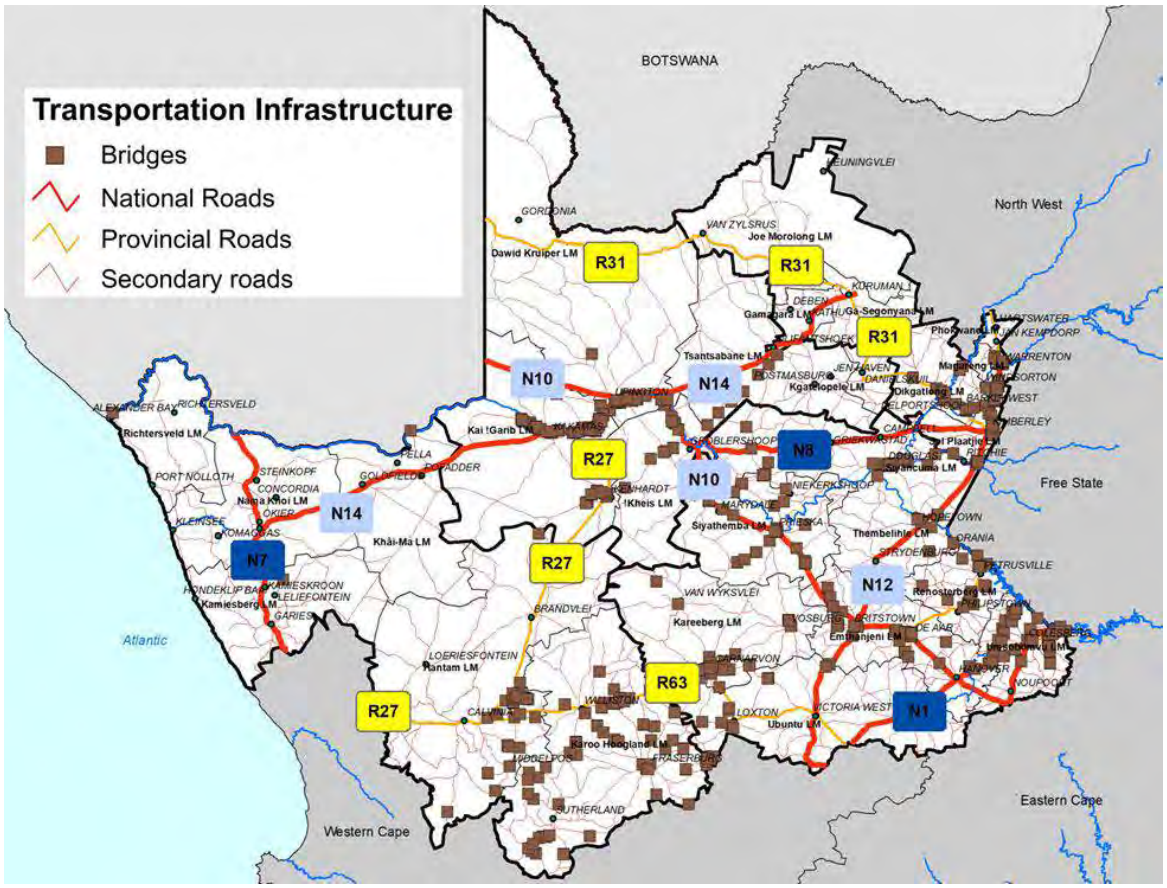


Figure 198: Northern Cape Transport Infrastructure

6.1.1 Main roads

Northern Cape is linked to surrounding areas by a system of national and provincial roads. The national and provincial roads systems within the Northern Cape provide the following regional links:

- The N14 linking Gauteng with Springbok (N7). Development nodes within along this route include Kuruman, Kathu, Upington (N10), Kakamas and Pofadder.
- The N12 route between Gauteng and Cape Town including the development nodes of Kimberley, Hopetown, Britstown and Victoria West.
- The N1 route linking Gauteng with Cape Town including the development nodes of Bloemfontein, Colesberg, Hanover and Richmond.
- The N7 linking Windhoek (Namibia) with Vioolsdrift, Nababeep, Springbok (N14) and Garies
- The N10 linking Keetmanshoop (Namibia) with Upington, Prieska, De Aar and Hanover (N1)

6.1.2 Railway

The railway system provides the following main links:

- Sishen–Saldanha Ore Line
- Ngqura (Coega) Manganese Line
- Cape Town – Windhoek Line
- Johannesburg- Upington Line

6.1.3 Airports and Airfields



Figure 199: Northern Cape airports and harbours

Two major airports are provided:

- **KIMBERLEY AIRPORT (ACSA)**
- **UPINGTON AIRPORT (ACSA)**

Other smaller airfields include:

- Fraserburg Airport
- Augrabies Airport
- Pofadder Airport
- Sutherland Airport
- Kleinsee Airport
- Lime Acres Finch Mine Airport
- Ashkam Airport
- Barkley West Airport
- Tommies Field Airport (Beeshoek)
- Bosluispan Airport
- Brandvlei Airport
- Calvinia Airport
- Colesberg Airport
- Adamsfontein Airport (Colesberg)
- Alkantpan Airport (Copperton)
- De Aar Airport
- Baken Mine Airport (Drifsand)
- Flamino Vlei Airport
- Ganspan Airport
- Gifvlei Airport
- Halfweg Airport
- Kakamas Airport
- Kenhardt Airport
- John Wesson Airport (Kimberley)
- Koingnaas Airport
- Loeriesfontein Airport
- Lohatla Military Airport
- Dippiesfield Airport (Lohatla)
- Malabar Airport
- Bateleur (Maselsfontein)
- Nieuwoudtville Airport
- Jack Duvehage (Olifantshoek)
- Petrusville Airport
- Postmasburg Soil Airport
- Prieska Airport
- Richmond Airport
- Black Rock Airport (Santoy)
- Schmodtsdrif Airport
- Witberg Airport (Tswalo Game Reserve)
- Ulco Airport

The Upington International Airport has the longest runway in the southern hemisphere. Upington is centrally located in the Province. The purpose of the Upington Cargo Hub project is to promote the airport and air services development within the Northern Cape Province. A feasibility study was concluded in 2006 which determined that Upington is ideally suited to serve as a cargo hub.

Upington is centrally located within South Africa and the Upington International Airport could be considered as a viable alternative to OR Tambo International Airport for cargo traffic. The development of the Upington Cargo Hub represents considerable and attractive benefits for users, such as:

- Less congestion.
- Quicker airport turn-around times.
- Potential for payload factors.
- Lower handling and airport charges.

About seventy hectares of land has been earmarked for this project. Within these seventy hectares, there will also be the establishment of a designated area for aircraft maintenance and storage services whereby older aircrafts can be parked in circumstances similar to those found in Middle Eastern countries and other semi desert areas of the world. Aircrafts will also be maintained for future use or stripped for the recycling of spare parts in this designated area.

The airport at Upington has three runways, the main runway has a length of 4,900 metres and a width of 60 metres — essentially making it the longest in South Africa and the southern hemisphere. The runway was built in the 1970's when it was decided to use Upington as a departure point for semi-direct flights to Europe. In 2005 the airport handled 14,000 departing passengers.

6.1.4 Small Harbours

Unproclaimed small harbours include:

- Alexander Bay
- Port Nolloth and Hondeklip Bay

The small-craft harbour of Port Nolloth, Alexander Bay and Hondeklip Bay services the requirements of the local fishing and mining industries. The area has a rich fishing history which boosts the empowerment of the local community regions. It was a trans-shipment point for copper from Okiep mines and Diamonds from the Namaqua coast.

- Groenrivier

The potential to construct a regional deep-sea port as an extension of the current Port of Port Nolloth is imminent, which could make a significant contribution to creating long-term economic development and growth thus effectively eradicating poverty and creating approximately 12,000 direct and indirect employment opportunities for the people of the Richtersveld Municipal Area, whilst at the same time benefiting the Province as well as South Africa as a whole. The small-craft harbour of Port Nolloth, Alexander Bay and Hondeklip Bay services the requirements of the local fishing and mining industries. The area has a rich fishing history which boosts the empowerment of the local community regions. It was a trans-shipment point for copper from Okiep mines and Diamonds from the Namaqua coast.

6.1.5 Development implications

- The main roads, railway system, harbours and airports provide the accessibility and mobility necessary for regional economic development. The development thereof in terms of objectives of the NDP and National Infrastructure Plan to provide for economic growth and development is imperative
- Unlocking the Small Harbours within Northern Cape is part of Government's Operation Phakisa developing the Ocean Economy. Port Nolloth and Hondeklip Bay is considered to have huge potential.

6.2 ROAD MANAGEMENT

The annual principle objective of the Northern Cape Department of Roads and Public Works: Road Asset Management System (RAMS) is to analyse the 27,348km provincial roads to determine the impact of the provincial funding on the future performance of the provincial road network.

According to the most recent condition assessment data of 2015, the overall condition of paved DR&PW roads can be classified as on the border between "fair" and "good". Substantial preventive maintenance from 2012 increased the average network condition from mid fair to the border line between fair and good. The 14% poor and very poor roads have high investment needs and high associated road user costs. 32% of the paved roads are now in a fair condition requiring preventive

maintenance whereby their useful lives could be extended to postpone expensive future rehabilitation costs. The overall gravel thickness of the DR&PW unpaved road network is 17mm with 31% of these roads having no gravel wearing course material on them.

This analysis determined the impact of the current DR&PW funding levels considering the following intervention treatments: reseal, rehabilitation, re-gravelling and upgrading of unpaved roads to paved standards. The funding level for the DR&PW road network, according to the current DR&PW allocation, is estimated at R740 million annually.

6.2.1 Road classification

The Road Infrastructure Strategic Framework for South Africa (RISFSA) classification of the South African Department of Transport (DOT, 2006) was used as the basis for the development of the RCAM classification system that deals with both rural and urban roads and also including the aspect of access management. The result of this saw the development of a Technical Methods and Recommendations document called TRH 26 (South African Road Classification and Access Management Manual version 1.0 of August 2012).

As such 'TRH 26' is not an out of tangent document but rather builds and expands on the classification system of RISFSA and supersedes both the draft National Guidelines for Road Access Management in South Africa (COTO, 2005) and the Manual for the Redefinition of the South African Road Network (DOT, 2008). This guiding document (TRH 26) is currently the official requirement for the road classification and access management of the South African road network. It provides guidance to National, Provincial and Municipal spheres of the government on the functional classification of roads and the methodology according to which such classification must be undertaken. It also gives guidance to how roads must be managed in order to function effectively in accordance with their classification.

RCAM is a six-class rural and urban road classification system. The Table below is given here to show the hierarchy of the road classification system.

Table 73: Road classification [194]

ROAD CLASSIFICATION (MOBILITY/ACCESS)		
Class	Function	Description
Class 1	Mobility[195]	Principal arterial
Class 2		Major arterial
Class 3		Minor arterial
Class 4	Access/activity[196]	Collector street
Class 5		Local street

The following table provides an overview of the Road network, road Types and respective road authorities

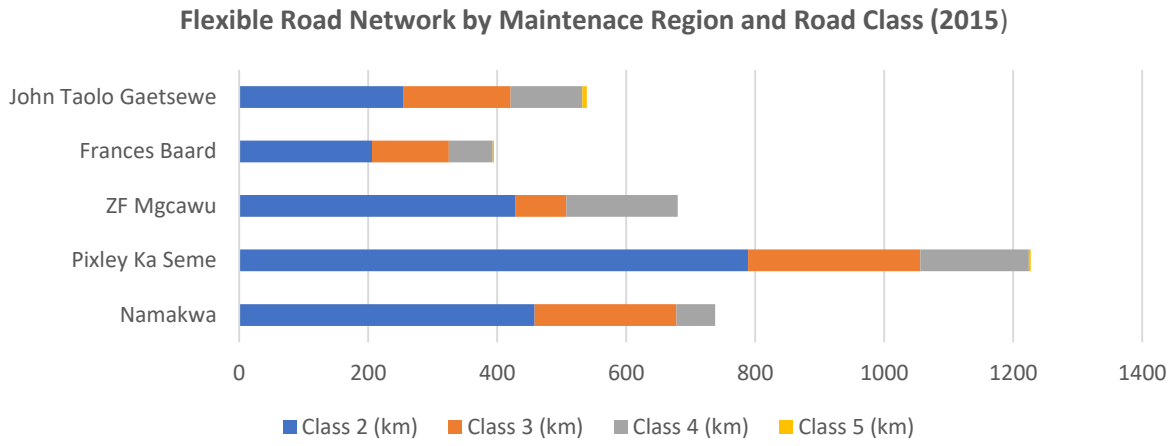
[194] *Manual for the Redefinition of the South African Road Network (DOT, 2008)*

[195] *'Mobility road - is a road specifically designed and protected to promote vehicle movement. Priority is given to through traffic movements. Most of the activities allowed on access/activity streets are not permitted on mobility roads*

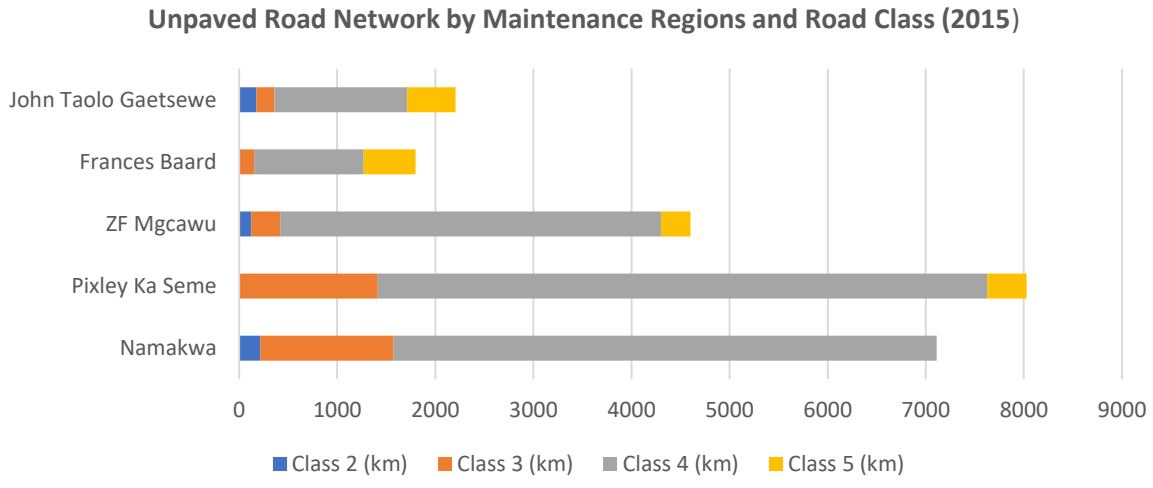
[196] *Access/activity - is any Class 4, 5 and 6 collectors, local and pedestrian street where the access function predominates and mobility is restricted.*

Table 74:Provincial road network overview

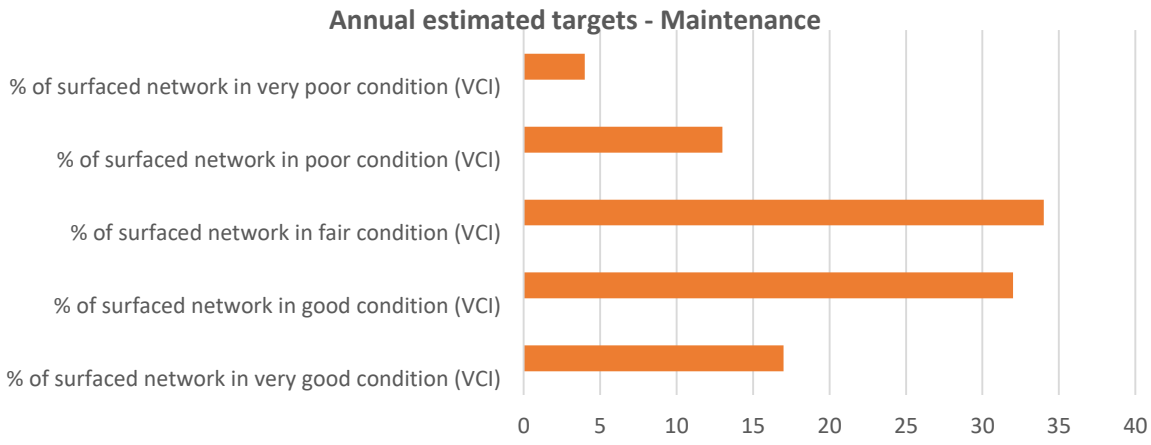
PROVINCIAL ROADS (KM)	27348 KM	PAVED - 13%	UNPAVED 87%
Traffic Volumes	Paved	500 or Less Cars per day – 60%	1000 or more Cars per day – 23%
	Unpaved	50 or less Cars per day – 70%	250 or more Cars per Day – 3%
Road types	Paved (Flexible) Roads	Authority 1 (Provincial) – 3579 km	Authority 2 (Municipal) – 143 km
	Segmented Block Roads	Authority 1 (Provincial) – 23km	Authority 2 (Municipal) – 1 km
	Unpaved Roads*	Authority 1 (Provincial) – 23747 km	Authority 2 (Municipal) – 244 km



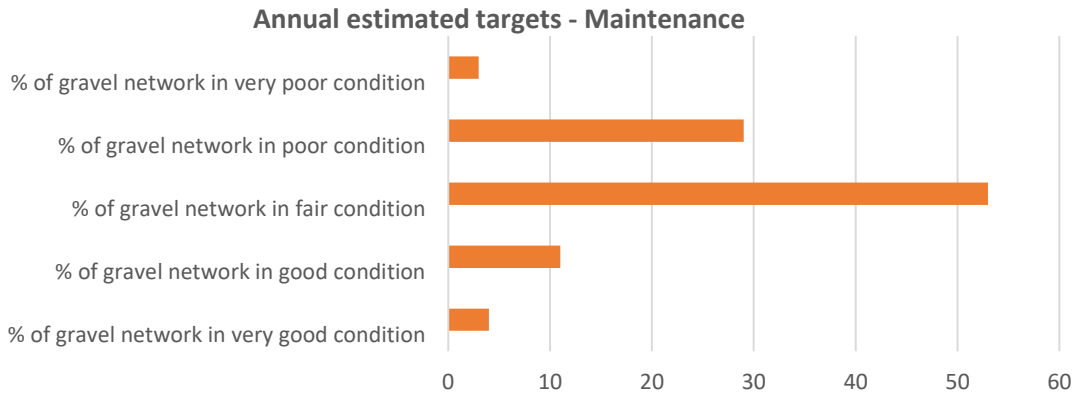
Graph 73: Flexible road network by maintenance region and road class, 2015



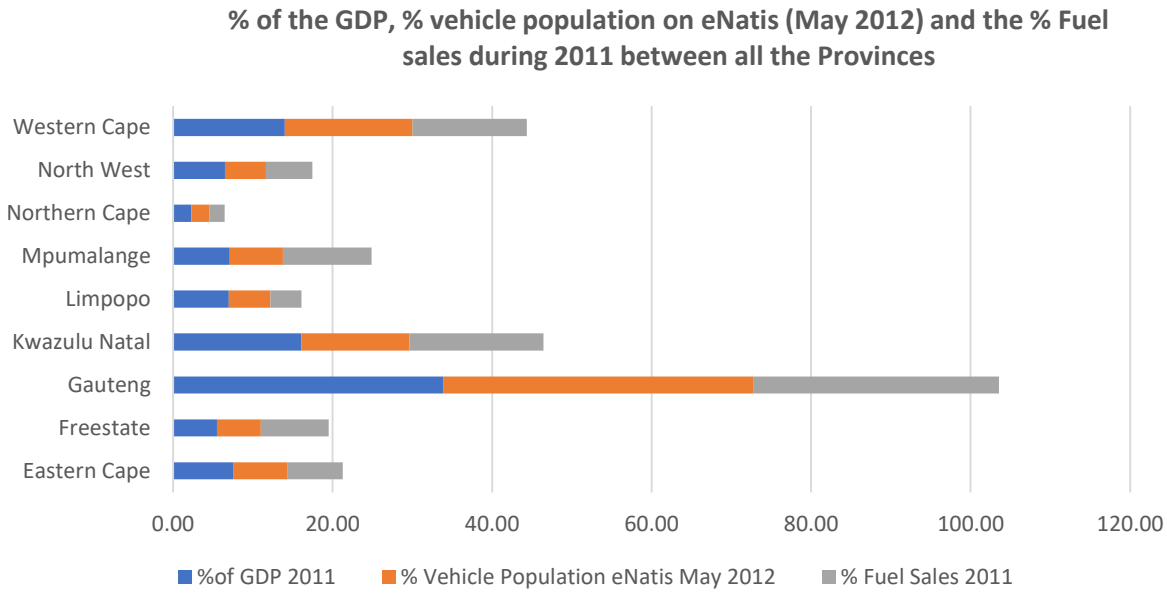
Graph 74: Unpaved road network by maintenance region and road class, 2015



Graph 75: Annual estimated targets of paved road networks - Maintenance



Graph 76: Annual estimated targets of gravel road networks - Maintenance



Graph 77: Percentage of the GDP, Vehicle population and Fuel sales during 2011 between all Provinces

6.3 NATIONAL TRANSPORT MASTER PLAN -NATMAP 2050

NATMAP 2050 for South Africa is a transport master plan that:

- Is comprehensive, multi modal, integrated, and dynamic, and provides a sustainable framework not only for implementing transport but also for providing infrastructure and service.
- Aims to develop continuously and improve the efficiency and effectiveness of a multimodal transport system – a transport system that is well regulated and well managed within a multi sectoral sphere of effective coordination within and cooperation between various government spheres, relevant private sectors, civil society partners and stakeholders up to 2050.
- Addresses key concerns that have been highlighted by Cabinet in 2013
- Ensures its alignment and integration with relevant strategies and policies, data and planning developments
- Reinforces the NATMAP 2050 Vision that transport is the heartbeat of the economy and the fabric of our country's socio -economic development as well as its alignment with key policy, legislation and planning frameworks recently developed.
- Aims to achieve: An integrated, smart and efficient transport system supporting a thriving economy that promotes sustainable economic growth, supports a healthier life style, provides safe and accessible mobility options, socially includes all communities and preserves the environment.
- In line with this vision, adopted a thematic approach in compiling this report centred on key strategic themes to achieve a national transport system for South Africa that (Strategic Themes):

  - ✓ Is well planned, integrated and aligned across sectors.
  - ✓ Is responsive to growing passenger and freight customer needs.
  - ✓ Supports an inclusive spatial vision.
  - ✓ Is well maintained and preserved and further developed to address/overcome developmental challenges.
  - ✓ Supports economic competitiveness through seamless multimodal trade corridors.
  - ✓ Offers safe, affordable and accessible modal options for passengers.
  - ✓ Preserves the environment.
  - ✓ Is managed by strong institutions.
  - ✓ Is supported through effective policy and regulation.
  - ✓ Is innovative/adaptive and reflect s emerging priorities
  - ✓ Is sustainably funded
  - ✓ Is effectively implemented through accountable delivery mechanisms.
  - ✓ Identifies the following key National Strategic Priorities for transport

6.3.1 NATMAP priorities

6.3.1.1 Short-Term Priorities

- Funding policies, strategies and reallocation
- Transport/road safety

- Urban transport and land use integration
- The eradication of inefficient planning to enable better decision-making and positive outcomes
- Institutional reform to enhance intergovernmental relations and coordination and strengthen institutional and organisational planning structures and processes
- Refocus public transport (including scholar transport) initiatives to be demand- and developmentally responsive, customer-focused and commercially driven in the context of integrated land use and transport
- Provide opportunities for empowerment in public transport provision
- Country-wide land transport infrastructure improvements (road and rail)
- Rural transport – improving rural mobility and accessibility to economic opportunities
- Examine the operational hours of heavy goods vehicles on public roads in support of road safety objectives.
- Tourism and transport integration.
- Science, technology and innovation in transport.
- Supporting the green economy strategy.
- Economy.

6.3.2 Medium- to Long-Term Priorities

- Urban densification.
- Preparation of regulations on universally accessible transport.
- National Travel Demand Management Strategy and a Traffic Congestion Management Plan.
- National freight transport operations across all modes must work together to supply services to meet pit-to-port demands.
- Supporting the green economy strategy.
- Develop a national transit-orientated development strategy and guidelines for cities.
- Investment in a mobility strategy and its implementation in rural areas, providing access to transport opportunities.

6.4 LAND USE, TRANSPORTATION AND THE ECONOMY

The contribution of NATMAP 2050 to the success of the NDP 2030, SIPs and other existing and emerging policies and strategies in transport, is dependent on:

- Understanding the strong spatial connection between land use and transportation.
- It is essential to consider land use, sectoral and other economic activity, settlement patterns, legislation, policies, and related initiatives that have an influence on transport.
- Addressing key issues pertaining to land use planning, observations from current land use planning, future spatial vision and its impact on transport planning, and the required interventions to achieve the NATMAP 2050 Vision.
- Ensuring efficient decision-making through the most possible robust economic justification for transport infrastructure while taking into consideration its impact on land use and the environment.

6.4.1 Key Issues Relevant to Land Use Planning

NATMAP 2050 identifies the need to address some of the following key issues pertaining to land use planning:

6.4.1.1 Integrated Planning

- The integration between economic development and spatial planning is evident in the progress made in transforming the country.
- The uncoordinated provision of infrastructure and transport services due to limited integration and coordination are evident between national, provincial and local level land use planning.

6.4.1.2 Coordination Between Spheres of Government

- A lack of coordination relating to multisectoral land use developmental projects.
- Duplication of effort and resources, requires an improved level of coordination between the 3 spheres of government and the private sector, mainly between projects in sectors such as mining, agriculture, forestry, manufacturing, commerce, tourism, education, health, housing, urban development and transportation

6.4.1.3 National Spatial Vision

- A lack of a clear vision for the future spatial context of South Africa is hampering the change in how the country is planned and land use is managed.
- Progress was made towards developing a spatial vision to further strengthen the relationship between land use and transport planning with:
    - The promulgation of the Spatial Planning and Land Use Management Act (16 of 2013) (SPLUMA).
    - The commencement of developing the National Spatial Development Framework. (NSDF)

6.4.1.4 Development corridor approach

- The potential to improve the socio-economic opportunities of the population by focusing economic development around development corridors. The focusing of economic development, housing and other civil services at specific strategic nodes along a development corridor are deemed more sustainable.
- Limitations on opportunities accessible by the communities not situated along the corridors.
- The importance to understand the sensitivity and functionality of a corridor and to ensure its mobility function versus that of its accessibility function.

6.4.1.5 Institutional Arrangements

- The co-operation across institutions to prevent fragmented development patterns is a key land use planning concern
- Enabling spatial and transport investment and ensuring implementation decisions should take place at the local municipal level.

6.4.1.6 Settlement patterns and formal and informal economic activity

- The interface between settlement patterns and economic activity is an imperative in planning transportation and land use development.
- Planning must address the transport needs of the many South Africans who function outside of the formal economy and/or formal settlement areas.

6.4.1.7 Physical factors that can hamper the development of transport infrastructure

- These include topography, climate and geotechnical issues, environmentally sensitive areas, and the location and spatial distribution of good agricultural land.

6.4.1.8 Fragmented development patterns

- The need for integration, consolidation, and normalisation within the provincial, urban, and rural spatial systems must be addressed to ensure sustainable transportation development.

6.5 NATMAP 2050 FUTURE SPATIAL VISION

Key directives for the future spatial vision includes:

- Population and land use scenarios for the NATMAP 2050 were evaluated and balanced in terms of land use development directives influenced by land use policies and current development trends summarised as follows:
- Settlement and investment must be encouraged in areas with high development and economic growth potential.
- Settlements of exclusion must be linked to areas with economic opportunity.
- Transportation must support an integrated settlement pattern.
- Growth and development must be environmentally sustainable.
- Key rural areas must be developed into sustainable economic entities.
- Industrial development must focus on international markets.
- Comparative and competitive advantages of regions must be exploited.

6.5.1 Focus Areas

To ensure that the NATMAP 2050 future spatial vision can be implemented over time and will provide an integrated system between land use, economic development and transport, which provides mobility to people and goods and accessibility to economic opportunities, employment and other social services, the following focus areas to ensure alignment were identified:

6.5.1.1 Need to focus transportation network development on existing corridors.

- The existing and proposed corridors should form the focal point of the transportation systems development for 2050. These corridors link nodes and hubs identified in the spatial frameworks and in areas where there are economic opportunities.
- In addition to the existing national and provincial corridors, the emerging national corridors need to be prioritised for detailed planning and alignment across the provinces.
- Within the Northern Cape the following corridors exist:

- N1 Corridor crossing South Africa from the Western Cape to Musina in the north of Limpopo and covers Gauteng and the Free State. The N1 is the most important national and regional transport corridor and is the road–rail link to Gauteng.
- Sishen–Saldanha Ore Line Corridor connecting Sishen in the Northern Cape to the Port of Saldanha Bay in the Western Cape and transports primarily iron ore. This corridor is an exclusive freight corridor.

6.5.1.2 Emerging national corridors.

- The various provincial strategies that focus on the alignment of land use development and transport systems identified a number of key emerging national or interprovincial corridors.
- These include the main existing corridors and new emerging corridors that need to be given priority by the government.
- Most of these are interprovincial or SADC regional corridors.
- These emerging corridors needs to be given priority in terms of more detailed planning, the alignment of provincial development programmes amongst each other, and also the alignment of the national spatial development framework and subsequent national development programmes.

Within the Northern Cape the following emerging corridor is identified:

- Ngqura (Coega) Manganese Line Corridor connecting Hotazel, Kimberley and Port Elizabeth via rail. It plays an important role in linking freight and raw materials to the Port of Ngqura, an important IDZ and SEZ for South Africa both now and in the future
- The Kgalagadi Transfrontier Park Tourism Corridor linking Upington with the Kgalagadi Transfrontier Park

6.5.1.3 Economic nodes or hubs.

- The nodes or hubs are areas of high-intensity land use activity located along or at the start and end points of existing, emerging or national corridors
- Nodes include areas of residence, industrial activity or trade that are the generators of transport demand – meaning that the flow of goods along transport corridors generally occurs between these points.

6.5.1.4 Consider Alternative Modes of Transport

- Specific land use is linked to appropriate modes of transport – for example, rail is the preferred mode of transport to carry bulk materials over long distances.
- Integrated spatial and transport planning will improve the interface between the transportation network, development and the use of land.

6.5.2 Spatial Integration of NATMAP 2050 with Policies

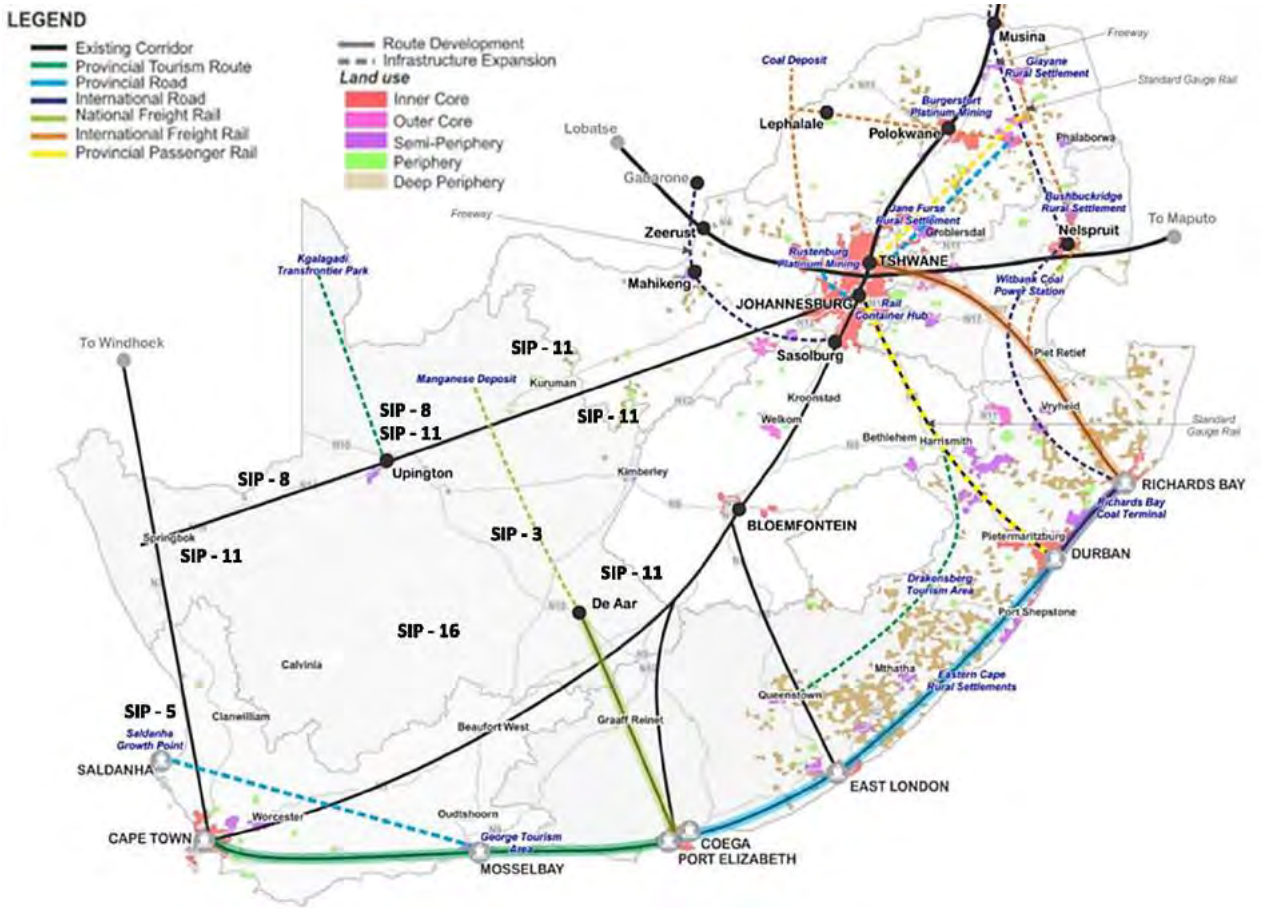


Figure 200: NATMAP 2050 - Existing and New/Emerging National Corridors

Figure 200 illustrates the interaction and location of existing, emerging and national, provincial and international corridors, the settlement hierarchy and other spatial indicators relevant to the NATMAP 2050 spatial planning.

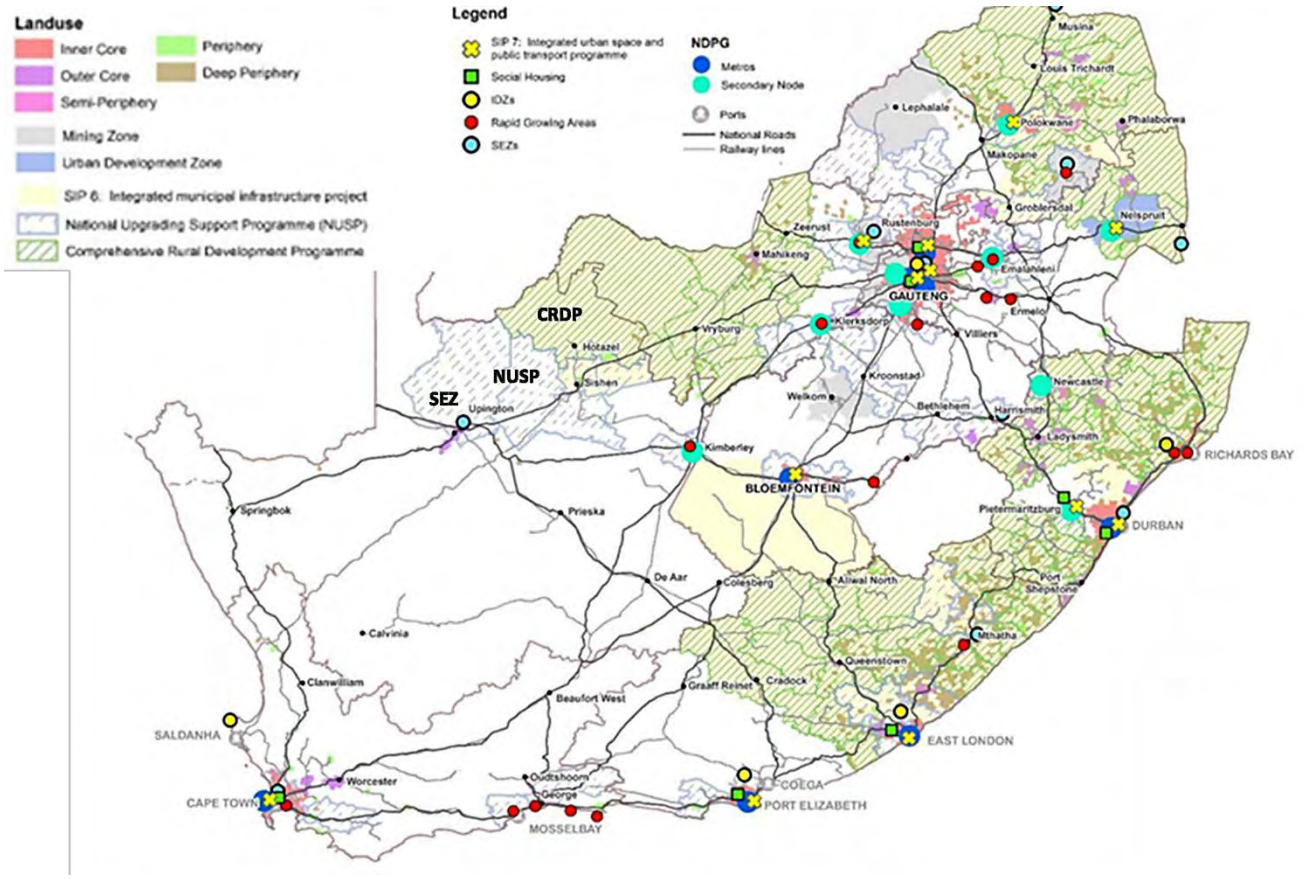


Figure 201: Spatial Integration of the NATMAP 2050 with latest Policies

Figure 201 illustrates the latest development areas and settlement hierarchy in comparison with the spatial structure of the NATMAP 2050. It is evident that these align and the development corridors and emerging corridors identified connect the areas of rapid development, mining areas and other salient spatial features.

The alignment of the salient features defined in the NATMAP 2050 with the latest spatial vision and initiatives are summarised per defined NATMAP focus area:

The existing corridors identified in the NATMAP 2050 align with the following strategic integrated projects:

- SIP 5 – Sishen–Saldanha – Eastern Cape–Northern Cape (NATMAP – Sishen–Saldanha Ore Line Corridor)
- Emerging transport corridors: The emerging corridors identified in the NATMAP 2050 align with the following strategic integrated projects:
- SIP 3 – South–east node and corridor development. Manganese rail line expansion, Hotazel – Kimberley rail upgrade (NATMAP – Ngqura (Coega) Manganese Line Corridor)

6.5.2.1 Economic and Development Nodes:

The Urban Networks Strategy (UNS), IDZ, SEZ, UDZ, mining municipalities and rapid growing areas include all the economic nodes of importance identified for the NATMAP 2050 strategic transport network.

6.5.2.1.1 Within the Northern Cape:

- Kimberley is regarded as a rapid growing Secondary Node
- Upington as an IDZ

6.5.2.1.2 Social housing and SIP 7 (public transport) alignment:

- The provision of high-quality public transport systems relies on increased densities at nodes along these state-of-the-art systems. The alignment between the UNS, UDZ, social housing projects and SIP 7 projects is evident. Social housing initiatives provide the opportunity for densification and bringing the poorest of the poor closer to opportunities of work.

6.5.2.1.3 Rural–urban migration and rural development alignment with SIP 6 and SIP 11:

- Migration from rural areas has a significant impact on rural development and an equitable return on investment.
- With the focus of SIP 6 to provide national capacity to assist 23 areas to eradicate all the maintenance backlogs and to bring about the required upgrades in water, electricity and sanitation bulk infrastructure will assist in the attempt to attract investment to rural areas and sustain existing economic activities, and, thus, limit rural–urban migration patterns. In the long term, this initiative sets the scene for the development of rural areas into sustainable economic entities.

Within the Northern Cape:

- The areas of Kuruman and Sishen and areas to the north west thereof forms part of SIP 6 and Comprehensive Rural Development Programme. (CRDP)
- The areas to the east and north of Upington forms part of the

6.6 FREIGHT

The economic efficiency in the movement of goods is the objective of all freight transport. Freight transport should therefore aim to provide conditions in support of this objective. Freight transport in South Africa is characterised by the following:

- A very large proportion of freight transport movement is provided by parastatals in railways, ports, pipelines, and aviation.
- The annual tonnage handled by major freight transport infrastructures in 2013 illustrated in Figure 3 4 includes:

  - ✓ 1.53 billion tonnes of freight transported by road representing 76% of the total amount of freight transported
  - ✓ The balance of freight having been transported through ports (13%), rail (10%), pipelines (1%) and airports (0,02%).

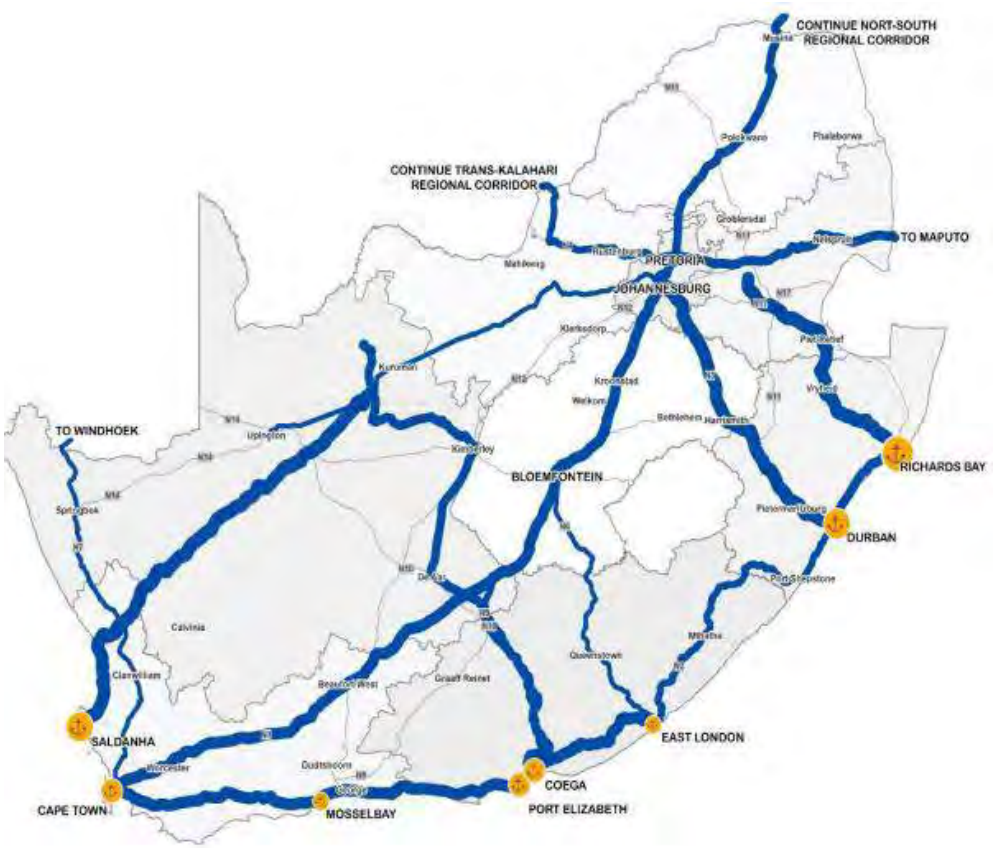


Figure 202: Freight Tonnage Movements for Road and Rail

Figure 203: Annual Tonnage handled by major Freight Transport Infrastructures 2013[197]

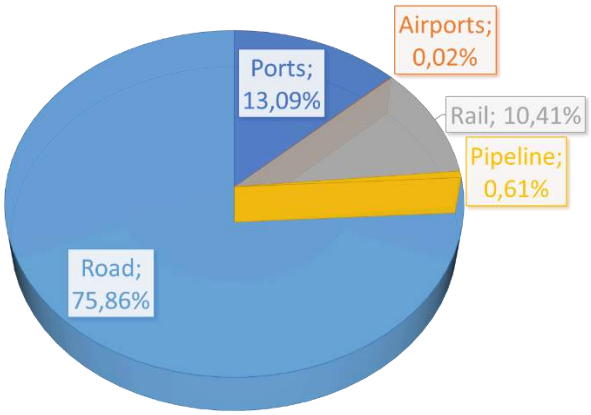


Figure 203: Annual Tonnage handled by major Freight Transport Infrastructures 2013

The NATMAP 2050 and Transnet intend to rebalance this unequal split to maximise the efficiencies of each mode in support of socio-economic development. The movement on national corridors as illustrated in Figure 7-2 indicates that within the Northern Cape the highest volumes were experienced on:

- Sishen–Saldanha Ore Line Corridor (Highest volume)

[197] *Source: National Freight Logistics Strategy Review, March 2015*

- Ngqura (Coega) Manganese Line Corridor (Second highest volume)
- Cape Town – Windhoek Corridor
- Johannesburg- Upington Corridor

6.6.1 Freight Transport Issues

The pertinent issues regarding Freight Transport includes road–rail competition, road freight overloading, the lack of freight planning information, and aviation.

6.6.1.1 Road–rail competition

- The road freight industry is in a favourable position to compete with long-haul railway services for high-value commodities. Due to the increase of vehicle-carrying capacity. This resulted in the increase of the road freight market share along major corridors and covers high-value commodities and other goods that are normally regarded as suitable commodities for rail haulage, such as maize, fuel, coal, vehicles, containers, and cement.
- The rail market share declined due to operational policy constraints on the rail service provider resulting from the transport policy decisions of the government as a major shareholder.

6.6.1.2 Road-to-rail strategy

- The significant deterioration of the road network due to overloading and traffic congestion has resulted in the development and formulation of Transnet's road-to-rail strategy, the primary aim of which is to rebalance the road freight–rail freight split in an attempt to create a more appropriate market share and to reduce the number of heavy trucks on the roads to decrease overloading on the road network.
- The implication of the Road to Rail Strategy is a reduction in overall transport and logistics costs and externality costs (e.g. road damage, road accidents, road congestion, noise pollution and carbon emissions).
- The following commodities are best suited to be transported exclusively by rail in the form of break-bulk, liquid bulk and bulk due to factors such as route, type, distance, quality and high pressure:

    - ✓ Timber
    - ✓ Sugar
    - ✓ Cement
    - ✓ Zinc
    - ✓ Coal
    - ✓ Grain
    - ✓ Liquid bulk
    - ✓ Car parts.

- A gradual movement back to rail is noted by The Road Freight Strategy and the objective is that 2% of the rail-friendly cargo stated above be moved by rail annually.

6.6.1.3 Road freight overloading

The. increase in legal axle masses, combined with the rapid increase in the volumes of traffic, is the primary cause of the deterioration of the roads in all the provinces. The provincial and national authorities responsible for providing and maintaining roads are faced with an ongoing concern about the levels of overloading recorded across South Africa.

6.6.2 Freight Transport Analysis and Forecasting

6.6.2.1 Rail freight

Rail handled 210 million tonnes of freight in 2013, consisting mainly of block train consignments of primary minerals, such as ores and coal, and primary and secondary commodities including timber, steel, grains, fuels, and smaller proportions of industrial outputs, and imports and exports, such as motor vehicles, containers, and chemicals, where rail has a distinct advantage over road. The tonnages represented in **Table 75** report on the rail freight commodities for 2013 on the respective network links identified in the National Freight Logistics Strategy (2015), review currently in progress) and should be interpreted as such.

Table 75: Rail Freight Commodities on Major Lines/Links (2013)

NETWORK LINK	FREIGHT COMMODITIES	RAIL TONNE (MT)
Gauteng–Cape Town	cars, grains, containers, perishables, cement, steel	11
Cape Town–Namibia	fish, containers, fertilisers, cement, machinery	0
Gauteng–Upington	foods, cement, steel, machinery, vehicles, perishables	0.7
Britstown–Nakop	food, cement, steel, machinery, cars, perishables	0.7
Sishen–Saldanha	iron ore, lead	62

Table 76 shows that two sections of the South African railway network within the Northern Cape have practically reached their maximum capacity measured in terms of capacity utilisation.

Table 76: Railway Network Capacity Current Rail Operational Problems and Constraints

RAIL NETWORK	CAPACITY
Kimberley–De Aar	The Kimberley–De Aar section was initially a double line but one line was closed and the other electrified about 20 years ago. However, the number of passing loops for long trains was limited; this now presents a problem when two trains with 104 wagons need to pass each other. The second line needs to be electrified and signalled for passing loops.
Orex line–Saldanha Bay	The Orex line–Saldanha Bay section has reached its capacity and is undergoing substantial upgrading to allow for longer trains and extra passing loops.

Transnet, through its market demand strategy, is in the process of rolling out its capital investment programme as well as focussing on improving operational efficiencies. Some of the highlights of the strategy are:

- R300bn capital investment programme
- Expanding rail, port and pipeline infrastructure
- Increase in capacity to meet market demand
- Continued financial stability and strength
- Significant productivity and operational efficiency improvements
- Shift from road to rail – reducing the cost of doing business and carbon emissions
- Enabling economic growth
- Job creation, skills development, localisation, empowerment and transformation opportunities.

The strategy will result in the following improvements:

- Additional capacity across all commodities
- Rapid growth in general freight
- Significant improvement in rail operational performance
- Productivity improvements and improved asset utilisation at ports
- Reduction in the cost of doing business by means of the promotion of a shift from road to rail
- Positioning of South Africa as the integrated hub in sub-Saharan Africa
- Suppliers' partnering with Transnet to deliver capital spend and achieve localisation and empowerment objectives
- Reduction in the cost of doing business (0.5% of GDP)
- Driving of regional integration
- Localisation programme supports local products and skills development

6.6.3 Road Freight Corridors

The NDP 2030 identifies the strengthening and optimisation of these corridors as one of the key policy and planning priorities under the wider focus area of economic infrastructure. The Durban–Free State–Gauteng freight corridor is seen as a model corridor in this regard by the NDP 2030 and is supported by the NATMAP 2050. **Table 77** indicates the road freight commodities for 2013 on the respective major network sections according to the National Freight Logistics Strategy Review of March 2015. The table shows that the Gauteng–Durban section carries the largest share of freight commodities, followed by the Gauteng–Swaziland, Cape Town–Port Elizabeth and Gauteng–Cape Town corridors.

Table 77: Road Freight Commodities on the Respective Major Network Sections 2013

NETWORK SECTION	FREIGHT COMMODITIES	ROAD TONNES(mt)
Gauteng-Cape Town	cars, grains, containers, perishables, cement, steel	15
Cape Town-Namibia	fish, containers, fertilisers, cement, machinery	4
Gauteng-Upington	foods, cement, steel, machinery, vehicles, perishables	2.1

Britstown-Nakop	food, cement, steel, machinery, cars, perishables	0.2
Sishen-Saldanha	iron ore, lead	0

6.6.3.1 Operational Problems and Constraints

- A summary of the current road freight operational problems and constraints is given below:

Cost of roads

- It is evident that heavy goods vehicles do not currently contribute adequately to compensate for the wear, damage, and externalities caused on the roads.

Availability of diesel

- There is a shortage of diesel worldwide, due to current manufacturing trends and economics.
- Electricity shortages have a harmful influence on road freight transport due to the rapidly escalating usage of diesel for power generation.

Personnel and staffing

- Skills shortage and lack of adequately trained and competent personnel in a wide range of disciplines are experienced.
- The national technical training structures are inadequate and do not ensure the supply of competent technicians in the automotive trades.
- The management training for managers in road transport is ineffective.
- The ineffectiveness of the driver training systems and institutions in South Africa is a growing concern.

Externalities

- The externalities associated with the rapid increases in the road freight operations in South Africa are a are, in part, due to the high percentage of goods being transported by road instead of rail.
- The main city centres suffer from considerable congestion during peak hours, aggravated by the presence of heavy vehicles.
- The rising heavy vehicle accident rates are partly caused by competition for road space and the inadequate control of operating standards in the trucking industry.
- Externality factors include driving hours, driver training, and control of speeds and loads.
- Heavy goods vehicle exhaust emissions are a major cause of air pollution in cities.

Forecasting of road and rail freight

- A multimodal freight demand model (with the base year of 2010) was developed to compare future demand. The following trends for South Africa are anticipated:

- the number of road freight vehicles will rise from 400 000 to over one million by 2050. The result will be unprecedented delays on the already congested roads in industrial areas and around the ports.
- The cost (at 2009 reported prices) of road freight transport is expected to rise to over R400 billion per annum or much more if fuel shortages result in hefty price increases.
- Cross-border traffic will rise to more than one million freight vehicle border crossings annually by 2050. The current border arrangements are already inadequate and will definitely not be able to handle the increased flow of traffic

It is expected that the demand, for road freight on most of the national corridors, to increase over the period. Further expansion of the Sishen–Saldanha iron ore line to 45 million tonnes is planned for this period (2050). The limited handling facilities available at the ports and industrial plants are inadequate to accommodate the volumes proposed by railway plans and budgets.

6.6.4 Analysis of Aviation Freight Transport

Apart from ACSA, which is government-owned, the air freight service providers are private companies that operate in a highly competitive market.

Constraints to the growth of the freight market are:

- The lack of outbound air freight from South Africa, when compared to imported goods, is a major obstacle in the growth of the air. Another constraint is the lack of belly-hold capacity on passenger aircraft.
- Limited air freight demand in rural provinces will negatively affect the viability of dedicated air freight.
- Reliance on efficient road access to the OR Tambo International Airport, the Cape Town International Airport, and the King Shaka International Airport will become important.

Implications for Future Freight Transport Planning

Currently, road is unavoidably the default freight transport mode, absorbing whatever traffic cannot be accommodated in other modes. The road industry is an extremely competitive one – its future will be influenced by policy and related successfully implemented developments envisaged for other modes. Critical implications for the future freight transport planning are summarised in the following sections.

6.6.5 National Freight Transport Strategic Imperatives: Rail Freight Strategies

- **Green Paper on National Rail Policy:**

  This paper is currently in development by the DoT and the strategies listed below must be aligned with this process.

  - The road-to-rail strategy developed by Transnet must be implemented.
  - The road freight strategy supporting the move back to rail must be implemented.
  - An ongoing review of NFLS supports the same strategy and must be implemented.
  - The strategies listed above must be aligned and combined into a single strategy.

- A review and the liberalisation of the regulatory framework of South Africa in support of the development of integrated regional corridors are important.

- **Investment base:** Introduce policies to permit the widening of the investment base in rail freight operations.
- **Training:** Develop national training capacity for the development of operational, technical, and managerial skills in the rail freight sector.
- **Research capacity:** Provide research capacity to inform national policy decisions on railway development.
- **Legislative framework:** Commission research into the creation of a legislative framework for sustainable intermodal rail freight systems.
- **Electrified railways research:** Commission a technical and economic evaluation of the role of electrified railways in relation to probable future restrictions on hydro-carbon liquid fuels.
- **Branch lines in rural areas:** Commission an urgent investigation into strategies to maximise the potential for the use of branch lines in rural areas.

6.6.6 National freight transport strategic imperatives: Road freight strategies

- **Research:** Commission research to:

  - Establish the necessary conditions for creating a sustainable road freight infrastructure funding system.
  - Investigate the creation of operator competence and development of skills in the road freight sector.
  - Investigate the logistics systems surrounding the major ports and the need for infrastructure planning.
  - Establish the implications of reducing the availability of fuel for road freight applications.
  - Review and liberalise the regulatory framework of South Africa in support of the development of integrated regional corridors.

- **Weighbridges:** Establish weighbridges at identified strategic points along the road network.
- **Road user cost recovery:** Develop effective methods for road user cost recovery, including a re-evaluation of toll roads strategies and practicable nation-wide alternatives.
- **Institutional structure:** Create structures and institutional changes to achieve effective operator regulation.
- **Provincial management:** Evaluate the potential for developing effective provincial management of road freight operations quality.
- **Cross-border analysis:** Complete the analysis of cross-border road freight operations and plan for large-scale upgrades to facilities and systems at key border posts.
- **Overloading:** Strategic imperatives to address overloading include the:

  - Implementation of weighbridges at identified strategic points along the road network and standardisation of data collection mechanisms
  - Development of effective methods for road user cost recovery, including the re-evaluation of toll roads strategies and practicable nation-wide alternatives

- Implementation of structures and institutional changes to achieve effective operator regulation
- Commissioning of research for creating operator competence, and skills development in the road freight sector.
- Development of effective provincial quality management for road freight operations.

6.6.7 Aviation freight transport

Gradual growth in wide-bodied air freighters is expected, as is the continued dependence on belly-freight capacity in passenger airliners. Containerised air freight is expected to penetrate and increase in the air freight market. Research is required into the future potential industrial development that will support demand for air freight.

6.6.8 Proposed Freight Interventions Proposed

6.6.8.1 SIP 3: Manganese export line

- Transnet Freight Rail is developing the rail network between the manganese-rich Northern Cape and the Port of Ngqura in the Eastern Cape, to become the utility's third heavy-haul export channel. The development aims to increase South Africa's annual manganese export capacity to 16 million tonnes. The manganese export line development also involves port-related expenditure, including at the Ngqura manganese terminal.

Critical freight transport planning proposals

- Adoption of a general policy principle to rebalance the road vs rail market share
- An essential element of the strategic policy direction is to keep the expansion of the current road network to a minimum, to focus on improving the quality and the application of demand management mechanisms, and to align all of these elements with the policy processes currently taking place in the transport environment.

A capacity-driven dedicated rail network strategy

To rectify the unbalanced 89% to 11% modal split between road and rail freight in line with current policy processes in the transport sector such as the draft Green Paper on National Rail Policy, the adoption of policy directives and principles needs to include:

- Users' freedom of freight service choice based on the allocation of cost
- Technical and economic regulatory measures that validate reasons for protecting the road network by an all-embracive body, such as a single-transport economic regulator (STER), that is applicable to all transport modes, including roads
- The typical characteristics that determine appropriate modes for freight commodities – value, volume and weight, perishables, and consumer requirements – such as time, speed, reliability, packaging, and general product conditions
- Rail network availability for other operators on the branch lines but not on the primary network. The mechanism exists in the private sector participation (PSP) programme, which is currently under review by the DoT.

- The rail mode will systematically recover from historic market losses and regain the market share on commodities that would usually be transported by rail freight. In turn, rail will become competitive – at least for long-distance traffic.
- Air freight transportation will continue with its high growth and gain in total market share.

Freight transport regulatory measures

High-priority new regulatory measures for freight transport that are aligned with the policy processes taking place in the transport environment should include:

- Addressing the bulk movements of:
    - Iron ore, coal and other unrefined bulk mining commodities.
    - Agricultural products that are less likely to perish or get damaged.
    - Any liquid or gas product not transported by pipeline, and dangerous goods.
    - Subjecting any future economic activity-generating new freight traffic of a bulk nature to statutory planning and the provision of infrastructure at the developers' own cost.
    - Subjecting cargo road transportation to severe increased pricing, and new mechanisms for the use and access of public roads and designated areas.
    - Restricting the continuous expansions on the current road network to those strategic roads that improve quality, standards, and efficiency, the application of demand management mechanisms, and capacity.
    - Given the far-reaching effects of South Africa's current and projected demographic, economic and land use profile, aspects of freight and passenger transport cannot be viewed in isolation. The realisation of the transport vision for 2050 will require a solid infrastructure that will result in an efficient and effective integrated transport system with consideration to financial realities.
    - Competition in the management of container terminals

Greater competition in the management of container terminals is encouraged. The approach to competition should be nuanced and properly timed or linked to a broader strategy for the container freight system and should be linked to private sector involvement. The mechanism for this is hosted in the PSP currently under review by the DoT.

6.6.8.2 Passenger Transport

Current Passenger Transport Trends

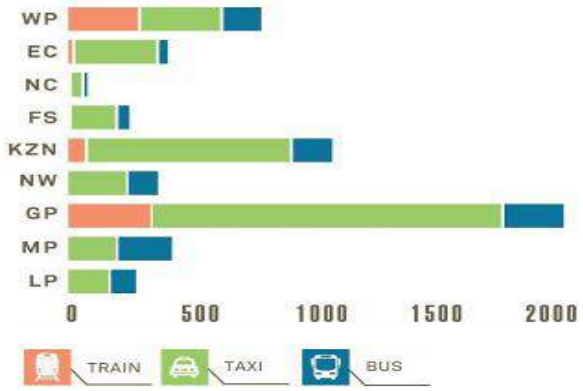
The following trends are identified as per **Table 78** which demonstrates the change in percentage of work trips per province between 2003 and 2013 indicating:

- The percentage contribution per province to the total number of trips in South Africa did not change significantly from 2003 to 2013.
- The main contributors to the overall work trip movements are Gauteng, KwaZulu-Natal and the Western Cape (70% in total) that area home to metropolitan municipalities.
- Only 1% are generated in the Northern Cape

Table 78: Work-Related Trips Per Province

Province	2003	2013
Western Cape	15	14
Eastern Cape	7	7
Northern Cape	1	1
Free State	4	4
KwaZulu- Natal	19	19
Northwest	9	7
Gauteng	36	36
Mpumalanga	5	8
Limpopo	4	5

(Source: NHTS, 2003 & 2013)



Graph 78: Number of Work Trips by modal type per Province (NHTS, 2013) indicates that the change in number of work trip passengers in the Northern Cape is the smallest of all the provinces. No metro-rail services are provided in the Northern Cape.

Graph 78: Number of Work Trips by modal type per Province (NHTS, 2013)

6.6.8.3 Long-Distance Rail

The following critical issues are identified within NATMAP 2050:

- The utilisation of the rail mode, especially in rural areas, is hampered by poor access, availability, reliability, distance, cost, and safety and security.
- Long-distance rail suffers due to old rolling stock, low demand, low profitability, and discontinued services. To improve the quality and availability of rolling stock, though, the government has committed R4 billion in the 2012 national budget for the purchase of new coaches between 2012 and 2015. The funding made available will include for long-distance coaches.

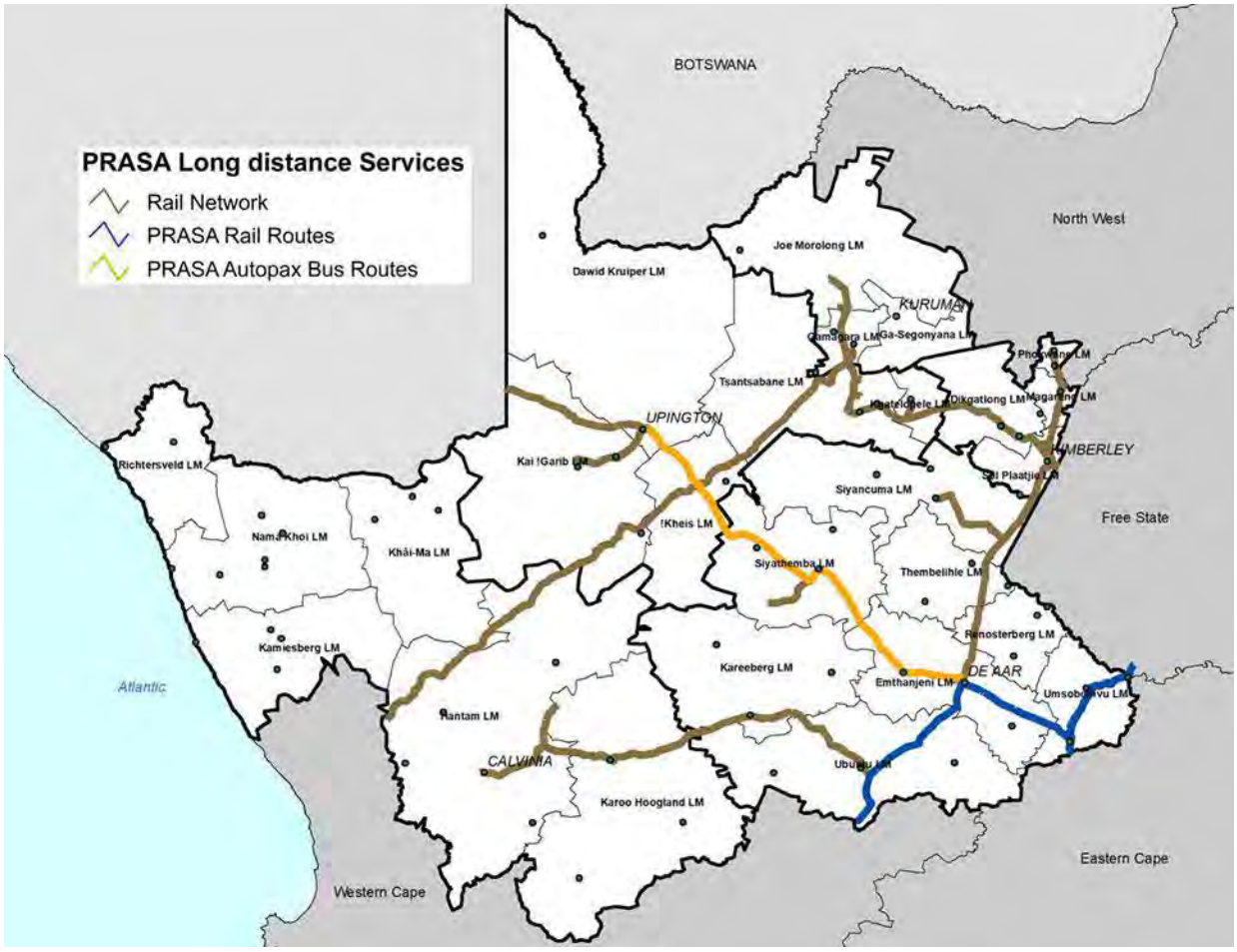


Figure 204: PRASA Long distance services

- The Figure above gives an overview of the Shosholoza Meyl (PRASA long-distance) services.
- Failure to maintain and upgrade infrastructure, including lines and signal systems, results in a reduction of line capacity, the unreliability of services and, eventually, loss of market share. Inefficiencies in service provision can also be attributed to the disjointedness between rail line ownership and operations.
- Critical issues in rail passenger transport include strategies to revive the mode in South Africa to form the backbone of transport, and how, when and where to introduce high-speed technology. In order to improve the operational capacity of the mode, there is a need to address speed and travel time, traffic and safety concerns, interoperability and integration.
- Passenger rail service provision and network coverage are also limited to mainly urban areas. New network developments have stagnated over the past five decades. This has eroded the rail mode's market share, which has declined systematically in the past few decades but is showing gains in patronage in the past few years, according to statistics reported in the NHTS of 2013
- To promote interoperability objectives, there is a need to transform the current institutional arrangements for the rail mode (government-owned, -regulated and -managed), and reverse long-term disinvestment in the rail mode, stagnation, and a resistance to technological changes (including high-speed systems and gauge).

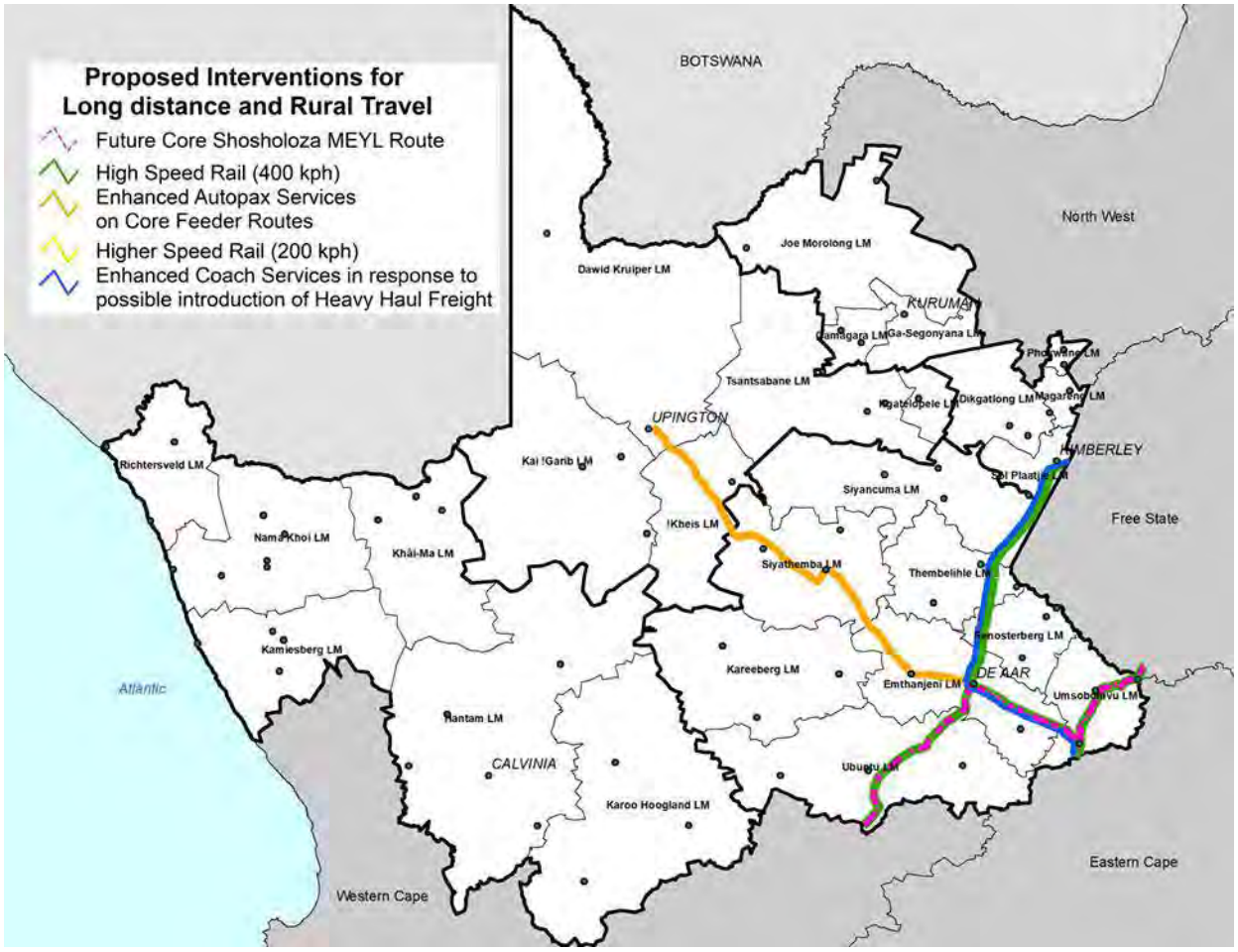


Figure 205: Proposed Interventions for Long-distance and Rural Travel

The proposed interventions for long-distance and rural travel in South Africa defined in the PRASA Strategic Plan 2013 are illustrated in the **Error! Reference source not found.**above.

With regard to the Northern Cape the following interventions are proposed:

- A core Shosholozo Meyl rail system between Johannesburg, Noupoort and Cape Town
- High speed rail (400km/hour) as part of a high-speed rail system between Johannesburg and Cape Town:

  ✓ between Bloemfontein and Kimberley
  ✓ between Kimberley and De Aar
  ✓ between De Aar and Noupoort

- Enhanced PRASA Autopax services linking De Aar and Upington extending to Namibia
- Enhanced Coach Services linking Johannesburg, Kimberley, De Aar, Noupoort, Graaff Reinet and Port Elizabeth in response to the possible introduction of heavy haul freight

6.6.8.4 Road Passenger Mode

The road passenger services range from luxury tourism and long-distance to regional and locally subsidised (bus) and non-subsidised (taxi) commuter services and also includes bus rapid transit (BRT) and scholar transport services.

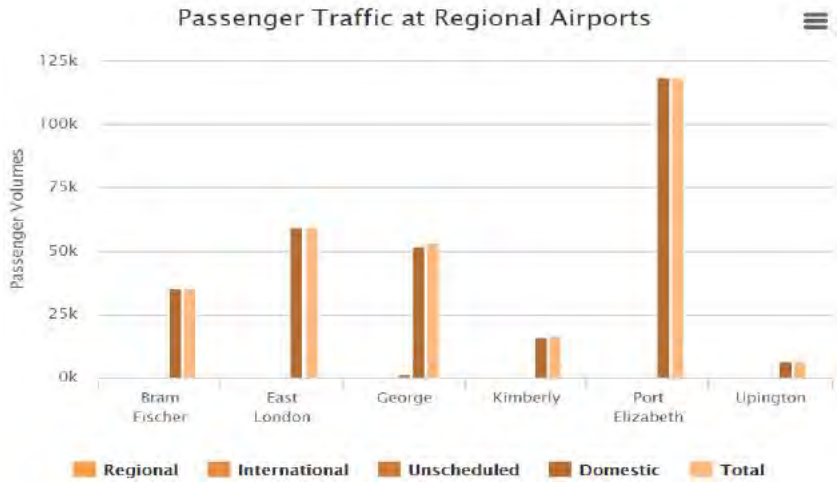
- Operational perceptions of the road passenger mode are better that of rail mode largely attributed to:
- its versatility and adaptability to market demand,
- its adaptability to infrastructure capacity conditions (e.g. in relation to traffic congestion),
- and changes in route and service frequencies.

A strategic public transport network (SPTN) is required that:

- integrates local level IPTNs and the IRPTNs allowing the passenger transport system to meet interregional and local travel needs. The SPTN should be streamlined into a detailed operational plan, business plan, financial plan, and implementation plan. All plans by planning authorities, Department of Transport agencies and passenger enterprises should be aligned with the SPTN. Suitable modes should be identified and supported to improve passengers' connectivity and accessibility to opportunities.
- Identify primary routes for implementation up to 2030, with secondary routes following the establishment of the backbone of the primary routes.
- Future technologies should be considered for implementation during the period up to 2030 with room for migration into the period beyond.
- Prescribe suitable institutional arrangements determining
- the responsibility for the provision, funding and maintenance of facilities and the operations, control and management functions of the proposed services are required.
- Provides proposals about how national, provincial, and local governments should coordinate their planning to determine funding needs and prioritise planning actions across the provinces.
- Provincial master plans to guide and coordinate the development and implementation of local and district ITPs

6.6.9 Air Passenger Transport

Total Passenger Traffic at various Airports Company South Africa airports - February 2018, Kimberley experienced just over 13000 domestic passengers while Upington experienced just over 4000 passengers for the month of February 2018.



Graph 79: Passenger traffic volumes by Air Travel for the month of February 2018

Table 79: Kimberley Airport - Arrival passengers, 2012-2018

Arrival Passengers						
Domestic	FY12/13	FY13/14	FY14/15	FY15/16	FY16/17	FY17/18
April	5 856	6 706	6 403	5 509	7 419	6 178
May	7 030	6 643	6 592	6 493	7 679	7 400
June	6 497	6 736	7 317	6 721	7 444	7 157
July	7 173	6 492	7 329	7 172	8 019	7 622
August	7 205	6 452	7 426	7 044	7 516	7 654
September	7 086	7 109	7 373	7 679	8 356	7 749
October	7 153	7 412	8 179	8 472	8 387	8 018
November	7 110	7 525	7 124	7 714	8 192	7 887
December	4 121	4 453	4 204	5 363	5 500	5 336
January	4 239	4 859	4 325	5 398	4 978	5 177
February	6 296	6 774	6 366	7 703	6 671	8 091
March	6 615	7 787	7 391	7 587	7 862	
TOTAL	76 381	78 948	80 029	82 855	88 023	78 269

Table 80: Kimberley Airport – Departure passengers, 2012-2018

Departure Passengers						
Grand Total	FY12/13	FY13/14	FY14/15	FY15/16	FY16/17	FY17/18
April	5 744	6 699	6 450	5 704	7 430	6 005
May	6 863	6 539	6 756	6 476	7 719	7 435
June	6 426	6 621	7 272	6 554	7 680	7 402
July	6 884	6 213	7 346	7 275	7 887	7 470
August	7 217	6 639	7 485	7 275	7 558	7 931
September	6 860	6 944	7 323	7 938	8 654	7 915
October	6 968	7 294	8 367	8 596	8 495	7 971
November	7 150	7 611	7 267	7 637	8 244	7 982
December	4 012	4 529	4 317	5 617	5 699	5 548
January	4 220	4 859	4 199	5 385	4 884	4 919
February	6 121	6 800	6 313	7 605	6 796	8 315
March	6 559	7 529	7 318	8 043	8 191	
TOTAL	75 024	78 277	80 413	84 105	89 237	78 893

Table 81: Upington Airport - Arrival passengers, 2012-2018

Arrival Passengers						
Total	FY12/13	FY13/14	FY14/15	FY15/16	FY16/17	FY17/18
April	1 902	2 455	2 776	2 581	2 578	2 480
May	2 215	2 365	2 808	3 084	2 599	2 863
June	2 593	2 538	2 844	2 947	2 715	2 686
July	2 354	2 569	3 012	3 214	2 624	3 345
August	2 340	2 779	3 460	3 241	2 962	3 145
September	2 419	3 122	3 467	2 975	3 068	2 909
October	2 632	3 060	3 375	3 492	3 100	3 172
November	2 767	3 269	3 650	3 359	3 299	3 044
December	1 750	2 166	2 221	1 863	1 827	1 781
January	2 096	2 704	3 086	2 489	2 778	2 915
February	2 728	3 266	3 198	2 803	2 680	2 740
March	2 451	3 158	3 461	2 540	3 107	
TOTAL	28 247	33 451	37 358	34 588	33 337	31 080

Table 82: Upington Airport – Departure passengers, 2012-2018

Departure Passengers						
Grand Total	FY12/13	FY13/14	FY14/15	FY15/16	FY16/17	FY17/18
April	1 963	2 335	2 705	2 602	2 668	2 388
May	2 109	2 456	2 805	2 849	2 485	2 829
June	2 413	2 400	2 744	2 879	2 802	2 717
July	2 198	2 378	3 136	3 277	2 586	2 863
August	2 330	2 826	3 270	3 090	2 766	3 283
September	2 363	2 849	3 434	3 114	3 013	2 776
October	2 415	2 964	3 287	3 322	2 863	2 941
November	2 655	2 907	3 446	3 219	2 838	3 110
December	2 005	2 769	3 016	2 478	2 344	2 572
January	1 845	2 106	2 412	2 004	2 068	2 094
February	2 739	3 114	3 257	2 746	2 641	2 502
March	2 444	2 832	3 427	2 632	2 881	
TOTAL	27 479	31 936	36 939	34 212	31 955	30 075

A steady growth in passenger numbers has been experienced from 2012 towards the end of 2015 whereby a decline at the Upington Airport was experienced. Upington Airport experienced a year on year decline of -5% and -7% in passenger numbers while Kimberley Airport proved to have a 4% growth rate in the same period.

Air passenger transport within South Africa experiences the following positive attributes:

- The most positive commercial image of all modes in South Africa.
- Its utilisation levels are high with utilisation levels of the scheduled services at major airports ranging from about 80% for domestic flights to about 70% for international flights
- infrastructure is of an exceptional standard.
- Support of The Airport Company of South Africa's (ACSA's) good strategic planning, management, funding, and prioritisation processes
- Private sector market forces and the flexibility of operations.
- A good safety record and a healthy and competitive market

6.7 PROPOSED INTERVENTIONS

- Strategic and continued improvement in the performance of passenger transport across all modes is required. The NATMAP 2050 proposes some strategic network interventions that includes the following:
- Provides A hierarchy of passenger transport corridors to promote modal integration and sustainable improvements. The strategic network categorises corridors by movement, including international, interregional or interprovincial, intercity, and urban or rural.
  Links to the demographic and land use patterns along corridors of national importance.
- Identifying modal interchanges situated in the metropolitan, urban and rural areas.
- Incorporating important economic evaluation and long-term project appraisal criteria and standards relating to:

    - increased safety, reliability, efficiency,
    - the full integration of transport operations and infrastructure facilities,
    - low operating costs,
    - economic construction methods,
    - the minimisation of environmental disruption,
    - the promotion of better land development and the long-term sustainability of transport systems eradicating Inefficient land use planning and encouraging densification enabling better decision-making, planning and provision of passenger transport services.

- Supports the main objective of the strategic approach to move from network to broader corridor integrated transport and to plan land use.
- Incorporating important economic evaluation and long-term project appraisal criteria and standards focusing on increased safety, reliability, efficiency, the full integration of transport operations and infrastructure facilities, the promotion of better land development, and the long-term sustainability of transport systems.
- Promotes institutional reform

6.7.1 Proposed Interventions for Passenger Transport Include the Following:

- Devolution responsibilities must be assigned to authorities as foreseen in the Constitution and prescribed by the NLTA to deal with the issue of the role of the different spheres of government in passenger transport and the fragmented and uncoordinated delivery of passenger transport,
- The DoT and Department of Basic Education must develop a collaborative and integrated task team geared to investigate the scholar transport issue and decide on the most appropriate socio-economic solution.
- The implementation of densification plans in Brownfield developments must be encouraged to protect greenbelt areas and prevent further urban sprawl.
- The development of an overarching public transport subsidy policy that incorporates all modes of public transport to subsidise users and not the operators.
- Appropriate modal technology choice guidance must be developed to ensure that alternatives are appropriately assessed and that demand-driven and -responsive services are implemented.
- An in-depth investigation (review, evaluation and economic feasibility study) led by the DoT of the existing BRT delivery model is required to either improve the sustainability of its delivery or to intervene in the future role of BRT systems in South Africa.
- Public transport planning guidelines must be developed, including:

    - the alignment of spatial and geographical development, population densities and land use patterns, with appropriate modal and infrastructure responses based on technology choice analysis.
    - Developmental approaches, particularly in rural areas, where sufficient passenger numbers do not exist to satisfy the classic demand drive model of predict and provide, must be applied.

- Long-term financial viability and funding mechanisms for the ongoing and ever-increasing operational costs of services must be established.
- The development of an overarching subsidy policy for the effective distribution of the limited operational subsidy to the benefit of commuters and not that of operators.
- The provision of NMT is underlined by its associated policy, addressed by the national rural strategy as well as the IRPTN requirements for NMT facilities around BRT facilities. However, a comprehensive NMT strategy and guideline document is required for the overall urban and rural transport system.
- The development of universal access guidelines based on international best practice to implement universal access in terms of all classes of passengers, people with disabilities, aged, young children, language, with the roll-out of future passenger transport and retro-fitting current vehicles and facilities.
- Amend existing transport legislation, definitions and provisions to include and provide for new technology operating services in public transport including e-hailing services.





CHAPTER 9 – The SPATIAL CONTEXTUALISATION outlines the distribution of settlements and the status of spatial and land use management mechanisms of the Northern Cape.

CHAPTER 9

Status Quo Analysis – Spatial Contextualisation

CHAPTER 9 | SPATIAL CONTEXTUALISATION

1 OVERVIEW

The Spatial Contextualisation chapter aims to provide insight regarding the spatial distribution of the Northern Cape settlements as well as the distribution or concentration of services within settlements. By doing so, a greater understanding of the interaction and roles of settlements comes to light.

As the province is known as a water scarce region, large centres are mainly concentrated in close proximity to reliable water sources, such as rivers, dams or aquifers. Due to this, a larger concentration of towns are located towards the east of the province.

Trends such as urbanisation, and migration are playing and ever-increasing role, as residents are struggling to make a living outside of urban areas, due to various factors such a drought and lack of accessibility to services and opportunities. A high level of in-migration into towns places an increased level of pressure on local municipalities to provide basic services. The influx of people mainly results in the increase or growth in informal settlements that will require municipal and provincial interventions.

Town functions vary greatly due to environmental and economic factors that typically determine which activities are viable within certain regions of the province. Settlement or service centres within the Northern Cape typically specialises in agricultural or mining activities, where the isolated and rural settlements main purpose is to provide basic or elementary services to residents and communities.

2 GUIDING POLICIES AND LEGISLATION

2.1 THE NATIONAL DEVELOPMENT PLAN

The National Development Plan proposes that by 2050 the following issues should be adhered to:

- Inequalities in the land market that makes it difficult for the poor to access the benefits of life in towns and cities be addressed
- Stronger measures to reconfigure towns and cities towards more efficient and equitable urban forms be adopted
- Housing and land policies that accommodate diverse household types and circumstances be developed

Spatial restructuring:

- Must respond to Apartheid legacy of spatial patterns that exacerbate inequality and economic inefficiency
- Housing delivery is a process of social change
- Delivery of housing must be seen as a process for restructuring towns and cities
- Municipalities and the province must a play an elevated role in decision making and coordinating investment for social and economic infrastructure in towns and cities

2.2 SPATIAL PLANNING AND LAND USE MANGEMENT ACT

SPLUMA requires wall to wall planning, and further stipulates that the local municipalities are the authority of first instance (Section 33(1)). It further requires national and provincial spheres of government and each municipality to prepare Spatial Development Frameworks (SDF's). A Municipal Planning Tribunal may not make a decision that is inconsistent with the Municipal Spatial Development Framework; they can only depart from a Municipal Spatial Development Framework if site-specific circumstances justify a departure. and Land Use Schemes (LUS's), in order to coordinate and manage spatial development and land use distribution in an effective and sustainable manner.

The guiding principles of SPLUMA aims to address the spatial inequality and fragmentation as a result of the Apartheid spatial legacy. For a detailed description of SPLUMA refer to Chapter 1.

2.3 INTEGRATED URBAN DEVELOPMENT PLAN (IUDF)

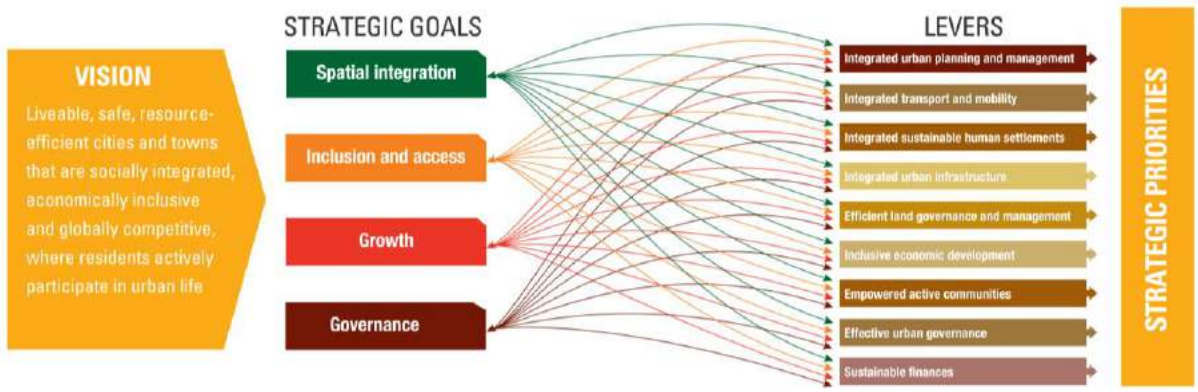


Figure 206: Core elements of the IUDF

In Brief, the IUDF identified 97 priority Municipalities that would require support towards the current trends of urbanisation. Sol Plaatje, Dawid Kruiper and Kuruman has been identified and prioritised. In 2017, 37 Municipalities have been re-prioritised for the IUDF program. Sol Plaatje has been identified as priority no.20 and would be eligible to obtain financial support towards the upgrading and regeneration of the urban areas.

- The IUDF overall outcome is spatial transformation, the IUDF marks a new deal for South African cities and towns, by steering urban growth towards a sustainable growth model of compact, connected and coordinated cities and towns.
- IUDF also focuses on urban-rural continuum as part of highlighting rural-urban interdependency, urban resilience and urban safety.
- It is through the outline spatial outcome and proposed growth model that the implementation plan is based on.

Key Changes

The IUDF Spatial transformation is based on the following elements: **LAND – HOUSING - TRANSPORT – JOBS** with the aim to:

- reduce travel costs and distances,
- prevent further development of housing in marginal places,
- increase urban densities to reduce sprawl,

- improve public transport and the coordination between transport modes
- shift jobs and investment towards dense peripheral townships.
- A new section on urban typology is also included in the redrafted IUDF. This section stresses the importance of the different urban contexts and their related contribution to, for example, the national economy.

Guiding principles for the selection of Towns

- Spatial Equity and equality
- Capital Growth: Agglomeration of towns
- Efficient use of resources
- Poverty Reduction
- Employment /Jobs
- Local Resources, Local Skills and Local Markets
- Compact city development and Densification
- Improvement in Transportation modes as part of
- improving access
- Towns and Settlements near of places of work and play– development of connected and compact towns and cities
- Sustainable Infrastructure and Services
- Drought awareness – and planning for disasters
- Integrated Human Settlement development
- Prioritisation of Education and Health as part of poverty eradication

2.3.1 KEY FINDINGS

- Mixed income and mixed housing typologies limited
- Mixed land uses evident but limited and not consistent
- Backlog figures from PRM for Backlog eradication = 39 981
    - 2011 informal dwelling count = 39 604
    - 2016 informal dwelling count = 42 246
    - Draft development plan speaks of 53 000
- Fit between the spatial development and economic opportunities not tight
- Mining Towns will require special attention linked to life cycle of mining
- Empowerment value chain in construction limited and needs to be expanded

3 SETTLEMENTS

3.1 CURRENT SETTLEMENT TRENDS

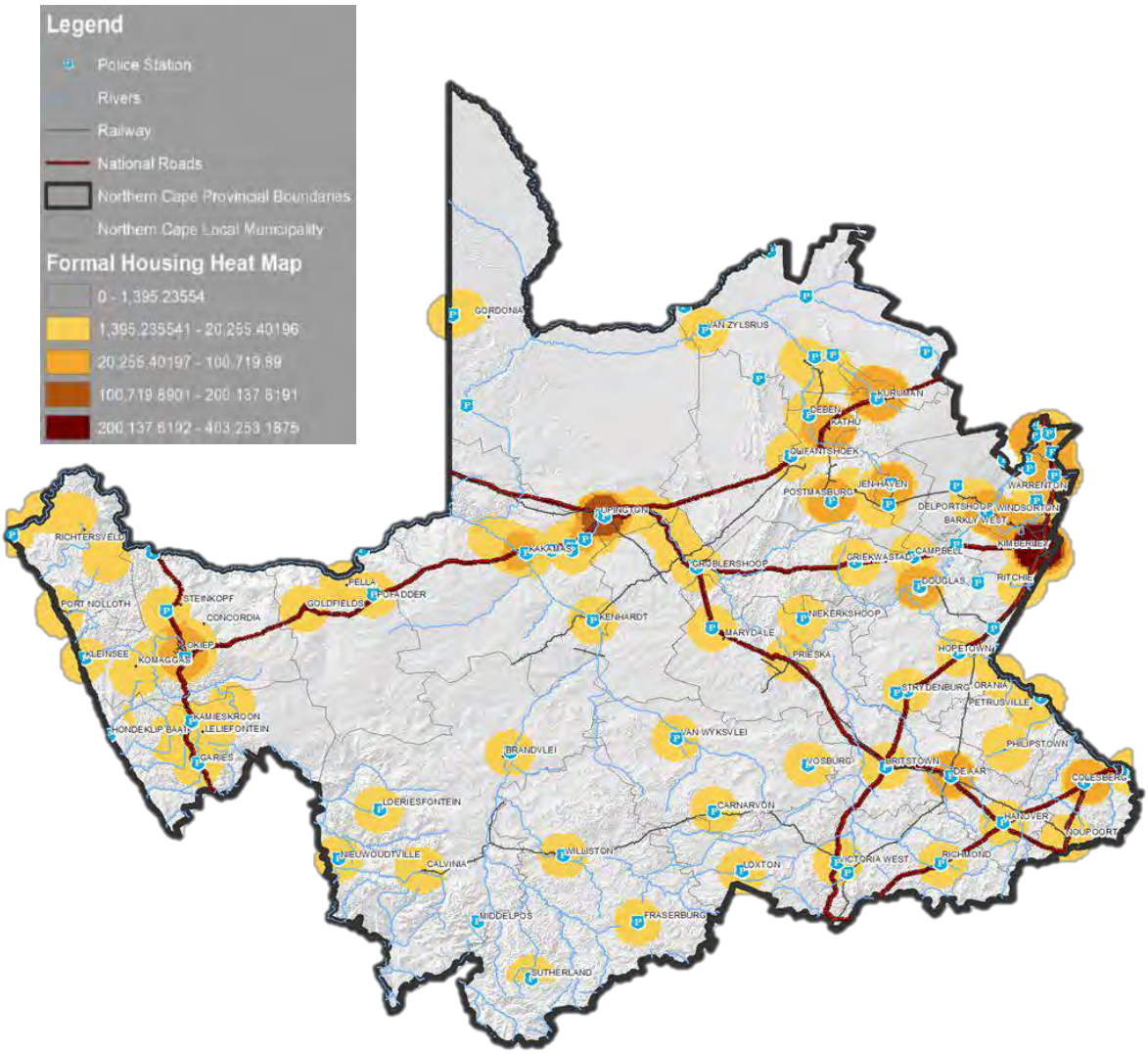


Figure 207: Distribution of Formal Settlements

3.1.1 Formal Settlement Distribution

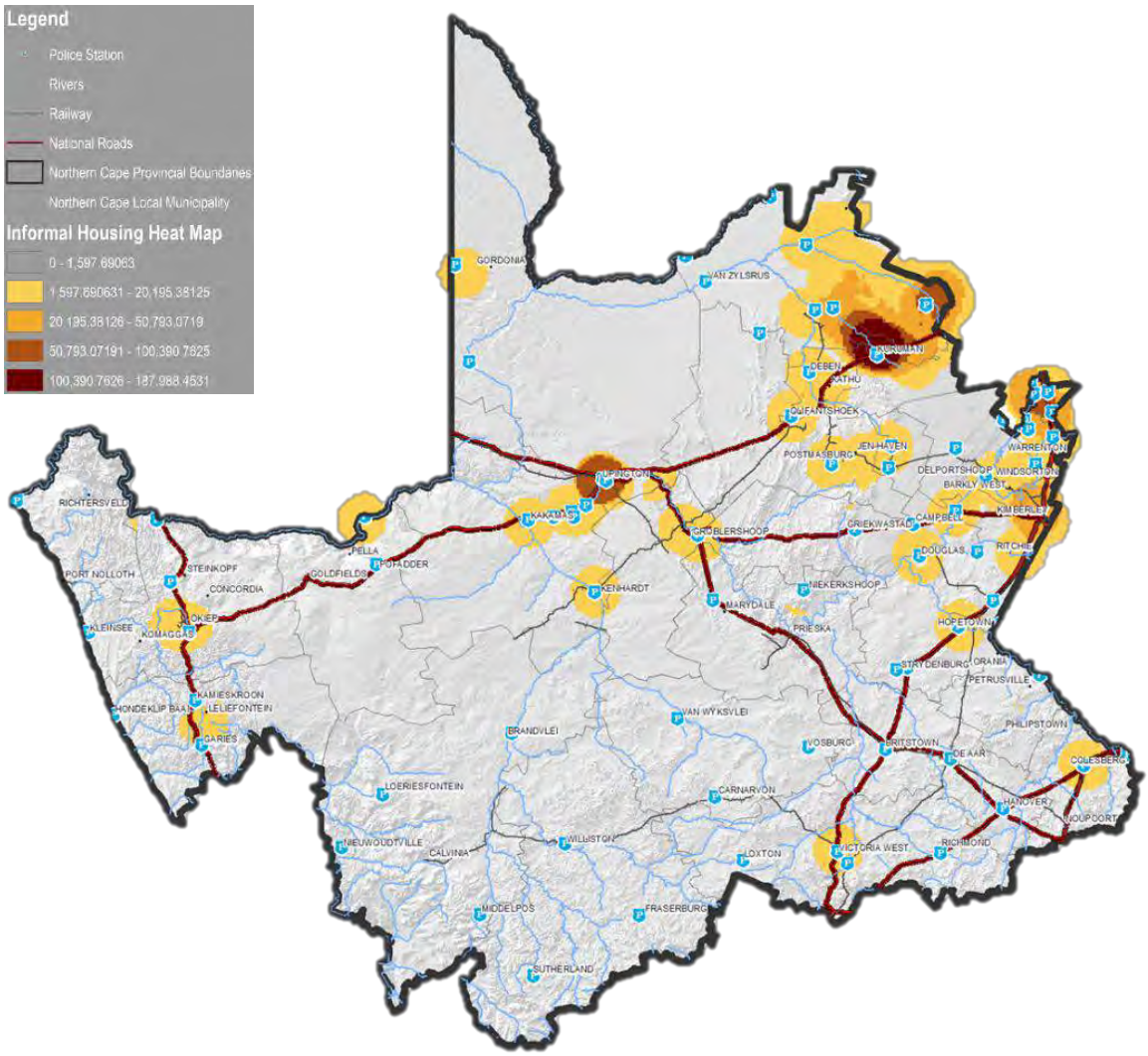
The highest concentration of formal housing, is located within the capitol of the Northern Cape: Kimberley. This is due to origin of the diamond industry within the city, that resulted in the first formal settlements being constructed, concentrated among the diamond claims, that can be observed at the Big Hole Centre.

Upington, and its surrounding regions has the second highest concentration of formal centres, mainly due to the high level of economic activity originating from intensive agriculture activities.

The settlements in the Springbok and Kuruman region, jointly forms the areas with the third highest concentration of formal settlements. The high concentration is mainly due to mining activity within the areas, providing economic and housing opportunities.

The Apartheid legacy is still visible, as the formal settlements are mainly in the previously 'white' restricted areas, with the highest level of social infrastructure.

The previously dedicated areas for other racial groups have been steadily been formalised and emphasis has been placed in the provision of basic, and social services.



3.1.2 Informal Settlements Distribution

Informal settlements are concentrated in areas with the highest population densities, typically associated with areas with high economic potential, associated with mining and intensive agriculture activities.

The high concentration of informal settlements in these areas are caused by migration, driven by the hope of job opportunities of the labour force. Typically, the provision of formal housing cannot keep up with the influx of migrants, resulting in the growth of informal areas.

Informal areas towards the east are mainly concentrated in tribal or communal areas, such as in the case of Concordia and Pella. Informal settlements are also evident in the tribal regions of the John Taolo Gaetsewe district.

The isolated central region of the Northern Cape has the lowest population concentration and thus also the lowest concentration of informal settlements.

The adjacent figure also illustrates the distribution of police station to provide an idea in terms of where social infrastructure is under pressure, especially in informal areas.

The Northern Cape, in its current jurisdictional form, was created in 1994 when the historic Cape Province was divided into the present-day Western Cape, Eastern Cape and the Northern Cape. Kimberley is the capital of the province which comprises 5 district municipalities and 26 local municipalities. The main regional settlements are Springbok, Upington, De Aar, Kuruman, Calvinia and Colesberg.

The Northern Cape comprises approximately 115 urban settlements of various sizes (Van der Merwe and Zietsman, 2011) The settlement pattern is characterised by small and isolated urban and quasi-urban settlements scattered across the vast area of the province. Some of these have a solid economic base which stimulates energetic growth. However, many of the settlements find it hard to provide basic services and sufficient income generating-opportunities to their inhabitants.



3.1.3 Urbanisation and Migration

Sub-Saharan Africa is experiencing the highest rates of urbanisation in the world[198]. South Africa, and the Northern Cape is experiencing high urbanisation levels, as job-seekers migrate to areas with a perceived high level of economic potential. As indicated by **Table 83**: , the district with the lowest concentration of urban households is John Taolo Gaetsewe due to the dominance or the tribal culture and livelihood within the district. Although the district has the lowest urban concentration currently,

[198] Council on Foreign Relations https://www.cfr.org/backgrounder/urbanization-sub-saharan-africa

it also is experiencing some of the highest levels of in-migration, where Joe Morolong residents tend to migrate to Ga-segonyana and Gamagara in order to access job opportunities[199].

The municipalities with an urban household concentration higher than 90%, are as follow:

- Sol Plaatje
- Magareng
- Gamagara
- Kamiesberg
- Khai-Ma
- Nama-Khoi
- Richtersveld
- Emthanjeni
- Renosterberg
- Siyathemba
- Umsobomvu

A high concentration of urban households is observed in predominantly rural areas, which seems counter intuitive, although it indicates that a very low percentage of residents reside or are able to maintain their livelihoods outside of the urban areas and settlement. As a result of the limited potential in rural areas, due to limited service provision and accessibility, a higher concentration of the population is found in "urban areas" or settlements, indicating that urbanisation trends are manifesting within the Northern Cape.

Table 83: Distribution of households per region type[200]

		2011				2016			
DM	**LM**	**Tribal**	**Farm**	**Urban**	**Total**	**Tribal**	**Farm**	**Urban**	**Total**
Frances Baard	Dikgatlong	4,30%	10,80%	84,90%	11 964	2,89%	7,77%	89,34%	48 164
	Magareng		8,30%	91,70%	6 123		7,18%	92,82%	24 059
	Phokwane	36,30%	8,30%	55,40%	17 544	34,44%	7,24%	58,32%	60 168
	Sol Plaatje		1,30%	98,70%	60 297		1,83%	98,17%	255 351
	Subtotal	***7,20%***	***4,20%***	***88,60%***	***95 931***	***5,70%***	***3,74%***	***90,56***	***387 742***
John Taolo Gaetsewe	Gamagara		4,20%	95,80%	10 809		8,25%	91,75%	53 656
	Ga-Segonyana	86,20%	1,70%	12,10%	26 817	89,75%	0,56%	9,69%	104 408
	Joe Morolong	90,60%	6,20%	3,20%	23 706	93,92%	3,03%	3,05%	84 201
	Subtotal	***72,70%***	***3,90%***	***23,40%***	***61 335***	***71,32%***	***3,12%***	***25,56%***	***242 265***
Namakwa	Hantam		27,90%	72,10%	6 339		15,65%	84,35%	21 342
	Kamiesberg		13,30%	86,70%	3 144		9,78%	90,22%	9 605
	Karoo Hoogland		37,80%	62,20%	3 843		31,31%	68,69%	13 069
	Khai-Ma		26,20%	73,80%	3 798		5,05%	94,95%	12 473
	Nama Khoi		10,30%	89,70%	13 191		6,00%	94,00%	46 512
	Richtersveld		2,40%	97,60%	3 543		0,90%	99,10%	12 487
	Subtotal		***18,00%***	***82,00%***	***33 855***		***10,31%***	***89,69%***	***115 488***

[199] *John Taolo Gaetsewe SDF 2017, p.118.*

[200] Dept. Social Development Diagnostic report

		2011				2016			
DM	**LM**	**Tribal**	**Farm**	**Urban**	**Total**	**Tribal**	**Farm**	**Urban**	**Total**
Pixley ka Seme	Emthanjeni		10,70%	89,30%	10 458		2,87%	97,13%	45 404
	Kareeberg		27,70%	72,30%	3 225		10,22%	89,78%	12 772
	Renosterberg		16,70%	83,30%	2 997		91,18	90,82%	11 818
	Siyancuma		25,30%	74,70%	9 579		14,57%	85,43%	35 941
	Siyathemba		20,10%	79,90%	5 829		7,70%	92,30%	23 075
	Thembelihle		13,40%	86,60%	4 143		11,33%	88,67%	16 230
	Ubuntu		27,30%	72,70%	5 127		10,47%	89,53%	19 471
	Umsobomvu		11,40%	88,60%	7 839		5,61%	94,39%	30 883
	Subtotal		***18,20%***	***81,80%***	***49 194***		***8,34%***	***91,66%***	***195 594***
ZF Mgcawu	!Kheis		30,30%	69,70%	4 149		17,29%	82,71%	16 566
	//Khara Hais		7,90%	92,10%	23 244		6,26%	83,74%	100 282
	Kai! Garib		39,20%	60,80%	16 701		23,80%	76,20%	68 929
	Kgatelopele		5,50%	94,50%	5 379		2,02%	97,98%	20 691
	Mier		41,80%	58,20%	1 782		20,18%	79,82%	6 879
	Tsantsabane		13,20%	86,80%	9 840		11,54%	88,46%	39 345
	Subtotal		***19,60%***	***80,40%***	***61 095***		***12,62%***	***87,38%***	***252 692***
NORTHERN CAPE		**17,10%**	**11,10%**	**71,80%**	**301407**	**16,33%**	**6,88%**	**76,79%**	**1 193 781**

3.1.4 Upgrading of informal settlements[201]

The Department of Cooperative Governance, Human Settlements and Traditional leaders developed in 2014 the Provincial Informal Settlements strategy. Through the support of the National Department for Human Settlements, assistance from the National Upgrading Support Programme was accessed and utilised for this process. At present, few Provinces and Municipalities have developed Programmes for informal settlement upgrading. The NUSP aims to provide assistance and guidance on how these should be developed and/or implemented. As part of this initiative, the Northern Cape Province also received support from the NUSP to develop Strategies and Programmes to upgrade informal settlements. For this phase of the NUSP support, a Provincial Strategy and Programme will be drafted, as well as Strategies and Programmes for the 6 pre-identified Municipalities. The 6 Municipalities are:

- Sol Plaatje Municipality
- Phokwane Municipality
- Tsantsabane Municipality
- Dawid Kruiper Municipality
- Gamagara Municipality
- Ga-Segonyana Municipality

3.1.5 Resilient and sustainable human settlements

The sustainable approach is endorsed by the Provincial department of COGHSTA:

- Spatial transformation and economic integration
- Viable infrastructure provisioning and life-cycle management

[201] *COGHSTA, PGDP Diagnostic Report, 2017, page 53*

- Functional, responsive and innovative design
- Easy and close access to range of services and amenities
- Affordable urban living
- Financial viability
- Effective urban management and municipal financial sustainability
- Environmental sustainability
- Local job creation and empowerment

There has been an acceptance that conventional approaches to upgrading, premised on BNG-type housing delivery and formalisation, are inadequate in addressing the informal settlement challenge in South Africa. There is general acceptance that a new approach to upgrading is needed, to be inclusive of all informal settlements, incremental, participative and partnership-orientated.

This is consistent with both National Policy as well as international practice. The new approach to upgrading needs to foster a different and more functional relationship between the state and the urban poor which is not premised solely on state service delivery but which also leverages the partnerships necessary for more effective social capital formation, collaboration and 'self-help'. State investments (e.g. in basic services) need to 'leverage' this kind of shift. There also needs to be a focus on more than just basic services, functional tenure and incremental housing improvements. Key social services (e.g. ECD, schools, clinics etc.) are also important as is more effective access to public transport and economic opportunities.

Upgrading needs to be seen as a sustained process of urban change over time, rather than a once-off project-type intervention. It needs to be programmatic and area-based in orientation rather than just focused on delivering single/separate 'projects'. In general, the state needs to focus its efforts and finite resources mainly on enabling public realm investments (rather than the provision of free housing). Shifting to the new approach has significant implications for the institutional arrangements, partnerships and funding instruments of upgrading.

The current statutory and regulatory environment (e.g. with respect to building plans, town planning processes and zoning) are also typically not 'fit-for purpose' in the context of informal settlements and greater flexibility is needed. In addition to this, there are compelling reasons for the all Municipal departments to work in an integrated way. Addressing the myriad of challenges within informal settlements is a complex and difficult exercise, and it cannot be done in isolation. What is required is a coordinated, aligned and integrated approach, an approach that all strategic plans from National down to Local continuously preach.

3.1.6 Settlement specialisation

Town functions vary greatly due to environmental and economic factors that typically determine which activities are viable within certain regions of the province. Areas with high population concentrations are able to sustain specialised services as described in planning theory, more specifically the central place theory, developed by Walter Christaller.

As depicted by **Figure 208**: Town Specialisation. The regional centres (Sol Plaatje, Upington and Kuruman) are able to sustain numerous functions and services due to the high population

concentrations and favourable environmental and economic conditions which enabled the establishments of large mining and agricultural based industries.

The “bigger service” centres indicates established towns that act as rural service centres providing supporting services to the agriculture and mining industries located in close proximity to the urban settlement or service centre.

The smaller service centres mainly provide basic services to serve the local community and provide the elementary requirements for agriculture activities.

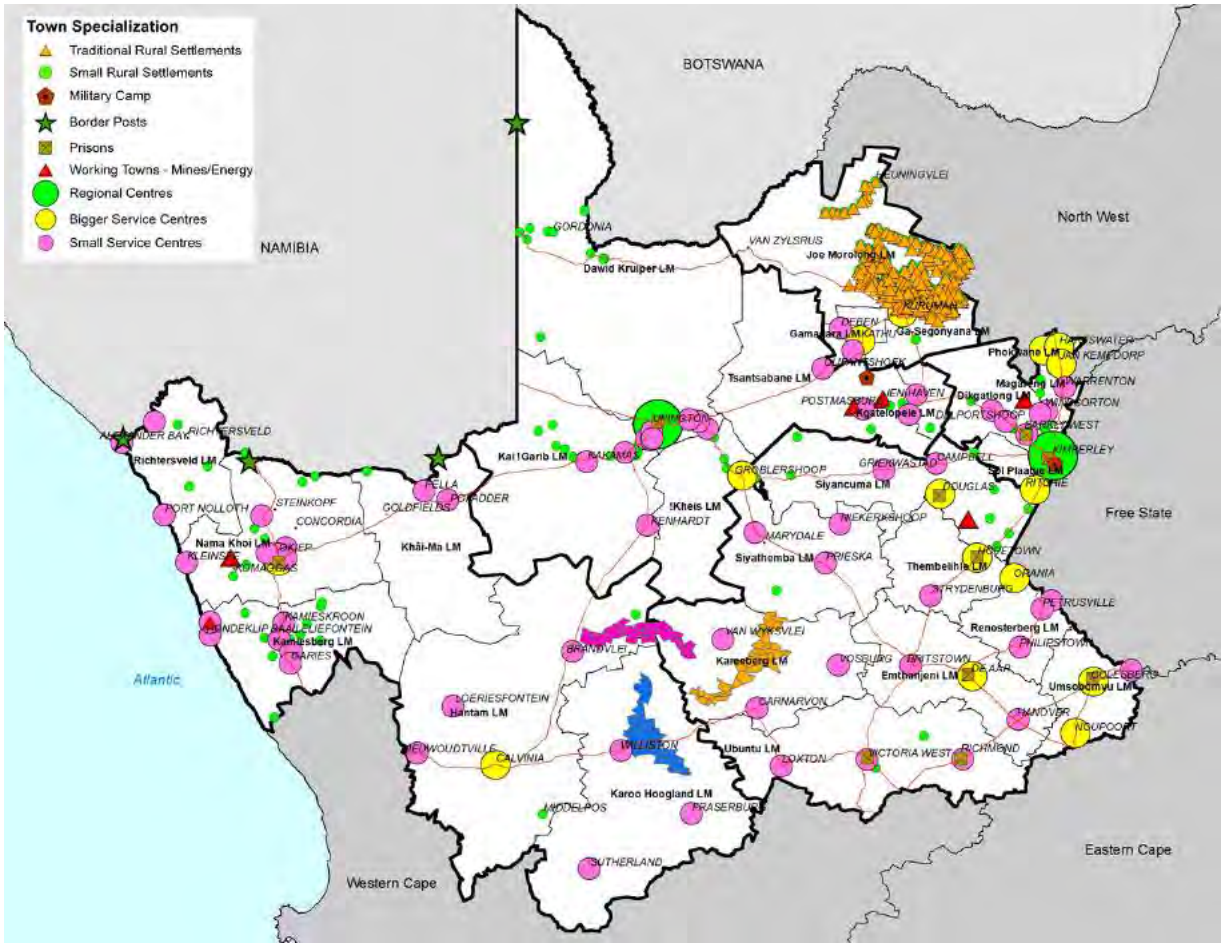


Figure 208: Town Specialisation

3.1.7 Settlement hierarchy

A settlement hierarchy is required in order to provide insight regarding the distribution of settlements and services contained within them. The foundation of the settlement hierarchy is obtained from the existing PSDF as well as from the District SDF’s, which provides the baseline hierarchy as depicted in the table below.

Table 84: Baseline settlement hierarchy

SETTLEMENT	MUNICIPALITY	HIERARCHY
Frances Baard District		
Kimberley	Sol Plaatje	1
Ritchie	Sol Plaatje	3
Warrenton	Magareng	3

SETTLEMENT	MUNICIPALITY	HIERARCHY
Jan Kempsdorp	Phokwane	3
Hartswater	Phokwane	3
Pampierstad.	Phokwane	3
Barkly West	Dikgatlong	4
Windsorton	Dikgatlong	4
Delportshoop	Dikgatlong	4
Ganspan	Phokwane	4
Bullhill	Phokwane	5
Fourteen Streams	Phokwane	5
Sydney's Hope	Phokwane	5
Windsorton Station	Phokwane	5
John Taolo Gaetsewe District		
Kuruman	Ga-segonyana	2
Kathu	Gamagara	3
Hotazel	Joe Morolong	3
Churchill	Joe Morolong	3
Mothibistat	Ga-segonyana	4
Wrenchville	Ga-segonyana	4
Bankhara-bodulong	Ga-segonyana	4
Seoding	Ga-segonyana	4
Magobe	Ga-segonyana	4
Batlharos	Ga-segonyana	4
Olifantshoek	Gamagara	4
Sishen	Gamagara	4
Dibeng	Gamagara	4
Dingleton	Gamagara	4
Vanzylsrus	Joe Morolong	4
Mc Carthysrus	Joe Morolong	5
Maruping	Ga-segonyana	5
Seven miles	Ga-segonyana	5
Magojaneng	Ga-segonyana	5
Kagung	Ga-segonyana	5
Heuningvlei	Joe Morolong	5
Laxey	Joe Morolong	5
Bothitong	Joe Morolong	5
Gamopedi	Ga-segonyana	5
Gantatelang,	Ga-segonyana	5
Pietbos	Ga-segonyana	5
Gasehubane	Ga-segonyana	5
Thamoyanche	Ga-segonyana	5
Perth	Joe Morolong	5
Mahukhubung	Joe Morolong	5
Padstow	Joe Morolong	5
Eiffel	Joe Morolong	5
Ditshelabeleng	Joe Morolong	5
Pixley ka Seme District		

SETTLEMENT	MUNICIPALITY	HIERARCHY
De Aar	Emthanjeni	2
Colesberg	Umsobomvu	2
Victoria west	Thenbelihle	3
Hopetown	Thembehlile	3
Hanover	Emthanjeni	3
Carnarvon	Kareeberg	3
Prieska	Siyathemba	3
Douglas	Siyancuma	3
Petrusville	Renosterberg	3
Britstown	Emthanjeni	3
Hanover	Emthanjeni	4
Philipstown	Renosterberg	4
Strydenburg	Thenbelihle	4
Richmond	Ubuntu	4
Vanderkloof	Renosterberg	4
Noupoort	Umsobomvu	4
Vanwyksvlei	Kareeberg	4
Vosburg	Kareeberg	4
Loxton	Ubuntu	4
Marydale	Siyathemba	4
Norvalspont	Umsobomvu	4
Griekwastad	Siyancuma	4
Schmidtsdrift	Siyancuma	4
Campbell	Siyancuma	4
Hutchinson	Ubuntu	4
Niekerkshoop	Siyathemba	4
ZF Mgcawu District		
Upington	Dawid Kruiper	2
Postmasburg	Tsantsabane	3
Groblershoop	!Kheis	3
Kakamas	Kai! Garib	3
Keimoes	Kai! Garib	3
Raaswater	Dawid Kruiper	4
Klippunt	Dawid Kruiper	4
Louisvale	Dawid Kruiper	4
Swartkop	Dawid Kruiper	4
Lambrechtsdrif	Dawid Kruiper	4
Karos	Dawid Kruiper	4
Leerkrans	Dawid Kruiper	4
Kenhardt	Kai! Garib	4
Lime acres	Tsantsabane	4
Beeshoek	Tsantsabane	4
Danielskuil	Kgateleopele	4
Namakwa District		
Springbok	Nama-khoi	3
Calvinia	Hantam	3

SETTLEMENT	MUNICIPALITY	HIERARCHY
Pofadder	Khai-ma	4
Sutherland	Karoo Hoogland	4
Fraserburg	Karoo Hoogland	4
Nieuwoudtville	Hantam	4
Williston	Karoo Hoogland	4
Loeriesfontein	Hantam	4
Okiep	Nama-khoi	4
Garies	Kamiesberg	4
Port nolloth	Richtersveld	4
Brandvlei	Hantam	5
Karkams	Kamiesberg	5
Hondeklipbaai	Kamiesberg	5
Kamieskroon	Kamiesberg	5
Koingnaas	Kamiesberg	5
Kleinsee	Kamiesberg	5
Carolusberg	Nama-Khoi	5
Buffelsbank	Nama-Khoi	5
Okiep	Nama-Khoi	5
Nababeep	Nama-Khoi	5
Concordia	Nama-Khoi	5
Steinkopf	Nama-Khoi	5
Pella	Khai-ma	5
Alexander bay	Richtersveld	5
Sanddrif	Nama-Khoi	5

The above hierarchy of settlements is the compilation and extrapolation from the current district SDF's and existing PSDF (including the existing socio-economic potential of towns study). Due to the strong district focus, (and outdated data utilised by the PSDF), the categorising in some cases are biased, as certain settlements are ranked higher, due to the prominence within the district, and not from a provincial point of view. Due to this, an additional hierarchy was developed in order to provide a provincial point of view, informed by the CSIR mesozone approach which was modified further to provide the most realistic portrayal, by grouping certain close lying settlements together, as they function as a single integrated urban settlement, and not as separate small entities.

As depicted by the Figure 209, settlements are differentiated into five categories ranging from the first order (Administrative Capitol) to the fifth order (small/isolated population concentrations).

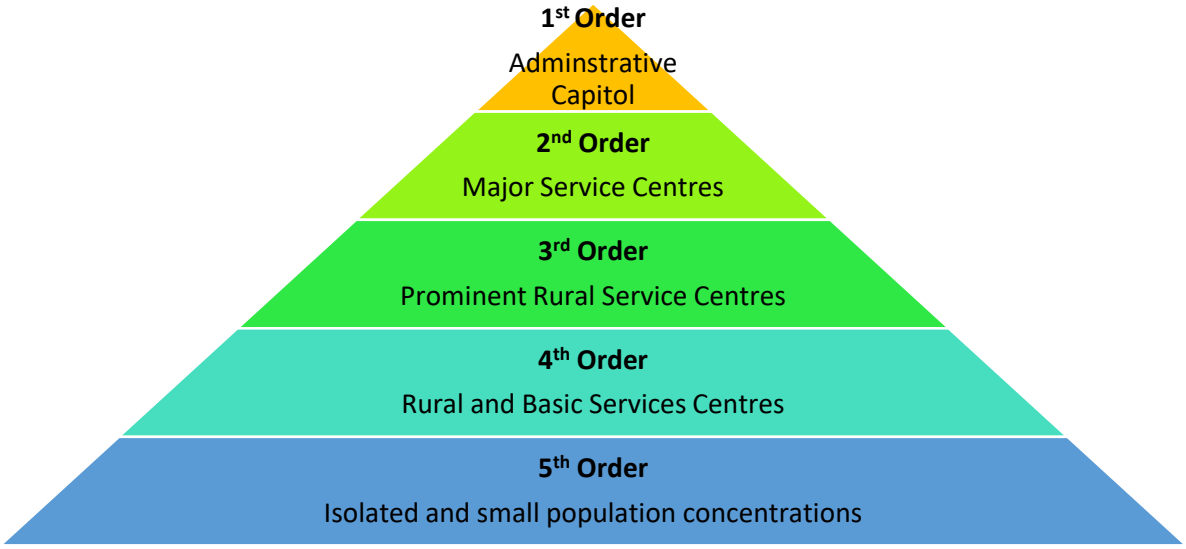


Figure 209: Settlement hierarchy classifications

Table 85: Modified settlement hierarchy

SETTLEMENT	LOCAL MUNICIPALITY	DISTRICT MUNICIPALITY	FUNCTION
First order			
Kimberley	Sol Plaatje	Frances Baard	Provincial Administrative Capitol
Second order			
Upington (incl. Kakamas, Keimoes and other surrounding settlements)	Dawid Kruiper and Kai! Garib	ZF Mgcawu	Major Agriculture Service Centre
Kuruman (incl. Kathu and surrounding villages and towns)	Ga-segonyana and Gamagara	John Taolo Gaetsewe	Major Mining Service Centre and Agri-Hub
Springbok (incl. Okiep and other surrounding towns and Villages)	Nama-khoi	Namakwa	Multi-purpose Rural Service Centre and Agri-Hub
Third order			
Ritchie	Sol Plaatje	Frances Baard	Agricultural Service Centre
Warrenton	Magareng	Frances Baard	Agricultural Service Centre (Agri-Hub))
Jan Kempdorp	Phokwane	Frances Baard	Mining Service Centre
Hartswater	Phokwane	Frances Baard	Agricultural Service Centre
Pampierstad.	Phokwane	Frances Baard	Agricultural Service Centre
Barkly West	Dikgatlong	Frances Baard	Agricultural and Mining Service Centre
Hotazel	Joe Morolong	John Taolo Gaetsewe	Mining Service Centre
Churchill	Joe Morolong	John Taolo Gaetsewe	Rural Service Centre
De Aar	Emthanjeni	Pixley ka Seme	Rural Service Centre
Colesberg	Umsobomvu	Pixley ka Seme	Rural Service Centre
Victoria West	Thembehlile	Pixley ka Seme	Rural Service Centre
Hopetown	Thembehlile	Pixley ka Seme	Rural Service Centre
Orania	Thembehlile	Pixley ka Seme	Private Rural Service Centre

SETTLEMENT	LOCAL MUNICIPALITY	DISTRICT MUNICIPALITY	FUNCTION
Carnarvon	Kareeberg	Pixley ka Seme	Agricultural and SKA Rural Service Centre
Prieska	Siyathemba	Pixley ka Seme	Agriculture Rural Service Centre
Douglas	Siyancuma	Pixley ka Seme	Agricultural Rural Service Centre
Petrusville	Renosterberg	Pixley ka Seme	Rural Service Centre (Agri-Hub)
Postmasburg	Tsantsabane	ZF Mgcawu	Rural Mining Service Centre
Groblershoop	!Kheis	ZF Mgcawu	Agricultural Rural Service Centre
Calvinia	Hantam	Namakwa	Multi-Purpose Rural Service Centre
Pofadder	Khai-ma	Namakwa	Rural Mining Service Centre
Port Nolloth	Rictersveld	Namakwa	Fishing and Harbour Service Centre
Fourth Order			
Windsorton	Dikgatlong	Frances Baard	Basic Service Centre
Delportshoop	Dikgatlong	Frances Baard	Mining and Basic Service Centre
Ganspan	Phokwane	Frances Baard	Basic Service Centre
Mothibistat	Ga-segonyana	John Taolo Gaetsewe	Village Service Centre
Wrenchville	Ga-segonyana	John Taolo Gaetsewe	Village Service Centre
Bankhara-bodulong	Ga-segonyana	John Taolo Gaetsewe	Village Service Centre
Seoding	Ga-segonyana	John Taolo Gaetsewe	Village Service Centre
Magobe	Ga-segonyana	John Taolo Gaetsewe	Village Service Centre
Batlharos	Ga-segonyana	John Taolo Gaetsewe	Village Service Centre
Olifantshoek	Gamagara	John Taolo Gaetsewe	Small Mining Service Centre
Sishen	Gamagara	John Taolo Gaetsewe	Small Mining Service Centre
Dibeng	Gamagara	John Taolo Gaetsewe	Village Service Centre
Dingleton	Gamagara	John Taolo Gaetsewe	Village Service Centre
Vanzylsrus	Joe Morolong	John Taolo Gaetsewe	Village Service Centre
Hanover	Emthanjeni	Pixley ka Seme	Small Rural Service Centre
Philipstown	Renosterberg	Pixley ka Seme	Small Rural Service Centre
Strydenburg	Thenbelihle	Pixley ka Seme	Small Rural Service Centre
Richmond	Ubuntu	Pixley ka Seme	Small Rural Service Centre
Vanderkloof	Renosterberg	Pixley ka Seme	Small Rural Service Centre
Noupoort	Umsobomvu	Pixley ka Seme	Small Rural Service Centre
Vanwyksvlei	Kareeberg	Pixley ka Seme	Small Rural Service Centre
Vosburg	Kareeberg	Pixley ka Seme	Small Rural Service Centre
Loxton	Ubuntu	Pixley ka Seme	Small Rural Service Centre
Marydale	Siyathemba	Pixley ka Seme	Small Rural Service Centre
Griekwastad	Siyancuma	Pixley ka Seme	Small Rural Service Centre
Raaswater	Dawid Kruiper	ZF Mgcawu	Small Rural Service Centre
Klippunt	Dawid Kruiper	ZF Mgcawu	Small Rural Service Centre
Swartkop	Dawid Kruiper	ZF Mgcawu	Small Rural Service Centre
Lambrechtsdrif	Dawid Kruiper	ZF Mgcawu	Small Rural Service Centre
Leerkrans	Dawid Kruiper	ZF Mgcawu	Small Rural Service Centre
Kenhardt	Kai! Garib	ZF Mgcawu	Small Rural Service Centre
Lime acres	Kgatelopele	ZF Mgcawu	Small Rural Service Centre
Beeshoek	Tsantsabane	ZF Mgcawu	Small Rural Service Centre
Jenhaven	Tsantsabane	ZF Mgcawu	Small Rural Service Centre
Danielskuil	Kgatelopele	ZF Mgcawu	Small Rural Service Centre

SETTLEMENT	LOCAL MUNICIPALITY	DISTRICT MUNICIPALITY	FUNCTION
Sutherland	Karoo Hoogland	Namakwa	Small Rural Service Centre
Fraserburg	Karoo Hoogland	Namakwa	Small Rural Service Centre
Williston	Karoo Hoogland	Namakwa	Small Rural Service Centre
Nieuwoudtville	Hantam	Namakwa	Small Rural Service Centre
Loeriesfontein	Hantam	Namakwa	Small Rural Service Centre
Garies	Kamiesberg	Namakwa	Small Rural Service Centre
Pella	Khai-ma	Namakwa	Small Rural Service Centre
Kleinsee	Kamiesberg	Namakwa	Small Rural Settlement Concentrations
Hondeklipbaai	Kamiesberg	Namakwa	Small Fishing and Harbour Service Centre
Fifth Order			
Bullhill	Phokwane	Frances Baard	Small Rural Settlement Concentrations
Fourteen Streams	Phokwane	Frances Baard	Small Rural Settlement Concentrations
Sydney's Hope	Phokwane	Frances Baard	Small Rural Settlement Concentrations
Windsorton Station	Phokwane	Frances Baard	Small Rural Settlement Concentrations
Mc Carthysrus	Joe Morolong	John Taolo Gaetsewe	Small Rural Settlement Concentrations
Maruping	Ga-segonyana	John Taolo Gaetsewe	Small Rural Settlement Concentrations
Seven miles	Ga-segonyana	John Taolo Gaetsewe	Small Rural Settlement Concentrations
Magojaneng	Ga-segonyana	John Taolo Gaetsewe	Small Rural Settlement Concentrations
Kagung	Ga-segonyana	John Taolo Gaetsewe	Small Rural Settlement Concentrations
Heuningvlei	Joe Morolong	John Taolo Gaetsewe	Small Rural Settlement Concentrations
Laxey	Joe Morolong	John Taolo Gaetsewe	Small Rural Settlement Concentrations
Bothitong	Joe Morolong	John Taolo Gaetsewe	Small Rural Settlement Concentrations
Gamopedi	Ga-segonyana	John Taolo Gaetsewe	Small Rural Settlement Concentrations
Gantatelang,	Ga-segonyana	John Taolo Gaetsewe	Small Rural Settlement Concentrations
Pietbos	Ga-segonyana	John Taolo Gaetsewe	Small Rural Settlement Concentrations
Gasehubane	Ga-segonyana	John Taolo Gaetsewe	Small Rural Settlement Concentrations
Thamoyanche	Ga-segonyana	John Taolo Gaetsewe	Small Rural Settlement Concentrations
Perth	Joe Morolong	John Taolo Gaetsewe	Small Rural Settlement Concentrations
Mahukhubung	Joe Morolong	John Taolo Gaetsewe	Small Rural Settlement Concentrations
Padstow	Joe Morolong	John Taolo Gaetsewe	Small Rural Settlement Concentrations
Eiffel	Joe Morolong	John Taolo Gaetsewe	Small Rural Settlement Concentrations
Ditshelabeleng	Joe Morolong	John Taolo Gaetsewe	Small Rural Settlement Concentrations
Norvalspont	Umsobomvu	Pixley ka Seme	Small Rural Settlement Concentrations
Schmidtsdrift	Siyancuma	Pixley ka Seme	Small Rural Settlement Concentrations
Campbell	Siyancuma	Pixley ka Seme	Small Rural Settlement Concentrations
Hutchinson	Ubuntu	Pixley ka Seme	Small Rural Settlement Concentrations
Niekerkshoop	Siyathemba	Pixley ka Seme	Small Rural Settlement Concentrations
Brandvlei	Hantam	Namakwa	Small Rural Settlement Concentrations
Kharkams	Kamiesberg	Namakwa	Small Rural Settlement Concentrations
Kamieskroon	Kamiesberg	Namakwa	Small Rural Settlement Concentrations
Koingnaas	Kamiesberg	Namakwa	Small Rural Settlement Concentrations
Alexander bay	Rictersveld	Namakwa	Small Rural Service Centre
Buffelsbank	Nama-khoi	Namakwa	Small Rural Settlement Concentrations
Nababeep	Nama-khoi	Namakwa	Small Rural Settlement Concentrations
Concordia	Nama-khoi	Namakwa	Small Rural Settlement Concentrations

SETTLEMENT	LOCAL MUNICIPALITY	DISTRICT MUNICIPALITY	FUNCTION
Steinkopf	Nama-khoi	Namakwa	Small Rural Settlement Concentrations
Sanddrif	Richtersveld	Namakwa	Small Rural Settlement Concentrations

(Source: CSIR 2017, Socio-Economic Potential of Towns and Town Specialisation)

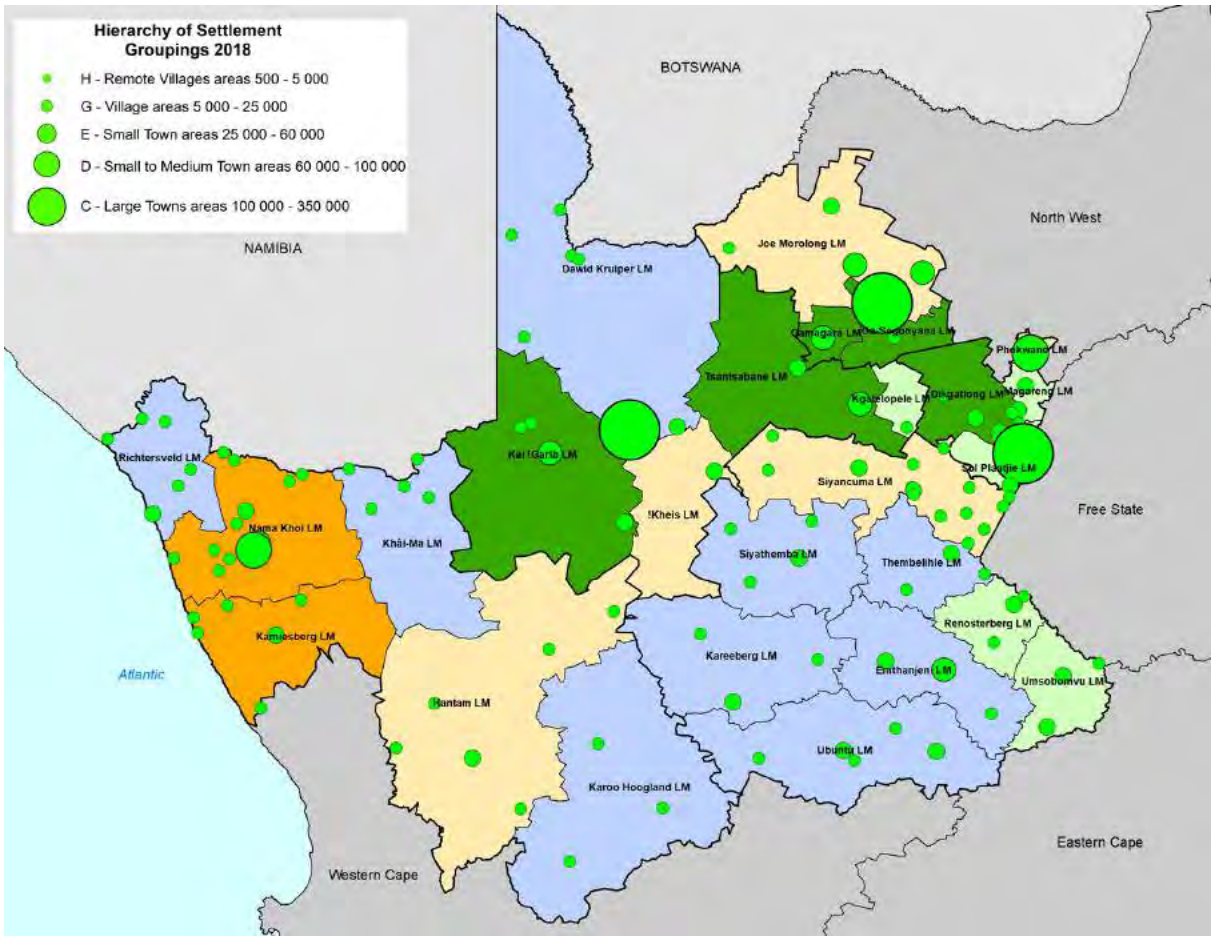


Figure 210: Modified Settlement Hierarchy

As a result of the combining of urban settlements, as illustrated by **Figure 210**, the following key aspects are observed:

- Kimberley remains the only first order settlement due to the large population concentration as well as the presence of high level administrative functions.
- The prominence of Upington, Kuruman and Springbok drastically escalates when the adjacent settlements are seen as a collective along with the larger settlements.
- The conglomerate of the Kuruman, Upington and Springbok settlements forms a clear second order of settlement hierarchy, which clearly differentiates from the second and third order settlements.
- Supporting settlements, or other significant towns such as Calvinia and De Aar are identified as third order settlements.
- The fourth order settlements consist of small, yet significant settlements that play
- Small settlements and villages are identified as fifth order settlements.

4 SPATIAL AND LAND USE MANAGEMENT MECHANISM ANALYSIS

4.1 PROVINCIAL SPATIAL DEVELOPMENT FRAMEWORK

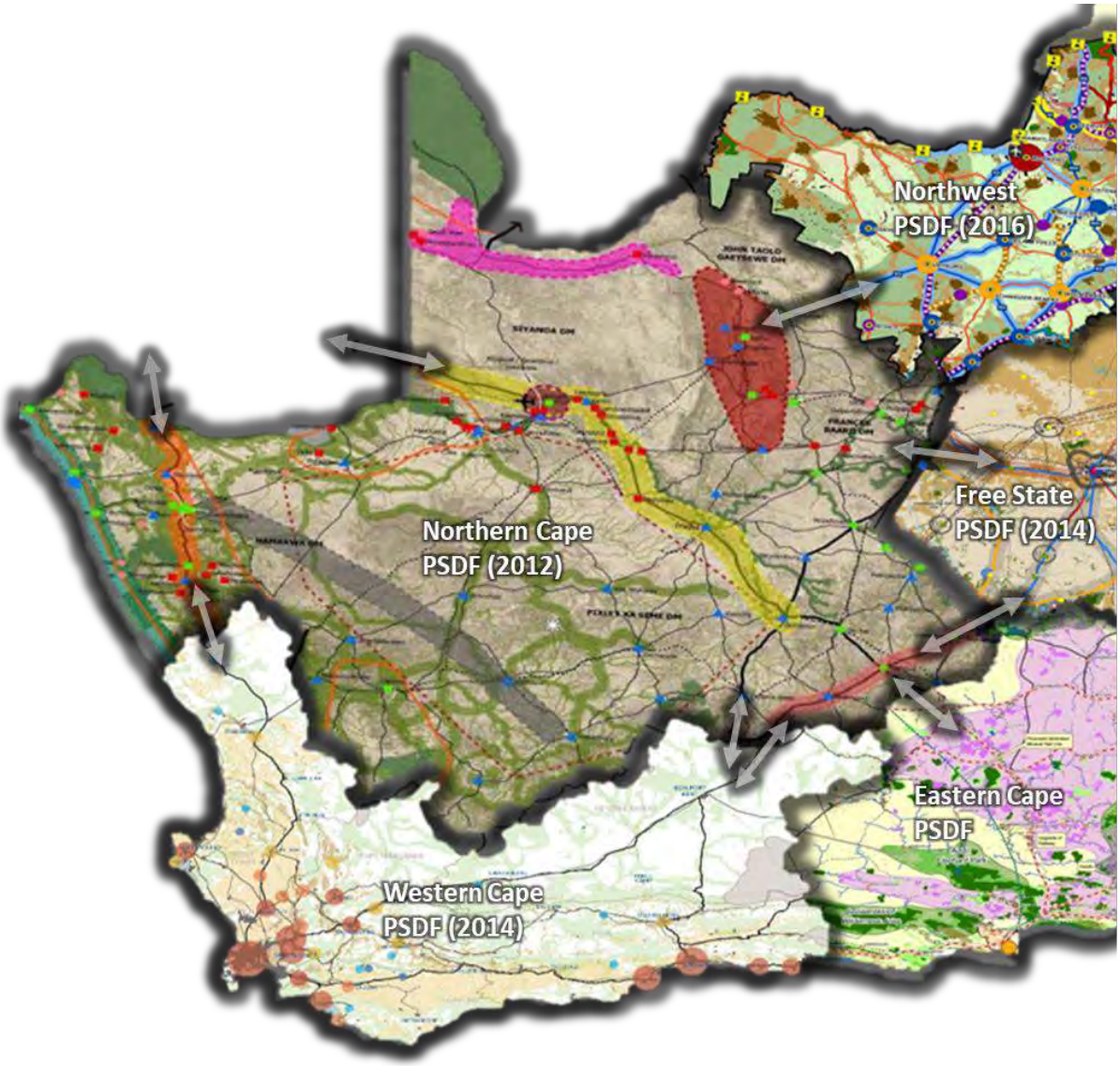


Figure 211: Provincial SDF alignment

The Northern Cape, shares borders with Namibia, Botswana, North West, Free State and Western Cape. It is crucial to align with the neighbouring spatial plans, in order create consistency and foster integration and cooperation across the borders. As indicated by Figure 211, a limited level of alignment is visible between the existing Northern Cape SDF and that of the Western Cape and Eastern Cape SDF's. As access could not be gained to the National SDF of Namibia or Botswana, it was not possible to assess the level of alignment.

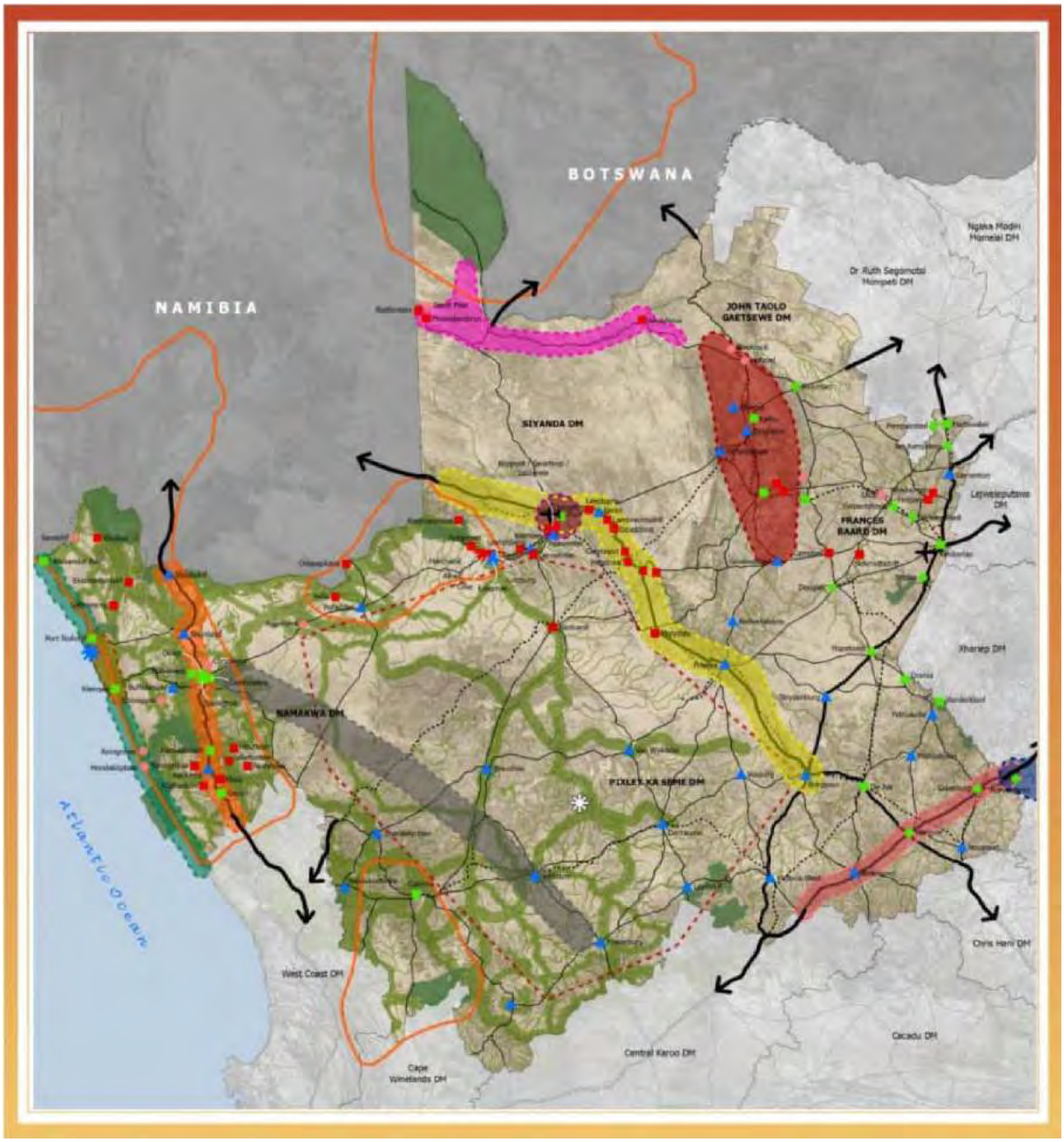


Figure 212: Existing PSDF composite map

The existing PSDF has been thoroughly assessed by the Department of Rural Development and Land Reform (DRDLR), the Department of Cooperative Governance, Human Settlements and Traditional Affairs (COGHSTA) as well as SALGA and MISA, in 2014. The assessment exercise found that the PSDF is to be reviewed due some of the following aspects (DRDLR, 2014:2):

- A greater level of alignment with policy and legislation is needed due to the limited link between the PSDF and NDP. Apart from SPLUMA, the IUDF policy has been proclaimed among others, that will also need to find expression within the PSDF.
- Limited alignment with departmental sector plans as well as the clear definition of roles and functions of departments.
- Outdated statistical data was utilised to inform the proposals made within the document.

- Monitoring and evaluation tools and mechanisms need to be developed in order to assess the level of implementation of the PSDF strategies.
- Amendment of corridor proposals in order to accurately portray development realities.
- The Spatial Planning Categories (SPC's) play a key role in defining and regulating land use management within local municipalities and should be preserved during the PSDF review process.

4.2 EXISTING DISTRICT SPATIAL DEVELOPMENT FRAMEWORKS

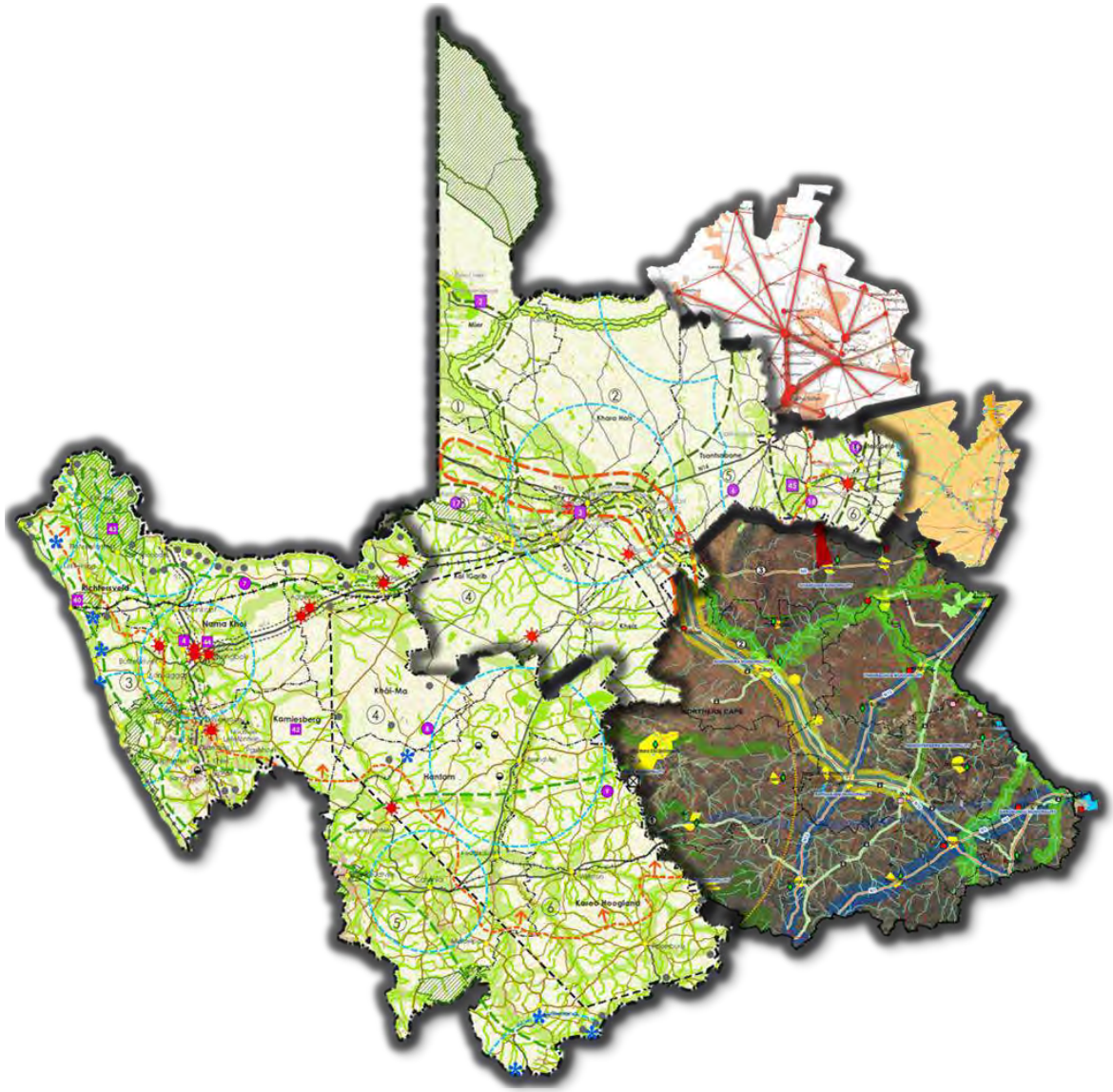


Figure 213: Compilation of Northern Cape District SDF's

As depicted in the figure above, there is visible level of alignment to the broad strategies of the PSDF. There is however, significant disjuncture between neighbouring district municipalities regarding the approaches and articulation of spatial strategies. An assessment exercise was conducted regarding the level of SPLUMA compliance of SDF's at local and district level in 2015. The table below provides a summary of the key findings of the District SDF's assessments conducted by DRDLR, COGHSTA, MISA and SALGA.

Table 86: Summary of 2015 SPLUMA compliance assessment findings

District	Key Findings
Frances Baard	• FBDM SDF could be regarded as partially aligned based on the NDP and the SPLUMA principles as the authors were aware of the principles and worked within that framework • Sector departmental alignment is not reasonable. • Alignment with the PSDF is well articulated. • Overall the SDF lacks some strategic impetus which would inform public and private sector investment. • Capital Investment Framework (CIF) not sufficiently detailed. • Alignment with the DRDLR SDF guidelines to some extent.
John Taolo Gaetsewe	• The John Taolo Gaetsewe was reviewed in 2017, where all the concerns identified in the assessment exercise was addressed. • Progress of the implementation over the following period will determine whether the strategies are achieving the set objectives.
Pixley ka Seme	• No alignment based on the NDP and the SPLUMA principles; • The SDF was prepared before the promulgation of the SPLUMA; • Alignment with neighbouring municipalities is well articulated. • CIF not sufficiently detailed • No alignment with the DRDLR SDF guidelines
ZF Mgcawu	• The SDF refer to the SPLUMB as the SDF was prepared before the promulgation of the Act; • Alignment with neighbouring municipalities is well articulated. • Sector departmental alignment is reasonable. • Alignment with the PSDF is well articulated. • CIF not sufficiently detailed;
Namakwa	• No alignment with the NDP; • Sector departmental alignment is not reasonable; • Alignment with the PSDF is well articulated. • Good alignment with neighbouring and local municipalities. • CIF not sufficiently detailed.

Source: DRDLR, 2015: SPLUMA Compliance Assessments.

From the assessments it is clear there is a strong level of alignment from the provincial to the district SDF's, this further aids the level of coordination of SDF strategies of neighbouring districts. Although there is still a small level of disjuncture when comparing the Frances Baard, Pixley ka Seme and John Taolo Gaetsewe SDF's.

4.3 LOCAL SPATIAL DEVELOPMENT FRAMEWORK ANALYSIS

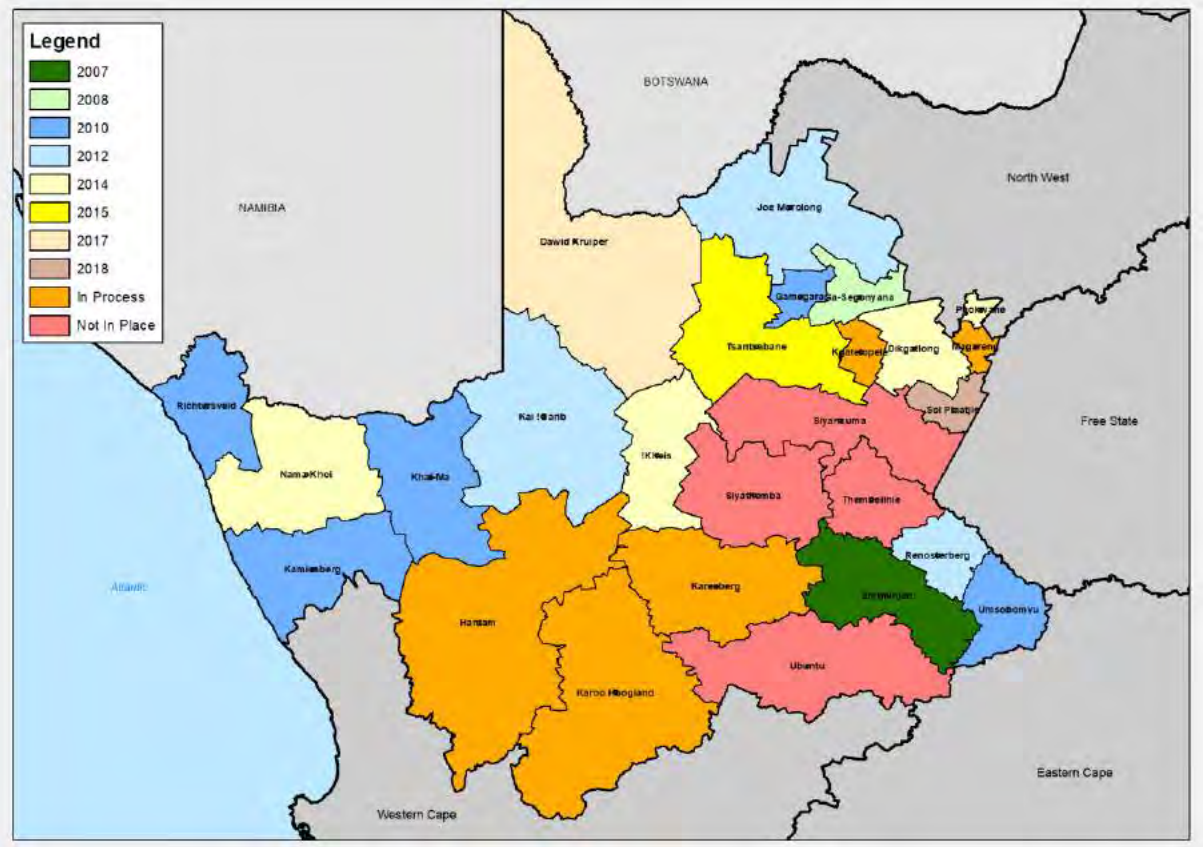


Figure 214: Local Spatial Development Framework statuses

As local municipalities are the Authority of First instance as stipulated in SPLUMA Section 33(1), the Local SDF's carry a higher weight, as it forms the foundation of development decisions made by the municipal planning tribunal. The following crucial aspects came to light during the assessment of Local SDF's:

- The quality and consistency of the documents vary greatly.
- The documents were prepared in accordance to varying legislation (SPLUMA, DFA etc.).
- The SDF's produced before the proclamation of SPLUMA, only addresses planning within urban areas, and not wall to wall as required by SPLUMA, indicating that spatial planning has not yet been under taken for numerous rural regions.
- Four municipalities within the Pixley ka Seme District, namely Siyancuma, Siyathemba, Thembehlile and Ubuntu are yet to develop their first SDF documents.
- The Spatial Planning Categories play a key role in defining and regulating land use management within local municipalities.
- Local SDF's alignment to the PSDF, is less apparent than that of the District SDF's, and in some cases deviates significantly from the PSDF proposals.

4.4 LAND USE SCHEMES AND MANAGEMENT SYSTEMS (LUS AND LUMS)

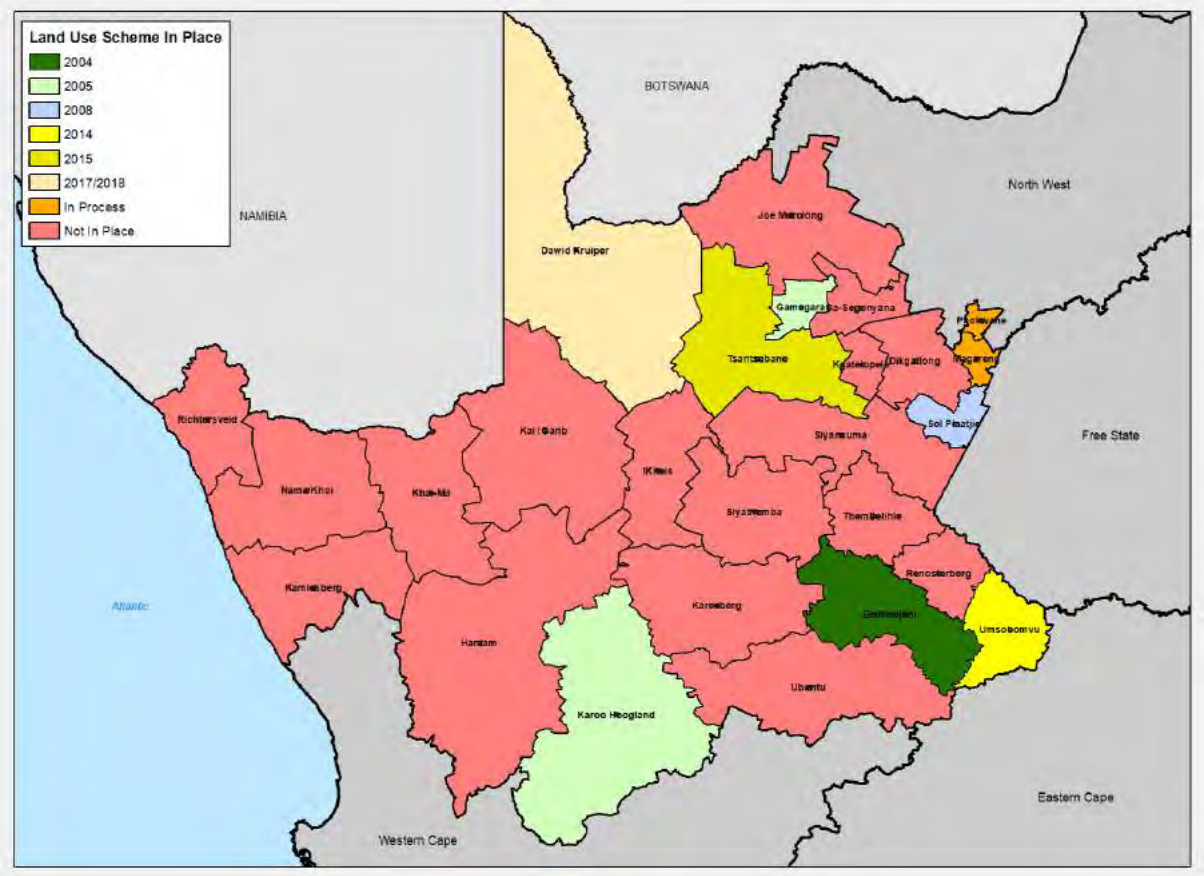


Figure 215: Land use scheme and system statuses of local municipalities

Land use schemes and management systems determine which land uses are allowed per zoning of erven or land parcels. SPLUMA further stipulates in section 24(1) that local municipalities are obligated to develop SPLUMA compliant Land Use Schemes within 5years of the commencement of the act. As illustrated by **Figure 215**, only 9 of the 25 municipalities have a land use scheme in place, where only 5 was developed in accordance with SPLUMA. Due to the high costs associated with the development of LUS and LUMS, municipalities are not able to meet the stipulated deadline, and requires intervention from the provincial government in order to comply.

4.5 SPATIAL PLANNING CATEGORIES (SPC'S)

The SPC's, as illustrated by Figure 216, were developed as part of the existing PSDF in order to assist municipalities with land use management, as well as to create a level of uniformity between land use schemes, which aids in alignment. It further enables the Province to utilise and illustrate the data effectively on GIS systems, in order to assist with decision-making and the identification of challenges and opportunities. The SPC's are one of the main features of the current PSDF that truly made an impact on land use planning, and was identified within the assessment conducted by DRDLR, COGHSTA, MISA and SALGA, as a feature that needs to preserved when the PSDF is reviewed.

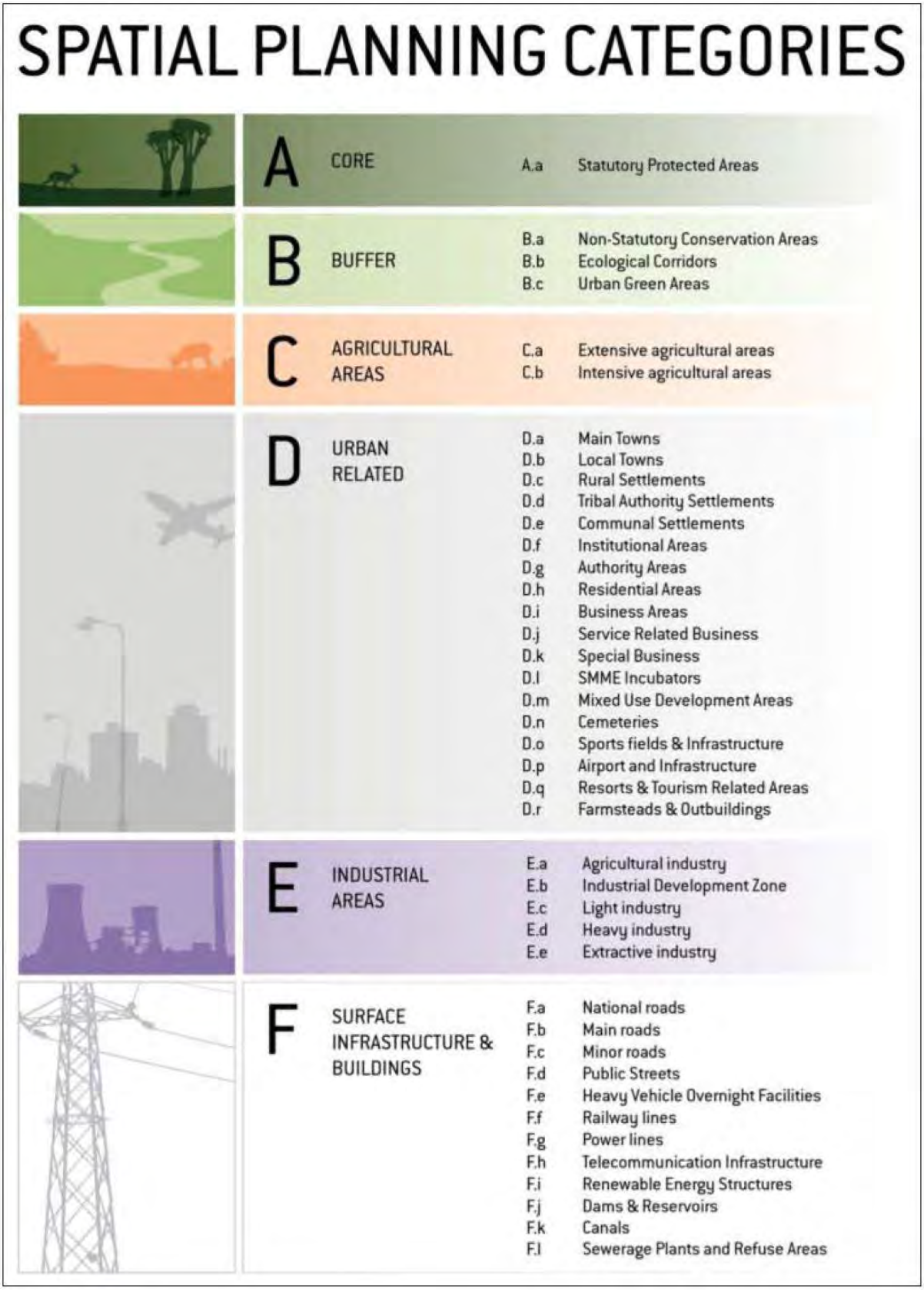


Figure 216: Spatial Planning Categories

5 SPATIAL STRUCTURING ELEMENTS

Within the existing PSDF and DSDF's spatial structuring elements are identified, such as corridors, nodes and buffer zones. Various towns and areas have been earmarked for conservation or development within the province, where Table 87: Spatial structuring elements within the Northern Cape provides a summary.

Table 87: Spatial structuring elements within the Northern Cape

STRUCTURING ELEMENT	SPATIAL PLANNING CATEGORY	LOCATION	DISTRICT MUNCIPALITY
Solar corridor	F: Surface infrastructure	Britstown to Riemvasmaak	Pixley ka Seme and ZF Mgcawu
Gamagara corridor	E:Industrial areas	Kathu, Postmasburg, Olfantshoek, Danielskuil, Griekwastad	John Taolo Gaetsewe, Pixley ka Seme and ZF Mgcawu
N1 corridor	F:Surface infrastructure	Colesberg to Victoria West	Pixle ka Seme
N7 corridor	B & F: Buffer and Surface infrastructure	Vioolsdrif to Garies	Namakwa
Eco-toursim corridor	B &D:Buffer and urban related	Van Zylsrus to Rietfontein	John Taolo Gaetsewe and ZF Mgcawu
Fishing and mariculture corridor	A & B: Buffer and core protected areas	Entire west coast	Namakwa
Namakwa Mining corridor	E:Industrial areas	Spring bok to Fraseburg	Namakwa
Sishen-Saldanha corridor	F:Surface infrastructure	Sishen Mine to Saldhana	John Taolo Gaetsewe, ZF Mgacwu and Namakwa
Manganese freight line	F: Surface infrastructure	Hotazel to Ngqura	John Taolo Gaetsewe, Frances Baard and Pixley ka Seme
Manufacturing (solar tech.) IDZ	E: Industrial	Upington	ZF Mgcawu
Upington SEZ (cargo hub)	D: Urban related	Upington	ZF Mgcawu
De Aar SEZ (cargo hub)	D & F:Urban related and Surface infrastructure	De Aar	Pixley ka Seme
Conservation/protected areas	A & B: Core and buffer areas	Richterveld Heritage Site	ZF Mgacwu and Namakwa

STRUCTURING ELEMENT	SPATIAL PLANNING CATEGORY	LOCATION	DISTRICT MUNCIPALITY
		Namaqua National Park Goegap Nature Reserve Augrabies Falls National Park Kgalagadi Transfontrier Park Mokala National Park	
SKA core region	A:Core area	Carnarvon, Brandvlei, Van Wyksvlei and Willston	Namakwa, Pixley ka Seme and ZF Mgcawu
Astronomy Reserve	B: Buffer area	Central Nortern Cape	Namakwa, Pixley ka Seme and ZF Mgcawu
Provincial nodes	D: Urban related	Kimberley	Frances Baard
Regional nodes	D: Urban related	Upington, Kuruman and Springbok	ZF Mgcawu, John Taolo Gaetsewe and Namakwa

Key observations:

- Although Upington is identified as a key role player regarding industrial and economic development, certain constraints such as limited electricity supply is prohibiting the province from fully unlocking the potential of the area.
- The solar corridor is not a true reflection of the distribution of solar activities. Furthermore, not only solar energy is produced, but also wind, thus indicating that it should rather be identified as a renewable energy corridor.
- The Namakwa Industrial and Mining corridor did not manifest as expected, as the activities are within the area are declining.
- Buffer zones for high potential agricultural land is absent in current PSDF structuring elements.
- Buffer zones and regulations are absent for water resources of provincial and national significance.
- Buffer and protection zones could be expanded to provide enhanced protection of the natural environment and eco-systems.
- Both the Orange and Vaal Rivers play a key role in the spatial structure and distribution of activities within the Northern Cape.

6 ALLIGNMENT OF SPATIAL STRATEGIES

6.1 CROSS-MUNICIPAL BOUNDARY PLANNING AND ALIGNMENT

In terms of both the (MSA-S26 (d), MSA Regulations Section 2(4) (h), and SPLUMA, Municipalities are required to provide a clear indication of how the SDF is aligned with the planning of neighbouring areas. Local and District Government requires regular engagement with neighbouring municipalities on an ongoing basis. This ought to be done through a variety of fora – which can include regular meetings held with representatives of each neighbouring municipality to discuss areas of alignment, shared services, demarcation, understanding the implications of development applications and developing coordinated responses as well as through the more formally established SIP, Regional SDF platforms and IGR's. Cross Boundary alignment should also be achieved through engagement in the COGHSTA driven IDP Forums at which there are representatives of provincial government departments and parastatals responsible for developments in the different regions. All the SDF's should seek to visually depict the areas of alignment and nonalignment and serve as a basis for further discussions. The Province should create a platform to drive this initiative and work collectively with its neighbours in trying to address the developmental and service challenges in the region. Emphasis towards cross border/boundary alignment is also critical and needs to accommodate the following:

- Eastern Cape Provincial Spatial Development framework
- Free State Provincial Spatial Development framework
- Western Cape Provincial Spatial Development framework

6.2 HORIZONTAL AND VERTICAL ALIGNMENT (TRANSVERSAL ALIGNMENT)

The Northern Cape PSDF should use alignment as an instrument to synthesize and integrate the top down and bottom-up planning process between different spheres of government and sectors. There are two types of alignment procedures that needs to be initiated in the planning process i.e. vertical and horizontal alignment.

Vertical alignment is between local and neighbouring municipalities as well as other spheres of government (Provincial, National Departments, Private Sector and other stakeholders such as Eskom, Telkom). The aim of this alignment is to ensure that the respective local and district IDP's and SDF's are in line with National and Provincial policies and strategies, in order for the municipalities to be considered for the allocation of departmental budgets and conditional grants. It also guides the private sector in terms of highlighting areas of strategic investment and critical spending.

This vertical alignment of the planning process should also include the various planning schemes in operation, in particular for those planning regions on the periphery of municipalities. These schemes need to implement the intentions of the respective SDFs, and it is important that the proposed planned land uses zones are compactable or aligned with those of the adjoining municipality's. It is further noted that the NSDF is currently being compiled, and that the necessary measures will be taken in the following phases, to ensure alignment of both policy documents are obtained.

The COGHSTA initiated Provincial IDP Forum brings together all the relevant provincial and municipal stakeholders in an effort to achieve this desired vertical alignment at a provincial level. At the same time, National Treasury and National COGTA are providing support at a national level by bringing together key national departments and parastatals involved in the respective municipal areas. While

this provides each local and district municipality with the additional support needed to achieve more integrated and coordinated development it has also led to the duplication of some processes that have been in place for some time and in this regard a more structured approach with clearly defined roles and responsibilities across the national and provincial spheres of government is recommended.

Horizontal alignment occurs across provincial sector departments and aims to ensure that the planning process is integrated and issues are co-ordinated and addressed jointly. Regular and extensive sector engagement should be undertaken in the preparation of the PSDF through on-going Provincial Planning Forum meetings and sector input in all sector plans in an effort to align the spatial vision, strategies, priority projects and timing of implementation across the province.

Further opportunities for multi-sectoral engagement and input from “critical thinkers” takes place in related processes such as the Provincial SPLUMA, and Planning forums, which work on the long-term planning for the province, Implementation of the Climate Change Strategy and involvement in sector planning processes.

Such on-going engagements help facilitate the horizontal sectoral alignment from the high level strategic plans through to the identification and implementation of catalytic projects and programmes in the province. These on-going engagements with key sector departments will help to foster a more consensus-based and synergistic approach towards development in the Northern Cape.







CHAPTER 10

Status Quo Analysis - Conclusion

CHAPTER 10 | CONCLUSION

1 OVERVIEW

The following section provides an overview of the key aspects of the Northern Cape context, that were identified during the status quo analysis. The summary is structured as follow:

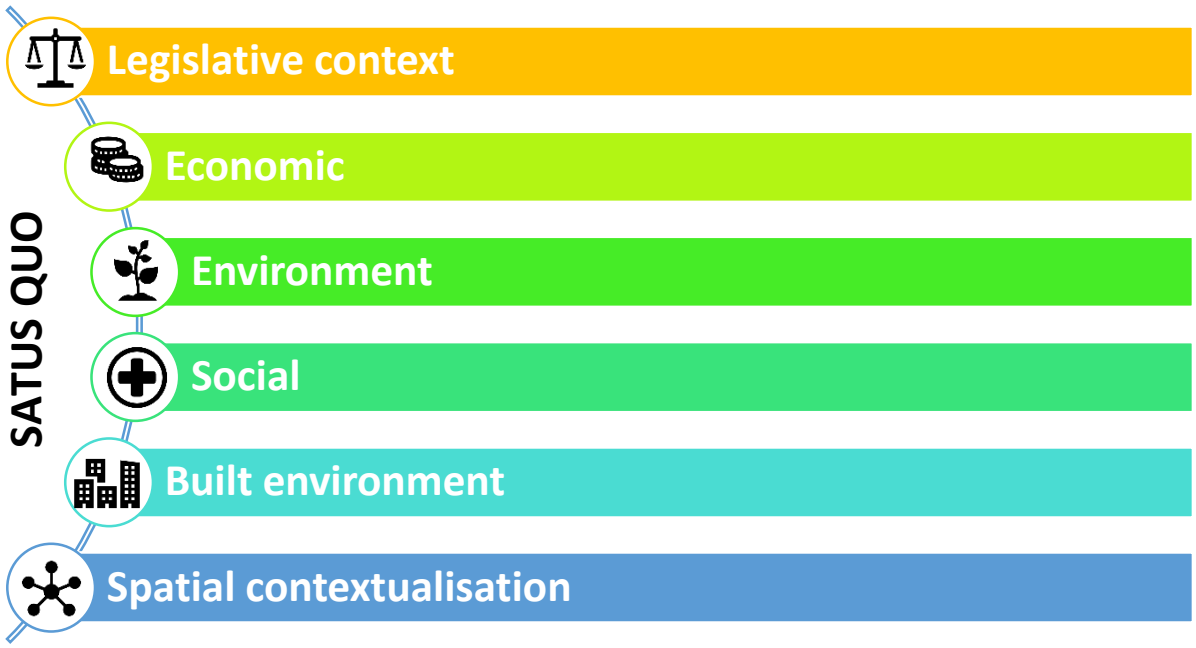


Figure 217: Summary structure of the status quo analysis

The summary will indicate which aspects and challenges are to be addressed. Some of the key aspects will be addressed in phase 3 and 4, where other issues will need to be addressed by the Office of the Premier and provincial government, in order to enable the province to effectively implement the PGDP and PSDF strategies.

1.1 SUMMARY OF KEY FINDINGS

The following table provides a summary of the Status Quo key findings.

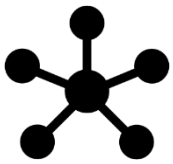
Table 88: Summary of the Status Quo key findings

CATEGORY	KEY ASPECTS AND FINDINGS
Legislative context	The following key observation were made: • Limited inter-governmental relationships • Lack of implementation for various legislation such as: a) Development Facilitation Act has not yet been retracted and is in conflict with SPLUMA. b) Spatial Data Infrastructure Act c) Land use scheme requirements of SPLUMA. d) Limited compliance with NEMA and Disaster Risk Management • Disjuncture between provincial strategies and plans, due to silo planning. The following is required:

	• Identify departments and units that require urgent intervention in order to obtain the skills and capacity required to implement key legislation and policies. • Launch a programme to determine why provincial departments are not functioning effectively (apart from capacity and skills challenges) • Provide a manual for alignment of national, provincial and local level policy. • Provide spatial and policy framework for integration of sectoral interests. • Ensure that all provincial departments are obligated to utilise the PGDP and PSDF policies in order to gain access to funds. • Improve communication between Provincial Government and municipalities pertaining to planning, land-use, etc. • Provide guidelines to ensure compliance of SDFs of district and local municipal with PSDF. • Identify and address legislation and policy that create barriers for sustainable development. • Provide guidance pertaining to long-term management of the coastal zone through the implementation of appropriate overlay zones. • Strengthen environmental legislation compliance and enforcement. • Support coherent implementation of the Comprehensive Rural • Development Program (CRDP). • Provide strategy to ensure that infrastructure spending has a long-term focus which is not subject to short-term political cycles and IDP budgets only.
Economic 	The following key observations were made: • Limited beneficiation occurs with mining and other high impact projects. • High transport cost and long distances are trapping households in poverty. • Limited employment opportunities are created. • High impact projects are hindered due to the lack of infrastructure (e.g. electrical lines etc.) • Transport costs and long distances are hindering SMME registration. • Trade agreements are limiting the opportunities of manufacturing within the Province. The following is required: • Provide a plan for supporting bulk services and infrastructure, including roads, electricity, water and telecommunication. • Unlock potential of tourism markets, especially in rural areas where new product opportunities for cultural, adventure and ecotourism exist. • Revisit study on desirability of development of cargo facilities and chartered cargo air services out of Alexander Bay, Upington and Kimberley airports (previous work was not conclusive). • Create a transformed and vibrant agricultural sector with an increasing contribution to the provincial economic growth, job creation and food security.

	• Promote the opportunities for communities to establish transport and logistic enterprises. • Ensure that new development is subject to the availability of resources, with specific reference to water and bulk services infrastructure. • Promote innovative and sustainable Local Economic Development, such as bakeries in order to reduce the cost (due to transport etc) of basic food items. • Utilise the Paris Agreement and Carbon Credits to access additional funding for the Province. • Establishing stronger backward and forward linkages between sectors to ensure stronger multipliers. • Create incentives and opportunities for commercial banks to extend their input into LED and to unlock benefits associated with banking charters more efficiently • Explore models for public-private partnerships (e.g. the Karsten Women Trust).
Environmental 	The following key observations were made: • Limited protection is provided to surface and ground water resources • Disjuncture of environmental priorities between the various Environmental department and units. • Limited awareness programmes and recycling initiatives. • Negative impacts of renewable energy projects are not fully comprehended or understood. • Increasing prominence of degraded land. • Communities are not educated on how to sustainably utilise natural resources. • Ineffective waste management and practices are a large contributor to environmental pollution. The following is required: • Consider designation of agricultural reserves in areas of high-potential agricultural soils with adequate irrigation water. • Create appropriate ecological linkages between conservation areas. Designate coastal zone as a core conservation area. • Institute standard development approach along the Orange River by all relevant municipalities. • Enhance sustainable use of formal conservation areas and their resources. • Explore desirability of implementing strategies such as Protected Nature Areas and Special Management Areas in collaboration with organised agriculture and the Department of the Environment. • Preparation and implementation of an efficient Water Demand Conservation Strategy must be mandatory for all municipalities. • Promote cross-border conservation initiatives – explore the merit and desirability of UNESCO biosphere reserves. • Promote history and archaeology as primary tourism resources.

	• Protect high-potential agricultural land through appropriate land-use designation. Provide for biodiversity conservation in terms of SANBI's critical biodiversity area (CBA) indicators. • Provide guidelines for the re-use and/or the more sustainable use of resources. • Provide innovative strategies to help conserve conservation-worthy habitats on private land. • Provide land-use plan as a basis for integration of mining activities with conservation. • Establish various training centres in close proximity to conservation areas in order to train tour guides etc. from the local communities. • Improve communication and awareness programs as currently they do not reach the communities on ground level. • A system is required to measure pollution levels which includes mitigation strategies. • Formulate guidelines for the preparation of a provincial climate-neutrality strategy in terms of international best practice.
Social 	The following key observations were made: • Health services are not easily accessible by all. • Emphasis is placed in the health requirements of the elderly, and not the youth or other age groups • Quality of health services varies greatly throughout the province • Scientific orientated school subjects are not provided in rural areas • Disjuncture between skills provided within education systems and what is required by the market. • Increase in substance abuse is observed • Crime is becoming more prominent due to poverty, unemployment and inequality. • Large dependence on social grants. • CPA's and Traditional authority's roles are not delineated, while the CPA's and Tribal authorities also tend to not provide a true reflection of the communities wants and needs. • Loss and deterioration of heritage sites and knowledge is prevalent throughout the Province. The following is required: • A new approach to health service delivery needs to be investigated. • High quality basic education needs to be prioritised. • Programmes and initiatives to preserve heritage, indigenous knowledge and practices need to be established. • Utilisation of existing or abandoned health facilities needs to be prioritised. • Emphasis needs to be placed on youth and self-development. • Joint ventures between NGO's and the department of Social development should be promoted

Built Environment 	The following key observations were made: • The limited bulk infrastructure is hindering the implementation of high impact projects. • Limited maintenance of existing infrastructure. • Urban sprawl is increasing the costs associated with service delivery. • Waste management practices need to be improved and effectively regulated. • It is not feasible to provide services to all isolated communities within the Province. The following is required: • Planning and design of industrial and mining infrastructure have to be undertaken in accordance with dedicated design criteria. • Provide a spatial plan for bulk services and infrastructure for settlement priorities. • District and local SDFs should incorporate place-specific guidelines for architecture and landscaping premised upon historic design precedents and vernacular. • Provide framework for performance management of municipalities and settlements. • Ensure infrastructure of major project benefits the communities, and not only the project. • Duplication of services should be limited.
Spatial Contextualisation 	The following key observations were made: • The main structuring elements within the province are the Orange and Vaal Rivers. • The current PSDF corridors do not reflect the spatial reality. • The majority of land use schemes and spatial development frameworks are not SPLUMA compliant. • Settlements need to densify and reduce urban sprawl. The following is required: • District and local SDFs should incorporate place-specific guidelines for architecture and landscaping premised upon historic design precedents and vernacular. • Update of corridor and nodes proposed within the current PSDF. • Growth in isolated towns, with limited potential needs to be restricted. • Promotion of urbanisation, in order to be able to concentrate service delivery • Development of a mitigation strategy for municipalities that are not yet SPLUMA compliant. • Indicate actions to be taken by municipalities to enhance the status of settlements as it relates to development potential and human needs. • Indicate investment typologies required by the various municipalities and settlements. • Provide a spatial plan for settlement development priorities.

	• Provide a spatial premise and rationale for decision-making as it relates to the appropriation of government funds. • Provide a spatial premise and rationale for decision-making as it relates to the private sector investment in development. • Provide broad guidelines for improvement of subsidised housing – district and local municipalities must adopt such guidelines in their SDFs. These guidelines must be mandatory. • Provide spatial structuring elements to facilitate sustainable urban development. • Provide appropriate spatial context and orientation for the Northern Cape in terms of international agreements, protocols and conventions. • Interrogate the delineation of the provincial, district, municipal and ward boundaries.

As indicated by the summary above, many of the challenges identified within the current PSDF is still to be addressed. This highlight the lack of coordination and utilisation of the current PSDF, that will need to be addressed by the Office by the Premier in order to ensure the reviewed PSDF does not suffer the same fate.





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