Gamsberg Nature Reserve

Northern Cape Province, South Africa

Integrated Management Plan

Planned Cycle 2021 to 2024

AUTHORIZATION

This Integrated Management Plan (IMP) for the Gamsberg Nature Reserve (GBNR) was drafted by a multi-disciplinary team in consultation with all stakeholders, for approval in terms of sections 39 and 41 of the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003).

NAME AND TITLE	SIGNATURE AND DATE
Mr. LMM Wa Modise **Acting Head of Department**	28/06/2021

Approved by:

NAME AND TITLE	SIGNATURE AND DATE
GM Manopole (MPL) **Member of Executive Council** **Agriculture, Environmental Affairs, Rural Development and Land Reform**	1/09/2021

Contents

Index of Tables

Index of Figures

Index of Annexures

FOREWORD

The Department of Agriculture Environmental Affairs Rural Development and Land Reform (DAERL) is the provincial conservation authority tasked with the mandate of ensuring biodiversity conservation in the Northern Cape. Part of this mandate is the establishment and management of a system of protected areas which is representative of the province's ecosystems and ecological processes.

The protected area portfolio under the direct management of the DAERL consists of eight provincial nature reserves which cover an array of ecosystems and landscapes of high biodiversity conservation value. These provincial nature reserves have numerous benefits to both humans and natural ecosystems. They contribute directly to local, regional and national economies through tourism, employment and expenditure on reserve management. Nature reserves also facilitate complementary private sector investments, such as infrastructure and commercial services, which includes enabled industries such as the hospitality industry. Important social benefits to the public include the provision of an educational resource; indigenous and heritage values; and in increased quality of life, health and wellbeing.

Nature reserves are established in Northern Cape Province as a strategy to conserve and protect the natural environment for the benefit, enjoyment and welfare of present and future generations from a healthy environment. In 2004, the 7th Conference of Parties decided that all member states of the Convention on Biological Diversity should develop and apply methodologies and criteria that would enable them to measure the effectiveness of nature reserve (protected area) management in the conservation and protection of biodiversity. South Africa has endorsed the World-Wide Fund for Nature (WWF) Management Effectiveness Tracking Tool (METT-SA) in this regard, which is being used in Northern Cape Province to measure management effectiveness in nature reserves. Management effectiveness evaluations of nature reserves are vital for the measurement and improvement of the performance of each provincial nature reserve against set management objectives.

The management plans that have been developed for Northern Cape Province include:

- Conservation and tourism objectives for the effective management of the nature reserves that fall under the jurisdiction of Northern Cape Province;
- Visitor marketing and the facilitation of investment opportunities;
- Capacity building and tourism transformation;
- METT indicators to ensure the continuous improvement of the management of these nature reserves; and
- Provision of mechanisms for collaboration with communities and neighbours for harmonious co-existence and beneficiation to the province and the country.

By developing these management plans, the Department has ensured:

- That the Northern Cape Province meets its obligatory implementation of international agreements; the Convention on Biological Biodiversity; the provisions of the Constitution of the Republic of South Africa, 1998 (Act No. 108 of 1998) and the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) which lists minimum standards for PA proclamation and their management.
- The provision of ecosystem services for everyone in order to facilitate employment, economic growth and a good quality of life.

GM Manopole (MPL)
Member of Executive Council
Agriculture, Environmental Affairs, Rural Development and Land Reform

ABBREVIATIONS AND PLANNING TERMS

ABBREVIATIONS:

APO	Annual Plan of Operations
ARTP	Ai-|Ais/ Richtersveld Transfrontier Park
AFNP	Augrabies Falls National Park
ARTP	/Ai/Ais-Richtersveld Transfrontier Park
BCEA	Basic Conditions of Employment Act, 1997 (Act No. 75 of 1997)
BMM	Black Mountain Mining (Pty) Ltd
BOA	Biodiversity Offset Agreement
CAPEX	Capital Expenditures
CARA	Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)
CPPP	Community Public Private Partnership
DAERL	Department of Agriculture, Environmental Affairs, Rural Development and Land Reform
DENC	Department Environment and Nature Conservation
DFEE	Department of Fisheries, Forestry and Environment
DMR	Department Mineral Resources
DRPW	Department of Roads and Public Works
DWAS	Department of Water and Sanitation
EEA	Employment Equity Act, 1998 (Act No. 55 of 1998)
EMF	Environmental Management Framework (Local Authority CBA's))
EPWP	Extended Public Works Programme
ERM	Environmental Resources Management Southern Africa (Pty) Ltd;
ESIA	Environmental and Social Impact Assessment
EWT	Endangered Wildlife Trust
FEPA	Freshwater Ecosystem Priority Area
FPA	Fire Protection Association [in terms of the National Veld and Forest Fire Act, 1998 (Act No. 101 of 1998)]
GBNR	Gamsberg Nature Reserve
HDI	Historically Disadvantaged Individual
HO	Head Office
HOD	Head of Department
HR	Human Resources
HRD	Human Resources Development
IBA	Important Bird Area
IDP	(municipal) Integrated Development Plan
IT	Information Technology
IUCN	International Union for the Conservation of Nature
KPA	Key Performance Area
LRA	Labour Relations Act, 1995 (Act No. 66 of 1995)
LOR:	Lower Orange River
LORMP:	Lower Orange River Management Plan
MEC	Member of the Executive Council
METT-SA	Management Effectiveness Tracking Tool for South Africa
MET:	Ministry of Environment and Tourism
NWA:	National Water Act
NBRBSA	National Building Regulations and Building Standards Act, 1977 (Act No. 103 of 1977)
NEMBA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NEMPAA	National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003)
NEMWA	National Environmental Management: Waste Act, 2008 (Act No. 58 of 2008)
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NPAES	National Protected Area Expansion Strategy
NSBA	National Spatial Biodiversity Assessment

NVFFA	National Veld and Forest Fire Act, 1998 (Act No. 101 of 1998)
OHSA	Occupational Health and Safety Act, 1993 (Act No. 85 of 1993)
OPEX	Operating Expenditures
PAAC	Protected Area Advisory Committee
PAM	Protected Area Management
PFMA	Public Finance Management Act, 1999 (Act No. 1 of 1999)
PPP:	Public Private Partnership
PSA	Public Service Act, 1994 (Act No. 103 of 1994)
RMP	Reserve Management Plan
RPT	Reserve Planning Team
SADC:	Southern African Development Community
SAHRA:	South African Heritage Resources Authority
SANParks:	South African National Parks
SAQA:	South African Qualifications Authority
SANS	South African National Standard
SDA	Skills Development Act, 1998 (Act No. 97 of 1998)
SEMP	Strategic Environmental Management Plan (Local Authority)
SIS	Security and Investigation Services
SKDR	State of Knowledge Data Repository
SONR	State-owned Nature Reserves
SP	Strategic Plan
TOR	Terms of Reference
THETA:	Tourism and Hospitality Education and Training Authority
UNESCO	United Nations Educational, Scientific and Cultural Organization
UZM	Use Zone Map
VCA	Veld Condition Assessment
WfW	Working for Water
WfWet	Working for Wetland
WftC	Working for the Coast
WHS:	World Heritage Site
WOF	Working on Fire
WSA	Water Services Act, 1997 (Act No. 108 of 1997)

DEFINITION OF KEY PLANNING TERMS:

Activities	*Activities are management tasks required to collectively realize the objectives.*
Domain (Planning domain)	*Planning domain include areas not declared in terms of NEMPAA where DAERL is appointed as management authority as a result of ownership or co-management agreements with planned protected area expansion for next 5-year planning period.*
Estate	*Estate is the area declared in terms of NEMPAA and where DAERL is appointed as management authority as a result of ownership or co-management agreements.*
Guiding principles	*Guiding principles provide overall direction to the implementation of activities*
Monitoring	*Monitoring is the collection of data and information in a consistent manner over time for the purpose of evaluation.*
Objectives	*Objectives are derived from the vision. They represent key areas in which achievements must be obtained in total, or in some combination, to give direction to the management aspiration (the vision).*
Outcomes	*Ideally outcomes are benefits produced from objectives and activities.*
Outputs	*Outputs are tangible results produced by activities.*
Performance	*Performance assessment is a measurement of accomplishment assessment against a set of pre-determined criteria (e.g., efficiency or effectiveness).*
Performance indicator	*A performance indicator is a measurement used to evaluate the success in achieving targets and realizing objectives.*

Resources	*Resources include the people, materials, technologies, money, etc. required to implement the activities.*
Target	*Targets are set for particular aspects of performance – financial returns, efficiency, and quality of services, etc. – against which performance is monitored and measured.*
Conservation Development Framework (CDF)	*A CDF is a spatial framework that includes a use zone map (zoning) that guides and co- ordinates conservation and development activities in a protected area.*
Value	*A value is a specific attribute or feature (cultural, ecological or recreational) within a reserve that may require additional/special consideration during the planning process and subsequent management.*
Vision	*Vision indicates the direction of management aspiration.*
Zone of Influence	*Shows the areas within which surrounding land-use changes could affect the reserve. Reserve boundaries are not static and there are factors beyond the current or future boundaries that can influence the Reserve.*

EXECUTIVE SUMMARY

The following Executive Summary provides an overview of the 5-Year Integrated Management Plan (IMP) of the Gamsberg Nature Reserve.

i.Purpose of the plan

The SMP sets out the ambitions for the Gamsberg Nature Reserve (GBNR), as articulated through the vision and objectives for the GBNR for the next 5-year planning cycle. The plan sets out how these ambitions will be achieved and delivered through a range of management guidelines and actions. The SMP strives to:

- Identify the defining qualities and characteristics of the GBNR (i.e., what makes it special and unique) and why it was declared;
- Describe the GBNR's management requirements and challenges;
- Set out medium- and long-term ambitions for the desired state of the GBNR;
- Provide a five-year operational management framework for delivering this desired state
- Describe the specific activities to be implemented on an annual basis;
- Identify the measures required to evaluate if the management actions are collectively contributing to achieve the desired state; and
- Describe the institutional, human resource and budget requirements for implementing the management plan.

ii.Reserve context

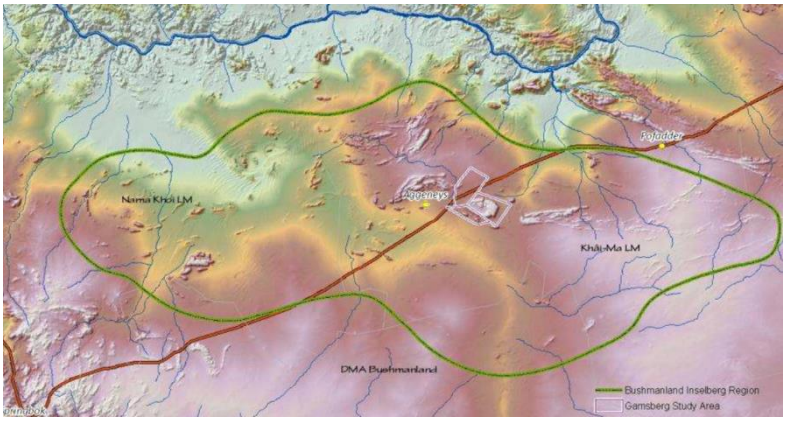
Vedanta Resources purchased Black Mountain Mine and the associated rights in 2011 with a view to pursuing the Gamsberg Zinc resources. Environmental Resources Management Southern Africa (Pty) Ltd (ERM) was appointed to undertake an Environmental and Social Impact Assessment (ESIA) for the various listed activities and to amend the existing EMPR for Gamsberg Zinc Mine. After the initial approach, the provincial competent authority (The Department of Environment and Nature Conservation - DENC) informed Vedanta that due to the sensitivity of the site, it was likely that a biodiversity offset commitment would need to be investigated in parallel to the ESIA process. Vedanta approached Dr Philip Desmet and Mark Botha to assist with developing a turn-key proposal for a biodiversity offset that lead to a Biodiversity Offset Agreement (BOA) between Black Mountain Mining (Pty) Ltd (registration number 2005/040096/07) and the provincial Department of Environment and Nature Conservation, Northern Cape Province.

In terms of clause 6.1.2 of the BOA, BMM has secured four (4) of the Nearby Properties listed in section 2.1 covering an area of 21 935.9097 ha that is more than the 12 900-ha required in terms of the agreement. These properties (or portions thereof, as the case may be) were made available to DENC for declaration by the MEC as Protected Areas; and the Gamsberg Nature Reserve (GBNR) was declared as a Nature Reserve on 05 August 2019 in terms of section 23(1)(a), and assigned the name Gamsberg Nature Reserve in terms of section 23(1)(b). DAERL was appointed as the Management Authority in terms of section 38(2) of the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003), on the properties managed jointly as such. An additional three properties need to be secured by BMM by 1 April 2024 and need to be included and Proclaimed as part of the GBNR and will require an update of the GBNR SMP.

The GBNR is named after "Ghaamsberg" a mountain situated just east of Aggeneys, its summit 1148 meters above sea level and is not to be confused with the Gamsberg Nature Reserve of Namibia.

The GBNR consist of two sections located 20 km apart the Rozynbosch section located 7Km north of the town Aggeneys and the Achab section located 20 km east of the town Aggeneys in the Khâi-Ma Region of the Namakwa District of Northern Cape Province.

The GBNR form part of the Bushmanland Inselberg Region as one of nine identified geographic priority areas that have conservation value and are most vulnerable to increasing land-use pressures. In these priority areas, SKEP will seek to establish informal conservation networks that will achieve vegetation and process targets.



The Bushmanland inselberg Region is located on the north-eastern margin of the Succulent Karoo biodiversity hotspot, just south of the Orange River and the border between Namibia and South Africa. Floristically GBNR is situated within the Bushmanland Centre of Endemism with its 397 succulent species of which 16 are endemic and four restricted, including two flagship endemics: *Conophytum ratum* and *Lithops dorotheae*. Isolated mountains and rocky outcrops (the inselbergs) that dominate the landscape are home to a rich and unique complement of succulent and geophytic plants of over 400 plant species, of which more than 10% are endemic to the sub-region and 20% are threatened species making this an extraordinary diversity for a semi-arid flora.

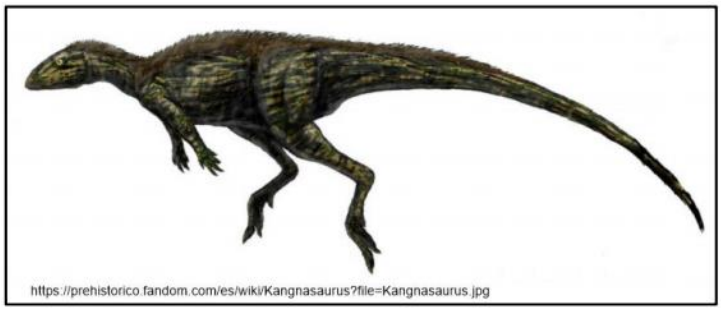
The area is dominated by a plain of desert grasslands and peppered by Inselbergs, ancient rocky outcrops in irregular patterns. The arid conditions and the unique ecologies on the various inselbergs, peaks, hills and plains, with their varied rocky and shallow soil substrate, support a wide range of plants, animals, birds and insects, including rare and endemic species. These bushmanland inselbergs are important refugia for plants and animals and act as stepping-stones for landscape connectivity across the sand-covered plains of the Bushmanland. Isolation of populations has led to diversification within the dwarf succulent habitats. The GBNR also plays a major role in acting as a landscape level biodiversity corridor linking the Succulent Karoo Biome, Desert Biome and Nama-Karoo Biome as part of the proposed Greater Gariep Trans Frontier Conservation area.

The ancientness of the landscape is evident in the preservation of numerous volcano crater lake deposits in the Kangnas-Gamoep area. Radiometric dating indicates a late Cretaceous to Palaeocene age range of ~80 to 56 Ma for these volcanoes.
The crater lake mudstones near Platbakkies indicates a dry subtropical forest of podocarps (yellowwoods) and araucarias (monkey puzzle trees now extinct in Africa), with an understory of Restionaceae, Proteaceae and Ericaceae representing early Cape Floristic Region taxa.

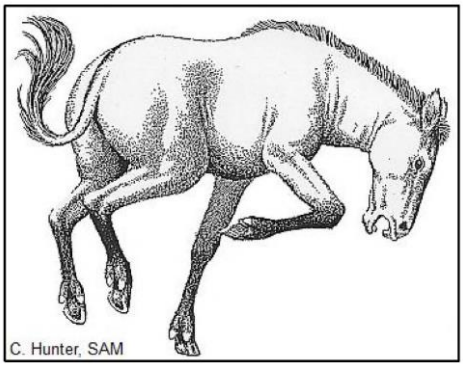
System/ Period	Series/ Epoch	Stage/ Age	Age (Ma)	
Quaternary	Pleistocene	Gelasian	younger	
Neogene	Pliocene	Piacenzian	2.58	3.600
		Zanclean	3.600	5.333
	Miocene	Messinian	5.333	7.246
		Tortonian	7.246	11.63
		Serravallian	11.63	13.82
		Langhian	13.82	15.97
		Burdigalian	15.97	20.44
		Aquitanian	20.44	23.03
Paleogene	Oligocene	Chattian	older	

Subdivision of the Neogene Period according to the ICS, as of 2017.[2]

The teeth and bones of a bipedal, herbivorous dryosaurid dinosaur Kangnasaurus from this time period named *Kangnasaurus coetzeei* were found in a well dug on the farm Kangnas A prominent, broad "fossil" valley, the Koa River, traverses the region, its course marked by red dunes and a series of pans, of which Bosluispan is prominent. The Koa River was either a major tributary of the Proto-Orange River or was the course of the actual Orange River when it took a southerly route to the Atlantic. The ~16 Ma age of the Koa River fauna corresponds with the Mid Miocene Climatic Optimum, a warm interval.



During this period of global warming substantial melting of polar ice raised sea level and the corresponding palaeoshoreline of the highest sea level elevation attained at ~16 Ma is now uplifted to 90 m asl. along the West Coast, as exemplified by sea cliffs and the marine deposits of Kleinzee. The lower Orange River valley was flooded by the rising sea level forming a large estuary, while upstream the valley was backfilled by accumulating sediments, some of which are preserved as the high-level "Proto-Orange" terraces in which a world-renowned, rich fossil fauna has been found at Arrisdrift and Auchas on the north bank. At Areb the teeth of the extinct three-toed horse *Hipparion namaquense* dated to 6-4 Ma (latest Miocene/early Pliocene) were found.



The Northern Cape Province reflects a rich, mainly Stone Age, archaeological heritage, with cave sites and a wealth of rock art sites. This area is home to all three of the known phases of the Stone Age, namely: The Early- (2.5 million -250 000 years ago), Middle- (250 000 - 22 000 years ago) and Late Stone Age (22 000 - 200 years ago). Archaeological sites in the area around Aggeneys tend to be focused on places where water can be obtained – generally after rain storms and include pans and flat bedrock outcrops that have hollows and crevices that trap water, the bases of rocky hills and outcrops and along sand dunes. Archaeological and historical evidence show that the Middle Orange River and Bushmanland regions have been populated more or less continuously during prehistoric times and that the region was extensively occupied by Khoi herders and San hunter-gatherers during the last 2000 years. Early to Middle Stone Age sites are less common in this area, however rock-art sites and Late Stone Age sites are much better known.

The landscape setting rather than individual sites takes on major significance along with the plain situated between Namiesberg and Ghaamsberg where historical records attest to massacres during the genocide against the San of this region. Inkruip Kloof at the south eastern side of Ghaamsberg was identified as the possible site of this genocidal massacre.

The GBNR is located in a "Hot Desert" region (AATS, 2000b). The area is one of the hottest and driest areas in South Africa with desert and semi-arid conditions. The area experiences extreme climate conditions with temperature fluctuating often over short periods of time between hot and cold with an annual range of -2 degrees Celsius in winter and maximums exceeding 40°C in the summer months. Temperature regimes are varied throughout the area from low-lying points along the Orange River to high, exposed mountain peaks in the interior. These climatic factors are added to by wide variations in elevation ranging to as high as 1 200 meters.

The Bushmanland lies between the Orange River in the north, Namaqualand in the west, Loeriesfontein in the south and Van Wyksvlei, Verneukpan and the Hartbees River in the east. The altitude is between 900 and 1 200 meters above mean sea level, sloping down towards the Kalahari-basin in the northwest. The northern section of the reserve form part of the only true mountain desert in South Africa and lies within a dry and remote area where the topographical landscape is harsh, but visually spectacular.

> **"For sheer uncompromising aridity, for stark grotesque naked horror, these mountains stand probably unsurpassed on the face of the globe."**
>
> - **William Charles Scully**

The ranges of hills, mountains and inselbergs in the area display some of the most diverse and complex geology in Southern Africa including some of the richest known concentrations of copper, lead and zinc. Geologically, the GBNR is regarded as one of the most interesting and visually stunning geological areas of Southern Africa with rocks ranging in age from one to 2 000 million years old.

The ancient geological forces which occurred in the area are clearly evident - intense folding, buckling and fracturing as a result of uplifting, plate movements, and volcanic and glacial systems are on display throughout the area and most strikingly in the high cliff walls along the Orange River.
This makes the area very attractive to this tourist niche. The soils, geology and associated landscapes combine to produce spectacular vistas, panoramic views and scenery, which is critical for tourism.

The GBNR form part of the Orange River catchment. The Orange River is South Africa's major river. Its length from the Drakensberg in Lesotho to the mouth at the West Coast at Alexander Bay is approximately 2 300 km. Where it rises in the eastern highlands of Lesotho, the river is known as the Senqu River. The Orange River forms the borders between several South African provinces as well as the border between Namibia and South Africa.

The present ecological status of the river has been generally assessed as being largely modified and its condition is deemed to be on a negative trajectory. Controlling the present mechanical manipulation of the river bed, banks and floodplain is extremely important as these factors are major contributors towards the decline in the condition of the riverine ecosystem, which together with the current manipulation of the flow regime will eventually lead to its complete collapse (ARTP JMB. 2008).

GBNR include portions of the Succulent Karoo Biome (SKB), Desert Biome (DB) and Nama Karoo Biome (NKB). The NSBA identified the last two biomes as a geographic priority region for conservation action in South Africa. The SKB is recognized as one of 34 global Biodiversity Hotspots and one of only two to exist in a desert. The Bushmanland Inselbergs covers 31 400ha and includes 429 plant species, of which 67 are found only in this hotspot and 87 are Red List species including two flagship endemics *Conophytum ratum* and *Lithops dorotheae*.

Fifty-six species of mammals are found in this area, including six species endemic to the southern African subregion and eight Red Data Book species. Predators include leopard, caracal, brown hyena and black-backed jackal. The only ungulate that is common is the klipspringer. Other ungulates that occur in lower densities are, duiker, steenbok, gemsbok and kudu.

Baboons are found in some areas and smaller mammals include rock hyrax and mountain ground squirrel.

The GBNR form part of a Global Important Bird and Biodiversity Area (IBA). According to Bird Life South Africa this IBA is one of a few sites protecting both the globally threatened *Certhilauda burra* (red lark), which inhabits the red sand dunes and sandy plains with a mixed grassy dwarf shrub cover, and the near-threatened *Spizocorys sclateri* (sclater's lark), which occurs erratically on gravel plains. The site potentially supports 16 of the 23 Namib-Karoo biome-restricted assemblage species and a host of other arid-zone birds. It is seasonally important for nomadic larks, such as *Spizocorys starki* (stark's lark) and sparrow-larks, which are abundant after good rains.

The number of known species for this IBA is 142 with 16 lark species. Besides the trigger species, *Polemaetus bellicosus* (martial eagle), *Sagittarius serpentarius* (secretarybird), Aquila verreauxii (verreauxs' eagle), *Hieraaetus pennatus* (booted eagle), *Circaetus pectoralis* (black-chested snake eagle), *Bubo capensis* (cape eagle-owl) and *B. africanus* (spotted eagle-owl) are present.

The area is noted for its herpetofauna and regarded as a hotspot for endemism with regard to reptiles and insects. A large variety of lizards (35 species) and snakes (16 species) populate the diverse microhabitats of the area. A number of species such as the Namaqua day gecko, Paradise toad and Rubber frog have restricted distributions.
Many species such as the *Bitis xeropaga* (Desert mountain adder) is uniquely adapted to arid regions.

The arthropods of this region include tenebrionid beetles, the large spider hunting wasp, the roseate emperor moth and some of the world's most poisonous scorpions including the *Parabuthus villosus (*black hairy thick-tailed scorpion). This scorpion is large, about 140 mm in length and is often seen during the day. Besides its normal prey it also captures lizards and mice.

With regard to socio-economic context the Khâi-Ma Local Municipality is the municipality in the Northern Cape Province with the lowest population in 2016 namely 115488 and is the least populated district in the Province and Country, although geographically the largest, with a population comprising 10% of the Provincial total population. The Khâi-Ma Municipality has been, in terms of the Local Government: Municipal Structures Act, 1998, Act nr. 117 of 1998, classified as a Category B municipality and was proclaimed as a local municipality with a council combined with a ward participatory system. The Khâi-Ma Municipality is deemed to be a low-capacity municipality, and shares executive and legislative authority with the Namakwa District Municipality.
Khâi-Ma Municipality renders basic services to the inhabitants of Onseepkans, Blyvooruitsig, Pofadder and Wittbank. Vedanta renders basic services to the inhabitants of Aggeneys, which has been proclaimed

as a town. The municipality is sparsely populated (+/- 1 person/km2); most people are settled in its five (5) towns and surrounding farms. The municipality is characterized by vast tracts of land, pristine natural environment, unique mountains and its limited cell phone reception, which can be regarded as a unique attraction by some urban dwellers who wish to escape the rush of the cities. This inherent potential for eco-tourism needs to be exploited and managed in a sustainable manner in order to retain this unique setting.

The Namakwa District Strategic Environmental Management Plan (SEMP, 2011) acknowledge that biodiversity underpins sustainable development as it provides many important ecosystem services such as forage production for livestock and water production that form the cornerstone of local economies and livelihoods. EPIP programs within the reserve to develop tourism infrastructure will also make a huge contribution to job creation.

South Africa has a well-developed tourism circuit with 9 defined zones that represent unique environments and associated activities. One of the nine, the Arid Desert Zone, offers unique scenic landscapes characterized by arid desert landforms and the Orange River provides a vein of life.
The ARTP/CA – Integrated Regional Tourism Plan (Peace Parks Foundation, 2002) study has shown that the area has the potential opportunity to offer a unique product, in terms of pristine, divers and un-spoilt arid environment. This opportunity consists of the combination of the eco-tourism product (fauna, flora, geology, scenery etc.) with the recreational & cultural-tourism product.

The GBNR is included in one of the focus areas identified for protected area expansion by the National Protected Area Expansion Strategy (NPAES) namely the Kamiesberg Bushmanland Augrabies focus area (#15). With regard to the provincial PAES the GBNR form part of the Bushmanland primary focus area (#10) and any expansion must be directed towards forming linkages between the Nababiep Steinkopf Harasberg focus area (#11), the Bushmanland focus area (#10) and the Augrabies Falls Expansion (#9) as part of the Greater Gariep TFCA initiative. The Namakwa District Biodiversity Sector Plan (2008) also identifies the area as a terrestrial critical biodiversity area (CBA).

iii.Reserve values

The following key values have been identified during the situational assessment and refined through a series of stakeholder workshops to inform implementation and planning.

Institutional

- The reserve potential to demonstrate the efficacy and benefits of functional partnerships between DAERL, Local communities, NGO's, Private landowners and Mining companies across International boundaries in the collaborative administration and management of GBNR and Greater Gariep TFCA.
- The reserve is committed to management in accordance with best practice and rationally driven by current knowledge.
- The reserve is committed to good administration and the efficient use and good maintenance of resources.
- The reserve is committed to being a good employer and socially affirmative neighbour in the local communities.

Ecological

- The GBNR is of biodiversity significance because it includes two global important bioregions, viz, the Gariep Desert (Gariep Centre of endemism) and Richtersveld (Bushmanland inselbergs) as part of the Succulent Karoo (SK) a global hotspot for biodiversity.
- The GBNR includes areas, which have been identified as irreplaceable, and vulnerable through the SKEP biome-wide conservation planning projects.

- The reserve forms an integral part of the planned Greater Gariep TFCA.
- The GBNR forms part of the Bushmanland focus areas for land based protected area expansion in terms of the National Protected Area Expansion Strategy (NPAES, 2016).
- The reserve contains areas classified as "important and necessary" in terms of Critical Biodiversity Values (CBA's).
- The reserve is situated within areas classified as hotspot for Quartz Patches, Sand Movement corridors, plants, invertebrates, insects, birds and amphibians.
- The reserve supports a high diversity and abundance of succulent species and is believed to provide an important role in linking populations among the Desert, Succulent- and Nama Karoo Biomes.

Socio-Economic

- The reserve is easily accessible by tourists from the N14 national road.
- The wilderness character of this area offers some of the best scenic 4X4 routes in the country.
- The reserve has the potential to play an important socio-economic support role in local and surrounding communities.

Other functions of protected areas important to people include microclimate control, carbon storage, soil erosion control, pollination, watershed protection and water supply, soil formation, nutrient recycling, and inspiration and a sense of place (Daily and Matson 2008). A recent study has provided a quantitative demonstration of the value of protected areas as an effective strategy for conserving biodiversity (Coetzee et al. 2014), a critical component of the life-support system of the Earth.

iv.Management issues and challenges

The following key management issues and challenges facing the reserve have been identified during the situational assessment and refined through a series of stakeholder workshops to inform implementation and planning.

Institutional

- The first few years of management will show whether there are sufficient resources and capacity to coordinate and implement effective management of the reserve;
- Lack of formalized trans-boundary (local, national or provincial) collaboration;
- Lack of institutional arrangements required to facilitate active involvement of local stakeholders in decision making;
- There is potential for greater collaboration with the Greater Gariep TFCA initiative to support management objectives; and
- There is a potential for management objectives to be undermined if not clearly communicated to and supported by institutions responsible for management of the reserve interface.

Ecological

- The boundary of the reserve is inconsistent due to the separate portions north and south of the N14 and does not adequately incorporate important habitat features and is poorly aligned with existing ecological boundaries;
- The small size of the reserve could result in edge effects and fragmentation of biological communities. This in turn might lead to a lack of migration, lack of species diversity (especially the terrestrial fauna and flora) and loss of genetic diversity;
- Corridors for migration patterns from winter to summer rainfall areas & varying habitats are extremely limited;
- There is a need to identify and implement appropriate biodiversity management procedures and habitat management prescriptions and practices;
- Ecologically sensitive area and parts are ecologically degraded;
- The occurrence of exotic plants within catchment areas;

- Alien invasive plants need to be controlled in order to maintain and improve integrity of vegetation;
- Monitoring is required to improve baseline data and assess changes in the ecosystem's responses to management activities;
- There is a need to promote scientific research and disseminate results to better understand the functioning of the ecosystems;
- Appropriate mechanisms of waste management and removal are required to limit waste accumulation;
- There is a need to identify and implement appropriate habitat management prescriptions and practices;
- Climate change - severe weather lead to habitat shifting, increase in severe weather incidents, capacity of species for range shifts;
- Transportation and service corridors;
- Pollution - excess light and dust pollution from mining activities;
- Natural system modifications - dams & water management/use - abstraction of surface water (mining and agricultural use);
- Renewable energy production and mining.

Socio-Economic

- A focused tourism development plan is required to grow tourism activities associated with the reserve;
- There is a need to develop and/or review the reserve conservation development framework (CDF) to manage tourism activities within the reserve;
- Marketing strategies need to be implemented to encourage tourists to visit the reserve;
- Overall project marketing is fragmented without a consolidated base;
- Individual product marketing is mostly of a low-level nature;
- The product lacks linkages and the perception of this result in the destination being considered inaccessible and remote;
- There is a need to ensure that tourism-related benefits accrue to local target communities;
- There is a need to promote educational activities;
- Access to the site is not adequately monitored and controlled;
- Illegal harvesting of biological, geological and archaeological resources from the reserve for the international market;
- Potential conflict between conservation and community land use objectives could undermine the proposed expansion of the reserve;
- Pastoral utilization may pose negative impacts on the environment and tourism;
- There is a risk of future land use planning activities around the site undermining the ecological and aesthetic character of the area; and
- The existing road network should be rationalized to limit impacts on habitat and associated biota.

v.Desired condition of the reserve

The vision of the reserve describes the overall long-term goal for the operation, protection and development of the GBNR. The following vision was developed by the RPT:

VISION

To conserve the GBNR with its unique Inselberg and Desert biodiversity and sensitive ecosystems for the benefit of people and the environment.

From this, it is envisaged that the following will be secured:

- ***Conservation of biodiversity and ecosystems essential for the functioning of ecological processes;***
- ***Preservation of the important cultural and historical heritage attributes;***
- ***The integrity of the natural environment is protected to sustain its scenic qualities to serve as a basis for tourism;***
- ***Quality of life of rural communities are improved by developing opportunities; and***
- ***Equitable access to, and responsible use of, the reserve and its natural resources for the benefit of present and future generations through strategic partnerships.***

vi.Key management activities and targets

Twenty-four objectives, grouped according to six key performance areas, is anticipated to contribute to realizing the vision of the PA. These key performance areas with their objectives as identified by the RPT is as follow:

KPA 1: Biodiversity and Heritage Conservation

Objective 1.1 Obtain Biodiversity knowledge;
Objective 1.2: Restoration and mitigation of degradation;
Objective 1.3: Maintenance of ecological processes;
Objective 1.4: Maintenance of critical ecosystem services;
Objective 1.5: Land use planning and management outside of the protected area;
Objective 1.6: Water use planning and management influencing the protected area;
Objective 1.7: Audit achievement of biodiversity targets;
Objective 1.8: Manage and mitigate the environmental impacts of conservation management, tourism, recreation and natural resource use; and
Objective 1.9: Obtain Cultural Heritage knowledge.

KPA 2: Recreation, Marketing, Education, Awareness and Interpretation

Objective 2.1: Develop, deliver and maintain a diverse range of tourism and recreational services for visitors in accordance with CDF;
Objective 2.2: Develop and implement a focused and cost-effective marketing program; and
Objective 2.3: Develop and implement a focused and cost-effective awareness-raising and educational program.

KPA 3: Enforcement, Security and Access Control

Objective 3.1: Secure the management authority and its tenure;
Objective 3.2: Secure the boundaries of, and maintain controlled access; and
Objective 3.3: Sustain an effective law enforcement and compliance capacity

KPA 4: Infrastructure and Equipment

Objective 4.1: Acquire and maintain operational equipment and vehicles;
Objective 4.2: Construct, maintain and upgrade the administration infrastructure and bulk services infrastructure; and
Objective 4.3: Construct, upgrade and maintain day and overnight visitor buildings and infrastructure.

KPA 5: Stakeholder Involvement

Objective 5.1: Interaction with stakeholders and communities in the planning, development and management;
Objective 5.2: Actively participate in local and regional conservation and socio-economic development initiatives that may affect or benefit the protected area; and
Objective 5.3: Develop, implement and maintain effective mechanisms for ongoing communications with co-management partners.

KPA 6: Administration and Planning
Objective 6.1: Institute and maintain an effective management planning capability;
Objective 6.2: Maintain an adequately equipped, resourced and trained staff complement; and
Objective 6.3: Institute and maintain an effective financial and administration and planning capability.

vii.Institutional arrangements and budget requirements

The following recommendations regarding the minimum staffing complement and funding required for the successful implementation of the Reserve Management Plan (i.e., the SMP and APO) was made by the RPT making use of the RB Martin formula.
Martin has developed formulae which give a crude estimate of the number of field staff, the required operating costs and the necessary capital expenditure for a protected area of any given size.
The RB Martin formula has been used to estimate minimum conservation costs for protected areas and compare these with disclosed budgets, which suggests a 30% aggregate underfunding of conservation in general. Conservation functions in provinces appear seriously underfunded, largely because they must vie for provincial allocations along with other critical social functions such as health, education and social welfare. Regardless of the final figure, there appears to be ample evidence from a number of sources that conservation is seriously underfunded in aggregate, and that a comprehensive review of the funding requirements for conservation is required (DEA, 2012).
According to the RB Martin formula 14 Field rangers will be required to manage the biodiversity aspects of the GBNR but as law enforcement is not a major issue in this area it is proposed that a total of 6 staff members, (consisting of a reserve manager, 1 senior field ranger and 4 field rangers), would be required for the successful implementation of the Strategic Management Plan for this planning cycle.
The following personnel, operational and capital budgets are proposed for the successful implementation of this SMP. The proposed budget in terms of the R.B. Martin formula[1] is also provided for comparison.

ECONOMIC CLASSIFICATION - SCOA	*2021-2022 Budget*	*2022-2023 Budget*	*2023-2024 Budget*
PERSONNEL	*R2 563 891.16*	*R2 646 151.49*	*R2 714 413.80*
GOODS AND SERVICES	*R6 024 949.88*	*R450 649.88*	*R73 049.88*
CAPITAL ASSETS >R5000	*R20 000.00*	*R20 000.00*	*R115 500.00*
Total activity based budget	*R8 608 841.04*	*R3 116 801.37*	*R2 902 963.68*
Total activity based budget without Persal	*R6 044 949.88*	*R470 649.88*	*R188 549.88*
Total budget required in terms of RB Martin formula	**R2 967 329.90**	**R2 967 329.90**	**R2 967 329.90**

[1] Adapted formula for SA protected areas as provided in the "Review of Institutional Arrangements for Management of Protected Areas" DEA 2010

1. INTRODUCTION

1.1 Integrated Environmental Management System

The Integrated Environmental Management System (IEMS) assists DAERL in managing its ecological, social (including human resources) and financial resources to meet the Nature Reserve management objectives. It is a system that meets the requirements of relevant ISO 14001 standards but also enables the DAERL and its Nature Reserves to plan for and meet strategic (five-year) objectives as well as assist with the implementation of annual planning objectives within a coherent system of continual improvement. Linking the strategic planning cycle and the annual planning cycle enables the Department to ensure that operations are focused to meet Departmental and Nature Reserve strategic objectives. At a Nature Reserve level, the strategic objectives and annual planning objectives will be guided by the Departments objectives within these two cycles of planning.

The following is an overview of an ideal Integrated Environmental Management System developed to meet the ISO 14001 EMS requirements but also compatible with reserve management planning objectives.

1.2 Strategic Management Planning

The Integrated Management Plan (IMP) is drafted every five years with the involvement of representative stakeholders. The IMP forms a bridge between the long-term policy and vision for the Reserve, and the medium term (five year) priorities to attain that vision.

Rather than detailing all operational and potential reactive courses of action in the next five years the IMP focuses on strategic priorities. These priorities are considered strategic because they will shape the future development of the Nature Reserve, as well as ensuring responsible operational management on a day-to-day basis. In drafting the IMP, significant efforts are directed towards integrating the vision with operational reality.

To ensure its survival as an action plan, the IMP is presented as a series of Key Performance Areas, each of which contains objectives that the reserve staff will need to address. For each one of the aforementioned objectives, a number of guiding management principles (i.e., norms and standards by which operational decisions with regard to the reserve will be made); management actions (i.e., key strategic activities to be implemented in order to achieve the reserve's objectives); and management targets were set by the RPT.

Each management action was defined and prioritized as being of a high, medium or low priority for the five-year horizon covered by this Integrated Management Plan. Time frames, targets, key performance indicators and responsibilities were also allocated to each management action, or to a group of linked management actions.

The aforementioned principles, actions and targets will be used to inform the annual plan of operation (APO) of the reserve, as well as the resources required to implement it. To provide a spatial context to the strategic reserve objectives, a Conservation Development Framework (CDF) is formulated to demarcate the reserve into functional areas (use zones) with a specification of management guidelines for each use zone and to provide a spatial framework for visitor facility provision and access with a specification of management guidelines for the range of visitor sites, facilities and access.

1.2.1 The GBNR Management Plan

The Reserve Management Plan (RMP) is the overarching management planning document for the Gamsberg Nature Reserve (GBNR).

The GBNR Management Plan comprises two complementary documents[2]:

- An Integrated Management Plan (IMP) covering a period of five years (this document); and
- An Annual Plan of Operation (APO) covering a period of five years including an Operational Management Framework (OMF) covering the current financial year.

[2] These two planning documents will be supported by a **State of Knowledge Data Repository (SKDR)** and program-specific, more detailed **Subsidiary Plans**.

All the information necessary to guide the management of the nature reserve is included in these two documents. The structure used for the GBNR IMP (Table 1) is the same as for all DAERL Nature Reserves. No major decisions potentially affecting the future of the reserve will be taken without reference to the IMP.

Table 1 Structure of the SMP

SECTION 1	**INTRODUCTION**
This section briefly describes the: (i) planning context for the IMP; (ii) purpose of the IMP; (iii) structure of the IMP; and (iv) approach to developing the IMP.	
SECTION 2	**CONTEXTUAL FRAMEWORK**
This section provides a succinct summary of contextual information about the GBNR. Context identify the defining qualities and characteristics of the GBNR What makes it special and unique and also describe the GBNR's management issues and challenges.	
SECTION 3	**STRATEGIC PLANNING FRAMEWORK**
This section defines the ambitions for the GBNR, through the formulation of a vision and a set of objectives. This section also spatially represents the desired state of the GBNR in the form of a use zone map for the GBNR. Strategic planning is an organization's process of defining its strategy, or direction, and making decisions on allocating its resources to pursue this strategy. Set out medium- and long-term ambitions for the desired state of the GBNR.	
SECTION 4	**OPERATIONAL MANAGEMENT FRAMEWORK**
This section defines how the vision and the objectives will be delivered. It details the key management guidelines and management actions for six thematic areas (Key Performance Areas). Operations management is a dynamic, iterative and complex process, which is comprised of a series of decisions and activities by managers and employees – affected by a number of interrelated internal and external factors – to turn strategic plans into reality in order to achieve strategic objectives. Operational Management Framework- - Translates the strategic planning framework for each set of objectives into management actions; and management targets to accomplishing objectives and the resources required to implement it, including specific activities to be implemented on an annual basis; - Identify the measures required to evaluate if the management actions are collectively contributing to achieve the desired state; - Describe control mechanisms (legislation, policies, norms and standards) for guiding implementation and decision-making; and - Provide procedures on how to implement operations (standard operating procedures).	
SECTION 5	**RESOURCING AND GOVERNANCE FRAMEWORK**

1.2.2 Purpose of the GBNR SMP

National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003), NEMPAA, requires that DAERL produces management plans for all Nature Reserves in consultation with relevant stakeholders.

The overall aim of the Management Plan as per the NEMPAA is to:

- Ensure the protected area is managed according to the reason it was declared;
- Be a tool to guide management of a protected area at all levels, from the basic operations to the level of the Minister of Environmental Affairs;
- Be a tool which enables the evaluation of progress against set objectives;
- Be a document which can be used to set up key performance indicators for Reserve staff;
- Set the intent of the Reserve, and provide explicit evidence for the financial support required for the Reserve; and
- Provide for the scoping process required as part of the Environmental Impact Assessment (EIA) process for development in the Reserve.

The purpose of the IMP is in line with the aim of the NEMPAA and is to:

- Identify the defining qualities and characteristics of the reserve (i.e., what makes it special and unique);
- Describe the reserve's management issues and challenges;
- Set out medium- and long-term ambitions for the desired state of the reserve;

- Provide a five-year implementation framework for delivering this desired state;
- Describe the specific activities to be implemented on an annual basis;
- Identify the measures required to evaluate if the management actions are collectively contributing to achieve the desired state; and
- Describe the institutional, human resource and budget requirements for implementing the management plan.

The overall purpose of the IMP is to set out the medium-term ambitions for the reserve. These ambitions are expressed through the **vision** and **objectives**. The IMP then describes how these ambitions will be delivered through a range **of management guidelines** and **management actions**.
Eight basic steps were taken in preparing the SMP, these steps are outlined in the Table 2 below.

Table 2 The eight basic steps taken in preparing the SMP

Step	Purpose of step
STEP 1: Data collection, background research and site visit.	To collect, collate and review the contextual reserve information that informs the GBNR management planning process.
STEP 2: Establishment of a GBNR Planning Team (RPT).	To establish an inter-disciplinary team to guide and advise on the preparation, and ongoing review and evaluation, of the IMP.
STEP 3: Identification of the GBNR values.	To describe why the GBNR was designated, and its associated values and benefits.
STEP 4: Deciding on the desired state for the GBNR.	To develop and articulate a desired condition, state or appearance of the GBNR (vision, objectives and use zone plan).
STEP 5: Development of an action plan for the GBNR.	To identify and develop the key management actions needed to achieve the desired state for the GBNR.
STEP 6: Preparation of the first draft of the IMP for the GBNR.	To integrate all the information from Step 1 and Steps 3 to 5 into a first draft of the IMP.
STEP 7: Stakeholder consultation.	To create an opportunity for the RPT, and later the general public and other stakeholders/interested parties, to review and comment on iterative drafts of the IMP.
STEP 8: Revision of the IMP to include comments and recommendations from the RPT and other stakeholders.	To revise the draft IMP, considering the comments received from the RPT and other stakeholders/interested parties and the public. Complete a final IMP for approval.

1.3 IEMS audit

An audit of the IEMS is undertaken on an annual basis. An audit is designed to obtain objective information that provides an evaluation of the PA's conformance to the criteria it has set itself. These criteria may include legal compliance, conformance with PA procedures, achievement in Key Performance Areas, and compliance with any other standard the Department may have adopted. The annual management review below and progress against KPA's forms the basis of the annual IEMS Audit. The results of this process are communicated to management, staff and other stakeholders through the management effectiveness improvement strategy (MEIS).

1.4 Management review

A review of the IEMS is undertaken on an annual basis to prevent it from constraining new initiatives and innovative approaches to challenges that may arise. The review takes account of the changing circumstances that comprise the reserve environment.
In undertaking such a review or assessment, the Protected Area Manager considers the results of the METT-SA, relevant recommendations by Stakeholders, and any other information considered relevant to the review. The Management review provides the framework within which Protected Areas will develop their Operational Management Framework (OMF) for the following year.

1.5 Operational Management Framework

The PA is required to develop and maintain an OMF or Annual Plan of Operations (APO). This Framework translates the expectations of the IMP into workable objectives or project areas in a manner that serves the management style of the respective operational sections within the GBNR. The OMF

provides an indication of required human and financial resources for each of the objectives or project areas. The development of OMF therefore serves as an important interface between the project-planning and budgeting exercises.

1.6 Strategic review

A Strategic Review of the IMP is held every five years and seeks to evaluate the effectiveness, suitability and adequacy of the IEMS, within the context of a changing PA environment. The Strategic Review differs from the Management Review in that it includes the participation of relevant stakeholders. The Strategic Review may recommend changes to Policy and Procedures. Participants may also decide to commission further Environmental Reviews (including a Legal Review) to provide information necessary for the assessment. The results of the Strategic Review provide the framework for the development of a five-year Integrated Management Plan for the following 5-year planning cycle of the PA.

1.7 Implementation

Implementation and maintenance of the IMP is the responsibility of all reserve staff. Specific procedures are developed and followed to ensure there is continuity in the implementation.

1.8 Responsibilities

General responsibilities for reserve operations are set out in the Performance Agreements and Work Plans of the reserve staff. An assessment of personal performance in respect of allocated tasks and applicable Key Performance Areas is undertaken on an annual basis for all reserve staff. This is described in the Northern Cape Provincial Administration's Performance Management and Development Policy.

1.9 Training

As part of the Performance Management and Development Policy training needs in relation to Work Plans is described in the Personal Development Plan of staff members. This system aims to ensure that reserve staff is competent to carry out allotted tasks in a manner that supports the goals of the Environmental Policy.

1.10 Communications

Communication within the reserve is regarded as a two-way dialogue, and all reserve staff are encouraged to raise issues and concerns they have regarding the operation. Effective communication is seen as imperative in creating a reserve community.

1.11 Documentation and Records

Documentation is maintained to provide management, staff, visitors and other stakeholders with an understanding of the management priorities and systems that operate within the reserve. Wherever possible, documentation is available electronically to facilitate access and avoid unnecessary paper waste. A document control system is employed to ensure documents remain relevant, up-to-date and accessible. All documentation and records form part of the SKDR of the reserve.

1.12 Monitoring

According to McGeoch et al. (2011) the measurement and monitoring of biodiversity in protected areas is generally aimed at,

- assessing and improving the efficiency and effectiveness of conservation action;
- informing management action and policy at both local and national levels;
- providing evidence of conservation success; and
- strengthening the case for conservation among policy makers, funding agencies and land owners.

In addition, biodiversity monitoring systems in protected areas are intended to provide early recognition of unforeseen changes that impact on biodiversity, and to contribute to understanding potential impacts of current and new activities on biodiversity. This data will also feed into national and international assessments of the state of biodiversity. Monitoring systems are thus necessary to both identify where

policy or management intervention may be required, and to inform and evaluate the effectiveness of any interventions.
DAERL has developed a Biodiversity Monitoring Framework that maps the way forward for biodiversity monitoring in DAERL nature reserves. The monitoring framework provides the principal motivation for the development and implementation of a Monitoring systems (BMS) for DAERL that addresses and prioritises the full range of key biodiversity concerns, conservation, and reporting commitments and obligations across reserves, taxa and environments. As such, it is intended to play a significant role in guiding investment in research, monitoring, and resulting policy and management action in nature reserves for the foreseeable future.
Two main approaches were used to guide the design and development of the DAERL BMF and to identify Biodiversity Monitoring Programmes (BMPs).
The approach that will be used to track and evaluate progress in the development and adoption of DENCs' BMS will be based on the evaluation and monitoring principles set for the PA IMP. This approach adopts a logical series of steps to measure progress with the implementation of the BMS. It ensures ongoing assessment of the effectiveness of the BMF and its implementation, and ultimately the organisation's mandate to enable informed and accountable decision-making through monitoring and analysis. As part of this process, the BMF should be regularly reviewed and evaluated, as is the case with management plans

2. CONTEXTUAL FRAMEWORK

2.1 Location and interface

The GBNR consist of two sections located 20 km apart the Rozynbosch section located 7 km north of the town Aggeneys and the Achab section located 20 km east of the town Aggeneys in the Khâi-Ma Region of the Namakwa District of Northern Cape Province.
The GBNR forms an integral part of the proposed Greater Gariep Transfrontier Conservation Area (GGTFCA) that stretches from Augrabies Falls to the Orange River Mouth (ORM) and includes sections of South Africa and Namibia (Refer section 2.3.2.2 & Figure 4).
The GBNR covers an area of 21 935.9097 ha and was declared as a Nature Reserve on 05 August 2019 in terms of section 23(1)(a), and assigned the name Gamsberg Nature Reserve in terms of section 23(1)(b) and DAERL appointed as the Management Authority in terms of section 38(2) of the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003), on the properties managed jointly as such.
The surface area of the GBNR consists of several properties as indicated in Table 3 and shown in Figure 3 and 4[3].

Table 3: Properties included in Gamsberg Nature Reserve

Farm	Size ha	Tile deed	Landowner	Declaration No.
Farm Achab 59	7982.2187	T4850/2017	Black Mountain Mining Company (Pty) Ltd	No 80/2019
Rem Vogelstruishoek 88	4287.5611	T4602/2017		
Rem Rozynbosch 41	5098.4943	T70536/2015CTN		
Port 2 Rozynbosch 41	4567.6356	T68144/2016CTN		

2.2 Legal status

The NEMPAA has as one of it's aims the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes and makes provision for the declaration of various types of protected areas. Section 9(a) provides for special nature reserves, national parks, nature reserves (including wilderness areas) and protected environments and Section 9(c) provides for Marine Protected Areas.

[3] Information according to tile deeds as at June 2020.

In terms of a Biodiversity Offset Agreement (BOA) between Black Mountain Mining (Pty) Ltd (registration number 2005/040096/07) and the provincial Department of Environment and Nature Conservation, BMM were required to secure 12 900 hectares of land containing the following characteristics:

- at least 3 700ha of land comprising Aggeneys Gravel Vygieveld, including those component habitats supporting quartz gravel communities and those that are range restricted or which support localised and endemic plant species;
- at least 3 200ha of Bushmanland Sand Inselberg Shrubland, including those habitat units supporting large succulent plants on the south facing aspects;
- at least 4 000ha of Bushmanland Arid Grassland, including those component habitats supporting calcrete gravel communities; and
- at least 2 000ha of azonal vegetation types compromising Bushmanland ephemeral river courses and outwash plains.

As a result of this agreement the (GBNR) covering an area of 21 935.9097 ha was declared as a Nature Reserve on 05 August 2019 in terms of section 23(1)(a), and assigned the name Gamsberg Nature Reserve in terms of section 23(1)(b).

GBNR consist of four properties registered in the name of the Black Mountain Mining Company (Pty) Ltd (an in the process of being transferred to the Northern Cape Provincial Government). The Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAERL) is currently the Management Authority of the GBNR.

In addition to the NEMPAA, a Reserve Management Plan must comply with other related national legislation such as the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004 (NEMBA), National Policy and International Conventions that have been signed and ratified by the South African Government. The key national, provincial and local legislation that has a direct influence on management activities are provided for in the SKDR.

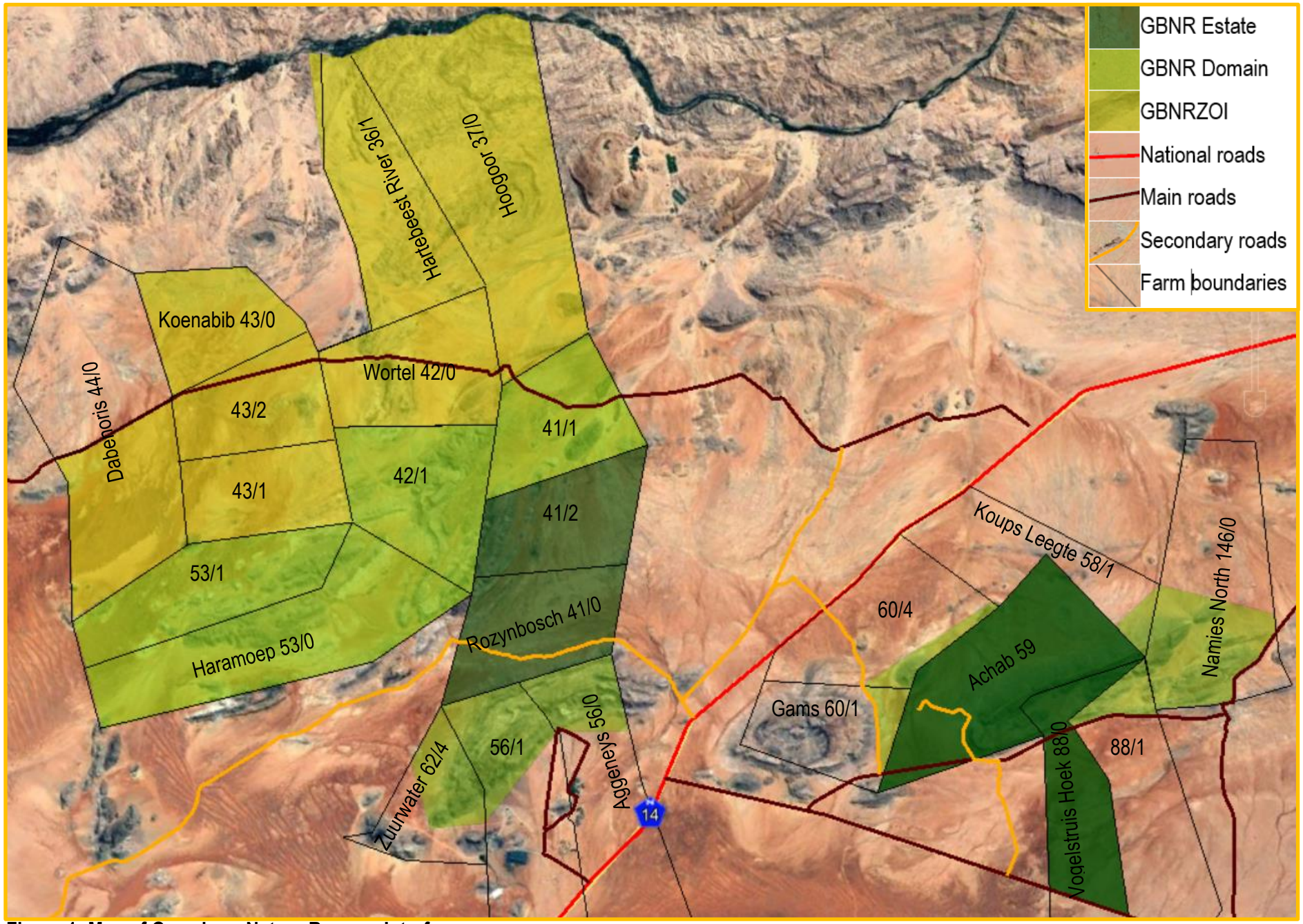


Figure 1: Map of Gamsberg Nature Reserve Interface

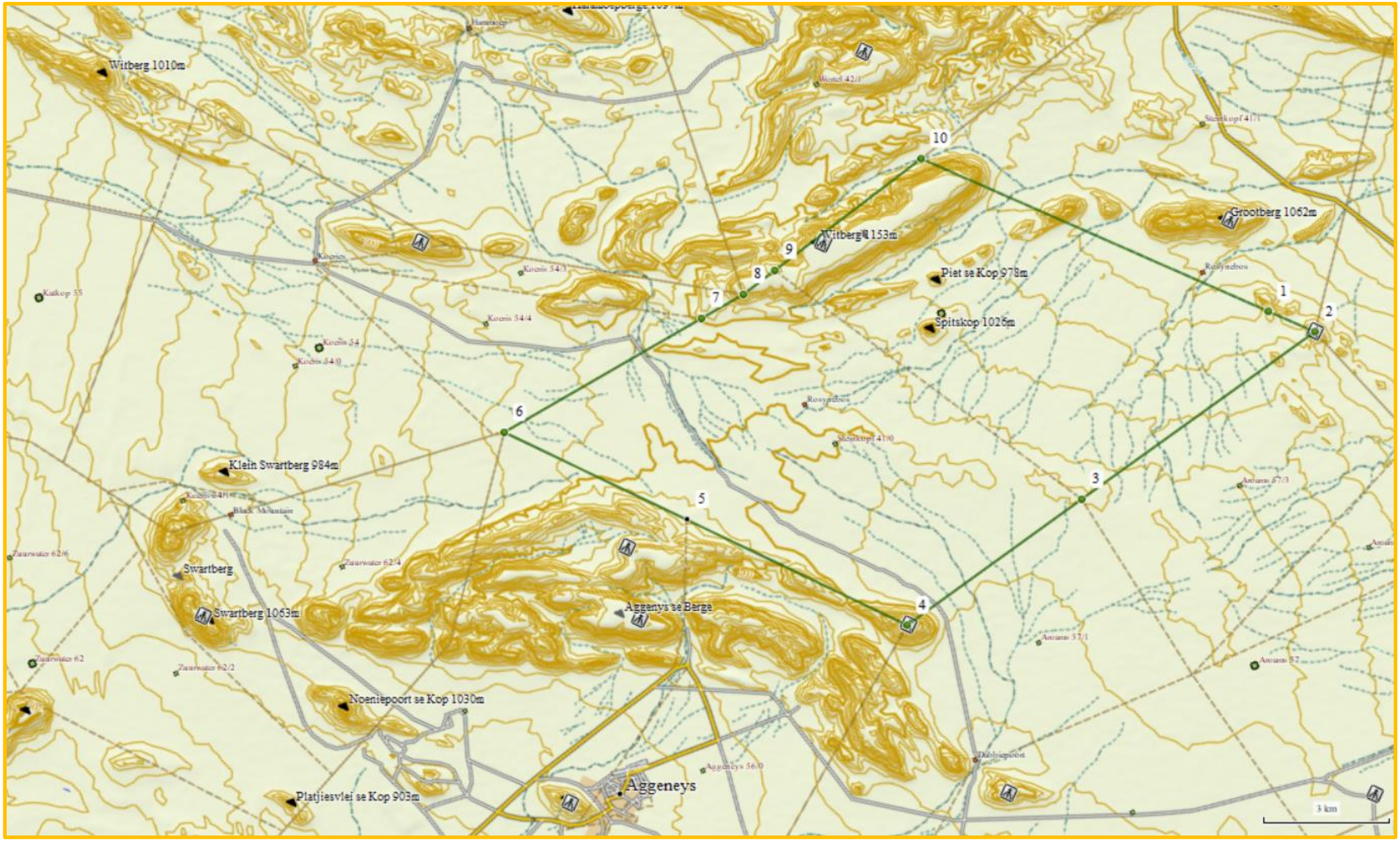


Figure 2: Map of Gamsberg Nature Reserve Estate – Rozynbosch section

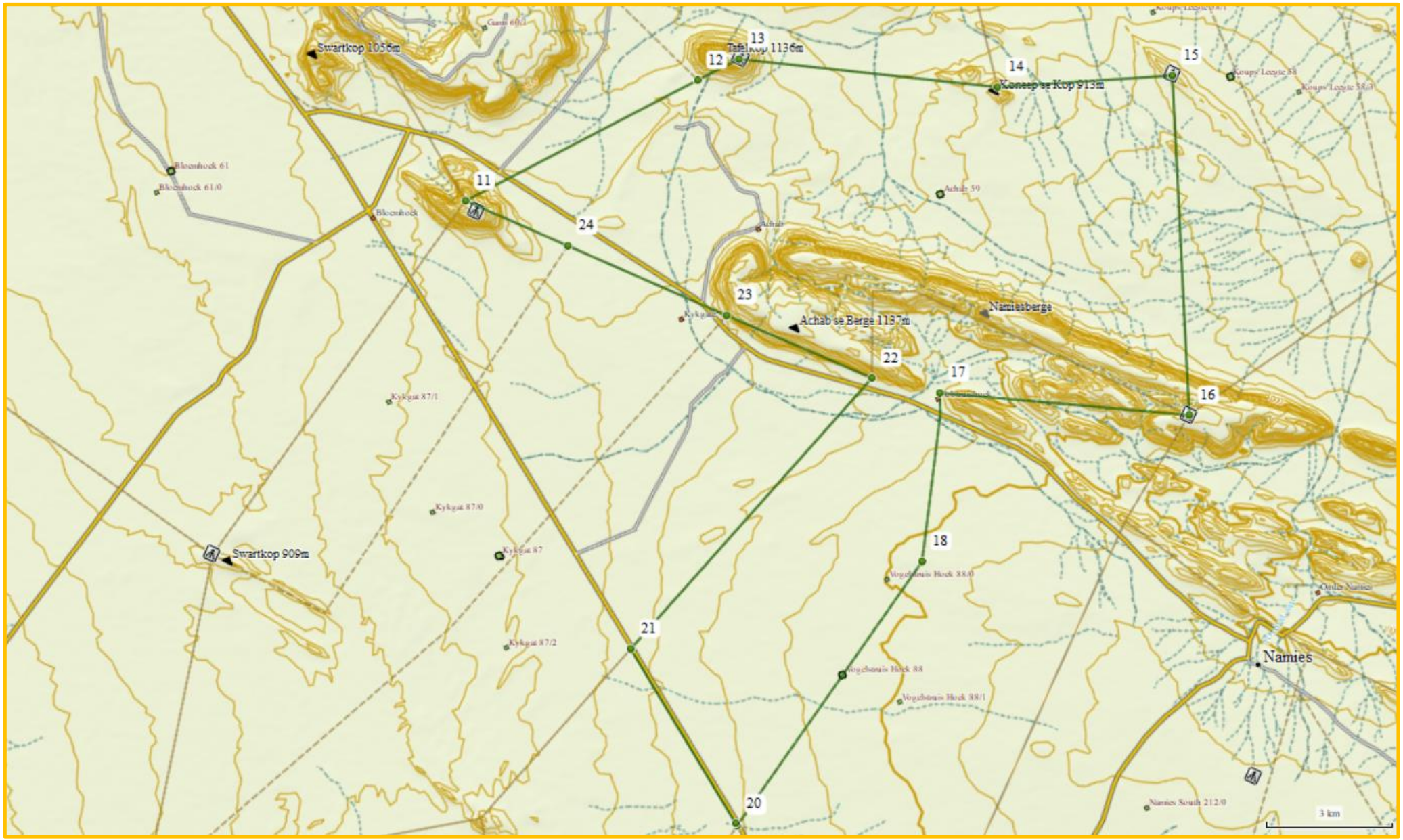


Figure 3: Map of Gamsberg Nature Reserve Estate – Achab section

Table 4: Demarcation beacon Co-ordinates[4]

Beacon No	Y	X
1	S29.08694°	E18.92809°
2	S29.08668°	E18.93953°
3	S29.14002°	E18.90792°
4	S29.18006°	E18.88435°
5	S29.17962°	E18.82912°
6	S29.17924°	E18.78345°
7	S29.13947°	E18.81283°
8	S29.13107°	E18.81909°
9	S29.12360°	E18.82321°
10	S29.08882°	E18.84241°
11	S29.28522°	E19.00484°
12	S29.24103°	E19.04073°
13	S29.23326°	E19.04716°
14	S29.21537°	E19.10262°
15	S29.19737°	E19.13725°
16	S29.26115°	E19.17325°
17	S29.27938°	E19.12015°
18	S29.31341°	E19.13267°
19	S29.38095°	E19.12020°
20	S29.38059°	E19.11969°
21	S29.35652°	E19.08151°
22	S29.28263°	E19.10486°
23	S29.28373°	E19.06917°
24	S29.28464°	E19.03006°

2.3 Institutional arrangements

2.3.1 General

In implementing the IMP, it is essential that Reserve Management understand the mandates of various role-players and the institutional framework in which decision making; implementation and monitoring will be carried out. In light of this, a brief outline of the mandates and responsibilities of the Management Authority and key supporting government departments is provided below.

The mission of the DAERL, as the current designated management authority of the GBNR, 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 goals are to conserve, value, sustainably use, protect and continually enhance environmental assets; enhance socio-economic benefits and employment creation for present and future generations from a healthy environment; and provide a department that is fully capacitated to deliver its services efficiently and effectively.

The current Strategic and Annual Performance Plan of DAERL aim at achieving 6 strategic goals for the current cycle that is reviewed in line with the Medium Strategic Framework and the Environmental Sector Strategic Plan.

[4] The co-ordinates provided were converted from cape feet and in some cases cape roots. All properties need to be re-surveyed and beacons maintained in correct position as part of KPA 3: Enforcement, Security and Access Control (Objective 3.2.2) and data provided as part of the SKDR (01 SKDR General & Logistical Data-02 Fences Beacons -02 Property description)

The Strategic goals with goal statements of DAERL include the following:

Goal 1	**Environmental Quality and Biodiversity Management**
statement	Environmental assets conserved, valued, sustainably used, protected and continually enhanced;
Goal 2	**Socio-economic benefits and Employment creation**
statement	Enhanced socio-economic benefits and employment creation for the present and future generations from a healthy environment;
Goal 3	**Cooperative Governance and Administration**
statement	A department that is fully capacitated to deliver its services efficiently and effectively;
Goal 4	**Environmental Education**
statement	Environmental education provided to stimulate critical thinking and influence decision making;
Goal 5	**Research and development support**
statement	Ensure sustainable development and utilisation of natural resources while securing representative and resilient ecosystems through scientific research, spatial planning and cooperative governance; and
Goal 6	**Compliance and Enforcement**
statement	Promote and enforce compliance with environmental legislation.

To achieve these strategic goals the Department is divided in 8 programs with their sub-programs. Protected Area Management resorts under sub subprogram 8.3.2 Conservation Agencies and Services. The strategic objective of this sub-subprogram is that "The protected area network is secured, expanded and managed to ensure that a representative sample of biodiversity and key ecological processes are conserved".

The purpose of the sub-program is implementing mechanisms for management of ecologically viable areas, conserving biodiversity; protecting species and ecosystems of specific land areas, and related conservation activities.

Also, to build a sound scientific base for the effective management of natural resources and biodiversity conservation decision making.

Conservation agencies (either external statutory bodies or provincial departments) are primarily engaged in nature conservation as well as the tourism and hospitality industry, the management of provincial nature reserves, enforcement and monitoring within their areas and as well as research, education and visitor services.

This sub sub-program currently directly manages 8 nature reserves covering a total area of 75 261.5843 ha or 3.29% of the total Northern Cape protected area estate. This total area does not include areas managed in terms of management or co-management agreements.

In addition, a range of other core government departments have important roles to play in ensuring that the GBNR is appropriately conserved and managed as set out in the sections below.

2.3.1.1 Department of Environmental Affairs

South Africa's National Department for Environment, Forestry and Fisheries (DEFF) is responsible for the overall coordination of environmental activities in South Africa and is also the custodian of all protected areas in terms of NEMPAA. It also coordinates environmental research, undertakes environmental education and ensures the implementation of environmental impact assessments, amongst other duties.

The DEFF is also tackling the critical challenge of natural resource management, environmental protection and infrastructure under the management of Environmental Programs (EP) through two divisions, namely Natural Resource Management (NRM) Programs and the Environmental Protection and Infrastructure (EPI) Programs.

Natural Resources Management (NRM) Programs address threats to the productive use of land and water, and the functioning of natural systems. These range from invasive alien species clearing programs to wild fires and land degradation.
NRM programs include the following:

- Working for Water
- Working for Wetlands
- Working on Fire
- Working on Land
- Working for Forests
- Working for Energy

Environmental Protection and Infrastructure (EPI) Programs manage the identification, planning and implementation of focal areas such as:

- Working on Waste
- Working for the Coast
- People & Parks
- Eco-Furniture Factories, a component of Working for Land,
- Greening and Open Space Management.

DEA's Chief Directorate – Transfrontier Conservation Areas is also task for the establishment and co-ordination between partners within Trans-frontier Conservation Areas.

2.3.1.2 Department of Water and Sanitation (DWS)

The DWS has the responsibility of developing tools and legislation related to water resource management; establishing appropriate institutional arrangements (CMA, other forums & advisory committees); and creating awareness and building capacity. Water resource planning, both quantity and quality, at catchment level, as well as the issuing of water use licenses and the enforcement and compliance of the provisions of the NWA also fall within the responsibilities of DWS.
It is also the responsibility of the DWS to develop legislation and policies related to water resource management, namely:

- Developing approaches, systems, tools, standards, objectives and strategies that support and promote the sustainable utilisation of water resources;
- Facilitating the implementation of catchment management and other related strategies;
- Monitoring resource quality (this includes hydrological, water quality and bio monitoring);
- Auditing the state of South Africa's water resources against set objectives;
- Constructing & maintaining water-related infrastructure; and
- Setting water quality standards for the specific Water Management Area

2.3.1.3 Department Roads and Public Works (DRPW)

The Northern Cape DRPW, in accordance with their Constitution, is responsible for Public Works functions, which relate to provincial functions and provincial state property (including State-owned Nature Reserves). The Department's mission is to provide and maintain all provincial land, buildings and road infrastructure in an integrated, sustainable manner.
The core functions of the DRPW include:

- The provision and management of immovable properties that serve as a platform for the efficient delivery of various government services;
- Rendering an expert-built environment function that involves technical planning, design and construction management; and
- Coordination of the expanded Public Works Programme.

2.3.1.4 Department Sports, Arts and Culture

Only the Western Cape, Eastern Cape and Kwa-Zulu Natal have Provincial Heritage Authorities, and consequently the national heritage authority, SAHRA administers heritage in the remaining provinces particularly where archaeology and palaeontology are the dominant concerns. Archaeology, including

rock art, graves of victims of conflict and other graves not in formal cemeteries are administered by the South African National Heritage Authority, SAHRA.
World Heritage Sites are administered by DEFF. Heritage Northern Cape (Ngwao Boswa Kapa Bokoni) a public entity established in terms of the National Heritage Resources Act is responsible for the protection, conservation, management and interpretation of the heritage resources of the Northern Cape. Amongst other things the latter administers:

- World Heritage Sites;
- Provincial Heritage Sites (except those defined as archaeological and palaeontological sites, which are administered by SAHRA);
- Heritage Areas;
- Register Sites;
- Structures older than 60 years, but younger than 100 years or structures older than 100 years and still in use; and
- Public monuments & memorials.

2.3.1.5 Department: Cooperative Governance, Human Settlements and Traditional Affairs (CoGHSTA)

The mission of the Northern Cape Department of CoGHSTA 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 intersphere engagement for integrated planning and coordination;
- facilitate, develop and support systems and structures to enhance traditional leadership; and
- ensure the efficient, effective and economic utilisation of departmental resources to maximise service.

2.3.1.6 Department of Rural Development and Land Reform

The Spatial Planning and Land Use Management Branch of the department are to:

- Develop policy and standards, provide support and monitor implementation of SPLUM legislation and capacitate planning institutions;
- Provide spatial planning information and environmental planning services;
- Provide integrated spatial planning support;
- Manage projects at Branch level;
- Provide programme management support; and
- Provide service delivery coordination services.

This branch through the local municipality will be responsible for the implementation of the Northern Cape Spatial Planning and Land Use Management Act, 2013 (Act No. 16 of 2013). This act provides for the spatial planning, land use management and development of land in the Northern Cape Province in a sustainable manner, by means of the coordination and alignment of land use, land development policies, plans and systems of all spheres of government through the development of a single spatial structuring system, which ensures that sustainable development is developmental, consistent, uniform, transparent and inclusive in nature.
The function of the Land Redistribution and Development Branch of the department is to:

- Provide land acquisition and strategic institutional partnerships;
- Provide PLAS trading account's financial management services;
- Develop and provide strategic support to farmers and cooperatives;
- Provide land reform programme support and service delivery coordination; and
- Provide land acquisition and recapitalisation & development services at regional and district level.

2.3.1.7 Department of Transport, Safety and Liaison

The mission of the Northern Cape Department of Transport, Safety and Liaison 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 partnerships;
- 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; and
- provision of an integrated transport system and operation for goods and people.

2.3.2 Institutional Arrangements Specifically Relevant to GBNR

2.3.2.1 Local Community, NGO's and Private Landowners

All properties included in the GBNR is private land and no communal land is included in the reserve at this stage although several of the surrounding properties and some of the properties included in the zone of influence are communal land.

Stakeholder consultation and support is an important aspect of effective protected area management. It is also a requirement in terms of Sections 39(3) and 41(2)(e) of the NEMPAA. Accordingly, the development of this 5-year IMP has been undertaken through a collaborative process involving local communities and other key stakeholders. Stakeholder engagement has furthermore also been set as a Key Performance Area in this 5-Year IMP: Strategic Implementation Framework: KPA 5 - Stakeholder Involvement.

To give effect to the objectives of the NEMPAA section 2(f) to promote participation of local communities in the management of protected areas, where appropriate, and Section 41(2)(e) that states a management plan must contain procedures for public participation, including participation by the land owner, any local community or other interested party. GBNR will be establishing a Protected Area Advisory Committee (PAAC).

A PAAC provides the means for a legitimate platform through which to communicate Nature Reserve and Protected Environment issues to ensure participation of all stakeholders on matters of mutual relevance affecting the Reserve. It is expected that the PAAC will facilitate a constructive interaction between the Reserve and the surrounding communities / stakeholders. PAACs are established to encourage the building of constituencies in support of the natural and cultural heritage conservation goals of the Northern Cape. PAAC's are not decision-making institutions, but are crucial for adherence to Batho Pele Principles.

2.3.2.2 Linkages with Greater Gariep Transfrontier Conservation Area

Guided by the principles underlying the SADC Protocols on Transfrontier conservation and wildlife management, several Transfrontier Parks and TFCAs have been established, including the /Ai-/Ais-Richtersveld Transfrontier Park (ARTP) to which Namibia and South Africa are signatories.

As a major dynamic conservation initiative, the establishment of Transfrontier Conservation Areas (TFCAs) is currently being implemented across the southern African region.

This initiative, which constitutes some of the most ambitious conservation projects in the world today, has been hailed as a step in the right direction for Africa's eco-tourism development. These projects aim to establish large conservation and wildlife areas not only through the integration of vast landscapes and re-connecting ecological systems, but also through development of cross-border tourism linkages, ensuring sustainable benefits to local communities through socio-economic upliftment.

The establishment of TFCAs is an exemplary process of partnerships between governments, NGOs, communities and the private sector. While the main players are the relevant governments and implementing agencies, donors and NGOs also greatly contribute towards these initiatives. TFCAs in South Africa are facilitated by the DEFF and the Ministry of Environment and Tourism (MET) in Namibia. In a 2002 inventory on potential TFCAs in the SADC region, two areas along LOR were identified, namely the /Ai-/Ais-Richtersveld option and that of the Gariep region near Onseepkans. The former option, in being supported by existing protected areas, has triggered TFCA action and on 1 August 2003 the Heads

of State of the two partner countries (South Africa and Namibia) signed a Treaty to form a TFCA. The /Ai-/Ais-Richtersveld Transfrontier Park (ARTP) was established and a Joint Management Board (JMB) consisting of representatives from Namibia and South Africa constituted.

Within the ambit of the ARTP, Namibia and South Africa are investigating the possibility of establishing a TFCA, with the focus in both countries falling within the LOR eco-region, encompassing large portions of the Desert, Nama- and Succulent Karoo Biomes, and most of the Nama cultural landscape along the Orange River.

Numerous opportunities exist to create new or expand on the existing Transfrontier conservation initiatives to include the ARTP, Sperrgebiet, Richtersveld WHS, GFRCC, GBNR with the Namibian state land, Bushmanland Bio-region with the Sandfontein farm, Oranjevalle and the Augrabies cluster including the Riemvasmaak area (Figure 4).

This TFCA initiative will help to address the need to plan for the maintenance of landscape-level connectivity via a biodiversity corridor network aligned along major environmental gradients as identified by the National Spatial Biodiversity Assessment (NSBA). The need to plan for landscape level biodiversity corridors is important as this is a key component of the country's adaptation strategy to dealing with the effects of climate change. The GBNR will play a major role in acting as a landscape level biodiversity corridor linking the Succulent Karoo Biome, Desert Biome and Nama-Karoo Biome. The area is also a transition between winter and summer rainfall and therefore a species rich ecotone.

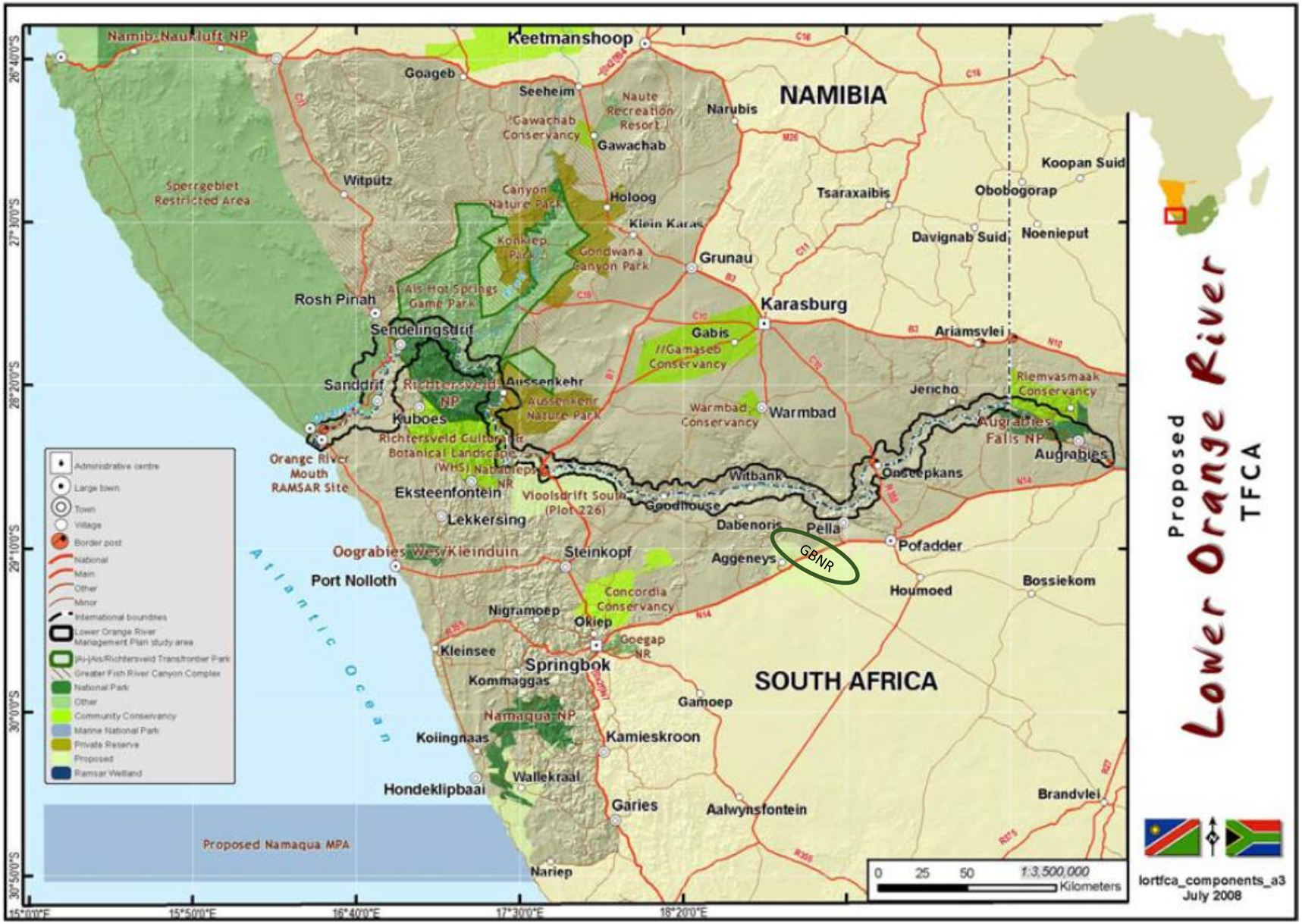


Figure 4: Regional location of the GBNR in relation to Greater Gariep TFCA (LORTFCA)

2.3.2.3 Linkages with Important Bird Areas

The GBNR form part of the Haramoep and Black Mountain Mine IBA (Number: ZA 026 Global IBA A1, A2, A3). The IBA is situated 12 km north-west of Aggeneys, the farm Haramoep (29°07'S 18°40'E; 14,745 ha) forms the central portion of the site. The remainder is formed by neighbouring farms: Dabenoris, Koeries Wes, Koeries Oos, Katkop and the adjoining Goldfields-owned private nature reserves, Black Mountain Mine and the farm Aggeneys. The area consists of extensive sandy and gravel-plains holding perennial desert grassland and shrubs scattered between bare sand patches.

This is one of few sites that protect both the globally threatened, *Certhilauda burra* (Red lark) (700–900 pairs), which inhabits the red sand-dunes, and the near-threatened, *Spizocorys sclateri* (Sclater's lark) (up to 500 individuals), which occurs sporadically on the barren stony plains. This site also holds most of the species restricted to the Namib–Karoo biome and a host of other arid-zone birds.

Some large trees hold the communal nests of *Philetairus socius* (Sociable weaver) with the associated *Polihierax semitorquatus* (Pygmy falcon) in attendance. The newly recognized *Certhilauda subcoronata* (Karoo long-billed lark) occurs at the site.

2.4 Reserve description

2.4.1 History

The conservation value of the area was recognized as early as the late nineteen century when the Bushmanland Conservation Initiative (BCI) project was initiated by Succulent Karoo Ecosystem Programme (SKEP). The objective of the BCI was to establish a multi-owned protected area through a variety of innovative interventions and mechanisms that draw in local landowners. The protected area will achieve the SKEP conservation targets for this geographic priority area (60,000 hectares), and will be nested within a multi-use landscape. The area was the only priority conservation area identified in the Critical Ecosystems Program Fund (CEPF) and supported by SKEP that had no land under formal conservation status.

In 1999 Anglo American plc's Base Metals division proposed opening the Gamsberg Zinc Project in Bushmanland, a large open pit mine on the Gamsberg quartzite inselberg in a SKEP conservation priority area. In 2000 the Botanical Society of South Africa (BotSoc) approached Anglo Base Metals to discuss the implications of this mining project on conservation initiatives in the region. The discussion, initiated by BotSoc, was intended to minimize potential damage to the biodiversity value of the Gamsberg, and to assess what opportunities could be realized for conservation efforts in the region. The first version of the environmental and social impact assessment (ESIA) of the proposed Gamsberg Zinc Project was underway by this stage. Following the initiation of contact in 2000, BotSoc proposed to Anglo Base Metals that they set aside for conservation the land on their Gamsberg property not required for the development of the mine and associated infrastructure. By doing so this land would contribute towards the regional conservation initiative being funded by CEPF. BotSoc simultaneously engaged the CEO of Anglo Base Metals and participated in the ESIA process in a technical capacity (flora and fauna surveys) to guide the mine design to minimize its impact on the unique biodiversity of the site. BotSoc engaged Anglo Base Metals over a seven-year period. Although the initial interaction commenced in June 2000, a more formal collaboration was established only three years later, in August 2003, with the issuing of a formal letter from Simon R. Thompson (CEO of Anglo Base Metals at the time) officially stating the company's support for the Bushmanland Conservation Initiative (BCI).

Vedanta Resources purchased Black Mountain Mine and the associated rights in 2011 with a view to pursuing the Gamsberg Zinc resources. After the initial approach, the provincial competent authority (The Department of Environment and Nature Conservation - DAERL) informed Vedanta that due to the sensitivity of the site, (established in the previous EIA), it was likely that a biodiversity offset commitment would need to be investigated in parallel to the ESIA process.

Vedanta approached Dr Philip Desmet and Mark Botha to assist with developing a turn-key proposal for a biodiversity offset that lead to a Biodiversity offset agreement between Black Mountain Mining (Pty) Ltd (registration number 2005/040096/07) and the provincial Department of Environment and Nature

Conservation, Northern Cape Province. In terms of clause 6.1.2 of the biodiversity offset agreement (BOA) BMM has to secure four (4) of the Nearby Properties listed in section 2.1 covering an area of 21 935.9097 ha that is more than the 12 900 ha required in terms of the agreement, but habitat representivity is key.

These properties (or portions thereof, as the case may be) were made available to DAERL for declaration by the MEC as Protected Areas; and the Gamsberg Nature Reserve (GBNR) was declared as a Nature Reserve on 05 August 2019 in terms of section 23(1)(a), and assigned the name Gamsberg Nature Reserve in terms of section 23(1)(b) and DAERL was appointed as the Management Authority in terms of section 38(2) of the NEMPAA, on the properties managed jointly as such.

2.4.2 Climate

The area is one of the hottest and driest areas in South Africa with desert and semi-arid conditions. The area receives both summer and winter rainfall with an average of 103 mm/annum, with a rainfall gradient from north to south. There appears to be an orographic control on the rainfall distribution with the mountainous areas receiving higher rainfall, around 110 – 145 mm MAP.

Precipitation occurs throughout the year, but Figure 5 shows significantly higher rainfall is experienced in summer and February is regarded as the wettest month, likely to be dominated by afternoon thunderstorms.

The climate is further affected by intense summer “berg” (mountain) winds which originate from the east being drawn towards low pressure cells in the Atlantic. The area experiences extreme climate conditions with temperature fluctuate often over short periods of time between hot and cold with an annual range of -2 degrees Celsius in winter and maximums exceeding 40°C in the summer months (Figure 6). Temperature regimes are varied throughout the area from low-lying points along the Orange River to high, exposed mountain peaks in the interior. These climatic factors are added to by wide variations in elevation ranging to as high as 1200 meters.

The CSIR created a detailed new Köppen-Geiger map to quantify the current climatic conditions as accurately as possible in South Africa. This classification uses a combination of a maximum of three alphabetic characters that describe the main climatic category, amount of precipitation and temperature characteristics. GBNR is located in the climatic category BWh (Arid, Desert, Hot arid).

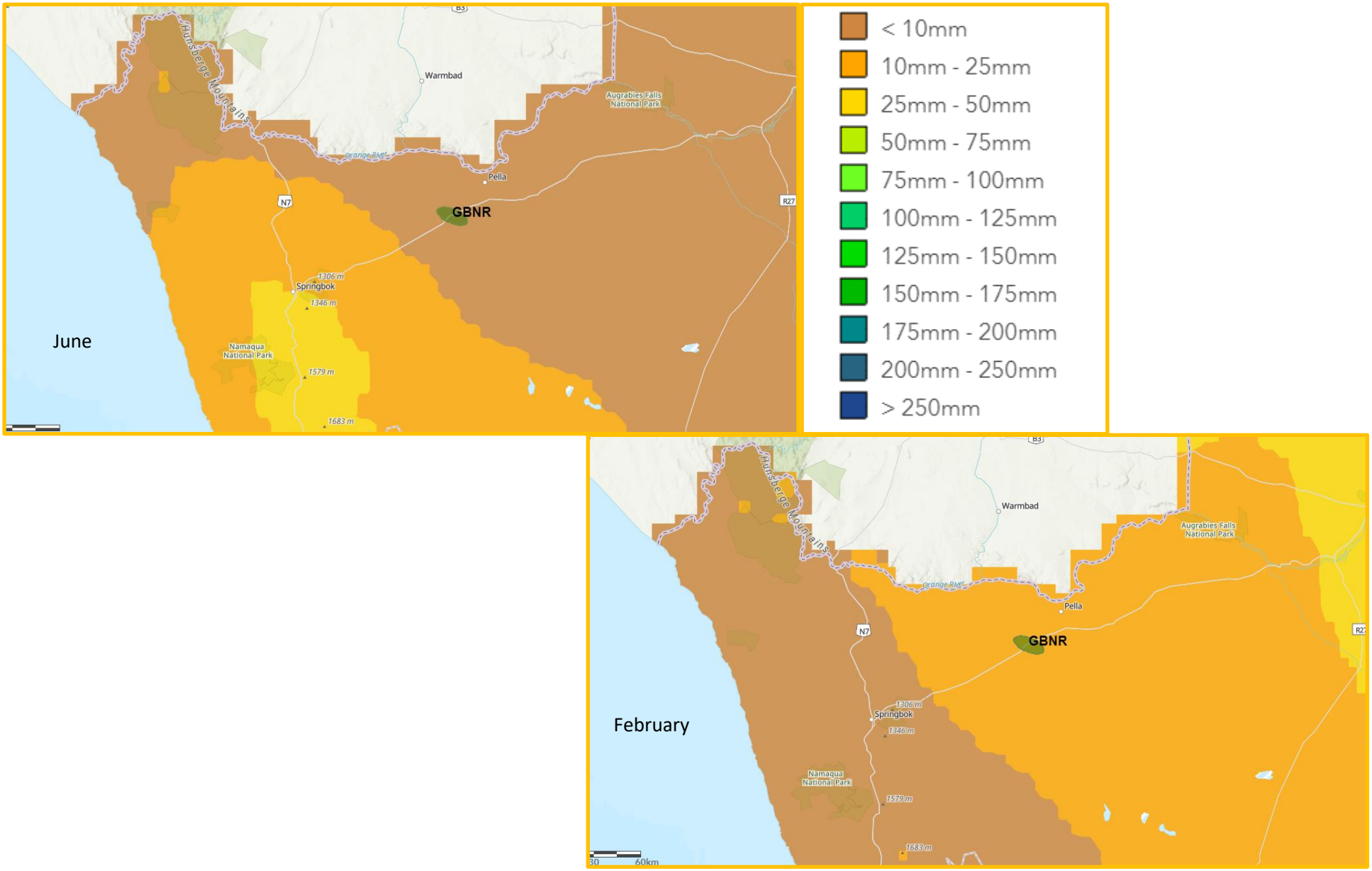


Figure 5: Long Term Rainfall Comparison
Comparison of mean long-term (a) winter rainfall (June) and (b) summer rainfall (February) in the GBNR (www.agis.agric.za)

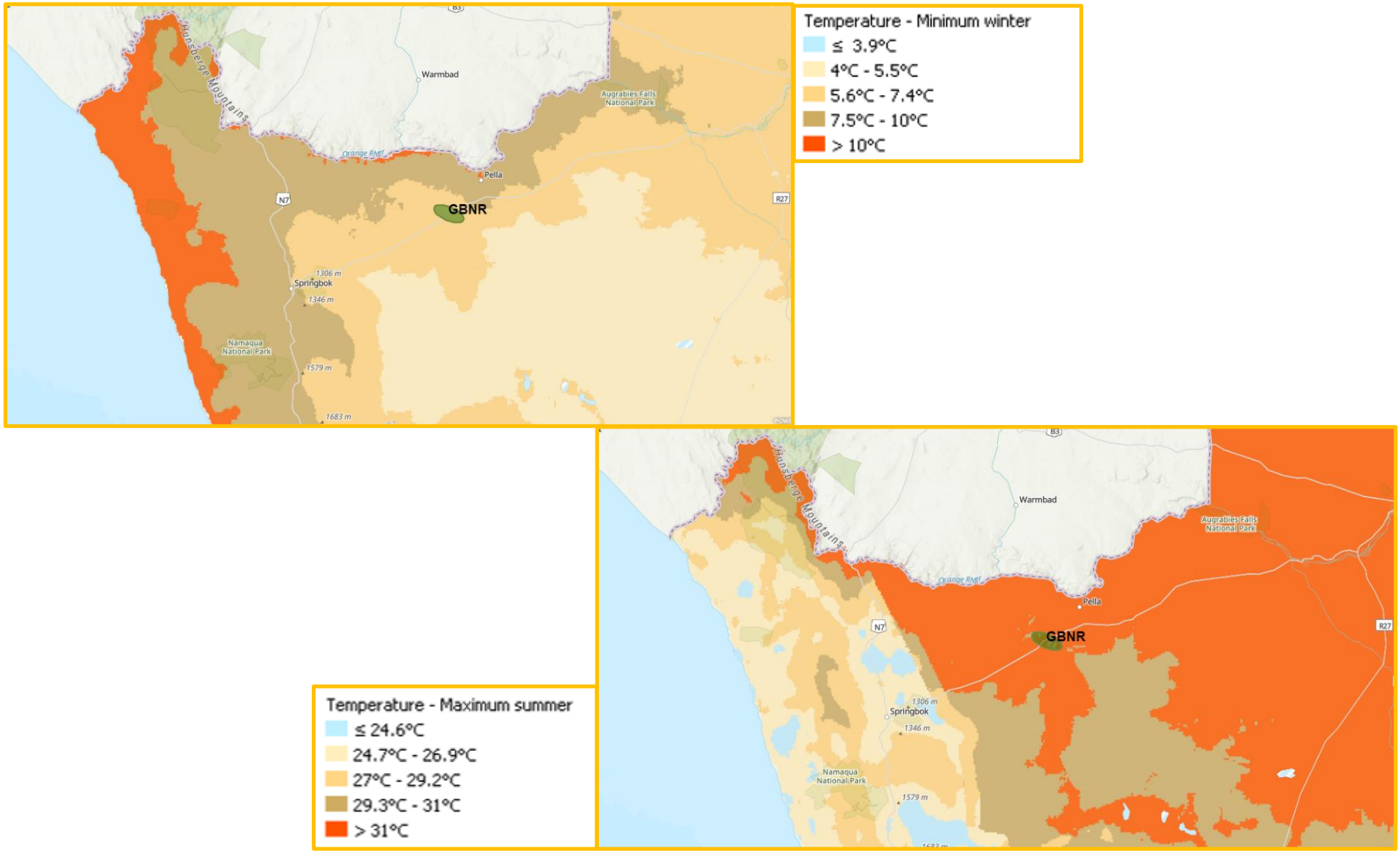


Figure 6: Temperature Comparison
Mean long-term (a) minimum winter temperatures and (b) maximum winter temperatures (www.agis.agric.za, 20 December 2007).

2.4.2.1 Climate change

The Namakwa District Municipality IDP/Budget (2012) recognize that the Northern Cape specifically will be affected very adversely by climate change. Already the effects are evident in the shift of habitat to higher and more southern latitudes; marine life along the coast is changing, and large numbers of the Namaqualand flowers are endangered. It also stressed that eco-systems-based adaptation approaches, using nature and biodiversity to help people cope with and respond to the negative impacts of climate change, will have an important role to play in the Namakwa District. Studies of the impacts of climate change on the Richtersveld flora are being carried out. Particularly, the Aloidendron dichotomum (Quiver tree) and Aloidendron pillansii (Giant quiver tree) are considered under threat from global warming. Several areas where A. dichotomum were formerly abundant are now devoid of young plants, leading scientists to believe that the rise in temperature and the resultant effect on changes in rainfall patterns are preventing young plants from surviving.

Protected areas play a vital role in contributing to climate change mitigation and adaptation, both on global and local scales.

As the climate changes, so the climate zones that are suitable for individual species will shift, and the species will either adapt over time through selection, or the species will shift its geographic range, or will go locally extinct.

Bomhard and Midgley (2005) summarizes the potential climate change impacts on biodiversity as follows:

- Species distributions
  - Individualistic species responses in latitudinal and altitudinal directions;
  - Individualistic species responses to warmer/cooler and drier/moister conditions;
  - Geographic variation in the magnitude of species responses to the changing conditions;
  - Species range shifts/losses due to range expansions, contractions and eliminations;
  - Species range shifts relative to reserve boundaries: net loss/gain of species in reserves;
  - Local, regional and global extinctions of species due to the changing conditions; and
  - Spread of invasive alien species and/or pathogens and parasites.
- Community composition and configuration
  - Changes in presence/absence and relative/absolute abundance (evenness/richness); and
  - Formation of non-analogue communities (new species assemblages)
- Ecosystem functioning, services and states
  - Changes in phenology (the timing of events such as flowering);
  - Changes in nutrient cycling and natural resource supply (e.g., water);
  - Changes in predator-prey, parasite-host, plant- pollinator and plant-disperser relationships pollination and soil stabilization; and
  - Ecosystem switches following changes in ecosystem functioning and disturbance regimes.
- Disturbance regimes
  - Changes in the intensity, frequency and seasonality of periodic and extreme events such as fires, floods, droughts and other extreme weather events
  - Changes in human land use pressures (global change synergies)

2.4.3 Topography

Despite being perceived as a flat landscape, the area is characterized by vast altitudinal variation. The highest peak in the northern section is Witberg at 1153.9 m. The highest mountain ranges are in the southern section of the reserve with Gams East peak (south-western corner of the GBNR) at 1138.3m and part of the Ghaamsberg range and Namies peak (south-eastern corner of the GBNR) at 1164 m part of the Namiesberg range, rising nearly 250 m above the plains which lies between 800 and 900 m above sea level (Figure 7).

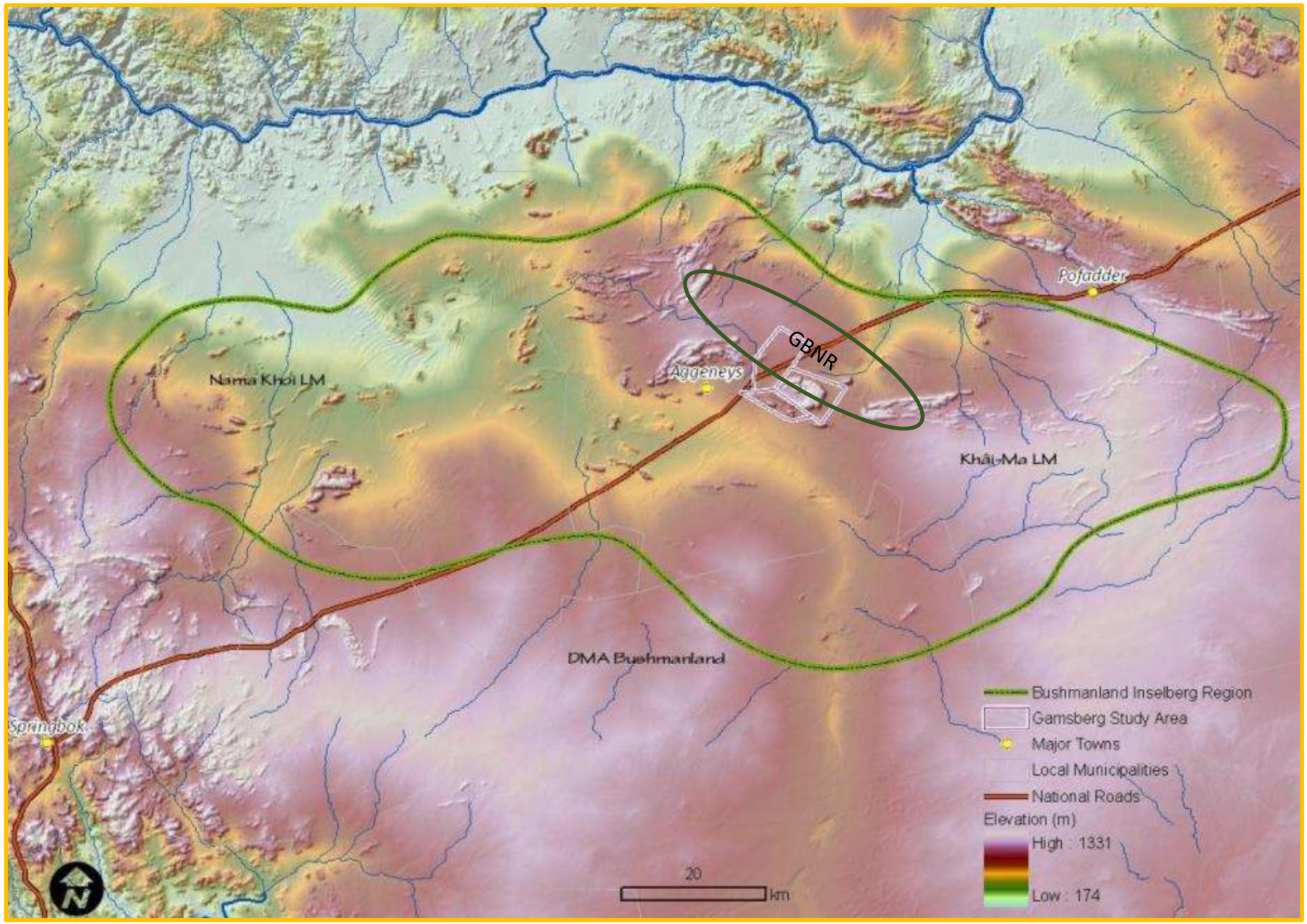


Figure 7: Digital Terrain Model Map

2.4.4 Geology and Soils

2.4.4.1 Regional Geology

The rocks in the Northern Cape (Namaqua Province) are subdivided into several tectonically bound terrains. The Bushmanland Terrane is a large supra-crustal block, the volcano-sedimentary rocks of which have been subjected to multiple phases of deformation and medium- to high-grade metamorphism. The Bushmanland Terrane is composed of basement granitic rocks (1 700-2 050 Ma), supracrustal sequences of sedimentary and volcanic origin (1 200, 1 600 & 1 900 Ma) and intrusive charnokite to granitic rocks (950, 1 030-1 060 & 1 200 Ma) (Cornell et al., 2006).

The Aggeneys copper-lead-zinc-silver deposits occur in the Precambrian metavolcanic metasedimentary Bushmanland Group which forms part of the Namaqualand Metamorphic Complex. The Bushmanland Basin occupies an area measuring around 18,000 km^2 in the western half of the Namaqualand-Natal Mobile Belt.

The GBNR is situated in the northern part of the Bushmanland Plateau where inselbergs and ridges of bedrock granites, gneisses and metamorphic rocks project steeply above the sandy plains. These are rocks of the Namaqua Metamorphic Province and the specific strata comprising Gamsberg belong to the Aggeneys Subgroup of the Bushmanland Group. The Aggeneys Subgroup is a meta-volcano sedimentary succession that overlies ~1800 Ma gneiss of the Gladkop Suite (Figure 8).

The age of the Bushmanland Group is between 1640 and 1200 Ma when it was deposited in a setting similar to that of the present-day Red Sea where active geothermal venting is depositing base metals in clayey muds accumulating in depressions on the sea floor (Bailie et al, 2007). Subsequently the sediments and volcanic exhalative were metamorphosed and deformed.

Between the inselbergs is a buried bedrock topography of ancient drainages that are now filled with a variety of deposits. These include fluvial gravels and sands, local lacustrine and pan deposits, alluvial fan deposits, colluvial deposits and aeolian sands. Within these deposits are palaeosols marking palaeosurfaces of longer duration when pedocretes such as calcrete formed in the soil profile. Boreholes in these palaeovalleys reveal thicknesses of sand and grit up to ~140 m (Rogers, 1915).

The most prominent palaeovalley is that of the Koa River, a broad fossil river course marked by red dunes and a series of pans. The Koa Valley curves to the northwest where it passes south of the Gamsberg and is truncated by the rugged flank of the deeper Orange River valley near Henkries. The Koa River was either a major tributary of the Proto-Orange River or was the course of the actual Orange River when it took a southerly route to the Atlantic (De Wit et al, 2000). The basal fluvial deposits are fossiliferous.

2.4.4.2 Local Geology

Three data sets from various authors (Council for Geoscience, Strydom, et al., 1987, Colliston, et al., 1986) are used to summarise important features. Based on different level of detail of geological mapping, and different geological interpretations, these data sets show slightly different distributions of various units, slightly different traces of various faults, and slightly different sub-divisions of the stratigraphy. The important features for this study are summarised as:

- The plains consist of various depths of surficial, relatively thin cover of wind-blown sand, dunes, scree rubble, sandy soil and alluvium (SRK, 2010). Underlying this in the vicinity of the inselberg is the Haramoep Gneiss Member of the Koeipoort (Gneiss) Formation, which is a pink medium to fine grained, biotite-rich, leucogneiss. The gneiss can be considered the basement rocks in the region.
- The Namies Schist Member of the Wortel (Witputs) Formation overlies the Haramoep Gneiss. It is a pelitic schist around 70 m thick. The schist is clearly visible in the walls of Ghaamsberg, and the base of the schist forms a bowl shape.
- Overlying the Koeipoort Formation, is the Pella Quartzite Member of the Wortel (Witputs) Formation, reported as a layered sequence of medium to thick bedded quartzite with interbedded sillimanite, lenticular quartzite, biotite gneiss and amphibolite/calc-sillicate gneiss (SRK, 2010). Outcrops of the Pella Quartzite in Gamsberg inselberg suggest the interbedded units are minor, and the massive fractured quartzite dominates. The unit reaches a maximum stratigtraphic thickness of 375m.

- The Gamsberg Iron Formation overlies the Pella Quartzite, and is a sequence of schist, quartzite, banded iron formation, and the ore body, which is the target of the mining operations in the region.
- The Koeris Formation (schists and amphibolite) overlies the Gamsberg Iron Formation.

2.4.4.3 Structural Geology

The Bushmansland Terrain shows multi-phase metamorphic and tectonic events, four of which have been identified in the Aggenys – Gamsberg area, and are summarised by SRK (2010). The key structural information relevant to GBNR can be summarised as:

- The main deformation events resulted in the development of the Ghaamsberg – a large east trending inclined basin structure with overfolded beds within it, allowing for a doubling up of the thickness of the Pella Quartzite and the Gamsberg Iron Formation.
- The main deformation events also resulted in the large east- west trending thrust faults at Broken Hill, Aggenys se Berg, and also within Ghaamsberg.
- In addition to the larger scale faulting, the multiple phases of deformation have resulted in an extremely folded and fractured environment, evident in the exposed quartzite in the "Inkruip kloof".

2.4.4.4 Land types and Soils

The soil on the plains is predominantly shallow (less than 60cm deep), and stony, overlying dorbank (duripan) or calcrete. Areas of deeper red sandy soils are limited to small dunes and sand movement corridors. On the inselbergs the soils are shallow lithosols, and bare rock on the scarps and crest and shallow gravelly on the Plato's.

The superficial deposits that form the surface of the plains are mapped as Quaternary to Recent Units Q-s2 and Q-s1 (Figure 8). A brief description of the land types and accompanying soil/rock complexes are provided below:

- Q-s2 - comprised of coversands and soils, ephemeral stream deposits and colluvial deposits.
- Q-s1 is the red aeolian dunes and may be regarded as the western equivalent of the Gordonia Formation of the Kalahari Group deposits of the interior. Fluvial deposits occur along the larger watercourses.
- Nsm - Swartmodder Gneiss, Biotite-hornblende augen gneiss.
- Kkoe - Koeris Formation, Psammitic schist, conglomerate, amphibolite, quartzite.
- Kga - Gams Member, Sulphide-bearing magnetitegmnente-gamet-pyroxene rocks, cordierite fels, sillimarute schist, quartzite.
- Kht- Hotson Formation, Rhythmically layered quartzite, quartz-feldspar-biobte gneiss ± sillimarute nodules, quartz-biotiltesillimarute schist.
- Kwr - Wortel Formation, Sequence of medium- to thickbedded white quartzite with pelitic schist and interbedded sillimanite bodies.
- Kbk – Brulkolk Formation, Pegmatite-bearing quart -feldspar gneiss, calc-silicate rocks with lenses of schist, marble, conglomerate and amphibolite.
- Kkop - Koeipoort Gneiss Medium- to coarse-grained leucogneiss in places biotite- and augen-rich.

2.4.4.5 Soil Erosion

In terms of the United Nations Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification, particularly in Africa (UNCCD), to which South Africa is signatory, land degradation refers to the reduction or loss of biological or economic productivity of agricultural lands, woodlands, and forests that result mainly from human activities. Desertification refers to land degradation in drylands that result from both climatic variability and human activities. Desertification occurs when several degraded patches of land expand and join to form large, unproductive areas. Thus, desertification occurs over a larger scale than land degradation and results in the 'permanent' loss of productivity and supply of ecosystem services (DEA, 2006).

Soil degradation in the form of sheet and gully erosion is most severe (and generally perceived to be occurring at an increasing rate) in most communal grazing lands, and settlements in South Africa. Relative to overall global conditions, South Africa has more widespread and serious physical soil

degradation, in the form of crusting (surface sealing) and soil compaction. Crusting is becoming an increasing problem in overgrazed, bare patches (Hoffman et al. 1999). This is clearly evident in the communal land surrounding the GBNR.
direction towards the Orange River some 35km from the GBNR. The D82C catchment is endorheic; an interior drainage basin that does not drain to the sea and equilibrates through evaporation.
The Gariep-Koa River Watershed marks the highest point in the Bushmanland. Most of the Inselbergs make up this SE-NW watershed. A number of drainage basins exist to the north and south of this watershed. Maintaining the integrity of these drainages is essential as they play an important role in the structure and dynamics of specific habitats and populations.
Because of the climate, the drainage features in the region are all ephemeral. Overland flow and ground water levels for this area indicate that the area fall in the catchment (head waters), but very little water reaches the low-lying areas. There is however evidence of historic high flow events that occurred in past decades.

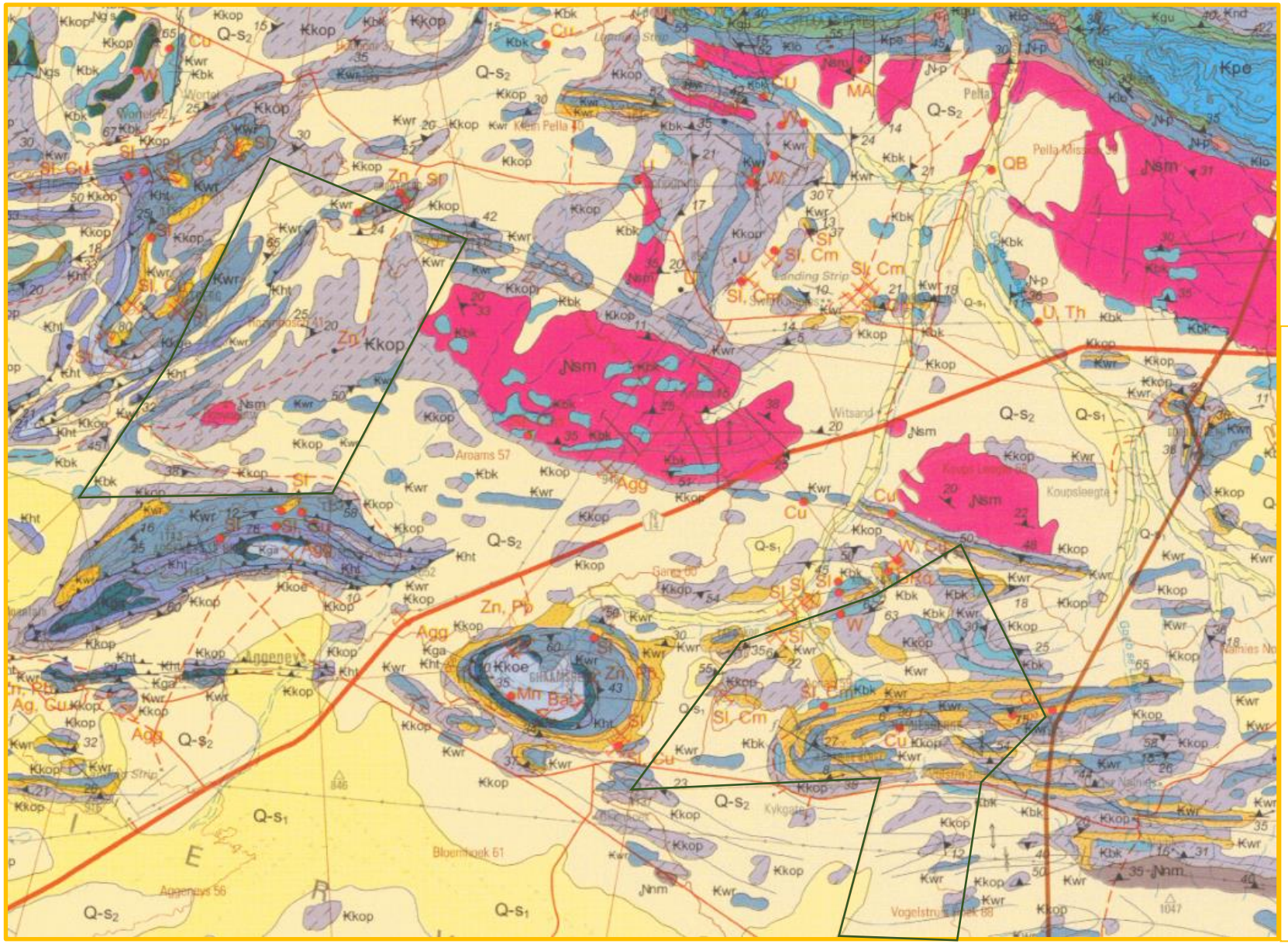


Figure 8: Geological Map for the Gamsberg Nature Reserve
(Extract from Sheet 1: 250 000 Geological Series 2918 Pofadder (Council for Geoscience, 2007)

2.4.5 Wetlands and other Aquatic Ecosystems

The Water Research Commission and the South African National Biodiversity Institute (SANBI) commissioned the development of a National Wetland Classification System for the South African National Wetland Inventory, to encompass the broad suite of 'wetlands' as defined by the Ramsar Convention (Ollis et al. 2013; SANBI 2013). The new Classification System for Wetlands and other Aquatic Ecosystems in South Africa' was develop to avoid confusion around the term 'wetland', which is defined differently by the Ramsar Convention and the National Water Act, 1998 (Act No. 36 of 1998) (NWA). According to the classification system distinction is made between seven Hydrogeomorphic (HGM) units namely Floodplain wetlands, Un-channelled valley-bottom wetlands, Wetland flats, Channelled valley-bottom wetlands, Depressions, Seeps and Rivers. Looking at the criteria of these units it is possible that at least three units may be present on GBNR (Figure 9).[5]

2.4.5.1 Groundwater

Because of the limited thickness of the alluvial cover and the hard rock nature of all other rocks in the area, no regional-scale aquifers transmitting water over large scales have developed in the Namaqualand Metamorphic Complex (Vegter, 2006). Primary weathered zone aquifers are rare and localised because soils are thinly developed. Groundwater occurs mainly in secondary fractured-rock aquifers. Groundwater tends to be concentrated preferentially along fractures within hydraulically isolated rocks of low permeability, which dominate the surrounding plains (DWAF, 1996).

Vegter (2006) assessed the properties of 115 boreholes drilled across a larger region including GBNR. Key observations on the data can be summarised as:

- Out of 115 boreholes, the depths ranged from 10 – 152 m. The median depth was 68 m.
- Forty-one boreholes (36%) yielded greater than 0.1 l/s, 8 boreholes (7%) yielded greater than 1 l/s, one borehole (<1%) yielded greater than 10 l/s.
- Water levels ranged from 2 to 72 mbgl, with the median depth at 20 mbgl.
- The distribution of water strikes with depth shows a large range from 10 to 113 m, and shows a fairly flat distribution over depth (i.e., no decrease in water strikes with depth). Boreholes even above 90 m, and boreholes at 110 – 114m, also encountered water strikes, indicating open water bearing fractures at depth.

Private boreholes are used for either domestic or livestock watering, and are equipped with wind pumps. The average borehole abstraction rate is 1 160 m³/a, or 0.04 l/s. The 3 springs in the area are recorded as being utilised for abstraction, and their abstraction rates range from 3 154 to 15 768 m³/a, or 0.1 to 0.5 l/s. The total groundwater abstracted from boreholes and springs in the area is ± 54 000 m³/a.

Water level measurements in 2000 indicate that the piezometric water levels in the fractured aquifer system have dropped significantly in the Broken Hill area since mining has started.

The typical background groundwater quality was found to have average SO_4 concentrations of below 1000 mg/l, Cl values of below 1500 mg/l and fluoride up to 3 mg/l.

2.4.5.2 Surface water

The Orange River catchment is divided in two water management areas that is the Upper Orange and the Lower Orange Water Management Areas. The Lower Orange area (between Douglas and Alexander Bay) is the lowest Water Management Area in the Orange/Vaal River Basin (Catchments) and as such is affected by upstream activities in the Orange River and the Vaal River.

Situated in the Orange River basin, the GBNR is located at the watershed between three quaternary catchments, D81G, D82A and D82C (Figure 9). The first two quaternary catchments drain in a northerly direction towards the Orange River some 35km from the GBNR. The D82C catchment is endoreic; an interior drainage basin that does not drain to the sea and equilibrates through evaporation.

[5] The Aquatic Ecosystems of the GBNR must be formally classified according to the six-tiered structure of the Classification System for Wetlands and other Aquatic Ecosystems in South Africa' as part of KPA 1: Biodiversity and Heritage Conservation (Objective 1.5)

The Gariep-Koa River Watershed marks the highest point in the Bushmanland. Most of the Inselbergs make up this SE-NW watershed. A number of drainage basins exist to the north and south of this watershed. Maintaining the integrity of these drainages is essential as they play an important role in the structure and dynamics of specific habitats and populations.
Because of the climate, the drainage features in the region are all ephemeral. Overland flow and ground water levels for this area indicate that the area fall in the catchment (head waters), but very little water reaches the low-lying areas. There is however evidence of historic high flow events that occurred in past decades.

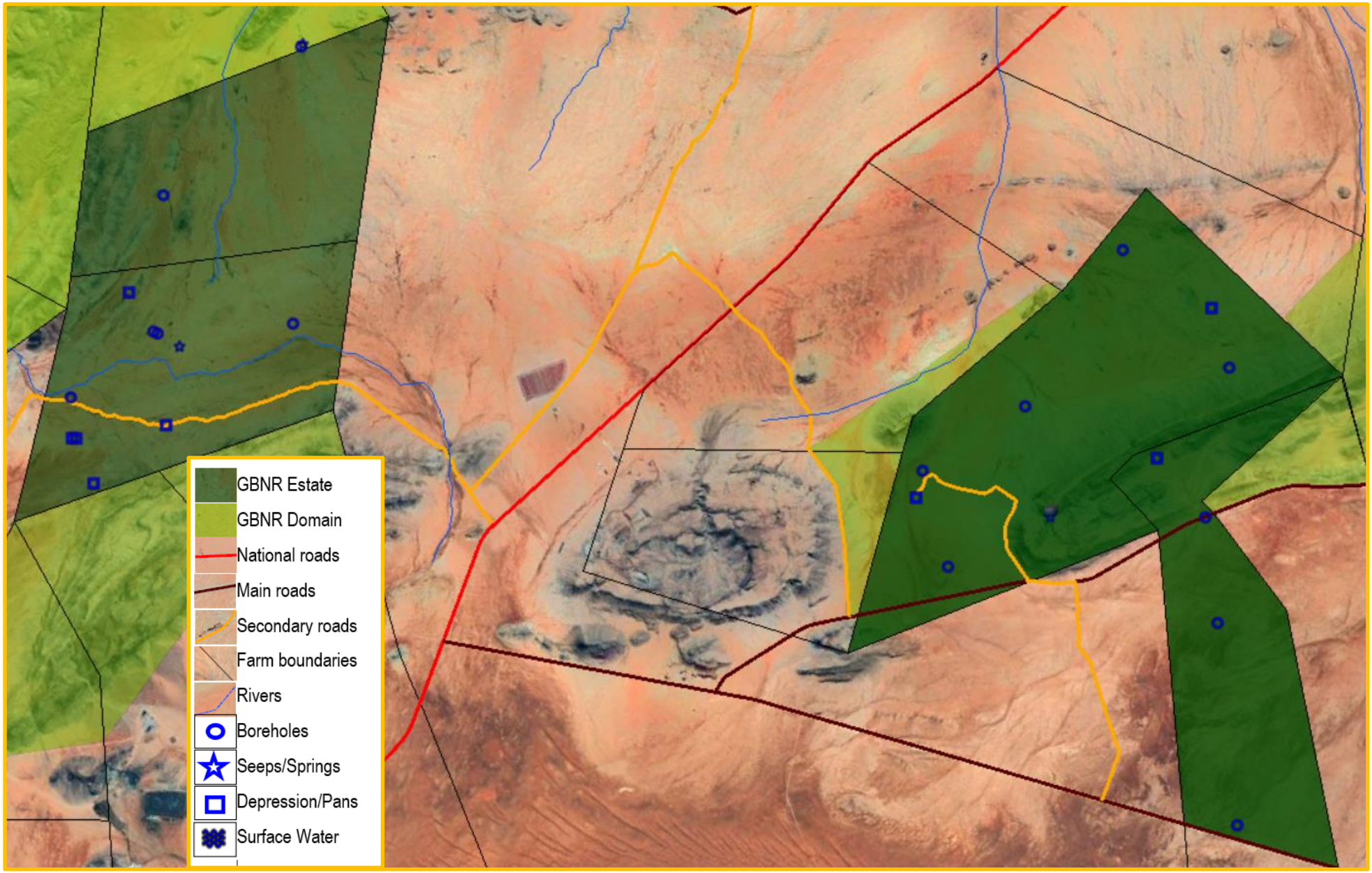


Figure 9: Map of Wetlands and other Aquatic Ecosystems of Gamsberg Nature Reserve

2.4.6 Broad-Scale Processes & Critical Biodiversity Areas

The GBNR include three biomes the Succulent Karoo, Desert, and Nama Karoo Biome.

Succulent Karoo Biome (SKB)

As part of the SKB, the world's only entirely arid region diversity hotspot, the GBNR include parts of the Richtersveld Bioregion one of six Bioregions in the SKB. The Richtersveld Bioregion comprises of small outliers on inselbergs and rocky areas. The conservation status of this Bioregion is very low with less than 2% of the area under formal conservation and only 4 of the 19 vegetation units covered. The Bushmanland Inselberg areas are located on the northeast margin of the Succulent Karoo Hotspot, just south of the Orange River and the border between Namibia and South Africa.

The Bushmanland Inselbergs is also recognized as one of the nine SKEP geographic priority areas (Hotspots). These geographic priority areas were refined on the basis of their ability to contribute to the maintenance of Red Data List species, and maintain important ecological processes, particularly in the face of climate change.

The area is dominated by a plain of desert grasslands and peppered by Inselbergs, ancient rocky outcrops in irregular patterns. These Inselbergs are important refugia for plants and animals and act as stepping-stones for rock-loving species migrating east west across the sand-covered plains of Bushmanland. Isolation of populations has led to diversification within the dwarf succulent shrublands. In total, the 31 400-hectare area includes 429 plant species, of which 67 are found only in this hotspot and 87 are Red List species. Mining has impacted many of the Inselbergs, and an existing opencast Zinc mine may devastate large portions of the spectacularly diverse Gamsberg Inselberg, home to two flagship endemics: *Conophytum ratum* and *Lithops dorotheae*. The *Certhilauda albescens* (Red lark) is also an important endemic species, although severe overgrazing on communal lands in this part of the Bushmanland plateau is impacting its habitat.

The area experiences summer rainfall patterns, and is characterized by an expansive, undulating landscape. The area is dominated by a plain of dry grasslands with scattered ancient rocky outcrops, named Inselbergs. These Inselbergs are important refugia for plants and animals and act as steppingstones for rock-loving species migrating east west across the sand-covered plains of Bushmanland. The isolation of populations has led to diversification within the dwarf succulent shrublands. creating remarkable local populations of plant life (Marsh et al. 2009).

Desert Biome

As part of the Desert Biome the GBNR includes parts of the Gariep Desert Bioregion one of two Bioregions in the DB.

The Gariep Desert Bioregion includes the desert areas from Sendelingsdrif to the vicinity of Onseepkans/Pofadder and shows the characteristic climatic properties of the continental part of the Namib Desert. Fog is unimportant and absent as one proceeds eastwards within the Gariep Desert Bioregion. This is the hottest area within the whole of southern Africa. Rainfall is mainly caused by convective thunderstorms in summer, with very low predictability and high temporal and spatial variability.

The Gariep Desert Bioregion (Gariep Centre of endemism), also recognized as one of the nine SKEP geographic priority areas, has a staggering 2700 plant species, 560 (20.7%) of which are endemic. Since 80% of the plant species are succulents, the Gariep Desert Bioregion is widely regarded as the area with the world's highest succulent diversity. Due to the inaccessibility of the area a small percentage of the area has been sampled and the possibility exists for the discovery of new species and as yet, there is no comprehensive checklist for the area.

Nama Karoo Biome

As part of the Nama Karoo Biome the GBNR include parts of the Bushmanland Bioregion one of three Bioregions in the NKB.

Critical Biodiversity Areas (CBA)

The GBNR lies within the planning domain of the Namakwa Biodiversity Sector Plan (Desment & Marsh 2007). This biodiversity assessment identifies Critical Biodiversity Areas (CBAs) which represent biodiversity priority areas which should be maintained in a natural to near natural state. The CBA maps indicate the most efficient selection and classification of land portions requiring safeguarding in order to maintain ecosystem functioning and meet national biodiversity objectives. As can be seen from the CBA map (Figure 11), the CBAs in the area are complex and reflect the landscape diversity in the area as well as the abundance of specific habitats of conservation significance.

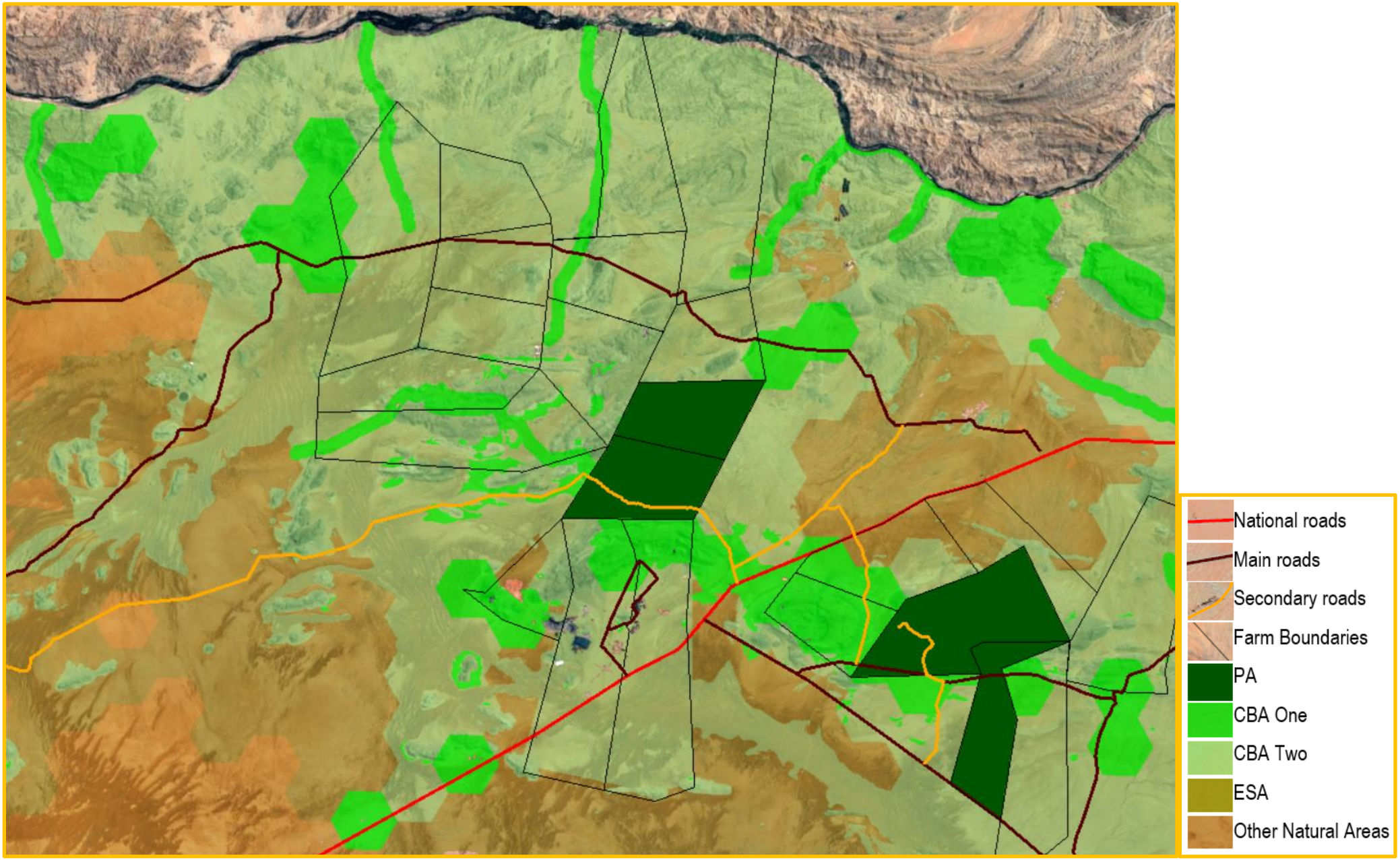


Figure 10: Map of CBA's of the GBNR interphase

2.4.7 Vegetation

2.4.7.1 Vegetation types

According to Mucina et al. (2006) eight vegetation types occur within the GBNR interphase (Figure 12) including:

Succulent Karoo Biome - Namaqualand Hardeveld
SKn 1 Namaqualand Klipkoppe Shrubland
Succulent Karoo Biome – Richtersveld Bioregion
SKr 18 Bushmanland Inselberg Shrubland
SKr 19 Aggeneys Gravel Vygieveld
Desert Biome - Gariep Desert Bioregion
Dg 9 Eastern Gariep Plains Desert
Dg 10 Eastern Gariep Rocky Desert
Nama Karoo Biome - Bushmanland Bioregion
NKb 3 Bushmanland Arid Grassland
NKb 4 Bushmanland Sandy Grassland
Azonal vegetation - Inland Saline Vegetation
AZi 5 Bushmanland Vloere

- **Succulent Karoo Biome - Namaqualand Hardeveld**
  - **Namaqualand Klipkoppe Shrubland SKn 1**

Distribution

Northern and Western Cape Provinces: Central and north-central regions of Namaqualand spanning Steinkopf in the north and Nuwerus in the south. Altitude 120-1 260 m.

Vegetation & Landscape Features

Dramatic landscape of huge granite and gneiss domes, smooth glacis and disintegrating boulder koppies supporting open shrubland up to 1 m tall, dominated by shrubs of dwarf to medium stature and with ericoid or succulent leaves. A few scattered pachycaul *Aloedendron dichotomum var. dichotoma* (Quiver trees) are found mostly on north-facing slopes. Flat or gently sloping rock sheets (the dominant feature of this unit) support dwarf or prostrate succulents in shallow pockets with soil or in cracks. Fringe vegetation at the bottom of steep rock sheets (collecting run-off water) consists of 1-3 m tall shrubs with non-succulent leaves and canopy cover reaching 40-100%.

Geology & Soils

A number of Mokolian granites and gneisses (most widespread is the Kamieskroon Gneiss) form gentle to moderate rocky slopes, rock sizes varying from medium to large with flat to gentle rock sheets as well as rock domes, yellow-brown to brown loamy sand, 0.15-0.6 m deep. Ag and Ib land types (35% each), followed by Fb and Fc (10% each).

Climate

Seasonal winter rainfall (May to September). MAP about 160 mm, with epizodic drought periods (well below 100 mm per year) of one or two years in succession. Dew is present throughout the winter. MAT 16.6°C. Plot summers, with mean maximum and minimum daily temperatures 30°C and 5°C for January and July, respectively. Frost occurs about 8 days per year, but can vary widely from year to year.

Endemic Taxa

Succulent Shrubs: *Ottosonderia monticola, Tylecodon nigricaulis*.
Low Shrubs: *Lotononis benthamiana, L. longiflora, L quinata, Wiborgia incurvata. Herbs: Tripteris spathulata, Zaluzianskya collina*.
Geophytic Herbs: *Ornithogalum leeupoortense, Oxalis clavifolia, O. louisae, Xysmalobium pearsonii*.
Succulent Herbs: *Quaqua bayeriana, Q. pallens, Stapeliopsis khamiesbergensis*.

Conservation

Least threatened. Some 6% statutorily conserved in Namaqua National Park, Goegap Nature Reserve with spectacular granite-koppie landscapes, and a small portion in the Moedverloren Nature Reserve. Target 28%. Largely without any alien invaders and hardly any transformation due to agriculture (steep

rocky habitats), but old mine spoils (mainly copper) are a disturbing view in some localities. Erosion is moderate (35%), very low (35%) or low (30%).

- **Succulent Karoo Biome – Richterveld Bioregion**

➢ **Bushmanland Inselberg Shrubland SKr 18**

Distribution

Northern Cape Province: A group of prominent solitary mountains (inselbergs) and smaller koppies towering over surrounding flat plains in northern Bushmanland in the Aggeneys and Pofadder regions. The most important inselbergs include Achab se Berg, Aggeneys se Berg, Ghaamsberg, Goob se Berg, Naib se Berg and Namiesberge. Altitude ranges from 600-1 180 m (most of the area 700-1 120 m).

Vegetation & Landscape Features

Shrubland with both succulent (*Aizoaceae, Asphodelaceae, Crassulaceae, Didiereaceae, Euphorbiaceae, Zygophyllaceae*) as well as no succulent (mainly Asteraceae) elements and with sparse grassy undergrowth (*Aristida, Eragrostis, Stipagrostis*) on steep slopes of the inselbergs.

Geology & Soils

Inselbergs of high-grade metamorphic rocks on a broad alluvial plain consist of clastic sediments, volcanics and intrusive rocks of Mokolian age that were metamorphosed during the Namaqualand Metamorphic Event, Ib and Ic land types are dominant in the area.

Climate

Erratic, very low rainfall (MAP below 100 mm, range 70-120 mm) occurring mainly in the form of thunderstorms in late summer from February to April. Around 20 days of frost per year (range 10-30 days). Mean maximum and minimum mean monthly temperatures for Aggeneys are 38°C and -3°C for February and July, respectively.

Endemic Taxon

Succulent Herb: *Huernia barbata* subsp. *ingeae*

Conservation

Threatened (although not immediately) by potential mining interests around Aggeneys. Target 34%. None conserved in statutory conservation areas—a fact needing quick remedy. Erosion is very low.

➢ **Aggeneys Gravel Vygieveld SKr 19**

Distribution

Northern Cape Province: Plains at foothills or on peneplains of inselbergs in northern Bushmanland scattered between Pofadder and Aggeneys and further westwards to the edges of the Namaqualand granite hill ridges. Altitude: mainly 840-1 060 m.

Vegetation & Landscape Features

Flat or slightly sloping plains (appearing as distinctly white surface quartz layers against the background of red sand or reddish soil) and supporting sparse, low-growing vegetation dominated by small to dwarf leaf-succulents of the families *Aizoaceae, Crassulaceae, Euphorbiaceae, Portulacaceae and Zygophyllaceae*, with some perennial component. The resurrection grass *Eragrostis nindensis* is the dominant perennial graminoid.

Geology & Soils

Gneiss of the Little Namaqualand and Hoogoor Suites, and quartzite of the Bushmanland and Geelvloer Groups dominate. The occurrence of these two broad geological groups is the primary determinant of the location of the different types of gravel patches usually found at the foothills or on peneplains associated with the base of inselbergs or low ridges amongst the gently undulating plains. In places rare feldspar patches occur, always associated with the pink gneiss of the Hoogoor Suite. Four types of gravel patches are encountered in the area:

(1) fine-grained quartz patches with a uniform covering of small diameter (<1 cm) quartz pebbles occur on the summits and foothills of some inselbergs (e.g., Gamsberg and Achab),

(2) quartz gravel patches with more variable size-class distribution occurring more widely, but generally associated with the foothills of the quartzite inselbergs of the region,

(3) feldspar gravel patches associated with open plains with underlying gneiss geology, and

(4) calcrete gravel patches occurring on open plains, where the topsoil and dorbank of the colluvial soils have been eroded, exposing the underlying calcrete layer. The soils are very shallow, skeletal and loamy-sandy. Ag land type covers half of the area, followed by Ic and Af land types.

Climate

Erratic, very low rainfall (MAP below 100 mm, range 70-120 mm) occurring mainly in the form of thunderstorms in late summer from February to April. Around 20 days of frost per year (range 10-30 days). Mean maximum and minimum mean monthly temperatures for Aggeneys are 38°C and -3°C for February and July, respectively.

Endemic Taxa

Succulent Shrubs: *Adromischus nanus, Dinteranthus puberulus, D. vanzylii, Lapidaria margaretae*
Succulent Herbs: *Anacampseros bayeriana, Conophytum achabense, C. angelicae* subsp. *angelicae, C. burgeri, C. calculus subsp. vanzylii, C. friedrichiae, C. limpidum, C. lydiae, C. maughanii, C. praesectum, C. ratum, Lithops dorotheae, L. julii* subsp. *fulleri*

Conservation

Least threatened. None is conserved in statutory conservation areas. The conservation target was set at 18%. Due to low vegetation cover, the gravel patches are not targeted for grazing. No serious alien-plant incursions have been observed since the soil surface does not suffer disturbance injuries—consequently erosion is very low.

- **Desert Biome – Gariep Bioregion**
  - **Eastern Gariep Plains Desert (Dg 9)**

Distribution

Comprises the sheet wash plains east of the Richtersveld, which lead down to the Orange River at Henkries, Goodhouse, Kabis, Klein Pella/Kambreek and the vicinity of Onseepkans. Also mapped on plains west of Pella to south of Vuurdoodberg Mountain (and Goodhouse) in the west, forming a broad east-west passage between the mountains to the north that fringe or are close to the Orange River and the more broken east-west line of hills and mountains to the south (for example Annakoppies, Grootberg, Witberg, Haramoebberge, Bantamberg and Amankop). Also found at lower reaches of the Kaboep River in the east. This unit also occurs north of the Orange River in Namibia. Altitude roughly 250-900 m.

Vegetation & Landscape Features

Often sloping plains, sharply contrasting with the surrounding rocky hills and mountains. Typical wash vegetation in the breaks between the mountains to the Orange River. Grassland dominated by 'white grasses', some spinescent (*Stipagrostis species*), on much of the flats with additional shrubs and herbs in the drainage lines or on more gravelly or loamy soil next to the mountains.

Geology & Soils

Quaternary sheet-wash alluvial deposits, sands, deep in places; in south, red-yellow apedal, freely drained soils with a high base status. Land types Ag and Ae.

Climate

MAP about 45-80 mm, with rainfall peak in late summer and early autumn, becoming more pronounced eastwards. Summer maximum temperatures are often higher than 40°C, and occasionally reaching 50°C at low altitudes. Frost very rare. Mean monthly maxima and minima for Goodhouse are 44.9°C and 1,9°C for January and July, respectively.

Endemic Taxa

None

Conservation

Least threatened. Target 34%. None conserved in statutory conservation areas. Few intact examples of this vegetation remain. Heavy grazing and arid climate combined with the ease of accessibility of the vegetation to stock mean that pastoral activities in the past have significantly altered the structure and composition of vegetation of this unit. In some areas *Prosopis* spp shows potential to become a serious problem, especially around natural springs or aquifers. Some very restricted areas are cultivated, mainly with date palms and grape vines.

- **Eastern Gariep Rocky Desert (Dg 10)**

Distribution

All the rocky desert areas along the Orange River, including Groot Pellaberge, Dabenorisberge, Abbasasberge and many smaller mountains between Pella and Vioolsdrif. Also, some mountains mapped further south well away from the Orange River such as the Haramoebberge and Witberg. Altitude about 250-1 205 m at the highest peak of the Groot Pella.

Vegetation & Landscape Features

Hills and mountains (up to 650 m of relative altitude from their base), mostly with bare rock outcrops and covered with very sparse shrubby vegetation in crevices. Separated by broad sheet-wash plains (Dg 9 Eastern Gariep Plains Desert). Habitats are mainly controlled by topography, aspect, local climate and lithology. On the Groot Pellaberg, for example, there is a sparse shrubland on the southern foothills (with, for example. *Aloidendron dichotomum*, *Rhigozum trichoto-mum* and *Petalidium setosum*) and a higher cover of plants in the southern ravines and rocky drainage lines (e.g. *Abutilon pycnodon, Asparagus suaveolens, Ficus cordata, Searsia populi-folia* and *S. viminalis*). On the higher southern slopes *Justicia orchioides* is often dominant, with localised grassland directly below steep cliffs (*Enneapogon scaber, Triraphis ramosissima* and *Danthoniopsis ramosa*). The south-facing quartzite cliffs and steep slopes support chasmophytes (cremnophytes) such as *Ficus ilicina*, *Aloe dabenorisana* and *Bowiea gariepensis*. On the summits and higher northern slopes there is a much higher preponderance of succulent plants including *Euphorbia avasmontana*, *Aloidendron dichotomum, A. microstigma subsp. microstigma, Pelargonium aridum* and *Kleinia longiflora*. Succulent plants are also important on the northern foothills and also include *Aloedendron dichotoma, Euphorbia avasmontana, Sarcostemma viminale* and the diminutive *Lapidaria margarethae* (Van Jaarsveld 1985).

Geology & Soils

In the east, mainly leucocratic biotite gneiss and quartz-feldspar gneiss of the Stalhoek Complex and lesser amounts of leucocratic biotite gneiss occur, with intercalations of calc-silicate rocks, mafic gneiss, and a quartzite-schist association of the Horn Subgroup, Bushmanland Group. In the west the area consists of granodiorite, adamellite, leucogranite, tonalite and diorite of the Vioolsdrif Suite and intermediate and acid volcanics of the Haib Subgroup of the Orange River Group (all of the above of Mokolian age). Very rocky substrate, with little or no soils. Land type Ic.

Climate

MAP about 45-80 mm with rainfall peak in late summer and early autumn, becoming more pronounced eastwards. Summer maximum temperatures often more than 40°C, occasionally reaching 50°C at low altitudes. Frost is very rare, but occurs at high altitudes.

Endemic Taxa

Small Tree: *Ozoroa namaquensis*

Leaf-succulent Dwarf Shrub: *Tylecodon sulphureus*

Conservation

Least threatened. Target 34%. None conserved in South Africa in statutory conservation areas. This unit also occurs north of the Orange River in Namibia where it is potentially conserved through the ownership of the Farm Tsams by the Namibian Ministry of Environment and Tourism.

- **Nama Karoo Biome – Bushmanland Bioregion**
- **Bushmanland Arid Grassland (NKb3)**

Distribution

Northern Cape Province: Spanning about one degree of latitude from around Aggeneys in the west to Prieska in the east. The southern border of the unit is formed by edges of the Bushmanland Basin while in the northwest this vegetation unit borders on desert vegetation (northwest of Aggeneys and Pofadder). The northern border (in the vicinity of Upington) and the eastern border (between Upington and Prieska) are formed with often intermingling units of Lower Gariep Broken Veld, Kalahari Karroid Shrubland and Gordonia Duneveld. Most of the western border is formed by the edge of the Namaqualand hills. Altitude varies mostly from 600-1 200 m.

Vegetation & Landscape Features

Extensive to irregular plains on a slightly sloping plateau sparsely vegetated by grassland dominated by white grasses (*Stipagrostis species*) giving this vegetation type the character of semidesert 'steppe'. In places low shrubs of *Salsola* change the vegetation structure. In years of abundant rainfall rich displays of annual herbs can be expected.

Geology & Soils

A third of the area is covered by recent (Quaternary) alluvium and calcrete. Superficial deposits of the Kalahari Group are also present in the east. The extensive Palaeozoic diamictites of the Dwyka Group also outcrop in the area as do gneisses and metasediments of Mokolian age. The soils of most of the area are red-yellow apedal soils, freely drained, with a high base status and <300 mm deep, with about one fifth of the area deeper than 300 mm, typical of Ag and Ae land types.

Climate

Rainfall largely in late summer/early autumn (major peak) and very variable from year to year. MAP ranges from about 70 mm in the west to 200 mm in the east. Mean maximum and minimum monthly temperatures for Kenhardt are 40.6°C and -3.7°C for January and July respectively. Corresponding values for Pofadder are 38.3°C and -0.6°C. Frost incidence ranges from around 10 frost days per year in the northwest to about 35 days in the east. Whirl winds (dust devils) are common on hot summer days.

Endemic Taxa

Succulent Shrubs: *Dinteranthus pole-evansii, Larryleachia dinteri, L. madothii, Ruschia kenhardtensis*
Herbs: *Lotononis oligocephala, Nemesia maxii*.

Conservation

Least threatened. Target 21%. Only small patches statutorily conserved in Augrabies Falls National Park and Goegap Nature Reserve. Very little of the area has been transformed. Erosion is very low (60%) and low (33%).

- **Bushmanland Sandy Grassland (NKb 4)**

Distribution

Northern Cape Province: Surrounds of Aggeneys (northern Bushmanland) and a few isolated patches south of Copperton on the eastern edge of the Bushmanland Basin suggesting the course of the palaeoriverine system of the Orange River and its tributaries. The largest continuous patch of this vegetation type fills the shallow valley of the intermittent Koa River southeast and west of Aggeneys. Altitude varies mostly from 500-1 200 m.

Vegetation & Landscape Features

Dense, sandy grassland plains with dominating white grasses (*Stipagrostis, Schmidtia*) and abundant drought-resistant shrubs. After rainy winters rich displays of ephemeral spring flora (*Grielum humifusum, Gazania lichtensteinii*) can occur.

Geology & Soils

Mostly Quaternary sediments (sand, calcrete) with some contribution of the pre-Pleistocene Kalahari Group sediments in the east. Typically, the surface is covered by red sands >300 mm deep, forming dunes in places. Af land type dominates.

Climate

Major rainfall peak between February and April and a minor peak in November. MAP ranges from about 70-110 mm.

Endemic Taxa

None

Conservation

Least threatened. Target 21%. None conserved in statutory conservation areas. Very little of the area has been transformed. The alien shrub *Prosopis* spp. can be seen as a threat. Erosion is very low (82%) or moderate (17%).

- **Azonal vegetation - Inland Saline Vegetation**
- **Bushmanland Vloere AZi 5**

Distribution

Northern Cape Province: Vloere (salt pans) of the central Bushmanland Basin as well as the broad riverbeds of the intermittent Sak River (functioning as temporary connection between some of the pans) as well as its numerous ancient (today dysfunctional) tributaries. The patches of this vegetation unit are embedded especially within NKb 6 Bushmanland Basin Shrubland and NKb 3 Bushmanland Arid Grassland and to a lesser extent also within NKb 4, NKu 1, NKu 2 as well as marginal Succulent Karoo units summarised within the bioregion of Trans-Escarpment Succulent Karoo. Altitude 850-1 450 m.

Vegetation & Landscape Features

Flat and very even surfaces of pans and broad bottoms of intermittent rivers. The centre of a pan (or the river drainage channel itself) is usually devoid of vegetation; loosely patterned scrub dominated by *Rhigozum trichotomum* and various species of *Salsola* and *Lycium*, with a mixture of non-succulent dwarf shrubs of Nama-Karoo relationship. In places loose thickets of *Parkinsonia africana, Lebeckia lineariifolia* and *Acacia karroo* can be found.

Geology, Soil & Hydrology

Endorheic pans and alluvia of associated intermittent rivers filled with silty and clayey alluvial deposits with a high content of concentrated salt (sodic soils), supported by Ecca Group shales and Dwyka diamictites (Karoo Supergroup). Watkeys (1999) found that in the pan of Brandvlei, the orthic A horizon is underlain by a soft carbonate subsoil and the soils of the alluvial terraces of the Sak River are deep (more than 1 000 mm), stratified and weakly structured and calcareous landtype. Erosion in some places can be considerable, especially after unpredictable heavy thunderstorms leading to sudden swelling of the Sak River. The pans can be filled in wet summers and in autumn.

Climate

Arid, seasonal climate with bimodal (equinoctial) precipitation regime—two peaks, one in March and another in November. Overall MAP 141 mm (range 91 mm in western Bushmanland to 306 mm at northern edges of the Roggeveld). Overall MAT 16.8°C (range 17.4°C in northern Bushmanland to 14.5°C on northern edge of the Roggeveld). The region where the Bushmanland Vloere occur, is known for thermic extremes, both long-term (mean daily temperature in January approaching 32°C and in July only several degrees above zero) and short-term (daily temperature amplitude around 25°C). Frequent occurrence of frost is also indicative of the high thermic continentality of the region.

Endemic Taxa

None

Conservation

Least threatened. Target 24%. None conserved in statutory conservation areas. About 2% transformed for cultivation or building of dams (Vanwyksvlei Dam). Alien Prosopis occurs as scattered in some vloere and dry riverbeds. Several of the pans are mined for salt production.

Table 5: Number of plant species endemic to the GBNR East Gariep Centre per vegetation unit.

BIOME	VEGETATION UNIT	NUMBER ENDEMICS
Succulent Karoo	Namaqualand Klipkoppe Shrubland SKn 1	15
	Bushmanland Inselberg Shrubland SKr 18	1
	Aggeneys Gravel Vygieveld SKr 19	16
Desert	Eastern Gariep Plains Desert Dg 9	0
	Eastern Gariep Rocky Desert Dg 10	2
Nama Karoo	Bushmanland Arid Grassland NKb3	6
	Bushmanland Sandy Grassland NKb 4	0
Azonal	Bushmanland Vloere AZi 5	0

2.4.7.1 Invasive Alien Plants

Invasive alien plants are a problem on the reserve only in Azonal communities along drainage channels, where *Prosopis glandulosa* is present. The occurrence is however not only restricted to the reserve and emanates from an upstream influx of source material.

2.4.7.2 Species of Special concern

Table 6 lists the plant species of special concern with possible occurrence in the GBNR area[6].

Table 6: Plant species of special concern

SCIENTIFIC NAME	TOPS 2015 STATUS[7]	Red List STATUS	Other Concerns
Anacampseros herreana		EN	Collectable
Anginon jaarsveldii		EN	
Bulbine ophiophylla		EN	
Microdon capitatus		EN	
Conophytum achabense		VU	Collectable
Conophytum smorenskaduense		VU	Collectable
Lithops dinteri		VU	Collectable
Lithops olivacea		VU	Collectable
Crotalaria pearsonii		VU	Collectable
Tritonia marlothii		VU	Collectable
Conophytum blandum		NT	Collectable
Conophytum limpidum		NT	Collectable
Dinteranthus wilmotianus		NT	
Ectadium virgatum		NT	
Helichrysum marmarolepis		NT	
Crassula decumbens		NT	Collectable
Bauhinia bowkeri		NT	
Cyphia longiflora		NT	
Cyanella cygnea		NT	

[6] The species of conservation concern have a strong probability of occurrence at this reserve, based on the Plants of South Africa (POSA) database. The POSA includes a database of all plants recorded by means of voucher specimens lodged with one of the recognised herbaria in South Africa. The actual Occurrence of these species will need to be ground-truthed as part of KPA 1: Biodiversity and Heritage Conservation (Objective 1.1) and provided for in the SOKDR (02 Biodiversity Data)

[7] **T**hreatened **or P**rotected **S**pecies (TOPS) in terms of sec. 56(1), 57(2) and 57(4)(a), read with sec.63 and 100 of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)

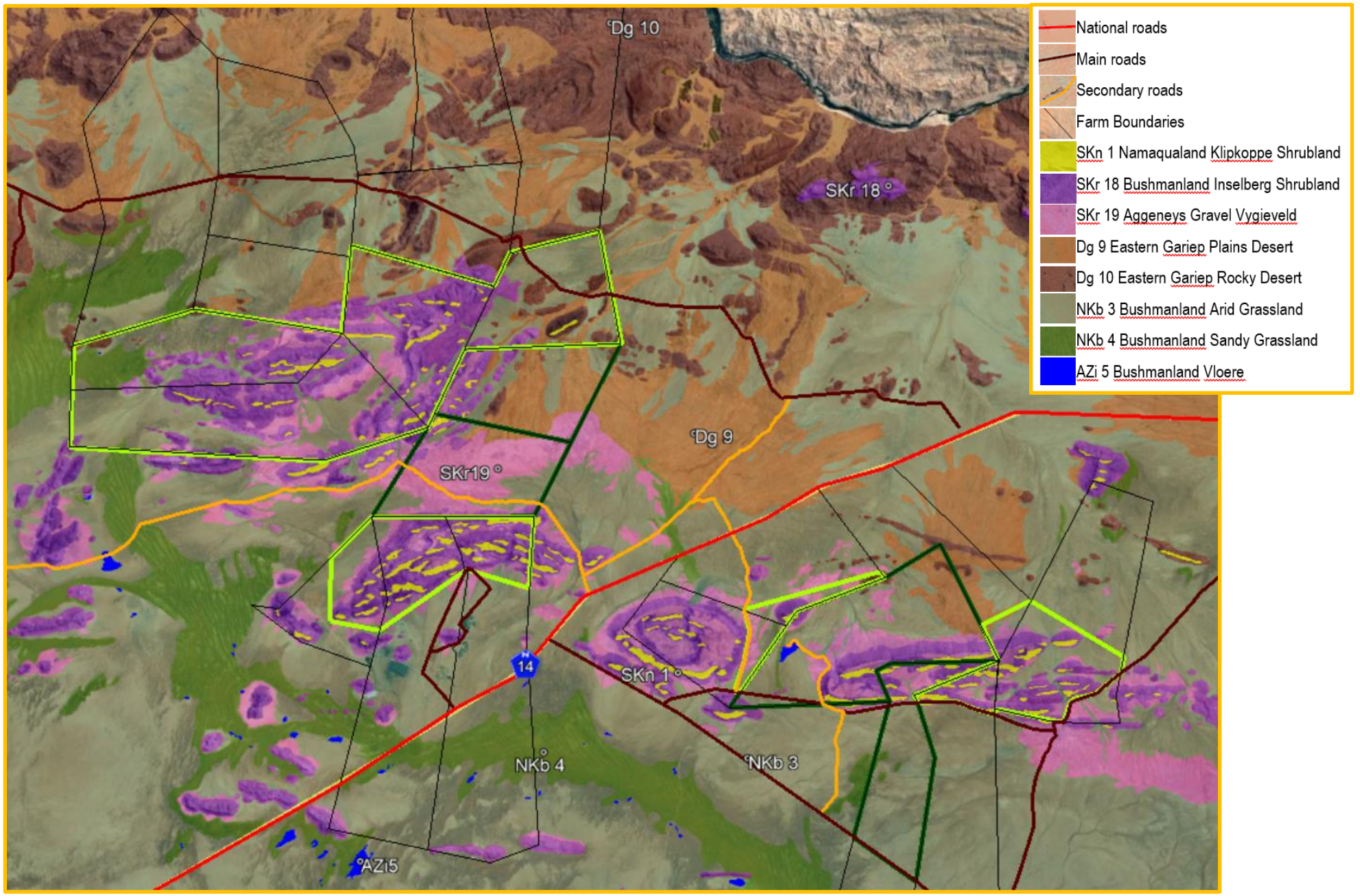


Figure 11: Map of Vegetation types of the Gamsberg Nature Reserve

2.4.8 Fauna

2.4.8.1 Mammals

Mammal species are not plentiful in the region and species endemism is low, with Kudu, Steenbok and Klipspringer the only antelope species with potential distribution in the reserve. Leopard, Caracal, Black-backed Jackal, Chacma baboon and Brown hyena can also be found at low densities.

The mammal species of special concern listed in Table 7 have the potential to occur at the GBNR[8].

Table 7: Mammal species of special concern

SCIENTIFIC NAME	COMMON NAME	TOPS 2015 STATUS	Red List STATUS	Other Concerns
Felis nigripes	Black-footed Cat	Protected	VU	
Panthera pardus	Leopard	VU	NT	
Cistugo seabrae	Angolan Hairy Bat		NT	
Orycteropus afer	Aardvark	Protected		
Hyaena brunnae	Brown Hyaena	Protected		

2.4.8.2 Avifauna

Globally threatened species are Red Lark (*Calendulauda burra*), Sclater's Lark (*Spizocorys sclateri)*, Kori Bustard *Ardeotis kori*, Ludwig's Bustard *Neotis ludwigii* and Black Harrier *Circus maurus*, and Karoo Korhaan *Eupodotis vigorsii* is regionally threatened. Biome-restricted species include Stark's Lark (*Spizocorys starki*), Karoo Long-billed Lark *Certhilauda subcoronata*, Black-eared Sparrow-lark *Eremopterix australis*, Tractrac Chat *Cercomela tractrac*, Sickle-winged Chat *C. sinuata*, Karoo Chat *C. schlegelii*, Layard's Tit-Babbler *Sylvia layardi*, Karoo Eremomela *Eremomela gregalis*, Cinnamon-breasted Warbler *Euryptila subcinnamomea*, Namaqua Warbler *Phragmacia substriata*, Sociable Weaver *Philetairus socius*, Pale-winged Starling *Onychognathus nabouroup* and Black-headed Canary *Serinus alario*.

The Avifauna species of special concern listed in Table 8 have the potential to occur at the GBNR.

Table 8: Avifauna species of special concern

SCIENTIFIC NAME	COMMON NAME	TOPS 2015 STATUS	Red List STATUS	Other Concerns
Neotis ludwigii	Ludwig's Bustard	EN	EN	
Circus maurus	Black Harrier		EN	
Geocolaptes olivaceus	Ground Woodpecker		NT	
Eupodotis vigorsii	Karoo Korhaan		NT	
Spizocorys sclateri	Sclater's Lark		NT	
Certhilauda burra	Red Lark		VU	
Sagittarius serpentarius	*Secretary-bird*		VU	
Torgos tracheliotos	*Lappet-faced Vulture*		VU	
Polemaetus bellicosus	*Martial Eagle*		VU	

2.4.8.3 Reptiles

Diversity is very rich and endemism rates very high for reptiles. Snake species include *Bitis cornuta, B. caudalis, B. arietans, Psammophis leightoni namibensis, Naja nigricollis woodii, Leptotyphlops occidentalis*, and the endemic *B. zeropaga* (Desert Mountain Adder) and *B. schneideri*, (Namaqua Dwarf Adder and the smallest of Africa's adders measuring only 20-25 centimetres). Chelonia is represented by the smallest tortoise on earth, *Homopus signatus*, which grows to maximum of 96 mm. Also, very small is *Psammobates tentorius*, which occurs in the Richtersveld and reaches between 90-100 mm.

[8] The species of conservation concern indicated in this section have a strong probability of occurrence at this reserve, based on desktop studies. The actual occurrence of these species will, however, need to be ground-truthed as part of KPA 1: Biodiversity and Heritage Conservation (Objective 1.5) and compared with the SOKDR (Biodiversity Data 03)

Other endemics include two species of burrowing skinks, four species of girdled lizards, five species of legless skinks and the *Chamaleo namaquensis* (Namaqua chameleon).
In total there are a possible 63 species that could occur in the area and most of them have a very high likelihood of being collected for the black-market pet trade.

The Herpetofauna species of special concern listed in Table 9 have the potential to occur at the GBNR.

Table 9: Reptile species of special concern

SCIENTIFIC NAME	COMMON NAME	TOPS 2015 STATUS	Red List STATUS	Other Concerns
Afroedura africana	African Rock Gecko			Collectable
Bitis caudalis	Horned Adder			Collectable
Bitis cornuta	Many Horned Adder			Collectable
Bitis schneideri	Namaqua Dwarf Adder			Collectable
Bitis xeropaga	Desert Mountain Adder			Collectable
Cordylus imkeae	Rooiberg Girdled Lizard	PR		
Cordylus mclachlani	Mclachlan's Girdled Lizard			Collectable
Gerrhosaurus typicus	Namaqua Plated Lizard			Collectable
Homopus signatus signatus	Nam Speckled Padloper	VU		
Namazonurus lawrenci	Lawrence's Girdled Lizard			Collectable
Pachydactylus goodi		VU		
Pachydactylus rangei	Namib Web-footed Gecko	CR		
Pachydactylus rugosus	Wrinkled Thick-toed Gecko			Collectable
Pachydactylus rugosus formosus	Skurwegeitjie			Collectable
Pachydactylus serval	Werner's Thick-toed Gecko			Collectable
Pachydactylus serval purcelli	Tierboskatgeitjie			Collectable
Pachydactylus weberi	Weber se Geitjie			Collectable
Pachydactylus atorquatus	Augrabies Gecko			Collectable

2.4.8.4 Amphibian, Mollusc and Crustaceans

Amphibian diversity in the area is low, possibly due to the aridity of the region and most of the endemic species are burrowing animals because of the extreme heat and the geographic isolation which often characterizes burrowing animals. Of such endemics to the Succulent Karoo are three amphibians including the *Breviceps namaquensis* (Namaqua rain frog) which only emerges from the sands during times of rain and which is equipped with shovel-like feet in order to dig burrows and an adhesive secretion which enables the bulbous-shaped male and females to adjoin during copulation. The *Cacosternum namaquense* (Namaqua caco frog) also hibernates during times of drought lasting even years and is believed by the Nama to have been born out of the dense mist clouds, as they only appear when the ground is moist and the open pans have become full of water.
The amphibian, mollusk and crustacean species of special concern listed in Table 10 have the potential to occur at the GBNR.

Table 10: Amphibian, mollusc and crustacean species of special concern

SCIENTIFIC NAME	COMMON NAME	TOPS 2015 STATUS	Red List STATUS	Other Concerns
Strongylopus springbokensis	Namaqua Stream Frog		Vulnerable	

2.4.8.5 Invertebrates

Diversity is very rich and endemism rates very high for invertebrates. Some notable species of arthropods include the Stenocarid beetles which have the longest legs in proportion to body size of any beetle on earth and the great diversity of scorpion species, of which 70 species live in the Succulent Karoo, 20 of which are endemic. These include *Parabuthus granulatus*, considered the most venomous scorpion in

southern Africa and *P. villosus* which when disturbed can eject venom from its tail up for to a metre. To support the high diversity of plant species a similarly high diversity of pollinators is required, including monkey-beetles, bees, wasps, blister beetles, and the nemestrinid and tabanid flies which use a 70-millimetre-long proboscis to tap nectar from flowers.

In all the fauna, highly specialised techniques are used for survival in the harsh environment. Cryptic colouring is used by most species, from the agamas blending into succulent plants, horned adders taking the colour of sand and the myriad of grasshopper, cricket, spider and other arthropods which take the colouring and shape of rocks. Because of the lack of dense vegetation, insect species, notably the grasshoppers, exhibit shape and colour characteristics to resemble stone types instead of vegetation with a variety of colouration resembling blue-grey of dolomite, rusty reds of quartzite, grey browns of shale-schist, shinier grey of quartzite, purples of shale, yellows and oranges of sandstone and weathered granite, and pinks and greens to resemble different soil types. Other survival strategies in insects include those of the bug species which also use their surroundings for protection, and in the case of some *Eurychora* species this is affected by emitting a waxy substance onto which particles of sand and debris stick to hide the bug from predators. Several beetle species also use waxy coating for conservation of water by decreasing direct exposure to the sun.

Although little is known about the invertebrate fauna of the region, the few groups that have been studied suggest high levels of endemism therefore the area is regarded as an Insect Hotspot.

2.4.9 Regional Palaeontology

According to Pether, 2013 the Western Bushmanland was intruded by numerous small volcanoes during the Late Cretaceous and Palaeocene 77-54 Ma. Known as the 'Gamoep pipe swarm' or Gamoep Suite, these occur as volcanic pipes 50-500 m in diameter. Interestingly, the preservation of Late Cretaceous volcano crater lake deposits shows that parts of the Bushmanland Plateau have undergone little erosion since ~70 Ma. Many of the volcanic pipes contain crater lake deposits which are highly fossiliferous. The crater lake mudstones from the Banke pipe near Platbakkies have provided a rich fossil pollen floral assemblage, fossil leaves and wood, some insects and several frogs. The fossil pollen indicates a dry subtropical forest of podocarps (yellowwoods) and araucarians (monkey puzzle trees now extinct in Africa), with an understory of Restionaceae, Proteaceae and Ericaceae representing early Cape Floristic Region taxa (Scholtz, 1985). The teeth and bones of a dinosaur Kangnasuarus were found in a well dug on the farm Kangnas 77 (Rogers, 1915; Haughton, 1915).

A prominent, broad "fossil" valley, the Koa River, traverses the region, its course marked by red dunes and a series of pans, of which Bosluispan is prominent. The Koa River was either a major tributary of the Proto-Orange River or was the course of the actual Orange River when it took a southerly route to the Atlantic (De Wit et al., 2000). At Bosluispan to the south and Geelvloer to the east the basal fluvial gravels and sands contain a faunal assemblage that indicates a mid-Miocene age of ~16 Ma for the sediments. The fossils at Bosluis include Gomphotherium, an extinct proboscidean, bovids, giraffids, a rhinocerotid, tortoises, rodents, crocodile teeth and catfish (Macey et al, 2011). The fauna indicates a warmer and more humid climate and the presence of both browsers and grazers suggests riverside woodlands with grassland in the wider area. In the Geelvloer palaeovalley the basal gravels contain bones of Miocene anthracotheres, an extinct hippo-like amphibious herbivore. Fossil wood indicates a tropical/subtropical wet climate with low seasonality (Bamford, 2000).

At Areb the teeth of the extinct *Hipparion namaquense* (Three-toed horse) were found in granitic grits underlying a 15 m thickness of multiple calcretes (Haughton, 1932; Pickford et al, 1999) dated to 6-4 Ma (latest Miocene/early Pliocene). Pickford et al. (1999) suggest that the Pliocene was still relatively humid and characterized by fluvial erosion and that aggradation of sediments in the palaeovalleys commenced in the Quaternary and is associated with aridification. This accords with the global palaeoclimatic record of the commencement of Ice Age climates since ~2.6 Ma and the intensification of cold upwelling at the coast.

2.4.10 Regional Cultural/Heritage Resources

Stone Age: The first and longest part of human history is the Stone Age, which began with the appearance of early humans between 3-2 million years ago. Stone Age people were hunters, gatherers and scavengers who did not live in permanently settled communities. Their stone tools preserve well and are found in most places in South Africa and elsewhere.

Early Stone Age 2 000 000 - 150 000 Before Present;
Middle Stone Age 150 000 - 30 000 BP;
Late Stone Age 30 000 - until c. AD 200;

Iron Age: Period covering the last 1800 years, when new people brought a new way of life to southern Africa. They established settled villages, cultivated domestic crops such as sorghum, millet and beans, and they herded cattle as well as sheep and goats. As they produced their own iron tools, archaeologists call this the Iron Age;

Early Iron Age AD 200 - AD 900;
Middle Iron Age AD 900 - AD 1300;
Late Iron Age AD 1300 - AD 1830; and

Historical Period: Since the arrival of the white settlers - c. AD 1840 - in this part of the country.

Archaeological sites in the area around Aggeneys tend to be focused on three types of landscape features:

- Places where water can be obtained – generally after rain storms. These include pans and low, flat bedrock outcrops that have hollows and crevices that trap water;
- The bases of rocky hills and outcrops. These areas frequently reveal low stone-walled structures, either at the base of the hills or, less frequently, on the rocky hills; and
- On and along sand dunes

The archaeology, including rock art, graves of victims of conflict and other graves not in formal cemeteries are of interest and should be investigated as information on the Cultural/Heritage Resources of the GBNR is limited[9].

2.4.10.1 The Stone Age

This area is home to all three of the known phases of the Stone Age, namely: The Early- (2.5 million - 250 000 years ago), Middle- (250 000 - 22 000 years ago) and Late Stone Age (22 000 - 200 years ago). Early to Middle Stone Age sites are less common in this area, however rock-art sites and Late Stone Age sites are much better known (Clark 1959).

Archaeological and historical evidence show that the Middle Orange River and Bushmanland regions have been populated more or less continuously during prehistoric times and that the region was extensively occupied by Khoi herders and San hunter-gatherers during the last 2000 years (Morris & Beaumont 1991; Beaumont et al. 1995; Smith 1995).

2.4.10.2 The Iron Age

No Iron Age sites are expected to be found in this area as it falls outside the southwestern periphery of distribution of Iron Age settlement in the region.

2.4.10.3 Pre-Colonial frontier

The importance of Ghaamsberg area as an archaeological/historical focal point is alluded to in early 19th century records (Penn 2005) as a place of refuge and conflict during the colonial frontier period and by the meaning of its name, which is derived from the Khoikhoi word Ghaams, meaning 'grassy spring'. The principal Khoikhoi inhabitants of the Middle Orange River were the Einiqua who belonged to the same language group as the Namaqua and Korana, namely the Orange River Khoikhoi (Penn 2005). The Einiqua occupied the area around and east of the Augrabies Falls while the Korana occupied the Middle-Upper Orange River further to the east. A large number of burial cairns were excavated near the Orange River in the Kakamas area and appear to be related to Korana herders (Morris 1995).

[9] A site-specific AIA should be completed as part of KPA 1: Biodiversity and Heritage Conservation (Objective 1.9.1) and data provided for in the SOKDR (02 Biodiversity Data)

Hinterland sites are mainly restricted rock shelters near mountainous terrain sand dune deposits, or around seasonal pans and springs (Beaumont 1995). Herder sites with ample pottery have been recorded near Aggeneys and, east of Poladder, at Schuitdrift South (Morris 1999) and historical records show that herder groups settled at the stronger springs such as Pella (Thompson 1827).
Nienaber & Raper 1977 also mentioned that long before the turn of the century, the Bushmen had several strongholds in the mountains between Pofadder and Springbok and from these they carried out raids on the farmers "Trekboere". Finally, the farmers could no longer tolerate the marauding Bushmen and formed a commando which followed the spoor of the Bushmen and the livestock that they had stolen to the kloof, which is today known as Aggeneys. Near the kloof they split into three parties which surrounded and trapped the Bushmen at a spring near the confluence of three ravines and the Bushmen were wiped out. Further sources contradict the above and links the incident of the killing of Bushmen rather with Ghaamsberg than with Aggeneys.

2.4.10.4 Colonial frontier

The first known references to the area date from the late 1770's when the farm, now Pella was called Cammas Fonteyn. The grazing rights were granted to Jacobus Bierman, though in 1776 it belonged to Coenraad Feijt. The name was changed to Pella in 1812, when Christiaan Albrecht of the London Missionary Society settled there after having been driven out of the Warmbad area of South West Africa by the notorious Jager Afrikaner. The name is derived from the ancient town Pella in Macedonia, which became a refuge from the persecuting Romans for the early Christians of Jerusalem. This settlement, however, was short-lived and was abandoned before 1824 after one of the missionaries was killed by Bushmen.
In approximately 1872 the first references are made to a farm at Aggeneys. It had become important with the arrival of the "Trekboere" as the first watering point reached after the Kweekfontein in the Springbok area. The old wells can still be seen in the canyon behind the present farmhouse. A certain Mr Hayes, a Catholic, and his family farmed cattle at Aggeneys. He was also responsible for the first Catholic settlement at Pella - the earlier ill-fated mission being Lutheran. He invited Father Gaudeul to establish the mission after the abandonment of the Copper mine at Springbok and the dispersal of the Father's former parishioners. The Mission was granted to the Roman Catholic Church in 1875 and the church built in the same year. Mr Hayes left the Aggeneys farm in 1900 and moved to Pella where he died in 1905 at the age of 85.
The farm was taken over by the Harridge or Herridge family. Edward Herridge was a former British soldier. The ruins of the original farmhouse are still there today and the original orchard, started by Mrs Harridge still flourishes. They left the farm after the Boer War for Klein Pella. The Burger family, who were trekboere, probably from the Williston area, passed through the region immediately prior to the Boer War and while near Aggeneys, some 720 of their cattle were seized by the British troops, at the time camped at Aggeneys. The old fortifications can still be seen on the valley sides. The reasons for the seizure of the cattle may have been - food for the troops, the scorched earth policy or in retaliation for the presence of the trekkers in the Boer forces. Anyway, a Boer unit including some of the Burgers, under the command of Major Froneman, made an attack on the British encampment from the front and rear, but Froneman disappeared and the necessary orders were never given, the attack failed with the loss of two Boer troops. After the war in 1904, the Burger family returned to Aggeneys and made applications to hire the State ground, at a nominal yearly rental. Barend and Willem were granted Aggeneys East and West respectively, the other brothers (there were 6 brothers and 5 sisters in all) hired grazing from these two. In 1908 right of property was granted to Barend and Willem. Barend died in 1941 and Wikkie his youngest son inherited the farm. The adjacent portions of Zuurwater and Koeris, purchased by Barend, were left to his sister and another brother and Wikkie bought these out later. It was from Wikkie Burger that the farms were purchased.

2.4.10.5 Mining History

The first known investigation of the mineral potential of the area was in 1928 when a German, Mr Horneman, who appears to have been some sort of local official, asked permission from Barend Burger

to prospect in the area. The following year he hired a qualified blaster, Abraham Maas, to sink a shaft on Swartberg. However, his interpretation of the geology was incorrect and the shaft was sunk in the poorly mineralised area of the ore body and was stopped after 20m, with little mineralization. Some samples were taken and it is reported that the O'Kiep Copper Company made an offer to Horneman but this was refused. Several times between then and the late 1960's a number of companies and individuals looked at the area or at samples and for varying reasons turned it down. This chequered period culminated when a Geologist, Ben Brock, representing Phelps Dodge, decided to recommend the prospect at Swartberg (Black Mountain) to his principals. While this was being done and an exploration company formed, the mineral rights were obtained from Wikkie Burger by David Graaf Interests. The Exploration Manager for Phelps Dodge, Dr P Ryan visited the outcrop area of the Black Mountain and realised for the first time the true structure of the outcrop and the localisation of the mineralisation in a synformal fold plunging east north east. Despite the previous unfavourable reports on the economic potential of the ore body, it was decided to reach an agreement on the options with the D.G.I. This was finalised in May 1971 and two months later the first borehole was sited and drilling commenced, intersecting disseminated mineralisation over some 80m. Exploration continued and then spread to Broken Hill and Ghaamsberg during the next two years. The Broken Hill ore body on the hill known as Nuniepoort-se-kop was found to be of higher grade and was selected to be the first mining target and emphasis shifted there in 1973, with a comprehensive drilling programme. Followed in 1974 by the development of an adit to take a bulk sample for metallurgical test work. The initial plan had been for an open cast mine but it became increasingly apparent that selective underground mining would be economically more attractive. In 1976 this feasibility study was completed and Phelps Dodge decided to look for a partner in a joint venture. On 11th May 1977 it was announced that Gold Fields of S.A. had reached an agreement in principle and later on that year G.F.S.A. acquired 51% of the interest in Black Mountain Mineral Development Company (Pty) Ltd and would manage the project. The remoteness of the site required major infrastructure and development and the new village and amenities were introduced over the next few years including the pump station and pipeline from the Orange River near Pella. The mine came on stream at the end of 1979 and has to date produced some 5,5 million tons of ore. The ore is treated in a metallurgical plant on the site, in a complex sequential-flotation system. The concentrate produced is road hauled to Loop 10 on the Sishen-Saldanha railway line - some 170 km, if for export to Saldanha. (http://www.aggeneys.com/history)

2.4.11 Bulk services, security and access

The previous land use of the properties included in the GBNR estate did not developed infrastructure in terms of a sensitivity analysis. Current development footprints did not take visual impact and impact on sensitive ecosystems into account. Development will have to be planned and adjusted according to the criteria of the use zones in the CDF even if it means that some farmsteads will have to be demolished. The section below provides limited information regarding bulk services and access control (also refer to the CDF section 3.5 for infrastructure requirements).

Bulk services

Detail planning of all bulk services must still be done and all options investigated as part of the APO, Objective 4.2: Construct, maintain and upgrade the administration infrastructure and bulk services infrastructure in the PA. ESKOM power is available at the Achab section to be zoned as "Leisure Zone High Intensity & Reserve administration.

Potable water will have to be provided by bore holes equipped with solar pumps. Electricity in the interior of the reserve will also be supplied by solar energy.

Programs for sewerage and waste disposal still needs to be developed as part of the APO, Objective 1.8: Manage and mitigate the environmental impacts of conservation management, tourism, recreation and natural resource use in the PA.

Storm-water services including erosion needs to be addressed in terms of the Rehabilitation Program as part of Biodiversity Management Plan, BMP 7 provided for in the APO, Objective 1.2: Restoration and mitigation of degradation.

Access and demarcation

The properties included in the GBNR estate is fully fenced with 1.4m stockproof fencing. The properties must be demarcated as a single unit and all internal fences should be removed. Demarcation and decommissioning of internal fences are provided for as part of the APO under Objective 1.2: Restoration and mitigation of degradation.

Boundary fences needs to be upgraded to be compliant with the Northern Cape Nature Conservation Act (2009) and must enhance the integrity of the management system and be at least 1.8 meters in height according to the offset agreement. Fencing will have to be phased over a period of time to provide for the protected area expansion strategy (PAES). Fencing will also require some negotiations regarding existing and proposed "give and take" arrangements to provide for better access control as well as to include important ecosystems now divided or excluded as part of current demarcation (Figure 13). Provision for demarcation is provided for in the APO under Objective 3.2: Secure the boundaries and maintain controlled access.

Roads

With the consolidation of different properties, the access (roads) and security (access points) will have to be aligned taking security and visual impact into account. Some of the public roads or multiple use roads will have to be negotiated with other road users regarding closing of multiple access points and/or alternative routes.

As soon as access points have been established directional signage from the N14 to the entrance of the nature reserve as well as to the administrative hub when in place will be put in place.

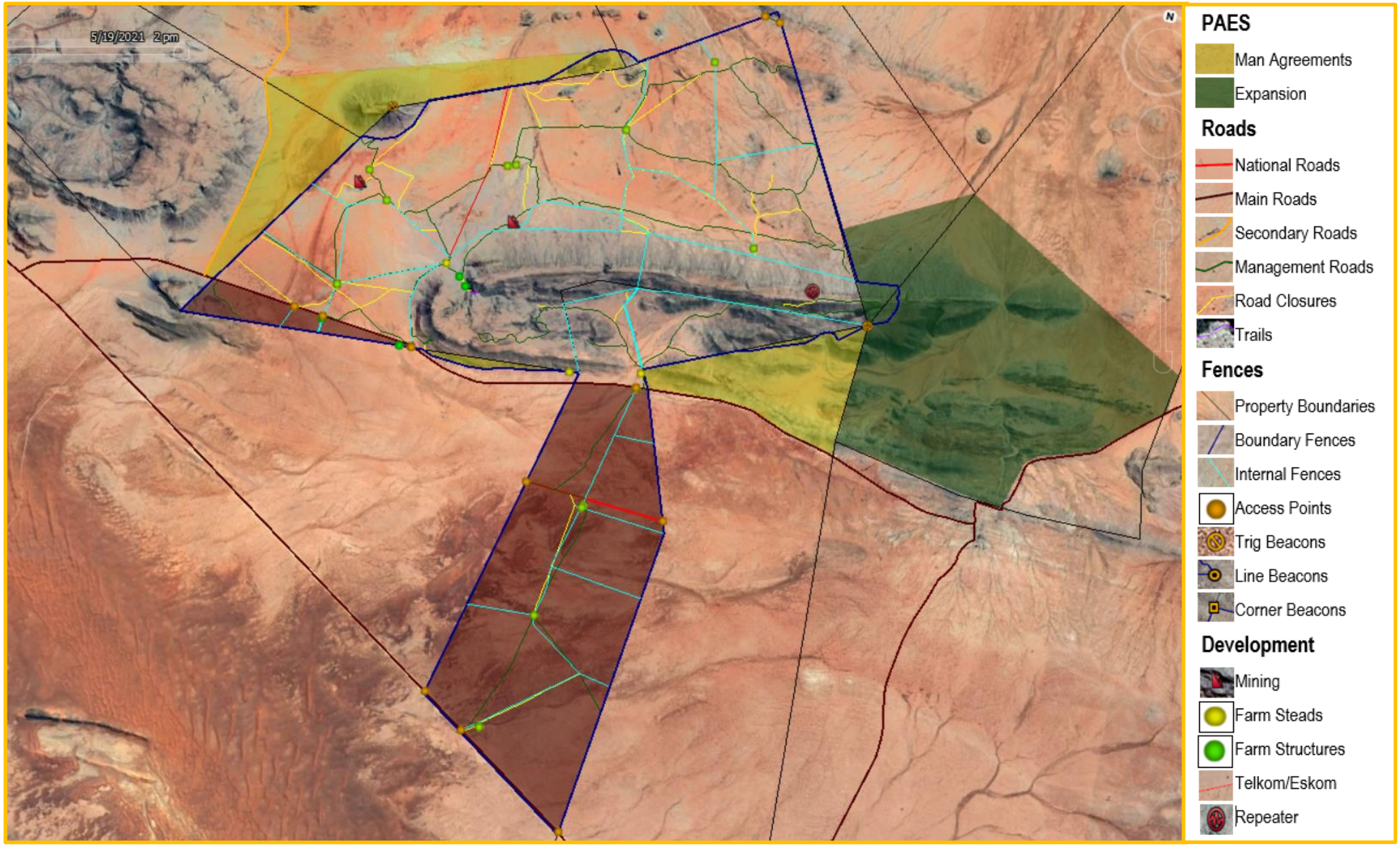
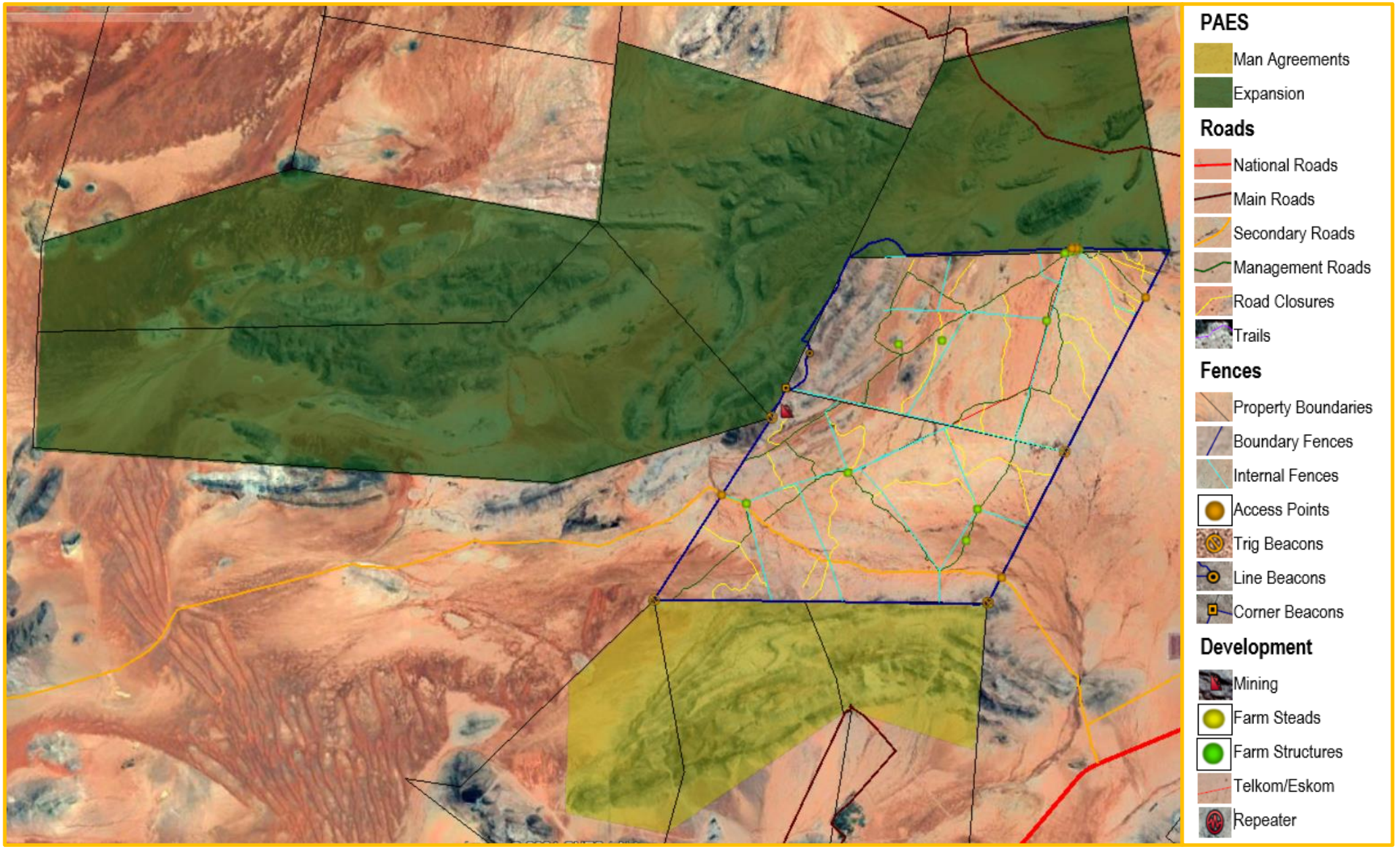


Figure 12: Map of Bulk services security and access
Achab Section



Rozynbosch section

2.4.12 Reserve Tourism

Any tourism activities will be according to the reserve CDF to establish a coherent spatial framework in and around the reserve to guide and co-ordinate conservation, tourism and visitor experience initiatives. The CDF will play an important role in minimizing conflicts between different users of the reserve by separating potentially conflicting activities such as hiking and day-visitor picnic areas whilst ensuring that activities which do not conflict with the reserve values and objectives (especially the wilderness value) can continue in appropriate areas. The area is ideal for nature-based recreation and tourism opportunities and an important destination for ecotourism.

The ARTP/CA – Integrated Regional Tourism Plan (Peace Parks Foundation, 2005) study has shown that the area has the potential opportunity to offer a unique product, in terms of pristine, diversity and un-spoilt arid environment.

This opportunity consists of the combination of the eco-tourism product (fauna, flora, geology, scenery etc.) with the recreational & cultural-tourism product. The study had identified Tourism Opportunities and Constraints in terms of attractions, access, amenities and awareness.

- **Attractions**

The whole range of unique attractions identified currently exist in the proposed PA, however these are not optimally established. The area is largely untouched and pristine, offering a unique and diverse unspoilt environment consisting of:

- Desert – The Gariep desert is the only mountain desert in the world;
- Mountains – The area is characterized by dramatic mountains that prove a forbidding landscape;
- Canyons – The area include some of the most impressive canyons in the region;
- Major rivers – The Orange River is South Africa's biggest river;
- Unique flora – The area form part of the Bushmanland Inselberg centre of endemism and is a biodiversity hotspot with unique endemics;
- Gorges & Cliffs – The arid environment and weathered geology provides a dramatic landscape with towering cliffs, deeply incised gorges and extensive plains; and
- Cultural history – The area has a rich cultural history from the early San people as can be seen from the rock paintings in the area.

The constraints which need to be dealt with include:

- Pastoral utilization and overgrazing may pose negative impacts on the environment and tourism;
- Infrastructure like power lines and public roads through the area, as well as renewable energy infrastructure may have a potential negative visual impact;
- The Orange River, a main and critical vein of life, is ecologically degraded;
- Present and previous mining activities provide negative visual impact and area threat to fauna and flora;
- Game densities are very low at present and
- Corridors for critical game movement and migration patterns from winter to summer rainfall areas & varying habitats are extremely limited. In an arid environment, nutritional value of the veld type is the primary factor in determining game densities.

- **Access**

Current access is seen as an important factor contributing to the relatively low usage of the area.

- Road access is good via the N14 main road; and
- Existing airstrips are to be found at Upington, Aggeneys, Springbok and Alexander Bay. There are currently very limited schedule flights to most of these destinations; however, the existence of these airstrips provides the infrastructure to deal with potential higher demand.

The constrains which need to be dealt with include:

- Existing airstrips have very limited scheduled flights; and
- There is no international airport in the region with the nearest national airport at Upington

- **Amenities**

Current amenities in the area are limited in performance and function.

- Various eco-tourism activities are taking place on an unstructured basis without any benefits to the local communities;
- At present most amenities are aimed at campers in strike and pitch camping sites with simple ablution facilities and 4x4 travellers; and
- The Orange River is also utilised for organized canoe trips. With the proposed Vioolsdrift dam there is also the potential for future water-based recreation activities.

Constraints which need to be dealt with include:

- The communities that have access to DEAT's 'Poverty Relief Funding' for tourism facilities lack the capacity and infrastructure to optimize the opportunity; and
- The range and dimension of products is limited.

• **Awareness**

Awareness of the area is generally very low, particularly amongst the national and international markets.

- The destination is best known to the 4x4 and canoe fraternities and hikers as an area of pristine, relatively inaccessible wilderness and as travel-through region for flower display tourism in Namakwaland.
- The destination is not promoted as part of a travel package by tour operators as is done for many of the other destinations in South Africa as it is perceived as being too remote to other destinations.

Constraints which need to be dealt with include:

- The area falls outside main established Southern African Tourism zones, routes and destinations that enjoy high awareness in the total tourism sector (including internationally).
- Overall project marketing is fragmented without a consolidated base.
- Individual product marketing is mostly of a low-level nature.
- The product lacks linkages and the perception of this result in the destination being considered inaccessible and remote.

A site-specific study for the reserve should however be undertaken to identify tourism opportunities and constraints in terms of attractions, access, amenities and awareness.

2.4.13 Social Context

Within the socio-economic context the Khâi-Ma Local Municipality includes inter alia the communities of Onseepkans, Blyvooruitsig, Pofadder and Witbank. Vedanta renders basic services to the inhabitants of Aggeneys, which has been proclaimed as a town. The inhabitants of Dwaggas Soutpans receive basic services from the employer (Khâi-Ma), while some of the employees has property in the Hantam Municipality.

The situational analysis and statistics presented in this chapter indicate the developmental challenges facing Khâi-Ma Municipality, such as poverty, unemployment, and service delivery backlogs.

The current macro-economic picture of the country can broadly be characterised as follows and impacts directly on Namakwa District Municipality and its local Municipalities, including Khâi-Ma:

- Economic and fiscal constraints (low growth in equitable share);
- rising unemployment and increasing inequality; (Closure of mining houses, middle class and poor);
- growing consumer indebtedness and inability to pay for services;
- growing indigency and Free Basic Services Bill (Some municipalities are averaging in excess of 80% e.g., Kamiesberg and Khâi-Ma);
- increasing debt owed to and by municipalities; (Eskom and Sedibeng, government, business and residents)
- Low revenue base for municipalities and increasing demand for maintenance (old infrastructure – mining towns);
- Climate change – drought, heat waves and shortages of water; and
- Energy pressures and bulk provision demands (paying constantly penalties to Eskom for exceeding demand).

The unemployment rate as well as the number of unemployed people in the District increased from 2008 and are presently the highest since data is available from 1996. This clearly indicates again that economic development and job creation is one of the urgent developmental issues in the District (Namakwa District Municipality, 2012). The Namakwa District Strategic Environmental Management Plan (SEMP. 2011) acknowledge that biodiversity underpins sustainable development as it provides many important ecosystem services such as forage production for livestock and water production that form the cornerstone of local economies and livelihoods.

The SEMP, (2011) also recognize the following primary agents of biodiversity loss within the Khâi-Ma Local Municipality (Todd et. al., 2009),

- the spread of alien vegetation (e.g., *Prosopis*);
- the unsustainable management of grazing land – resulting in the reduction of the veld carrying capacity;
- mining and crop growing;
- illegal plant and reptile collection;
- climate change;
- unsustainable water abstraction and
- human settlement expansion.

The SEMP. (2011) also acknowledge that the area is characterized by a unique environment and contains numerous areas of high conservation importance and high tourism potential. Tourism is a growing and developing sector within the area and its potential is yet to be fulfilled and the GBNR can assist in this regard in terms of eco-tourism. EPIP programs within the reserve to conserve biodiversity will also make a huge contribution to job creation. Among many promising projects is an initiative called the Working for Water Programme, which focuses on the removal of alien plants to encourage the regeneration of native vegetation and protection of watersheds. The program has created 3,600 jobs in the region and led to the clearing of nearly 500 km² of alien growth, one of the most impressive efforts of its kind in the world. There is also the possibility that TFCA status will help to encourage the 'biodiversity economy' in the region, and will promote eco-tourism.

With regard to the reserve domain the largest primary contributions to the economy are made by mining and agriculture. Mining activities consist of extraction of a variety of minerals (zinc, etc.). Extensive irrigation occurs at locations along the LOR, where the tendency has increasingly been towards growing high value orchard crops. Sheep and other livestock farming are found where the climate is more favourable.

Demographic projections show a steady decline in the population in the region over the next 25 years. Economic activity is likely to remain dependent on mining and irrigation for the foreseeable future, with modest contributions from ecotourism. There is considerable seasonal migration of labour. Outside the small towns along the river there are negligible infrastructure or community services. Any significant developments will make a meaningful contribution to the regional economy.

2.5 Local and Regional Planning

The GBNR is located within the Khâi-Ma Local Municipality, which forms part of the Namakwa District Municipality of Northern Cape. The Namakwa District Municipality has developed an Environmental Management Framework (EMF) and Strategic Environmental Management Plan (SEMP) in order to provide a high-level plan for sustainable development in the Namakwa District Municipality of the Northern Cape Province that also cover the Khâi-Ma Local Municipality.

The EMF and SEMP provide an evaluation of the state of the environment, sets out an environmental vision and details the constraints, opportunities, management measures, monitoring indicators and desired state of the environment for the various environmental elements. The management measures in the SEMP acknowledge the need for social and economic development and provide strategic issues which should be addressed to take advantage of the environmental goods and services in the district. On

the other hand, the strategic issues in the SEMP provide strategic actions that should be taken to protect and conserve environmental resources including nature reserves.
The Environmental Management Framework (EMF), the spatial section of the study, is presented as a series of environmental management zones which present the sensitive aspects of the environment, which land uses are suitable in each zone and which environmental studies should be conducted for proposed developments in each zone. The EMF is presented as a map showing the Environmental Management Zones. There are six Environment Management Zones and one additional zone for areas where insufficient information exists to decide. The seven zones are named from A to G and all protected areas are provided for in zone A and is describe as areas that includes a number of environmentally sensitive features and development should be avoided. If the development is critical to the economic and social wellbeing of the local population, utmost care should be taken to avoid impacts and mitigate where possible (Namakwa District Municipality, 2012).

2.6 Reserve Expansion

A National Protected Area Expansion Strategy (NPAES) was compiled for South Africa in 2008. The aim of the NPAES is to achieve cost-effective protected area expansion that will ensure a) ecological sustainability and b) increased resilience to climate change. The NPAES sets five- and twenty-year protected area expansion targets; identifies focus areas for protected area expansion; and makes recommendations on potential mechanisms through which protected area expansion could be achieved. The GBNR is included in one of the focus areas identified for protected area expansion by the NPAES, namely the Kamiesberg Bushmanland Augrabies focus area number 15.
Conservation action in this area should be aimed at reducing further habitat loss and ecosystem functioning as well as identifying approaches to increase protection for the vegetation types that require it.
With regard to the provincial PAES the GBNR form part of the Bushmanland primary focus area number 10 and any expansion must be directed towards forming linkages between the Bushmanland focus area number 10, the Nababiep Steinkopf Harasberg focus area number 11 and the Augrabies Falls focus area number 9 as part of the Greater Gariep TFCA initiative. The protected area expansion strategy is provided as a subsidiary plan to this SMP.

2.7 Strengths, Weaknesses, Opportunities and Threats

Table 11 lists the key strengths, weaknesses, opportunities and threats that were identified for the GBNR.

Table 11: SWOT analysis for the Gamsberg Nature Reserve

KEY STRENGTHS
• Form part of the Greater Gariep TFCA; • Exceptional scenic and wilderness qualities; • Peaceful and pristine environment; • Wealth of archaeological and historical artefacts and sites; • Supports a high diversity and abundance of reptile and plant species and is the core of the Busmanland Inselberg center of endemism; • Easily accessible by tourists from the N14; • Good relationship with local mining companies; and • Funding committed through formal agreement with local mining company.
KEY WEAKNESSES (ISSUES & CHALLENGES)
• Lack of infrastructure, administration hub; • Lack of management and access roads to and throughout the reserve; • Appropriate institutional arrangements are required to facilitate active involvement of local stakeholders in decision making; • Formal protection of the domain is required to better secure management of the area; • No biodiversity management procedures are in place at the reserve; • The reserve is fenced but needs upgrading and Illegal access is therefore be a problem;

- The reserve's remote location makes it less accessible to tourism; and
- The range and dimension of products is limited.

OPPORTUNITIES

- Potential for greater collaboration with other conservation initiatives to support management objectives;
- Potential for research and monitoring by tertiary institutions through support from Vedanta;
- Potential to improve tourism facilities, including the road network, in order to allow better access throughout the reserve;
- Potential to promote day visitors' facilities throughout the year;
- Potential for job creation; and
- Potential for tourism-related benefits accrue to local target communities.

THREATS

- Biological, Ecological and Archaeological resources collected from the reserve for the international market;
- Uncontrolled access to the site and not adequately monitored;
- Ecologically sensitive area and parts are ecologically degraded;
- The occurrence of exotic plants within catchment areas;
- Poor road conditions make vehicle access for management purposes difficult;
- Potential conflict between conservation and community land use objectives could undermine the proposed expansion of the PA;
- The expansion of mining and the indirect impacts of mining activities on the broader landscape (pollution, water abstraction, pesticide drift and the transformation of natural habitat) and renewable energy and electricity grid infrastructure;
- Agricultural and mining activities can lead to modifications to the natural river and wetland areas to facilitate water abstraction; and
- High levels of water abstraction in this naturally arid area can result in a lowering of the water table, with associated knock-on impacts that are difficult to predict.

3. STRATEGIC PLANNING FRAMEWORK

3.1 Purpose

The GBNR was initially proclaimed to conserve biodiversity of the Bushmanland Inselbergs in all its natural facets and fluxes (i.e., changes) and to provide human benefits in such a manner that detracts as little as possible from the natural qualities of the reserve.

In present times, four of the most important contributions of protected areas are:

- biodiversity conservation and ecological sustainability;
- adaptation to climate change;
- land reform and rural livelihoods; and
- socio-economic development, including ecosystem services.

Some of them were only partially realized through the initial goals of the GBNR that included the following:

- To conserve the biodiversity and life-support mechanisms of GBNR and the surrounding area;
- To implement an integrated environmental management strategy (CDF);
- To preserve and promote the cultural and historical heritage as well as the aesthetic and spiritual value of GBNR and the surrounding area; and
- To ensure local community involvement by securing access to and sharing benefits from natural and cultural resources.

In present times, the value of the GBNR as a conservation area can also be attributed to the following:

- It is of biodiversity significance because it forms part of a global hotspots, viz, the Succulent Karoo (SK);
- It includes areas identified as irreplaceable and vulnerable through the SKEP biome-wide conservation planning projects;

- It forms an integral part of the Richtersveld TFCA;
- It forms part of a focus areas for land based protected area expansion in terms of the National Protected Area Expansion Strategy (NPAES, 2008);
- It contains areas classified as "important and necessary" in terms of Critical Biodiversity Values (CBA,s);
- It has a wealth of archaeological and historical artefacts and sites;
- It is situated within areas classified as a Herpetofauna, Insect, Plant and Bird hotspots and centre of endism; and
- It supports a high diversity and abundance of endemic species especially succulents.

3.2 Reserve Values

The following key values of the GBNR were identified by the RPT:

Table 12: Key values associated with the Gamsberg Nature Reserve

KEY RESERVE VALUES
• The GBNR is of biodiversity significance because it forms part of a global hotspot, viz, the Succulent Karoo (SK); • The GBNR includes areas, which have been identified as irreplaceable, and vulnerable through the SKEP[10] biome-wide conservation planning projects; • The fact that the PA forms an integral part of the Greater Gariep TFCA; • The Richtersveld and Gariep Desert Bioregion, in which the PA is located, form part of the focus area for land based protected area expansion in terms of the National Protected Area Expansion Strategy (NPAES, 2008); • The reserve contains areas classified as "important and necessary" in terms of Critical Biodiversity Values (CBA,s); • It is situated within areas classified as a Herpetofauna, Insect, Plant and archaeological hotspots and centre of endemism; and • It supports a high diversity and abundance of endemic succulent, reptile and insect species.

3.3 The Reserve Vision

The vision of the reserve describes the overall long-term goal for the operation, protection and development of the GBNR. The vision of the GBNR is a collaborative partnership between the management authority and the surrounding communities in the conservation and sustainable use of the unique Inselberg ecosystem of the area.

From this partnership, it is envisaged that the following will be secured:

- Conservation of genetic diversity essential for the functioning of ecological processes;
- Conservation of the biodiversity of the fauna and flora and life-support mechanisms;
- Preservation of the species of special concern found in the area and the habitats present within the reserve;
- Implementation of an integrated environmental management strategy;
- Quality of life of rural communities are improved by developing opportunities for tourism; and
- Equitable access to, and responsible use of, the reserve and its natural resources for the benefit of present and future generations through strategic partnerships.

3.4 Key Performance Areas and Objectives

The RPT identified 24 Objectives for the GBNR (Table 13). Collectively these objectives are anticipated to contribute to realizing the Vision for the reserve.

These objectives have, in turn, been grouped into six Key Performance Areas (KPAs), as follows:

[10] Succulent Karoo Ecosystem Programme.

Table 13: Key Performance Areas and Objectives of the Gamsberg Nature Reserve

KEY PERFORMANCE AREAS (KPA)	OBJECTIVES
KPA 1: Biodiversity and Heritage Conservation	1.1 Obtain **Biodiversity knowledge** about the PA; 1.2 **Restoration and mitigation** of degradation; 1.3 Maintenance of **ecological processes** in the PA; 1.4 Maintenance of critical **ecosystem services;** 1.5 Land **use** planning and management **outside of the protected area;** 1.6 Water **use** planning and management **influencing the protected area;** 1.7 Audit achievement of **biodiversity targets;** 1.8 Manage and **mitigate** the **environmental impacts** of conservation management, tourism, recreation and natural resource use in the PA; and 1.9 Protect the **heritage resources** of the PA.
KPA 2: Recreation, Marketing, Education, Awareness and Interpretation	2.1 Develop, deliver and maintain a diverse range of **tourism and recreational services** for visitors to the PA in accordance with CDF; 2.2 Develop and implement a focused and cost-effective **marketing** program for the PA; and 2.3 Develop and implement a focused and cost-effective **awareness-raising and educational program** for the PA.
KPA 3: Enforcement, Security and Access Control	3.1 Secure the **legal tenure** of, and **management authority** for the PA; 3.2 **Secure boundaries** of, and maintain **controlled access** to, the PA; and 3.3 Sustain an effective **law enforcement and compliance capacity** in the PA.
KPA 4: Infrastructure and Equipment	4.1 Acquire and maintain **operational equipment and vehicles** for the PA; 4.2 Construct, maintain and upgrade the **administration infrastructure and bulk services** infrastructure in the PA; and 4.3 Construct, upgrade and maintain day and overnight visitor **buildings and infrastructure** in the PA.
KPA 5: Stakeholder Involvement	5.1 Interaction with **stakeholders and communities** in the planning, development and management of the PA; 5.2 Actively participate in **local and regional conservation** and **socio-economic development** initiatives that may affect or benefit the PA; and 5.3 Develop, implement and maintain effective mechanisms for ongoing communications with **co-management partners.**
KPA 6: Administration and Planning	6.1 Institute and maintain an effective **management planning** capability in the PA; 6.2 Maintain an adequately equipped, resourced and trained **staff complement** for the PA; and 6.3 Institute and maintain an effective **financial, administration and planning** capability in the PA.

3.5 Conservation Development Framework (CDF)

The CDF is a strategic spatial plan for the reserve and its surrounds that indicates a range of visitor use zones, areas requiring special management intervention, the placement of visitor facilities, the nature and size of these facilities, entry points and movement routes through the reserve. It also provides guidelines for potential future development, rehabilitation and the management of land-use along the reserve borders. The CDF is underpinned by a thorough analysis of the biodiversity, cultural-heritage and landscape limits to development, as well as the tourism opportunities. Sensitivity-value analysis is a decision support tool for spatial planning that is designed to integrate best available biodiversity information into a format that allows for defensible and transparent decisions to be made. The CDF for the reserve is not yet fully developed as the reserve is in a transition between having a zonation plan and a fully developed CDF (which will include the Use Zone Map). One of the elements underlying the CDF not yet fully developed is a full tourism market analysis and detailed analysis of all development nodes. Other element of the CDF still to be considered further in future are resource use potential and better interfacing with municipal Integrated Development Plans and Environmental Management Frameworks. The development of the initial CDF for the reserve followed the generic planning process and basic planning principles for all reserves as described in Appendix 2.

3.5.1 Use Zone map and development sites

3.5.1.1 Determine use zones

- This step of the CDF process is a requirement for all reserves in terms of the NEMPAA. A draft was exposed to all stakeholders and amended as required by the PAA that is now submitted to the Executive Management for ratification and approval by the MEC as part of this IMP.
- This process was informed largely by the sensitivity map and reserve policies and planning principles.
- The generic set of visitors use zones for all reserves was used as a guideline.

3.5.1.2 Determine locations for future development of specific facilities

- Informed by the use zones, regional influences, visitor requirements, market needs and other informants, sites for potential visitor facilities and alternates were identified.
- At the same time potential transport routes and alternates are identified and the standards for all roads, footpaths and cycle routes will be set.
- Using the principle of SEA the alternate sites will be critically examined and the most suitable location decided on.
- The scale of development and the numbers of visitors need to be informed by an assessment of cumulative impacts for the whole reserve.

Based on available information, and in consultation with the RPT, the Conservation Development Framework (CDF) (Annexure 1) is presented as a strategic spatial planning framework for the GBNR and its surrounds. The CDF describes the objectives, characteristics, uses, management guidelines and broad conservation and tourism infrastructural requirements designated for each of the use zones shown in Figure 14. Each of these zones has criteria for the type of activities, interaction with other users the type and size of facilities, the sophistication of facilities and the standard of roads.

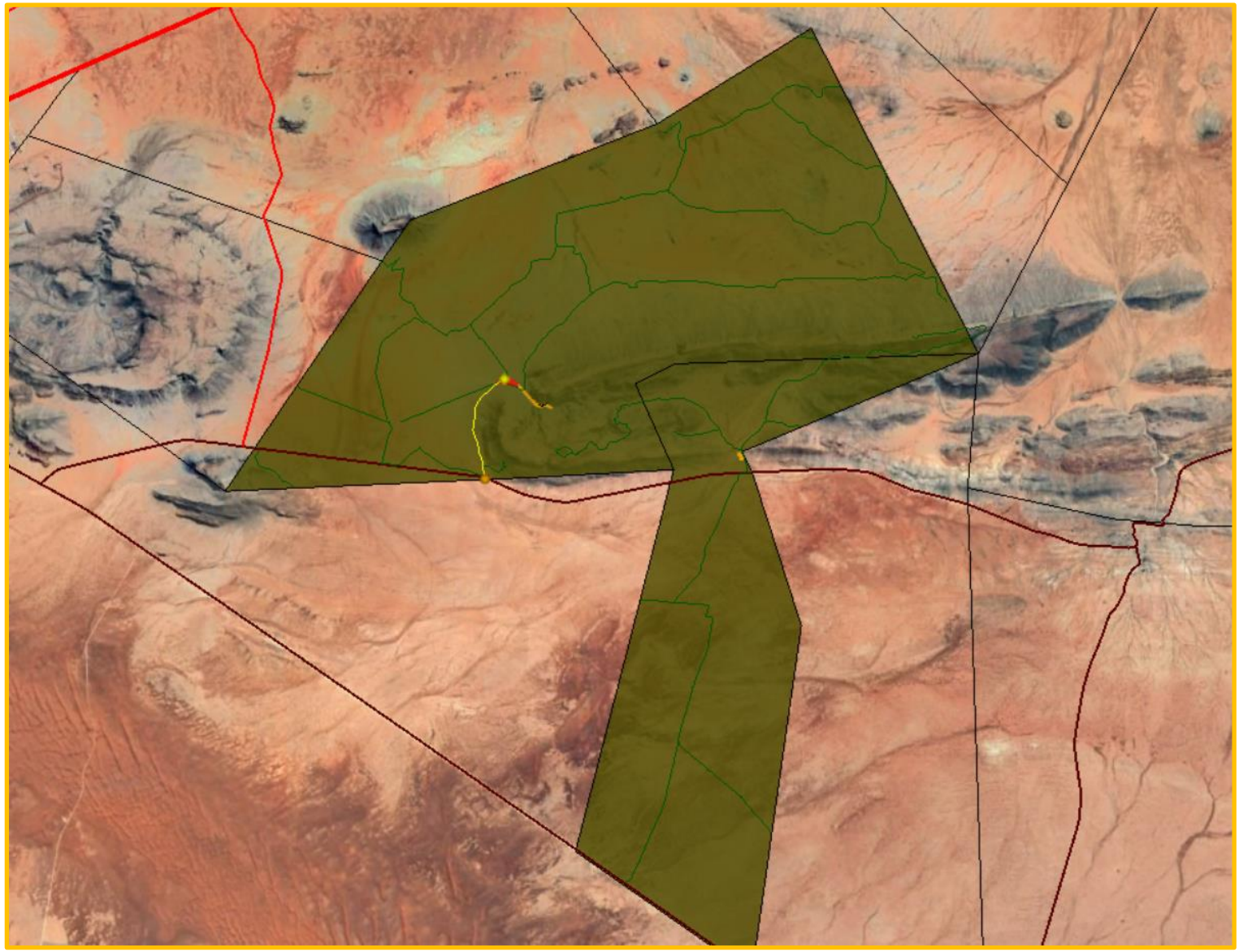
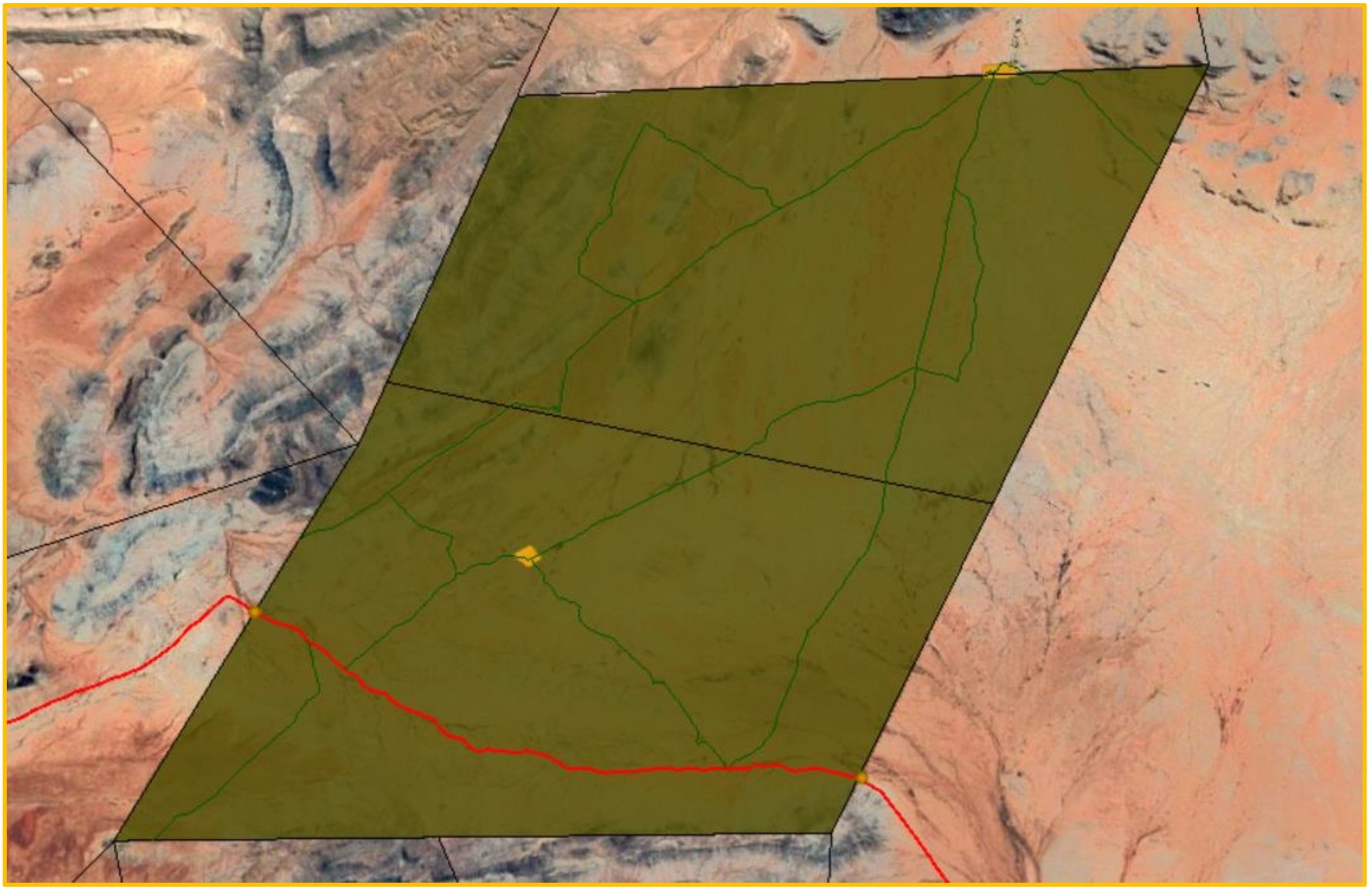


Figure 13: Use Zone Map for the Gamsberg Nature Reserve
Achab Section (Refer CDF for description)



Rozynbosch section (Refer CDF for description)

4. OPERATIONAL MANAGEMENT FRAMEWORK

The Operational Management Framework translates each KPA and it's set of related objectives into:

- Guiding management principles to guide decision-making and operations including:
  - International Conventions, Commissions and Treaties;
  - National Acts and Regulations;
  - Provincial legislation and municipal bylaws;
  - Policies to guide decision-making and operations and strategies relating to implementation; and
  - Standard Operating Procedures (SOP's) on how to implement policy and strategy including:
    - Frameworks;
    - Norms and Standards; and
    - Protocols

  (Guiding management principles are provided for in the Annual OMF with copies of the relevant documents as part of the SKDR.)
- Management actions and targets that should be implemented to achieve the PA objectives and the resources required to implement it.
- Key norm and standards and principles

Management actions according to priority, management targets and performance indicators are provided for in the APO together with Time Frames, Responsibilities and Cost estimates. The APO provided as subsidiary plan to this document.

4.1 KPA 1: Biodiversity and heritage Conservation

4.1.1 Objective 1.1: Obtain Biodiversity knowledge about the PA

4.1.1.1 Key Norms and standards[11]

- ❖ Ensure proper planning in the establishment or expansion of the protected area
  - ➢ A biodiversity resource inventory for the protected area is maintained and monitored.
    - Priority species, habitats or ecosystems have been identified;
    - Information on these species, habitats and ecosystems is sufficient to support planning and decision making and little additional information is required to manage the protected area's biodiversity; and
    - A monitoring programme for these species habitats and ecosystems is in place.
  - ➢ A cultural heritage resource inventory for the protected area is maintained.
    - There is a comprehensive inventory of cultural heritage resources.
- ❖ Ensure that each protected area has an approved programme identifying research needs and a monitoring plan according to the management plan of a protected area.
  - ➢ A research programme for the protected area is being implemented.
    - Research provides for management application (where possible and allowed for by budget);
    - Scientific decision support is available and or facilitated;
    - Management orientated research projects form a substantial part of the programme;
    - Results of research projects are fed back to protected area management;
    - The results are used to adapt management of the protected area where relevant;
    - There is an approved research plan with all research requirements;
    - There is a number of approved projects in place;
    - There is a platform in place to give feedback of research results;

[11] The norms, standards and indicators is according to the "Norms and standards for the management of protected areas in South Africa" published in terms of NEM:PAA Act (57/2003) under General Notice 528.

- There are research records in place;
- Distinction between research for management purposes and that done by outsiders which may not have direct applications and managing the external researchers; and
- Researchers to comply with ethical research procedures.

➢ A monitoring programme for the protected area is being implemented.

- The protected area has developed an applicable monitoring programme supporting management objectives, and provide for review of the programme;
- Indicators for monitoring have been established; and
- The results of the programme are used to adapt management of the protected area where relevant.

4.1.1.2 Principles[12]

- The Research and Monitoring Program (RMP) should be developed, where relevant, to align with and complement national and international monitoring systems (Teder et al. 2007);
- The RMP recognises that monitoring is required at multiple levels and scales and that monitoring objectives are often hierarchical. In this way, standard approaches facilitate aggregation of information across ecosystems and into organisational, national and global measures (Teder et al. 2007);
- Clear, rigorous and relevant sets of objectives, hypotheses and methods must be established for each monitoring programme (Nichols & Williams 2006), with feedbacks between scoping, design, testing and implementation phases (Reyers & McGeoch 2007);
- Monitoring programmes should be designed using best scientific practice and current understanding, and be supported by integrated, long-term and question- driven research (Pringle & Collins 2004; The Royal Society 2003; Nielsen et al. 2009);
- Where possible and appropriate design monitoring programmes using well-established, widely applied techniques and methods, that capitalise on technological developments (e.g., remote sensing, Margules et al. 2003; Soberon & Peterson 2009);
- Minimum monitoring requirements should initially be established independently of current capacity and resource constraints, whereafter cost-effectiveness assessments, prioritisation and staged implementation options should be evaluated (Gardner et al. 2008);
- Few, well-implemented monitoring programmes (including the indicators and thresholds of concern that underpin them) are preferable to many under-developed programmes, or programmes that cannot be sustained because of capacity limitations (Biggs & Rogers 2003; Timko & Innes 2009);
- Planning for analysis, reporting, data management, archiving and programme integration must be incorporated as essential elements during the design of the RMP (Spellerberg 2005; Field et al. 2007; Flenry et al. 2008). This includes planning for the translation of results and outcomes into actions and advice relevant to management and/or policy development, that is, to complete the adaptive management cycle;
- Monitoring programme proposals should be peer-reviewed prior to implementation, and thereafter should have regular review cycles; and
- The PMP will not necessarily exclude other monitoring activities (current or future), and additional monitoring with highly localised and perhaps shorter-term objectives may be necessary. Where such activities and projects exist or are implemented, they will add value to and are likely to complement the RMP and should be integrated into the RMP.

[12] The policy (principles) guiding the development of Biodiversity Monitoring System (BMS) and the Biodiversity Monitoring Programmes (BMPs) in this section were developed by SANParks.

4.1.2 Objective 1.2: Restoration and mitigation of degradation

4.1.2.1 Norms and standards

- ❖ Ensure that the protected area has visitor facilities that contribute positively to the experience without negatively affecting the environment and biodiversity.
  - ➢ Visitor facilities are established in line with the protected area objectives, and in response to tourism market demands, and contribute positively to the visitor experience
    - There are active programmes for restoration of degraded areas in the protected area and/or associated buffer zone, resulted (resulting) from visitor use; and
    - Areas in the protected area suffering from degradation or damage as a result of visitor use are subject to a rehabilitation plan;
- ❖ Ensure Biodiversity resources are managed to meet the protected area objectives as set out in the management plan.

The protected area is implementing an effective invasive species control and eradication (programme) strategy, as required in terms section 76 of the National Environmental Management: Biodiversity Act, 2004 (Act No 10 of 2004)

4.1.2.2 Principles [13]

- PA management shall strive to remove all alien species where possible, control, maintain and where necessary, restore previously invaded or planted areas, in order that these sites resemble or form part of the functioning landscape and ecosystem;
- DAERL recognises that invasive alien species are one of the greatest threats to the biodiversity of the reserve estate;
- Under the guiding international conventions, national legislation, and by means of its own objectives, invasive alien species impact on and harm the core conservation business of Provincial Reserves;
- DAERL as the leading conservation organization in the Northern Cape, has a responsibility to lead by example, provide awareness and educate the broader community about invasive alien species in the interests of the province ecological and economic environment;
- Implement rules applicable to use and control of ornamental plants within Nature Reserves including rules under which camps and personnel villages will be surveyed and cleared, as well as rules for replacement and use of plants for landscaping and ornamentation. These principles must also be captured in the Code of Conduct which guides staff residing in the reserve, as well as plants used for ornamental purposes at tourism facilities;
- Identify associated research and monitoring needs; and
- Highlight potential risks or threats.
  - Map the parcels of land under the control of the Protected Area Management Authority, in management unit compartments;
  - Compiling the List of Invasive Species for each management unit compartment;
  - Describing the prioritization of the land parcels in the management unit compartments;
  - Assessing the extent of infestations;
  - Reporting on the efficacy of previous control or eradication measures;
  - The current measures to monitor, control or eradicate Listed Invasive Species; and
  - The measurable indicators of progress and success, and indications of when the Control Plan is to be completed.

[13] The guidelines in this section were developed by DEA as part of the Guidelines for species listed as invasive in terms of Sec 70 of NEM:BA, 2004 (Act No. 10 of 2004) and as required by Sec 76 of this Act.

- Identify redundant structures and impacted sites within the PA which require removal and/or rehabilitation in order to restore wilderness qualities and 'sense of place' and also to improve ecosystem functioning;
- Prioritise rehabilitation goals with highest priority given to wilderness zones and areas bordering on those zones; and
- Determine the rehabilitation needs for the next five years with associated timeframes and projected funding requirements;

4.1.3 Objective 1.3: Maintenance of ecological processes in the PA

4.1.3.1 Norms and standards

- ❖ Ensure proper planning in the establishment or expansion of the protected area
  - ➢ The management of a protected area contributes to the maintenance of ecological processes.
    - The management of a protected area includes the operational management framework to ensure monitoring of ecological processes;
    - The management of a protected area effectively maintains the environment for ecological processes critical for the achievement of biodiversity targets;
    - Ecological processes are being effectively maintained with the result that ecological integrity and biodiversity are not being compromised;
    - The management of a protected area has a monitoring system in place; and
    - The management of a protected area has a system to mitigate ecosystem threats in place.
- ❖ Ensure the approved management plan is implemented accordingly to meet the objectives set in the management plan.
  - ➢ Biodiversity resources are managed to meet the protected area objectives as set out in the management plan.
    - An effective fire management programme for the protected area is implemented - where relevant;
    - The protected area is adequately managed for sustainable use of resources, where applicable;
    - The protected area has management guidelines for the sustainable use of biological resources;
    - The biodiversity assets and values are being managed consistent to objectives;
    - The impact of legal and illegal extractive use of biological resources is being monitored - where applicable; and
    - Species management plans as required in terms of NEM: Biodiversity Act, 2004 (Act No. 10 of 2004) are approved.
- ❖ Existing DAERL strategies relating to management of ecological processes:
    - Wildlife management strategy for provincial nature reserves in Northern Cape.
      - ➢ game census on provincial nature reserves;
      - ➢ national norms and standards on hunting on PA's;
      - ➢ procedures for game registers on provincial nature reserves;
      - ➢ procedures for the introduction of mammals into provincial nature reserves including provincial and national translocation policy;
      - ➢ Procedures on the donation of game;
      - ➢ Provincial directive on the control and management of damage-causing wild animals in Northern Cape Province; and
      - ➢ Removal of game from (provincial) nature reserves;
    - Vegetation monitoring strategy for Provincial nature reserves in Northern Cape.
- ❖ The reserve shall conform to the legal requirements of the NVFFA.

- Unplanned wildfires that occur in areas where it could have undesirable ecological effects, threaten reserve infrastructure or threaten neighbouring properties shall be suppressed or controlled wherever possible;
- Unplanned wildfires that occur in reserve areas where it will do no ecological harm and/or threaten properties may be allowed to burn, provided that safety concerns are not compromised;
- Fire protection measures and resources (equipment, trained personnel, firebreaks, etc.) must be maintained and effective in the reserve at all times;
- The reserve management shall, wherever possible, establish partnerships with neighbours and other role-players through agreements and membership of FPAs; and
- Controlled block burns can only be implemented after an ecological assessment of the dry matter/fuel load has been completed.

4.1.3.2 Principles [14]

- Respect the complexity, as well as the richness and diversity of the socio-ecological systems making up the PA and the wider landscape and context;
- Respect the interdependency of the fundamental drivers of landscape diversity, the associated biotic and landscape diversity, and the aesthetic, cultural, educational and spiritual attributes;
- Strive to maintain natural processes in ecosystems, along with the uniqueness, authenticity and worth of cultural heritage, so that these systems and their elements can be resilient and hence persist;
- Manage with humility the systems under our custodianship, recognising and influencing the wider socio-ecological context in which we are embedded;
- Strive to maintain a healthy flow of ecosystem and cultural goods and services (specifically preserving cultural artefacts), and to make these available, also through access to reserves, thereby promoting enjoyment, appreciation and other benefits for people;
- When necessary, intervene in a responsible and sustainable manner, complementing natural processes as far as possible, using only the level of interference needed to achieve our mandate;
- Do all the above in such a way as to preserve all options for future generations, while also recognizing that systems change over time;
- Acknowledge that conversion of some natural and cultural capital has to take place for the purpose of sustaining our mandate, but that this should never erode the core values above;
- Biodiversity forms an important basis of the ecosystem services that sustain the benefits that humans derive from conservation;
- People are seen as part of ecosystems, though the ways in which they interact with ecosystems may vary widely in different PA's and circumstances;
- We measure our performance in all that we are mandated to do;
- We are responsive to the impact of other value systems on biodiversity such as cultural and tourism values;
- We are concerned, and responsible, for the implications of our conservation management decisions/actions;
- Co-operative governance is seen as a central guiding principle, and collaborative methodologies are thus seen as fundamental;

[14] The principles in this section were developed by SANParks's as part of fulfilling their mandate for biodiversity custodianship.

- We treat all biodiversity elements (all species, ecosystems, processes, structural components, etc.) with equity;
- We strive to maintain a balance between the management of biodiversity and cultural heritage;
- Wildlife management in the reserve must be focused primarily on protecting the ecological functioning of the reserve;
- Wildlife stocking densities should be maintained within the ecological capacity of the supporting habitats of the reserve;
- A regular programme for monitoring the veld condition, the animal numbers and the physical condition of animals must be in place to ensure that the ecological capacity of the reserve is not exceeded;
- Population management of wildlife species shall be required to ensure that such species are not causing the ecological degradation of the reserve; and
- Wherever feasible, non-lethal and environmentally-friendly measures should be implemented to limit, or mitigate, the impacts of any indigenous damage causing animal in, or escaping from, the reserve.

4.1.4 Objective 1.4: Maintenance of critical ecosystem services

4.1.4.1 Norms and standards

❖ Ensure proper planning in the establishment or expansion of the protected area

➢ A protected area contributes to the socio-economic benefits of the surrounding communities.

- The protected area management has identified the ecosystem services that the protected area and neighbouring land-users are reliant upon; and
- The ecosystem services are being effectively maintained with the result that the protected area and neighbouring land users are deriving most benefit from these services.

4.1.4.2 Principles[15]

- Precautionary approach - The "precautionary approach" must apply. This is interpreted as:
  - leaving an appropriate „margin of error" where information is inadequate;
  - prohibiting or preventing use of resources in instances where the consequences of erring could be severely negative for species, heritage resources, cultural landscapes and/or ecosystems; and
  - Terminating resource use activities if doubt arises as to the sustainability or impacts on the PA.
- Maintenance of system integrity - The ecological, aesthetic, socio-cultural, archaeological and spiritual integrity of protected areas must not be jeopardised in the long-term in order to satisfy short-term needs/demands;
- Cost-benefit analysis - The benefit-cost ratio to DAERL must be positive;
- Determination and evaluation of potential influence of utilising resources
- The thresholds of potential concern for use on affected species, heritage resources, cultural landscapes and ecosystems must be determined and evaluated using methodology that is appropriate for this purpose. This must consider the effects of resource use on population dynamics, ecosystem functioning and social and cultural values. This must be achieved in an integrated manner, incorporating all relevant scientific, formal and informal information and knowledge (including traditional knowledge);

[15] The principles in this section were developed by SANParks's as part of fulfilling their mandate for biodiversity custodianship.

- Cost recovery - Costs must be recoverable from resource users who are able to pay, and it should be possible to leverage „contributions in kind" from users who are unable to pay. Cost recovery also includes the costs of monitoring programmes that are required to manage resources in a sound manner;
- Adequate capacity - Appropriate human and financial resources must be available to manage, monitor and regulate resource use;
- Adaptive management - Resource use must be managed adaptively, accompanied by constant learning based on monitoring, information gathering and research;
- Incentives - Incentives for sustainable resource use and disincentives for unsustainable or wasteful use must be put in place;
- Ethics - Accepted ethical norms and standards must be adhered to;
- Redress - Past inequalities must be addressed through benefiting the poor, but without undermining the diversity of people's livelihood strategies;
- Respect for rights - Intellectual property rights and historical claims to resources must be respected;
- Co-management – Decision-making must be consultative and transparent. All stakeholders involved in resource use should accept responsibility for sustainable use;
- Enforcement - Illegal resource use must be prevented through law enforcement;
- Rights and responsibilities: While DAERL acknowledge the responsibilities outlined above, it also has the right to choose which resources it will make available and how much, as well as the right to withdraw if necessary (i.e., the use of a resource does not automatically constitute the source as being permanent);
- The reserve regards any action that utilizes or impacts on the scenery, sense of place, soil, water, air and nutrient cycles, habitats, heritage resources, flora and fauna, and the interrelatedness between these, as a resource use;
- The reserve recognizes that it has a responsibility to ensure that natural and cultural resources which are not harvested from within the PA boundaries, but are used in the PA, are collected and harvested in an ethical way that conforms to DAERL policies;
- Strive to maintain a healthy flow of ecosystem and cultural goods and services (specifically preserving cultural artefacts), and to make these available, also through access to reserves, thereby promoting enjoyment, appreciation and other benefits for people;
- Biodiversity forms an important basis of the ecosystem services that sustain the benefits that humans derive from conservation;
- Our understanding and management must reflect the social imperatives (e.g. transformation, equity, efficiency, empowerment, growth) of an emerging African democracy; and
- Whenever feasible and justifiable, we strive to implement the option which best serves local community needs.

4.1.5 Objective 1.5: Land use planning and management outside of the protected area

4.1.5.1 Norms and standards

❖ Promote and or ensure the positive involvement of the protected area management in planning outside the protected area which may affect its integrity.

➢ An appropriate buffer zone for the protected area has been established.

- The protected area has identified a buffer zone in its management plan;
- The protected area has mechanisms to facilitate the implementation of the buffer zone;
- The protected area management has proactively sought to encourage neighbours to introduce conservation-friendly land uses to enhance buffering of the protected area; and
- A policy for controlling activities in the buffer zone has been developed and is implemented.

- A protected area is integrated into land-use planning outside of the protected area
  - Management authorities play an active role in land use planning affecting the protected are; and
  - The land-use planning takes cognizance of the protected area and the achievement of protected area management objectives.
- Promote compliance with NEMA, 1998 (Act No 107 of 1998) Environmental Impact Assessment Regulations, 2014 Listing Notice 3 of 2014 under sections 24(2), 24(5), 24D and 44, read with section 47A (1) (b) of the National Environmental Management Act, 1998 (Act No. 107 of 1998), in Gazette No. 38282 dated 04 December 2014 – Northern Cape Province

❖ Contribute to a good relationship between the protected area staff and neighbouring communities.
- Neighbour relations contribute positively to the success of the protected area.
  - A zone of influence has been identified;
  - A programme to encourage the development and maintenance of good relations with neighbours in the zone of influence is in place; and
  - There is a formalized programme of regular interaction between protected area management and neighbouring land users;
- The protected area staff regularly collaborate with partners, local communities and other organizations;

4.1.5.2 Principles[16]

- Develop and introduce appropriate strategies, mechanisms and incentives to integrate the reserve within the broader ecological and social landscape, and encourage conservation in adjacent private and communal areas;
- Support and promote activities adjacent to protected areas that are compatible with and which complement the objectives of the protected area;
- Discourage development in areas in which biodiversity and ecological function would be adversely affected.
- Conserve and make sustainable use of biological resources in the buffer zone and avoid or minimize adverse impacts on the biodiversity of such areas;
- Support the development of community-based biodiversity management initiatives as part of a broader set of approaches to land-use planning and developing local sustainable development strategies;
- Promote the development of partnerships between the management authority, other conservation authorities, community organisations, non-governmental organization (NGOs), and private entrepreneurs for purposes of planning and managing the use of resources within the PA zone of influence, and optimising benefits for local people;
- Enhance the capacity of communities residing in or adjacent to protected areas to participate in protected area management through providing appropriate training and education, and through recognising local expertise and traditional institutions;
- Take steps to avoid or minimize damage caused to people and property by wildlife; and
- Improve benefit flows to people in and around protected areas.

4.1.6 Objective 1.6: Water use planning and management influencing the protected area

4.1.6.1 Norms and standards

❖ Promote and or ensure the positive involvement of the protected area management in water-use planning and management operations influencing the PA.
- Water-use planning outside considers the objectives of the protected area.

[16] The principles in this section were modified from the goals of the Biodiversity Policy and Strategy for South Africa: Strategy on buffer zones for National Parks Government Gazette No 35020. 2012.

- Management authorities play an active role in water use planning affecting the protected area; and
- The water-use planning takes cognizance of the protected area and the achievement of protected area management objectives.

4.1.6.2 Principles:

- PA management is a key stakeholder and role player in the management of water resources in all the catchments within which it is situated (water quantity and quality issues are very important from both biodiversity management and tourism perspectives);
- The National Water Act details the involvement of stakeholders in the management of water resources and the PA has taken an active role in the initiation and management of Catchment Forums; and
- Increased interaction with neighbouring and upstream land-use planning and catchment management activities as the interdependence of these systems is more fully appreciated.

4.1.7 Objective 1.7: Audit achievement of biodiversity targets

4.1.7.1 Norms and standards

❖ Verify the importance of the protected area to the South African system of protected areas.

➢ A protected area contributes to the achievement of national biodiversity targets:
- The protected area is an ecological viable area;
- It protects a representative sample of South African biodiversity; and
- It protects a representative sample or iconic feature of South Africa's land/seascapes.

➢ A protected area is important for the conservation of biodiversity
- Contribution to protection of endemic, threatened, or endangered species;
- Contribution to conservation of threatened ecosystems;
- Contribution to biodiversity conservation targets;
- Protection of a representative range of plant and animal diversity for the eco-region [in terms of biodiversity targets];
- Viability and extinction risk of populations of key species;
- Contribution to the representative examples of biomes, vegetation types and ecosystems;
- Extent to which natural and disturbance processes necessary for ecosystem functioning are maintained;
- The state of landscape linkages and connectivity that allow the protected area to function as part of larger surrounding ecosystems;
- Provision of ecosystem services that the protected area and neighboring land-users are reliant upon;
- The protected area provides a critical landscape function; and
- The protected area includes ecosystems whose historic range has been greatly diminished.

4.1.7.2 Principles:

- Criteria must be scientifically credible, practical and simple;
- Different thresholds may be required for different environments;
- The most appropriate scale for mapping ecosystems depends on a range of factors including the nature of the ecosystems and the available data;
- The approach must be explicit and repeatable;
- The approach must be target-driven and systematic, especially for threatened ecosystems;
- The approach must follow the same logic as the IUCN approach to listing threatened species, whereby a number of criteria are developed and an ecosystem is listed based on its highest-ranking criterion; and

- The identification of ecosystems to be listed must be based on scientifically credible, practical and simple criteria, which must translate into spatially explicit identification of ecosystems.

4.1.8 Objective 1.8: Manage and mitigate the environmental impacts of conservation management, tourism, recreation and natural resource use in the PA

4.1.8.1 Norms and standards

- ❖ Ensure the approved management plan is implemented accordingly to meet the objectives set in the management plan.
  - ➢ All development projects that require environmental scoping are assessed through either internal or external EIA processes and are authorized at the relevant level.
    - There are records of decisions/authorizations in place; and
    - There is a process to monitor and effect compliance with conditions of records of decisions.

4.1.8.2 Principles

- The reserve shall strive to continually improve its environmental management systems, through reducing or mitigating the environmental impacts of inter alia: administrative and visitor infrastructure and activities; solid waste disposal; water supply and distribution systems; energy supply and distribution networks; sewage systems; herbicide use and fuel supplies; and
- The reserve shall strive to continually improve its environmental management systems, through restoration and/or rehabilitation efforts.

4.1.9 Objective 1.9: Protect the heritage resources of the PA

4.1.9.1 Norms and standards

- ❖ Proper planning in the establishment or expansion of the protected area.
  - ➢ A cultural heritage resource inventory for the protected area is maintained.
    - Cultural heritage values have been identified;
    - Information on these resources and values is sufficient to support planning and decision making and little additional information is required to manage the cultural heritage of the protected area; and
    - There is a comprehensive inventory of cultural heritage resources.
- ❖ Ensure the approved management plan is implemented accordingly to meet the objectives set in the management plan.
  - ➢ Cultural Heritage Resources are managed to meet the protected area objectives as per the management plan and in terms of the South African Heritage Resources Agency requirements.
    - The heritage resources are managed;
    - The heritage monuments are managed and maintained;
    - The cultural sites are adequately managed;
    - Cultural heritage resources adequately managed;
    - Heritage assets and values managed consistently to objectives;
    - The management of heritage assets and values (are being managed) is consistent (to) with protected area objectives; and
    - Critical cultural heritage assets are predominantly intact according to the objectives of the protected area.

4.1.9.2 Principles:

- The reserve shall conform to the legal requirements of the NHRA.

Table 14: Management actions and targets relating to Biodiversity and Heritage Conservation KPA 1

#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
KPA 1: Biodiversity and Heritage Conservation								**R437 034.73**	**R878 719.33**	**R570 055.32**	**R779 791.12**
Objective 1.1 Obtain Biodiversity knowledge about the PA								**R338 552.95**	**R254 928.43**	**R273 478.28**	**R334 566.31**
1	Identify, and prioritise the biodiversity management requirements (targets) for the PA for baseline monitoring.	There is an established Monitoring & Evaluation program which is fully implemented with PA management participation and is used to guide adaptive management.	3.1.1 Monitoring and Evaluation Programme					R -	R 10 502.98	R -	R -
a	*Compile Integrated biodiversity management Programme*										
2	Develop and maintain a targeted research program determined by implimenting BMF and relevant to management needs to guide biodiversity management	Research needs have been identified and projects relevant to all management needs are being undertaken, enabling the monitoring of results of management actions against set objectives	3.1 Management Research Programme					R -	R 12 051.59	R -	R 6 947.72
a	*Compile archive of all research completed on the site*										
3	Facilitate access for and assist external research	There is an established working relationship with researchers and regular liaison leads to research results feeding into management decisions.	3.1.2 Relationship with researchers					R -	R 7 951.00	R -	R 6 947.72
a	*Facilitate controlled access for external institutions undertaking relevant research projects within the reserve.*										
b	*Create DB with potential institutions to assist with outsourced research projects*										
4	Collect and update key baseline information - Implimentation of BMP's	Information and the understanding thereof concerning key species, habitats, ecosystems of the PA supports the achievement of all biodiversity objectives.	1.4. Biodiversity knowledge and understanding					R338 552.95	R224 422.86	R273 478.28	R320 670.87
a	*01 BMP 1 Biodiversity mechanisms*										
b	*02 BMP 2 SSC*										
c	*03 BMP 3 Freshwater and Wetlands*										
d	*04 BMP 4 IAS*										
e	*05 BMP 5 Resource Use Tourism*										
f	*07 BMP 7 Degradation Rehabilitation*										
g	*08 BMP 8 Cultural Heritage*										
h	*09 BMP 9 Climate and Climate Change*										

Objective 1.2: Restoration and mitigation of degradation								R82 454.52	R429 495.21	R251 520.31	R341 327.76
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Compile an invasive species control and eradication plan in terms sec. 76 of the NEM: Biodiversity Act, 2004	There is a plan for addressing degraded areas within the PA	2.6 Restoration of degraded areas								
a	*Eradication plan for damage-causing and problem animals in PA*							R -	R 10 502.98	R -	R -
b	*Eradication plan for invasive alien plant infestations in PA*										
2	Impliment an invasive species control and eradication plan in terms sec. 76 of the NEM: Biodiversity Act, 2004										
a	*Implement, environmentally friendly measures to reduce the impacts of any damage-causing and problem animals*							R50 400.00	R144 394.80	R77 938.10	R69 182.83
b	*Eradicate, on an ongoing basis, all known invasive alien plant infestations occurring in the reserve*										
3	Compile Rehabilitation Programme BMP 7							R -	R 21 005.96	R -	R -
4	Rehabilitation or mitigation of degradation in PA										
a	*Identify and map all degradation as part of BMP 4 and*										
b	*Rehabilitation, Restoration or mitigation of all un-natural and/or highly erodible areas in the PA estate and maintain mitigation measures*										
c	*Rehabilitation, Restoration or mitigation of visitor impact wrt. special natural features and heritage resources in te PA estate*										
d	*Close and rehabilitate solid waste dump sites in the reserve, and remove all solid waste to the nearest municipal dump sites.*							R -	R134 877.45	R95 441.09	R76 921.79
e	*Close/remove/demolish and rehabilitate all extraneous and redundent mining related buildings, foundations, waste dumps, equipment, excavations and fencing*										
f	*Close and rehabilitate all unused, extraneous and/or highly erodible tracks and roads in the reserve and maintain road closures*										

Objective 1.3: Maintenance of ecological processes in the PA								R8 597.06	R20 495.98	R11 028.13	R29 544.54
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	ID the ecological processes critical for the achievement of biodiversity targets	A scientifically based assessment has shown that ecological processes are being effectively maintained /augmented with the result that ecological integrity and biodiversity are not being compromised.	6.3 Ecological processes					R -	R -	R -	R -
2	Re-establish, manage and maintain viable populations of locally indigenous fauna and flora							R -	R -	R11 028.13	R -
a	*Determine historical distribution of game animals*										
b	*Compile reintroduction program*										
3	Develop and maintain a vegetation monitoring program, including an annual veldt condition assessment.							R -	R 20 495.98	R -	R29 544.54
4	Prepare and/or update a simple, functional Fire Management Programme for the reserve			NA				R -	R -	R -	R -
5	Manage watering points for game										
a	*Determine position of artificial and natural watering points*							R 8 597.06	R -	R -	R -
Objective 1.4: Maintenance of critical ecosystem services								**R0.00**	**R0.00**	**R22 056.26**	**R4 631.81**
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	ID critical ecological services that deliver services to surrounding communities	PA Expansion Plan in line with expansion strategy for the organisation and the size and shape of the PA is adequate to achieve the conservation mandate	2.1 PA design 2.1.1 PA expansion plan					R -	R -	R22 056.26	R 4 631.81
a	*Description wrt biodiversity importance of PA and interphase*										
b	*Compile PA Expansion Plan*										
2	Develop a structured and scientific measurement system for effective maintenance of ecological services	A structured and scientific measurement and monitoring system has shown that ecosystem services are being effectively maintained with the result that the PA and neighbouring land users are deriving benefit from these services.	6.4 Ecosystem services					R -	R -	R -	R -
3	Monitoring benefit of ecological services to PA and neighbouring land users							R -	R -	R -	R -
4	Compile an Wilderness Management Programme							R -	R -	R -	R -

Objective 1.5: Land use planning and management outside of the protected area								R7 430.20	R0.00	R0.00	R52 517.93
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Provide and define a zone of influence and applicable buffering mechanisms (interphases) with guidelines for suitable land uses.	A zone of influence (interphases) with guidelines for suitable land uses for input into the municipal IDP	2.1.2 Delineation of a zone of influence 2.1.3 Corridor management								
a	*Complete sensitivity analysys and demarcate ZOI and Domain*							R 7 430.20	R -	R -	R18 527.26
b	*Determine applicable buffering mechanisms*										
c	*Develop guidelines for suitable land uses.*										
d	*Demarcate corridors and include in ZOI or Domain*										
2	Collect baseline information and control illegal harvesting of natural resources in PA interface	Land use planning and management practices of surrounding areas with information and the understanding thereof concerning key species, habitats, ecosystems support biodiversity objectives of the site	6.5 Land use planning and management outside of the protected area								
a	*02 BMP 2 SSC*										
b	*03 BMP 3 Freshwater and Wetlands*										
c	*04 BMP 4 IAS*							R -	R -	R -	R33 990.67
d	*05 BMP 5 Resource Use Tourism*										
e	*07 BMP 7 Degradation Rehabilitation*										
f	*08 BMP 8 Cultural Heritage*										
g	*and residents in PA interface.*										
Objective 1.6: Water use planning and management operations influencing the protected area								**R0.00**	**R0.00**	**R0.00**	**R0.00**
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Collect and update key baseline information concerning land use practices of the reserve catchment interface and control illegal harvesting of natural resources .	Information and the understanding thereof concerning key species, habitats, ecosystems of the PA supports the achievement of all biodiversity objectives.	6.6 Water use planning and management operations influencing the protected area								
a	*02 BMP 2 SSC*										
b	*03 BMP 3 Freshwater and Wetlands*										
c	*04 BMP 4 IAS*							R -	R -	R -	R -
d	*05 BMP 5 Resource Use Tourism*										
e	*07 BMP 7 Degradation Rehabilitation*										
f	*08 BMP 8 Cultural Heritage*										
g	*Establish working relationship (MOU) with landowners and residents in PA interface.*										
2	Assist other enforcement agencies in cross border and other operations.	Catchment and river plans and water management fully take the water needs of the PA into account and the water quality meets required standards as set out by the relevant authority.						R -	R -	R -	R -
3	Participation in Catchment Management and other forums to ensure that the quality and quantity of water meets the needs for maintaining habitats, species and ecosystems							R -	R -	R -	R -
4	Compile Ramsar Management Plans			NA				R -	R -	R -	R -

Objective 1.7: Audit achievement of biodiversity targets								**R0.00**	**R0.00**	**R0.00**	**R0.00**
#	Management action	Management targets	Key performance indicators Mett-Sa Vers 3	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Monitoring results of management actions against set objectives. State of biodiversity report.	A structured and scientific biodiversity condition assessment has shown that the management of biodiversity is meeting the set targets. Management techniques are constantly being adapted to changing environments and new knowledge.	6.2 Achievement of biodiversity targets					R -	R -	R -	R -
Objective 1.8: Manage and mitigate the environmental impacts of conservation management, tourism, recreation and natural resource use in the PA								**R0.00**	**R50 414.31**	**R5 986.17**	**R10 917.29**
#	Management action	Management targets	Key performance indicators Mett-Sa Vers 3	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Develop management guidelines for the sustainable extractive use of biotic and abiotic resources .	Management guidelines for the sustainable extractive use of biotic and abiotic resources that apply to both the organisation and outside parties are in place.	4.12 Sustainable Extractive Use					R -	R 8 402.38	R -	R -
2	Introduce more environmentally-friendly technologies (recycling, water and energy saving, sourcing of biodegradable materials, dry and wet waste disposal, sustainable benefits to local communities, sourcing supplies locally and using certified sources of building materials).	The PA has been accredited with a recognised green standard. Examples are Green Globe. Green Leaf and Travelife. This does not only relate to tourism infrastructure.	4.16 Environmentally Responsible practice					R -	R 6 301.79	R -	R -
3	Mitigate Visitors Impact	Visitor impacts which could result from current and anticipated levels of visitation are fully mitigated by the design of the tourism infrastructure	5.1 Tourism Infrastructure (mitigating impacts)					R -	R 12 603.58	R 5 986.17	R10 917.29
a	*Maintain information about the reserve visitors*										
b	*Compile occupancy Schedules (carrying capasity) for any Tourism operations*										
c	*Develop and impliment a visitors compliments and complains register and adress issues*										
4	Waste Management	A formal legally compliant programme with functional infrastructure for the management of hazardous substances (flammable and non-flammable) is in place.	4.13 Management of Hazardous Substances					R -	R 12 603.58	R -	R -
a	*Develop a formal legally compliant programme for the management of domestic waste*										
b	*Develop a formal legally compliant programme for the management of hazardous waste*										
c	*Develop a formal legally compliant programme for the management and use of pesticides & insectisides*										
5	Develop functional infrastructure for the management of waste							R -	R 10 502.98	R -	R -

Objective 1.9 Protect the heritage resources of the PA								R0.00	R123 385.40	R5 986.17	R6 285.48
#	Management action	Management targets	Key performance indicators Mett-Sa Vers 3	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	In collaboration with academic institutions, research, document and inventorize the cultural heritage resources of the reserve an determine significance	A formal cultural heritage survey by an accredited heritage practitioner has identified heritage resources and values and has been verified by SAHRA and is included in the SMP	1.5 Cultural Heritage knowledge					R -	R 20 278.85	R -	R -
2	Develop management plans for significant Cultural Heritage assets	Formal AIA with mitigating and management guidelines by an accredited heritage practitioner for significant heritage resources/sites has been approved by the relevant heritage authority.	2.4 Management plans for significant Cultural Heritage assets								
a	*Palaeontological resources*							R -	R 98 905.36	R -	R -
b	*Archaeological resources*										
c	*Cultural-Heritage resources*										
3	Develop guidelines for finding and recording of heritage artifacts as part of Subsidary Plan for Management of significant heritage resources according to NEMPAA guidelines	The Collections Management Plan has been developed and is fully implemented.	2.7 Collections management/curatorship of heritage artefacts					R -	R 4 201.19	R -	R -
4	Monitor and regular condition assessment of Cultural Heritage Resources	A structured assessment conducted by an accredited heritage practitioner, has shown that the management of cultural heritage assets and values are meeting the set management objectives.	6.7 Cultural Heritage condition assessment					R -	R -	R 5 986.17	R 6 285.48

CATEGORY	PRIORITIES
HIGH PRIORITY	Critical to the effective management of the reserve. Funding and resources should be secured to implement these actions. As reflected in the Management Effectiveness Tracking Tool (METT)
LOW PRIORITY - Activity on hold	Constitutes good management practice, but not necessarily critical or important to reserve management effectiveness. Implementation may be dependent on availability of external funding or support.
COMPLETED	Activities Completed for the 5 year cycle to be assesst during the following 5-year planning cycle

4.2 KPA 2: Recreation, Marketing, Education, Awareness & Interpretation

4.2.1 Objective 2.1: Develop, deliver and maintain a diverse range of tourism and recreational services for visitors to the PA in accordance with CDF

4.2.1.1 Norms and standards

- ❖ Ensure the approved management plan is implemented accordingly to meet the objectives set in the management plan.
  - ➢ Commercial tourism, where applicable, contributes to the protected area objectives.
    - The commercial tour operators interact with protected area management;
    - There is an excellent co-operation between protected area management and tourism operators to enhance visitor experiences maintain protected area conservation values and resolve conflicts;
    - The commercial tour operators contribute to protected area management;
    - Permits, licenses and concessions are granted in terms of management plan objectives;
    - Tourism standards are developed for nature-based tourism; and
    - Protected areas serving as triggers for tourism, economic development (where applicable/ subject to management plan).

4.2.1.2 Principles:

- In developing and maintaining tourism and recreational infrastructure, the reserve shall obtain the necessary authorisation in terms of all relevant legislation;
- Tourism and recreational infrastructure developed within the reserve must be appropriate to the purpose for which the reserve has been proclaimed, and must not threaten its biodiversity or ecological function;
- Environmental resources, together with the maintenance of essential ecological processes and conservation of natural heritage and biodiversity, constitute a key element in tourism planning and development;
- Ensure that tourism development is appropriate in scale, requiring the lowest possible consumption of non-renewable resources;
- Ensure that additional funds for conservation are generated from the tourism business; and
- Tourism activities and experiences must optimise the PA's unique attributes and special features as the preferred focus to ensure sustainability and a unique product compatible with the overall desired state whilst applying the principles of Responsible Tourism.

4.2.2 Objective 2.2: Develop and implement a focused and cost-effective marketing program for the PA

4.2.2.1 Norms and standards

- ❖ Ensure the approved management plan is implemented accordingly to meet the objectives set in the management plan.
  - ➢ Commercial tourism, where applicable, contributes to the protected area objectives.
    - The commercial tour operators interact with protected area management;
    - There is an excellent co-operation between protected area management and tourism operators to enhance visitor experiences maintain protected area conservation values and resolve conflicts;
    - The commercial tour operators contribute to protected area management;
    - Permits, licenses and concessions are granted in terms of management plan objectives;
    - Tourism standards are developed for nature-based tourism; and
    - Protected areas serving as triggers for tourism, economic development (where applicable/ subject to management plan).

4.2.2.2 Principles:

- Tourism and recreational infrastructure shall be developed in response to tourism market demands and opportunities within the reserve, and should be carefully assessed to determine its viability;
- Using tourism as a conservation strategy by optimally deploying and appropriately utilizing environmental resources;
- Ensure viable, long-term economic operations, providing socio-economic benefits to all stakeholders that are fairly distributed, including stable employment and income-earning opportunities and social services to host communities and contributing to poverty alleviation;
- The reserve shall collaborate and cooperate with key local, regional and institutional partners to strengthen the marketing of the reserve's tourism and recreational infrastructure and services; improve the awareness of the reserve, and its prospective uses, in local communities; and promote the use of the reserve as a local educational resource;
- Visitor management must take heed of a recent demand analysis and develop creative alternatives e.g., „park and drive" vs. „self-drive", converting day visitors to overnight visitors, interpretive centres at gates for when gate quotas are reached;
- Infrastructure upgrading must be aimed at the state of grading of 70% (by the Grading Council of SA);
- Revenue sharing with applicable communities according to relevant clauses in the Co-Management Agreement; and
- Pricing strategy must ensure that pricing is competitive, affords access to all South Africans and that it correlates with star grading and tourism will need to focus on the flexibility of packages, in line with the rest of the ecotourism industry.

4.2.3 Objective 2.3: Develop and implement a focused and cost-effective awareness-raising and educational program for the PA

4.2.3.1 Norms and standards

❖ Ensure that the protected area has an education and awareness program in place.

➢ Education and awareness program developed.

- There is a planned education and awareness program;
- There is an education and awareness plan linked to the objectives of the protected area; and
- There is a fully implemented and highly effective education and awareness the objectives of the protected area.

4.2.3.2 Principles:

- ✓ The popularity of wilderness related activities and the fact that income is generated with very little impact on the environment, emphasized the importance to zone land for this purpose and to develop activities in this regard;
- ✓ Day programs can be developed to afford schools the opportunity to experience the PA for a day and to enjoy a carefully planned environmental education program run by qualified education and interpretative staff;
- ✓ Bush Camps can be provided to offer a unique opportunity for learners to experience their natural environment in the rustic comfort of a secluded campsite;
- ✓ Learners to enjoy the PA on foot or by open vehicle under the guidance of a qualified officer who gives insights into all aspects of the environment;
- ✓ Teacher development by contributing to Outcomes Based Education enhancement program, linking curriculum with environmental conservation and resources are developed in the process;

- ✓ Programs on rediscovering and using traditional knowledge and methodologies of learning used in the past to relate to their environment. Experiential learning through inter-generational communication is the key to this project. In their home language, "wise men" and women facilitate the interaction of small groups of young people with nature through interpretive trails and cultural activities in the camp;
- ✓ Outreach programs to promote the use of the PA as an "outdoor laboratory" and Centre for social science research and projects through the development of specialized educational programs aimed at tertiary institutions and researchers at the local and national levels, and active participation in the bioregional plan for the PA; and
- ✓ The use of interpretive materials such as information boards, signs and plaques pertaining to special features of the PA. Reliance on donor funding is seen as an important risk.

Table 15: Management actions and targets relating to Recreation, Marketing, Education, Awareness & Interpretation KPA 2

KPA 2: Recreation, Marketing, Education, Awareness and Interpretation								**R0.00**	**R0.00**	**R0.00**	**R78 527.26**
Objective 2.1: Develop, deliver and maintain a diverse range of tourism and recreational services for visitors to the PA in accordance with CDF								**R0.00**	**R0.00**	**R0.00**	**R0.00**
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Develop Subsidiary Plan - Commercial Tourism with guidelines that apply to both the organisation and outside parties concession holders	There is excellent interaction and co-operation between managers and tourism operators/concessionaires to enhance visitor experiences, protect values and resolve conflicts.	4.15 Commercial Tourism					R -	R -	R -	R -
2	Facilitate controlled access to the reserve for other complementary recreational activities, link up with adventure events, Angling clubs							R -	R -	R -	R -
3	Support entrepreneurial opportunities for local communities to participate in the provision and management of tourist and recreational products.							R -	R -	R -	R -
Objective 2.2: Develop and implement a Tourism Management Plan and cost-effective marketing programme for the PA								**R0.00**	**R0.00**	**R0.00**	**R78 527.26**
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Develop a tourism management plan	There is an approved and updated Tourism and Marketing Programme and it is fully integrated into the management plan of the PA.	3.8.1 Tourism grading					R -	R -	R -	R 78 527.26
2	Development of PA tourism marketing products and materials including pamphlets for visitors and users.							R -	R -	R -	R -
3	Continually provide updated information in the ongoing development of corporate, regional and provincial tourism marketing products and materials.							R -	R -	R -	R -
4	Accreditation of activities and facilities with a recognised tourism grading standard.							R -	R -	R -	R -
Objective 2.3: Develop and implement a focused and cost-effective awareness-raising and educational programme for the PA								**R0.00**	**R0.00**	**R0.00**	**R0.00**
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Develop site specific Education, awareness and interpretation programme	The education, awareness and interpretation programme is fully linked to the objectives and needs of the PA and is being fully implemented.	2.3 Education, awareness and interpretation programme					R -	R -	R -	R -
2	Establish links with local educational institutions and networks in order to promote subsidised access to, and use of, the reserve as an educational resource.		4.9 Implementation of Education, awareness and interpretation programme.								
a	*Assist with ad hoc awareness-raising and educational programs*							R -	R -	R -	R -
b	*Make facilities including environment available for educational programmes*										

4.3 KPA 3: Enforcement, Security & Access Control

4.3.1 Objective 3.1: Secure the legal tenure of, and management authority for, the PA

4.3.1.1 Norms and standards

- ❖ Ensure that correct legal processes have been followed in securing the protected area.
  - ➢ A protected area is declared in terms of the Act.
    - The protected area is declared in the Government Gazette;
    - The Registrar of Deeds has been informed in writing of the declaration and has recorded such declaration in the relevant registers and documents;
    - The protected area is listed in the Register of Protected Areas as required by section 10 of the Act; and
    - The protected area has an assigned management authority.
  - ➢ There are applicable legal mechanisms in place to control inappropriate activities.
    - There are appropriate regulations; and
    - The protected area has a formal set of internal rules.
  - ➢ There are adequate legal controls to ensure the integrity of the protected area.
    - The Act is applied / enforced;
    - The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA)
    - are applied and or enforced;
    - The relevant regulations are applied and or enforced; and
    - Internal rules are in effect.
- ❖ Ensure that the boundaries of the protected area are well demarcated, secured and publicly known.
  - ➢ Boundaries of the protected area are demarcated, secured and publically known.
    - The extent of the protected area is included in a description and Surveyor General diagram;
    - The boundaries are appropriately demarcated;
    - The boundaries are known by both the management authority of a protected area and the neighbouring community;
    - Any deviations from the declared area are agreed upon and documented in the management plan and include a signed, legally binding MoU; and
    - Conflicts with the local community are resolved fairly and effectively.

4.3.1.2 Principles:

- The reserve shall conform to the legal requirements of the NEM: PAA.

4.3.2 Objective 3.2: Secure the boundaries of, and maintain controlled access to, the PA

4.3.2.1 Norms and standards

- ❖ Ensure that the relevant legislation is effectively enforced in a protected area.
  - ➢ Protection systems are in place.
    - Management mechanisms effectively control and manage access;
    - The available management mechanisms are working to control both illegal and legitimate access;
    - Effective control measures are in place to control the use of the protected area;
    - Standard operating procedures for controlling activities have been developed and are being effectively implemented/ contingency plans;
    - Annual risk assessments completed and mitigating interventions applied where appropriate; and
    - Critical cultural heritage assets have been identified and secured in terms of a heritage management plan.

4.3.2.2 Principles:

- Fencing specifications shall conform to the legal requirements of the NCNCA and as set out in clause 7.4 of the BOA that states it is specifically agreed that any such fencing must-
  - ✓ comply with the Northern Cape Nature Conservation Act (2009) and enhance the integrity of the management system;
  - ✓ be at least 1.8 metres in height; and
  - ✓ should not unduly inhibit the free movement or dispersal of small animals.
- The boundaries of the reserve shall, at all times, be clearly demarcated and be regularly maintained; and
- All entry and exit points shall be properly managed to ensure that access to, and through, the reserve is effectively controlled at all times.

4.3.3 Objective 3.3: Sustain an effective law enforcement and compliance capacity in the PA

4.3.3.1 Norms and standards

❖ Ensure that the relevant legislation is effectively enforced in a protected area.

➢ The NEM: PAA, 2003 (Act No. 57 of 2003), the NEMA Act,1998 (Act No. 107 of 1998), the NEM: BA Act,2004 (Act No. 10 of 2004 their Regulations and internal rules are in effect.

- The protected area has sufficient capacity to enforce the Acts, regulations and internal rules;
- The protected area's staff is adequately capacitated to enforce legislation within the organization's mandate and does so effectively;
- Staff resources are adequate to conduct critical law enforcement activities;
- The staff has relevant law enforcement and compliance training;
- The law enforcement officers are appropriately trained;
- The staff has been formally designated to enforce the relevant legislation;
- Appropriate staff have been designated environmental management inspectors;
- The staff has the necessary equipment to enable them to do law enforcement effectively;
- The protected area has allocated sufficient funds for effective law enforcement;
- The protected area receives adequate support from other sections of the organization to effectively manage ensure effective management;
- Assessment of state on illegal activities in the protected area;
- The protected area management has a database to register illegal activities; and
- The database of illegal activities assessed.

4.3.3.2 Principles:

- The reserve shall conform to the legal requirements of all relevant legislation.

Table 16: Management actions and targets relating to Enforcement, Security & Access Control KPA 3

KPA 3: Enforcement, Security and Access Control								R162 371.54	R5 633 042.25	R197 133.59	R89 726.63
Objective 3.1: Secure the legal tenure of, and management authority for, the PA								**R0.00**	**R0.00**	**R0.00**	**R59 263.63**
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Ensure declaration of all properties within the estate to obtain legal status in terms of NEMPAA and registered on the SAPAD	All properties managed as part of the PA have been declared and listed in the SAPAD and the registrar of Deeds has recorded the declaration against the relevant register and documents.	1.1 Legal Status					R -	R -	R -	R 59 263.63
a	*Compile and submit notice of intend for domain to be approved and gazetted*										
b	*Record the declaration against the SAPAD*										
c	*Record the declaration against the relevant Title Deed.*										
d	*Consolidation of properties*										
e	*Apply for MPRDA sec 53 permission for all properties in PA domain*										
f	*Formal management agreements regarding properties in domain*										
Objective 3.2: Secure the boundaries of, and maintain controlled access to, the PA								**R129 475.47**	**R5 633 042.25**	**R167 516.24**	**R22 523.86**
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Impliment the protection systems or mechanisms for controlling current and anticipated levels of legitimate and illegitimate access or activities in the PA	Protection systems or mechanisms for controlling current and anticipated levels of legitimate and illegitimate access or activities in the PA are fully implemented. The success has been verified by a relevant PA integrity audit (eg. SOAM or PAME)	5.2 Functioning of Law Enforcement and Compliance systems					R100 580.53	R 159 539.27	R167 516.24	R 17 892.05
a	*Regular boundary patrols and access hotspots*										
b	*Implement, mechanisms for subsidised entry for local community user and interest groups.*										
c	*Provide, on request, controlled access to recognised cultural/religious sites and non-destructive or consumptive cultural/religious practices.*										
2	Complete the construction of the perimeter demarcation/fencing to meet all requirements of the DENC Technical Guidelines and Principles (TGP) for fencing.	The reserve assets are secure. The reserve visitors and users have equitable access to the reserve, and are safe from harm.	1.3 Protected Area boundary demarcation					R 28 894.94	R5 473 502.98	R -	R 4 631.81
a	*Verify position of estate beacons agains title deeds*										
b	*Maintain beacons in correct position*										
c	*Construction of the perimeter signage*										
d	*Demarcation of boundary by fencing, bollards, beacons, sign posts.*										
e	*Ensure regular maintenance of the perimeter demarcation/fencing in the reserve.*										

Objective 3.3: Sustain an effective law enforcement and compliance capacity in the PA								R32 896.07	R0.00	R29 617.35	R7 939.14
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Develop Integrated Compliance Plan with protection systems or mechanisms for controlling current and anticipated levels of legitimate and illegitimate access	The PA has an Integrated Compliance Plan addressing all aspects of law enforcement that incorporates inter alia raising awareness, improving community relationships, training and cooperation with legal agencies.	5.2.1 Integrated Compliance Plan								
a	*Draw up an Integrated Compliance Plan*							R -	R -	R 22 056.26	R -
b	*Impliment Integrated Compliance Plan*										
2	Ensure capacity/resources/support to impliment the Integrated Compliance Plan	The site has the apacity/recources/support to enforce internal rules/regulations effectively.	3.6. Law Enforcement Capacity & Capability								
a	*Determine capasity RB Martin or IUCN and develop list of critical skills required with training cources available for field rangers.*							R 32 896.07	R -	R 7 561.09	R 7 939.14
b	*Ensure the provision of enforcement and compliance training for all reserve field staff.*										
c	*Ensure that the field ranger staff complement is adequately resourced and equipped to fulfil an effective enforcement and compliance function.*										

4.4 KPA 4: Infrastructure & Equipment

4.4.1 Objective 4.1: Acquire and maintain operational equipment and vehicles for the PA

4.4.1.1 Norms and standards

- ❖ Ensure that each protected area has the necessary operational equipment and infrastructure in place, with an effective maintenance program.
  - ➢ Necessary operational equipment and infrastructure is in place.
    - The infrastructure necessary to manage the protected area effectively is in place;
    - Staff facilities are adequate to perform critical management activities; and
    - There is (an) adequate operational equipment as required for operational management purposes.
  - ➢ Equipment and infrastructure are effectively maintained.
    - A regular program of infrastructure maintenance is adhered to; and
    - Equipment is maintained in good working condition.

4.4.1.2 Principles:

- The reserve shall acquire and/or replace the equipment and vehicles necessary to implement the activities identified in this SMP; and
- All reserve equipment and vehicles shall be regularly maintained in accordance with the manufacturers' specifications.

4.4.2 Objective 4.2: Construct, maintain and upgrade the administration infrastructure and bulk services infrastructure in the PA

4.4.2.1 Norms and standards

- ❖ Follow Technical management guideline and procedures for the development, maintenance and upgrading of roads in provincial nature reserves.
- ❖ Promote and or ensure the positive involvement of the protected area management in Water use planning and management operations influencing the PA.
  - ➢ Water-use planning outside considers the objectives of the protected area.
    - Management authorities play an active role in water use planning affecting the protected area; and
    - The water-use planning takes cognizance of the protected area and the achievement of protected area management objectives.

4.4.2.2 Principles:

- Administrative and operations infrastructure and services must be limited, and appropriately scaled, to the necessary administrative and operational requirements of the reserve, and must not threaten its biodiversity or ecological function;
- In developing and maintaining administrative and operations infrastructure, the reserve shall obtain the necessary authorization in terms of the relevant legislation;
- The reserve shall strive to phase out bulk services that have a detrimental impact on the environment. It will, in turn, seek to introduce more sustainable technologies, wherever practicable and cost-effective; and
- The reserve shall rationalise the network of roads, tracks and footpaths to reduce the maintenance costs and limit the environmental impacts, while ensuring adequate access for tourism and operational management requirements.

4.4.3 Objective 4.3: Construct, upgrade and maintain day and overnight visitor buildings and infrastructure in the PA

4.4.3.1 Norms and standards

- ❖ Ensure that the protected area has visitor facilities that contribute to their visitor's experience.
  - ➢ Visitor facilities, where appropriate (are established in line) with the protected area objectives are established in response to tourism market demands, and contribute positively to the visitor experience.

- The visitor/tourism facilities are adequate and sufficient to prevent damage to protected areas;
- Tourism infrastructure is effectively servicing the current volume of visitors to the protected area according to the protected areas carrying capacity; and
- The visitor facilities are appropriate to the level of visitor use.

4.4.3.2 Principles:

- Continuously minimize the potential negative impacts caused by existing tourism use, particularly to sensitive sites; and
- Direct new tourism developments (if possible) to fewer sensitive areas.

Table 17: Management actions and targets relating to Infrastructure & Equipment KPA 4

#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
KPA 4: Infrastructure and Equipment								**R1 296 550.74**	**R409 306.71**	**R474 163.08**	**R487 305.79**
Objective 4.1: Acquire and maintain operational equipment and vehicles for the PA								**R330 251.00**	**R265 194.19**	**R286 667.44**	**R318 778.53**
1	Acquire and maintain stores and equipment	Operational equipment is adequate and suitable for current and future anticipated operational needs.There is a maintenance schedule and all operational equipment is being correctly maintained and meeting the set standards.	3.7 Adequacy of Operational equipment 4.6 Maintenance of operational equipment					R 110 881.00	R115 693.59	R139 267.44	R153 592.62
a	*General submissions for procurement*										
b	*Establish an electronic network (i.e. internet and e-mail) for, and connect services and applications to, the reserve.*										
c	*Procure, install and maintain a reliable internal communications network for the reserve, including repeaters, base station, hand-held radios and car radios.*										
d	*Maintain and/or replace all reserve equipment according to the manufacturers' specifications and/or corporate replacement cycles.*										
2	Adequacy of transport fleet	The transport fleet is totally appropriate and sufficient for all management needs with adequate numbers and range of vehicles (including boats, aircraft etc.) to meet management needs?	3.9 Adequacy of transport fleet					R 219 370.00	R149 500.60	R147 400.00	R165 185.91
a	*Do needs analyses regarding transport fleet for all management needs with adequate numbers and range of vehicles (including boats, aircraft etc.)*										
b	*Maintain and/or replace all reserve vehicles and equipment according to the manufacturers' specifications and/or corporate replacement cycles.*	There is a maintenance schedule and the entire transport fleet is being maintained and meeting the set standards.	4.6.2 Maintenance of Transport fleet								

Objective 4.2: Construct, maintain and upgrade the administration infrastructure and bulk services infrastructure in the PA								R966 299.74	R144 112.52	R169 850.63	R168 527.26
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Construct and upgrade the administration and bulk services infrastructure in the reserve and constantly update the infrastructure register and CDF.	Infrastructure required for operational management purposes buildings, roads, bulk services including jetties, storage facilities and staff housing is optimal for current and future anticipated management needs.. State (using a grading system) of reserve buildings and infrastructure. Records of instances of overloading of the bulk service supplies.	3.7.1 Adequacy of Operational infrastructure.					R 754 296.33	R 71 005.96	R -	R -
a	*Construct a permanent administration building, and associated facilities, within the reserve*										
b	*Construct the entrance/control gate infrastructure and associated ablution facilities to accommodate disabled visitors.*										
c	*Facilitate the provision|of ESKOM power to Lodges, critical staff accommodation and all administrative facilities.*										
d	*Install and maintain generator and/or solar power systems for the functioning of remote reserve operational equipment (e.g. water pumps) and the smaller tourism and recreational facilities.*										
e	*Develop a water supply, storage and treatment capacity for the reserve*										
f	*Develop waste treatment facilities and waste removal systems for the reserve water supply, storage and treatment capacity for the reserve*										
g	*Develop the road, track and footpath network*										
h	*Standardise, install and maintain directional and informational signage within, and en route to, the reserve.*										
2	Develop Infrastructure Maintenance Programme	There is a maintenance schedule and all operational infrastructure is being maintained and meeting the set standards.Rationalised network of well-maintained management tracks traversing the reserve.	4.6.1 Maintenance of operational infrastructure					R 212 003.41	R 73 106.56	R169 850.63	R168 527.26
a	*Develop Site Plans*										
b	*Maintenance standards & prosedures*										
c	*Maintenance of all reserve administrative, staff and operational buildings and infrastructure.*										
d	*Schedule and implement the maintenance of the network of roads in the reserve, with a strong focus on maintaining and mitigating highly erodible areas.*										
e	*Link up with EPIP projects as well as external projects with available funds*										

Objective 4.3: Construct, upgrade and maintain day and overnight visitor buildings and infrastructure in the PA								R0.00	R0.00	R17 645.01	R0.00
#	Management action	Management targets	Key performance indicators Mett-Sa Vers 3	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Assess the feasibility of developing additional overnight accommodation and camping/caravanning sites and day visitor facilities with reference to the CDF and update CDF if required	Tourism infrastructure is optimal to manage the current and anticipated future volume of visitors.	3.8 Adequacy of Tourism infrastructure					R -	R -	R 11 028.13	R -
2	Assess the cost-effectiveness of different management options for the operating of Lodges, Camps and select the preferred/optimal management option/s.	Tourism infrastructure is optimal to manage the current and anticipated future volume of visitors.	3.8 Adequacy of Tourism infrastructure					R -	R -	R 6 616.88	R -
a	*Plan and Develop the overnight visitor buildings, facilities, equipment and linked infrastructure, in accordance with the CDF to meet DENC standards for the provision of nature-based tourism products.*										
b	*Implement, and formalise (as required), the selected management option for the Lodges, Camps (e.g. concessioning, leasing, service agreement, community-managed, etc.).*										
3	DevelopTourism Infrastructure Maintenance Programme	Tourism infrastructure being maintained and meeting standards of a maintenance schedule	4.7 Maintenance of tourism infrastructure					R -	R -	R -	R -
a	*Develop Site Plans*										
b	*Maintenance standards & prosedures*										
c	*Maintenance of all tourism buildings and infrastructure.*										

4.5 KPA 5: Stakeholder Involvement

4.5.1 Objective 5.1: Interaction with stakeholders and communities in the planning, development and management of the PA

4.5.1.1 Norms and standards

- ❖ Good relationship between the protected area staff and neighboring communities.
  - ➢ Neighbor relations contribute positively to the success of the protected area
    - The neighboring communities have relevant input, where relevant, into decisions relating to protected area management; and
    - An advisory committee or park forum has been established.
- ❖ Ensure that the protected area plays an important role in socio-economic activities within their sphere of influence.
  - ➢ A process to evaluate the stakeholder's feedback is in place for all protected areas.
    - The protected area receives high level support as a result of co-management consultation and high-quality visitor experiences emanating from effective protected area management;
    - The protected area has a large degree of support from neighbours, district and public stakeholders;
    - The protected area has a functional protected area advisory committee; and
    - The protected area advisory committee is representative of all stakeholders of the protected area.

4.5.1.2 Principles:

- The reserve shall establish and maintain an effective Reserve Advisory Committee based on the Regulations for the Proper Administration of Nature Reserves, promulgated in terms of Section 86 (1) of NEMPAA.

4.5.2 Objective 5.2: Actively participate in local and regional conservation and socio-economic development initiatives that may affect or benefit the PA

4.5.2.1 Norms and standards

- ❖ Ensure that the protected area plays an important role in socio-economic activities within their sphere of influence.
  - ➢ A protected area provides substantive socio-economic benefits to the local area, where appropriate (refer to section 41 of the Act).
    - The protected area provides socio-economic benefits to local communities;
    - Programs to enhance local community welfare whilst conserving protected area resources are being implemented;
    - There is effective communication with local communities;
    - The protected area is a source of employment for local communities;
    - The protected area provides community development opportunities through sustainable resource use;
    - The protected area provides access to spiritual or religious sites;
    - An active education and interpretation program are implemented, focusing primarily on local children in the region around the protected area;
    - The protected area receives inside and outside contributions; and
    - The protected area has co-management framework for benefit flows.
- ❖ Good relationship between the protected area staff and neighboring communities.
  - ➢ Neighbor relations contribute positively to the success of the protected area
    - The protected area has trans-frontier and bilateral agreements - where applicable;

4.5.2.2 Principles:

- The reserve management shall actively collaborate with national, provincial and local tourism and conservation initiatives that could contribute to meeting the objectives of this SMP;

- The reserve shall strive to work with the relevant government institutions in order to integrate all local and regional planning and socio-economic development activities affecting the reserve;
- The reserve shall participate in, and support, any Co-Management Committee as an important governance mechanism to achieve the aims and objectives of the Co-Management Agreement; and
- The reserve shall strive to meet to the socio-economic development commitments made in any Co-Management Agreement.

4.5.3 Objective 5.3: Develop, implement and maintain effective mechanisms for ongoing communications with co-management partners

4.5.3.1 Norms and standards

- ❖ Good relationship between the protected area staff and neighbouring communities.
  - ➢ Neighbour relations contribute positively to the success of the protected area
    - The neighbouring communities have relevant input, where relevant, into decisions relating to protected area management;
    - The protected area has entered into a co-management agreement with neighboring communities and partners - where relevant;
    - The protected area has trans-frontier and bilateral agreements - where applicable; and
    - An advisory committee or park forum has been established.
- ❖ Ensure that the protected area plays an important role in socio-economic activities within their sphere of influence.
  - ➢ A protected area provides measurable economic benefits to the direct beneficiaries.
    - The protected area develops and implements a program that provides economic benefits to local communities / beneficiaries where appropriate; and
    - The protected area delivers considerable quantifiable long-term economic benefits that make a real difference to the livelihoods of local communities.

4.5.3.2 Principles:

- Stakeholder communications shall be focused on strengthening a sense of ownership and empowerment in local community, through an improved understanding of the contribution of the reserve to socio-economic development and heritage/biodiversity conservation.
- Stakeholder communications shall seek to develop a common understanding in surrounding communities of the issues affecting the integrity of the reserve, and collaborative approaches to resolve these.

Table 18: Management actions and targets relating to Stakeholder Involvement KPA 5

KPA 5: Stakeholder Involvement								**R48 631.13**	**R38 160.53**	**R48 523.77**	**R11 579.54**
Objective 5.1: Interaction with stakeholders and communities in the planning, development and management of the PA								**R0.00**	**R0.00**	**R26 467.51**	**R0.00**
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Under the guidance of the Regulations for the proper administration of Nature Reserves, as promulgated in terms of Section 86 (1) of NEMPAA, establish a Reserve Advisory Committee and meet on a regular, agreed to basis.	A well represented functioning and formalised Community Liaison Structure contributes significantly to the management/development of the PA.	4.11 Community Liaison Structure					R -	R -	R26 467.51	R -
2	Develop and impliment an active Public Relations (PR) and Communication Programme	There is a wide ranging multi media public relations and communication programme keeping the general public and internal role players informed of important aspects of the PA.	4.10 Public Relations (PR) and Communication Programme								
a	*Ensure positive press coverage is obtained and timeously and effectively respond to items in public media which may negatively impact on the organisation.*							R -	R -	R -	R -
b	*Initiate and sustain ongoing communications with the communal and/or private landowners to discuss opportunities for ongoing cooperation and collaboration.*										
3	Ensure members of the community are involved in supporting the PA through volunteering, projects and fundraising by establishing formal groups such as Friends groups, Volunteers or Honorary rangers	There are a wide range of projects supported by volunteers including fund raising and assistance with management that contribute significantly to increased PA management effectiveness.	5.5 Community Support					R -	R -	R -	R -

Objective 5.2: Actively participate in local and regional conservation and socio-economic development initiatives that may affect or benefit the PA								R30 626.02	R27 657.55	R11 028.13	R0.00
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Participate in local municipal IDP planning processes, with a specific focus on the provision of municipal infrastructure and services to the reserve and supporting local economic development initiatives in the community.	A formal published review/audit has shown that the PA delivers quantifiable long term stimuli to the regional (and possibly the national) economy and delivers a broad range of long term quantifiable community benefits that improve the livelihood strategies and resilience in the lives of communities.	6.1 Economic and Social benefit assessment Direct and measurable benefits accrue to local community from the reserve.					R -	R10 502.98	R -	R -
a	*Identify, and make application for, EPWP-related funding for relevant tourism and conservation initiatives in the reserve.*										
2	Participate in the planning and development of other conservation initiatives with a specific focus on strengthening linkages										
a	*Assist other DENC PA's with specific projects*	The PA is influencing the local or regional economy and providing measurable social benefits to communities? Social benefits to direct benefits such as jobs, training and health care. Stimulus of the economy	6.1 Economic and Social benefit assessment Direct and measurable benefits accrue to local community from the reserve.					R30 626.02	R17 154.57	R11 028.13	R -
b	*Establish linkages with ARTFCA, with a specific focus on strengthening tourism products and on improving access to technical and professional support/resources from TFCA partners.*										
3	Investigate and select mechanisms for optimising employment, empowerment and capacity building opportunities for the local community.	Direct and measurable benefits accrue to local community from the reserve. Extent (number of beneficiaries) and nature (employment – permanent/ temporary; business opportunity; training; capacity-building) of community benefits.	6.1 Economic and Social benefit assessment Direct and measurable benefits accrue to local community from the reserve.					R -	R -	R -	R -
a	*Develop opportunities for selected individuals from the local community to be trained and directly employed in appropriate conservation and tourism related work.*										
b	*Develop opportunities to facilitate an empowerment component for selected individuals from the local community in any outsourcing/concessioning of the tourism and recreational products.*										
c	*Identify, and if feasible develop, opportunities for the establishment of community-based entrepreneurial opportunities within, or linked to, the reserve, including: game drives; sale of curios and crafts; guided heritage trails; village tourism; conservation enterprise; horse trails; event management and commercial hunting packages.*										

Objective 5.3: Develop, implement and maintain effective mechanisms for ongoing communications with co-management partners								R18 005.11	R10 502.98	R11 028.13	R11 579.54
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Develop and continually review, and amend (as required), the structure, representation and TOR of the Co-Management Committee to ensure that it contributes to realising the intent of the Co-Management Agreement.	There is a formal representative structure for community partners to participate in decision making according to a legally binding co-management agreement.	4.14 Community partners					R10 002.84	R -	R -	R -
2	Provide ongoing support (e.g. logistical, administrative, technical, professional and leadership) to, and actively participate in, an										
a	*Hold quarterly (more regular if required) meetings with the Co-Management Committee to ensure that co-management decisions are made timeously and effectively.*	There is a formal representative structure for community partners to participate in decision making according to a legally binding co-management agreement.	4.14 Community partners					R 8 002.27	R10 502.98	R11 028.13	R11 579.54
b	*Support the ongoing capacity building of the local community representatives on the Co-Management Committee.*										
c	*Allocate office space in the administrative complex for office bearers of the Co-Management Committee.*										
d	*Host a regular quaterly meeting, each in a different neighbouring village, to present and discuss issues of mutual concern.*										

4.6 KPA 6: Administration & Planning

4.6.1 Objective 6.1: Institute and maintain an effective management planning capability in the PA

4.6.1.1 Norms and standards

- Ensure proper planning in the establishment or expansion of the protected area.
  - A protected area is designed and planned to meet its objectives.
    - The size of the protected area is sufficient to achieve its conservation objectives;
    - The protected area forms a critical part of a greater, integrated system forming a trans-frontier protected area;
    - The shape of the protected area is adequate sufficient to achieve its conservation objectives;
    - The design of the protected area is adequately to allow large-scale ecological processes to take place;
    - The objectives are consistent with the protected area location; and
    - The layout and configuration of the protected area optimizes the conservation of biodiversity.
- Ensure the approved management plan is implemented accordingly to meet the objectives set in the management plan.
  - A management plan has been developed for the protected area in accordance with section 39 of the NEMPAA, and the guidelines for the development of a management plan for a protected area in terms of the Act.
    - The purpose of the protected area is reflected in the management plan;
    - The management plan contains explicit biodiversity targets for all priority biodiversity elements;
    - The management plan addresses the management of specific priority species and habitats;
    - There is an analysis and strategy for addressing protected area threats and pressures;
    - The results of monitoring, research and evaluation are routinely incorporated into planning and decision making;
    - An expansion plan to meet the conservation objectives has been developed - where relevant;
    - A zoning plan indicating what activities may take place in different sections of the area, and the conservation objectives of these sections is included in the management plan;
    - An infrastructure development plan (concept development plan), subject to the zoning plan, is included in the management plan - where development is to be considered;
    - There is a program for the implementation of the management plan linked to annual work plans and staff performance agreements;
    - The management plan is being fully implemented;
    - Relevant components of the municipal IDP have been considered in the management plan;
    - Municipal IDPs have (taken the relevant aspects of the management plan into account) considered the ecological sensitivity of the protected area, its buffer zones and any priorities areas for protected area expansion;
    - The planning process allows adequate consultation with key stakeholders in the compilation of the management plan;
    - There is an established schedule and process for periodic review and updating of the management plan;
    - There is a program for the implementation of the management plan and its costing;
    - Where appropriate, the implementation of community-based natural resource management is planned for; and

- The terms and conditions of any relevant Biodiversity plan and/or the applicable aspects of the IDP of the local municipality have been considered as required by the NEMPAA.

➢ The management plan for the protected area has been approved.
- An up-to-date management plan has been adopted by the Board and or the HOD and approved by the Minister or the MEC.

➢ The management plan as approved is implemented successfully.
- Annual work plan of operations, implementing the management plan is in place; and
- There is a detailed work plan identifying specific targets for achieving management objectives linked to the management plan.

4.6.1.2 Principles:
- The reserve shall conform to the legal requirements of the NEMPAA.

4.6.2 Objective 6.2: Maintain an adequately equipped, resourced and trained staff complement for the PA

4.6.2.1 Norms and standards

❖ Ensure that all protected areas have effective systems in place to manage human resources.
➢ Human resource capacity is adequate to manage the protected area effectively.
- The skills development audit is completed and results are implemented;
- The protected area staff execute their duties to a high standard and require minimal supervision;
- The protected area employment conditions are adequate sufficient to retain high- quality staff;
- The protected area has a staff performance evaluation system in place; and
- The protected area has a succession program in place.

➢ Human resource management contributes to effective management of the protected area
- There is an effective staff management program in place;
- The protected areas fully implement the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993);
- The protected area has a staff health and safety program in place;
- The protected area staff have good living conditions; and
- The protected area has disaster management plans in place.

4.6.2.2 Principles:
- The protected area shall identify opportunities for the training and capacity building of reserve staff.

4.6.3 Objective 6.3: Institute and maintain an effective financial and administration capability in the PA

4.6.3.1 Norms and standards

❖ Ensure that each protected area has an effective performance evaluation system in place.
➢ A performance evaluation system for the management of the protected area is in place.
- There is a functioning evaluation system in place to measure performance against set objectives for the protected area.

❖ Ensure that each protected area has its own administrative system in place for its management.
➢ The protected area has a supportive administration system for effective management.

❖ Ensuring that the Public Finance Management Act, 1999 (Act No. 1 of 1999)?
- is implemented;
- That assets are well managed;
- The reporting system is well managed; and
- The system for information management is managed properly.

❖ Ensure that the protected area's finances are well managed and there is a system for their management.
➢ Financial management effectively contributes to the management of the protected area

- An operational budget is allocated to fund the critical management need of the protected area;
- The long-term financial outlook for the protected areas is stable;
- The allocation of expenditures is appropriate according to the protected areas priorities and objectives;
- Financial management practice enables efficient and effective protected area management;
- Funding to conduct critical management activities is adequate for the next 5 years to conduct critical management activities;
- The costing of management plans and shortfalls are addressed; and
- There is a procurement plan supporting local community (socio-economic).

➢ Alternative resources used for the management of a protected area are well managed.
- The management authority encouraged to solicit external funding or services for the management of a protected area; and
- Environmental programmes to assist management of the protected area.

➢ Mechanisms to enable volunteers to work in protected areas and managed where relevant are in place.
- There is a system for the appointment and management of volunteers in place; and
- There is a system for the application of external sources to be used to contribute to management of protected area.

4.6.3.2 Principles:
- All information that is used to support the operational planning and decision-making in the reserve shall be collected, collated, updated, maintained and presented in a cost-effective format that is readily accessible for use by management; and
- The reserve shall conform to all relevant provincial/departmental financial and administrative reporting requirements.

Table 19: Management actions and targets relating to Administration & Planning KPA 6

KPA 6: Administration and Planning								**R2 264 744.96**	**R1 888 704.98**	**R1 940 187.40**	**R2 006 159.46**
Objective 6.1: Institute and maintain an effective management planning capability in the PA								**R486 437.19**	**R105 895.51**	**R155 504.69**	**R248 306.24**
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Compile fully Integrated MP covering all aspects of PA management with measureable objectives	The IMP is fully integrated covering all aspects of PA management with measureable objectives and is approved by the MEC	2.2 Management Plan								
a	*Review of IMP on 5 year cycle*										
b	*Follow PPP and Obtain approval from MEC*							R 212 175.72	R -	R -	R 32 422.70
c	*Update a CDF based on a sensitivity analysis indicating use zones, and operational & visitor infrastructure*	An approved CDF based on a sensitivity analysis exists as part of the SMP.	2.2.1 Conservation Development Framework (CDF)								
2	Administer the administrative systems supportive of effective management and proper functioning of the PA	Administrative support systems are excellent and fully support management effectiveness.	4.4 Administrative support systems					R 10 002.84	R 10 502.98	R 11 028.13	R 11 579.54
a	*Do annual Mett assesment*										
3	Update APO and OMF identifying all the activities, tasks and outcomes (operational & nanagement) in accordance with predetermined time frames and approved management plans to be completed in a financial year with costing.	An approved OMF exists and actions are linked to the PA's management plan targets and to the Key Performance Areas of the PA manager An operational budget, specific to the PA, is secure and is guaranteed on a 3-5 year cycle	4.1 Annual Plan of Operation (APO)								
a	*Review APO accorrding to planning cycle*										
b	*Link APO to operational budget*		3.3 Adequacy of Operational budget 3.4 Security of Operational budget 3.4.1 Capital budget					R 21 718.53	R 10 652.27	R 12 759.80	R 31 925.05
c	*Annual review of APO Workplans & OMF*		4.1 Annual Plan of Operation (APO)								
d	*Link OMF to the Key Performance Areas of the PA manager and key personell.*		5.4 Linking of management Plan to Key Performance Areas								

Update SKDR - General & Logistical Data	The site have secure legal status in terms of relevant legislation	1.1 Legal Status					
01 Update declaration summary							
02 Fences Beacons	The boundary of the PA is known by the management authority, fully demarcated and is thus known and respected by the local residents/neighbouring land users and the public.	1.3 PA boundary demarcation 1.3.2 Servitude register					
Property descriptions according to deeds with records							
Record boundary deviations in a legal document.							
Compile servitude register with conditions							
Description of beacons							
03 S.H.E.Contingency plans for Disaster Management	A full risk assessment, covering inter alia biodiversity, financial management, human resources, tourism, pressures & threats has been undertaken for the PA that informs management planning.	1.6 Risk Assessment					
Undertake a Threat Analysis to determine all potential threats to the safety and security of the reserve.							
Update Risk assesment							
Compile a Disaster Management Plan for the reserve							
04 Protected area expenditure including historical data	Budget is effectively managed to meet critical management needs in accordance with the OMF	3.4.2 Budget Management					
05 Personnel Info	The approved organogram reflects the actual needs of management for effectively achieving all management objectives and the HR capacity meets the approved levels.	3.2 Human Resource capacity				R 52 280.90	R 23 688.10	R 43 007.86	R 40 526.43
06 Economic valuation	Operational equipment is adequate and suitable for current and future anticipated operational needs.	3.7 Adequacy of Operational equipment					
06a Assets and stock inventory registers							
07 Vehicle Fleet with utilisation	The transport fleet is totally appropriate and sufficient for all management needs with adequate numbers and range of vehicles to meet management needs	3.9 Adequacy of transport fleet					
08 Infrastructure Maintenance schedule	There is a maintenance schedule and all operational infrastructure is being maintained and meeting the set standards.	4.6.1 Maintenance of operational infrastructure					
14 Literature Inventory & Web Links.docx	Information technology systems are excellent and fully support management effectiveness. All electronic data are backed up on a routine basis, stored according to organisational standards and are easy to access.	4.5 Information Technology systems					
Update State of Knowledge Data Repository - Guiding management principles	Available management mechanisms working to control legitimate and illegitimate resource use and access?	5.2 Functioning of law enforcement and compliance systems				R -	R -	R -	R -
Complete list of Conventions, Commisions and Treaties relating to PAM							
Complete list of Nat Legislation & Regulations relating to PAM							
Complete list of Prov Legislation & Municipal Bylaws relating to PAM							
Complete list of Policies relating to PAM							
Develop Protected Area internal rules ito sec 52 of NEM:PAA Approve and Gazette Internal rules	Internal rules for controlling use & activities in the PA have been gazetted.Regular	1.2 Protected Area internal rules					
Compile standard operating procedures pertaining to all management activities	Relevant SOP pertaining to all management activities are in place to ensure best practice.	4.2 Standard operating procedures					

6	Update State of Knowledge Data Repository - Maps	The Management Plan is fully integrated covering all aspects of PA management with measureable objectives and is approved by the MEC. Review and compile for next 5-year planning period	2.2 Management Plan		R 190 259.20	R 61 052.16	R 88 708.90	R 131 852.52
a	IMP Maps							
	Map 1:Reserve Interface							
	Map 2: Reserve Interface comparison							
	Map 3: Reserve Estate							
	Map 4: Climate (Climatic regions within the NDM)							
	Map 5: Digital Terrain Model Map							
	Map 6: Geological Map							
	Map 7: Land types and soil Map							
	Map 8: Drainage and Hydrology							
	Map 9: Biomes, Bioregions and Vegetation units							
	Map 10: Plant communities and Management units							
	Map 11: Special habitats - Hotspots							
	Map 12: Archaeological and Cultural, Heritage resources							
	Map 13: Infrastructure and Bulk services							
	Map 14: Use Zone Map							
b	General & Logistical Maps Link to SMP for Estate and Domain not ZOI	Administrative support systems are excellent and fully support management effectiveness.	4.4 Administrative support systems					
	Map 1: Protected area Expansion							
	Map 2: Historical land uses - Polygon Only data From colonial time							
	Map 3: Conflicting land uses - Polygon Current and known future							
	Map 4: Anthropogenic incidence (HIRA) - Polygon Incidence of manmade disasters, accidents and impacts (poaching, arsen ect.)							
	Map 5: Site plans - update with CDF/GIAMA							
	Map 5-1: Development Plans - According to CDF							
	Map 6: Roads - Historic and current update with CDF							
	Map 7: Fences - Historic and current update with CDF							
	Map 8: Water supply systems - Historic and current update with CDF							
	Map 9: Watering points - Historic and current manmade update with CDF							
	Map 10: Electrical installations - Historic and current update with CDF							
	Map 11: Mining operations and Burrow pits - Historic and current update with CDF							
	Map 12: Erosion areas - Polygon - Rehabilitated and current areas							
c	Biodiversity Maps Link to BMS for Estate and Domain	Information and the understanding thereof concerning key species, habitats, ecosystems of the PA supports the achievement of all biodiversity objectives.	1.4. Biodiversity knowledge and understanding					
	Map 1: Fauna							
	Map 1-1 Exotic Fauna							
	Map 1-3 Fauna Distribution of SSC							
	Map 1-4 Fauna Distribution Large Predators							
	Map 1-5 Fauna Distribution Key Raptor Nests							
	Map 1-6 Fauna Monitoring sites							
	Map 2: Flora							
	Map 2-1: Flora Exotic							
	Map 2-3 Flora Distribution of SSC							
	Map 2-4 Flora Fire insidence							
	Map 2-5 Flora Monitoring sites							

Objective 6.2: Maintain an adequately equipped, resourced and trained staff complement for the PA								R1 626 449.88	R1 666 749.01	R1 676 227.77	R1 634 011.11
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Ensure that all vacant posts in the reserve's approved organogram are filled and determine actual needs for achieving management objectives as part of work plans.	The approved organogram reflects the actual needs for effectively achieving all management objectives and the HR capacity meets the approved levels.	3.2 Human Resource capacity					R 1 427 074.37	R 1 417 701.48	R 1 417 911.54	R 1 418 132.10
2	Implement the institutional staff performance appraisal system and link WP and PA to APO	Staff are well skilled for their duties and staff productivity targets (workplans) are often exceeded as indicated in staff performance reviews. There is an effective staff handover system and new staff are promptly made aware of relevant aspects of the PA management. Staff receive incentives to remain in the organisation to prevent loss of skills and experience.	5.3 Staff Development and productivity					R 151 021.06	R 200 285.86	R 193 217.34	R 164 949.58
a	*Have clear job descriptions and Performance Agreements on record. Link KPA's to APO and Mett*										
b	*Identify training needs, and facilitate access to training programs for reserve staff, with a priority focus on field ranger, first aid, hospitality and IT skills training.*										
c	*Maintain Leave and CWW register part of Monthley planner*										
3	Maintain all staff information for the reserve (leave records, attendance registers, overtime, etc.).	HR management and staff development systems are excellent and fully support management effectiveness.	4.3 HR Management systems					R 8 144.45	R 8 551.67	R 16 066.39	R 1 455.80
4	Implement the institutional Occupational Health and Safety policies and procedures in the reserve.	An external audit has certified that PA management complies with and implements	3.10 Health and safety					R 40 210.00	R 40 210.00	R 49 032.50	R 49 473.63
5	Develop a policy and standards for staff housing and ensure all staff housed accordingly.	There is a policy and standards for staff housing	3.11 Staff housing	NA				R -	R -	R -	R -
Objective 6.3:Institute and maintain an effective financial and administartive planning capability in the PA								**R151 857.89**	**R116 060.46**	**R108 454.94**	**R123 842.11**
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Information Technology systems										
a	*Ensure electronic data are backed up on a routine basis and stored according to organisational standards*	Information Technology systems are excellent and fully support management effectiveness.	4.5 Information Technology systems					R 83 987.48	R 61 149.91	R 53 791.95	R 78 025.50
b	*Institute and maintain an electronic and/or hard copy filing system for all reserve-specific information.*										
c	*Read and apply all updated Management Authority guidelines, policies and procedures to the daily*										
2	Ensure financial management is excellent and all management goals are met										
a	*Prepare annual budget according to the APO and identify needs for external funding.*	The available budget is sufficient and meets the full management needs of the PA. There are skills and capacity in the organisation to raise external sources of funding for specific projects. An operational budget, specific to the PA, is secure and is guaranteed on a 3-5 year cycle. Updated guidelines, policies and procedures available at the reserve.	3.3 Adequacy of Operational budget 3.4 Security of Operational budget 3.4.1 Capital budget 3.4.2 Budget Management 3.4.3 Delegation of management of budget 3.5.1 Fund raising					R 67 870.41	R 54 910.55	R 54 662.99	R 45 816.61
b	*Compile database of external sources of funding for specific projects*										
c	*Link OMF to operational budget and obtain dedicated budget*										
d	*Maintain a reserve-based record of all purchases made, accounts paid and services procured in support of reserve operations over each financial year.*										
e	*Keep record and manage own revenue according to PFMA and supply inputs when required*			NA							
3	Ensure administration management is excellent and all management goals are met										
a	*Attend PAM and other meetings*	Updated guidelines, policies and procedures available at the reserve.	4.4 Administrative support systems					R 53 727.62	R 84 620.99	R 95 151.72	R 99 909.31
b	*Update PAM task list*										
c	*Monthly and quaterly planning and reports*										

5. RESOURCING AND GOVERNANCE FRAMEWORK

This section provides brief recommendations on the minimum staffing complement and funding that would be required to implement the RMP (i.e., the APO). personnel

This section also briefly describes the key responsibilities of the reserve management team in the development, implementation, monitoring and review of the RMP.

5.1 Staffing Requirements

It is proposed that the minimum staffing complement[17] in table 20 would be required to implement this IMP[18]:

Table 20: Staff requirement

POST DESIGNATION	NUMBER
RESERVE MANAGER	1
ASST. RESERVE MANAGER	
SENIOR FIELD RANGER	1
FIELD RANGER	4
GENERAL FOREMAN	1
GENERAL ASSISTANT	3
ADMINISTRATION CLERK	0
ADMIN CLEANER	0
FACILITY MANAGER	1
HANDYMAN/DRIVER	0
GATE GUARD	0
FACILITY CLEANER	1

5.2 Funding Requirements

In terms of the Biodiversity offset agreement BMM will provide the following funding requirements through a Trust for the implementation of this SMP:

Goods and services (Including Personnel)

R3,500,000.00 per annum (increase yearly by CPIX or 6% (whichever is the lower)).

Capital assets

R500,000.00 per annum for five years for capital and establishment.

In addition to the available funds for Goods and services the following funding will be made available by BMM:

- All properties, or portions thereof shall be adequately fenced (1.8 metres in height) as part of Objective 3.2 Secure boundaries of, and maintain controlled access to, the PA;
- All properties, or portions thereof shall be rehabilitated as part of Objective 1.2 Restoration and mitigation of degradation;
- The provision of and operating costs of two (2) office units and the provision of and operating costs of three (3) accommodation units for the day-to-day management of the Protected Area as part of Objective 4.2 Construct, maintain and upgrade the administration infrastructure and bulk services infrastructure in the PA; and

[17] This minimum staff complement assumes that the planned overnight tourism facilities will not be completed and/or the services are outsourced to an operator or concessionaire and that the reserve management will not be directly responsible for the management of these facilities and services.

[18] The staffing requirements reflected are premised on two elements: (i) a critical assessment of the efficacy of the current approved (not actual) organogram for the reserve in respect of current reserve management responsibilities; and (ii) a facilitated discussion with the RPT on any (mostly minor) adjustments/changes that may be required to this approved organogram in order to more effectively implement the SP for the next five years.

- The servicing of motor vehicles which amount shall be limited to R50,000.00 per annum (increase yearly by CPIX or 6% (whichever is the lower)) as part of Objective 4.1 Acquire and maintain operational equipment and vehicles for the PA.

It is proposed that the operational[19] and capital[20] budget in table 21 would be required to implement this IMP:

Table 21: Budget requirement per KPA

KPA 1: Biodiversity and heritage conservation

ECONOMIC CLASSIFICATION - SCOA	2020-2021	2021-2022	2022-2023	2023-2024
	Budget	Budget	Budget	Budget
PERSONNEL	R175 358.69	R447 505.58	R372 235.39	R406 575.95
GOODS AND SERVICES	R62 593.02	R147 500.00	R10 500.00	R41 786.51
CAPITAL ASSETS >R5000	R165 600.00	R0.00	R0.00	R44 000.00
TOTAAL:	R403 551.71	R595 005.58	R382 735.39	R492 362.46

KPA 2: Recreation, Marketing, Education, Awareness and Interpretation

ECONOMIC CLASSIFICATION - SCOA	2020-2021	2021-2022	2022-2023	2023-2024
	Budget	Budget	Budget	Budget
PERSONNEL	0.00	0.00	22056.26	18527.26
GOODS AND SERVICES	0.00	0.00	0.00	60000.00
CAPITAL ASSETS >R5000	0.00	0.00	0.00	0.00
TOTAAL:	0.00	0.00	22056.26	78527.26

KPA 3: Enforcement, security and access control

ECONOMIC CLASSIFICATION - SCOA	2020-2021	2021-2022	2022-2023	2023-2024
	Budget	Budget	Budget	Budget
PERSONNEL	133476.60	170042.25	193983.75	194419.31
GOODS AND SERVICES	0.00	5463000.00	0.00	50000.00
CAPITAL ASSETS >R5000	0.00	0.00	0.00	0.00
TOTAAL:	133476.60	5633042.25	193983.75	244419.31

KPA 4: Infrastructure and equipment

ECONOMIC CLASSIFICATION - SCOA	2020-2021	2021-2022	2022-2023	2023-2024
	Budget	Budget	Budget	Budget
PERSONNEL	72495.76	96506.70	111363.08	103035.79
GOODS AND SERVICES	426770.00	292800.00	342800.00	361770.00
CAPITAL ASSETS >R5000	783000.00	20000.00	20000.00	22500.00
TOTAAL:	1282265.76	409306.70	474163.08	487305.79

KPA 5: Stakeholder involvement

ECONOMIC CLASSIFICATION - SCOA	2020-2021	2021-2022	2022-2023	2023-2024
	Budget	Budget	Budget	Budget
PERSONNEL	48631.13	38160.53	48523.77	11579.54
GOODS AND SERVICES	0.00	0.00	0.00	0.00
CAPITAL ASSETS >R5000	0.00	0.00	0.00	0.00
TOTAAL:	48631.13	38160.53	48523.77	11579.54

KPA 6: Administration and planning

ECONOMIC CLASSIFICATION - SCOA	2020-2021	2021-2022	2022-2023	2023-2024
	Budget	Budget	Budget	Budget
PERSONNEL	1983671.96	1811676.10	1897989.25	1980275.96
GOODS AND SERVICES	121649.88	121649.88	97349.88	73049.88
CAPITAL ASSETS >R5000	49000.00	0.00	0.00	49000.00
TOTAAL:	2154321.84	1933325.98	1995339.13	2102325.84

[19] Operational costs are roughly based on an area-complexity factor (i.e. different cost ranges per ha, based on the level (high, medium or low) of management complexity). This was then moderated against documented expenditure for operational costs in Northern Cape's provincial reserves, wherever available. This was then again moderated against equivalent reserves in Kwa-Zulu Natal and the Western Cape, as well as reserves of SANParks and ECParks, where operating costs have stabilised and are well documented over a period of three to five years.

[20] Capital budget requirements are roughly based on known costs for similar capital investments, either in terms of replacement costs (e.g. vehicles), infrastructure development costs (e.g. cost/ha or cost/km for fencing or roads), bulk services (e.g. costs/m for pipelines, etc.), or building costs (e.g. cost/m^2 for staff accommodation or chalets), etc.

Table 22: Total Budget requirements

KEY PERFORMANCE AREA	2020-2021			2021-2022			2022-2023			2023-2024		
	PERSAL	OPEX	CAPEX	PERSAL	OPEX	CAPEX	PERSAL	OPEX	CAPEX	PERSAL	OPEX	CAPEX
KPA 1: Biodiversity and heritage conservation	R175 358.69	R62 593.02	R165 600.00	R447 505.58	R147 500.00	R0.00	R372 235.39	R10 500.00	R0.00	R406 575.95	R41 786.51	R44 000.00
KPA 2: Recreation, Marketing, Education, Awareness and Interpretation	R0.00	R0.00	R0.00	R0.00	R0.00	R0.00	R22 056.26	R0.00	R0.00	R18 527.26	R60 000.00	R0.00
KPA 3: Enforcement, security and access control	R133 476.60	R0.00	R0.00	R170 042.25	R5 463 000.00	R0.00	R193 983.75	R0.00	R0.00	R194 419.31	R50 000.00	R0.00
KPA 4: Infrastructure and equipment	R72 495.76	R426 770.00	R783 000.00	R96 506.70	R292 800.00	R20 000.00	R111 363.08	R342 800.00	R20 000.00	R103 035.79	R361 770.00	R22 500.00
KPA 5: Stakeholder involvement	R48 631.13	R0.00	R0.00	R38 160.53	R0.00	R0.00	R48 523.77	R0.00	R0.00	R11 579.54	R0.00	R0.00
KPA 6: Administration and planning	R1 983 671.96	R121 649.88	R49 000.00	R1 811 676.10	R121 649.88	R0.00	R1 897 989.25	R97 349.88	R0.00	R1 980 275.96	R73 049.88	R49 000.00
Total per economic classification	**R2 413 634.13**	**R611 012.90**	**R997 600.00**	**R2 563 891.16**	**R6 024 949.88**	**R20 000.00**	**R2 646 151.49**	**R450 649.88**	**R20 000.00**	**R2 714 413.80**	**R586 606.39**	**R115 500.00**
Total activity based budget	**R4 022 247.03**			**R8 608 841.04**			**R3 116 801.37**			**R3 416 520.19**		

Table 23: Total Budget requirements and allocations in terms of offset agreement

KEY PERFORMANCE AREA	2020-2021		2021-2022		2022-2023		2023-2024	
	OPEX	CAPEX	OPEX	CAPEX	OPEX	CAPEX	OPEX	CAPEX
KPA 1: Biodiversity and heritage conservation	R 237 951.71	R 165 600.00	R 595 005.58	R -	R 382 735.39	R -	R 448 362.46	R 44 000.00
BMM Annual allocation	R 187 551.71	R 165 600.00	R 284 224.38	R -	R 209 356.21	R -	R 302 257.85	R 44 000.00
BMM Rehabilitation and invasive species control and eradication KPA 1.2	R 50 400.00	R -	R 310 781.20	R -	R 173 379.19	R -	R 146 104.61	R -
KPA 2: Recreation, Marketing, Education, Awareness and Interpretation	R -	R -	R -	R -	R 22 056.26	R -	R 78 527.26	R -
BMM Annual allocation	R -	R -	R -	R -	R 22 056.26	R -	R 78 527.26	R -
KPA 3: Enforcement, security and access control	R 133 476.60	R -	R5 633 042.25	R -	R 193 983.75	R -	R 244 419.31	R -
BMM Annual allocation	R 104 581.66	R -	R 159 539.27	R -	R 193 983.75	R -	R 239 787.50	R -
BMM construction of the perimeter demarcation/fencing KPA 3.2.2	R 28 894.94	R -	R5 473 502.98	R -	R -	R -	R 4 631.81	R -
KPA 4: Infrastructure and equipment	R 499 265.76	R 783 000.00	R 389 306.70	R 20 000.00	R 454 163.08	R 20 000.00	R 464 805.79	R 22 500.00
BMM Annual allocation	R 232 966.02	R 83 000.00	R 245 194.18	R 20 000.00	R 284 312.44	R 20 000.00	R 296 278.53	R 22 500.00
BMM Administration infrastructure and bulk services KPA 4.2	R 266 299.74	R 700 000.00	R 144 112.52	R -	R 169 850.63	R -	R 168 527.26	R -
KPA 5: Stakeholder involvement	R 48 631.13	R -	R 38 160.53	R -	R 48 523.77	R -	R 11 579.54	R -
BMM Annual allocation	R 48 631.13	R -	R 38 160.53	R -	R 48 523.77	R -	R 11 579.54	R -
KPA 6: Administration and planning	R 2 105 321.84	R 49 000.00	R1 933 325.98	R -	R1 995 339.13	R -	R2 053 325.84	R 49 000.00
BMM Annual allocation	R 2 926 269.48	R 251 400.00	R2 772 881.63	R 480 000.00	R2 741 767.57	R480 000.00	R2 571 569.33	R433 500.00
Total required per economic classification	**R3 024 647.03**	**R997 600.00**	**R8 588 841.04**	**R20 000.00**	**R3 096 801.37**	**R20 000.00**	**R3 301 020.19**	**R115 500.00**
Budget available in terms of offset agreement	**R3 845 594.68**	**R1 200 000.00**	**R9 428 396.69**	**R500 000.00**	**R3 843 229.82**	**R500 000.00**	**R3 819 263.68**	**R500 000.00**
Deviation	**R820 947.65**	**R202 400.00**	**R839 555.66**	**R480 000.00**	**R746 428.45**	**R480 000.00**	**R518 243.49**	**R384 500.00**

5.3 Roles and Responsibilities

5.3.1 Reserve Management

The key responsibilities of reserve management in the development, implementation, monitoring and review of the IMP are summarised as follows:

Table 24: Management responsibilities

Management Authority (HOD) conservation agencies and services	The Management Authority through the conservation agencies and services program will have direct responsibility for: • Ensuring the alignment of the PA SMP with and Strategic Plan and APP as well as Provincial policies and guidelines; • Ensuring the coordination and alignment of the SMP with other departmental activities and initiatives; and • Providing financial, professional and technical support to the Program Manager and PA Manager in the implementation of the SMP and OMF.
Program Manager	The Program Manager will have overall responsibility for: • Providing oversight of the implementation of the SMP and OMF; • Reporting on the performance of the GBNR in the implementation of the SMP and OMF to Management Authority; • Instituting corrective actions to ensure that the SMP and linked OMF is implemented, reviewed and updated; and • Approval of the OMF.
Reserve Manager	The Reserve Manager will have direct responsibility for: • Annually drafting an OMF to operationalize the priority activities identified in the APO and SMP; • Implementation of the OMF; • Monitoring of performance against the OMF (and the SMP); • Reporting of performance against the OMF (and the SMP) to the Program Manager; • Management of reserve staff, resources and finances in the implementation of the OMF; and • Communicating with the Program Manager about obstacles in the implementation of the OMF.

5.3.2 Reserve Planning Team

The RPT may include any of the following persons:

- Regional Manager;
- Northern Cape PA Managers
- The Reserve Manager;
- Key reserve management staff;
- Biodiversity planner;
- Regional scientist/s;
- Landowner/s (in the case of stewardship agreements);
- Representative/s of any reserve co-management committee (in cases where one has been established); and
- Co-opted technical experts/consultants.

The RPT is specifically responsible for the following:

- Overseeing all planning initiatives and activities in the reserve;
- Providing strategic direction to the SMP;
- Providing technical and scientific inputs into the SMP;
- Approving the first draft of the reserve's SMP for public consultation; and
- Identifying the need for subsidiary plans in the reserve, and guiding its formulation;

The RPT should meet under the guidance of the Program Manager, who should also act as chairman at all meetings.

5.3.3 Protected Area Advisory Committee

Regulation 9 of the Regulations for the Proper Administration of Nature Reserves made in terms of Section 86 (1) of NEMPAA states that the Management Authority may establish one or more advisory committees in respect of a nature reserve according to the procedure stipulated in Regulation 10 of the aforementioned Regulations. Upon following this procedure, the Management Authority may appoint an advisory committee, provided that at least one employee of the Management Authority, nominated by the Management Authority itself, serve as an ex officio member of the committee. Each member of the advisory committee is appointed by the Management Authority for a period determined by the Management Authority, which may not exceed three years.

The mandate of any advisory committee must be defined by the Management Authority itself in specific terms in writing. These specific terms must include the terms of reference; the method of communicating advice; the acceptance and rejection of advice offered; the appointment and removal of committee members; and the support to be provided, together with any remuneration payable and its terms.

5.3.4 Reserve Co-Management Committee

As all properties are currently State-owned no co-management agreement is applicable. If private or community land are incorporated at a later stage as part of the expansion strategy the key responsibilities of GBNRCMC in the development, implementation, monitoring and review of the RMP are summarised in Table 25:

Table 25: Co-management Committee responsibilities

Gamsberg Nature Reserve Co-Management Committee
The GBNRCMC shall have overall responsibility for: • Representing the interests of the different reserve stakeholder groups and institutions during the preparation of the IMP and APO; • Providing strategic inputs into the drafting of the IMP, and technical inputs into the annual drafting of the OMF; • Making recommendations to the Regional Manager on the adoption of the IMP and annual OMF; • Reviewing the quarterly and annual performance of the GBNR against the OMF (and IMP); and • Providing inputs into ad hoc and emergency reserve decision-making not adequately addressed in the IMP/OMF.

6. BIBLIOGRAPHY

ARTP JMB. 2008. “Lower Orange River Management Plan.” Unlocking the Ecotourism Potential of the River

Bamford, M.K. 2000. Cenozoic Macro-Plants. In: Partridge, T.C. & Maud, R.R. (Eds.) The Cenozoic of Southern Africa, pp.351-356. Oxford University Press, Oxford.

Barnes, K N (ed.) (1998). The important bird areas of southern Africa. Birdlife South Africa, Johannesburg.

Birdlife South Africa. 2012. [online] Available at: http://www.birdlife.org.za/ conservation/iba/ibadirectory [Accessed May 2015].

Bomhard B. and Midgley (2005). Securing Protected Areas in the face of Global Change.

Cowan, G.I. & Mpongoma, N. 2011. Guidelines for the development of a management plan for a protected area in terms of the National Environmental Management: Protected Areas Act, 2003. Unpublished document.

DEA, 2012. Working Group 1 Action Plan for Implementing the Convention on Biological Diversity’s - Programme of Work on Protected Areas

DWAF. 2012. [online] Available at: http://www.dwaf.gov.za/iwqs/gis data/river/rivs500k.html [Accessed June 2015].

Department of Environmental Affairs and Tourism. 2006. South Africa Environment Outlook. A report on the state of the environment. Department of Environmental Affairs and Tourism, Pretoria. 371pp

IUCN. 2012. [online] Available at: <http://www.iucnredlist.org/> [Accessed June 2020].

Hilton-Taylor, C. & Le Roux, A. 1989. Conservation status of the fynbos and Karoo Biomes. In: Biotic diversity in Southern Africa: concepts and conservation, Huntley, B.J. (ed.). Oxford University Press, Cape Town. pp 202-223.

Haughton, S.H. 1915. On some dinosaur remains from Bushmanland. Transactions of the Royal Society of South Africa 5: 265-272

Jürgens, N. 1991. A new approach to the Namib Region. I: Phytogeographic subdivision. Vegetation 97: 21-38.

Jürgens, N. 1997. Floristic biodiversity and history of African arid regions. Biodiv. Conserv. 6: 495-514.

Keith, M. (Technical Editor). 2010. [online] Available at: http://sites.google.com/ site/samammals/ [Accessed June 2020].

Macey, P.H., Siegfried, H.P., Minnaar, H., Almond, J. & Botha, P.M.W. 2011. The geology of the Loeriesfontein area. Explanation to 1: 250 000 geology sheet 3018, 139 pp. Council for Geoscience, Pretoria.

Martin R.B. (1996). Costs of Conserving State Protected Areas in Southern Africa. Fact Sheet No.6, Africa Resources Trust, P.O. Box A860, Avondale, Harare, Zimbabwe.

Morris, D. 2009. Cultural Heritage Assessment Gamsberg Supplementary Observations to a Previous Specialist Report on Archaeological Resources.

Mucina, L. & Rutherford, M.C. (eds.). 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.
Namakwa District Municipality. 2011. Environmental Framework and Strategic Environmental Management Plan

Namakwa District Municipality. 2011. Strategic Environmental Management Plan

Namakwa District Municipality. 2012. IDP/Budget: 2012/2016. District Municipal Integrated Development Plan.

Ollis, D.J., Snaddon, C.D., Job, N.M. & Mbona, N. (2013). Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland systems. SANBI Biodiversity Series 22. South African National Biodiversity Institute, Pretoria.

Orton J. and Kalkett D. (2010). Stone tools, Beads and a River. South African Archaeological Bulletin 65 (191): 13–25, 2010

Partridge, T.C. and Maud, R.R. 1987. Geomorphic evolution of South Africa since the Mezozoic. South African Journal of Geology 90: 179-208.

Peace Parks Foundation. 2002. Status Report Existing and Potential Transfrontier Conservation Areas in the SADC Region. August 2002

Peace Parks Foundation. |Ai-|Ais/Richtersveld Transfrontier Park Joint Management Plan [online] Available at: www.peaceparks.org [Accessed August 2015].

Pether J. (2013) "Project Reference Number 0164903. Environmental and Social Impact Assessment (ESIA) for the Gamsberg Zinc Mine and Associated Infrastructure, Northern Cape. Palaeontological Impact Assessment, Desktop Study.
Pickford, M., Eisenmann, V. & Senut, B. 1999. Timing and landscape development and calcrete genesis in northern Namaqualand, South Africa. South African Journal of Science 95: 357-359.
Republic of Namibia and Republic of South Africa. 2003. Treaty between the Government of the Republic of Namibia and the Government of the Republic of South Africa on the Establishment of the [|Ai-|Ais/Richtersveld] Transfrontier Park

River Health Programme (2006). State of Rivers Report. Department of Water Affairs and Forestry, Pretoria

Rogers, A.W. 1915. The occurrence of dinosaurs in Bushmanland. Transactions of the Royal Society of South Africa 5: 265-272.

Sander, M. 2001. Master Thesis on Development and Resource Management through Tourism in the Context of the TRANSFORM-Project in the Richtersveld, South Africa

Scholtz, A. 1985 The palynology of the upper lacustrine sediments of the Arnot Pipe, Banke, Namaqualand. Annals of the South African Museum 95: 1–109.

Smuts, R. 2010. Are partnerships the key to conserving Africa's biodiversity? Four partnership case studies between mining companies and conservation NGOs. Conservation International

SADC. 2007. "Framework for Transfrontier Conservation Areas." Draft Final Issues and Options Report. Second Draft, March 2007

SAHRA. 2009. Palaeotechnical Report, Palaeontological heritage of the Northern Cape.

Siegrist, D., Clivaz, C., Hunziker, M. & Iten, S. (eds.) (2006). Exploring the Nature of Management. Proceedings of the Third International Conference on Monitoring and Management of Visitor Flows in Recreational and Protected Areas. University of Applied Sciences Rapperswil, Switzerland, 13-17 September 2006. Rapperswil.

Stuart, C. & Stuart, T. 2007. Field guide to mammals of Southern Africa. Struik Publishers, Cape Town.

VAN WYK, A. E. & SMITH, G. F. 2001. Regions of floristic endemism in southern Africa: A review with emphasis on succulents. Umdaus Press, Pretoria.

Annexure 1: Conservation Development Framework (CDF)

Conservation Development Framework (CDF) and Use Zone Map

1. Introduction

The CDF is a strategic spatial plan for the reserve and its surrounds that indicates a range of visitor use zones, areas requiring special management intervention, the placement of visitor facilities, the nature and size of these facilities, entry points and movement routes through the reserve. It also provides guidelines for potential future development, rehabilitation and the management of land-use along the reserve borders. The CDF is underpinned by a thorough analysis of the biodiversity, cultural- heritage and landscape limits to development, as well as the tourism opportunities. Sensitivity-value analysis is a decision support tool for spatial planning that is designed to integrate best available biodiversity information into a format that allows for defensible and transparent decisions to be made.

2. Basic planning principles applied

The basic planning principles applied in the compilation of the CDF and facilities in reserves are as follow:

2.1 Reserve Interface Zone

- Recognize that Reserve boundaries are not static and that there are factors beyond the current or future boundaries that can influence the Reserve.
- Interface Zones, shows the areas within which surrounding land-use changes could affect the reserve.
- The zones serve as a basis for identifying focus areas in which reserve management should respond to development proposals and EIAs, identifying impacts that would be important at a particular site, and most importantly, serving as the basis for integrating long-term protection of a reserve into the spatial development plans of municipalities and other local authorities.

2.2 Regional Influences

- Recognize that the Reserve cannot exist in isolation and that planning needs to ensure that the Reserve is integrated with the surrounding landscapes and economic and social structures.
- Ensure that the plans take account of the IDP/SDF of the local municipality
- Conduct market research to ensure that the proposed facilities are sustainable in the local regional and national market.
  - Provide unique integrated ranges of products.
  - Provide facilities that serve the local community.
- Determine the extent to which Reserve management will be involved in planning issues outside of the future boundary (Reserve interface Zone) and produce guidelines for this area.

2.3 Biodiversity conservation

- Recognize that the prime mandate of Reserves is to conserve biodiversity.
  - All planning will be underpinned by a thorough sensitivity analysis of all biophysical aspects using the best available data.
  - Apply the principles of Strategic Environmental Assessment (SEA) that is similar to that of EIA for projects.
  - Apply the principles of Limits of Acceptable Change to determine the carrying capacity of the Reserve.
  - Follow the IEM system for all developments that promotes the principles of transparency, accountability and informed decision-making at all stages of the project life-cycle.

- Apply the “precautionary” principle whenever insufficient information is available to make an informed decision.
- Reduce the current impacts of structures and roads.
- Rationalize and consolidate the roads system.
- Mitigate current impacts.
- Rehabilitate impacted areas.

2.4 Scenic resources

- Recognize that conservation and management of scenic quality is a vital part of Reserves mandate
- Mitigate the visual impact of current structures and where necessary remove structures from highly visually sensitive areas.
  - Ensure that new developments and roads do not impact on the scenic quality
  - Visual sensitivity must inform the acquisition of land outside of the Reserve
- Improve the sense of place at existing facilities in the Reserve

2.5 Heritage/Cultural assets

- Recognize that Reserves has a mandate not only in terms of the PAA but also the National Heritage Resources Act to manage cultural assets.
- Ensure that cultural sites are not disturbed by developments.
- Celebrate cultural assets in the provision of facilities, information and interpretation.

2.6 Visitor facilities and infrastructure

- Recognize that Reserve offers a wide range of unique opportunities for experiences of solitude and nature-based recreation.
- All facilities to comply with “Touching the Earth Lightly” principles.
  - Determine the optimum number of visitors to ensure quality experiences.
  - Provide a range of unique experiences without significant impacts on biodiversity and scenery.
- Zone the Reserve to allow for different levels of intensity of use.
- Consolidate and minimize entry points.
- Where possible place new management and visitor facilities on the periphery of the Reserve.
- Provide opportunities to experience the Reserve on foot and or bicycles

3. Sensitivity analysis

As a first step in compiling the CDF a sensitivity analysis was done for the reserve. Biodiversity conservation, wilderness attributes, unique landscape features, and the legacy of development that includes obsolete structures, infrastructure considered asheritage in terms of the National Heritage Resources Act, all act as the primary informants to land-use planning. The process analysed the overall reserve environment and assessed the range and scale of activities that the reserve can support. Where available the data extend beyond the Reserve estate and cover the complete domain. Ideally data should include the complete interface

The following data used in the Sensitivity analysis is only the basic requirements andall available data should be sourced.

3.1 Reserve interface

- This layer should be divided into historic, current situation with regard to conservation and protected areas as well as the vision for the future (yesterday, today and tomorrow).
- A rudimentary reserve interface delineation exercise for reserves has been conducted and identified three Interface Zone categories
  - Priority Natural Areas:
    - These are key areas for both pattern and process that are required for the long-term persistence of biodiversity in and around the reserve and includeother protected- and

conservation areas.

- The zone also includes areas identified for future reserve expansion. Inappropriate development and negative land-use changes should be opposed in this area.
- Developments and activities should be restricted to sites that are already transformed. Only developments that contribute to ensuring conservation friendly land-use should be viewed favorably.
- This layer was derived from identification of intact natural areas around reserves as highlighted through the CBA assessment combined with an evaluation of areas for their corridor value.

➢ Catchment Protection Areas:

- These are areas important for maintaining key hydrological processeswithin the reserve.
- Inappropriate development (dam construction, loss of riparian vegetationetc.) should be opposed.
- Control of alien vegetation and soil erosion as well as appropriate land careshould be promoted.
- The delineation of these areas is based on river health program.
- This assessment is not very well geared at showing areas of reserve vulnerability to specific hydrological impacts, and the Aquatic Ecosystems of the reserve must be formally classified according to the six-tiered structure of the Classification System for Wetlands and other Aquatic Ecosystems in South Africa'.

➢ Viewshed Protection Areas:

- These are areas where development is likely to impact on the aesthetic quality of the visitor's experience in a reserve.
- Within these areas any development proposals should be carefully screened to ensure that they do not impact excessively on the aesthetics of the reserve.
- The areas identified are only broadly indicative of sensitive areas, as at a fine scale many areas within this zone would be perfectly suited fordevelopment.
- In addition, major projects with large scale regional impacts may need to bere-considered even if they are outside the Viewshed Protection Zone.
- This layer was derived from a visual analysis conducted for the reserve.

3.2 Reserve domain (Planning domain)

- Planning domain include current reserve boundaries (estate) with planned expansion for next 5-year planning period.

3.3 Reserve estate (Boundaries & Beacons)

- Layout plan of the reserve showing current boundary.
- All corners (beacons) should be listed with their co-ordinates in the legend[21].

3.4 Climate regions

- CSIR Köppen-Geiger map based on 1985 to 2005 South African Weather Services data on a very fine 1 km x 1 km grid.
- This layer was completed on a large scale for the complete Northern Cape Province.

3.5 Digital Terrain Model (topography)

- This was done on a 30m resolution and indicate areas with special natural features (waterfalls, canyons, plato's, escarpments, caves and rock formations).

[21] Only estimated position but needs to be replaced with surveyed co-ordinate according to deeds diagrams

- This layer also indicates all high points with names and or trig beacons.
- Areas that have particular aesthetic value were also mapped as polygons

3.6 Geology map

- Fine scale units according to the maps provided by the council of geoscience were used and were geo-reference to produce the layer for the reserve domain.

3.7 Land types & Soil map:

- The Land Type Map covering the reserve domain together with the Land Type Memoir with explanatory information on land types, modal profiles and climate zones were used to compile this layer.

3.8 Aquatic Ecosystems

- Classification and mapping according to SANBI System for Wetlands and other Aquatic Ecosystems in South Africa' were used to map the aquatic ecosystems.
- Distinction is made between Floodplain wetlands, Un-channeled valley-bottom wetlands, Wetland flats, Channeled valley-bottom wetlands, Depressions, Seeps and Rivers

3.9 Biomes and Bioregions

- The biomes and bioregions according to the reserve domain were mapped.

3.10 Vegetation Map

- This layer needs to broadly fit in with the new national classification.
- Sub-categories including management units and disturbed areas that will include degraded areas for the previous 5 years and all transformed areas were also included.

3.11 Special habitats:

- Known concentrations of species of special concern (breeding colonies, etc.) needs to be mapped.
- This will only be broadly mapped (complete habitat), and can be based on expert assessment.

3.12 Archaeological and Cultural resources:

- Brief survey with cultural/heritage sites points data.
- Specialist studies needed to classify the value of each site (national-local etc.) (Research proposals submitted).

3.13 Existing infrastructure, services and facilities:

- All visitor facilities provided in the reserve estate were mapped.
- All tourism facilities in reserve domain were mapped.
- All infrastructure within the reserve domain were mapped.
- All existing and potential access points were mapped.
- All services (potable water, Eskom power supply) within the reserve domain were mapped.

3.14 Visual Analysis:

- The view shed from the reserve domain was determined to establish the footprint of the reserve interphase.
- Visual analysis was also done to determine the view shed from existing visitor facilities and other infrastructure.
- The analysis was used to determine the aesthetic value.

4. Reserve Policies & Context

4.1 Reserve policies in respect of biodiversity conservation and the provision of facilities

- The second step in the CDF process were to determine the policies in respect of biodiversity

conservation and the provision of facilities

- These policies are provided for as Appendix 1 to this SMP as it also needs to be approved as part of the SMP.

4.2 Determine what the short- and longer-term visitor requirements are

- This should be underpinned by a visitor survey which sets out the visitor profile, site patronage & visitor's concerns and requirements.
- This should be accompanied by a market survey of the demand for services and products.
- In order to be strategic, the planning process should look beyond the current boundaries and plan accordingly.
- It is also essential to determine the extent to which local (adjacent to reserve domain) and regional (reserve interface) influences will influence visitor requirements in the reserve.

5. Sensitivity-values mapping

5.1 Determine significant informants

- All the data layers collected during the first step of the CDF process (sensitivity analysis) were examined in terms of significance and sensitivity to development.
- The result has informed the use zone mapping and the placing, extent and the nature of visitor facilities.
- To determine and map sensitivity-values it must be emphasized that the data required to make this exercise defensible, is often inadequate or not available at all. Thus, the first step in the CDF process, the collecting and recording of the best available data should be seen as an extremely high priority for all reserves.

6. Use Zone map and development sites

6.1 Determine use zones

- This step of the CDF process is a requirement for all reserves in terms of the PAA. A draft was exposed to all stakeholders and amended as required by the PAA that is now submitted to the Executive Management for ratification and approval by the MEC as part of this SMP.
- This process was informed largely by the sensitivity map and reserve policies and planning principles.
- The generic set of visitor use zones for all reserves was used as a guideline.

6.2 Determine locations for future development of specific facilities

- Informed by the use zones, regional influences, visitor requirements, market needs and other informants, sites for potential visitor facilities and alternates were identified.
- At the same time potential transport routes and alternates are identified and the standards for all roads, footpaths and cycle routes will be set.
- Using the principle of SEA the alternate sites will be critically examined and the most suitable location decided on.
- The scale of development and the numbers of visitors need to be informed by an assessment of cumulative impacts for the whole reserve.

Based on available information, and in consultation with the RPT, the Conservation Development Framework (CDF) is presented as a strategic spatial planning framework for the PA and its surrounds. The CDF describes the objectives, characteristics, uses, management guidelines and broad conservation andtourism infrastructural requirements designated for each of the use zones. Each of these zones has

criteria for the type of activities, interaction with other users the type and size of facilities, the sophistication of facilities and the standard of roads.

7. Site plans

- As a final step in the planning process detailed planning will be undertaken for each site to produce a site plan for each visitor site which will inform the development of the specific facilities.
- The percent plans will determine the nature and scale of the facilities and will guide future phased expansion.
- In the long term it is proposed to produce a design manual for each reserve which will guide the style of al facilities and accompanying signage.

8. CDF Guide to Use Zones - General characteristics and objectives

8.1 Wilderness Zone

8.1.1 General Characteristics

- It complies fully with the criteria for the designation in terms of the Protected Areas Act.
- This is an area retaining an intrinsically wild and rugged appearance and character, or capable of being restored to such and which is undeveloped and without roads.
- Different wilderness blocks are usually separated from each other by management tracks, a necessity in areas with increased poaching pressure and the need to access remote areas by rangers.
- The area provides outstanding opportunities for solitude and has awe-inspiring natural characteristics.
- Areas where users have little chance of encountering any other human presence or group.
- Sight or sound of human activities outside zone barely discernible and at far distance; preferably no human impact or infrastructure inside the zone other than trails.
- Natural burning regimes, with no active fire management and road/firebreak infrastructure.
- Areas with minimal Invasive Alien Plant infestations, where IAP control can be done without vehicle access.
- Include sensitive or threatened habitats & species, important heritage sites and features in this low use zone when contiguous sites meet the criteria for wilderness.

8.1.2 Conservation Objective:

- Wilderness zones are managed to protect and maintain natural and cultural biodiversity and the provision of environmental goods and services.
- Management interventions use a “minimum tool approach” and “no-trace-left” activities may be conducted.
- Maintain the zone in as near to a natural state as possible with no impact on biodiversity pattern or processes.
- Existing impacts on biodiversity either from historical usage or originating from outside the zone should be minimized.

8.1.3 Aesthetic / recreational objectives

- To provide an experience of solitude in pristine landscapes with minimal evidence of human presence or use.
- Activities which Impact on the intrinsically wild appearance and character of the area, or which impact on the wilderness characteristics of the area (solitude, remoteness, wildness, serenity, peace etc.) will not be tolerated.

8.1.4 Conservation and Special Management (Resource Utilisation)

- Minimal management requirements, typically natural burning regime.
- Prevent or restore visible trampling or any other impact.
- Rehabilitate non-essential roads to natural vegetation. Re-zone essential roads out of Wilderness Zoning.
- Resource Utilisation not compatible

8.1.5 Visitor Management

- Manage to conserve natural and cultural resources, ecological processes and wilderness integrity.
- Limited management interventions. Management measures may be carried out in extreme conditions, but tread lightly principles must apply.
- Intensive maintenance of visitor activities. Leave no trace ethic. Restrict numbers of visitors and allow for no-use rest periods if required.
- Active enforcement of reserve regulations.
- Since visitor use cannot be intensively managed, re-route trails away from any areas with sensitive local habitats or plant and animal species.
- Trail layout, design and construction must reduce maintenance requirements.

8.2 Remote Zone

8.2.1 General Characteristics

- These areas provide a "wilderness experience", but do not necessarily comply with the criteria for legal designation as wilderness.
- The same criteria as for wilderness although limited unimproved management tracks (mostly extreme 4x4) are allowed. There are no permanent improvements or any form of human habitation. Moderate levels of visibility obtrusiveness allowed.
- Popular view sites or natural and cultural attractions only accessible by extreme 4 X4 self-drive or access by boat.
- Areas that may have natural burning regimes, with no active fire management and road/firebreak infrastructure or areas that require active fire management to stay within thresholds of concern.

8.2.2 Conservation Objective:

- The conservation objective is to maintain the zone in a natural state with no impact on biodiversity pattern or processes. Existing impacts on biodiversity either from historical usage or originating from outside the zone should be minimized.
- Habitats with minimal management requirements, typically natural burning zones.
- To minimise and mitigate the effects of visitor use on the reserve's natural habitats and species and its cultural sites.

8.2.3 Aesthetic / recreational objectives

- To provide an experience of relative solitude and wildness. Signs and sounds of the urban area are more obvious and encounters with other visitors are more frequent than in Wilderness. There may be some signs of infrastructure mainly of a heritage nature.
- Although less physical exertion is required, a reasonable level of fitness, self- reliance and experience is necessary.
- The nature of the experience is dependent on the quality of the natural environment.

8.2.4 Conservation and Special Management (Resource Utilisation)

- May require active conservation management interventions erosion control, fire breaks and block

burning.

- Intensive maintenance of visitor activities
- Intensive conservation management activities undertaken (rehabilitation).
- Resource Utilisation not compatible

8.2.5 Visitor Management

- Manage to conserve natural and cultural resources, ecological processes and wilderness integrity.
- Limited management interventions. Management measures may be carried out in extreme conditions, but tread lightly principles must apply.
- Intensive maintenance of visitor activities. Leave no trace ethic. Restrict numbers of visitors and allow for no-use rest periods if required.
- Active enforcement of reserve regulations.
- Since visitor use usually cannot be intensively managed, re-route trails away from any areas with sensitive local habitats or plant and animal species. Trail layout, design and construction must reduce maintenance requirements.
- Trail layout, design and construction must reduce maintenance requirements.

8.3 Primitive Zone

8.3.1 General Characteristics

- Intrinsically wild appearance & character
- Areas where users will seldom encounter other human groups or presence with access controlled in terms of numbers, frequency and size of groups.
- Any visible human impact or infrastructure inside the zone is unobtrusive. Views of human activities and development outside of the reserve or zone may be audible or visible in places.
- The zone has limited access roads and the potential for basic small-scale self- catering accommodation facilities or small Rest Camps (which would generally have more sophisticated facilities).
- Areas remote from management centres, or otherwise difficult or expensive to access for management.
- Primitive areas are designated to buffer remote or wilderness areas from higher use areas and activities outside the reserve, as well as to protect most of the remaining sensitive areas from high levels of tourist activity.
- Almost all highly and moderately sensitive environments that were not included within the Wilderness or Remote zone are included in this zone.
- Primitive areas are also designated in valleys with relatively low environmental sensitivity to allow access to remote areas as well as to contain the infrastructure required for management and tourist activity in these areas (e.g. trail huts and access roads).
- Areas that might not meet the criteria for Wilderness or Remote but can serve as undeveloped visual buffers for these zones.
- Areas that may have natural burning regimes, with no active fire management and road/firebreak infrastructure OR areas that require active fire management to stay within thresholds of concern.

8.3.2 Conservation Objective:

- The conservation objective is to maintain the zone in an almost completely natural state with little or no impact on biodiversity processes, and very limited and site-specific impacts on biodiversity pattern.
- Existing impacts on biodiversity either from historical usage or originating from outside the zone should be minimized.
- To limit visitor use, numbers and infrastructure to minimise impact in sensitive environments. To reduce need for management of users and visitor impacts.
- Allows for minimal or more intensive biodiversity management intervention.

- Include extensive areas of sensitive or threatened habitats & species in this low use zone when sites do not meet the criteria for wilderness.

8.3.3 Aesthetic / recreational objectives

- The aesthetic/recreational objectives for the zone specify that activities which impact on the intrinsically wild appearance and character of the
- infrastructure/facility should be designed to fit in with the environment within which it is located in order to avoid aesthetic impacts.
- To provide an experience of solitude in natural landscapes with little nearby evidence of human presence.
- Can provide access to and buffer Wilderness and Remote Zones.
- To provide easy access to experience the reserve's natural landscapes, habitats, species and heritage resources.
- Limited range of activities and relaxation in a natural environment.

8.3.4 Conservation and Special Management (Resource Utilisation)

- Habitats with lower or higher management requirements.
- Usually, remote areas so roads and trails should be planned and constructed assuming infrequent maintenance.
- Intensive maintenance of visitor activities and facilities
- Prevent or restore visible trampling or any other visitor impact.
- Rehabilitate non-useful roads to natural vegetation
- Sustainable use can be appropriate under controlled circumstances subject to a formal assessment and application in accordance with DENC policies.

8.3.5 Visitor Management

- Manage to conserve natural and cultural resources, ecological processes and wild appearance & character.
- Restrict numbers of visitors and allow for no-use rest periods if required.
- Active enforcement of reserve regulations.
- All facilities will be small, very basic, self-catering and distributed to avoid contact between users.
- There should be limited if any interaction between groups. Visible & audible human impacts from adjacent zones should be mitigated.
- Since visitor use can be intensively managed, trails can be routed to access areas with sensitive local habitats or plant and animal species.

8.4 Quiet Zone

8.4.1 General Characteristics

- The same as for primitive with the exception that this zone is characterised by unaccompanied (or accompanied under some circumstances) non-motorised access, where visitors can walk or cycle and experience nature without the intrusion of any form of motorised transport.
- Visitor numbers and density are higher than in the primitive zone and contact between visitors is frequent.
- This zone provides experiences of a relative sense of solitude and relaxation in an environment that is openly exposed to the sights of the surrounds.
- There is less of a challenge and the zone is easier to access and less physical exertion is required.
- The quality of the experience is less dependent on the quality of the natural environment than primitive with the provision of basic facilities as for the leisure low intensity zone.
- It also serves as a buffer to the adjoining primitive or farm/urban area.

8.4.2 Conservation Objective:

- The same as for primitive.

8.4.3 Aesthetic / recreational objectives

- The same as for leisure low intensity

8.4.4 Conservation and Special Management (Resource Utilisation)

- The same as for primitive.

8.4.5 Visitor Management

- The same as for leisure low intensity with the exception of no motorised transport

8.5 Leisure Zone Low Intensity

8.5.1 General Characteristics

- Areas with extensive lower sensitivity habitats:
- Areas able to accommodate higher numbers of visitors regularly, with no identified sensitive or regionally rare biodiversity.
- Popular view or access sites.
- Extensive areas able to accommodate roads, trails and tracks without high risk of erosion and degradation.
- Areas accessible for regular management of roads and trails.
- Areas where roads and trail infrastructure can be located with low visibility from the surrounding landscape, particularly from adjacent Primitive or Wilderness Zones.
- Usually, areas that require active fire management with firebreaks to stay within thresholds of concern, but may also include natural burning regimes.
- Facilities along roads are limited to basic self-catering picnic sites with toilet facilities.
- Low intensity leisure areas are designated in current game viewing loops, around current accommodation and other associated infrastructure outside of the main camps, and along existing public access roads where they form part of the reserve road network.
- Areas with a contained, low-density development footprint.
- The underlying characteristic of this zone is motorised self-drive access with the potential for roads, trails and small to medium scale recreational facilities and self-catering accommodation units in small basic camps without modern facilities such as shops and restaurants.

8.5.2 Conservation Objective:

- The conservation objective is to mitigate the biodiversity impacts of the relatively high levels of tourism activity and infrastructure that are accommodated within this zone through careful planning and active management, and to ensure that both the negative effects of the activities and infrastructure are restricted to the zone, and that the zone is maintained in a generally natural state that is in keeping with the character of a protected area.
- To manage and direct visitor use, and plan infrastructure to minimise impact on sensitive environments.
- To actively manage users and visitor impacts. Allows for minimal or more intensive biodiversity management intervention.
- Provide additional protection to localised sensitive or threatened habitats, species or other features by Special Management Overlays
- Deviation from the natural / pristine state should be minimized and limited to restricted impact footprints as far as possible. However, it is accepted that some damage to the biophysical environment associated with tourist activities and facilities will be inevitable.

8.5.3 Aesthetic / recreational objectives

- The aesthetic / recreational objectives for the zone specify that although activities and facilities will impact on the wild appearance and reduction of the wilderness characteristics of the area (solitude, remoteness, wildness etc.) is inevitable, these should be managed and limited to ensure that the area still provides a relatively natural outdoor experience.
- To provide easy access to natural landscapes with low expectation of solitude at all times. Can buffer between development and wilderness or Primitive Zones.
- To provide a wide range of medium sized accommodation, facilities, activities and services with relaxation in a relatively natural environment.
- Although it is inevitable that activities and facilities will impact on the wild appearance and reduce the wilderness characteristics of the area, these should be managed and limited to ensure that the area still provides and relatively natural outdoor experience.

8.5.4 Conservation and Special Management (Resource Utilisation)

- Habitats with lower or higher management requirements.
- May be natural burning zones. Prevent or restore visible trampling or any other visitor impact.
- Rehabilitate non-useful roads to natural vegetation.
- Limited conservation management activities undertaken.
- Sustainable use of natural resources may, where feasible, be considered on application, and subject to a formal permitting arrangement.

8.5.5 Visitor Management

- More frequent monitoring of these areas is necessary to prevent damage or degradation.
- More frequent footpath maintenance must be scheduled for busy routes, with particular attention paid to use of railings or other access control to prevent damage to sensitive areas.
- Unless visitor access can definitely be intensively guided and managed, re- route trails away from any sensitive local habitats or plant and animal species.
- Trail layout, design and construction must be specified to reduce maintenance requirements under higher use.
- Visible & audible human impacts to adjacent Primitive or Wilderness Zones should be mitigated.
- Active enforcement of reserve regulations.
- Active visitor control.
- Risk management (e.g., fire safety) measures implemented.
- Development footprint actively contained.

8.6 Leisure Zone High Intensity & Reserve administration

8.6.1 General Characteristics

- The main characteristic is that of a high-density tourist development node with amenities such as shops, restaurants and interpretive centres.
- Areas where new infrastructure can be located with low visibility from the surrounding landscape. Areas not visible from Primitive or Wilderness Zones.
- Areas where risk of fire damage to infrastructure is low or can be mitigated without unacceptable impacts on surrounding environment.
- This is the zone where more concentrated human activities are allowed and is accessible by motorised transport on high volume transport routes.
- Major provincial roads cutting through the reserve should be in the high intensity leisure zone.
- Areas with extensive degraded or transformed footprints.
- Areas with an extensive high-density development footprint.
- Areas with limited biodiversity significance.

- Areas where risk of fire damage to infrastructure is low, or can be mitigated.
- Areas that have access to potable water and Eskom power, and not sensitive to disposal of treated wastewater.
- Areas that is easily accessible from the reserve entry points.
- Areas with low visibility from the surrounding landscape.

8.6.2 Conservation Objective:

- The main focus is to ensure a high-quality visitor experience; however, the conservation objectives still require that the high levels of tourism activity and infrastructure that are accommodated within this zone are planned and managed to minimize the effect on the surrounding natural environment, and that the zone must still retain a level of ecological integrity consistent with a protected area.
- To actively manage users and visitor impacts on adjacent sensitive areas.
- To contain the impacts and footprint of reserve visitor facilities, services and infrastructure.
- Deviation from the natural / pristine state should be minimized and limited to restricted impact footprints as far as possible. However, it is accepted that some damage to the biophysical environment associated with tourist activities and facilities will be inevitable.
- To define the location of the infrastructure and facilities for reserve administration.

8.6.3 Aesthetic / recreational objectives

- To provide access to adjacent natural landscapes with no expectation of solitude.
- The aesthetic/ recreational objectives for the zone specify although the high visitor numbers, activities and facilities will impact on the wild appearance and reduction of the wilderness characteristics of the area (solitude, remoteness, wildness etc.) is inevitable, these should be managed and limited to ensure that the area generally still provides a relatively natural outdoor experience.
- To provide a wide range of medium sized to large scale accommodation, facilities and associated attractions and conveniences.
- Comfortable and sophisticated facilities while retaining a natural ambiance.

8.6.4 Conservation and Special Management (Resource Utilisation)

- Provide access and generate maximum revenue.
- Management should aim to mitigate the biodiversity impacts of the high number of visitors only in sensitive areas (if any) identified by Special Management Overlay.
- These are highly transformed habitats with lower management requirements.
- Natural fire exclusion areas.
- Prevent or rehabilitate visible trampling or any other visitor impact.
- Plan for a compact overall development footprint, avoiding dispersed infrastructure that will increase fire risk and/or environmental footprint. This is most critical in fire-prone environments.
- Sustainable use unlikely to be compatible.

8.6.5 Visitor Management

- Management action will focus mostly on maintenance of facilities & providing high quality experiences.
- Use infrastructure solutions such as railings, hard surfacing and boardwalks to manage undesirable visitor impacts.
- Frequent landscape, footpath and road maintenance must be scheduled for high impact areas.
- Active enforcement of reserve regulations.
- Risk management (e.g., fire safety) measures implemented.
- Active visitor control.

- Visible impacts to adjacent Zones should be mitigated.

8.7 Azonal - Special Protection Zones (Species, Habitats, Heritage)

8.7.1 General Characteristics

- Sites or areas where uncontrolled public access is undesirable due to the presence of threatened species and habitats or sensitive heritage features.
- Sensitive habitat types identified for special protection in order to reduce any potential loss and to priorities rehabilitation work in these areas.

8.7.2 Conservation Objective:

- Protection of species, habitats or heritage sites of special conservation concern.
- No deviation from natural / pristine state is allowed, Infrastructure, especially paths and viewpoints should be designed to limit the impact of large numbers of visitors on the biophysical environment.

8.7.3 Aesthetic / recreational objectives

- Na

8.7.4 Conservation and Special Management (Resource Utilisation)

- Restrictions on access and numbers of visitors may be enforced.
- Active conservation and heritage management activities undertaken, as required.

8.7.5 Visitor Management

- Where visitor access is permitted, strict access control is required to delimit access routes, and, if necessary, screen visitors; i.e., hides, boardwalks, screened routes, and paths with railings may be appropriate.

8.8 Azonal - Special Management Zones (Resource Utilisation)

8.8.1 General Characteristics

- Demarcated sites or areas where seasonal utilisation of natural resources (i.e., harvesting of grass for thatching, collection of reeds for building material, hunting of wildlife for trophies or meat, angling etc.) takes place.
- Demarcated sites or areas where bait collection will be allowed
- Regulation and control of resource utilisation (commercial and/or community based), including hunting.
- Seasonal restrictions on access may be enforced.
- Active management of resource utilisation permits.

8.9 Azonal - Special Management Zones (Private Land)

8.9.1 General Characteristics

- These are areas of land which are fenced into the reserve through stewardship programs or agreements with the Department, but which are owned by private individuals, companies, trusts, communities, etc.
- A co-management agreement should be drawn up and management should be implemented through negotiation with the Co Management Committee.
- While owners are not restricted to this zone, they do have exclusive use in it.
- Reserve Management, however, retains access and all management rights in these zones at all times.
- No access is allowed to these areas unless by prior arrangement with the landowners. Reserve Management, or their nominated agent, will obviously have access for control purposes.

- The owner retains any agreed development rights subject to an Environmental Impact Assessment (EIA) and possible re-negotiation of fees and carries any costs associated therewith.

9. CDF Use Zones - Desired State Limits of acceptable change (LAC)

Zone & Map colour	Limits of acceptable change: Biophysical	Limits of acceptable change: Aesthetics and recreational
Wilderness Zone Remote Zone	The zone should be kept in a natural state with no impact on biodiversity pattern or processes.	The area should be kept in a natural state, and activities which impact on the intrinsically wild appearance and character of the area, or which impacton the wilderness characteristics of the area (solitude, remoteness, wildness, serenity, peace etc.) should not be allowed. Controlled access, only on foot for visitors. Established footpaths where erosion maybe a problem. Essentially undeveloped and road less
Primitive Zone	Deviation from a natural/pristine state should be small and limited to restricted impact footprints and existing impacts should be reduced.	Any facilities constructed in these areas, and activities undertaken hereshould be done in a way that limits environmental impacts. Road and infrastructure specifications should be designed to limit impacts. Infrastructure, especially paths and viewpoints should be designed to limitthe impact of large numbers of visitors on the biophysical environment.
Quiet Zone	The zone should be maintained in a generally natural state, but some deviation from a natural/pristine state is allowed. Infrastructure should only be allowed within a restricted development footprint, and infrastructure, especially paths andviewpoints should be designed to limit the impacts of large numbers of visitors on the biophysical environment.	The zone should retain a generally natural appearance and character, and activities which impact on this should be restricted. In particular visitors are not allowed motorised access to this zone. It is however recognized that thepresence of larger numbers of visitors and the facilities they require, may impact on the feeling of wildness found in this zone.
Leisure Low Intensity	Although it is inevitable that activities and facilities will impact on the wild appearance and reduce the wilderness characteristics of the area (solitude, remoteness, wildness etc),these should be managed and limited to ensure that the area still provides a relatively natural outdoor experience.	The area should be managed to provide a relatively natural outdoor experience. Although, it is inevitable that the high visitor numbers, activitiesand facilities will impact on the wild appearance, the aesthetics of the zonestill need to be maintained in a sufficiently natural state to ensure that the overall objectives and purpose for proclamation of the reserve are not compromised.
Leisure High Intensity	The zone must retain a level of ecological integrity consistent with a protected area. The greatest level of deviation from a natural/pristine state is allowed in this zone, and it is accepted that damage to the biophysical environment associated with tourist activities and facilities will be inevitable, however no activities or infrastructure should be allowed which compromise the overall objectives and purpose for proclamation of the reserve.	

10. CDF Use Zones - Guidelines for Managing Recreational Activities

Recreational Activities	Interaction between users' groups	Off-road self-drive	Mountain Biking	Horse Riding	Hiking	Walking (Day trails)	Running	Bouldering Kloofing	Traditional & Free Climbing	Sport Climbing	Guided nature / heritagetours	Hang & Paragliding	Overnight	Caravanning / camping	Picnic & braai	Row boats	Canoes & kayaks	Sailing (large yachts)	Dinghies & Sail board (wind surfing)	Power boating (fuel driven)	Swimming & Water sports	Angling	On road self-drive	Tourist route Busses	Workshop or conference
Wilderness Zone	None				1				1				2				3								
RemoteZone	None to low	4			1	1	1	1	1		1		2				3			8					
PrimitiveZone	Low to medium	4	4	4	5	4	4	4	5	4	5	7	6		4	7	7		7	8	8	8	4		
Quiet Zone	Medium		4	4	9	4	4	4	9			7	6	6		7	7		7		8	8			
Leisure LowIntensity	Frequent	4	4	4						10		7				7	7		7	10	10	8	4		
Leisure HighIntensity	Frequent		4							10		10								10	10	8			

	Restricted activities - If an activity is not listed in the table, then it is not permitted
	Controlled activities - Suitable under management conditions
	Unrestricted activities - Very suitable
Management conditions for controlled activities	
1	Only groups >3 and <10 people per group on designated trails "Leave-no-trace" activities: "Carry in, Carry out" principle for all food and waste.
2	Overnight hiking, without any sleeping facilities, formal campsites, or with only basic, un-serviced shelters. No fires.
3	Entry is by foot or by river from outside the zone provided all equipment is carried in and out.
4	Only on designated routes or sites, seasonal restrictions if needed for safety
5	Only small groups <16 people per group
6	Basic, un-serviced, accommodation (cabin, huts) or formal campsites (tent camps). Isolated, small, unobtrusive facilities for up to 16 guests on restricted footprints. Designated fire places
7	From launch sites provided or by river from outside the zone or provided all equipment is carried in and out.
8	Only on designated sites. No skiing and restrictions on size of outboard motors. No beaching on islands or bank. Angling regulations applicable.
9	Only small groups <8 people per group
10	Skiing can be allowed and restrictions on size of outboard motors. .

11. CDF Use Zones - Guidelines for the Provision of Visitor Facilities & Other Infrastructure

Infrastructure and Facilities	Signage	Trails	Water ways, jetty's	Horse, donkey cart, pack animals	Shelters Natural	Tracks	Internal fences & firebreaks	Interpretive & Educational Centres	Launching sites	Refuse bins	Picnic site	Accommodation and Houseboats	Camping & Caravan sites	Bird/Game hides or view points	Rustic Campsites	Interpretive signage	Toilets	Roads	Access Points Reception offices, gate huts	Lodges and Rest Camps	Conference	Bulk infrastructure	Services (power, waste management, water, etc.)	Food & Beverages Outlet, Equipment Rental	Curios & Craft Sales	Air strip	Swimming pools and water parks	Fuel supply pump
Wilderness Zone	6	7	2	3	1																							
Remote Zone	6	7	2	3	1	5	5																					
Primitive Zone	6	7	2	3	1	8	10	10	10	13	10	11		10	10	10	10	9				19	19					
Quiet Zone											10	11		12	12	12	13					19	19					
Leisure Low Intensity											14	14	14				13	16	17	15		19	19					
Leisure High Intensity																		17		4	18					20		

	Restricted activities - If an activity is not listed in the table, then it is not permitted except for temporary structures
	Controlled activities - Suitable under management conditions
	Unrestricted activities - Very suitable

Management conditions for controlled activities

1	No structures except small existing buildings of cultural, historic or aesthetic value. Can be used as un-serviced sleeping shelters for hikers & provided with composting toilets.
2	Use of non-motorised canoe or flotation device on rivers can be acceptable where entry is by foot or by river from outside the zone.
3	Use of donkeys, horses or other pack animals with an official guide only on designated historical routes and trails, or existing tracks, and only where this will not cause trampling, erosion or any degradation.
4	High density tourist resorts with modern amenities including restaurants, curio and refreshment stalls, shops, education centres and high-volume roads. Infrastructure should be designed to reduce impacts of higher visitor numbers and planning should ensure that area still provides relatively natural outdoor experience.
5	No roads but limited vehicle tracks mainly on fire breaks. Unguided visitor access only on foot. Only allows for 4x4 routes or vehicle access if specifically considered and noted.
6	No signage except small, unobtrusive markers for closed routes, or at trail junctions.
7	Narrow permanent walking trails. Visitors have freedom to use various trails. The traditional wilderness concept of access without defined trails is unsafe and rapidly results in undesirable user- created trails and erosion.

8	All roads, tracks or trails to be located and constructed to reduce maintenance, visibility and erosion. Where un-surfaced tracks will result in erosion, use concrete strip or interlocking pavers to stabilise. Re-route unstable or erosion-prone road sections if this will lower long-term visual and environmental impact.
9	New roads for visitor access only justified if also required for management access or firebreaks. Avoid wide surfaced roads or roads and tracks wider than required for a single vehicle.
10	Deviation from natural state to be minimised. Infrastructure should not be visible from Wilderness Zones. Designated fire places with services.
11	May provide isolated, small, unobtrusive accommodation facilities for up to 16 guests on restricted footprints,
12	Unaccompanied non-motorised access to specific facilities. Vehicle access on dedicated routes, with pedestrian access from parking areas or adjacent Development Zones.
13	Facilities maybe provided in high use areas.
14	Self-catering accommodation and camping for up to 100 guests in total at any time
15	Single small Rest Camps for up to 30 guests are permissible if all facilities are contained in a compact footprint, this represents the total accommodation for the zone, and any restaurant or catering facilities are for overnight guests only.
16	Roads open to the public should be accessible by 2x4 sedan. Roads in this zone should be surfaced to reduce management cost and environmental impacts.
17	Accessible by motorised transport (car/bus) on high volume transport routes, including delivery vehicles. If possible, roads should be narrow with separate incoming and outgoing routes; otherwise double vehicle width roads are strongly advisable for safety and usability.
18	Meetings, workshop or -conference activities for no more than the number of people that can be accommodated overnight in the zone.
19	Location of infrastructure and facilities for Reserve Administration & especially conservation management facilities (storage facilities, workshops, game capture and holding facilities). Not compatible with tourism and tourism access.
20	The Reserve Airspace is regulated by Section 47 of the Protected Areas Act as 2500 ft. (762 meters) above the highest point.

12. CDF Use Zones - Guidelines for Managing External Commercial Activities & Organised Events

Recreational Activities	Film shoots	Group Events	Helicopter tours	Cultural events	Specialised adventure events	Environ Education	Commercial passenger boats (ferries)	Houseboats (private and commercial)	Research
Wilderness Zone									
Remote Zone	2			1	1	1			1
Primitive Zone	3			1	1	1			1
Quiet Zone				1	3	1			1
Leisure Low Intensity	3			3	3	3			1
Leisure High Intensity	3	3	4	3	3		3	3	1

	Restricted activities - If an activity is not listed in the table, then it is not usually permitted
	Controlled activities - Suitable under management conditions. The type of activities may be considered but not necessarily approved.
	Unrestricted activities - Very suitable
1	The number of events, the number of participants and frequency of events to be strictly controlled
2	Restricted to nature and scientific films. All equipment to be carried in and out.
3	Activities should not interfere with designated use of the zone
4	The Reserve Airspace is regulated by Section 47 of the Protected Areas Act as 2500 ft (762 meters) above the highest point (900 meters).

13. CDF Visitor Site Categories – Role, Facilities and Management Guidelines

Site & map legend	Role	Facilities	Applicable zones	Guidelines
 Tourist Destination	Main tourist destinations. Seeing and experiencing specific attractions. Short duration visit.	Appropriate facilities to deal with large numbers of tourists e.g., parking, ablutions, interpretation, footpaths, transport systems and refreshments.	Leisure High Intensity	Due to high pressure of tourist volumes and the sensitive nature of the surrounds, these sites are maintained as destinations of high volumes and short duration. Facilities should not detract from the intrinsic qualities of the area.
 Mixed Use	Serves a variety of purposes - recreation, leisure, transit, education, refreshments. Varies in scale and purpose according to context	Ablutions, parking, food outlets, interpretative centres, education facilities, recreation facilities (picnic & braai) and administration facilities.	Leisure High Intensity Leisure Low Intensity Primitive	Length of stay is longer than for Tourist Destinations and provides for a range of activities.
 Picnic / braai, Camping	Provides braai and/or picnic facilities. Rustic camping sites	Only picnic and braai facilities, tables with seating and ablutions. No other facilities.	Leisure Low Intensity Primitive	Provides for safe and secure family orientated facilities for low intensity leisure activities
 Entry Point	Points of entry which can be categorised as: Pay Points, Gateways, Minor Access Points and Local Access Points	Parking with signage & information. Ablutions and trading at selected sites.	Leisure Low Intensity	Maintained as entry points Not suitable to diversify into Mixed Use sites. Management of security is required
 Accommodation	Accommodation from which adjoining zones can be accessed.	Small (max. 16 beds) accommodation units, preferably self-catering for visitors	Leisure Low Intensity Primitive Quiet	The accommodation should be appropriate to the surrounding environment.

14. CDF: Management Guidelines for the Reserve Movement Network

	Characteristics	Applicable zones	Guidelines
Transit route	A high-volume road used to gain access to high intensity visitorsites. Used by delivery, service and management vehicles to tourist and admin facilities. Commercialised coach tours are allowed.	Leisure High Intensity	Managed to allow tourism and management access to destinations. Minimal facilities such as view sites along road. The view shed is included in zone for all newroads and where possible for existing roads.
Tourist Roads	These may be surfaced or un-surfaced roads used for gameviewing and sight-seeing in sedan vehicles and microbuses.Self-drive and tours. Busses are allowed, but no commercial coach tours.	Leisure Low intensity	View sites and interpretative boards at suitable sites. Parking to access footpaths and facilities. The view shedis included in zone for all new roads and where possible for existing roads.
Limited access roads	These may be surfaced or un-surfaced roads used only for accessing campsites and accommodation	Primitive Quiet	Minimal facilities such as view sites along road.Directional and regulatory signage provided.
Tracks	These may be two wheel or 4x4 tracks. Used as footpaths and for activities such as mountain biking, horse-riding and approved scenic/game drives on extreme 4X4 roads requiring specialised driving skills under controlled conditions.	Remote Primitive Quiet	These tracks are used primarily for recreational access.There must be strict management guidelines for the useof vehicles. Generally, maintenance is low key to allow the road to be as unobtrusive as is possible. Directionaland regulatory signage provided.
Reserve Roads	These may be two wheel or 4x4 tracks or roads used only for management purposes.	Remote Primitive Quiet	These roads are used only for management access. Generally, maintenance is low key to allow the road to be as unobtrusive as is possible. No directional andregulatory signage provided.
Paths	Used as footpaths and for activities such as mountain biking and horse-riding	Remote Primitive Quiet	These paths are used primarily for recreational access. Generally, maintenance is low key to allow the paths tobe as unobtrusive as is possible. Directional and regulatory signage provided.

Notes:

1. The movement network provides for linking visitor sites across different use zones as determined through local planning processes and statutory approvals (e.g., EIA and HIA)

2. If the Reserve's use zones are traversed by public roads. Joint management arrangements will be sought between the Reserve and the relevant authorities to upholdthe experiential qualities of the zone that the road traverses.

Annexure 2: Annual Plan of Operation (APO)

Annual Plan of Operations (APO) for 2020 to 2024 - planning cycle

#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
KPA 1: Biodiversity and Heritage Conservation								**R437 034.73**	**R878 719.33**	**R570 055.32**	**R779 791.12**
Objective 1.1 Obtain Biodiversity knowledge about the PA								**R338 552.95**	**R254 928.43**	**R273 478.28**	**R334 566.31**
1	Identify, and prioritise the biodiversity management requirements (targets) for the PA for baseline monitoring.	There is an established Monitoring & Evaluation program which is fully implemented with PA management participation and is used to guide adaptive management.	3.1.1 Monitoring and Evaluation Programme					R -	R 10 502.98	R -	R -
a	*Compile Integrated biodiversity management Programme*										
2	Develop and maintain a targeted research program determined by implimenting BMF and relevant to management needs to guide biodiversity management	Research needs have been identified and projects relevant to all management needs are being undertaken, enabling the monitoring of results of management actions against set objectives	3.1 Management Research Programme					R -	R 12 051.59	R -	R 6 947.72
a	*Compile archive of all research completed on the site*										
3	Facilitate access for and assist external research	There is an established working relationship with researchers and regular liaison leads to research results feeding into management decisions.	3.1.2 Relationship with researchers					R -	R 7 951.00	R -	R 6 947.72
a	*Facilitate controlled access for external institutions undertaking relevant research projects within the reserve.*										
b	*Create DB with potential institutions to assist with outsourced research projects*										
4	Collect and update key baseline information - Implimentation of BMP's	Information and the understanding thereof concerning key species, habitats, ecosystems of the PA supports the achievement of all biodiversity objectives.	1.4. Biodiversity knowledge and understanding					R338 552.95	R224 422.86	R273 478.28	R320 670.87
a	*01 BMP 1 Biodiversity mechanisms*										
b	*02 BMP 2 SSC*										
c	*03 BMP 3 Freshwater and Wetlands*										
d	*04 BMP 4 IAS*										
e	*05 BMP 5 Resource Use Tourism*										
f	*07 BMP 7 Degradation Rehabilitation*										
g	*08 BMP 8 Cultural Heritage*										
h	*09 BMP 9 Climate and Climate Change*										

Objective 1.2: Restoration and mitigation of degradation								R82 454.52	R429 495.21	R251 520.31	R341 327.76
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Compile an invasive species control and eradication plan in terms sec. 76 of the NEM: Biodiversity Act, 2004	There is a plan for addressing degraded areas within the PA	2.6 Restoration of degraded areas								
a	*Eradication plan for damage-causing and problem animals in PA*							R -	R 10 502.98	R -	R -
b	*Eradication plan for invasive alien plant infestations in PA*										
2	Impliment an invasive species control and eradication plan in terms sec. 76 of the NEM: Biodiversity Act, 2004										
a	*Implement, environmentally friendly measures to reduce the impacts of any damage-causing and problem animals*							R50 400.00	R144 394.80	R77 938.10	R69 182.83
b	*Eradicate, on an ongoing basis, all known invasive alien plant infestations occurring in the reserve*										
3	Compile Rehabilitation Programme BMP 7							R -	R 21 005.96	R -	R -
4	Rehabilitation or mitigation of degradation in PA										
a	*Identify and map all degradation as part of BMP 4 and*										
b	*Rehabilitation, Restoration or mitigation of all un-natural and/or highly erodible areas in the PA estate and maintain mitigation measures*										
c	*Rehabilitation, Restoration or mitigation of visitor impact wrt. special natural features and heritage resources in te PA estate*										
d	*Close and rehabilitate solid waste dump sites in the reserve, and remove all solid waste to the nearest municipal dump sites.*							R -	R134 877.45	R95 441.09	R76 921.79
e	*Close/remove/demolish and rehabilitate all extraneous and redundent mining related buildings, foundations, waste dumps, equipment, excavations and fencing*										
f	*Close and rehabilitate all unused, extraneous and/or highly erodible tracks and roads in the reserve and maintain road closures*										

Objective 1.3: Maintenance of ecological processes in the PA								R8 597.06	R20 495.98	R11 028.13	R29 544.54
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	ID the ecological processes critical for the achievement of biodiversity targets	A scientifically based assessment has shown that ecological processes are being effectively maintained /augmented with the result that ecological integrity and biodiversity are not being compromised.	6.3 Ecological processes					R -	R -	R -	R -
2	Re-establish, manage and maintain viable populations of locally indigenous fauna and flora							R -	R -	R11 028.13	R -
a	*Determine historical distribution of game animals*										
b	*Compile reintroduction program*										
3	Develop and maintain a vegetation monitoring program, including an annual veldt condition assessment.							R -	R 20 495.98	R -	R29 544.54
4	Prepare and/or update a simple, functional Fire Management Programme for the reserve			NA				R -	R -	R -	R -
5	Manage watering points for game							R 8 597.06	R -	R -	R -
a	*Determine position of artificial and natural watering points*										
Objective 1.4: Maintenance of critical ecosystem services								**R0.00**	**R0.00**	**R22 056.26**	**R4 631.81**
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	ID critical ecological services that deliver services to surrounding communities	PA Expansion Plan in line with expansion strategy for the organisation and the size and shape of the PA is adequate to achieve the conservation mandate	2.1 PA design 2.1.1 PA expansion plan					R -	R -	R22 056.26	R 4 631.81
a	*Description wrt biodiversity importance of PA and interphase*										
b	*Compile PA Expansion Plan*										
2	Develop a structured and scientific measurement system for effective maintenance of ecological services	A structured and scientific measurement and monitoring system has shown that ecosystem services are being effectively maintained with the result that the PA and neighbouring land users are deriving benefit from these services.	6.4 Ecosystem services					R -	R -	R -	R -
3	Monitoring benefit of ecological services to PA and neighbouring land users							R -	R -	R -	R -
4	Compile an Wilderness Management Programme							R -	R -	R -	R -

Objective 1.5: Land use planning and management outside of the protected area								R7 430.20	R0.00	R0.00	R52 517.93
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Provide and define a zone of influence and applicable buffering mechanisms (interphases) with guidelines for suitable land uses.	A zone of influence (interphases) with guidelines for suitable land uses for input into the municipal IDP	2.1.2 Delineation of a zone of influence 2.1.3 Corridor management								
a	*Complete sensitivity analysys and demarcate ZOI and Domain*							R 7 430.20	R -	R -	R18 527.26
b	*Determine applicable buffering mechanisms*										
c	*Develop guidelines for suitable land uses.*										
d	*Demarcate corridors and include in ZOI or Domain*										
2	Collect baseline information and control illegal harvesting of natural resources in PA interface	Land use planning and management practices of surrounding areas with information and the understanding thereof concerning key species, habitats, ecosystems support biodiversity objectives of the site	6.5 Land use planning and management outside of the protected area								
a	*02 BMP 2 SSC*										
b	*03 BMP 3 Freshwater and Wetlands*										
c	*04 BMP 4 IAS*							R -	R -	R -	R33 990.67
d	*05 BMP 5 Resource Use Tourism*										
e	*07 BMP 7 Degradation Rehabilitation*										
f	*08 BMP 8 Cultural Heritage*										
g	*Establish working relationship (MOU) with landowners and residents in PA interface.*										
Objective 1.6: Water use planning and management operations influencing the protected area								**R0.00**	**R0.00**	**R0.00**	**R0.00**
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Collect and update key baseline information concerning land use practices of the reserve catchment interface and control illegal harvesting of natural resources .	Information and the understanding thereof concerning key species, habitats, ecosystems of the PA supports the achievement of all biodiversity objectives.	6.6 Water use planning and management operations influencing the protected area								
a	*02 BMP 2 SSC*										
b	*03 BMP 3 Freshwater and Wetlands*										
c	*04 BMP 4 IAS*							R -	R -	R -	R -
d	*05 BMP 5 Resource Use Tourism*										
e	*07 BMP 7 Degradation Rehabilitation*										
f	*08 BMP 8 Cultural Heritage*										
g	*Establish working relationship (MOU) with landowners and residents in PA interface.*										
2	Assist other enforcement agencies in cross border and other operations.	Catchment and river plans and water management fully take the water needs of the PA into account and the water quality meets required standards as set out by the relevant authority.						R -	R -	R -	R -
3	Participation in Catchment Management and other forums to ensure that the quality and quantity of water meets the needs for maintaining habitats, species and ecosystems							R -	R -	R -	R -
4	Compile Ramsar Management Plans			NA				R -	R -	R -	R -

Objective 1.7: Audit achievement of biodiversity targets								**R0.00**	**R0.00**	**R0.00**	**R0.00**
#	Management action	Management targets	Key performance indicators Mett-Sa Vers 3	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Monitoring results of management actions against set objectives. State of biodiversity report.	A structured and scientific biodiversity condition assessment has shown that the management of biodiversity is meeting the	6.2 Achievement of biodiversity targets					R -	R -	R -	R -
Objective 1.8: Manage and mitigate the environmental impacts of conservation management, tourism, recreation and natural resource use in the PA								**R0.00**	**R50 414.31**	**R5 986.17**	**R10 917.29**
#	Management action	Management targets	Key performance indicators Mett-Sa Vers 3	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Develop management guidelines for the sustainable extractive use of biotic and abiotic resources .	Management guidelines for the sustainable extractive use of biotic and abiotic	4.12 Sustainable Extractive Use					R -	R 8 402.38	R -	R -
2	Introduce more environmentally-friendly technologies (recycling, water and energy saving, sourcing of biodegradable materials, dry and wet waste disposal, sustainable benefits to local communities, sourcing supplies locally and using certified sources of building materials).	The PA has been accredited with a recognised green standard. Examples are Green Globe. Green Leaf and Travelife. This does not only relate to tourism infrastructure.	4.16 Environmentally Responsible practice					R -	R 6 301.79	R -	R -
3	Mitigate Visitors Impact	Visitor impacts which could result from current and anticipated levels of visitation are fully mitigated by the design of the tourism infrastructure	5.1 Tourism Infrastructure (mitigating impacts)					R -	R 12 603.58	R 5 986.17	R10 917.29
a	*Maintain information about the reserve visitors*										
b	*Compile occupancy Schedules (carrying capasity) for any Tourism operations*										
c	*Develop and impliment a visitors compliments and complains register and adress issues*										
4	Waste Management	A formal legally compliant programme with functional infrastructure for the management of hazardous substances (flammable and non-flammable) is in place.	4.13 Management of Hazardous Substances					R -	R 12 603.58	R -	R -
a	*Develop a formal legally compliant programme for the management of domestic waste*										
b	*Develop a formal legally compliant programme for the management of hazardous waste*										
c	*Develop a formal legally compliant programme for the*										
5	Develop functional infrastructure for the management of waste							R -	R 10 502.98	R -	R -

Objective 1.9 Protect the heritage resources of the PA								R0.00	R123 385.40	R5 986.17	R6 285.48
#	Management action	Management targets	Key performance indicators Mett-Sa Vers 3	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	In collaboration with academic institutions, research, document and inventorize the cultural heritage resources of the reserve an determine significance	A formal cultural heritage survey by an accredited heritage practitioner has identified heritage resources and values and has been verified by SAHRA and is included in the SMP	1.5 Cultural Heritage knowledge					R -	R 20 278.85	R -	R -
2	Develop management plans for significant Cultural Heritage assets	Formal AIA with mitigating and management guidelines by an accredited heritage practitioner for significant heritage resources/sites has been approved by the relevant heritage authority.	2.4 Management plans for significant Cultural Heritage assets					R -	R 98 905.36	R -	R -
a	*Palaeontological resources*										
b	*Archaeological resources*										
c	*Cultural-Heritage resources*										
3	Develop guidelines for finding and recording of heritage artifacts as part of Subsidary Plan for Management of significant heritage resources according to NEMPAA guidelines	The Collections Management Plan has been developed and is fully implemented.	2.7 Collections management/curatorship of heritage artefacts					R -	R 4 201.19	R -	R -
4	Monitor and regular condition assessment of Cultural Heritage Resources	A structured assessment conducted by an accredited heritage practitioner, has shown that the management of cultural heritage assets and values are meeting the set management objectives.	6.7 Cultural Heritage condition assessment					R -	R -	R 5 986.17	R 6 285.48

CATEGORY	PRIORITIES
HIGH PRIORITY	Critical to the effective management of the reserve. Funding and resources should be secured to implement these actions. As reflected in the Management Effectiveness Tracking Tool (METT)
LOW PRIORITY - Activity on hold	Constitutes good management practice, but not necessarily critical or important to reserve management effectiveness. Implementation may be dependent on availability of external funding or support.
COMPLETED	Activities Completed for the 5 year cycle to be assesst during the following 5-year planning cycle

KPA 2: Recreation, Marketing, Education, Awareness and Interpretation								R0.00	R0.00	R0.00	R78 527.26
Objective 2.1: Develop, deliver and maintain a diverse range of tourism and recreational services for visitors to the PA in accordance with CDF								**R0.00**	**R0.00**	**R0.00**	**R0.00**
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Develop Subsidiary Plan - Commercial Tourism with guidelines that apply to both the organisation and outside parties concession holders	There is excellent interaction and co-operation between managers and tourism operators/concessionaires to enhance visitor experiences, protect values and resolve conflicts.	4.15 Commercial Tourism					R -	R -	R -	R -
2	Facilitate controlled access to the reserve for other complementary recreational activities, link up with adventure events, Angling clubs							R -	R -	R -	R -
3	Support entrepreneurial opportunities for local communities to participate in the provision and management of tourist and recreational products.							R -	R -	R -	R -
Objective 2.2: Develop and implement a Tourism Management Plan and cost-effective marketing programme for the PA								**R0.00**	**R0.00**	**R0.00**	**R78 527.26**
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Develop a tourism management plan	There is an approved and updated Tourism and Marketing Programme and it is fully integrated into the management plan of the PA.	3.8.1 Tourism grading					R -	R -	R -	R 78 527.26
2	Development of PA tourism marketing products and materials including pamphlets for visitors and users.							R -	R -	R -	R -
3	Continually provide updated information in the ongoing development of corporate, regional and provincial tourism marketing products and materials.							R -	R -	R -	R -
4	Accreditation of activities and facilities with a recognised tourism grading standard.							R -	R -	R -	R -
Objective 2.3: Develop and implement a focused and cost-effective awareness-raising and educational programme for the PA								**R0.00**	**R0.00**	**R0.00**	**R0.00**
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Develop site specific Education, awareness and interpretation programme	The education, awareness and interpretation programme is fully linked to the objectives and needs of the PA and is being fully implemented.	2.3 Education, awareness and interpretation programme					R -	R -	R -	R -
2	Establish links with local educational institutions and networks in order to promote subsidised access to, and use of, the reserve as an educational resource.		4.9 Implementation of Education, awareness and interpretation programme.								
a	*Assist with ad hoc awareness-raising and educational programs*							R -	R -	R -	R -
b	*Make facilities including environment available for educational programmes*										

KPA 3: Enforcement, Security and Access Control								R162 371.54	R5 633 042.25	R197 133.59	R89 726.63
Objective 3.1: Secure the legal tenure of, and management authority for, the PA								**R0.00**	**R0.00**	**R0.00**	**R59 263.63**
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Ensure declaration of all properties within the estate to obtain legal status in terms of NEMPAA and registered on the SAPAD	All properties managed as part of the PA have been declared and listed in the SAPAD and the registrar of Deeds has recorded the declaration against the relevant register and documents.	1.1 Legal Status					R -	R -	R -	R 59 263.63
a	*Compile and submit notice of intend for domain to be approved and gazetted*										
b	*Record the declaration against the SAPAD*										
c	*Record the declaration against the relevant Title Deed.*										
d	*Consolidation of properties*										
e	*Apply for MPRDA sec 53 permission for all properties in PA domain*										
f	*Formal management agreements regarding properties in domain*										
Objective 3.2: Secure the boundaries of, and maintain controlled access to, the PA								**R129 475.47**	**R5 633 042.25**	**R167 516.24**	**R22 523.86**
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Impliment the protection systems or mechanisms for controlling current and anticipated levels of legitimate and illegitimate access or activities in the PA	Protection systems or mechanisms for controlling current and anticipated levels of legitimate and illegitimate access or activities in the PA are fully implemented. The success has been verified by a relevant PA integrity audit (eg. SOAM or PAME)	5.2 Functioning of Law Enforcement and Compliance systems					R100 580.53	R 159 539.27	R167 516.24	R 17 892.05
a	*Regular boundary patrols and access hotspots*										
b	*Implement, mechanisms for subsidised entry for local community user and interest groups.*										
c	*Provide, on request, controlled access to recognised cultural/religious sites and non-destructive or consumptive cultural/religious practices.*										
2	Complete the construction of the perimeter demarcation/fencing to meet all requirements of the DENC Technical Guidelines and Principles (TGP) for fencing.	The reserve assets are secure. The reserve visitors and users have equitable access to the reserve, and are safe from harm.	1.3 Protected Area boundary demarcation					R 28 894.94	R5 473 502.98	R -	R 4 631.81
a	*Verify position of estate beacons agains title deeds*										
b	*Maintain beacons in correct position*										
c	*Construction of the perimeter signage*										
d	*Demarcation of boundary by fencing, bollards, beacons, sign posts.*										
e	*Ensure regular maintenance of the perimeter demarcation/fencing in the reserve.*										

Objective 3.3: Sustain an effective law enforcement and compliance capacity in the PA								R32 896.07	R0.00	R29 617.35	R7 939.14
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Develop Integrated Compliance Plan with protection systems or mechanisms for controlling current and anticipated levels of legitimate and illegitimate access	The PA has an Integrated Compliance Plan addressing all aspects of law enforcement that incorporates inter alia raising awareness, improving community relationships, training and cooperation with legal agencies.	5.2.1 Integrated Compliance Plan								
a	*Draw up an Integrated Compliance Plan*							R -	R -	R 22 056.26	R -
b	*Impliment Integrated Compliance Plan*										
2	Ensure capacity/resources/support to impliment the Integrated Compliance Plan	The site has the apacity/recources/support to enforce internal rules/regulations effectively.	3.6. Law Enforcement Capacity & Capability								
a	*Determine capasity RB Martin or IUCN and develop list of critical skills required with training cources available for field rangers.*							R 32 896.07	R -	R 7 561.09	R 7 939.14
b	*Ensure the provision of enforcement and compliance training for all reserve field staff.*										
c	*Ensure that the field ranger staff complement is adequately resourced and equipped to fulfil an effective enforcement and compliance function.*										

KPA 4: Infrastructure and Equipment								R1 296 550.74	R409 306.71	R474 163.08	R487 305.79
Objective 4.1: Acquire and maintain operational equipment and vehicles for the PA								R330 251.00	R265 194.19	R286 667.44	R318 778.53
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Acquire and maintain stores and equipment	Operational equipment is adequate and suitable for current and future anticipated operational needs.There is a maintenance schedule and all operational equipment is being correctly maintained and meeting the set standards.	3.7 Adequacy of Operational equipment 4.6 Maintenance of operational equipment					R 110 881.00	R115 693.59	R139 267.44	R153 592.62
a	*General submissions for procurement*										
b	*Establish an electronic network (i.e. internet and e-mail) for, and connect services and applications to, the reserve.*										
c	*Procure, install and maintain a reliable internal communications network for the reserve, including repeaters, base station, hand-held radios and car radios.*										
d	*Maintain and/or replace all reserve equipment according to the manufacturers' specifications and/or corporate replacement cycles.*										
2	Adequacy of transport fleet	The transport fleet is totally appropriate and sufficient for all management needs with adequate numbers and range of vehicles (including boats, aircraft etc.) to meet management needs?	3.9 Adequacy of transport fleet					R 219 370.00	R149 500.60	R147 400.00	R165 185.91
a	*Do needs analyses regarding transport fleet for all management needs with adequate numbers and range of vehicles (including boats, aircraft etc.)*										
b	*Maintain and/or replace all reserve vehicles and equipment according to the manufacturers' specifications and/or corporate replacement cycles.*	There is a maintenance schedule and the entire transport fleet is being maintained and meeting the set standards.	4.6.2 Maintenance of Transport fleet								

Objective 4.2: Construct, maintain and upgrade the administration infrastructure and bulk services infrastructure in the PA								R966 299.74	R144 112.52	R169 850.63	R168 527.26
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Construct and upgrade the administration and bulk services infrastructure in the reserve and constantly update the infrastructure register and CDF.	Infrastructure required for operational management purposes buildings, roads, bulk services including jetties, storage facilities and staff housing is optimal for current and future anticipated management needs.. State (using a grading system) of reserve buildings and infrastructure. Records of instances of overloading of the bulk service supplies.	3.7.1 Adequacy of Operational infrastructure.					R 754 296.33	R 71 005.96	R -	R -
a	*Construct a permanent administration building, and associated facilities, within the reserve*										
b	*Construct the entrance/control gate infrastructure and associated ablution facilities to accommodate disabled visitors.*										
c	*Facilitate the provision|of ESKOM power to Lodges, critical staff accommodation and all administrative facilities.*										
d	*Install and maintain generator and/or solar power systems for the functioning of remote reserve operational equipment (e.g. water pumps) and the smaller tourism and recreational facilities.*										
e	*Develop a water supply, storage and treatment capacity for the reserve*										
f	*Develop waste treatment facilities and waste removal systems for the reserve water supply, storage and treatment capacity for the reserve*										
g	*Develop the road, track and footpath network*										
h	*Standardise, install and maintain directional and informational signage within, and en route to, the reserve.*										
2	Develop Infrastructure Maintenance Programme	There is a maintenance schedule and all operational infrastructure is being maintained and meeting the set standards.Rationalised network of well-maintained management tracks traversing the reserve.	4.6.1 Maintenance of operational infrastructure					R 212 003.41	R 73 106.56	R169 850.63	R168 527.26
a	*Develop Site Plans*										
b	*Maintenance standards & prosedures*										
c	*Maintenance of all reserve administrative, staff and operational buildings and infrastructure.*										
d	*Schedule and implement the maintenance of the network of roads in the reserve, with a strong focus on maintaining and mitigating highly erodible areas.*										
e	*Link up with EPIP projects as well as external projects with available funds*										

ective 4.3: Construct, upgrade and maintain day and overnight visitor buildings and infrastructure in the PA							R0.00	R0.00	R17 645.01	R0.00
Management action	Management targets	Key performance indicators Mett-Sa Vers 3	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
Assess the feasibility of developing additional overnight accommodation and camping/caravanning sites and day visitor facilities with reference to the CDF and update CDF if required	Tourism infrastructure is optimal to manage the current and anticipated future volume of visitors.	3.8 Adequacy of Tourism infrastructure					R -	R -	R 11 028.13	R -
Assess the cost-effectiveness of different management options for the operating of Lodges, Camps and select the preferred/optimal management option/s.	Tourism infrastructure is optimal to manage the current and anticipated future volume of visitors.	3.8 Adequacy of Tourism infrastructure					R -	R -	R 6 616.88	R -
Plan and Develop the overnight visitor buildings, facilities, equipment and linked infrastructure, in accordance with the CDF to meet DENC standards for the provision of nature-based tourism products.										
Implement, and formalise (as required), the selected management option for the Lodges, Camps (e.g. concessioning, leasing, service agreement, community-managed, etc.).										
DevelopTourism Infrastructure Maintenance Programme	Tourism infrastructure being maintained and meeting standards of a maintenance schedule	4.7 Maintenance of tourism infrastructure					R -	R -	R -	R -
Develop Site Plans										
Maintenance standards & prosedures										
Maintenance of all tourism buildings and infrastructure.										

KPA 5: Stakeholder Involvement								R48 631.13	R38 160.53	R48 523.77	R11 579.54
Objective 5.1: Interaction with stakeholders and communities in the planning, development and management of the PA								R0.00	R0.00	R26 467.51	R0.00
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Under the guidance of the Regulations for the proper administration of Nature Reserves, as promulgated in terms of Section 86 (1) of NEMPAA, establish a Reserve Advisory Committee and meet on a regular, agreed to basis.	A well represented functioning and formalised Community Liaison Structure contributes significantly to the management/development of the PA.	4.11 Community Liaison Structure					R -	R -	R26 467.51	R -
2	Develop and impliment an active Public Relations (PR) and Communication Programme	There is a wide ranging multi media public relations and communication programme keeping the general public and internal role players informed of important aspects of the PA.	4.10 Public Relations (PR) and Communication Programme					R -	R -	R -	R -
a	*Ensure positive press coverage is obtained and timeously and effectively respond to items in public media which may negatively impact on the organisation.*										
b	*Initiate and sustain ongoing communications with the communal and/or private landowners to discuss opportunities for ongoing cooperation and collaboration.*										
3	Ensure members of the community are involved in supporting the PA through volunteering, projects and fundraising by establishing formal groups such as Friends groups, Volunteers or Honorary rangers	There are a wide range of projects supported by volunteers including fund raising and assistance with management that contribute significantly to increased PA management effectiveness.	5.5 Community Support					R -	R -	R -	R -

Objective 5.2: Actively participate in local and regional conservation and socio-economic development initiatives that may affect or benefit the PA								R30 626.02	R27 657.55	R11 028.13	R0.00
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Participate in local municipal IDP planning processes, with a specific focus on the provision of municipal infrastructure and services to the reserve and supporting local economic development initiatives in the community.	A formal published review/audit has shown that the PA delivers quantifiable long term stimuli to the regional (and possibly the national) economy and delivers a broad range of long term quantifiable community benefits that improve the livelihood strategies and resilience in the lives of communities.	6.1 Economic and Social benefit assessment Direct and measurable benefits accrue to local community from the reserve.					R -	R10 502.98	R -	R -
a	*Identify, and make application for, EPWP-related funding for relevant tourism and conservation initiatives in the reserve.*										
2	Participate in the planning and development of other conservation initiatives with a specific focus on strengthening linkages										
a	*Assist other DENC PA's with specific projects*	The PA is influencing the local or regional economy and providing measurable social benefits to communities? Social benefits to direct benefits such as jobs, training and health care. Stimulus of the economy	6.1 Economic and Social benefit assessment Direct and measurable benefits accrue to local community from the reserve.					R30 626.02	R17 154.57	R11 028.13	R -
b	*Establish linkages with ARTFCA, with a specific focus on strengthening tourism products and on improving access to technical and professional support/resources from TFCA partners.*										
3	Investigate and select mechanisms for optimising employment, empowerment and capacity building opportunities for the local community.	Direct and measurable benefits accrue to local community from the reserve. Extent (number of beneficiaries) and nature (employment – permanent/ temporary; business opportunity; training; capacity-building) of community benefits.	6.1 Economic and Social benefit assessment Direct and measurable benefits accrue to local community from the reserve.					R -	R -	R -	R -
a	*Develop opportunities for selected individuals from the local community to be trained and directly employed in appropriate conservation and tourism related work.*										
b	*Develop opportunities to facilitate an empowerment component for selected individuals from the local community in any outsourcing/concessioning of the tourism and recreational products.*										
c	*Identify, and if feasible develop, opportunities for the establishment of community-based entrepreneurial opportunities within, or linked to, the reserve, including: game drives; sale of curios and crafts; guided heritage trails; village tourism; conservation enterprise; horse trails; event management and commercial hunting packages.*										

Objective 5.3: Develop, implement and maintain effective mechanisms for ongoing communications with co-management partners								R18 005.11	R10 502.98	R11 028.13	R11 579.54
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Develop and continually review, and amend (as required), the structure, representation and TOR of the Co-Management Committee to ensure that it contributes to realising the intent of the Co-Management Agreement.	There is a formal representative structure for community partners to participate in decision making according to a legally binding co-management agreement.	4.14 Community partners					R10 002.84	R -	R -	R -
2	Provide ongoing support (e.g. logistical, administrative, technical, professional and leadership) to, and actively participate in, an										
a	*Hold quarterly (more regular if required) meetings with the Co-Management Committee to ensure that co-management decisions are made timeously and effectively.*	There is a formal representative structure for community partners to participate in decision making according to a legally binding co-management agreement.	4.14 Community partners					R 8 002.27	R10 502.98	R11 028.13	R11 579.54
b	*Support the ongoing capacity building of the local community representatives on the Co-Management Committee.*										
c	*Allocate office space in the administrative complex for office bearers of the Co-Management Committee.*										
d	*Host a regular quaterly meeting, each in a different neighbouring village, to present and discuss issues of mutual concern.*										

KPA 6: Administration and Planning								R2 264 744.96	R1 888 704.98	R1 940 187.40	R2 006 159.46
Objective 6.1: Institute and maintain an effective management planning capability in the PA								**R486 437.19**	**R105 895.51**	**R155 504.69**	**R248 306.24**
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Compile fully Integrated MP covering all aspects of PA management with measureable objectives	The IMP is fully integrated covering all aspects of PA management with measureable objectives and is approved by the MEC	2.2 Management Plan								
a	*Review of IMP on 5 year cycle*							R 212 175.72	R -	R -	R 32 422.70
b	*Follow PPP and Obtain approval from MEC*										
c	*Update a CDF based on a sensitivity analysis indicating use zones, and operational & visitor infrastructure*	An approved CDF based on a sensitivity analysis exists as part of the SMP.	2.2.1 Conservation Development Framework (CDF)								
2	Administer the administrative systems supportive of effective management and proper functioning of the PA	Administrative support systems are excellent and fully support management effectiveness.	4.4 Administrative support systems					R 10 002.84	R 10 502.98	R 11 028.13	R 11 579.54
a	*Do annual Mett assesment*										
3	Update APO and OMF identifying all the activities, tasks and outcomes (operational & nanagement) in accordance with predetermined time frames and approved management plans to be completed in a financial year with costing.	An approved OMF exists and actions are linked to the PA's management plan targets and to the Key Performance Areas of the PA manager An operational budget, specific to the PA, is secure and is guaranteed on a 3-5 year cycle	4.1 Annual Plan of Operation (APO)					R 21 718.53	R 10 652.27	R 12 759.80	R 31 925.05
a	*Review APO accorrding to planning cycle*										
b	*Link APO to operational budget*		3.3 Adequacy of Operational budget 3.4 Security of Operational budget 3.4.1 Capital budget								
c	*Annual review of APO Workplans & OMF*		4.1 Annual Plan of Operation (APO)								
d	*Link OMF to the Key Performance Areas of the PA manager and key personell.*		5.4 Linking of management Plan to Key Performance Areas								

4	Update SKDR - General & Logistical Data	The site have secure legal status in terms of relevant legislation	1.1 Legal Status					R 52 280.90	R 23 688.10	R 43 007.86	R 40 526.43
a	*01 Update declaration summary*										
b	*02 Fences Beacons*	The boundary of the PA is known by the management authority, fully demarcated and is thus known and respected by the local residents/neighbouring land users and the public.	1.3 PA boundary demarcation 1.3.2 Servitude register								
	Property descriptions according to deeds with records										
	Record boundary deviations in a legal document.										
	Compile servitude register with conditions										
	Description of beacons										
c	03 S.H.E.Contingency plans for Disaster Management	A full risk assessment, covering inter alia biodiversity, financial management, human resources, tourism, pressures & threats has been undertaken for the PA that informs management planning.	1.6 Risk Assessment								
	Undertake a Threat Analysis to determine all potential threats to the safety and security of the reserve.										
	Update Risk assesment										
	Compile a Disaster Management Plan for the reserve										
d	*04 Protected area expenditure including historical data*	Budget is effectively managed to meet critical management needs in accordance with the OMF	3.4.2 Budget Management								
e	*05 Personnel Info*	The approved organogram reflects the actual needs of management for effectively achieving all management objectives and the HR capacity meets the approved levels.	3.2 Human Resource capacity								
f	*06 Economic valuation*	Operational equipment is adequate and suitable for current and future anticipated operational needs.	3.7 Adequacy of Operational equipment								
g	*06a Assets and stock inventory registers*										
h	*07 Vehicle Fleet with utilisation*	The transport fleet is totally appropriate and sufficient for all management needs with adequate numbers and range of vehicles to meet management needs	3.9 Adequacy of transport fleet								
i	*08 Infrastructure Maintenance schedule*	There is a maintenance schedule and all operational infrastructure is being maintained and meeting the set standards.	4.6.1 Maintenance of operational infrastructure								
j	*14 Literature Inventory & Web Links.docx*	Information technology systems are excellent and fully support management effectiveness. All electronic data are backed up on a routine basis, stored according to organisational standards and are easy to access.	4.5 Information Technology systems								
5	Update State of Knowledge Data Repository - Guiding management principles	Available management mechanisms working to control legitimate and illegitimate resource use and access?	5.2 Functioning of law enforcement and compliance systems					R -	R -	R -	R -
a	Complete list of Conventions, Commisions and Treaties relating to PAM										
b	Complete list of Nat Legislation & Regulations relating to PAM										
c	Complete list of Prov Legislation & Municipal Bylaws relating to PAM										
d	Complete list of Policies relating to PAM										
e	Develop Protected Area internal rules ito sec 52 of NEM:PAA Approve and Gazette Internal rules	Internal rules for controlling use & activities in the PA have been gazetted.Regular	1.2 Protected Area internal rules								
f	Compile standard operating procedures pertaining to all management activities	Relevant SOP pertaining to all management activities are in place to ensure best practice.	4.2 Standard operating procedures								

6	Update State of Knowledge Data Repository - Maps	The Management Plan is fully integrated covering all aspects of PA management with measureable objectives and is approved by the MEC. Review and compile for next 5-year planning period	2.2 Management Plan		R 190 259.20	R 61 052.16	R 88 708.90	R 131 852.52
a	IMP Maps							
	Map 1:Reserve Interface							
	Map 2: Reserve Interface comparison							
	Map 3: Reserve Estate							
	Map 4: Climate (Climatic regions within the NDM)							
	Map 5: Digital Terrain Model Map							
	Map 6: Geological Map							
	Map 7: Land types and soil Map							
	Map 8: Drainage and Hydrology							
	Map 9: Biomes, Bioregions and Vegetation units							
	Map 10: Plant communities and Management units							
	Map 11: Special habitats - Hotspots							
	Map 12: Archaeological and Cultural, Heritage resources							
	Map 13: Infrastructure and Bulk services							
	Map 14: Use Zone Map							
b	General & Logistical Maps Link to SMP for Estate and Domain not ZOI	Administrative support systems are excellent and fully support management effectiveness.	4.4 Administrative support systems					
	Map 1: Protected area Expansion							
	Map 2: Historical land uses - Polygon Only data From colonial time							
	Map 3: Conflicting land uses - Polygon Current and known future							
	Map 4: Anthropogenic incidence (HIRA) - Polygon Incidence of manmade disasters, accidents and impacts (poaching, arsen ect.)							
	Map 5: Site plans - update with CDF/GIAMA							
	Map 5-1: Development Plans - According to CDF							
	Map 6: Roads - Historic and current update with CDF							
	Map 7: Fences - Historic and current update with CDF							
	Map 8: Water supply systems - Historic and current update with CDF							
	Map 9: Watering points - Historic and current manmade update with CDF							
	Map 10: Electrical installations - Historic and current update with CDF							
	Map 11: Mining operations and Burrow pits - Historic and current update with CDF							
	Map 12: Erosion areas - Polygon - Rehabilitated and current areas							
c	Biodiversity Maps Link to BMS for Estate and Domain	Information and the understanding thereof concerning key species, habitats, ecosystems of the PA supports the achievement of all biodiversity objectives.	1.4. Biodiversity knowledge and understanding					
	Map 1: Fauna							
	Map 1-1 Exotic Fauna							
	Map 1-3 Fauna Distribution of SSC							
	Map 1-4 Fauna Distribution Large Predators							
	Map 1-5 Fauna Distribution Key Raptor Nests							
	Map 1-6 Fauna Monitoring sites							
	Map 2: Flora							
	Map 2-1: Flora Exotic							
	Map 2-3 Flora Distribution of SSC							
	Map 2-4 Flora Fire insidence							
	Map 2-5 Flora Monitoring sites							

Objective 6.2: Maintain an adequately equipped, resourced and trained staff complement for the PA								R1 626 449.88	R1 666 749.01	R1 676 227.77	R1 634 011.11
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Ensure that all vacant posts in the reserve's approved organogram are filled and determine actual needs for achieving management objectives as part of work plans.	The approved organogram reflects the actual needs for effectively achieving all management objectives and the HR capacity meets the approved levels.	3.2 Human Resource capacity					R 1 427 074.37	R 1 417 701.48	R 1 417 911.54	R 1 418 132.10
2	Implement the institutional staff performance appraisal system and link WP and PA to APO	Staff are well skilled for their duties and staff productivity targets (workplans) are often exceeded as indicated in staff performance reviews. There is an effective staff handover system and new staff are promptly made aware of relevant aspects of the PA management. Staff receive incentives to remain in the organisation to prevent loss of skills and experience.	5.3 Staff Development and productivity					R 151 021.06	R 200 285.86	R 193 217.34	R 164 949.58
a	*Have clear job descriptions and Performance Agreements on record. Link KPA's to APO and Mett*										
b	*Identify training needs, and facilitate access to training programs for reserve staff, with a priority focus on field ranger, first aid, hospitality and IT skills training.*										
c	*Maintain Leave and CWW register part of Monthley planner*										
3	Maintain all staff information for the reserve (leave records, attendance registers, overtime, etc.).	HR management and staff development systems are excellent and fully support management effectiveness.	4.3 HR Management systems					R 8 144.45	R 8 551.67	R 16 066.39	R 1 455.80
4	Implement the institutional Occupational Health and Safety policies and procedures in the reserve.	An external audit has certified that PA management complies with and implements	3.10 Health and safety					R 40 210.00	R 40 210.00	R 49 032.50	R 49 473.63
5	Develop a policy and standards for staff housing and ensure all staff housed accordingly.	There is a policy and standards for staff housing	3.11 Staff housing	NA				R -	R -	R -	R -
Objective 6.3:Institute and maintain an effective financial and administartive planning capability in the PA								**R151 857.89**	**R116 060.46**	**R108 454.94**	**R123 842.11**
#	Management action	Management targets	Key performance indicators Mett-Sa	2020	2021	2022	2023	2020/2021	2021/2022	2022/2023	2023/2024
1	Information Technology systems										
a	*Ensure electronic data are backed up on a routine basis and stored according to organisational standards*	Information Technology systems are excellent and fully support management effectiveness.	4.5 Information Technology systems					R 83 987.48	R 61 149.91	R 53 791.95	R 78 025.50
b	*Institute and maintain an electronic and/or hard copy filing system for all reserve-specific information.*										
c	*Read and apply all updated Management Authority guidelines, policies and procedures to the daily*										
2	Ensure financial management is excellent and all management goals are met										
a	*Prepare annual budget according to the APO and identify needs for external funding.*	The available budget is sufficient and meets the full management needs of the PA. There are skills and capacity in the organisation to raise external sources of funding for specific projects. An operational budget, specific to the PA, is secure and is guaranteed on a 3-5 year cycle. Updated guidelines, policies and procedures available at the reserve.	3.3 Adequacy of Operational budget 3.4 Security of Operational budget 3.4.1 Capital budget 3.4.2 Budget Management 3.4.3 Delegation of management of budget 3.5.1 Fund raising					R 67 870.41	R 54 910.55	R 54 662.99	R 45 816.61
b	*Compile database of external sources of funding for specific projects*										
c	*Link OMF to operational budget and obtain dedicated budget*										
d	*Maintain a reserve-based record of all purchases made, accounts paid and services procured in support of reserve operations over each financial year.*										
e	*Keep record and manage own revenue according to PFMA and supply inputs when required*			NA							
3	Ensure administration management is excellent and all management goals are met										
a	*Attend PAM and other meetings*	Updated guidelines, policies and procedures available at the reserve.	4.4 Administrative support systems					R 53 727.62	R 84 620.99	R 95 151.72	R 99 909.31
b	*Update PAM task list*										
c	*Monthly and quaterly planning and reports*										