

KAROO

NATIONAL PARK



MARCH 2008

PARK MANAGEMENT PLAN

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*South African National Parks would like to thank everybody who participated and had input in the formulation of this document,*

*notably*

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## AUTHORISATION

*This management plan is hereby internally accepted and authorized as the legal requirement for managing Karoo National Park as stated in the Protected Areas Act.*

DATE: 31 MARCH 2008

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### LIST OF ACRONYMS AND ABBREVIATIONS

DEAT	Department of Environmental Affairs & Tourism
EPWP	Expanded Public Works Programme
SANParks	South African National Parks
Karoo NP	Karoo National Park
SANF	South African Nature Foundation
CKDM	Central Karoo District Municipality
TPC	Threshold of Potential Concern
HR	Human Resources
V-STEER	The values (social, technological, economic, ecological and political), used to understand, with stakeholders, the social, economic and ecological context of the system to be managed, and the principles/values that guide management. These are used to develop a broadly acceptable vision of the future.
IDP	Integrated Development Plan
SDF	Spatial Development Framework

### GLOSSARY OF SELECTED WORDS

**Balanced Scorecard** – the performance management tool used by SANParks to ensure feedback and effective implementation of various management objectives.

**Objectives hierarchy** – the objectives for a park, with the most important, high level objectives at the top, cascading down to objectives at finer levels of detail, and eventually to operational actions at the lowest level.

**Desired state** – the overall conditions of the park (across the full V-STEER range) that stakeholders desire.

**Vision** – a word “picture” of the future, or what the stakeholders see as the future for the park.

**Mission** – an articulation of the Vision that describes why the park exists, and its overall philosophy on how to achieve its desired state.

**Vital attributes** – unique or special characteristics of the park, the determinants of which management should strive to protect, and the threats towards which management should strive to minimise.



## EXECUTIVE SUMMARY

SANParks has developed a Biodiversity Custodianship Framework to plan, integrate, implement and review the biodiversity conservation, tourism and constituency building components that make up its core business, whilst ensuring continual learning and compliance with DEAT norms and standards. Proclaimed in 1979, Karoo NP is situated in the Great Karoo, South Africa's largest ecosystem, covering 35% of its land area, against the Nuweveld Mountain range, some 3km northwest of Beaufort West, in the Western Cape Province. Karoo NP thus falls within the Central Karoo District of the semi-arid Nama-Karoo environment. The Central Karoo District was declared a presidential poverty node due to the high unemployment and poverty levels in the region, and Karoo NP consequently plays a significant role as an economic contributor in the region.

Karoo NP experiences cold winters and hot summers. The steep topographical gradients and different altitudes in the Park produce a structurally complex environment which provides many niches for animal and plant species. Vegetation types are closely linked to soil type, soil depth, rockiness, slope and aspect. Elements of four phytocoria are represented in the Park. These are the Tongaland-Pondoland succulent thickets, Karoo-Namib elements, Afromontane remnants and Sudano-Zambesian grasslands. The park has a wide variety of endemic wildlife, with 58 mammal species, more than 200 bird species and a rich reptilian fauna including 18 snake species and five tortoise species. All of the above vital attributes of Karoo NP are largely determined by the steep gradients associated with the Nuweveld mountains, the geology and soil, climate and rainfall typical of the Great Karoo. Climate change and development of conflicting land uses present the biggest threats to Karoo NPs vital attributes.

The Vision and Mission of Karoo NP recognise the value not only of its biodiversity components, but also its outstanding landscape elements. In addition, Karoo NP's commitment to the upliftment of the local communities is captured by including the statement about the park working together with the community so that all may benefit from it. Karoo NP's desired state thus has characteristic Karoo biodiversity components, including ecological processes, as well as its associated Karoo cultural, historical and scenic resources. Karoo NP's socio-political desired state is a park that provides benefits to the neighbouring communities by creating job opportunities and other forms of income generation, while remaining informed and constrained by its biodiversity values. Programmes to achieve Karoo NP's desired state fall within four categories, i.e. Biodiversity & heritage conservation, Constituency building, Sustainable tourism and Effective park management:

### i) Biodiversity & heritage conservation

Park expansion remains important for Karoo NP in its attempt to establish a large protected area representative of the Great Karoo landscape. Expansion in the 2006-10 management cycle will focus primarily on the consolidation of the Leeu River catchment and upper escarpment vegetation types and also on consolidating the boundary into a more manageable ecological unit. Sustainable resource use in Karoo NP is informed by SANParks corporate guidelines, which outline the decision-making process in developing detailed park-specific regulations regarding resource use, as well as park-specific procedures, which stipulate the detailed rules and regulations regarding resource use in specific parks.

The purpose of the herbivory programme is to understand and manage the herbivory as a modifier of biodiversity, including the effects of the major herbivore architects at different spatial and temporal scales. The main implication of conforming to the SANParks corporate policy on herbivore management is that management decisions will no longer be based on stocking rates, but rather on direct measurements of herbivore impacts on the vegetation. A second implication is that minimum interference should be practised as far as is practically possible, to allow for natural variation in the system that improves its resilience. A crucial element of this change in the decision-making environment is sufficient monitoring to determine the extent of vegetation change by herbivores, measured in a way that reflects and enhances our understanding of the system. Since biodiversity is firmly entrenched in SANParks values and operating principles, it is important to evaluate the outcome of Karoo NP's various integrated management actions on its resultant biodiversity complement. It can therefore be linked to the Balanced Scorecard system currently used by SANParks to measure the performance of its management.

An annual biodiversity survey has been proposed that aims to detect changes in biodiversity. A realistic prioritization framework has been developed to aid in decision-making regarding which species of special conservation concern to allocate resources for sensibly. Because of the implications of reintroducing predators for Karoo NP's neighbouring farming community, as well as potentially conflicting tourism objectives, it is imperative that this policy is guided by the SANParks corporate policy on carnivore reintroductions. Exceptional care will therefore be taken if lions are considered for reintroduction. Although wild dogs used to be part of the system, they generally do not do well in arid systems and should not be reintroduced without exceptional care and consideration. If the reintroduction of cheetah is considered it should form part of a metapopulation plan. Rehabilitation efforts will be applied wherever land transformation has a negative consequence of ecosystem functioning. Most of the farmlands that were purchased for park expansion have been transformed by minor vegetation transformation, including change of vegetation community in terms of composition, density and structure. The historical overgrazing in Karoo NP has been accompanied primarily by sheet erosion. There is also significant donga erosion mainly induced by flash floods, as well as a number of unwanted structures in Karoo NP that should be removed. Removal of alien plant and animal species remains a high priority. Fire is not an important driver of the Karoo ecosystem as the rainfall is too low to support regular fire events. Fire management in Karoo NP is therefore restricted to protection of human life and infrastructure. However, where lightning fires do occur, for example on the plateau, these will be allowed to burn, in recognition of the role of fire in this part of the ecosystem. Neighbouring farmers will be informed, and these fires will be controlled when they begin to pose a threat to human life or infrastructure. All other fires should be stopped or controlled by management as far as possible within the regulation of the National fire act.



### ii) Sustainable tourism

Karoo NP is developing a Conservation Development Framework that zones the park into areas of different use, to guide and co-ordinate conservation, tourism and visitor experience initiatives. Development of the existing tourism plan will also focus on increasing day visitor numbers. Currently only a small percentage of visitors is from the local community. The tourism plan must be integrated with all other components of the park management plan, to ensure that there are no conflicts of interest with biophysical objectives, which according to SANParks values must always take precedence. The marketing plan focuses on changing this visitor profile. There is currently only one commercial operation associated with the Karoo NP, i.e. the restaurant and shop. Opportunities for public-private partnerships for any commercial operations in the park will continue to be explored, including opportunities for the involvement of small, medium and micro-enterprises, as well as disadvantaged communities.

### iii) Building co-operation

A stakeholder relationship management programme aims to establish and maintain meaningful and beneficial relationships with all stakeholders of Karoo NP, in accordance with national co-operative governance legislation, as well as SANParks corporate values. Karoo NP stakeholder groups have been identified and details can be found in the associated lower level plan. The programme promotes inclusively and ensures compliance with legislation through improved relationships and collaboration with government and various governing bodies. An environmental education and interpretation programme builds constituencies amongst people in support of SANParks' conservation endeavours by playing a significant and effective role in promoting a variety of educational opportunities and initiatives. The People and Conservation Division will continue to focus attention on environmental education and youth outreach in order to build a conservation constituency for the future. A local socio-economic development programme aims to play a significant, targeted and effective role in contributing to local economic development, economic empowerment and social development in communities and neighbouring areas adjacent to National Parks by partnering with Local Government to form part of the Integrated Development Plans (IDP's), participating in Government Programmes (*WfW* and *EPWP*) to contribute to local skills development by supporting learnership programmes, implementing needs related training pro-

grammes and by creating business opportunities.

### iv) Effective park management

The development of an Environmental Management System for Karoo NP will ensure that the environmental impacts associated with management operations within the Karoo NP are avoided or minimised. A number of standard operating procedures have already been developed, but require regular review and management of decisions, actions and record keeping. Current tourism infrastructure consists of the restcamp, campsite, shop, restaurant and interpretive centre at Stolshoek and a day visitor's facility at Bulkraal. Limited tourist roads and management and support infrastructure. Details of these structures can be found in the associated lower level plan. Several old, unused farmsteads also occur in Karoo NP. The current status of Karoo NP's infrastructure is variable. The strategic intent of Karoo NP's safety and security plan is to ensure that effective visitor safety measures are in place, to ensure the safety and security of SANParks employees and concessionaires, and to ensure that tourist perceptions are managed in order to protect the brand and reputation of SANParks and SA Tourism Industry at large. The lower level plan on Safety and Security comprehensively addresses both the strategic and operational aspects of Visitor Safety and Security within the framework set out by the SANParks Security Plan. A staff capacity building plan recognises that an essential complementary function of park effectiveness is

maintaining adequate human resources, staff development and training, and developing a learning organisation. SANParks thus strives to promote employee well-being and creating understanding of ways to mitigate occupational risks. The financial sustainability plan details budgets for existing and future management costs. Corporate support for Karoo NP includes an increase in staff capacity (e.g. a dedicated research technician) to carry out the monitoring that is essential for the successful implementation of the biophysical programmes to achieve the desired state. The AIDS/HIV programme for Karoo NP forms part of a broader SANParks initiative. Karoo NP will make use of the comprehensive Risk Management Framework provided on a corporate level by SANParks, incorporating corporate risk management policy, procedures and methodology. Finally, the communications programme for Karoo NP follows the Corporate Communications policy.

The essential feature of the adaptive management system employed by SANParks for its biodiversity custodianship is the iterative way in which it will enable continual improvement in the management of each park through annual and five-year review cycles. The SANParks review process employs the Balanced Scorecard system to measure the performance of its management actions. The Balanced Scorecard integrates SANParks' and park-specific objectives across all levels of its staff through explicit linkages with individual performance areas.



## OVERVIEW OF THE SANPARKS MANAGEMENT PLANNING PROCESS

### Process Overview

South African National Parks (SANParks) has adopted an overarching park management strategy that focuses on developing, together with stakeholders, and then managing towards a 'desired state' for a National Park. The setting of a park desired state is done through the adaptive planning process (Rogers 2003). The term 'desired state' is now entrenched in the literature, but it is important to note that this rather refers to a 'desired set of varying conditions' rather than a static state. This is reinforced in the SANParks biodiversity values (SANParks 2006) which accept that change in a system is ongoing and desirable. Importantly, a desired state for a park is also not based on a static vision, but rather seeks refinement through ongoing learning and continuous reflection and appropriate adaptation through explicit adoption of the Strategic Adaptive Management approach.

The 'desired state' of a park is the parks' longer-term vision (30-50 years) translated into sensible and appropriate objectives through broad statements of desired outcomes. These objectives are derived from a park's key attributes, opportunities and threats and are informed by the context (international, national and local) which jointly determine and inform management strategies, programmes and projects. Objectives for national parks were further developed by aligning with SANParks corporate strategic objectives, but defining them in a local context in conjunction with key stakeholders. These objectives

are clustered or grouped into an objectives hierarchy that provides the framework for the Park Management Plan. Within this document only the higher level objectives are presented. However, more detailed objectives, down to the level of operational goals, have been (or where necessary are currently being) further developed in conjunction with key stakeholders and specialists.

This approach to the management of a National Park is in line with the requirements of the National Environmental Management: Protected Areas Act No. 57 of 2003 (NEM: PAA). Overall the Park Management Plan forms part of a National Planning framework for protected areas as outlined in the figure on the left.

Park Management Plans were not formulated in isolation of National legislation and policies. Management plans comply with related national legislation such as the National Environmental Management: Biodiversity Act, national SANParks policy and international conventions that have been signed and ratified by the South African Government.

### Coordinated Policy Framework Governing Park Management Plans

The SANParks Coordinated Policy Framework provides the overall framework to which all Park Management Plans align. This policy sets out the ecological, economic, technological, social and political environments of national parks at the highest level. In accordance with the NEM: Protected Areas Act, the Coordinated Policy Framework is open to regular review by the public to ensure that it continues to reflect the organisation's mandate, current societal values and new scientific knowledge with respect to protected area management. This document is available on the SANParks website.

### Key functions of Park Management Plans

The key functions of this management plan are to:

- ensure that the Park 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 operational level to the Minister of Environmental Affairs and Tourism;
- 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 Park staff;
- set the intent of the Park, and provide explicit evidence for the financial support required for the Park.

### This Management Plan for Karoo National Parks comprises three broad sections:

1. The background to and outline of the desired state of the Park and how this was determined.
2. A summary of the management strategies, programmes and projects that are required to move towards achieving the desired state (obviously these strategies, programmes and projects can extend over many years but here we present the management focus until 2010).
3. An outline of the Strategic Adaptive Management methodology and strategies that will ensure that the Park undertakes an adaptive approach to management. It focuses park management on those critical strategic issues, their prioritisation, operationalisation and integration, and reflection on achievements to ensure that the longer-term desired state is reached.

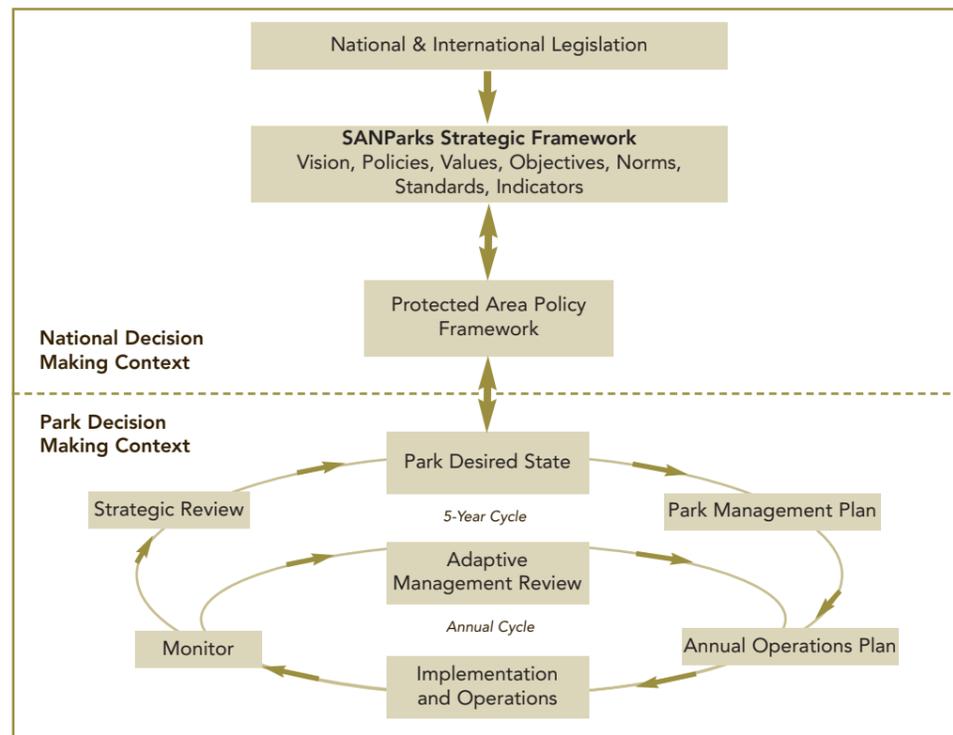


Figure 1: Protected Areas planning framework



## INTRODUCTION

### 1. BACKGROUND TO AND FORMULATION OF THE DESIRED STATE FOR THE PARK

The proclamation of the National Environmental Management: Protected Areas Act No. 57 of 2003 (NEM: PAA) in 2005 required existing park management plans to be reformulated in compliance with this Act (Cowan 2006). In accordance with the specific requirements, SANParks has developed a Biodiversity Custodianship Framework (Rogers 2003) to plan, integrate, implement and review the biodiversity conservation, tourism and constituency building components that make up its core business, whilst ensuring continual learning and compliance with DEAT norms and standards (see Coordinated Policy Framework document). The essential feature of the system is the iterative way in which it will enable continual improvement in the management of each park through annual and five-year review cycles. The first step in developing/revising a management plan is to develop the desired state of the park, which guides park management in its daily operations. The desired state is drafted every five years with the involvement of representative stakeholders, and forms a bridge between the long term Policy and Vision for the Park, and the medium term (five year) priorities and resources available to attain that vision.

The management plan for Karoo National Park (Karoo NP) has been formulated using this Biodiversity Custodianship Framework and adaptive planning process. The adaptive planning process involves setting the fundamental decision-making environment, understanding the V-STEPP system to be managed, and prioritising objectives for each park. The desired state for Karoo NP comprises a Vision and Mission reflecting the high-level essence of what Karoo NP is aspiring towards, and a hierarchy of objectives translating these broad values into strategic, auditable management outcomes. This section of the plan details the setting of Karoo NP's desired state, focusing on the determinants and threats to its vital attributes, and translating the maintenance of these determinants and overcoming of these threats from broad objectives into specific and auditable management actions.

Thereafter, specific programmes to achieve the desired state for Karoo NP are detailed. These programmes are the core components of protected area management and for SANParks comprise biodiversity conservation, sustainable tourism, building co-operation and effective park management. Finally, the plan outlines how the various Karoo NP park objectives will be prioritized, integrated and operationalised, and which feedback mechanisms will be used to ensure compliance, auditability and maximum learning, as part of the adaptive management cycle.

### 1.1 The fundamental decision-making environment

As with all SANParks, the objectives and management of Karoo NP must be aligned with SANParks' Vision and Mission:

#### **Vision**

*National parks will be the pride and joy of all South Africans and of the world.*

#### **Mission**

*To develop and manage a system of national parks that represents the biodiversity, landscapes, and associated heritage assets of South Africa for the sustainable use and benefit of all.*

While adhering to the SANParks vision and mission, the three pillars of the decision-making environment are the park-specific mission statement, the context of/for the managed system (at local, regional, national and international levels and at ecological, socio-economic, political and legal levels), and thirdly, the values and operating principles. While a park's vision is a concise statement describing its core business and philosophy of management, a statement of the operating principles describes the core values of the organisation. SANParks Biodiversity and corporate values have been set but they may need to be supplemented by operating principles that meet specific needs of an individual National Park.

#### 1.1.1 Vision and Mission for Karoo NP

The development of the Vision for Karoo NP took place during stakeholder workshops, in which the importance of drawing in the surrounding community was highlighted as a key means of contributing towards upliftment of communities of the Central Karoo district. Other important elements of the Vision jointly agreed upon during this processes included the recognition of Karoo NP's outstanding landscape qualities, as well as its associated biodiversity components (including its rich fossil history).

The resulting Vision of Karoo NP is:

*A park that works with the community to enhance, and benefit from, its unique Nama-Karoo qualities.*

In order to achieve this Vision, Karoo NP's Mission is:

To restore and conserve Karoo NP's cultural, landscape and ecological processes, thereby delivering high quality nature-based tourism derived from the Karoo's sense of place, and providing benefits to the communities of the Central Karoo district.

The Vision and Mission for Karoo NP ensure that while the park's management objectives and strategies

(detailed further down in this management plan) conform to SANParks broad-level objectives, the specific high level objectives of the Karoo NP can ultimately be traced back to its stakeholders' values.

#### 1.1.2 Context

Together with the corporate, park-specific and societal values and Vision, the social, technological, ecological, economic and political facts that define the circumstances relevant to Karoo NP provide the context for its decision-making environment.

#### **Location and Boundaries**

Karoo NP forms part of the Great Karoo, South Africa's largest ecosystem, covering 35% of its land area. It is situated against the Nuweveld Mountain range, some 3km northwest of Beaufort West, in the Western Cape Province (Appendix 2: Maps 1 and 6). Karoo NP thus falls within the Central Karoo District of the semi-arid Nama-Karoo environment. The entrance gate to the park is strategically located on the main north-south arterial road linking Johannesburg with Cape Town. The Fraserburg (south), Molteno-Loxton road (east), the Nuweveld Mountains (north) and the provincial boundary between the Western and Northern Cape (west) generally bound the current extent of the park. The total length of the park's border is approximately 190km. It was originally envisaged that Karoo NP would eventually be some 100 000 - 120 000 ha in extent and comprise four-fifths Karoo plains and a fifth mountain terrain. The current 88 133 ha consists of 95% plains and 5% mountain terrain, substantially less than the original target of 20% mountain terrain.

#### **History and pre-history**

During the late 1950's a local farmer (and twitcher) William Quinton campaigned for a conservation area in the Beaufort West vicinity. However, it was only in the 1970s that South African National Parks proposed the establishment of a National Park that would be representative of the Nama Karoo Biome after a campaign launched by the South African Nature Foundation (SANF) and funded through the commission and sale of special art stamps depicting the flora and fauna of the Great Karoo. After considering a number of possible suitable areas it was decided to establish this new park in the vicinity of Beaufort West. In a gesture of support, the Town Council of Beaufort West donated 7 209 ha of communal land north-west of the town to the South African National Parks. This area then formed the nucleus of the Karoo NP, proclaimed in 1979. SANF purchased additional land to be incorporated into Karoo NP, and in 1989 a luxury rest camp was opened.



The Great Karoo is an area of unrivalled importance for understanding the evolution of the oldest known complex ecosystems on land. The park forms part of one of the Karoo's classic study and collecting areas for the wealth of ancient petrified fossils of the long-gone Karoo animals. In the Karoo NP there is a clearly visible link between the geological horizons of the plains of Beaufort West, progressing through time, layer by layer, to those at the top of the Nuweveld escarpment.

#### **Social, economic and political context**

KNRP is situated within the Central Karoo District which includes the towns of Beaufort West, Laingsburg, Prince Albert and two District Management Areas of which Karoo NP is one. The Central Karoo District was declared a presidential poverty node due to the high unemployment and poverty levels in the region. Although the district is the largest (spatially) municipal district in the Western Cape, it also has the smallest population. This geographical separation of its inhabitants contributes to the difficulty experienced by local government in delivering to all of its constituents. Karoo NP consequently plays a significant role as an economic contributor in the region. The park itself offers employment to 40 Permanent staff, 11 Temporary, 15 at Salt & Pepper (Private operator), the EPWP (funded by DEAT) supplies 180 families with an income on the Fence Project and 130 will be employed in the road construction project.

The Karoo has limited resources (such as water) and this is manifested in the few manufacturing industries that have been established. The nearby town of Beaufort West has an extremely high unemployment rate of around 51%, and an estimated 70% of the population of the district receiving social grants. The park itself is mainly surrounded by private livestock (mainly sheep) farms. There is a history of friction between the local farmers and Karoo NP regarding small predators, but this should be addressed by the new predator proof fence being constructed. The majority of the farms around the park have no electricity and rely on generators, solar and wind power to generate energy. The area is believed to have significant uranium deposits, which have attracted applications for mining in the area. Although mining has the potential for considerable job opportunities, it could conflict with Karoo NP's conservation objectives due to the proximity of the prospecting areas.

The Karoo NP falls within the Central Karoo District Municipality and the Beaufort West local municipality. Both of these entities have IDPs that incorporate Karoo NP, and which have been adopted by Karoo NP. Karoo NP's infrastructure development plans were submitted to both municipalities before their adoption. However, they do not yet have SDF's, which are expected to be completed in the

first quarter of 2008 and are still open for participation. Karoo NP management will thus interact with the consultants early in 2008.

#### **Physical environment and land use**

The physical features and land use surrounding the park are illustrated in Appendix 2: Maps 2 and 3.

##### **i) Climate**

Mean annual rainfall ranges from 175- 406 mm in different parts of the park, with 60-75% falling in summer. Rainfall reliability, as expressed by the coefficient of variation in annual rainfall, diminishes from west to east. Karoo NP experiences cold winters (mean winter minimum temperature is 3.5°C) and hot summers (mean summer maximum temperature is >32°C). The mountains of the Great Escarpment experience a cool steppe climate, with the steep elevation and precipitation gradient rapidly changing to a warm steppe climate in the eastern, southern and western lowland areas of the park. Mild to heavy frost occurs with periodic snow on top of the Nuweveld mountains. The vegetation growth season lasts 7 to 8 months. Westerly and north westerly winds dominate and have a scorching effect on the soil and vegetation.

##### **ii) Geology**

The Karoo Supergroup of Permian age consists of the Dwyka Formation, Eccca Group and Beaufort Group. The Beaufort group overlies the Eccca group and consists of alternating mudstone (red in places) and sandstone. It sub-divides into the lower Abrahamskraal Formation (1500-2000m thick) and an upper Teekloof formation (±1400m thick) with the boundary arbitrarily at the base of the so-called "Poortjie Sandstone". This formation consists of mudstone (red in places), sandstone and thin greenish cherty beds. The sandstones represent river channel deposits and the mudstones, floodplain deposits. The cherty beds were originally ashfall tuffs, although the presence micro-cross-lamination suggests subsequent transportation by water onto the floodplains. Jurassic-age dolerite extensively intrudes the Beaufort Group as dykes and sheets. Inclined sheets form crescent-shaped or concentric intrusions that are clearly visible on the Middle- and Upper Plateau. The sills range from a few metres to over 100 m in thickness. The dolerite causes a metamorphosis effect on the adjacent host rocks. Mudstone altered to hornfels and the sandstones develop a quartzitic appearance. Deposits of Quaternary age include river terrace gravel, calcrete, alluvium and debris. Terrace gravel consists of fairly well-rounded cobbles and boulders composed largely of dolerite. The terrace gravel shows clearly along the banks of the Gamka River where sharp profiles occur. These gravels are partly calcrete cemented and occur on

terrace remnants that now lie from a few metres to a maximum of 30 m above the general land surface. Calcrete occurs directly on bedrock and has also formed extensive deposits within some larger areas of alluvium, attaining a maximum thickness of a few metres. The alluvium embraces both alluvial slopes (sheet wash) and alluvial valley (channel-related) deposits, with the former predominating in the Lammertjiesleegte and the latter dominating in the Stolshoek areas of Karoo NP.

No commercial mining currently occurs within the Karoo NP. Current prospecting on the borders of the protected area for uranium is a concern as it will affect the status and health of the protected area. It will also have a negative spatial effect and possible pollution of underground water resources. The extraction of underground water can also reduce availability of water for human and game consumption over the long term. Dust particles and waste from the proposed mines can also result in pollution within the boundaries of the park. Some borrow pits (quarries) were established inside the protected area for the construction and maintenance of roads within the park. The verges of the borrow pits should be rehabilitated according to EMP's created for that specific project. Co-ordinates of all borrow-pits are available from the park manager upon request.

Vegetation types are closely linked to soil type, soil depth, rockiness, slope and aspect. Finer soil types with smaller grains (such as clay) generally retain moisture better than coarse-grained soils. In soils with very high clay content water may be retained so well that it is unavailable for absorption by plant roots. Clay also forms a compacted surface more easily, causing water to run off rather than penetrate deeply into the soil. Deep soil, if it is too sandy does not retain water as well as rocky soils. Vegetation growing on rocky soils is therefore more resilient to the effects of drought and grazing. Deep Karoo soils are very easily eroded by wind and water if denuded of a healthy vegetation layer, leading to even more degraded veld with poor fodder production for herbivores.

##### **iii) Soils**

The dominant soil-forming processes have been rock weathering, the formation of orthic topsoil horizons and, commonly, clay alleviation, giving rise typically to lithocutanic horizons. Soil forms that are typical of these processes are Glenrosa and Mispah. Any other soil form can however also be found in these land types. Oakleaf soil forms, deep or shallow, developed by rock weathering also occur in upland sites. The steep slopes, middle plateau and Puttersvlei (upper plateau) areas of Karoo NP, excluding the northern most corner, fall into the Ib land type. Surface rock with underlying soil or rock covers sixty to eighty percent of these areas. The parent material of the slopes consists of mudstone, siltstone



and sandstone with some dolerite intrusions, and typically Mispah or Glenrosa soil forms. Dolerite covers most of the middle plateau, with an influence of mudstone, siltstone and sandstone closer to the upper slopes. Fertile soils occur on this flat plateau with little erosion save where the deep red soils gradually erode from a natural basin. Dolerite rocks cover most of the Puttersvlei section of land type Ib, with the underlying sandstone appearing in terraces, descending in a northerly direction. The northernmost corner of the upper plateau occurs in land type Db. Prisma-cutanic and/or pedocutanic diagnostic horizons characteristically dominate this land type. Non-red B horizon, duplex soils cover more than half the land area.

#### iv) Topography

The Karoo National Park can be divided into five physiographic units: The Southern and Central plains (<1 000 m. a.s.l.), the South eastern plains (< 1000 m a.s.l.), the Middle plateau (1 100 – 1 200 m a.s.l.), the Northern Upper plateau (1 600 – 1 900 m a.s.l.), and the flat topped Korannasfontein mountain in the west (1 400 – 1 550 m a.s.l.). The Southern edge of the upper plateau forms part of the Nuweveld Mountains, which also forms the northern boundary of the Park except for the Puttersvlei area where approximately 3600 ha of the upper plateau is included in the Park. The western and central plains are part of a large interior basin that extends to the south, and is criss-crossed by drainage lines. The Park's profile includes the high-lying area above the steep south facing Nuweveld escarpment; the escarpment itself with its deep cut ravines; and the slopes reaching down to the plains in the west, south and south-east dotted with the characteristic Karoo koppies. The slopes and rocky areas support vegetation types with taller plants than the flat plains. The steep topographical gradients and different altitudes in the Park produce a structurally complex environment which provides more niches for animal and plant species than a more level environment would. However the temperature gradient which accompanies the topographical gradient may make species with narrow tolerance limits vulnerable to the effects of global warming.

#### v) Hydrology

The Nuweveld Mountain range forms a watershed between the Upper Karoo and the Central Karoo. However, most of the park is situated to the south of the mountain range where water drains into a large number of drainage lines. Consequently, a number of important rivers have their source in the park, namely the Sak, Leeu and Gamka Rivers. The Leeu Rver flows through the park towards the west, and is

joined by the Paalhuis River, Klipplaatsfontein River, Boesmanskop river, Doringhoek River and Sand River, all of which have their sources within the park. In the north east, the Gamka River has part of its source partly in the Park and then flows through the park toward the south. The Stolshoek River originates in the park and joins the Gamka River further downstream. Also in the north east the Puttersvlei area drains from a gentle slope towards the north and forms the source of the Sak River. All of these streams and rivers are seasonal and dependent on rainfall to flow. However, some of these such as the Klipplaatsfontein and Doringhoek rivers, can retain water in pools for long periods after rain. There are a number of small springs in the park. The spring at Kookfontein is the largest and best-known of the springs, and was used for irrigation in earlier times. Ground water is abundant, but not properly quantified for the whole area. Some boreholes in the Stolshoek and Doringhoek areas yield in excess of 40 000 per hour, and more than 60 boreholes exist which were at some stage equipped with windmills. Some wetlands occur, mostly small and associated with larger rivers and springs. The northern upper plateau and mountain slopes are generally more moisture rich than the southern plains.

#### Biological environment

##### i) Vegetation

Elements of four phytochoria are represented in the Park. These are the Tongaland-Pondoland succulent thickets (Moll & White 1978), Karoo-Namib elements (Werger 1978), Afromontane remnants (White 1983) and Sudano-Zambesian grasslands (Werger & Coetzee 1978). A Phytosociological study described fifteen dominant plant communities in the original 33 000 ha of the Park (Rubin & Palmer 1996). The major plant communities recognised in the study can be used as ecological units in a management strategy. The two Veld Types represented in the original section of the Park are the Karroid Broken Veld of the Great Karoo (Acocks 1988: Veld Type 26), and the Karroid *Merxmuellera* Mountain Veld replaced by Karoo vegetation (Veld type 42). With Park expansion to the west two small areas of Central Lower Karoo (Veld Type 30) are now also included in the Park. A total of 864 plant species, representing 355 genera and 93 families have been recorded in the Park (Rubin et. al. 2001). Although the Park only effectively conserves representative samples of one of the 21 Veld Types of the Nama-Karoo biome, namely Karroid Broken Veld, it nevertheless protects 30% of the recognized flora of the Nama-Karoo biome.

##### ii) Fauna

The park has a wide variety of endemic wildlife, particularly small reptiles. It is unlikely that the great herds of

migrating springbok, wildebeest, ostrich and the ill-fated quagga documented in the 1800's will ever be seen again but the park still hosts an impressive array of fauna, with 58 mammal species, more than 200 bird species and a rich reptilian fauna including 18 snake species and five tortoise species – the highest density of species per equivalent area in the world. Many species such as black rhino and buffalo, as well as Cape mountain zebra, have been relocated to Karoo NP. Over 20 breeding pairs of black eagle find sanctuary within the park. The "quagga project" introduced in 1998 in an effort to re breed the "formerly extinct" quagga species, now regarded as a sub-species of the Plain's Zebra, is gathering momentum in the park. The invertebrate fauna are little known, however the Park lies within an area where outbreaks of the brown locust (*Pardalina locustana*) and Karoo caterpillar (*Loxostege frustalis*) occur periodically. Harvester termites and harvester ants also occur.

#### 1.1.3 Values and Operating Principles

Our values are the principles we use to propose and evaluate between alternative options and decisions. SANParks has adopted eleven corporate values (for more detail please refer to the SANParks Co-ordinated Policy Framework (CPF) submitted to the Minister of Environmental Affairs and Tourism along with these management plans. These corporate values serve as guiding principles around which all employee behaviour and actions are governed and shaped. These corporate values include:

- We shall demonstrate *leadership* in all we do
- We shall embrace, and be guided by *environmental ethics* in all we do
- We shall promote *transformation* within, and outside of the organisation
- We shall strive for *scientific* and *service excellence* at all times
- We shall act with *professionalism* at all times
- We shall adopt, and encourage *initiative* and *innovation* by all
- We shall treat all our stakeholders with *equity* and *justice*
- We shall exercise *discipline* at all times
- We shall show *respect* to all
- We shall act with *honesty* and *integrity*
- We shall strive for *transparency* and open *communication* at all times

Karoo NP takes its biodiversity values from the headline SANParks biodiversity values:

- We adopt a **complex systems view** of the world while striving to ensure the **natural functioning** and **long term persistence of the ecosystems** under our care.
- We aim at persistent achievement of **biodiversity representivity** and **complementarity** to promote



- **resilience** and ensure **ecosystem integrity**.
- We can **intervene in ecosystems responsibly and sustainably**, but we focus management on **complementing natural processes** under a “**minimum interference**” philosophy.
- We accept with humility the **mandate of custodianship** of biodiversity **for future generations** while recognising that both natural and social systems change over time.

Although SANParks corporate and biodiversity values have been set (see SANParks CPF), they need to be supplemented in Karoo NP by operating principles that meet the specific needs of Karoo NP’s maintenance phase and focus on upliftment of the surrounding communities. The operating principles below reflect the values of individuals in the Karoo NP stakeholder group, including SANParks and Karoo NP management:

- A work ethic that values honesty, humility, diligence, loyalty and professionalism
- Transparency with the surrounding community
- Guests that are treated as individuals
- Respect for cultural diversity
- Strive to maintain good staff team
- Conservation by means of high standards, respect for nature
- Recognition that ecosystems change, are complex and management must deal with uncertainty
- Open to learning and adapting

## 1.2 Vital attributes underpinning the value proposition of Karoo NP

Listing the vital attributes of a park is an important step in the objective setting process as it identifies the fundamental purpose(s) of conservation management for a particular park. The following vital attributes have been identified as making Karoo NP unique, or at least very special in its class. Each attribute is accompanied by important factors determining or threatening the attribute. Using this information helps management to achieve the desired state by formulating park objectives that focus on maintaining the determinants of, and on overcoming the constraints and threats to, these vital attributes. In addition, in this way the management plan is customized in its fullest local extent, without detracting from some of its more generic SANParks functions. The vital attributes of Karoo NP, as recognised by its stakeholders, can be summarised as follows:

- Karoo NP’s biodiversity assets are seen primarily as the ecological gradients, geology, soil and climate that produce the particular drainage lines, catchments and vegetation structure typical of the Great Karoo
- The typical Karoo vistas produced by the geology, topography and vegetation, and beautiful sunsets

- The underrepresented Nama Karoo vegetation is protected in Karoo NP
- Endemic species (121 plant species recorded in the Park are endemic to the Nama-Karoo biome)
- The scenic and strategic position of Karoo NP’s rest-camp below the Nuweveld mountains, and along the N1 highway between Cape Town and Johannesburg
- An excellent staff team at Karoo NP, who are community-friendly, professional and hospitable
- Place where Cam live and speak language
- Fossil trails, richness in fossils
- Sense of place, tranquility, opportunity for reflection provided by Karoo NP
- History

The biophysical attributes are largely determined by the steep gradients associated with the Nuweveld mountains, the geology and soil, climate and rainfall typical of the Great Karoo. Climate change and development of conflicting land uses present the biggest threats to Karoo NP’s biophysical attributes. Other threats, or potential threats, to Karoo NP included a loss of interest by the community because of a perceived lack of sharing of information with school children and other locals, conflicting objectives with other institutions, inappropriate tourism development (don’t try and clone Kruger!), uncontrolled resource use, imprudent introduction of carnivores and lack of publicity.

## 1.3 Setting the details of the desired state for Karoo NP

SANParks’ biodiversity custodianship framework guides park management in setting up a management plan, implementation thereof, and the review of the plan (see Coordinated Policy Framework document). The essential feature of the system is the iterative way in which it will enable continual improvement in the management of each park through annual and five-year review cycles. The first step in developing/revising a management plan is to develop the desired state of the park, which guides park management in its daily operations. The desired state is drafted every five years with the involvement of

representative stakeholders, and forms a bridge between the long term Policy and Vision for the Park, and the medium term (five year) priorities and resources available to attain that vision.

Karoo NP’s desired state has characteristic Karoo biodiversity components, including ecological processes, as well as its associated Karoo cultural, historical and scenic resources. Karoo NP’s socio-political desired state is a park that provides benefits to the neighbouring communities by creating job opportunities and other forms of income generation, while remaining informed and constrained by its biodiversity values.

### 1.3.1 An objectives hierarchy for Karoo NP

In order that the current and future extent of the Park is protected and managed effectively, the desired state is decomposed into a hierarchy of component objectives of increasing focus, rigour and achievability. The final level represents acceptable, achievable and measurable objectives, linked to a performance management tool known as the Balanced Scorecard.

In order for Karoo NP to move towards realising its jointly agreed upon Vision, five high level objectives have been identified, and are cascaded down to finer and finer levels of detail, ending with specific operational or management strategies. Figure 1 represents the highest level objectives in Karoo NP’s objectives hierarchy, which form the basis for prioritisation of management issues, and are explicitly derived from the park’s Mission and Vision. The full hierarchy of objectives can be obtained from park management upon request. The high level objectives focus on re-establishing/maintaining and reducing the threats to the ecological patterns and processes necessary to conserve the unique biodiversity attributes of the Nama Karoo, as well as on developing and monitoring the use of its cultural resources. The high level objectives also reflect Karoo NP’s vision of nature-based tourism, which has cross-linkages with achieving the biodiversity objectives. Karoo

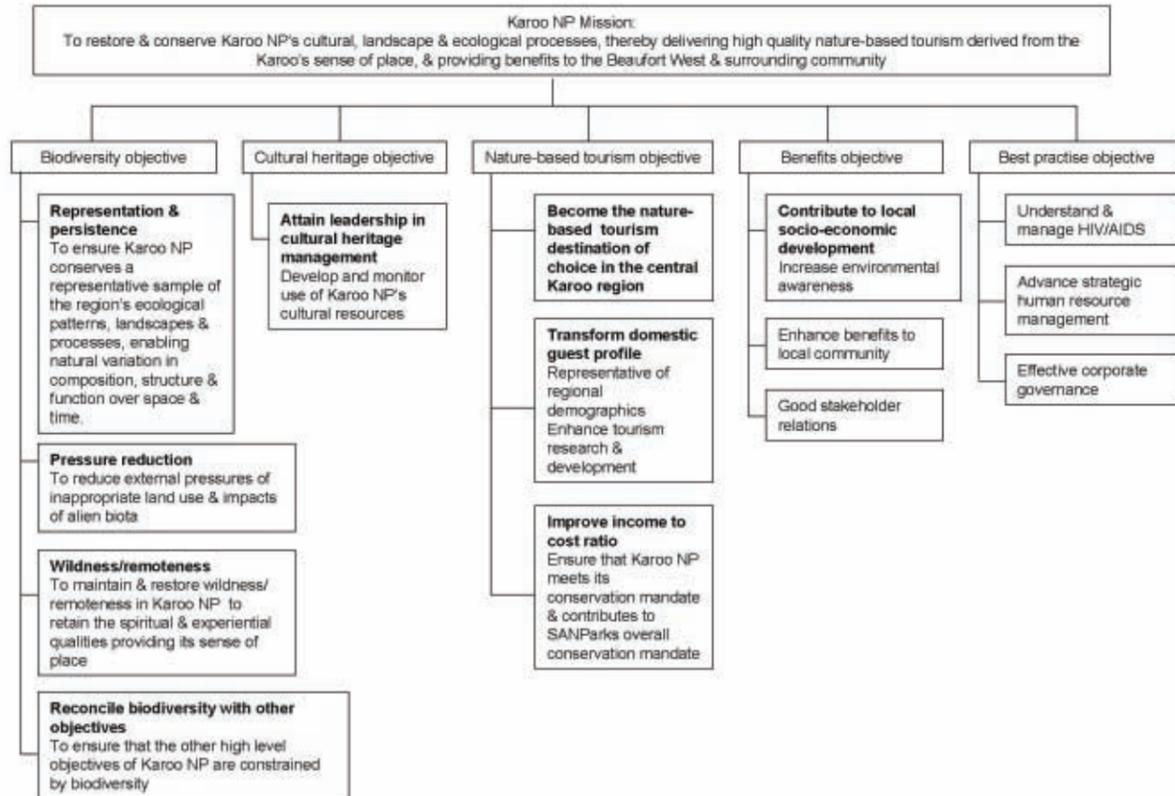


Figure 1 - High level objectives in an objectives hierarchy for Karoo NP

NP's commitment to providing benefits to the surrounding community is reflected in the high level Benefits objective, while the Best practise objective recognises Karoo NP's values in respect of its human resources component, as such is also cross-linked to the Benefits objective. Together this set of objectives strives to make Karoo NP the Custodian of Choice for Protected Area management in the region. Table 1 provides a list of initiatives needed to address each of the objectives and programmes to achieve the desired state.

### 1.3.2 Thresholds of concern and other exact conservation targets

In the adaptive management of ongoing change in ecological systems, thresholds of concern are the upper and/or lower limits of flux allowed, explicitly specifying the boundaries of the desired state of the park. If monitoring or predictive modelling indicate exceedances beyond these limits, then mandatory management options of the adaptive cycle are prompted. Considering the biophysical objectives stated above, the following TPCs are provisionally listed for Karoo NP, but require development in consultation with scientific experts:

- Extent of change of vegetation structure typical of the Great Karoo (this could potentially be brought about by climate change or overutilization of vegetation by herbivores).
- Extent of change of the underrepresented Nama Karoo vegetation.
- Change in growth rates of Species of Special Concern, e.g. Cape mountain zebra, black rhino.

- Change in proportional representation of herbivore foraging guilds.
- Prey-switching by predators.
- Extent of change of plant basal cover, indicating success of/need for rehabilitation.

These provisional TPCs will form part of particular programmes (below) to achieve the desired state, and will require explicit monitoring to assess the potential exceedance of each TPC. This has critical capacity and funding implications for the future budgeting and resource requirements of the park. It is therefore crucial to note at this point that the adaptive management cycle cannot be successfully implemented without the necessary capacity for monitoring. In addition, research should be solicited in conjunction with the monitoring to increase our understanding of the ecological processes in Karoo NP. Research, too, should be explicitly linked to the issues in Karoo NP's objective hierarchy.

The above TPCs constitute the range believed to be necessary initially. If other issues arise (e.g. the need for certain rare biota TPCs) these can be set from generic principles.

### 1.3.3 Conservation Development Framework (CDF)

A full CDF will be developed for Karoo NP within the first iteration of this plan in 5 years' time. However, a practical zonation for Karoo NP (Appendix 2: Maps 4 and 5) has been undertaken and may be used to guide development of the park.



## PROGRAMMES TO ACHIEVE THE DESIRED STATE

### 2. PROGRAMMES TO ACHIEVE THE DESIRED STATE

This section deals with the specific, but often crosslinked, programmes that address the park objectives and lead to management actions on the ground. Together they represent the park's best attempt to achieve the desired state. Each subsection is a summary of the particular programme, invariably supported by a detailed description called a low-level plan, not included in this plan, but available for scrutiny upon request. All of these programmes are subservient to, and guided by, SANParks corporate level policies that translate SANParks values into operating principles (see SANParks Coordinated Policy Framework document).

The various programmes are detailed under the five "real-world" activity groupings as reflected in the SANParks biodiversity custodianship framework, namely Biodiversity and Heritage Conservation, Sustainable Tourism, Building Co-operation, Effective Park Management, and Corporate Support.

#### 2.1 Biodiversity and Heritage Conservation

##### 2.1.1 Park Expansion Programme

Although not situated within an identified priority habitat by the South African national conservation assessment (Driver *et al.* 2005), the expansion of Karoo NP remains important for SANParks and falls in line with the national strategic objective (SO 5) in the NBSAP (2005) in its attempt to establish a large protected area representative of the Great Karoo landscape. Specifically, the purpose of Karoo NP's park expansion programme is:

- The conservation of a representative sample of the ecological patterns and processes (eg upland lowland interfaces, river processes, and mammalian herbivores etc) associated with the Nama-Karoo Biome specific to the central great Karoo environment in a contiguous functional system.
- The consolidation of an ecologically viable park, encapsulating the altitudinal variation with its associated habitat types and wildlife species characteristic of the Karoo environment from the Great Escarpment's Nuweveld Mountains to the lowland plains of the Leeu-Gamka river catchment.
- The provision of habitat diversity in the face of expected climatic change.
- Incorporation of the source of the Gamka and part of the Leeu River catchments.
- The provision of a diverse eco-tourism opportunity as an economic engine for the region.

The expansion programme is in full congruence with SANParks accepted biodiversity values, and addresses the achievement of biodiversity representivity and complementarity. Moreover, the expansion programme follows the SANParks land acquisition framework (see coordinated policy framework document). The expansion of the park impinges upon numerous National Acts, some of which require particular attention to their potential social impacts, especially on the agricultural labour sector. An initial conservation development plan for the park (Castley & Knight 2000) provided the initial expansion vision for the park.

In order to conserve this range of biodiversity and landscapes, the park has systematically focused on consolidating the Leeu-Gamka catchment system from the Nuweveld Mountains escarpment to the low lying plains (Castley & Knight 2000) towards an ecologically viable park size and shape. The expanded park will provide the largest formally protected area within the Great Karoo region. Towards meeting these objectives the park has grown from its humble beginning in 1979 to its current 88 133 ha. To meet the expansion objectives, a single upland expansion zone has been identified that will increase the Karoo Escarpment Grasslands, Eastern Upper Karoo, Western Upper Karoo and Upper Karoo Hardeveld types by a collective 39 896 ha. The Upper Karoo Hardeveld, Gamka Karoo and Western Upper Karoo vegetation types would only be protected in the park, emphasising the importance of this protected area. Furthermore, the Karoo NP remains important in the conservation of the Gamka Karoo and Upper Karoo Hardeveld as the park conserves 13 and 21% of the national target (Driver *et al.* 2005). Expansion in the 2006-10 management cycle will primarily focus on the consolidation of the Leuu River catchment and upper escarpment vegetation types and also on consolidating the boundary into a more manageable ecological unit. In this regard it is planned to acquire a total of 13 000 ha for an estimated total of R13.3 million.

##### 2.1.2 Cultural Heritage statement of intent

In order to fully comply with all management requirements for cultural heritage resources in the park a number of initiatives have been planned and will be implemented within the next five years. SANParks legal obligations and management principles regarding cultural heritage resources are included in the *Cultural Heritage Corporate Policy Statement* available on the SANParks website. Although a detailed archaeological survey of Karoo NP still needs to be undertaken, an inventory of most of the farmsteads, historical buildings and known gravesites in the park is available, and will form the basis of Karoo NP's cultural heritage management plan.

##### 2.1.3 Herbivory Programme (including water provision)

The purpose of the herbivory programme is to understand and manage herbivory as a modifier of biodiversity, including the effects of the major herbivore architects at different spatial and temporal scales. The herbivory programme must support the conservation of biodiversity patterns (particularly vegetation) and processes (particularly herbivory) representative of the Karoo, using adaptive management to maximise learning and ensure feedback of this information to continually refine the policy. It must also conform to the SANParks corporate herbivore management framework. The main implication of this is that management of herbivores should no longer be based on stocking rates, but rather on direct measurements of herbivore impacts on the vegetation. A second implication is that minimum interference should be practised as far as is practically possible, to allow for natural variation in the system that improves its resilience. A crucial element of this change in the decision-making environment is sufficient monitoring to determine the extent of vegetation change by herbivores, measured in a way that reflects and enhances our understanding of the system (see the lower level plan for herbivory and details of the monitoring programme).

For Karoo NP, ideally the effects of the historically vast migratory herds of large herbivores in the Karoo should be simulated as far as practically possible, by removing animals once vegetation TPCs indicate that insufficient forage would have caused the animals to move out of the area in previous times. To enable detection of trends of vegetation change, various parameters need to be monitored. This, in turn, will enhance our understanding of how change takes place in Karoo ecosystems. Monitoring of the herbaceous vegetation is therefore focused on detecting changes brought about by herbivory and/or climate change. Unacceptable vegetation change will be the most important indicator of excessive herbivory, and will be monitored using indicator species and changes in vegetation composition in the representative Karoo landscapes. The effects of patch selective grazing will be monitored in terms of changes towards unpalatable species through over utilization by herbivores. Other parameters that have a bearing on important ecological processes in the Karoo, e.g. soil erosion, will be measured through vegetation indicators such as species cover, density and frequency. While it is not practical to reproduce the historically wide variations in animal numbers that occurred in the Karoo, we can attempt to reproduce some of the variability that such a wide range in herbivore numbers would have created on the vegetation by setting very wide vegetation TPCs, and then dramatically decreasing animal numbers when the TPCs are exceeded. This has practical removal implications which will have to be examined more closely.



Inextricably linked to herbivore management is the provision of artificial water, which is one of the few options available to manipulate large herbivores in semi-arid environments. Since there is sufficient natural water for the game in Karoo NP, the minimum of artificial water should be made available, and none should be far from areas where water would have been expected to occur naturally. For those artificial waterpoints that remain, largely to enhance tourist game viewing, they should be controllable and opened and closed to encourage mini-migration of animals to avoid over utilization of certain areas due the presence of water alone. These waterpoints should be specifically monitored for vegetation and soil degradation.

#### 2.1.4 Biodiversity Survey Programme

Since biodiversity conservation is firmly entrenched in SANParks values and operating principles, it is important to evaluate the outcome of Karoo NP's various integrated management actions on its resultant biodiversity complement. It can therefore be linked to the Balanced Scorecard system currently used by SANParks to audit the success of its management. An annual biodiversity survey has been proposed that aims to detect changes in biodiversity, and that makes use at least initially of capacity provided by volunteers and academic groups. Details of the other species that make up Karoo NP's faunal biodiversity complement, and that will be monitored as part of the biodiversity survey, can be found in the lower level plan for the biodiversity survey. These include invertebrates and all other vertebrates not already covered in the herbivore management plan. As such, the issue of outbreaks of the Karoo caterpillar and brown locust will be dealt with under this plan

#### 2.1.5 Rehabilitation Programme

Rehabilitation efforts will be applied wherever land transformation has a negative consequence on ecosystem functioning. The purpose of Karoo NP's rehabilitation programme is:

- To rehabilitate, to the best of its ability, or where necessary, to simulate the natural patterns and processes of degraded landscapes and other systems to maintain the biodiversity integrity under its authority.
- To attend to rehabilitation needs of the drainage lines and eroded lands.
- To remove all alien plant species thus improving the environmental integrity of the park.
- To enhance the remoteness and sense of place in the park.

Most of the farmlands that were purchased for park expansion have been transformed in some way. Degradation through previous agricultural land use practises in Karoo NP is evidenced by minor vegetation transformation, including change of vegetation community in terms of composition, density and structure. The histori-

cal overgrazing in Karoo NP has been accompanied primarily by sheet erosion. There is also significant donga erosion mainly induced by flash floods. There are also still a fair number of unwanted structures in Karoo NP, including fences, buildings, dipping tanks and general rubble, that reduce the aesthetic value of the park and should therefore be removed (detailed methods are contained in the associated lower level plan). Around some farmsteads, and particularly along river courses, alien tree species should be removed. Large areas around farmsteads require revegetation.

#### Vegetation Rehabilitation

Physical rehabilitation activities on the ground need to be crosslinked with the herbivore management policy, to prevent overgrazing.

#### Alien monitoring and control programme

The Working for Water programme has already done a significant amount of work in eradicating alien plant species, with most remaining alien plants around farmsteads within Karoo NP. The mechanical approach is the main approach that the park has been using. There is a need for a follow-up monitoring programme in those areas that have been cleared of alien plants. Alien or extralimital animal species will be opportunistically removed. Alien invasive plants currently present in Karoo NP are:

##### Category 1:

*Argemone mexicana*  
*Arundo donax*  
*Atriplex nummularia*  
*Atriplex lindleyi*  
*Cuscuta campestris*  
*Opuntia imbricata*  
*Opuntia ficus-indica*  
*Nicotiana glauca*  
*Pennisetum setaceum*  
*Xanthium spinosum*

##### Category 2:

*Agava sisalana*  
*Prosopis glandulosa*  
*Pinus spp.*

The infestations of these species are not covering huge tracts of land and are in most cases localised with low densities. The only species present in high densities is the Spanish reed, but this occurs in very localised areas. The *Opuntia spp.* occurs over the entire area and is widely spread. This makes controlling the species very difficult. Current control efforts seem to be effective except in the case of the treatment of some *Prosopis* which coppiced again after treatment, and follow up treatment will be required. Currently the Working for Water Programme is active in Karoo NP and focuses its

attention mainly on *Atriplex spp.* and *Opuntia spp.* The species *Arundo donax* is scheduled to be controlled in the near future. All listed species are localised populations and the most spread species is the *Opuntia ficus-indica*, although in low densities. *Pinus spp.* only occurs at previous homesteads where it was used as a wind break. There is no danger of these species spreading as most trees are old and have started to die off naturally. *Agava sisalana* is also only occurring in localised areas and is easy to control. These plants do not spread easily in the arid areas, and are therefore a lower priority for control at present. *Prosopis glandulosa* was initially controlled using mechanical and chemical methods. Unfortunately the application was not successful and follow-up treatments will be necessary. *Pennisetum setaceum* occurs along drainage lines in the eastern section of the park and a research program is under way by the University of Stellenbosch to gain more insight into the distribution rate and ecology of this species in Karoo NP.

Due to the terrain and distribution of most alien plant species in the park, the total eradication of these species is impossible. The alien species will be controlled to a level where the survival rate is minimized and expansion is limited. Treatment areas are surveyed after completion of contracts by eradication teams and monitored thereafter once a year. Business plans for the control of invasive species will be submitted for funding by Working for Water on an annual basis. The extent of operations is decreasing due to the fact that most areas already received initial clearing. Henceforth mainly follow up treatments will be necessary, except in cases where new invader species are identified and seen a threat, or in cases where new land is added to the park and initial clearing of that land becomes necessary.

#### Erosion control programme

Erosion in the park is a significant problem, with both sheet and donga erosion occurring. The erosion potential is enhanced by reduced plant cover, in combination with flash floods. Erosion areas in Karoo NP require mapping. In dongas the main intervention should be construction of gabions. Rubble from old farm houses can also be used to fill dongas, covering it with topsoil and seeding it with grass seeds. Sheet erosion needs to be carefully managed and primarily involves revegetation.

One of the primary goals of research and monitoring will be to understand the structure and function of soil ecology, and to ensure that relevant interventions are implemented. Monitoring will be essential to assess the effectiveness of the interventions. Rehabilitation around the farmsteads should be applied in an experimental fashion in order to enhance learning. Karoo NP may not currently have enough capital budget to attend to all its rehabilitation requirements, and it should thus be linked with the government's social commitment of linking natural rehabilitation with poverty alleviation.



### 2.1.6 Species of Special Concern Programme

SANParks' biodiversity values stipulate that, except in crucial instances for the survival of globally critically endangered species, management for system integrity and biodiversity must take precedence over species management. However, SANParks will strive to prevent extinction, within National Parks, of species on the IUCN's global critically endangered or endangered lists, and will work with other conservation initiatives to secure and strengthen the future of such species over their historic distribution ranges. Within this context, a realistic prioritization framework has been developed to aid in decision-making regarding which species to allocate resources for sensibly. The threatened fauna of the Karoo biomes represent only a small fraction of the total diversity of vertebrate taxa. In the Nama Karoo Biome the Noorsveld, Great Karoo (represented in the Karoo NP) and Steytlerville areas have the greatest density of threatened taxa (Hilton-Taylor & Le Roux 1989). Hilton-Taylor & Le Roux (1989) indicate that a total of 95 species are threatened within the Nama Karoo with the majority of these falling into the 'rare', 'uncertain', 'indeterminate' or 'vulnerable' IUCN classes. Of these, 1 endangered, 10 vulnerable, 10 rare, 5 indeterminate and 86 endemic vertebrate species occur in Karoo NP (see lower level plan for detail)

The Karoo NP may be particularly important for the conservation of the endangered riverine rabbit *Bunolagus monticularis* as well as securing additional breeding habitat for the vulnerable Cape Vultures *Gyps coprotheres*. The Karoo NP is also currently home to the second largest population of Cape mountain zebra *Equus zebra zebra*. Animals from the quagga breeding programme were recently introduced to the park and will become the principle population of this ecotype. However, this should be maintained as a breeding group only to avoid competition with the endangered Cape mountain zebra. The redlisted vertebrate species in Karoo NP must be put through the SANParks species of special concern prioritization process, and those that come out in the top 2 categories must have TPCs and a monitoring programme. Most of the redlisted species for Karoo NP are well-known and could be effectively monitored using the cybertracker system.

Monitoring will focus on population sizes, sex and age ratios, while research will focus on improving our understanding of the interactions of these herbivores with other components of the Karoo NP ecosystem, and on modelling population viability. The possibility of bolstering the populations of SSC that approach minimum viable populations must be carefully considered against the reasons for the decline

in Karoo NP, and where a metapopulation plan exists the species' conservation will be guided by this plan.

### 2.1.7 Fire Management Programme

Fire is not an important driver of the Karoo ecosystem as the rainfall is too low to support regular fire events. There is therefore no explicit lower level plan for fire management in Karoo NP. Fire management in Karoo NP is therefore restricted to protection of human life and infrastructure. However, where lightning fires do occur, for example on the plateau, these will be allowed to burn, in recognition of the role of fire in this part of the ecosystem. Neighboring farmers should be informed, and these fires will be controlled when they begin to pose a threat to human life or infrastructure. All other fires should be stopped or controlled by management as far as possible within the regulation of the National fire act. According to changes in national fire legislation, Karoo NP is expected to be a member of the local Fire Protection Association, and needs to also assert its ecosystem fire management needs at a realistic level in this forum.

### 2.1.8 Predator Management Programme

The rationale behind the predator management programme is that reintroducing large predators will re-establish the important ecosystem process of carnivore-herbivore interactions, thereby reinstating the natural control of herbivore numbers, and decreasing the need for capturing and culling. However, the risk of not having large predators in this system may be partially overcome by the smaller predators that are present in the system already. Because of the implications of reintroducing predators for Karoo NP's neighbouring farming community, as well as potentially conflicting tourism objectives, it is imperative that this policy is guided by the SANParks corporate policy on carnivore reintroductions (see co-ordinated policy framework document).

An important implication of reintroducing larger predators into Karoo NP is that a sufficiently large area is required in order to maintain a predator-prey ratio with minimum management intervention. The minimum size that could reasonably be considered would be 50 000 ha although the aridity of the Karoo may require a substantially larger area of at least 75 000 - 100 000 ha. Hence Karoo NP currently falls within the recommended extent to sustain a large predator population. Lions were part of the system originally; the fact that the system is now enclosed in different land uses makes it difficult to manage such a large predator in an arid system with low herbivore numbers. Exceptional care will therefore be taken if lions are considered for reintroduction. Wild dog used to be part of the system (*pers comm* Gus Mills, SANParks), but generally do not do well in arid systems and should not be reintroduced without exceptional care

and consideration. If the reintroduction of cheetah is considered it should form part of a broader metapopulation plan. Any plans to reintroduce predators to control herbivore numbers should consider whether the predator will indeed control the herbivore numbers of expanding species and not decrease the population of other rarer species. In addition, all introductions should form part of a metapopulation management plan, and should be based on the number of animals that could be supported by the prey base that can be sustained over the long term in the Park. All introductions should be done as research projects and the adaptation of animals and their interaction with the system should be monitored closely.

### 2.1.9 Damage-causing Animals Programme (Contingency Plan)

These contingency plans do not have an explicit lower level plan.

#### **Contingency plan in the event of escape of a damage-causing animal**

Reports of escaped damage-causing animals will be investigated immediately and relevant role-players informed eg. Park Manager, Provincial Authority, Regional Manager. The Section Ranger will take charge of the recovery/relocation of the animal/s. The SANParks' Wildlife Veterinary Officer will be called upon to dart the animal whereafter the animal will be relocated to the temporary holding camp and kept for at least two weeks before being released back into the veldt. All darting, transporting and handling of the animal will be conducted according to the guidelines of the Animal Care Committee of SANParks. According to the Draft Norms, Standards and Regulations Relating to the Management of Permits for the capture or destruction of any large predator will only be issued after the provincial authority has been satisfied that the capture or killing of such animal is warranted. In the event that the escaped animal causes damage to livestock outside of Karoo NP, SANParks' Legal department will address all civil suits/claims lodged against Karoo NP. Similarly, SANParks' Legal department will address all civil suits/claims lodged against Karoo NP in the event that the escaped animal threatens human life. In such instances the animal in question will be destroyed.

#### **Contingency plan for disease affecting any damage-causing animal/s**

If it is suspected that the damage-causing animal from Karoo NP had contracted any disease, the SANParks' Wildlife Veterinary Officer and provincial authority (state veterinarian) will be informed as soon as possible. If the animal has sustained a life-threatening injury the Wildlife Veterinary Officer will advise on the treatment or



euthanasia of such animal. The Guidelines of the Animal care Committee will apply in case of euthanasia.

#### 2.1.10 Other programmes under Biodiversity and Heritage Conservation

Natural resource utilisation in Karoo NP enjoys corporate guidance, but at present simply entails offtakes of game for ecological purposes.

### 2.2 Sustainable Tourism

#### 2.2.1. Park zoning plan

The primary objective of a park zoning plan is to establish a coherent spatial framework in and around a park to guide and co-ordinate conservation, tourism and visitor experience initiatives. A zoning plan plays an important role in minimizing conflicts between different users of a park by separating potentially conflicting activities such as game viewing and day-visitor picnic areas whilst ensuring that activities which do not conflict with the park's values and objectives (especially the conservation of the protected area's natural systems and its biodiversity) can continue in appropriate areas. The zoning of Karoo National Park was based on an analysis and mapping of the sensitivity and value of a park's biophysical, heritage and scenic resources; an assessment of the regional context; an assessment of the park's current and planned infrastructure and tourist routes/products; all interpreted in the context of corporate level and park objectives.

#### *Overview of the use zones of Karoo National Park*

The summary of the use zoning plan for Karoo National Park is shown in Map 4. Full details of the use zones (including high resolution maps), the activities and facilities allowed in each zone, the conservation objectives of each zone, the zoning process, the Park Interface Zones (detailing park interaction with adjacent areas) and the underlying landscape analyses are included in Appendix 1: Karoo National Park Zoning Plan.

**Remote Zone:** This is an area retaining an intrinsically wild appearance and character, or capable of being restored to such and which is undeveloped and roadless. There are no permanent improvements or any form of human habitation. It provides outstanding opportunities for solitude, with awe inspiring natural characteristics with sight and sound of human habitation and activities barely discernable and at far distance. The conservation objectives for this zone require that devia-

tion from a natural/pristine state should be minimized, and existing impacts should be reduced. The aesthetic/recreational objectives for the zone specify that 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. In Karoo NP, Remote areas were designated in the plains, mid-altitude plateau and mountain areas to include most landscapes with high environmental sensitivity and value.

**Primitive Zone:** The prime characteristic of the zone is the experience of wilderness qualities with the accent on controlled access. Access is controlled in terms of numbers, frequency and size of groups. The zone shares the wilderness qualities of the Remote zone, but with limited access roads and basic small-scale self-catering accommodation facilities. Views of human activities and development outside of the park may be visible from this zone. The conservation objectives for this zone require that deviation from a natural/pristine state should be small and limited to restricted impact footprints, and that existing impacts should be reduced. The aesthetic/recreational objectives for the zone specify that 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) should be restricted and impacts limited to the site of the facility. Ideally visitors should only be aware of the facility or infrastructure that they are using, and this infrastructure/facility should be designed to fit in with the environment within which it is located in order to avoid aesthetic impacts. In Karoo NP, Primitive areas were designated to buffer remote areas and to protect most of the remaining sensitive areas from high levels of tourist activity. Primitive areas were also designated in low sensitivity valleys to allow access to remote areas.

**Quiet Zone:** This zone is characterized by unaccompanied non-motorized access. Visitors are allowed unaccompanied (or accompanied) access, mainly on foot, for a wide range of experiences. Larger numbers of visitors are allowed than in the primitive zone and contact between visitors is frequent. The conservation objectives for this zone specify some deviation from a natural/pristine state is allowed, but care should be taken to restrict the development footprint. The aesthetic/recreational objectives for the zone specify that activities which impact on the relatively natural appearance and character of the area should be restricted, though the presence of larger numbers of visitors and the facilities they require, may impact on the feeling of "wildness" found in this zone. In Karoo NP, Quiet areas were designated immediately adjacent to the main rest camp to allow visitors access on foot.

**Low Intensity Leisure Zone:** The underlying characteristic of this zone is motorized self-drive access with self-catering accommodation units in small basic camps without facilities such as shops and restaurants. Facilities along roads are limited to basic self catering picnic sites with toilet facilities. The conservation objectives for this zone specify that although deviation from a natural/pristine state should be minimized and limited to restricted impact footprints as far as possible, it is accepted that some damage to the biophysical environment associated with tourist activities and facilities will be inevitable. 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. In Karoo NP, Low intensity leisure areas were designated in the current game viewing areas, along planned access routes through to the recently acquired western expansion areas, and around the current environmental education facilities in the high altitude plateau, where these areas did not conflict with the underlying landscape sensitivity and value analysis.

**High Intensity Leisure Zone:** The main characteristic is that of a high density tourist development node with amenities such as shops, restaurants and interpretive centres. This is the zone where more concentrated human activities are allowed, and is accessible by motorized transport on high volume transport routes. The conservation objectives for this zone specify that the greatest level of deviation from 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, care must be taken to ensure that the zone still retains a level of ecological integrity consistent with a protected area. 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. In Karoo NP, High intensity leisure areas were restricted to the current rest camp, interpretive centre and management areas.

#### *Overview of the Special Management Overlays of Karoo National Park*

Special management overlays which designate specific areas of the park that require special management interventions have not yet been identified in Karoo National Park.



### **Overview of the Park Interface Zone of Karoo National Park**

The Park Interface Zones show the areas within which land use changes could affect a national Park. The zones, in combination with guidelines, serve as a basis for identifying the focus areas in which park management and scientists should respond to EIAs; helping to identify the sort of impacts that would be important at a particular site, and most importantly; serving as the basis for integrating long term protection of a national park into the spatial development plans of municipalities (SDF/IDP) and other local authorities. In terms of EIA response, the zones serve largely to raise red-flags and do not remove the need for carefully considering the exact impact of a proposed development. In particular, they do not address activities with broad regional aesthetic or biodiversity impacts.

Karoo National Park has three Park Interface Zone categories. The first two are mutually exclusive, but the final visual/aesthetic category can overlay the others (Map 6).

**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 park. The zone also includes areas identified for future park 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.

**Catchment Protection Areas:** These are areas important for maintaining key hydrological processes within the park. Inappropriate development (dam construction, loss of riparian vegetation etc.) should be opposed. Control of alien vegetation & soil erosion as well as appropriate land care should be promoted.

**Viewshed Protection Areas:** These are areas where development is likely to impact on the aesthetic quality of the visitor's experience in a park. Within these areas any development proposals should be carefully screened to ensure that they do not impact excessively on the aesthetics of the park. The areas identified are only broadly indicative of sensitive areas, as at a fine scale many areas within this zone would be perfectly suited for development. In addition, major projects with large scale regional impacts may have to be considered even if they are outside the Viewshed Protection Zone.

#### **Current status and future improvements**

The current park use zonation is based on the same biodiversity and landscape analyses undertaken for a Conservation Development Framework (CDF); however

certain elements underlying the CDF such as a tourism market analysis are not be fully incorporated into the park use zonation. A full CDF will be developed for Karoo National Park within the current update cycle. Remote areas will be investigated for possible formal declaration designated as Wilderness Area in terms of section 22 of the PAA. Special management overlays which designate specific areas of a park that require special management interventions (e.g. areas requiring rehabilitation) will also be identified.

#### **2.2.2 Tourism Programme**

Although the park was proclaimed in 1979 it was only ten years later that tourism infrastructure was developed in the park. This included a restcamp, campsite, 20km tar and 6km gravel roads. The main restcamp and administrative infrastructure is located in the Stolzhoeck area of Karoo NP, some 6km from the N1 and the main entrance gate. Park tourism facilities at Stolzhoeck include a reception area and offices, serviced six-bed family cottages and three-bed chalets, self-catering cottages, camping and caravan sites, washing facilities, a swimming pool, restaurant, shop, interpretive centre and a day visitor's facility with braai areas, a swimming pool and cloakrooms. A small rustic camp with basic amenities is situated in the Mountain View area and is mainly utilised for environmental education for youth groups. The 4x4 route accommodation consists of a farmhouse (Doornhoek) and a rustic shepherd's cottage (Afsaal). Park tourism and recreation services include a conference facility, scenic game viewing drives, night drives, nature trails (Bossie- and Pointer trails and upgraded fossil trail) and a bird hide.

The new Interpretive Centre adds to the experience of the guests as it provides them with an overview of the ecological and cultural history of the Great Karoo dating back millions of years. Due to the lack of road infrastructure, only about 5% of the park (Stolzhoeck, Lammertjiesleegte and Klipspringer Pass) is accessible to the regular visitor by car. The construction of a 40-50 km road network to access the Doornhoek area with normal vehicles commenced later in 2006. A picnic site will also be erected on this road network. A 10-bed Wilderness Camp is planned for the western section of the park to attract a different sector of the ecotourism market. Unit occupancies are generally very high (64-70%) whilst bed occupancies are generally in the range of 50-60%.

Development of the existing tourism plan will also focus on increasing day visitor numbers. Currently an estimated 27 000 visitors a year visit Karoo NP, of which only a small percentage is from the local community. The tourism plan must be integrated with all other components of the park management plan, to ensure that there are no conflicts of interest with biophysical objec-

tives, which according to SANParks values must always take precedence. The current tourism plan focuses on ways to attract increased numbers of visitors, and to increase their length of stay. Product development and diversification, as well as the development of a marketing plan and budget is high on the Karoo NP tourism agenda. The Park will focus on new activities such as mountain bike trails, donkey cart trips, kiosk, new 4x4 trails and overnight hiking trails. The ultimate aim is to change the profile of the Park from an overnight stopover to a holiday destination where visitors want to stay more nights and experience the hospitality and activities on offer in the Karoo NP.

#### **2.2.3 Marketing Programme**

Close to 70% of the current visitors use the park as a stopover en route to another destination. The challenge for Karoo NP is to change this visitation pattern by means of the Marketing Programme, which has the following objectives:

- To consolidate marketing, advertising & communications into one integrated plan.
- To increase occupancies during the low season through effective marketing of the park's conference facility and seasonal discounts. A special emphasis will be placed on the growth of the domestic 'PDI' market share.
- To introduce a Community Wild Card for locals from the Beaufort West community, to increase visitation and sense of ownership from the local community.
- To redesign all marketing and advertising collateral, according to international standards in order to reposition the park, and its current product offerings, as a destination of choice.
- To evaluate, plan and implement a new range of global tourism growth needs products and services within the Park, which is not in conflict with SANParks environmental and socio economic guidelines.
- To implement a CRM (Customer Relationship Marketing) retention strategy and co-operative marketing campaigns, to be market driven and create happy, loyal customers and stakeholders who become ambassadors and marketers for the Park.
- To ensure that marketing efforts such as effective utilization of the media, distribution of brochures, promotions and exhibition contribute to the annual increase in tourism revenue generation.
- To increase and maintain high quality customer service and service delivery.
- To establish partnerships with local and regional Tourism structures in order to promote Karoo NP.



#### 2.2.4 Commercial Development Programme

There is currently only one commercial operation associated with the Karoo NP, and as such there is no explicit lower level plan for this programme. The restaurant and shop are managed by Jobojali trading as Salt and Pepper on a 7-year contract (expiring 2011). The concessionaire pays a fixed monthly rental which escalates annually according to CPI. Regular meetings are held with the concessionaire and the Business Development Unit visits the site annually to assess the performance of the concessionaire. Commercial concessions and operators potentially offer an important source of income for the Karoo NP, but their operations can have negative environmental impacts and therefore require careful monitoring and evaluation. Opportunities for public-private partnerships for any commercial operations in the park will continue to be explored, including opportunities for the involvement of small, medium and micro-enterprises, as well as disadvantaged communities. Specialised services and activities for which the Park lack the skills and expertise such as Donkey cart trips, abseiling etc. are possibilities for outsourcing. Karoo NP will continue to identify and implement opportunities for concessioning and outsourcing of visitor services to provide a more cost-effective and efficient delivery of goods and services.

### 2.3 Building co-operation

This component of the management plan is essential for the high level objective of ensuring the upliftment of the surrounding community, and fostering good relationships between the community and Karoo NP.

#### 2.3.1 Stakeholder Relationship Management Programme

The purpose of the stakeholder relationship management programme is to establish and maintain meaningful and beneficial relationships with all stakeholders of Karoo NP. This is in accordance with national co-operative governance legislation, as well as SANParks corporate values. Karoo NP stakeholder groups have been identified and details can be found in the associated lower level plan. The Karoo Park Forum is a means of providing a legitimate platform to communicate park / SANParks issues and to ensure participation of all stakeholders on matters of mutual relevance. The Park Forum is represented by government departments, non-governmental organisations and community-based organisations including the municipalities, Youth Forum, Minister's Fraternal, VGK B/W East, Central Karoo District Municipality, Southern Land Committee, Tourism Bureau, NGK B/W, Karoo Gender Education Programme, Beaufort West Municipality, Central Karoo Gender Forum, Vereniging vir persone met gestremdhede (Disabled), Koup 4 Landbou vereniging and Nuweveld Farmers Association. Park Forum meetings are held

quarterly and are presently chaired by a member of the stakeholder community.

Future plans to improve the functioning of the Park Forum include involving the Ward Committees, Ward Councillors and Community Development workers, as the forum is currently very weak. At present there is a good working relationship with the Local and District Municipalities, both of which are represented on the Park Forum. Karoo NP is represented on several local forums, and liaises with various conservation entities to ensure that it keeps up to date with global and national trends. Karoo NP fosters good media relations, not only to market its tourism products, but also as a key communication tool to keep stakeholders informed. Karoo NP will identify and implement the delivery of benefits to adjacent and broader communities. Such benefits would include community access to employment opportunities, provision of educational programs (ecological and cultural), access for recreational use, access to natural resource use, access to economic opportunities and access to cultural heritage sites (graves). Delivery of benefits will focus on previously disadvantaged communities and local SMME's through the prioritised contractual use of local service providers.

#### 2.3.2 Environmental Interpretation and Education Programme

The purpose of the environmental education and interpretation programme is to build constituencies amongst people in support of SANParks' conservation endeavours by playing a significant and effective role in promoting a variety of educational opportunities and initiatives. The People and Conservation Division will continue to focus attention on environmental education and youth outreach in order to build a conservation constituency for the future, by promoting a conservation ethic and developing park-community relations. The park's service area can roughly be estimated at 35 000 people and a total of 19 schools (primary as well as secondary). The areas of learning concentrate on the protection and management of natural, social, cultural, socio-economic environment.

The number of learners visiting the park has increased tremendously since the establishment of a partnership with the SAPS who have been transporting all learners to the park for the past three years. The Karoo NP also provides an educational and information outreach service eg. Learning Cape Central Karoo Festival, presentation of awareness programmes eg. National Health events (AIDS Day or Human Rights Day). Karoo NP supports the Decade for Education for Sustainable Development, which commenced in 2005, and uses environmental education as a tool for achieving effective resource management and sustainable development. Eco-Schools is a program which encourages learners to run schools for the benefit of the environment, and aims

at achieving sustainable environmental management at local levels.

To complement and support these education and awareness programs, Karoo NP develops and maintains resource materials, tools and kits; supports teacher programs; develops information resources such as booklets, books, videos, maps and pamphlets and develops and maintains interpretive displays and signage. An interpretive centre was established to offer visitors/learners an insight into the ecological and cultural history of the area.

#### 2.3.3 Local Socio-economic Development Programme

The purpose of the local socio-economic development programme is to play a significant, targeted and effective role in contributing to local economic development, economic empowerment and social development in communities and neighbouring areas adjacent to Karoo NP. To do so, Karoo NP partners with Local Government to form part of the Integrated Development Plans (IDP's), participating in Government Programmes (WfW and EPWP) to contribute to local skills development by supporting learnership programmes, implementing needs related training programmes and by creating business opportunities.

Karoo NP aims to identify and facilitate the delivery of direct and indirect benefits to adjacent and broader communities. Such benefits would include community access to employment opportunities, provision of educational programs, access for recreational use, access to economic entrepreneurial opportunities and the provision of cultural interpretation. Delivery of direct benefits will focus on disadvantaged communities and local SMME's through the prioritised contractual use of local service providers.

The Expanded Public Works Programme (EPWP) will remain a significant focus area of the organisation to effectively contribute to the creation of temporary jobs in the short term. Poverty relief projects that are currently being implemented in the park include the 177 km fencing project and the 40km tourist road. These projects will benefit a total of 180 families from the Beaufort West municipal area. The projects will end in March 2007. Karoo NP procures contracted services ranging from maintenance, security, tourism and other conservation related services.

Where possible, local SMME's (especially PDI's) are favoured when sourcing contractors, provided that all procurement conditions as stated in SANParks Procurement Policy are adhered to. Employment opportunities are concentrated on the Beaufort West, Nelspoort and Merweville communities, using SMME's for maintaining park infrastructure. When awarding business contracts, preference is given to historically disadvantaged individuals (PDI's) and upcoming contractors.



Karoo NP maintains a database of successfully executed EPWP projects, for future services required. Collaboration with local government currently focuses on the integration of park plans into Integrated Development Plans (including Local Economic Development plans and Spatial Development Frameworks.) Skills development programmes offered will focus on training related to Tourism and Conservation.

## 2.4 Effective Park Management

### 2.4.1 Environmental Management Programme

Although basic information already exists for Karoo NP, no explicit lower level plan is currently available for the Environmental Management Programme, which enjoys corporate guidance. Additional key information is needed against which to assess the outcome of various park management strategies, as well as the internal and external impacts of developments in Karoo NP. This information requires appropriate maintenance and storage, so as to be readily accessible to park management. The impacts that the park can mitigate need to be identified and procedures developed and implemented to reduce those environmental impacts. Development of the existing EMS for the park is a priority. An EMS exists with procedures for the Park as set out in the Green Standard. Environmental aspects and impacts of management actions have been identified and scored in terms of the EMS scoring system. Some objectives and targets have been set to mitigate the impacts of waste management, electricity use and water extraction. Emergency plans have been drafted and training needs identified but these need to be incorporated into the EMS. A number of standard operating procedures have been developed although more should be developed as the EMS is a dynamic system which requires regular review and management of decisions, actions and record keeping. The EMS can be accessed at the Park filing office and still requires implementation of certain components.

### 2.4.2 Infrastructure Development Programme

The distribution of the park's infrastructure is illustrated in Appendix 2: Map 7. Current tourism infrastructure consists of the restcamp at Stolshoek, with 38 plastered brick and thatch units (138 beds): **Family cottages:** 8 units x 6 beds each (48 single beds), **Chalets:** 20 units x 2 single beds and 1 sleeper couch in each (60 beds all), **Cottages:** 10 units x 1 three-quarter bed and 1 sleeper couch in each (20 beds in all). The tourist camp also has a conference room seating a maximum of 60 people. The shop and licensed restaurant are run by a concessionaire and have cold storage, a storeroom, office and kitchen. Karoo NP's camping area has 24 campsites (maximum of 6 people each), an ablution block, laundry and kitchen, a swimming pool and generator room. The day visitor's facility at Bulkraal has 20 pic-

nic sites (maximum of 6 people per site) and a swimming pool with ablutions. The main tourist camp also has an ablution facility. Tourist roads are limited, but are mostly tarred (26 km), apart from the 60-km of 4x4 routes. Dirt/gravel tourist roads are 40-km in extent. Management and support infrastructure comprises park administration offices (5 offices in the main tourist camp and 3 elsewhere) and boardroom, staff accommodation (26 houses), an interpretive centre, public toilets, the Mountain View complex (whose future is currently uncertain), technical stores, vehicle sheds, workshop and bulk feed stores. There is also a slaughter room and student flat. Eight old farmsteads with sheds still exist in Karoo NP. Management roads and tracks are 200 km in extent, while fences are 177 km in extent. Details of these structures can be found in the associated lower level plan. Several old, unused farmsteads also occur in Karoo NP. There is on helipad near the main tourist camp. One security gate is present at the entrance to the park. Power is supplied by Eskom electricity, and water reticulation, telephone and radio infrastructure is present in the park. There is one sewage treatment works within Karoo NP.

In terms of Conservation infrastructure, there is a hiking trail of approximately 50 km. There is also a weather station, one rhino boma, 10 operational boreholes, 6 reservoirs, 6 borrow pits and 2 horses' stables. Infrastructure falling under the People and Conservation department includes the Mountain View building (10 rondavels, a kitchen, bathroom and 2 ablution blocks for the rondavels), the 100-m fossil trail, and the 800-m Bossie trail (with floral guide).

The current status of Karoo NP's infrastructure is variable. Stolshoek restcamp, built 16 years ago, is currently in good condition and well maintained. Recent upgrading of furnishings was done in the 6-bed units, and retiling of floors as well as repainting of interiors in the older units. Units 29 – 38 were constructed fairly recently (2003) and are in good condition. The Ou Skuur interpretive centre and associated buildings/offices, including an access boardwalk, are in good condition, having been renovated in 2004. Similarly, the fossil trail underwent a facelift during 2005. Although tourist roads are in a fair condition, they require some maintenance. A new gravel tourist road of 40km will be constructed during late 2006. While staff houses are in a reasonable condition, technical buildings are in poor condition and require fairly extensive upgrading in order to comply with the OHS Act. The feed store is fair but needs some repair work. The electrical reticulation network caused some problems and required extensive repairs during 2004, but has not failed since. General maintenance of the high-tension network and installations are required as preventative maintenance. The water supply system is functioning correctly, although the level of water extraction from boreholes requires close scrutiny. The waste water system (evaporation dams) is fully functional although the

third of the four dams are now nearly full. The situation is being monitored to determine whether the system is large enough for the current amount of waste water flowing into it. Management roads are generally in a poor condition requiring the use of 4x4 vehicles. A new 2.4m electrified predator boundary of 177km is under construction and due for completion at the end of March 2007. Old farmsteads are generally in a very poor condition. The Conservation Development Framework will inform future decisions regarding the future and potential use of some of the old buildings. Renovation action appropriate to the function of such buildings will then be undertaken. Please refer to the lower level plan for a detailed maintenance, development and budget plan for the next 5 years.

Karoo NP has 39 permanent staff members, with approval for establishing a further 6 posts. There are 6 temporary staff members, and 12 learnerships (7 new and 5 permanent). The park has 2 conservation students and a tourism student. According to the current size of the park, Karoo NP requires an increase from 13 to 20 conservation staff in order to achieve effective park management. In addition, relevant technical lower level plans are being developed by specialists and these may require additional staff once completed. Karoo NP's cultural heritage programme is being developed and will focus on the old farmsteads found in the park. Programmes still under development may require additional staff at a later stage once the planning has been completed.

### 2.4.3 Safety and Security Programme

Karoo NP is situated centrally on the N1 road just outside the town of Beaufort West. Virtually all road traffic between Cape Town and the north of the country therefore passes through the town and past the entrance gate to the Park. An estimated 5000 vehicles, of which 2000 are trucks, pass the park each day. Due to its convenient location, Karoo NP is a popular overnight stop for people *en route* through the Karoo. The proximity of the park's rest camp to the National road and the town of Beaufort West, and the fact that the entrance gate is open for 16 hours a day, makes it vulnerable to criminal intent aimed at the park, its staff members and also at tourists.

The strategic intent of this safety and security plan is to:

- ensure that effective visitor safety measures are in place
- ensure the safety and security of SANParks employees and concessionaires
- ensure that tourist perceptions are managed in order to protect the brand and reputation of SANParks and SA Tourism Industry at large

Access to Karoo NP rest camp is controlled by a single access gate on the N1 just outside the town of Beaufort West. The gate is manned 24 hours per day although gate access for visitors is restricted to the hours between 5h00 and 22h00. The Mountain View recreational area



can be accessed by visitors but only by prior arrangement. This gate is situated on the Loxton road on the northern boundary of the park. Other entrance gates along the boundaries are only for use by staff for operational purposes. These gates are unmanned but locked on a permanent basis. Only conservation staff have access to these gates. The highest point in Karoo NP is situated on the farm Puttersvlei and is 1908.8m above sea level. No airfields for light aircraft are situated within the park. A helicopter landing area (helipad) is situated in the Stolshoek area and only used for official purposes and emergencies. Any requests for aircraft to fly within the controlled airspace of the park should be directed to the Park Manager or Section Ranger.

The lower level plan on Safety and Security comprehensively addresses both the strategic and operational aspects of Visitor Safety and Security within the framework set out by the SANParks Security Plan. Safety in the context of this Safety and Security plan must be seen as personal safety and does not address all aspects of the Occupational Health and Safety requirements. The Plan is informed by analysis of high risk/use areas, associated crime statistics for each identified area, and the associated risks and criminal behaviour for each area. The above information coupled with the combined operational experience of the parties involved enabled Karoo NP to detail the needs for each area including infrastructure, Operational Expenditure (OPEX), Capital Expenditure (CAPEX) and Human Resources (HR) requirements.

#### 2.4.4 Staff Capacity Building Programme

An essential complementary function of park effectiveness is maintaining adequate human resources, staff development and training, and developing a learning organisation. This requires the organisation to recruit and retain staff with the appropriate competencies and to create an appealing work environment built upon best practices. Currently Karoo NP has a budget explicitly set aside for training, although no explicit lower level plan is yet in existence for this programme. In addition, each staff member has an Individual Development Plan, with career goals reflected in the Key Performance Areas for each department head. Individual Development Plans are the mechanism used by SANParks to ensure a development-oriented organization. Four members of staff are currently involved in personal development training, funded by the park's budget.

#### 2.4.5 Financial Sustainability Programme

Table 1 provides summary of the costs involved in striving towards the desired state for Karoo NP over the next 5-year period through all of the objectives and associated programmes detailed in this management plan. It is significant to note that there is shortfall of between R8 – 21.5 million between 2008 – 2010, due to funding required for planned park expansion and infrastructure development.

Allocated funds are from poverty relief projects and park development funds. An important omission from the current costing for Karoo NP that requires urgent attention is an estimated costing for liability and risk. Corporate support (i.e. not included in Karoo NP's budget) will be required in the form of a technician and operating budget to undertake the monitoring necessary to evaluate TPCs and feedback as part of the adaptive management process. No cost estimates have yet been included for the adaptive management components of non-biophysical aspects of the plan. A detailed breakdown of these figures can be found in the associated lower level plan.

## 2.5 Corporate Support

### 2.5.1 Research Support Programme

A crucial element of the adaptive management of Karoo NP is the requirement for research and monitoring, particularly of the biophysical component. Research is directed primarily at improving our knowledge of the system in order to fine-tune the TPCs that inform management decision-making for biodiversity conservation. Monitoring is essential to assess where along a trajectory of change the system is from the desired state, and hence requires management action. Without research and monitoring, it would not be possible to complete the adaptive management cycle. Corporate support is therefore required either in the form of additional scientific or technical capacity to carry out the research and monitoring, or in the form of funds to outsource these activities

### 2.5.2 HIV/AIDS Programme

The purpose of the HIV & AIDS program is to enable SANParks maintain a healthy and productive workforce within a viable and sustainable organization. The SANParks HIV/AIDS Programme is available in the corporate policy framework. Karoo NP currently has an AIDS Action Group, with staff from different departments volunteering to offer programmes on AIDS education and awareness. Various staff members have attended courses and information sessions held by the Health Department, and transferred the knowledge thus acquired to the rest of the staff. Karoo NP's AIDS Action Group is responsible for the distribution of information pamphlets, condoms, etc. within the staff component, and also coordinate's education programmes on AIDS Day every year, in collaboration with the Dept of Health, Khomanani and the Beaufort West AIDS Action Group. An unemployed community member was provided with employment as a community-based worker for Khomanani during 2005.

### 2.5.3 Other programmes under Corporate Support

Karoo NP enjoys corporate guidance (see SANParks website for co-ordinated policy framework) for several other programmes that will develop park-specific initiatives within the next 5 year management cycle. These programmes include Risk Management and Communications.

Table 1 – Estimated costs (in Rands) of reaching the desired state for Karoo NP

Costs	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011
To acquire Phase 1(ha)	R 0.00	R 3 069 240.00	R 3 069 240.00	R 5 115 400.00	R 204 160.00
Total Development costs	R 769 250.00	R 25 499 010.00	R 18 580 250.00	R 2 961 850.00	R 284 250.00
Annual operational costs	R 6 085 588.00	R 6 438 913.00	R 6 641 339.00	R 6 947 787.00	R 7 407 333.00
<b>Total costs</b>	<b>R 6 854 838.00</b>	<b>R 35 007 163.00</b>	<b>R 28 290 829.00</b>	<b>R 15 025 037.00</b>	<b>R 7 895 743.00</b>
Allocated funds	R 5 835 588.00	R 17 423 913.00	R 6 641 339.00	R 6 947 787.00	R 7 407 333.00
Shortfall	R 1 019 250.00	R 17 583 250.00	R 21 649 490.00	R 8 077 250.00	R 488 410.00



## ADAPTIVE AND INTEGRATIVE STRATEGIES TO SUSTAIN THE DESIRED STATE

### 3. ADAPTIVE AND INTEGRATIVE STRATEGIES TO SUSTAIN THE DESIRED STATE

Section 1 has dealt with the desired state for Karoo NP, and Section 2 with all the specific programmes which are believed necessary to achieve that state. However, the desired state cannot be effectively maintained without explicit attention being given to prioritization, integration, operationalisation, and above all, reflection and adaptation according to the principles in the biodiversity custodianship framework.

#### 3.1 Key prioritization, integration and sequencing issues

High level objectives needed to achieve Karoo NP's jointly agreed upon Mission have been identified and are priorities for the next 5-year management cycle. By means of an objectives hierarchy, these high level objectives have been broken down into finer level objectives and, finally, operational initiatives to attain these objectives. In this way decision-making even at the operational level can be traced all the way back to the core values of stakeholders, upon which they have been based.

The relatively recent substantial expansion of Karoo NP, effectively leaving 10% of the park developed, and the remaining 90% in various stages of rehabilitation, has implications for prioritization and sequencing of the high level objectives - while certain initiatives towards achieving Karoo NP's objectives are already well under way in the more developed sector of the park, others have yet to be initiated in the recently acquired sectors of the park.

A key priority for Karoo NP, cross-cutting several of the high level objectives, is the final land acquisition that will consolodate the park into a more contiguous ecological unit, thereby enabling key ecological patterns and processes to play themselves out over the landscape at various scales. This consolodation will have to be achieved before certain mammal reintroductions can be made, particularly those requiring large home ranges. Because of the predominantly agricultural land use of surrounding properties, it is also crucial for both the maintenance of ecological integrity within Karoo NP, as well as for minimising conflict with neighbours, to complete the predator-proof fencing around the entire perimeter of the park. This will become increasingly important as Karoo NP moves towards achieving its objective of re-establishing ecological processes by reintroducing large carnivores, in particular. Moreover, fencing within Karoo NP may become a significant means of reconciling the reintroduction of large herbivores such as rhino, with other important tourism products such as hiking. In contrast, removal of existing fences in newly acquired properties should be completed as soon as possible to allow for

movement of game. A critical issue that requires urgent resolution is the organisation's stance concerning outbreaks of the brown locust, and the legislative conflict around this issue.

The large amount of recent land acquisition, mainly in the form of farmlands, requires extensive rehabilitation to achieve the objective of retaining the spiritual and experiential qualities that provide the Karoo NP's sense of place. Such rehabilitation is therefore a high priority in Karoo NP within the next 5 year management cycle. Crosslinked to the tourism objective, there is an urgent need for an explicit water provision policy to ensure patchiness of herbivore impacts, as well as to simulate natural migration patterns, albeit on a smaller scale. Moreover, the recognition that Karoo NP is an arid ecosystem whose vegetation can be irreversibly damaged, places monitoring of vegetation impacts and the setting of TPCs for vegetation change as a high priority.

Recognition of the significance of the cultural history in Karoo NP demands that attention be paid to developing the lower level plan to make use of its rich cultural resources. A high level tourism objective is to transform the current guest profile, both by increasing the length of stay of visitors, and by correcting the social bias in the visitor profile. Karoo NP has suitable habitat to make a significant contribution to the conservation of black rhino in South Africa. If other objectives, such as tourism hiking, can be reconciled, Karoo NP would require the addition of rhino cows to form a breeding population.

The shift to an adaptive management approach requires a dedicated monitoring programme and staff to undertake the monitoring. Developing the monitoring programme and appointing dedicated staff is therefore a top priority for Karoo NP's biodiversity objective.

#### 3.2 Steps to Operationalisation

The formulation an objectives hierarchy for Karoo NP assisted in prioritising management actions and goals for the park. The next step is for park management to use this guidance to draw up a detailed plan of action down to annual operational level, and wherever necessary, down to the level of tasks and duties of individual staff members. The park manager must be satisfied that the desired state for Karoo NP is adequately and appropriately served by all of this. A further cross-check is contained in the Balanced Scorecard system used by SANParks to measure its performance. Karoo NP's own Balanced Scorecard, as well as those of individual staff members, is in alignment with SANParks corporate-level Balanced Scorecard objectives, thereby supporting effective implementation of objectives across all levels of the organisation.

In addition, Karoo NP's broad costing for the next 5-year cycle outlines existing, as well as projected budgets and

costs to achieve the desired state. It is important not to underestimate the required costs of implementing this management plan because of historical financial limitations, but to be realistic about the funds required to carry out the operations necessary to achieve the jointly agreed upon desired state under new paradigms, and using adaptive management that requires feedbacks not previously budgeted for. The fact that this plan's budget is higher than in previous years is a direct consequence of this planning exercise having made explicit the objectives, and associated operations, necessary to achieve this jointly agreed upon desired state.

#### 3.3 Key ongoing adaptive management and evaluation interventions

- **Feedback that the management action as decided upon and specified, is carried out as such:-** This responsibility lies with line-function management, and will be reported on via SANParks regional reporting structures to the Executive Director: Parks. Park-specific and individual Balanced Scorecards provide an explicit mechanism to ensure that this feedback takes place.
- **Feedback whenever a TPC specifying the end-points of any of our biodiversity objectives is violated, or is credibly predicted to be violated in the future:-** This requires that a disciplined monitoring programme be in place, that the custodian of the particular programme (post/person specified in low-level TPC plans for each theme in Karoo NP) duly report the exceedance to a competent (preferably formally constituted) joint science-management forum, which includes the Park Manager or his duly appointed delegate. This must lead to a management response.

There is currently no such science-management forum in Karoo NP, and establishing one is therefore a crucial step in the park's adaptive management cycle over the next 5 years. Moreover, the suite of biophysical TPCs suggested for Karoo NP require explicit formulation and quantification. Wide experience shows it is far better to have roughly defined preliminary TPCs for these themes (and improve these later, something which then tends to happen automatically) than wait years for perfect ones to be developed.

- **Feedback that the predicted outcome (of management resulting from the above exceedance) of an intervention is achieved, or what materialized instead in its place:-** This is usually directly measurable by checking whether the same TPC returned to within its acceptable limits after management action was taken. In Karoo NP this should be done by at least quarterly meetings of the science-management forum to be formed. The best possible adaptive



decision must then be taken in light of this evaluation. Examples of outcomes that are likely to be of particular learning value in Karoo NP are different rehabilitation strategies on newly acquired farmsteads, herbivore movement patterns when fences are dropped within the park, and changes in the distribution of herbivore impacts in relation to the newly formulated water provision policy. Additional feedbacks that are required, but for which no formal TPCs exist, relate to the outcome of Karoo's stakeholder relationship programme. Management should prioritise the formulation of quantifiable feedbacks for this important social upliftment objective, or it runs the risk of perhaps continuing with inappropriate or less successful initiatives in this regard.

- **Feedback to SANParks Head Office of the overall performance of Karoo NP relative to its stated objectives:-** This will be done via an annual State of Biodiversity report and other incidental reporting for Karoo NP. It is likely that Karoo NP may, for several key themes, take many years to progress towards the desired state (e.g. social upliftment, rehabilitation), and that several issues may remain outside thresholds for many years, or may even require fine-tuning as our knowledge of the system increases or societal values change. It is important in these cases to track progress by achievement of intermediate steps towards the desired state, or to document the reasons for any changes in the mechanisms of achieving the desired state.
- **Feedback as to whether organizational or societal acceptance of the consequence of an intervention is still, as agreed on previously, acceptable:-** This is a longer-term adaptive evaluation, and if expectations are roughly met, can be dealt with at the time of the 5-yearly public meeting held to review the management plan. If, however, significant unintended consequences materialized that have shorter-term impacts, it will be the responsibility of the science-management forum above, to sense this, reflect on it, and make an appropriate recommendation to the Park Manager. The areas in which this is likely to occur are the introduction of large predators conflicting with the ability to hike in Karoo NP, animals from (or perceived to be from) Karoo NP causing damage to stock or threatening human lives on neighbouring properties, and tourism development that conflicts with other (particularly biophysical or sense of place) objectives.
- **Feedback as to whether the monitoring programme and list of TPCs is manageable/achievable and effective:-** This is the responsibility of the scientific custodians involved, but overall (the programme taken as a whole) the responsibility of the science-management forum above. It is broadly challenged each 5 yearly cycle. The explicit use of adaptive management, using TPCs to make

management decisions, and evaluating the state of Karoo NP along a trajectory of change away from its desired state by means of a monitoring programme, will be a new endeavour for Karoo NP. There may thus initially be feelings that the task is overwhelming, and these should be countered by referring to the objectives hierarchy for prioritisation of the various initiatives and strategies required. Manageable, achievable and effective monitoring and feedback will require complete buy-in and co-operation of the joint science-management forum, and careful consideration of the choice of a small and realistic list of TPCS that indicate the condition of essential ecosystem processes as far as possible.

- **Feedback as to whether objectives need adjustment in the longer-term:-** This is dealt with effectively at the 5-yearly review step. However, in the case of perceived "emergencies" the Park Manager is constrained within the limits of agreement. In Karoo NP, the most likely issue that may stir debate over the longer term is the tourism objective, since different sectors of the community have potentially conflicting values regarding what constitutes "appropriate" tourism development in the park. However, these issues should make use of the

objectives hierarchy, which flows directly from the jointly agreed upon Vision and Mission for Karoo NP, as guidance during conflict resolution.

- **Feedback as to, or at least latent preparation for, surprises:-** By definition these cannot be predicted. It will however, be an explicit obligation of the Park Manager to take responsibility to stimulate contingency and risk management assessments. From an ecosystem perspective, such surprises are best dealt with by generating scenarios. Karoo's joint science-management should aim to conduct at least one structured scenario planning session per 5-year cycle. In Karoo NP, an appropriate scenario is likely to be significant and drastic changes to herbivore numbers that will be left to cycle naturally with rainfall, which is potentially conflicts with the tourism objective, and has major practical implications at organisational levels outside of Karoo NP for capture of excess stock.



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## APPENDIX 1

### KAROO NATIONAL PARK ZONING PLAN

#### 1. INTRODUCTION

The primary objective of a park zoning plan is to establish a coherent spatial framework in and around a park to guide and co-ordinate conservation, tourism and visitor experience initiatives. A zoning plan plays an important role in minimizing conflicts between different users of a park by separating potentially conflicting activities such as game viewing and day-visitor picnic areas whilst ensuring that activities which do not conflict with the park's values and objectives (especially the conservation of the protected area's natural systems and its biodiversity) can continue in appropriate areas. A zoning plan is also a legislated requirement of the Protected Areas Act, which stipulates that the management plan, which is to be approved by the Minister, must contain "a zoning of the area indicating what activities may take place in different sections of the area and the conservation objectives of those sections".

The zoning of Karoo National Park was based on an analysis and mapping of the sensitivity and value of a park's biophysical, heritage and scenic resources; an assessment of the regional context; and an assessment of the park's current and planned infrastructure and tourist routes/products; all interpreted in the context of park objectives. This was undertaken in an iterative and consultative process. This document sets out the rationale for use zones, describes the zones, and provides management guidelines for each of the zones.

#### 2. RATIONALE FOR USE ZONES

The prime function of a protected area is to conserve biodiversity. Other functions such as the need to ensure that visitors have access to the park, and that adjoining communities and local economies derive benefits from the area, potentially conflict with and compromise this primary function. Use zoning is the primary tool to ensure that visitors can have a wide range of quality experiences without comprising the integrity of the environment.

Further, people visit a park with differing expectations and recreational objectives. Some people are visiting a park purely to see wildlife as well as natural landscapes. Others wish to experience intangible attributes such as solitude, remoteness, wildness, and serenity (which can be grouped as wilderness qualities), while some visit to engage in a range of nature-based recreational activities, or to socialize in the rest camp. Different people have different accommodation requirements ranging from extreme roughing it up to luxury catered accommodation. There is often conflict between the requirements dif-

ferent users and different activities. Appropriate use zoning serves to minimizing conflicts between different users of a park by separating potentially conflicting activities such as game viewing and day-visitor picnic areas whilst ensuring that activities which do not conflict with the park's values and objectives (especially the conservation of the protected area's natural systems and its biodiversity) can continue in appropriate areas. Use zones serve to ensure that high intensity facilities and activities are placed in areas that are robust enough to tolerate intensive use, as well as to protect more sensitive areas of the park from over-utilization.



### 3. PARK USE ZONATION SYSTEM

#### The Zoning System

SANParks has adopted a dual zoning system for its parks. The system comprises:

- a) Visitor use zones covering the entire park, and
- b) Special management overlays which designate specific areas of a park that require special management interventions.

The use zoning of Karoo National Park is shown in Map 4, and summarised in Table One.

#### The Zoning process and its linkage to the underlying environmental analysis

The park use zonation plan is a lean version of the Conservation Development Framework (CDF). The park use zonation is based on the same biodiversity and landscape analyses undertaken for a CDF. However, certain elements underlying the CDF may not be fully incorporated into the park use zonation. In particular, the park use zonation plan will usually not incorporate elements such as a full tourism market analysis. Typically the park use zonation approach is applied developing parks such as Wilderness National Park, though the long term objective is to have a full CDF for all parks.

The zoning for Karoo National Park was underpinned by an analysis and mapping of the sensitivity and value of a park's biophysical, heritage and scenic resources. This analysis examined the biophysical attributes of the park including habitat value (in particular the contribution to national conservation objectives), special habitat value (the value of the area to rare and endangered species), hydrological sensitivity (areas vulnerable to disruption of hydrological processes such as floodplains and wetlands), topographic sensitivity (steep slopes), soil sensitivity (soils that are vulnerable to erosion) and vegetation vulnerability to physical disturbance. In addition, the heritage value and sensitivity of sites was examined (including archaeological, historical and current cultural aspects). The visual sensitivity of the landscape was also examined in order to identify sites where infrastructure development could have a strong aesthetic impact. This analysis was used to inform the appropriate use of different areas of the park, as well as to help define the boundaries between zones. The zoning was also informed by the park's current infrastructure and tourism products, as well as the regional context (especially linkages to neighbouring areas and impacts from activities outside the reserve). Planned infrastructure and tourism products were also accommodated where these were compatible with the environmental informants. These were all interpreted in the context of the park objectives. This was undertaken in an iterative and consultative process.

Table 1: Summary of Use Zone Characteristics

Zone	General Characteristics	Experiential Qualities	Interaction between users	Type of Access	Type of activities	Type of Facilities	Limits of acceptable change: Biophysical	Limits of acceptable change: Aesthetics and recreational
REMOTE	Retains an intrinsically wild appearance and character, or capable of being added to such.	Solitude and awe inspiring natural characteristics	None to very low	Controlled access, only on foot	Hiking in small groups	Established footpaths where erosion may be a problem. Essentially undeveloped and basic facilities	Deviation from a natural pristine state should be minimised, and existing impacts should be reduced.	Activities which impede the intrinsically wild appearance and character of the area will not be tolerated.
PRIMITIVE	Generally retains wilderness qualities, but with basic utilitarian facilities. Access is controlled. Provides access to the Remote Zone, and can serve as a buffer.	Experience wilderness qualities	Low	Controlled access. Accompanied or unaccompanied. Foot, 4x4 vehicles	Hiking, 4x4 drives, game viewing, horse riding	Small, basic utilitarian facilities; or limited concessions with limited numbers, 4x4 trails, hiking trails	Deviation from a natural pristine state should be small and limited to essential impacts. Existing impacts should be reduced.	Activities which impede the intrinsically wild appearance and character of the area should be avoided, and impacts limited to the site of the facility.
QUIET	This zone allows non-motorised access to areas which generally retain a natural appearance and character. Access is not spectrally controlled.	Wide range of activities, isolation in a natural environment	Moderate to high	Unaccompanied non-motorised access. Mainly on foot non-motorised access to specific trails	Hiking, walking, rock climbing, bird watching, possibly mountain biking and horse riding	Hiking trails, footpaths, management trails, but huts. Abution facilities may be provided in high use areas. No accommodation, and no built access by vehicle.	Some deviation from a natural pristine state is allowed, but care should be taken to restrict development to essential needs, especially paths and viewpoints should be designed to limit the impacts of large numbers of visitors on the biophysical environment.	Activities which impede on the relatively natural appearance and character of the area should be restricted, though the presence of large numbers of visitors and the facilities they require, may impede on the feeling of wilderness found in this zone.
LOW INTENSITY LEISURE	The underlying character of this zone is motorised self-drive access with basic utilitarian facilities. The numbers of visitors are higher than in the Remote and Primitive Zones. Campsites without modern facilities such as shops and restaurants.	Comfortable facilities in a relatively natural environment	Moderate to high	Motorised self-drive access	Motorised self-drive game viewing, picnicking, walking, cycling, rock climbing, hiking, adventure activities	Facilities limited to basic self-catering, picnic tables, abution facilities, information/education centres, parking areas. Small to medium self-catering and camping rest camps with abution facilities, but no shops or restaurants. Low special access roads to provide a more wild experience.	Deviation from a natural pristine state should be minimised and limited to essential impacts. However, it is accepted that some damage to the biophysical environment associated with tourist activities and facilities will be inevitable.	Although it is inevitable that activities and facilities will impede on the wild appearance and character of the area, these should be managed and limited to ensure that the area still provides a relatively natural outdoor experience.
HIGH INTENSITY LEISURE	The main characteristic is that of a high density tourist development node, with modern amenities, where more concentrated human activities are allowed.	Comfortable and sophisticated facilities while retaining a natural ambience	High	Accessible by motorised transport (abution) on high volume transport routes, including delivery vehicles.	Above: Additional sophisticated infrastructure. Larger, organised adventure activities (climbing, trekking, etc.) and dining at restaurants.	High density tourist camps with modern amenities. Footpaths, management trails, accommodation, restaurants, cafe and refreshment stalls, education centres. High volume roads.	The general 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.	Although it is inevitable that the high numbers, activities and facilities will impede on the wild appearance and character of the area, these should be managed and limited to ensure that the area generally still provides a relatively natural outdoor experience appropriate for a national park.

\*Wilderness areas need to be investigated and officially designated.



Map 5 shows the relationship between the use zoning and the summary products of the biodiversity and landscape sensitivity-value analysis. This indicates that in general it was possible to include most of the environmentally sensitive and valuable areas into zones that are strongly orientated towards resource conservation rather than tourist use. Table 2 summarizes the percentage area of the park covered by each zone, as well as the percentage of the highly environmentally sensitive and valuable areas (defined as areas with values in the top quartile of the sensitivity value analysis) that are in each zone. The analysis suggests that although the zonation scheme helps protect most environmentally sensitive areas, this protection is a function of the high proportion of conservation orientated zones, rather than a function of these zones being particularly well located. Almost 87% of the park is covered by zones that are strongly conservation orientated in terms of their objectives (i.e. Remote and Primitive), with a very significant 50% zoned Remote, the most strongly conservation orientated zone. The result is that almost 90% of the highly sensitive habitats of the park are protected by conservation orientated zones. Unfortunately, as a legacy of existing infrastructure and use patterns, there is only a slight spatial correlation between highly sensitive habitats and the conservation orientated zones.

Table 2: Summary of the percentage area of the park covered by each zone, as well as the percentage of the highly environmentally sensitive and valuable areas (defined as areas with values in the top quartile of the sensitivity value analysis) that are in each zone.

		Zone as a percentage of park area	Percentage of highly sensitive areas that are in the zone
<b>Karoo National Park</b>			
Conservation orientated zones	Remote	50.3	53.2
	Primitive	36.8	36.6
Tourism orientated zones	Quiet	0.5	0.7
	Low Intensity Leisure	12.2	9.5
	High Intensity Leisure	0.1	0.1

## Remote Zone

### Characteristics

This is an area retaining an intrinsically wild appearance and character, or capable of being restored to such, and which is undeveloped and roadless. There are no permanent improvements or any form of human habitation. It provides outstanding opportunities for solitude with awe inspiring natural characteristics. If present at all, sight and sound of human habitation and activities are barely discernable and at a far distance. The zone also serves to protect sensitive environments from development impacts and tourism pressure.

### Visitor activities and experience

**Activities:** Access is strictly controlled and on foot. Groups must be small, and can either be accompanied by a guide or unaccompanied. Several groups may be in area at the same time, but if necessary densities and routes should be defined so that no signs can be seen or heard between the groups. The principles of "Pack it in Pack it out" must be applied.

**Interaction with other users:** There is no interaction between groups. The numbers of groups within the area will be determined by the ability to ensure that there is no interaction between groups.

### Objectives of the zone (Limits of acceptable change)

**Biophysical environment:** Deviation from a natural/pristine state should be minimized, and existing impacts should be reduced.

**Aesthetics and recreational environment:** 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.

### Facilities

**Type and size:** No facilities are provided. Should overnight facilities be required to serve this zone, these should be placed in the adjoining zones.

**Sophistication of facilities:** No facilities except self carried portable tents. Guidelines for washing, ablution and cooking must be defined according to the "Pack it in Pack" it out principles. Camping only at designated sites. **Audible equipment and communication structures:** None.

**Access and roads:** Public access is non-motorized. Vehicular access and parking is provided in the adjoining Primitive zone. Established footpaths may be provided where erosion risks occur.

## Location in Park

In Karoo NP, Remote areas were designated in the plains, mid-altitude plateau and mountain areas to include most landscapes with high environmental sensitivity and value.

## Primitive Zone

### Characteristics

The prime characteristic of the zone is the experience of wilderness qualities with the accent on controlled access. Access is controlled in terms of numbers, frequency and size of groups. The zone shares the wilderness qualities of Wilderness Areas and Remote zones, but with the provision of basic self-catering facilities and access. It also provides access to the Remote zone and Wilderness Area. Views of human activities and development outside of the park may be visible from this zone.

This zone has the following functions:

- It provides the basic facilities and access to serve Wilderness Areas and Remote zones.
- It contains concession sites and other facilities where impacts are managed through strict control of the movement and numbers of tourists, for example if all tourists are in concession safari vehicles.
- It serves as a buffer to the fringe of the park and other zones, in particular Wilderness and Remote.
- It serves to protect sensitive environments from high levels of development.

### Visitor activities and experience

**Activities:** Access is controlled in terms of numbers, frequency and size of groups. Activities include hiking, 4x4 drives and game viewing. Access is controlled either through only allowing access to those with bookings for specific facilities, or alternatively through a specific booking or permit for a particular hiking trail or 4x4 route. Several groups may be in area at the same time, but access should be managed to minimize interaction between groups if necessary.

**Interaction with other users:** Interaction between groups of users is low, and care must be taken in determining the number and nature of facilities located in the area in order to minimize these interactions.

### Objectives of the zone (Limits of acceptable change)

**Biophysical environment:** Deviation from a natural/pristine state should be small and limited to restricted impact footprints. Existing impacts should be reduced. Any facilities constructed in these areas, and activities undertaken here should be done in a way that limits environmental impacts. Road and infrastructure specifications should be designed to limit impacts.



**Aesthetics and recreational environment:** 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) should be restricted and impacts limited to the site of the facility. Ideally visitors should only be aware of the facility or infrastructure that they are using, and this infrastructure/facility should be designed to fit in with the environment within which it is located in order to avoid aesthetic impacts.

#### Facilities

**Type and size:** Facilities are small, often very basic, and are distributed to avoid contact between users. Alternatively facilities designed for high levels of luxury, but limited visitor numbers can be accommodated here (e.g. controlled access private camps or concession sites).

**Sophistication of facilities:** Generally facilities are small, basic and self-catering, though concession facilities may be significantly more sophisticated.

**Audible equipment and communication structures:** None.

**Access and roads:** Vehicular access to facilities is limited to low-spec roads, often 4x4 only. Tourist and game viewing roads are 4x4 only. Established footpaths are provided to avoid erosion and braiding.

#### Location in Park

In Karoo NP, Primitive areas were designated to buffer remote areas and to protect most of the remaining sensitive areas from high levels of tourist activity. Primitive areas were also designated in low sensitivity valleys to allow access to remote areas, as well as to accommodate the existing 4x4 pass north of the rest camp. In areas where Remote zones border on the park boundary, a 100m wide Primitive zone was designated to allow park management access to fences.

#### Quiet Zone

##### Characteristics

This zone is characterized by unaccompanied non-motorized access without specific access control and permits. Visitors are allowed unaccompanied (or accompanied) access, mainly on foot, for a wide range of experiences. Larger numbers of visitors are allowed than in the Primitive zone and contact between visitors is frequent. The main accent is on unaccompanied non motorized access. Larger num-

bers of visitors are allowed and contact between visitors is frequent. It is important to note that this zone may have different interpretations in different parks and the CDF documentation for each park should set the objectives specific to that park. Thus, in some instances horses and mountain bikes could be accommodated. This zone can also provide non motorized access within Low and High Intensity Leisure zones away from vehicular access roads.

##### Visitor activities and experience

**Activities:** Hiking, rock climbing, bird watching, self-guided constructed trails and walks.

**Interaction with other users:** Interaction between groups of users is frequent.

##### Objectives of the zone (Limits of acceptable change):

**Biophysical environment:** Some deviation from a natural/pristine state is allowed, but care should be taken to restrict the development footprint. Infrastructure, especially paths and viewpoints should be designed to limit the impacts of large numbers of visitors on the biophysical environment.

**Aesthetics and recreational environment:** Activities which impact on the relatively natural appearance and character of the area should be restricted, though the presence of larger numbers of visitors and the facilities they require, may impact on the feeling of "wildness" found in this zone.

##### Facilities

**Type and size:** Hiking trails, footpaths, bird hides. No accommodation. Ablution facilities may be provided in high use areas. Heritage structures may be used for recreation purposes.

**Sophistication of facilities:** Where provided these should be basic.

**Audible equipment and communication structures:** Allowed, but should be managed to retain a relative level of solitude.

**Access and roads:** Essentially pedestrian access, but in certain parks horse and Mountain bikes can be accommodated. Pedestrian only or in some cases cycles. No access for tourists by vehicle. The only roads are essential two wheeled management tracks.

##### Location in Park:

In Karoo NP, Quiet areas were designated immediately adjacent to the main rest camp to allow access to short day trails.

#### Low Intensity Leisure Zone

##### Characteristics

The underlying characteristic of this zone is motorized self-drive access with basic self-catering facilities. The numbers of visitors are higher than in the Remote and Primitive zones. These camps are without modern facilities such as shops and restaurants. Relatively comfortable facilities are positioned in the landscape retaining the inherent natural and visual quality which enhances the visitor experience of a more natural and self providing experience. Access roads are low key, preferably gravel roads and/or tracks to provide a more wild experience. Facilities along roads are limited to basic self-catering picnic sites with toilet facilities. In some parks, large busses and open safari vehicles are not permitted.

##### Visitor activities and experience

**Activities:** Self drive motorized game viewing, picnicking, walking, cycling, rock climbing, hiking, adventure activities.

**Interaction with other users:** Moderate to high

##### Objectives of the zone (Limits of acceptable change)

**Biophysical environment:** Deviation from a 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.

**Aesthetics and recreational environment:** 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.

##### Facilities

**Type and size:** Picnic sites, view sites, information centres, ablution facilities, parking areas, education centres etc. Small self-catering (including camping) camps of low to medium density 25-35 beds. Additional facilities can include swimming pools. Trails for 4x4 vehicles can also be provided. Day visitor sites are not placed within the camps. Day visitor sites must be compliant with the general self-catering characteristic of the zone.

**Sophistication of facilities:** Self contained self-catering units with bathroom facilities. Camp sites will include ablution facilities. These camps are without modern facilities such as shops and restaurants.



**Audible equipment and communication structures:** Cell phone coverage in vicinity of camps. Code of use for cell phones and radios required to retain relative level of solitude.

**Access and roads:** Motorized self drive sedan car access (traditional game viewing) on designated routes which are preferably gravel roads. In some parks, large busses and open safari vehicles are not permitted. When busses are permitted some roads should be designated as accessible to self drive only. Roads are secondary gravel tourist roads or minor game viewing roads.

#### **Location in Park**

In Karoo NP, Low intensity leisure areas were designated in the current game viewing areas, along planned access routes through to the recently acquired western expansion areas, and around the current environmental education facilities in the high altitude plateau, where these areas did not conflict with the underlying landscape sensitivity and value analysis.

#### **High Intensity Leisure Zone**

##### **Characteristics**

The main characteristic is that of a high density tourist development node with modern amenities such as restaurants and shops. This is the zone where more concentrated human activities are allowed. As impacts and particularly cumulative impacts are higher, such facilities should be placed on the periphery of the park. Staff not directly associated with tourism facilities should be accommodated outside of the park if possible. All industrial type facilities such as laundries, abattoirs, maintenance depots and workshops should ideally be located outside of the park within suitably zoned adjoining urban or rural areas. Accessible by motorized transport (Car/bus) on high volume transport routes. More concentrated activities occur than in than Low Intensity leisure.

##### **Visitor activities and experience**

**Activities:** Traditional game viewing routes with associated more sophisticated infrastructure, sight seeing at tourist destinations, picnicking, walking, cycling, rock climbing, hiking, adventure activities (orienteeing, scuba diving, fun runs), activities associated with amenities such as dining in restaurants.

**Interaction with other users:** High

#### **Objectives of the zone (Limits of acceptable change)**

**Biophysical environment:** 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, care must be taken to ensure that the zone still retains a level of ecological integrity consistent with a protected area.

**Aesthetics and recreational environment:** Although it is inevitable that the high visitor numbers, 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 generally still provides a relatively natural outdoor experience.

#### **Facilities**

**Type and size:** High density camps providing tourist accommodation with modern amenities. Restaurants, shops, education centres, botanical gardens. Day visitor sites are provided outside of main camps. Day visitor sites or picnic sites may provide catered facilities and kiosks. In some parks it may be necessary to provide high density recreational sites with a wide range of intensive activities close to the periphery of the park. Picnic sites, view sites, information centres, ablution facilities, parking areas, education centres etc. Staff villages and administrative centres restricted to core staff. Non essential staff housing, administration and industrial activities positioned outside of or peripheral to the park.

**Sophistication of facilities:** Moderate to high density facilities. Self catering and catered. These camps have modern facilities such as shops and restaurants.

**Audible equipment and communication structures:** Cell phone coverage in vicinity of camps. Code of use for cell phones and radios required to retain relative level of solitude.

**Access and roads:** The zone is highly motorized including busses and delivery vehicles on designated routes which are often tarred. Care must be taken to distinguish between roads that serve as high access delivery routes to camps, link roads between camps, and game viewing roads to minimize conflict between users.

#### **Location in Park**

In Karoo NP, High intensity leisure areas were restricted to the current rest camp, interpretive centre and management areas.

#### **4. THE PARK INTERFACE ZONE**

The Park Interface Zones shows the areas within which landuse changes could affect a national Park. The zones, in combination with guidelines, will serve as a basis for a.) identifying the focus areas in which park management and scientists should respond to EIA's, b.) helping to identify the sort of impacts that would be important at a particular site, and most importantly c.) serving as the basis for integrating long term protection of a national park into the spatial development plans of municipalities (SDF/IDP) and other local authorities. In terms of EIA response, the zones serve largely to raise red-flags and do not remove the need for carefully considering the exact impact of a proposed development. In particular, they do not address activities with broad regional aesthetic or biodiversity impacts.

In Karoo National Park, there are three categories within the Park Interface Zone. The first two are mutually exclusive, but the final visual/aesthetic category can overlay the others (Map 6).

#### **Priority Natural Areas**

This zone aims to ensure the long term persistence of biodiversity, within and around the park, by identifying the key areas on which the long term survival of the park depends. This includes areas important to both biodiversity pattern (especially reasonably intact high priority natural habitats) and processes (ecological linkages, catchments, intact hydrological systems, etc.). This does not imply any loss of existing rights (e.g. current agricultural activities or legal extractive biodiversity use such as fishing), but rather aims to ensure the pars survival in a living landscape.

Priority natural areas include areas identified for future park expansion as well as reasonably natural areas of high biodiversity value which are critical for the long-term persistence of biodiversity within the park. These include adjacent natural areas (especially high priority habitats) which function as an ecologically integrated unit with the park, as well as areas critical for maintaining ecological links and connectivity with the broader landscape.

#### **Development guidelines**

Inappropriate developments and negative land use changes (such as additional ploughing permits for natural veld, development beyond existing transformation footprints, urban expansion, intensification of landuse through golf estates etc) should be opposed within this area. Developments with site specific impacts (e.g. a lodge on a game farm) should be favourably viewed if they contribute to ensuring conservation friendly land use within a broader area. Guidelines applicable for the Catchment Protection Section would also apply to these areas.



#### **Catchment Protection**

These are areas important for maintaining key hydrological processes (surface and groundwater) within the park.

#### ***Development guidelines***

Within these areas inappropriate development such as dam construction, loss of riparian vegetation and excessive aquifer exploitation should be opposed. In addition, the control of alien vegetation, the control of soil erosion, and appropriate land care (e.g. appropriate stocking rates) should be promoted.

#### **Viewshed protection**

These are areas where developments could impact on the aesthetic quality of a visitor's experience in a park. This zone is particularly concerned with visual impacts (both day and night), but could also include sound pollution.

#### ***Development guidelines***

Within these areas any development proposals should be carefully screened to ensure that they do not impact excessively on the aesthetics of the park. The areas identified are only broadly indicative of sensitive areas, as at a fine scale many areas within this zone would be perfectly suited for development. Further, very invasive developments outside this zone would also have to be considered.

#### **5. CURRENT STATUS AND FUTURE IMPROVEMENTS:**

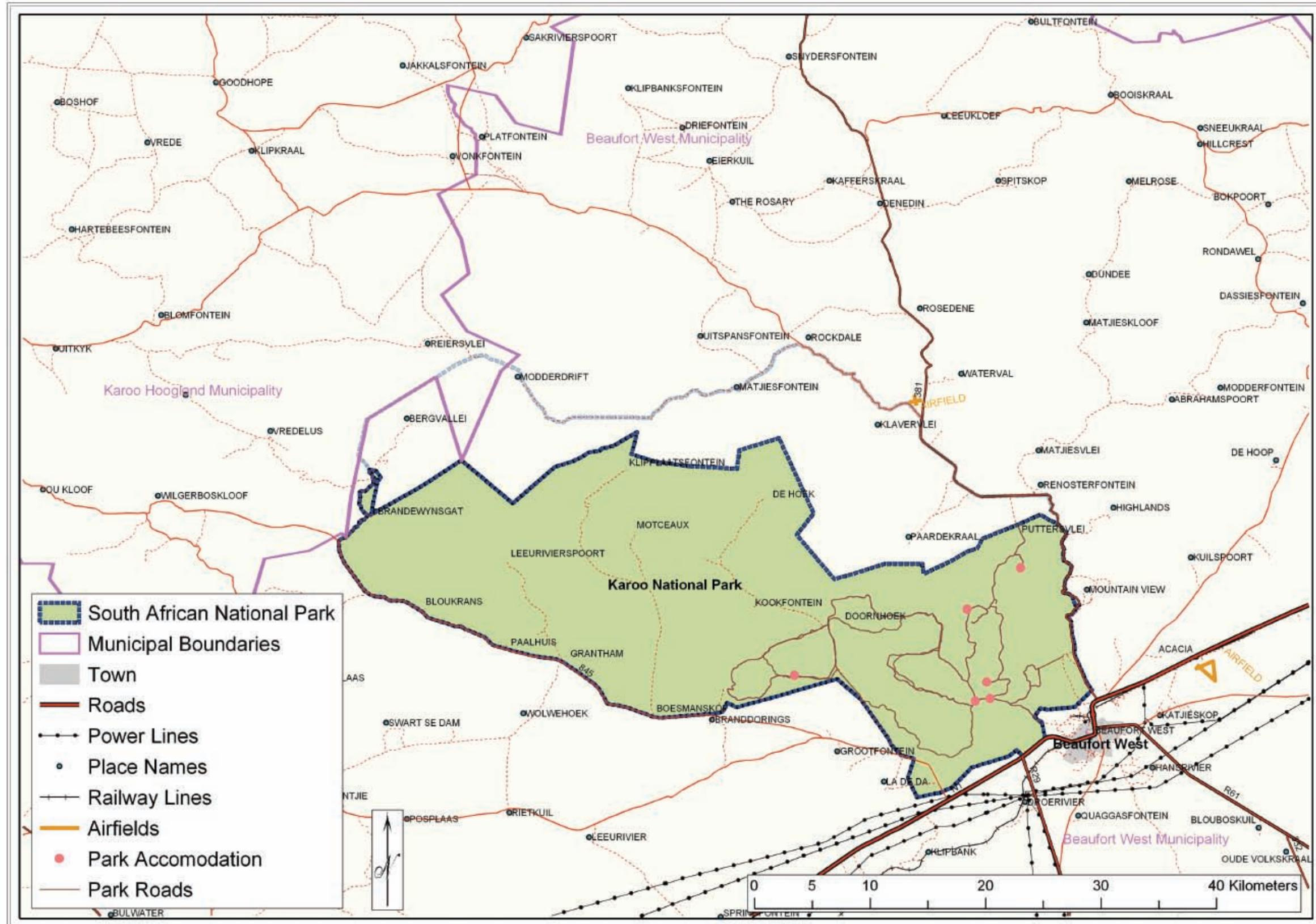
The current park use zonation is based on the same biodiversity and landscape analyses undertaken for a Conservation Development Framework (CDF); however certain elements underlying the CDF such as a tourism market analysis are not be fully incorporated into the park use zonation. A full CDF will be developed for Karoo National Park within the current update cycle. Remote areas will be investigated for possible formal declaration as Wilderness Areas in terms of Section 22 of the PAA. Special management overlays which designate specific areas of a park that require special management interventions (e.g. areas requiring rehabilitation) will also be identified.

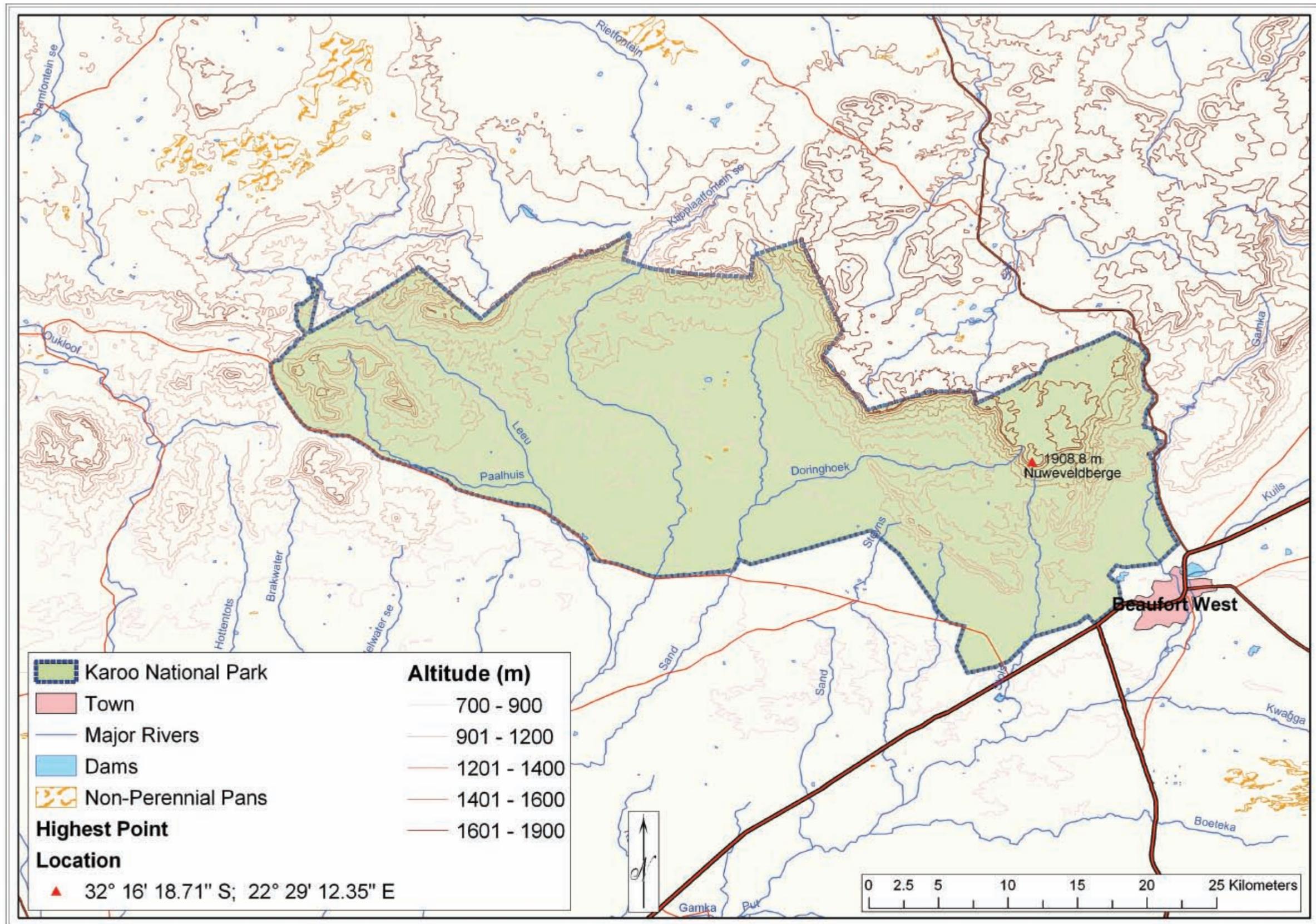
#### **6. REFERENCES**

- Department of Environmental Affairs and Tourism. 2003. National Environmental Management: Protected Areas Act (Act 57 of 2003). Department of Environmental Affairs and Tourism, Pretoria.
- SANParks. September 2005. Sensitivity-Value analysis Manual. Unpublished. SANParks, Pretoria.
- SANParks. November 2005. CDF Planning Manual. Unpublished. SANParks, Pretoria.

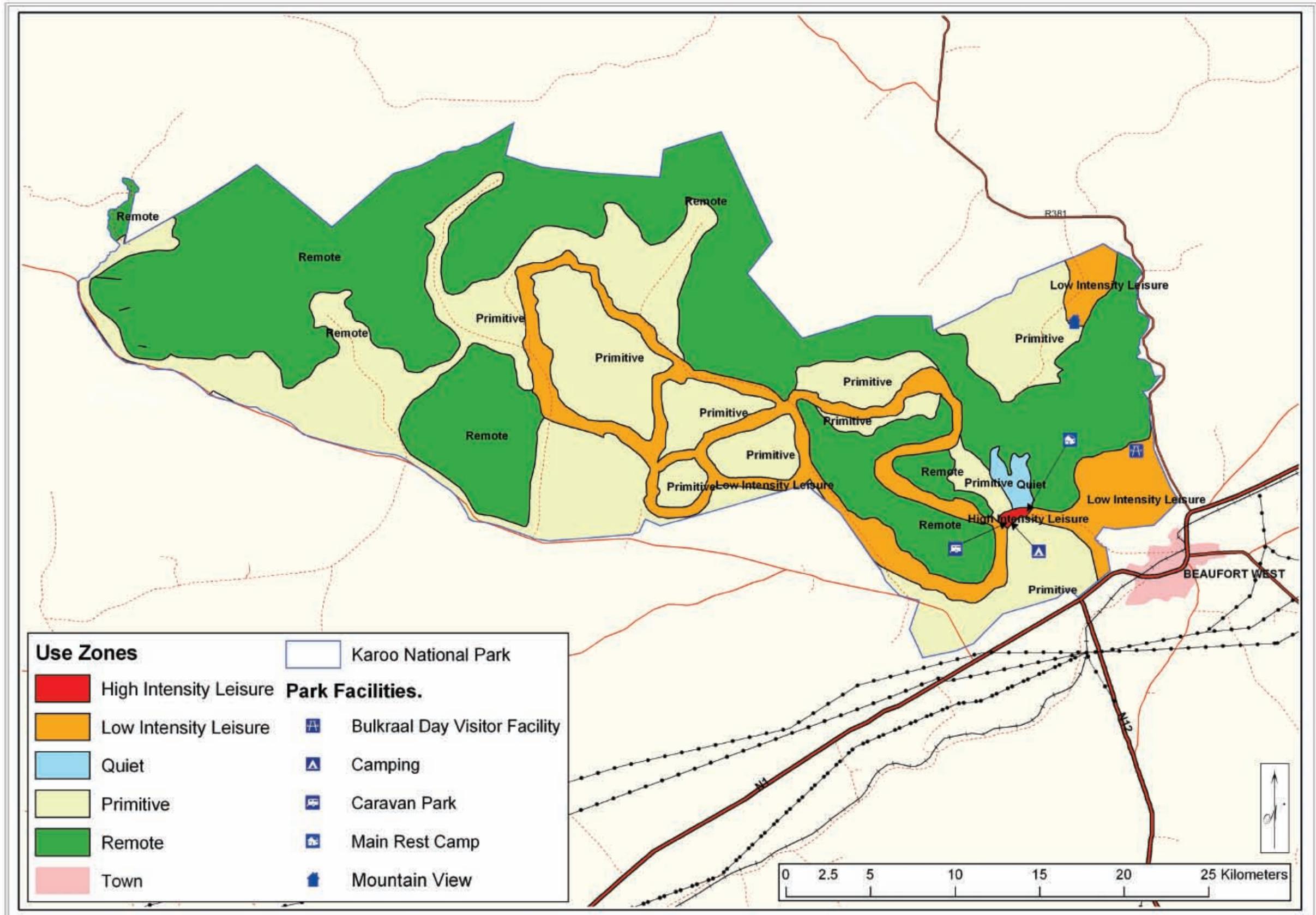
APPENDIX 2

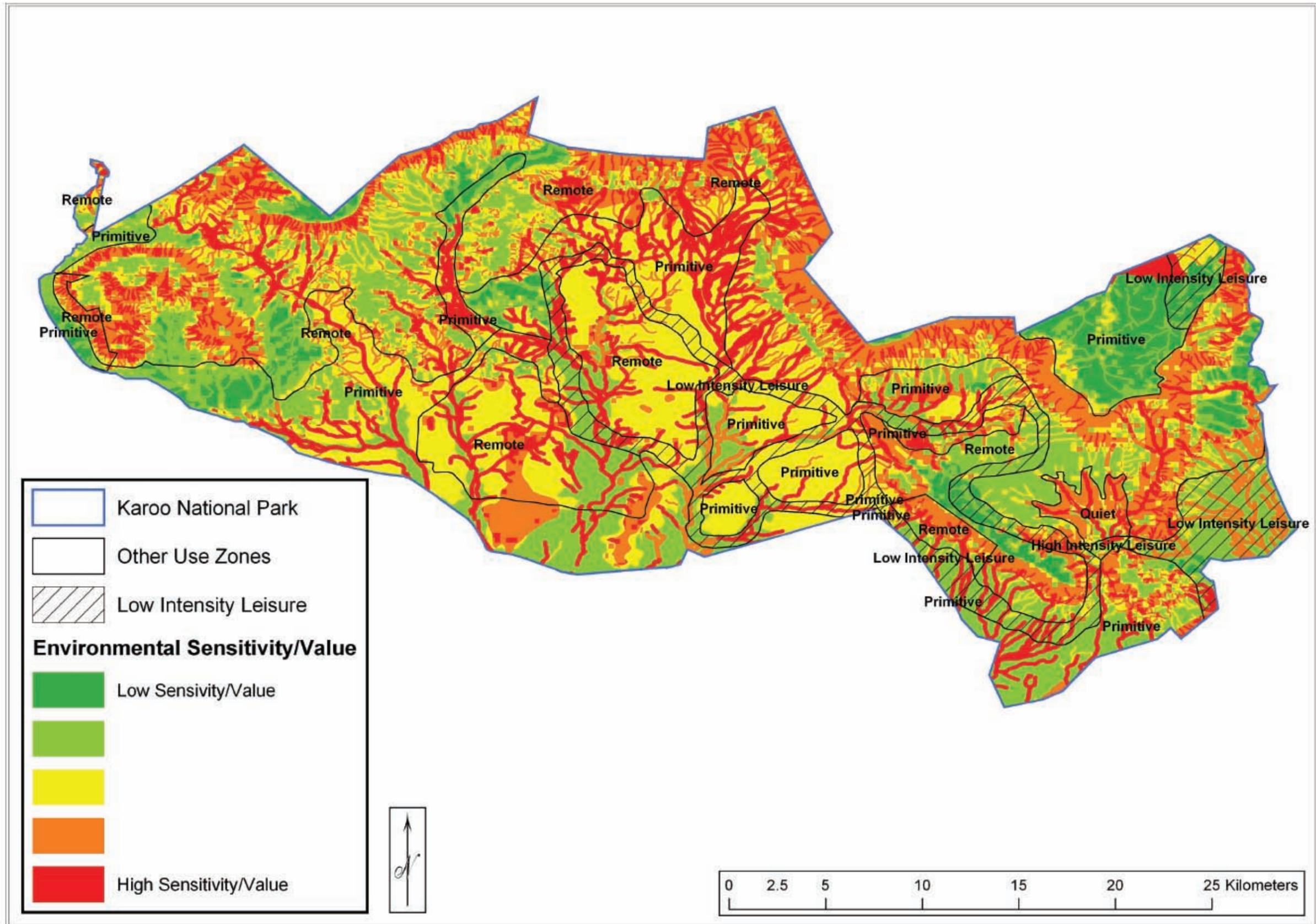
Map 1 – Regional Map

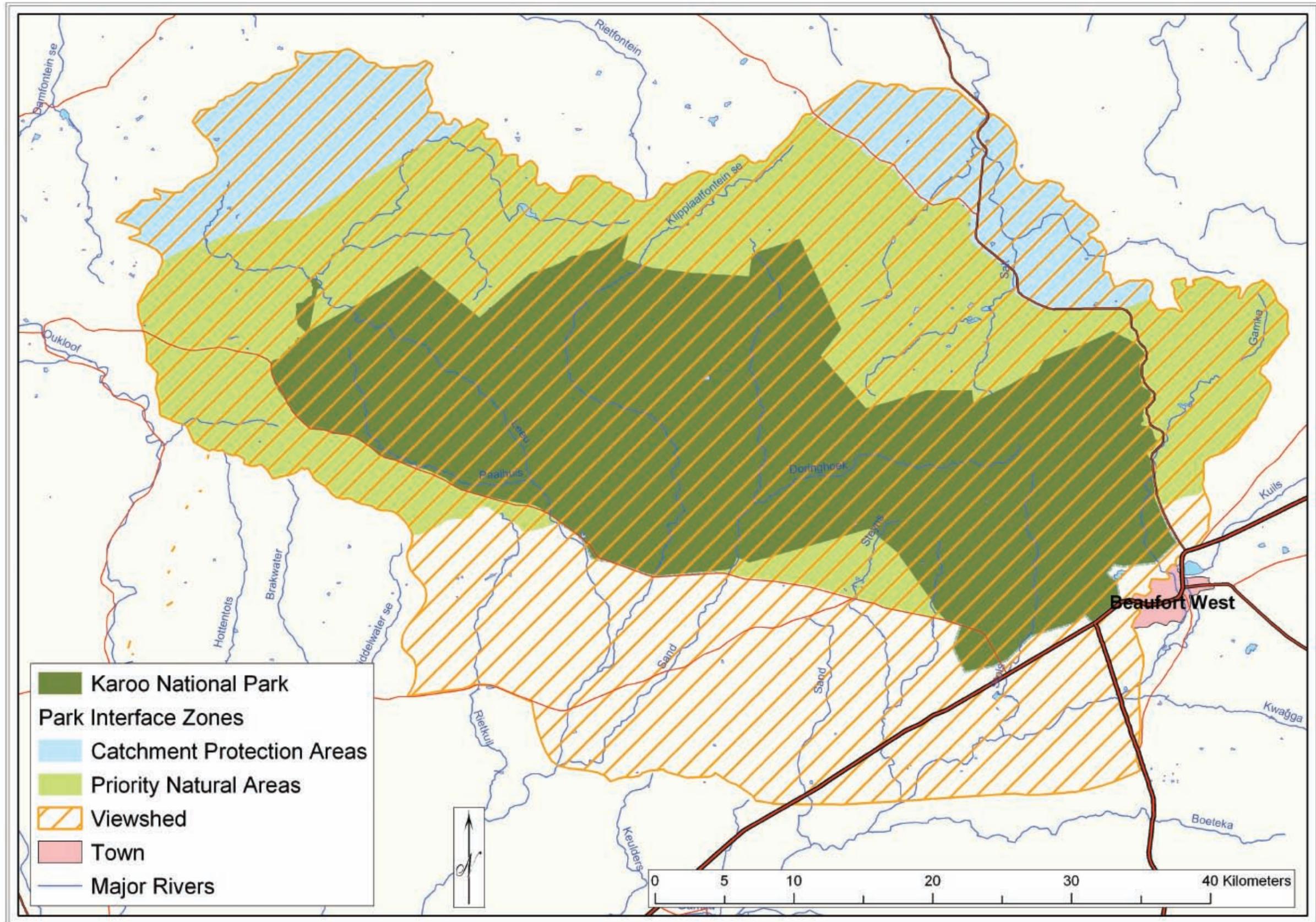


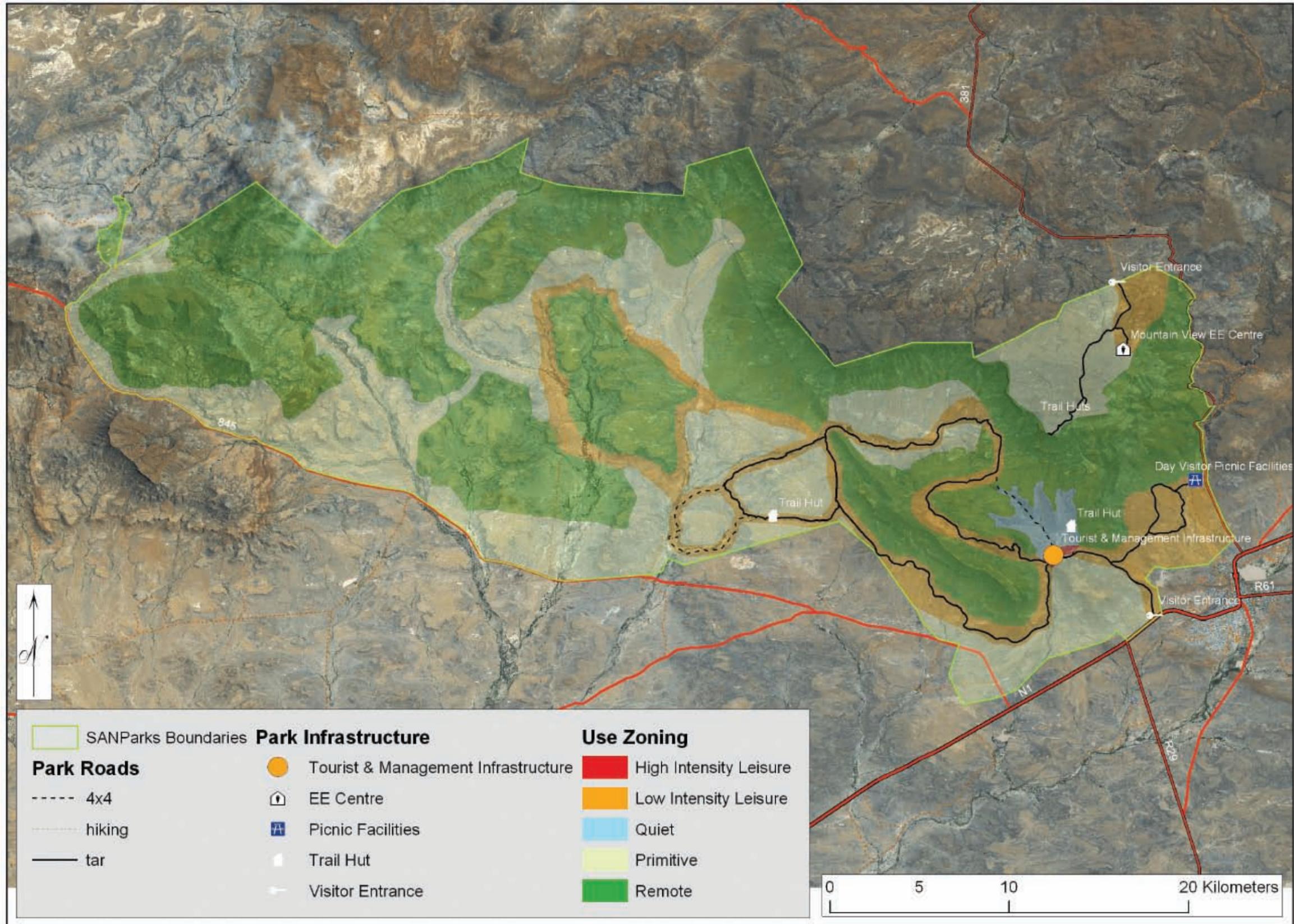












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