INGULA NATURE RESERVE

Management Plan

2017 - 2021

Prepared by:
Eskom Holdings and Ingula Partnership

Citation: ***INGULA NATURE RESERVE: Management Plan (January 2017) Eskom Holdings.***

AUTHORISATION

This Management Plan is hereby internally accepted and authorised, as required for managing the Ingula Nature Reserve in terms of Section 39 and 41 of the NEM: Protected Areas Act (Act 57 of 2003).

This Management Plan for INGULA NATURE RESERVE is **Recommended** by**:**

TITLE	NAME	SIGNATURE AND DATE
Eskom Ingula Partnership	Mr Malcolm Drummond Representing Middlepunt Wetland Trust	
	Mr Mark Anderson Representing BirdLife South Africa	
	Ms Deidre Herbst Representing Eskom	
Eskom Peaking Operating Unit	Mr Avi Singh	
Eskom Generation Executive Committee	Generation Group Executive	
Eskom Executive Committee	Eskom Holdings SOC Ltd – CEO	

This Management Plan for INGULA NATURE RESERVE is **approved** by:

TITLE	NAME	SIGNATURE AND DATE
KZN Nature Conservation Board		
Free State Department of Economic Development, Tourism and Environmental Affairs		

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

Amafa	Amafa aKwaZulu-Natali (KwaZulu-Natal Provincial Heritage Agency)
BWP	Bedford Wetland Park
COE	Centre of Excellence
DEA	National Department of Environmental Affairs
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
EMP	Environmental Management Plan
ESD	Education for Sustainable Development
Ezemvelo	Ezemvelo KwaZulu-Natal Wildlife
FPA	Fire Protection Association in terms of the National Veld and Forest Fire Act (No.1 of 1998)
GIS	Geographical Information System
A&APs	Interested and Affected Parties
IDP	Municipal Integrated Development Plan
IPSS	Ingula Pumped Storage Scheme
IUCN	International Union for the Conservation of Nature
MW	Mega Watt
NEMA	National Environmental Management Act
NEMA: BA	National Environmental Management Act: Biodiversity Act
NEMA: PAA	National Environmental Management Act: Protected Areas Act
NFEPA	National Freshwater Ecosystem Priority Area
NGO	Non-Government Organisation
NPAES	National Protected Area Expansion Strategy
NSBA	National Spatial Biodiversity Assessment
OEMP	Operational Environmental Management Plan
PA	Protected Area
PSS	Pumped Storage Scheme
RMP	Reserve Management Plan
RoD	Record of Decision
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SDF	Municipal Spatial Development Framework
SHE	Safety, Health and Environment
VCA	Veld Condition Assessment

DEFINITIONS OF TERMS

Alien species	Species or genotypes, which are not indigenous to Ingula Nature Reserve and the surrounding area including hybrids and genetically altered organisms.
Biodiversity	The variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems (as per the National Environmental Management: Biodiversity Act, 2004 [Act No. 10 of 2004]).
Buffer zone	An area surrounding a protected area that has restrictions placed on its use or where collaborative projects and programmes are undertaken to afford additional protection to the nature reserve.
Cultural heritage	As defined in Article 1 of the World Heritage Convention (UNESCO) 1972 , 'cultural heritage' is considered as "monuments, architectural works, works of monumental sculpture and painting, elements or structures of an archaeological nature, inscriptions, cave dwellings and combinations of features, which are of value from the point of view of history, art or science, groups of buildings, groups of separate or connected buildings which, because of their architecture, their homogeneity or their place in the landscape, are of significance from the point of view of history, art or science, sites, works of man or the combined works of nature and man, and areas including archaeological sites which are of value from the historical, aesthetic, ethnological or anthropological point of view."
Ecotourism	The travel to natural areas to learn about the way of life and cultural history of people, the natural history of the environment, while taking care not to change the environment and contributing to the economic welfare of the local people (adapted from a definition of ecotourism by Hecto Ceballos Lascurain).
Ecological infrastructure	Refers to functioning ecosystems that deliver valuable services to people, being the nature-based equivalent of built or hard infrastructure.
Ecological integrity	The sum of the biological, physical and chemical components of an ecosystem and its products, functions and attributes (as per the National Environmental Management: Protected Areas Act, 2003 [Act No. 57 of 2003]).
Ecosystem	A dynamic complex of animal, plant and micro-organism communities and their non-living environment interacting as a functional unit (as per the National Environmental Management: Protected Areas Act, 2003 [Act No. 57 of 2003]).
Ecosystem services	As defined in Section 1 of the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) as "environmental goods and services" meaning: a. Benefits obtained from ecosystems such as food, fuel and fibre and genetic resources. b. Benefits from the regulation of ecosystem processes such as climate regulation, disease and flood control and detoxification. c. Cultural non-material benefits obtained from ecosystems such as benefits of a spiritual, recreational, aesthetic, inspirational, educational, community and symbolic nature;"

	For the purposes of this Management Plan, sustainable water production is also specifically included under this definition.
Environmental degradation	The deterioration of the environment through depletion of resources such as air, water and soil; the destruction of ecosystems and the loss of species or undesirable reduction of species population numbers from a specific area from an environmental health perspective
Ezemvelo KZN Wildlife	Nature Conservation Service as established in terms of the KwaZulu-Natal Nature Conservation Management Act No. 9 of 1997.
Indigenous species	In relation to a specific protected area, means a species that occurs, or has historically occurred, naturally in a free state of nature within that specific protected area, but excludes a species introduced in that protected area as a result of human activity (as per the National Environmental Management: Protected Areas Act, 2003 [Act No. 57 of 2003]).
Invasive species	Means any species whose establishment and spread outside of its natural distribution range – a. Threaten ecosystems, habitats or other species or have a demonstrable potential to threaten ecosystems, habitats or other species. b. May result in economic and environmental harm or harm to human health. (As per the National Environmental Management: Protected Areas Act, 2003 [Act No. 57 of 2003]).
Local community	Any community of people living or having rights or interests in a distinct geographical area (as per the National Environmental Management: Protected Areas Act, 2003 [Act No. 57 of 2003]).
Management	In relation to a protected area, includes control, protection, conservation, maintenance and rehabilitation of the protected area with due regard to the use and extraction of biological resources, community-based practices and benefit sharing activities in the area in a manner consistent with the Biodiversity Act (as per the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003).
Management authority	In relation to a protected area, means the organ of state or other institution or person in which the authority to manage the protected area is vested (as per the National Environmental Management: Protected Areas Act, 2003 [Act No. 57 of 2003]).
Monitoring	The collection and analysis of repeated observations or measurements to evaluate change in status, distribution or integrity in order to track the impacts of directed management implemented to achieve a stated management objective.
Nature conservation	The conservation of naturally occurring ecological systems, the sustainable utilisation of indigenous plants and animals therein, and the promotion and maintenance of biological diversity (as per the KwaZulu-Natal Nature Conservation Management Act, 1997 [Act No.9 of 1997]).
Neighbouring community	The communities and people permanently living in the local municipal area/s bordering onto the Nature Reserve.
Natural heritage	As defined in Article 2 of the World Heritage Convention (UNESCO) 1972 'natural heritage' is as: "natural features consisting of physical and biological formations or groups of such formations, which are of value from the aesthetic or scientific point of

	view, geological and physiographical formations and precisely delineated areas which constitute the habitat of threatened species of animals and plants of value from the point of view of science or conservation, natural sites or precisely delineated natural areas of value from the point of view of science, conservation or natural beauty." For the purposes of this IMP, this would include the required ecological integrity of the protected area for the production of ecosystem services.
Partnerships	A co-operative and / or collaborative arrangement between the Nature Reserve management and a third party that supports the achievement of the Nature Reserve management objectives.
Protected areas	• Means any area declared or proclaimed as such in terms of section 3 or listed in the Second Schedule to the KwaZulu-Natal Nature Conservation Management Act, 1997 (Act No. 9 of 1997); or • Means any of the protected areas referred to in section 9 of the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003).
Ramsar Convention	Means: "The Convention on Wetlands of International Importance, signed in Ramsar, Iran, in 1971, is an intergovernmental treaty, which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources." (There are presently 158 Contracting Parties to the Convention, the Convention has broadened its scope to cover all aspects of wetland conservation and wise use, recognising wetlands as ecosystems that are extremely important for biodiversity conservation in general and for the well-being of human communities.)
Stakeholders/ interested parties	These are interested individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups and the general public. According to the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), "stakeholder" means a person, an organ of state or a community contemplated in section 82 (1) (a), or an indigenous community contemplated in section 82(1) (b).
Sustainable utilisation	In relation to the use of a biological resource, means the use of such resource in a way and at a rate that would not lead to its long-term decline; would not disrupt the ecological integrity of the ecosystem in which it occurs; and would ensure its continued use to meet the needs and aspirations of present and future generations of people (as per National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).

1) BACKGROUND

1.1 Purpose of the plan

Management plans for Protected Areas are strategic documents that provide the framework for the development and operation of these sites. They inform management at all levels, from the landowner / management entity through to support from a range of stakeholders. The purpose of the management plan is to:

- Provide the primary strategic tool for management of Ingula Nature Reserve, informing the need for specific programmes and operational procedures.
- Provide for capacity building, future thinking and continuity of management.
- Enable Eskom Holdings Pty Ltd to develop and manage Ingula Nature Reserve in such a way that its values and the purpose for which it has been established are protected.
- Very importantly, within the context of the Ingula Nature Reserve, to ensure the integration of the management of the nature reserve and the Ingula Pumped Storage Scheme (IPSS), so as to ensure continued operation of the pumped storage scheme, without impacting on the biodiversity value of the site.

1.2 Structure of the plan

The management plan for Ingula Nature Reserve has the following structure –

Section 1:	Provides an introduction and background to the management plan and Ingula Nature Reserve.
Section 2:	Establishes the context of the biodiversity stewardship site, providing the basis for the strategic and operational management frameworks that follow.
Section 3:	Sets out the Strategic Framework, including the vision and objectives for the biodiversity stewardship site.
Section 4:	Describes the Operational Management Framework, including the administrative structures and zonation of the biodiversity stewardship site, outlining the land uses in particular zones.
Section 5:	Describes the Operational Management, including management targets and programmes for managing the Ingula Nature Reserve.
Section 6:	Sets out the monitoring measures required to determine if management targets are being met.
Section 7:	Describes the components that must be included in the annual plan of operation.

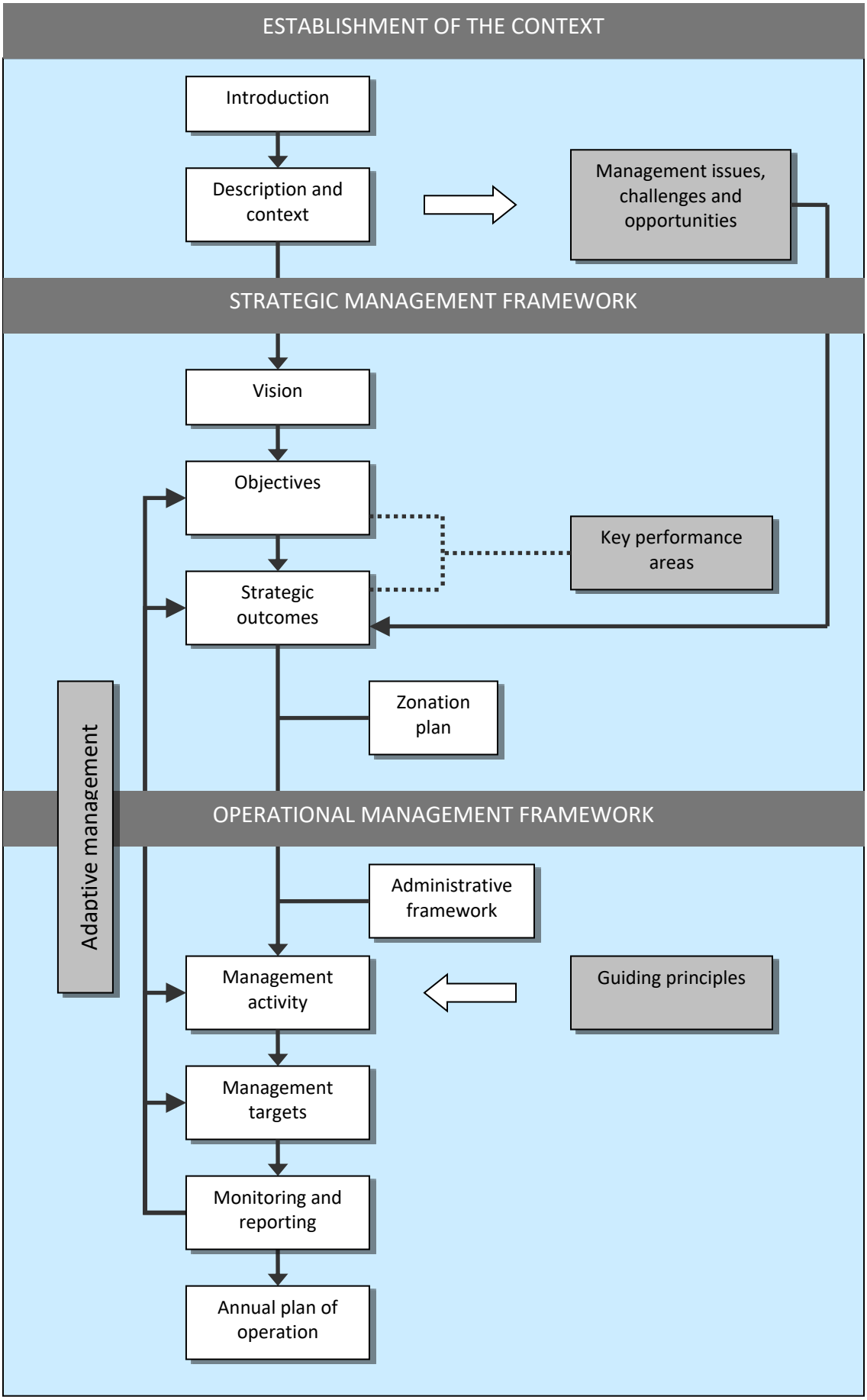


Figure 1.1: Structure of the Management Plan

1.3 Introduction

The Ingula Pumped Storage Scheme (IPSS), and the property associated with it, is situated on the boundary of the Free State and KwaZulu-Natal Provinces, straddling the escarpment of the Low Berg, South Africa (Figure 1.2). Eskom Holdings initiated an Environmental Impact Assessment (EIA) for the IPSS in early 1998, culminating in the then Minister of Environmental Affairs and Tourism authorising the scheme in December 2002. Construction of the scheme was initiated in mid-2005. One of the recommendations of the specialist studies during the EIA, subsequently captured into the Record of Decision, was the need to purchase additional land surrounding the IPSS and to apply for the proclamation of the land associated with the IPSS as a Nature Reserve, in order to secure the biodiversity value of the site.

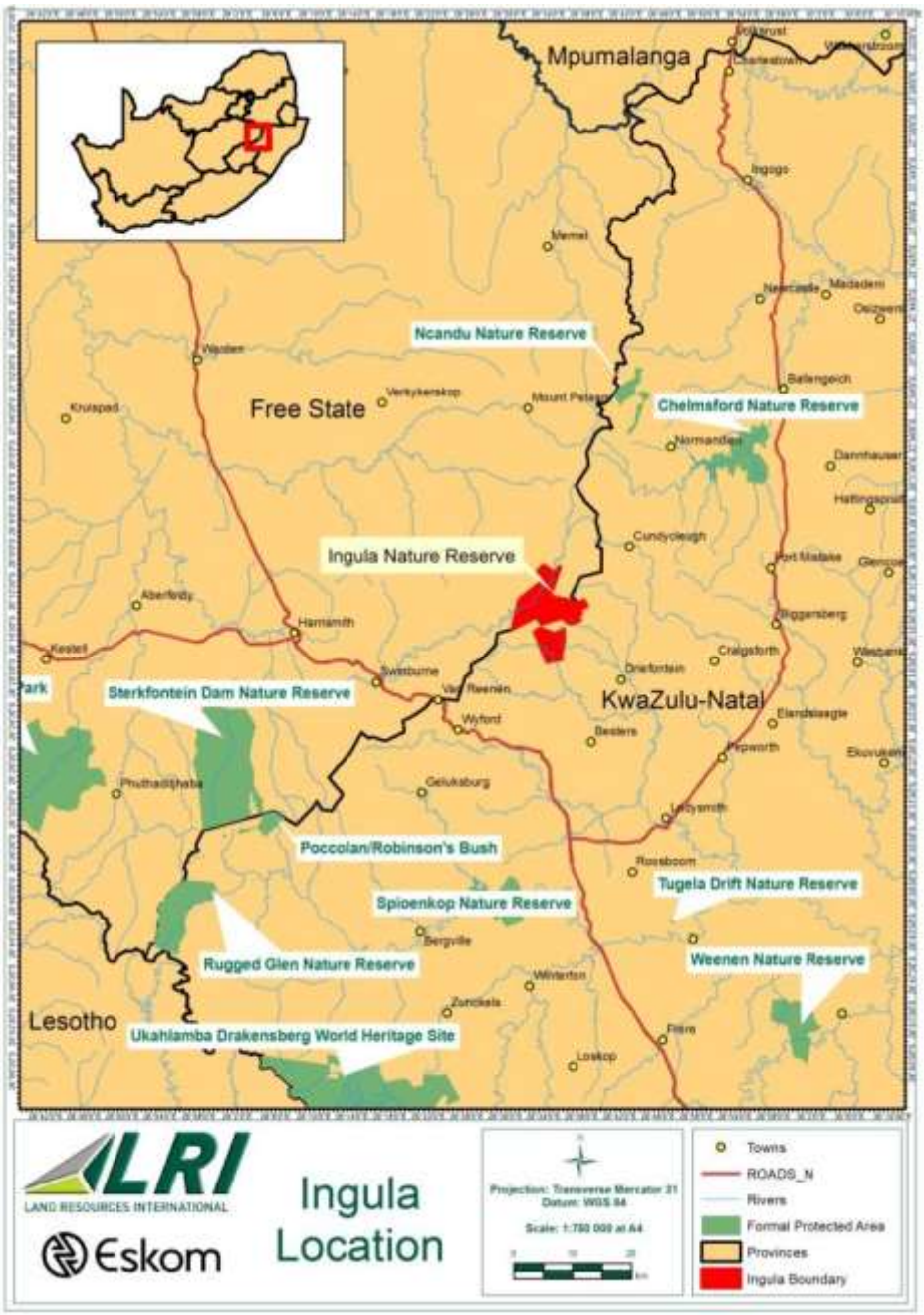


Figure 1.2: Regional location of Ingula Nature Reserve

The primary activity driving the development of this protected area is the Pumped Storage Scheme (PSS) and the generation of electricity, with the protection of the biodiversity value and the development of social integration ensuring the sustainability of the Pumped Storage Scheme. In order for the PSS to be developed and to be sustainable, the protection of the relevant biodiversity and catchments becomes a primary activity linked to the PSS activities.

1.4 The values of INGULA NATURE RESERVE

The values of a protected area are those remarkable attributes that exemplify it and which led to it being identified as a priority for being established and secured. The values are important in planning and management, as they are the aspects of the area that must be protected. The values of Ingula Nature Reserve include:

Table 1.1: The values of Ingula Nature Reserve

Strategic	Integration of an industry with a conservation area – model for future conservation initiatives, i.e. allowing the PSS to operate and conserve the natural capital of the surrounding area (biodiversity and ecosystem services value). Formation of a core conservation area as a catalyst for encouraging conservation principles and management in the broader landscape / catchment (regional context). Educational and scientific research value of the site. Sound environmental management allowing the Pumped Storage Scheme to operate (strategic value of the PSS to electricity generation, national benefit). To use this initiative to catalyse social development within the local communities.
Social values	Contribution to sustainable livelihoods in the district for local communities, contributing to job creation and food security, with the long-term objective of poverty alleviation.
Natural values	Presence of threatened habitats – wetlands, scarp forests, grasslands. The value of these key habitats for threatened species. Protection of under-represented (in the current protected area network) high-altitude grasslands, and the relatively large size of the property in the grassland biome. Extensive grassland and wetland habitat (and its good condition) on the property, considering the poor protection status nationally. Presence of significant areas of Scarp Forest, being listed as a “threatened ecosystem” by SANBI and protected through this initiative. Maintenance of escarpment forest connectivity along the escarpment corridor.

	A diversity of habitats (habitat heterogeneity). The presence of key species that require protection - • White-winged Flufftail • Wattled Crane, Blue Crane, Grey Crowned Crane • Southern Bald Ibis • Yellow-breasted Pipit • Martial Eagle • African Marsh Harrier • Oribi antelope • Fairy Shrimp The property has a number of regional endemics, e.g. Rudd's Lark, Yellow-breasted Pipit, *Kniphofia linearifolia*, Amatole Rocksitter, *Doratogonus septentrionalis* (Northern Black Millipede, KZN endemic), *Tetradactylus breyei* – (Breyer's Long-tailed Seps), *Smaug giganteus* (Sungazer), *Cordylus* vittifer (De Waal's Girdled Lizard) The site is registered as an Important Bird Area (IBA no.: SA043 - Bedford / Chatsworth). Potential for the site to become a Ramsar site.
Ecosystem service values	The position of the property along a continental watershed. Water catchment management value – ecological infrastructure to ensure water supply and regulation, water purification. The National Freshwater Ecosystem Priority Area status of the wetlands and rivers on the property – Wetlands and rivers are classed as 'Largely Natural or Good', and have FEPA status as priority areas for conservation. The extensive carbon storage in the grasslands and peat wetlands. Value in terms of climate change resilience (adaptation / mitigation) through the altitudinal gradient. Supply of sustainably harvested materials for community utilisation.
Eco-cultural tourism values	The scenic beauty of the site. Multiple use opportunities. Network of trails and paths for ecotourism opportunities.
Cultural and historic values	Paleontological, archaeological and historic value identified and present in a single property / reserve. Scientific value of archaeological and paleontological records (recorded in detail and stored in the National Museum in Bloemfontein). Continuum in a single place of cultural and archaeological history. Presence of recorded San history in the area, including extensive presence of San art and artefacts.
Economic	Job creation from the PSS and conservation and tourism activities. Ability of the site to sustain appropriate social development and utilisation.

1.5 Purpose of the INGULA NATURE RESERVE

Consistent with Section 17 of the National Environmental Management: Protected Areas Act (No.57 of 2003) (NEM: PAA), the purpose of the Ingula Nature Reserve is to:

- Support the development of the IPSS, through the legal authorisation process, ensuring the protection of regional biodiversity values.
- Create an environment in which social development of the area can take place, within the context of the IPSS and conservation requirements.
- Protect an ecologically viable, representative area of the vegetation types present (including the grasslands, wetlands and indigenous forests), and their associated biodiversity and species assemblages in efforts to achieve provincial and national biodiversity conservation targets.
- Protect the ecological integrity and functioning of wetlands, their catchments and surrounding grasslands, i.e. securing ecological water infrastructure.
- Protect the biodiversity of the area, in particular threatened, rare and endemic species to the area.
- Ensure that the Bedford and Wilge wetlands continue to perform a key role in the functioning of the upper Wilge River catchment through the sustained supply of environmental goods and services.
- Provide a destination for eco-cultural tourism that contributes to economic development in the surrounding local communities.
- Provide sustainable access by the public to the area and its resources.
- Create an environment in which the IPSS can operate.
- Support local community development through the integration of conservation and IPSS management.
- Protect the wetland habitats through securing the site in terms of the Ramsar Convention.

1.6 Adaptive management

The preparation of this management plan has been undertaken based on the guiding principles of adaptive management, which is a structured, iterative process in which decisions are made using the best available information, with the aim of obtaining better information through monitoring of performance (Figure 1.3). In this way, decision making is aimed at achieving the best outcome based on current understanding, whilst accruing the information needed to improve future management. Adaptive management and learning can lead to revision of a part or if necessary the whole management plan.

Figure 1.3: The adaptive management cycle (Management Strategy Evaluation, 2009)

Adaptive management enables landowners and managers to:

i. Learn through experience.
ii. Take account of, and respond to, changing factors that affect the area.
iii. Develop or refine management processes.
iv. Adopt best practices and new innovations in biodiversity conservation management.
v. Demonstrate that management is appropriate and effective.

1.7 Consultation

Stakeholder involvement and support is an important aspect of effective protected area management. It is also a requirement in terms of Sections 39(3) and 41(2)(e) of the NEM:PAA. Accordingly, the development of this management plan has been undertaken through a collaborative process, involving local communities and other key stakeholders.

Consultation in drafting the management plan has been undertaken through a series of meetings, discussions and workshops with key stakeholders, shown in Table 1.2.

Table 1.2: Workshops and meetings held with stakeholders in drafting the Ingula Nature Reserve management plan.

Date	Meeting	Province
18 June 2012	Free State DEDTEA – Coenie Erasmus and Narcelle Collins	Free State
6 / 7 August 2012	Ingula Management Plan workshop	KwaZulu-Natal and Free State representation

30 August 2012	Ingula Partners Forum – presented Vision / Management Objectives	Johannesburg
18 / 19 October 2012	Management Plan workshop (Ingula)	KwaZulu-Natal and Free State representation
19 November 2012	Management Plan workshop	KwaZulu-Natal and Free State representation
21 January 2013	Management Plan workshop	Ladysmith
245 January 2013	Ingula Partners Forum – presented management programmes	Johannesburg
27 March 2013	Eskom meeting – Legal Department (declaration agreements)	Johannesburg
15 May 2013	Management Plan workshop	Johannesburg
16 May 2013	Ingula Partners Forum	Johannesburg
29 May 2013	Eskom / Ingula Stakeholder Forum –	KwaZulu-Natal and Free State representation
1 July 2013	Management Plan workshop	Ladysmith
2014	Informal meetings with neighbours and local communities	IPSS, KwaZulu-Natal and Free State
19 June 2015	Formal revision of Ingula Nature Reserve management plan	Ladysmith

2) DESCRIPTION AND CONTEXT OF INGULA NATURE RESERVE AND ITS CONTEXT

2.1 Introduction

The IPSS is situated on the continental watershed known as the Klein Drakensberg dividing the Vaal catchments which flows into the Atlantic Ocean and the Tugela Catchments flowing into the Indian Ocean. The site is situated across two provincial boundaries namely the Free State and KwaZulu-Natal Province. The scheme operates two reservoirs, namely the upper Bedford Dam; situated in the Free State Province; and the lower dam known as the Braamhoek Dam; situated in KwaZulu-Natal Province. The two dams have an elevation difference of 468 meters and are connected through a series of underground waterways. An underground pump station responsible for the transfer of water between the two dams has four 333 MW turbines giving a total generation capacity of 1332 MW.

The envisioned operating methodology applied at IPSS is to produce electricity for supply to the National Energy Grid, operated and managed by Eskom, through the release of water from the upper Bedford reservoir, through the underground waterways and turbines into the lower Braamhoek reservoir. The same principle will be reversed during periods of low electricity demand by abstraction of surplus electricity from the National Energy Grid to power the pump station therefore abstracting water from the lower Braamhoek reservoir through the underground waterways thereby re-filling the Bedford reservoir.

The natural setting of the IPSS results in a very high biodiversity with ecosystems including the natural Highveld grasslands, high altitude Wilge River Wetlands and the high altitude forests that can be seen in the valleys formed by the escarpment. Eskom and its partners envisioned the conservation of the natural setting of Ingula by forming the Ingula Partnership. The conservation and protection of the environment is therefore seen as the second operational task at Ingula, other than just producing electricity.

The IPSS operates two primarily actions namely, the hydropower scheme and a conservation area in accordance with the conditions of the Ingula Record of Decision (RoD), Ref A24/16/3/124 of 13 December 2002. This document provides the guidelines for Eskom to follow in order to achieve the desired goal as a declared National Protected Area under NEM: Protected Areas Act, in compliance to the conditions within the RoD documents for IPSS. The long term management initiatives and implementation requirements for the declaration of a National Protected Area should be guided by the management objectives and requirements within this document in order to achieve a sustainable outcome for the conservation operations at IPSS.

2.2 The history of INGULA NATURE RESERVE

The area designated for proclamation as the Ingula Nature Reserve has historically been used for intensive grazing and to a lesser extent, for small scale farming. Historical photographic records from the 1950s show ploughed lands in the floodplains of both the Wilge and Braamhoek Rivers, and there are oral records of large numbers of sheep and cattle being grazed on the areas during the middle of the last century. The area was subjected to extremely heavy grazing by sheep during the 2nd World War, and again just prior to the purchase of the area by Eskom when there were in excess of 5000 head of cattle on the property, borne out by the varying ages of erosion on the property.

There are records of people frequenting the area from the late Stone Age, as indicated by archaeological research carried out by Eskom on the property. There are also records indicating the waterfall "Klipgat" was used as a refuge during the second Anglo-Boer War. Graffiti dating back the early 1900s (when sheep marking paint became available) is also recorded from Klipgat, where numerous farmers and visitors to the area recorded their names.

The area has primarily been used as summer grazing by commercial farmers, with a few resident dwellers with small numbers of livestock permanently in the area. The area has been subjected to annual fires, with very little historical management. Occasional ecological surveys were conducted, and the area was identified as an Important Bird Area By BirdLife SA. The Free State Department of Economic Development, Tourism and Environmental Affairs identified it as an important wetland and invested significant resources in wetland rehabilitation in 2001.

Conservation interest in the area increased when Eskom identified the upper reaches of the Bedford Wetland to develop their third Pumped Storage Scheme. The initial authorisation by Government to construct the station was overturned in 2001 following objections from various Government and Non-Government Organisations on the grounds of impact on wetlands and threatened species. Following further research, and detailed negotiation between all interested and affected parties, the objections were withdrawn and a new authorisation issued to Eskom to undertake the project. Amongst the many conditions were the requirements to purchase additional property and manage this as a conservation area to offset the impacts of the construction, and the recommendation to enter into a partnership with the NGOs to jointly oversee the development. The Ingula Partnership was established, and the extended area is being developed as a nature reserve.

2.3 The legislative basis for the management of INGULA NATURE RESERVE

There is a large body of legislation that is relevant to the management of Ingula Nature Reserve, but the primary legislation guiding the management of protected areas is the National Environmental Management: Protected Areas Act (No.57 of 2003).

The NEM: Protected Areas Act establishes the legal basis for the creation and administration of protected areas in South Africa, as its objectives include provisions "for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes". The Act sets out the mechanisms for the declaration of protected areas and the requirements for their management. A detailed list of relevant legislation is provided in the Eskom Ingula Environmental Management System (ISO14001 legal register).

2.3.1 Proclamation status of INGULA NATURE RESERVE

Eskom have initiated the formal proclamation of the below-mentioned properties associated with the IPSS, according to the process stipulated in NEM: Protected Areas Act. The properties involved in the declaration of the Ingula Nature Reserve include (shown in Figure 2.1):

Free State -

- The farm Bedford 2 No. 1845, Harrismith District in the Free State province, in extent 877,7279 (Eight hundred and seventy seven comma seven two seven nine) hectares, first registered and still held by certificate of Consolidated title T6308/1981 with diagram LG 471/80 relating thereto.
- Portion 6 of the Farm Bedford No. 389, Harrismith District in the Free State province, in extent 877,7273 (Eight hundred and seventy seven comma seven two seven three) hectares, first registered and still held by Certificate of Consolidated Title No. T6311/1981 with Diagram LG No. 472/80 relating thereto.
- The Farm Chatsworth No. 388, Harrismith District in the Free State province, in extent 1614,5628 (One thousand and fourteen comma five six two eight) hectares, first transferred by Deed of Transfer No. T19879/1994 with diagram relating thereto and held by Deed of Transfer No. T27596/2004.
- The Farm Ontario No. 663, Harrismith District in the Free State province, in extent 331,3052 (Three hundred and thirty one comma three zero five two) hectares, first transferred by Deed of Transfer No. T947/1915 with diagram relating thereto and held by Deed of Transfer No. T5468/1961.
- Portion 1 of the Farm Wilge Rivier No. 319, Harrismith District in the Free State province, in extent 446,2189 (Four hundred and forty six comma two one eight nine) hectares, first transferred by Deed of Transfer No. T3684/1943 with diagram relating thereto and held by Deed of Transfer No. T3821/2003.
- Portion 2 of the Farm Wilge Rivier No. 319, Harrismith District in the Free State province, in extent 446,2189 (Four hundred and forty six comma two one eight nine) hectares, first transferred by Deed of Transfer No. T3685/1943 with diagram relating thereto and held by Deed of Transfer No. T90/1958.
- Portion 3 of the Farm Wilge Rivier No. 319, Harrismith District in the Free State province, in extent 446,2189 (Four hundred and forty six comma two one eight nine) hectares, first

transferred by Deed of Transfer No. T3686/1943 with diagram relating thereto and held by Deed of Transfer No. T9176/1974.

- Remainder of the Farm Wilge Rivier No. 319, Harrismith District in the Free State province, in extent 446,3560 (Four hundred and forty six comma three five six zero) hectares, first transferred by Deed of Transfer No. T3207/1917 with diagram relating thereto and held by Deed of Transfer No. T32246/2000.

KwaZulu-Natal -

- The Farm Boundary Slopes No. 11081, Registration Division GS in the province of KwaZulu-Natal, in extent 548,3942 (Five hundred and forty eight comma three nine four two) hectares, first transferred by Crown Grant no. 11081/1927 with diagram relating thereto and held by Deed of Transfer T11912/1981.
- Portion 1 of the Farm Bramhoek No. 1220, Ladysmith District in the province of KwaZulu-Natal, in extent 819.6156 (Eight hundred and nineteen comma six one five six) hectares, first transferred by Deed of Transfer No. T2160/1906 with diagram relating thereto and held by Deed of Transfer No. T43835/1999.
- Portion 3 (of 1) of the Farm Bramhoek No. 1220, Ladysmith District in the province of KwaZulu-Natal, in extent 819.6156 (Eight hundred and nineteen comma six one five six) hectares, first transferred by Deed of Transfer No. T T7541/1949 with diagram relating thereto (SG diagram no. SV673F11) and held by Deed of Transfer No. T. T43835/1999.
- Proposed subdivision - Portion 34 of the Farm Zaaifonein No. 1074, Ladysmith District in the province of KwaZulu-Natal, in extent 314.6671 (Three hundred and fourteen comma six six seven one) hectares.
- Proposed subdivision - Portion 35 of the Farm Zaaifonein No. 1074, Ladysmith District in the province of KwaZulu-Natal, in extent 94.7364 (Ninety four comma seven three six four) hectares.

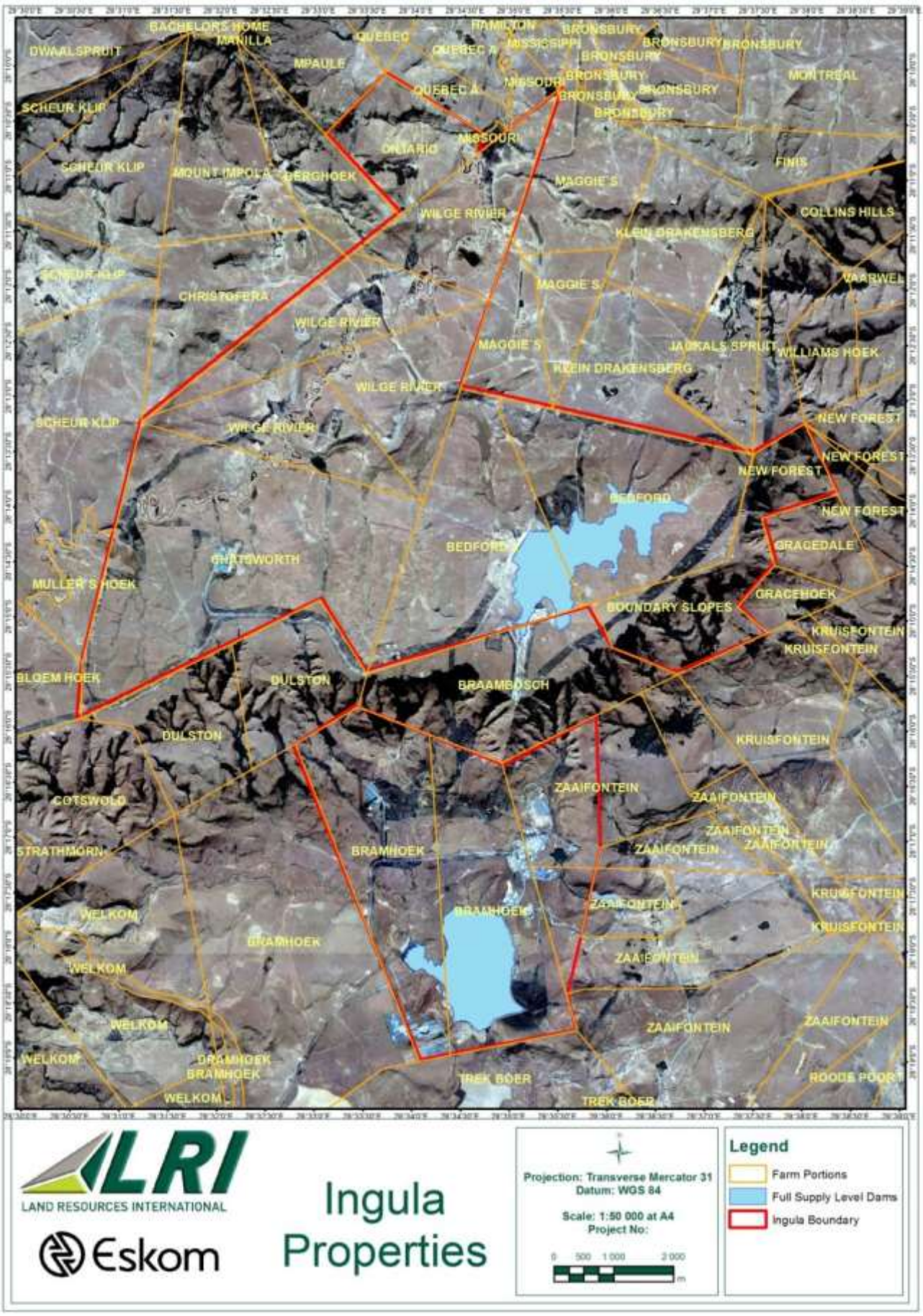


Figure 2.1: Cadastral boundaries of the properties involved in the declaration of the Ingula Nature Reserve.

2.3.2 Invasive species control in terms of the Biodiversity Act

In terms of Section 76 of the National Environmental Management: Biodiversity Act (No.10 of 2004), the management authority of a protected area must incorporate an invasive species control plan in the protected area management plan. This is addressed in Sections 4 and 5 below.

2.3.3 The Ramsar Convention

The Ingula Nature Reserve is planned to be listed as a Ramsar sited in terms of the Convention on Wetlands of International Importance (commonly known as the Ramsar Convention). In terms of the convention, South Africa, as a contracting party, is required to formulate and implement planning so as to promote the conservation of wetlands included in the list (Article 3). Article 4 of the convention requires that contracting parties establish nature reserves to protect their wetlands, encourage wetland research and provide competent personnel to manage their wetlands.

Guidelines for management planning for Ramsar wetlands were adopted in terms of Resolution VIII.14 of the 8th meeting of the Conference of the Contracting Parties to the convention. The guidelines provide a framework for the development of management plans, not a prescription of their detailed contents. Given the proposed Ramsar status of the Ingula Nature Reserve, the development of this management plan has taken into consideration the management planning requirements set out in the guidelines. In particular, the following requirements have been considered and integrated into the plan:

- The adaptive management approach.
- The layout suggested in the guidelines, which is similar to that adopted in this management plan.
- The requirements for stakeholder participation, which seek to involve all interested and affected parties, including local communities and government structures.
- The requirements for inclusion of buffers and zonation within a protected area in an effort to limit inappropriate activities in ecologically sensitive areas.
- The operational limits described in the guidelines, which are similar to the indicators of concern set out in Section 5 below.

2.3.4 Provincial Level Planning

In addition to national legislation, some of South Africa's provinces have their own provincial biodiversity legislation, as nature conservation is a concurrent function of national and provincial government in terms of the Constitution (Act 108 of 1996).

The Provincial Department responsible for environmental matters in the Free State Province is the Department of Economic Development, Tourism and Environmental Affairs. Relevant provincial legislation includes, but is not limited to:

- Free State Nature Conservation Ordinance, 1969 (Ord. No 8 of 1969) and;
- Free State Nature Conservation Bill (General Notice 10 of 2010).

The Provincial Department responsible for environmental matters in the KwaZulu-Natal Province is the Department of Agriculture and Environmental Affairs, delegated to the KwaZulu-Natal Nature Conservation Board (Ezemvelo KZN Wildlife). Relevant provincial legislation includes, but is not limited to:

- KwaZulu-Natal Nature Conservation Management Act, 1997 (Act No. 9 of 1997);
- KwaZulu-Natal Nature Conservation Management Amendment Act, 1999 (Act No. 5 of 1999);
- Natal Nature Conservation Ordinance, 1974 (Act No. 15 of 1974).

2.4 The regional and local planning context of INGULA NATURE RESERVE

2.4.1 EIA Regulations in terms of NEMA

In terms of the development of the IPSS, the following Records of Decision were obtained by Eskom Holdings -

Table 2.1: Records of Decision obtained in the development of the IPSS

ROD name	Dated	Reference Number	Covering
Main ROD	13 December 2002	A24/16/3/124	Power station, tunnelling, quarrying, dams and advanced infrastructure
Access Road ROD	24 April 2006	12/12/20/671	Sections 1-5 asphalt roads to IPSS
Ingula Bridge	02 January 2009	12/12/20/1266	Bridge upgrade on Bramhoekspruit below Bramhoek Dam wall
22 KV	18 August 2008	12/12/20/811	Distribution line for the IPSS linking Bedford Dam, Bramhoek Dam, labour camps and site admin buildings.
88kV	11 July 2012	12/12/20/2311	Construction of the Eskom 88kV power line from Mathondwane to Zaaifontein.
400kV HV Yard	24 April 2006	12/12/20/672	Substation for the IPSS
400kV Turn in lines	24 April 2006	12/12/20/674	400kV turn in line from the Majuba-Venus Main line to IPSS
400kV Main Line	24 April 2006	12/12/20/673	Main Bramhoek-Venus 400kV line
Telecoms Tower	24 June 2008	12/12/20/1089	IPSS Telecommunication Mast
Asphalt Plant	06 November 2007	12/12/20/961	Asphalt plant for the surfacing of Ingula Access Roads
Culverts and sewer line	19 August 2014	14/12/16/3/3/1/1019	Culvert upgrades, sewer line crossing and minor civils works in watercourses for Area 2 and Devil's Culvert.

The IPSS was subject to the following minimum conditions, in terms of the Mentis (2002) and Partridge (2002) reports, an annex to the RoD:

- *Eskom purchase the farms Wilge Rivier 319, Bedford 389 and Chatsworth 388, hereafter called Bedford Wetland Park (BWP).*
- *In addition to operating the pumped storage scheme, the objectives of BWP were to conserve, as far as reasonably possible, the natural features and native biota of BWP by means of a management plan that addresses significant environmental effects.*
- *Eskom dispense with the by-pass system and ensure that the unregulated streamflow regime is replicated in terms of volume and seasonal timing of base and flood flows.*
- *Eskom ensures that concentrated delivery of runoff and streamflow into Portion B of the wetland is prevented.*
- *Eskom ensures that the geometry of wetland Portion B is not altered, and the base level to which erosion is working is unchanged.*
- *Eskom rehabilitates sheet and gully erosion in the catchment of the Bedford-Chatsworth wetland (an offset).*
- *Eskom funds research into local wetlands and wetland biota (an offset).*
- *Eskom rehabilitates wetlands on BWP to the extent that research and experience show to be necessary (an offset in compensation for flooding wetland Portion A and wetland above the waterfall).*

Following the above requirements Eskom purchased the additional property (as outlined below) and initiated a process to proclaim the area in terms of NEM: Protected Areas Act.

ROD Requirement - REFERENCE NUMBER: A24/16/3/124 13 December 2002

6.2 Project specific conditions

6.2.1 The mitigation measures for this activity and the recommendations contained in the reports of Dr M Mentis and Prof T C Partridge, dated August and October 2002 respectively, must be implemented.

6.2.2 Environmental management plans (EMPs) for the construction and operation of all phases of the proposed development must be compiled and submitted to this department as well as the relevant provincial environmental departments for approval. The EMP may be altered where monitoring and auditing of the construction and operation of the units show this to be beneficial. Any alterations to the EMP shall be subject to approval by the Department of Environmental Affairs and Tourism.

6.2.3 Eskom shall purchase the farms Wilge Rivier 319, Bedford 389 and Chatsworth 388 as per recommendation in the specialist report revision 6 of October 2002, drafted for Eskom by Dr Mike Mentis, pg 44. This area will then be known as Bedford Wetland Park (BWP). This area shall be managed by Eskom in close cooperation with the relevant provincial departments.

2.4.2 Protected Area buffer requirement

In terms of the National Environmental Management Act (No.107 of 1998) environmental impact assessment (EIA) Regulations, various activities require environmental authorisation before they may commence. In terms of Regulation RN.546, Listing Notice No.3, there are a number of activities that require environmental approval *specifically* as a result of their proximity to a protected area (Figure 2.2).

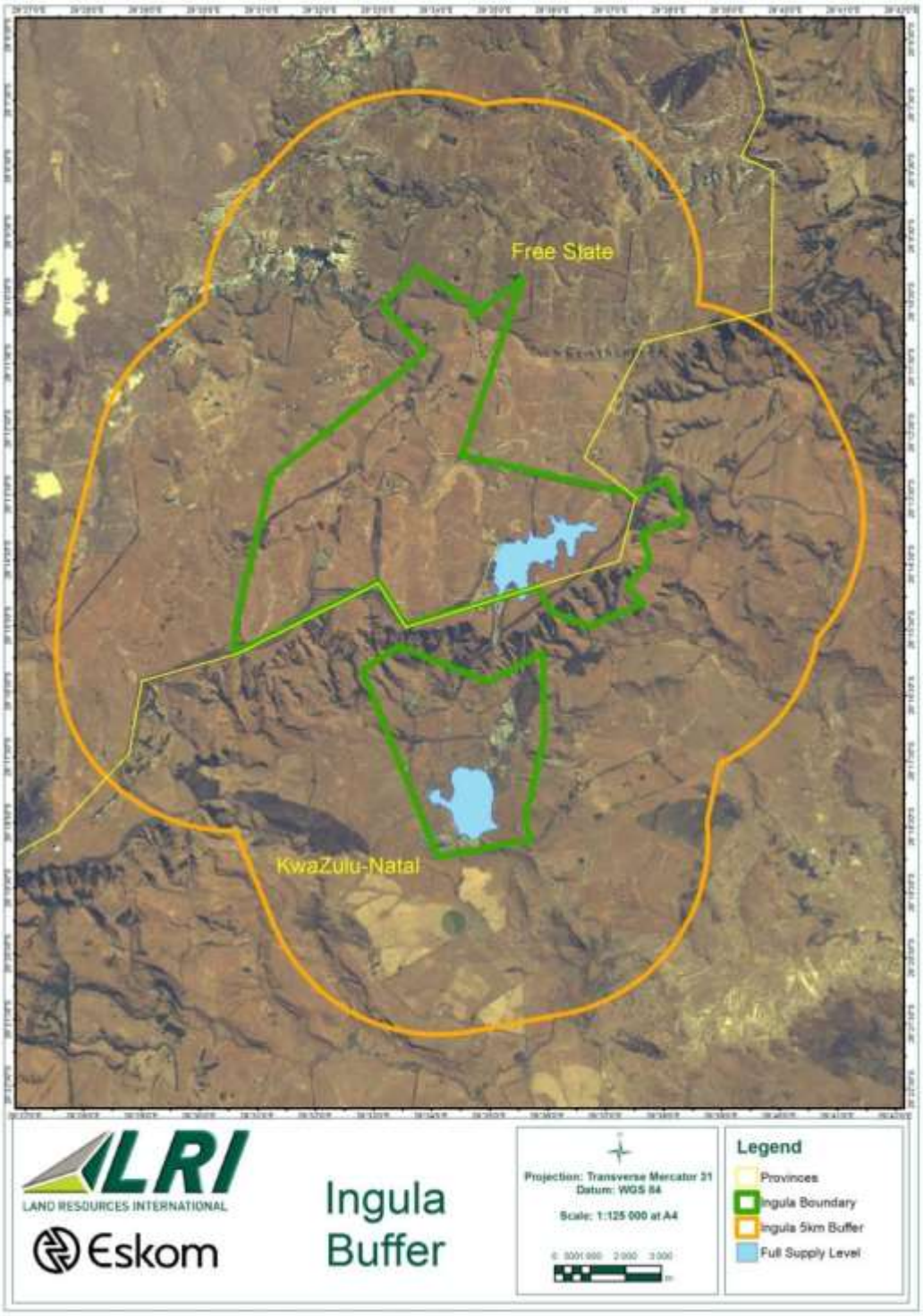


Figure 2.2: The five kilometre boundary, in which Listing Notice No. 3 of the EIA Regulations applies, around Ingula Nature Reserve

The implication of this is that if any of the activities listed in Notice 3 are proposed in the nature reserve, or within five kilometres of it, they will be subject to either a basic assessment or a full scoping and EIA process. A number of general activities and those proposed for either tourism development or operational management within the nature reserve or its buffer areas will thus also require environmental authorisation. Protected area management must ensure that neighbouring landowners are aware of this requirement.

2.4.3 The National Protected Area Expansion Strategy

In an effort to address a lack of effective protection and representation of all vegetation types within the protected areas system, a National Protected Area Expansion Strategy (NPAES, DEAT 2008) has been developed and approved at a national ministerial level. The purpose of the NPAES is to provide a national framework for the expansion and consolidation of the protected area system, focussing on priority areas for representation and persistence of biodiversity.

In terms of the NPAES, the areas around the borders of Ingula Nature Reserve are identified as priorities for protected area expansion (Figure 2.3). The nature reserve falls within Region 25 of the National Protected Area Expansion Strategy focus areas, the Moist Escarpment Grasslands. The NPAES states that this focus area "provides opportunities for consolidating protection of moist high-altitude grasslands, protecting ecosystem services, and incorporating ecological gradients for resilience to climate change. It is the source area for several free-flowing rivers and includes critically endangered river types."

On the basis of the NPAES, at a national level, Ingula Nature Reserve is a strategically important protected area that forms a critical nodal point for the expansion of protected area efforts in an important but currently under-represented ecosystem.

2.4.4 Local government planning mechanisms

In terms of the principles of cooperative governance set out in the Constitution of South Africa, the different spheres of government are required to coordinate their actions with one another. In terms of the conservation objectives of a protected area, this is an important aspect in ensuring that appropriate land uses are applied in the areas around it, as they may influence the operation of the protected area and the ecological functioning within it. Given the importance of the water production and ecosystem service values of the nature reserve, which extend well beyond its boundaries to the areas encompassing the catchment of the Wilge River and Braamhoek River systems, it is particularly important that these issues are adequately addressed.

On this basis, it is important to ensure that local government planning mechanisms such as Integrated Development Plans (IDPs) and Spatial Development Frameworks (SDFs) are aligned with the conservation objectives and principles of protected areas within their jurisdiction.

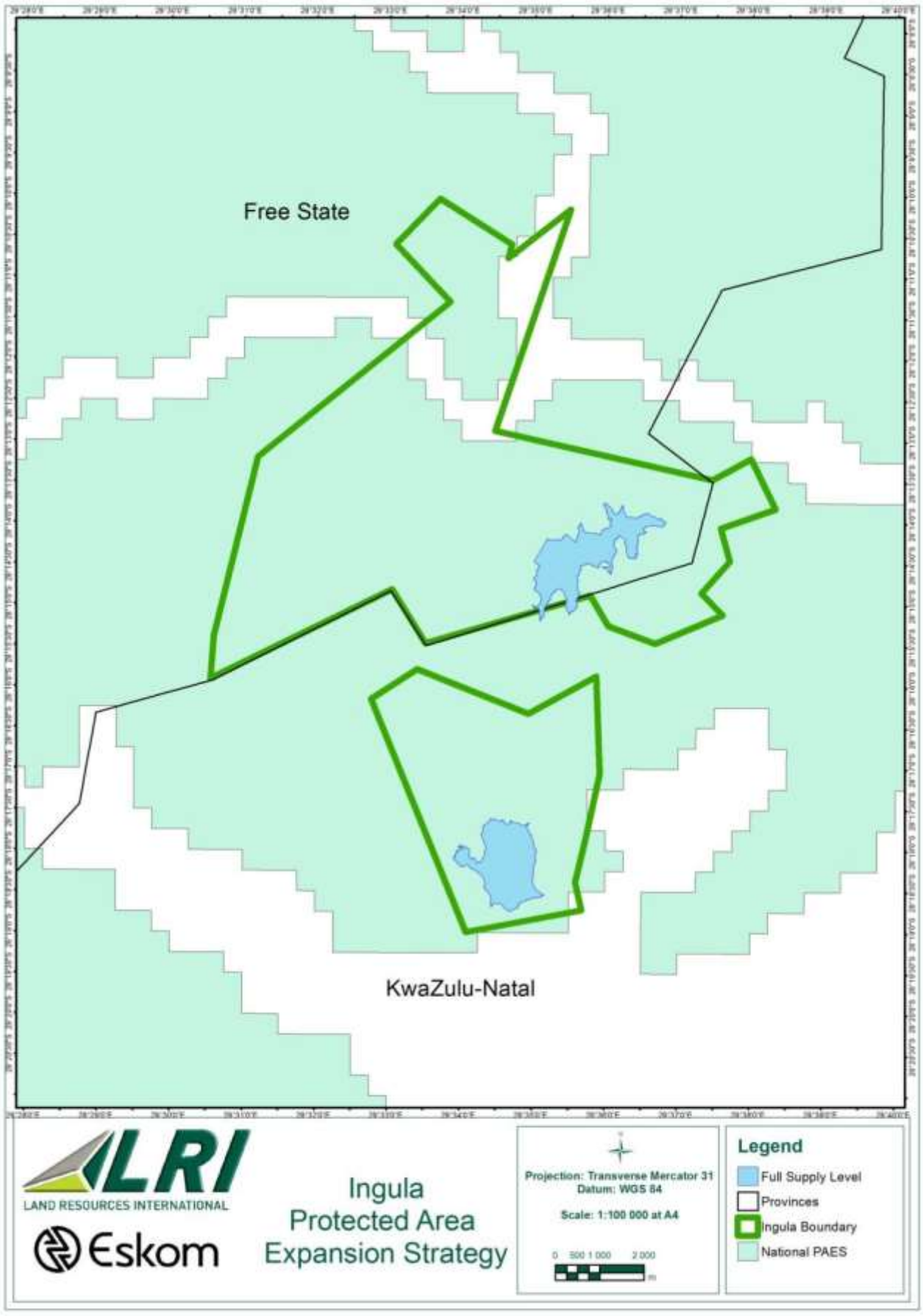


Figure 2.3: National Protected Area Expansion Strategy focus areas around Ingula Nature Reserve

According to the demarcation of local municipalities, the Ingula Nature Reserve falls into the following local municipalities (Figure 2.3):

- KwaZulu-Natal – Emnambiti Local Municipality (KZN232)
- Free State – Maluti A Phofung (FS 194) and Phumelela Local Municipalities (FS 195)

Emnambiti – Ladysmith Local Municipality (KZN 232)

According to the Integrated Development Plan for the Local Municipality, agriculture is the most prominent landuse and has the biggest spatial footprint, largely used for commercial farming. The economic make-up of the Municipality provides only for limited economic beneficiation. This aspect needs to be addressed to attain economic growth in the area. Therefore, according to the Spatial Development Framework, the Ingula Nature Reserve corresponds to the area identified for commercial agriculture and tourism, and is regarded as consistent with the suggested landuse of the area.

Maluti A Phofung Local Municipality (FS 194)

The Integrated Development Framework has highlighted several priorities, including the following: Extracted from the IDP –

- "Unlocking the development potential of the area, particularly tourism and indigenous knowledge and mobilising investment because of our uniqueness;
- Enabling all communities to have access to basic services and land;
- Ensuring a safe, healthy and secure environment."

The Ingula Nature Reserve is therefore perfectly placed to contribute to these priorities, focusing on the development of sustainable jobs with the management of the IPSS and nature reserve, and growing the job creation potential through the development of tourism products.

Phumelela Local Municipality (FS 195)

A detailed Land Use Management System has been developed for the Phumelela Local Municipality. This Land Use Management System has been developed using the following principles (relevant to the Ingula Nature Reserve), overall to promote integration of all communities: -

- To promote an environment which will contribute and facilitate local economic growth and be compatible with the needs of small, micro and medium enterprises;
- To develop a spatial framework which accommodates the diverse socio-economic needs of the local communities and potential investors;
- Promote the sustainable use of land and resources;
- Stimulate economic development opportunities in rural areas;
- Promote accountable, open and transparent decision-making in terms of land use and development; and
- Improve co-operative governance and information sharing.

Most of the Municipality is characterised by extensive agricultural activities. The Municipality has recognised the need to develop eco-tourism activities and facilities to supplement the current primary agricultural activities. The Phumelela Local Municipality has identified the following strategies, through which the Ingula Nature Reserve could contribute:

The following strategies should be implemented to address environmental aspects:

Promotion of Environmental Education:

- Environmental awareness campaign;/Environmental education;
- Environmental responsibility promotion;
- Availability of environmental information; and
- Preserving heritage and cultural sites

Promotion of Environmental Rehabilitation

- Preserving heritage and cultural sites;
- Promoting Maintenance of parks and natural areas; and

Promotion of Environmental Sustainability

- Implementing an effective waste management system;
- Integrated environmental conservation, protection and development;
- Access to the natural environment;
- Environment tourism throughout the district;
- Sensitive and sustainable land use planning;
- Regulations to protect the Environment;
- That red-data species be protected.

2.5 Ecological context of INGULA NATURE RESERVE

2.5.1 Climate and weather

The Ingula Nature Reserve is situated along the northern-most part of the Drakensberg mountain range, known for its extreme weather. The crest of the escarpment is known as an orographic barrier with high rainfall on the seaside, and a rain shadow inland. The area is characterized by summer rainfall, temperate summers and very cold winters. The rainfall season stretches from September to April with a mean annual rainfall ranging from 800 mm to 1000 mm. Summers are cool with the possibility of thunderstorms; winters are cold with occasional snow. Figures 2.4 and 2.5 show the average temperatures and rainfall for the area.

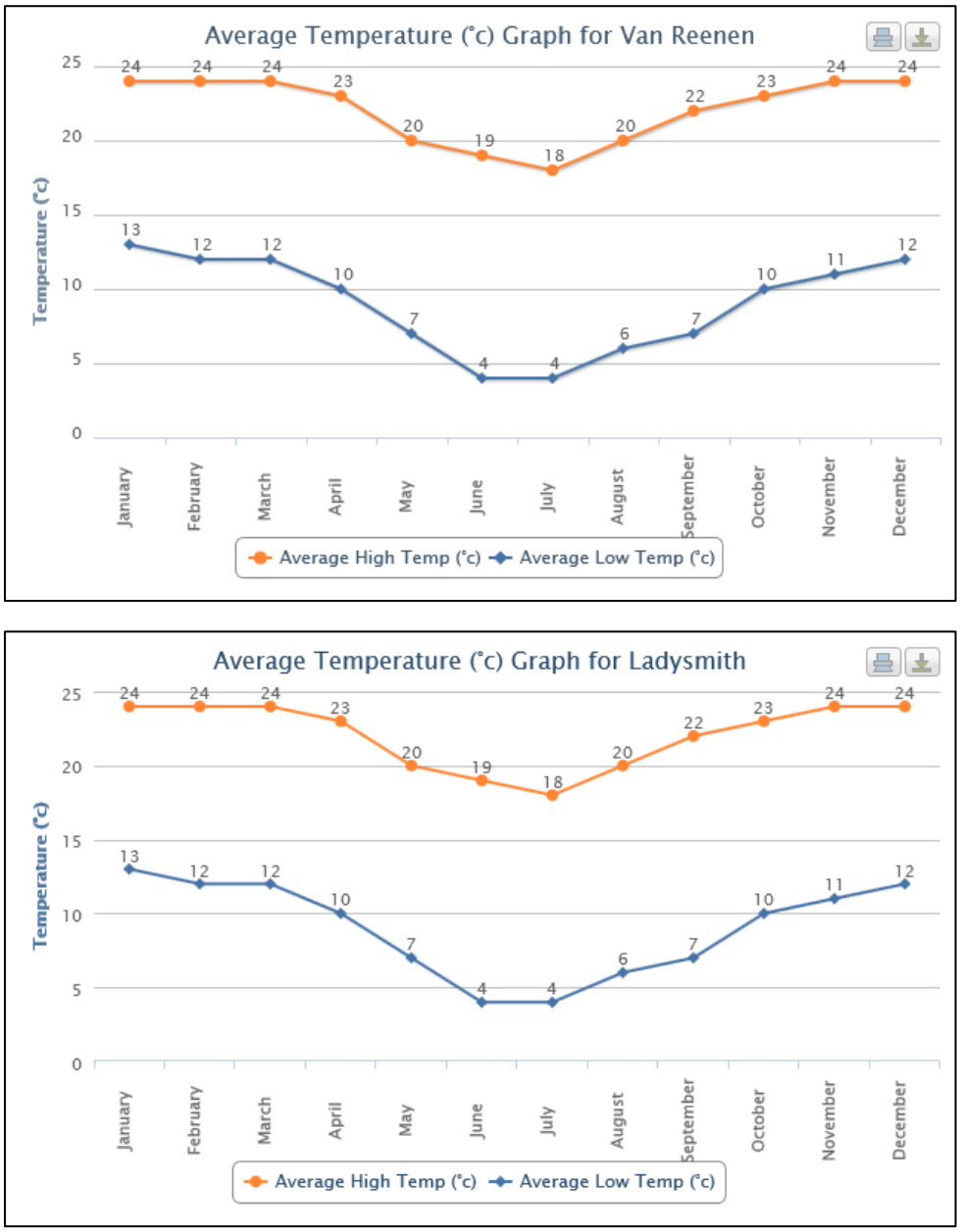


Figure 2.4: Average high and low temperatures at Van Reenen and Ladysmith

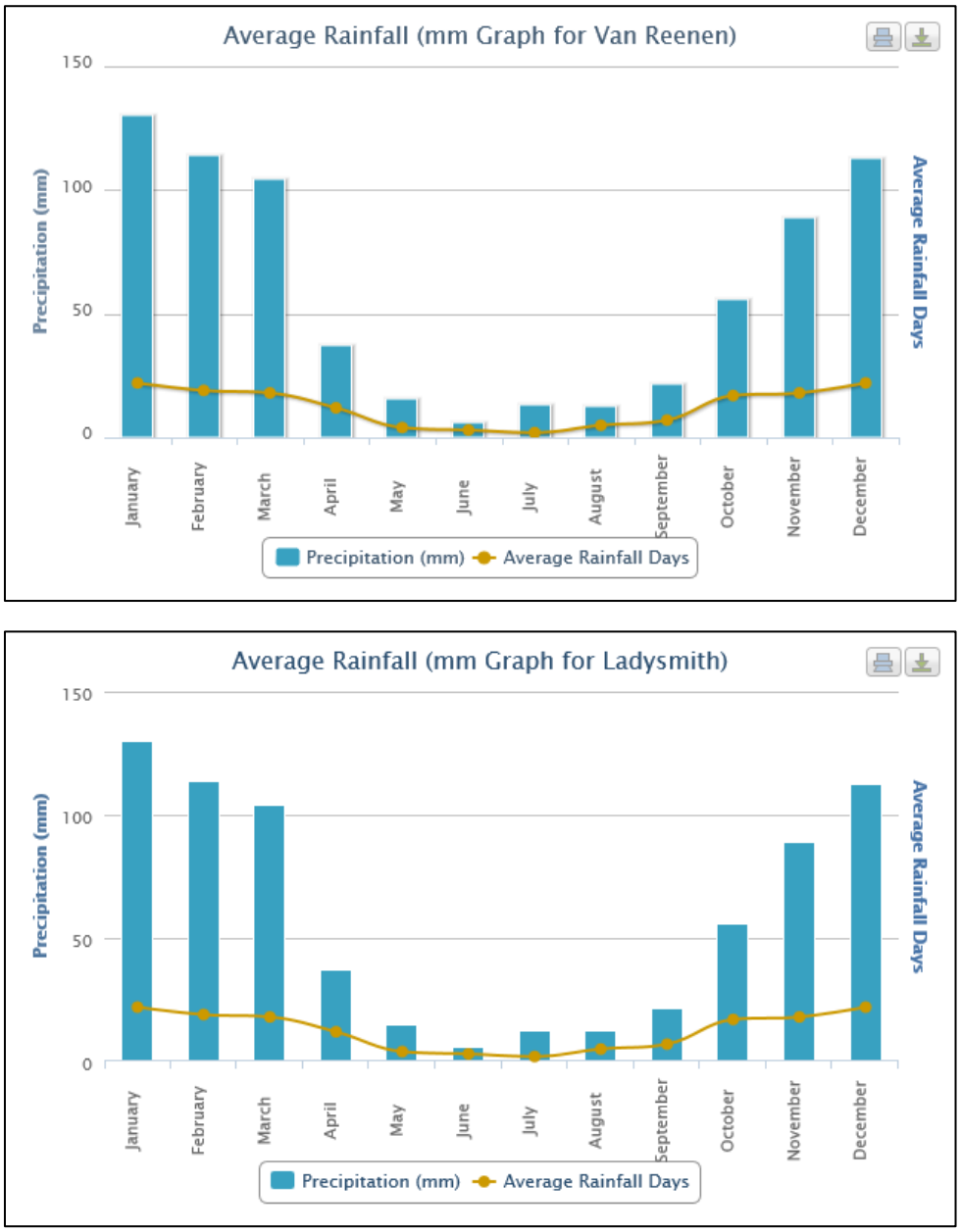


Figure 2.5: Average precipitation and rainfall days for Van Reenen and Ladysmith.

2.5.2 Topography

The Ingula Nature Reserve lies between 1260m and 1900m above sea level. It is underlain by rock formations representing the upper part of the Karoo Sequence in South Africa which is interrupted by dolerite dykes and sills. The lower site is characterised by open, wide, flat valleys through which flows a deeply incised meandering drainage line. Much of the area consists of a dry grassy plain part of which has been planted and irrigated under irrigation. The upper site on the other hand consists of relatively flat grassy plains, interspersed with extensive wetlands. The upper and lower sites are separated by a 600m high escarpment consisting of a number of mudstone spurs (of the Ecca and Beaufort groups), covered with Afrotemperate forests.

2.5.3 Geology and soils

The upper and lower sites are separated by the escarpment that was initially located along the coastline at the time of the break-up of the Gondwanaland super-continent between 160 and 120 million years ago. Erosion has driven it inland to its present position. As it receded so vast erosion surfaces were formed simultaneously above and below the escarpment. Remnants of the oldest of these, the African surface, form the lower interfluves at elevations of around 1750 – 1800 m in the vicinity of the upper site.

The lower site lies within the upper part of the Ladysmith Basin, formed by ongoing erosion along headwater tributaries of the Tugela River. In this area, all vestiges of the African surface have been removed by erosion, and the landscape is a characterised by frequent dolerite koppies and relatively thin soil mantles, except in the high rainfall zone in close proximity to the escarpment.

Around the upper site, local relief is about 100m. Low, flat topped koppies and spurs characterize the landscape and have resulted from the strong structural influence of flat-lying strata of the Karoo Supergroup, particularly the Rooinek Sandstone. Locally, streams have incised through the sandstone to depths of up to 50m, forming small waterfalls and narrow valleys along the Wilge River.

2.5.4 Hydrology

Ingula Nature Reserve is situated on a continental watershed, with water draining westward on the upper site (Wilge catchment), while water on the lower site drains eastwards (Tugela catchment). The catchment of the upper site consists of relatively undisturbed rolling grassland, with incised drainage lines. The Bedford Dam on the upper site is located in the secondary catchment of the Wilge River that flows into the Vaal River system, and ultimately into the Atlantic Ocean via the Orange River. The Wilge River is a tributary of the Olifants River. In the upper section of this subcatchment, extensive wetland areas exist within the drainage lines originating in the east and southeast. Extensive wetlands also occur at the confluence of the drainage lines in the lower segments below waterfalls.

The lower dam, Braamhoek Dam, is located in the secondary catchment of the Klip River that flows into the Tugela River, which meanders through KwaZulu-Natal draining from the Drakensberg towards the Indian Ocean. The wetlands in the lower sections occupy the entire valley bottoms. Hillslope seepage, valley bottom, floodplain and pan wetlands occur in the Wilge subcatchment. In the lower site there are steep rock lined streams with forest vegetation, draining from the escarpment onto the floodplain of the Braamhoekspruit. A high structural diversity of wetlands occurs in the floodplain, with the drainage lines originating in the west and north draining to the east and then south through a natural key point of a narrow valley. Hillslope seepage wetlands, channelled and unchannelled valley bottom systems and floodplain wetland types are common.

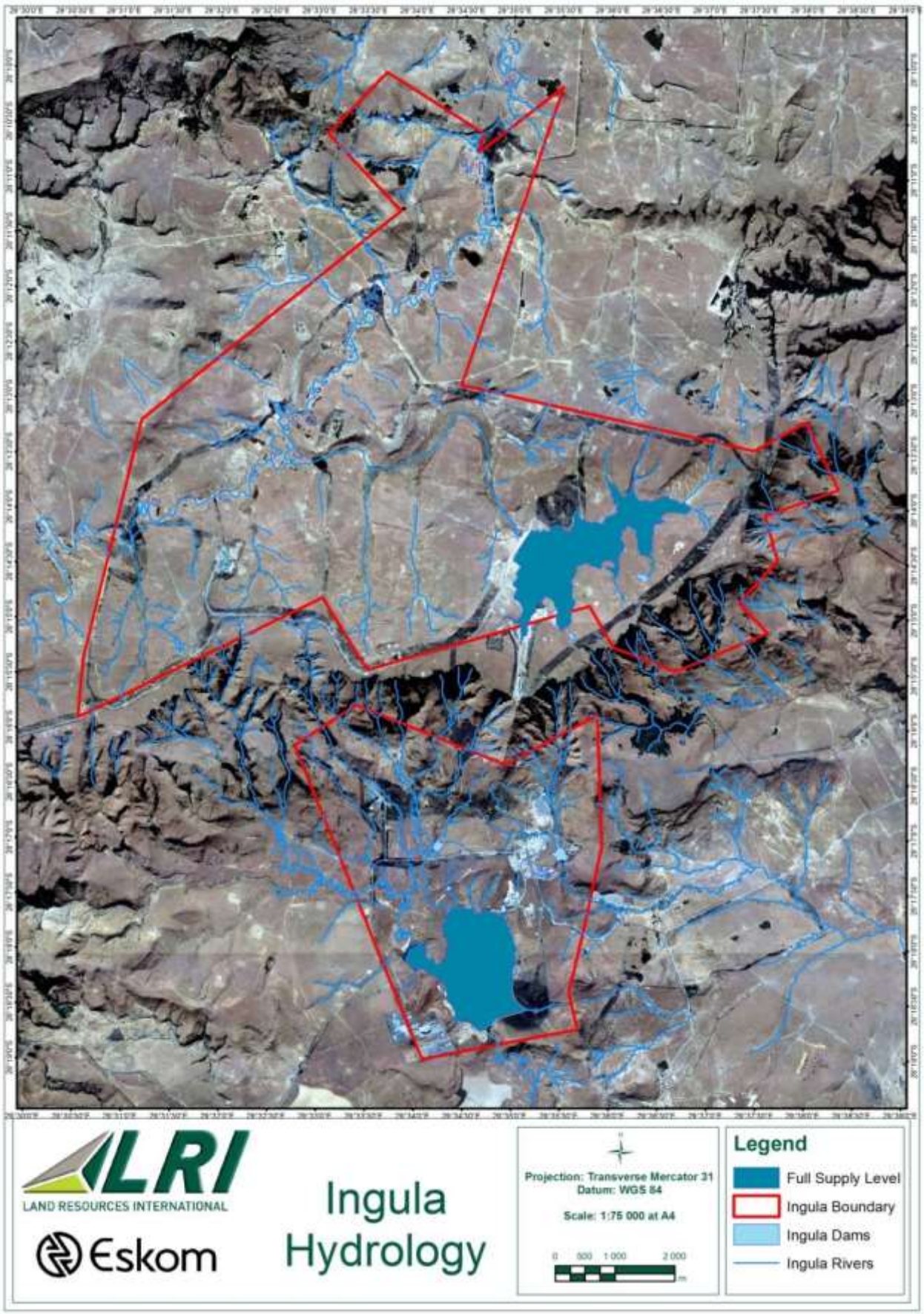


Figure 2.6: Location of the main river systems and wetlands within Ingula Nature Reserve.

2.5.5 Vegetation

The Ingula Nature Reserve falls in the Grassland Biome of South Africa and represents the Drakensberg Grassland Bioregion and the Mesic Highland Grassland Bioregion. Four vegetation types are recognised (Mucina & Rutherford, 2006):

- Eastern Free State Sandy Grassland;
- Northern KwaZulu-Natal Moist Grassland;
- Low Escarpment Moist Grassland;
- Northern Afrotemperate Forest.

The Eastern Free State Grassland is an endangered vegetation type and the Northern KwaZulu-Natal Moist Grassland vegetation type is classified as vulnerable with only 2% of both these habitat types conserved in the network of protected areas. These vegetation types are considered to be poorly protected and to have a high conservation urgency rating (Mucina & Rutherford, 2006). The Low Escarpment Moist Grassland and Northern Afrotemperate Forest are both listed as Least Threatened (Mucina & Rutherford, 2006).

2.5.6 Flora

The flora of the Ingula Nature Reserve is detailed below (taken from A.E. van Wyk, 1998, EIA Report):-

Eastern Free State Sandy Grassland (Gm4) -

The Eastern Free State Sandy Grassland consists of flat to undulating terrain with streams and rivers that drain the foothills of the Drakensberg. It is a closed grassland dominated by *Eragrostis curvula, Tristachya leucothrix* and *Themeda triandra*. Other dominant grasses include *E. capensis, E. racemosa, Cymbopogon pospischilii, Elionurus muticus, Eragrostis plana* and *Aristida junciformis*. Numerous herb species (especially Asteraceae: species of *Helichrysum, Vernonia, Berkheya*) increase alpha diversity considerably. The grassland has a patchy appearance owing to numerous fire and grazing regimes. Important taxa are listed in Table 2.2.

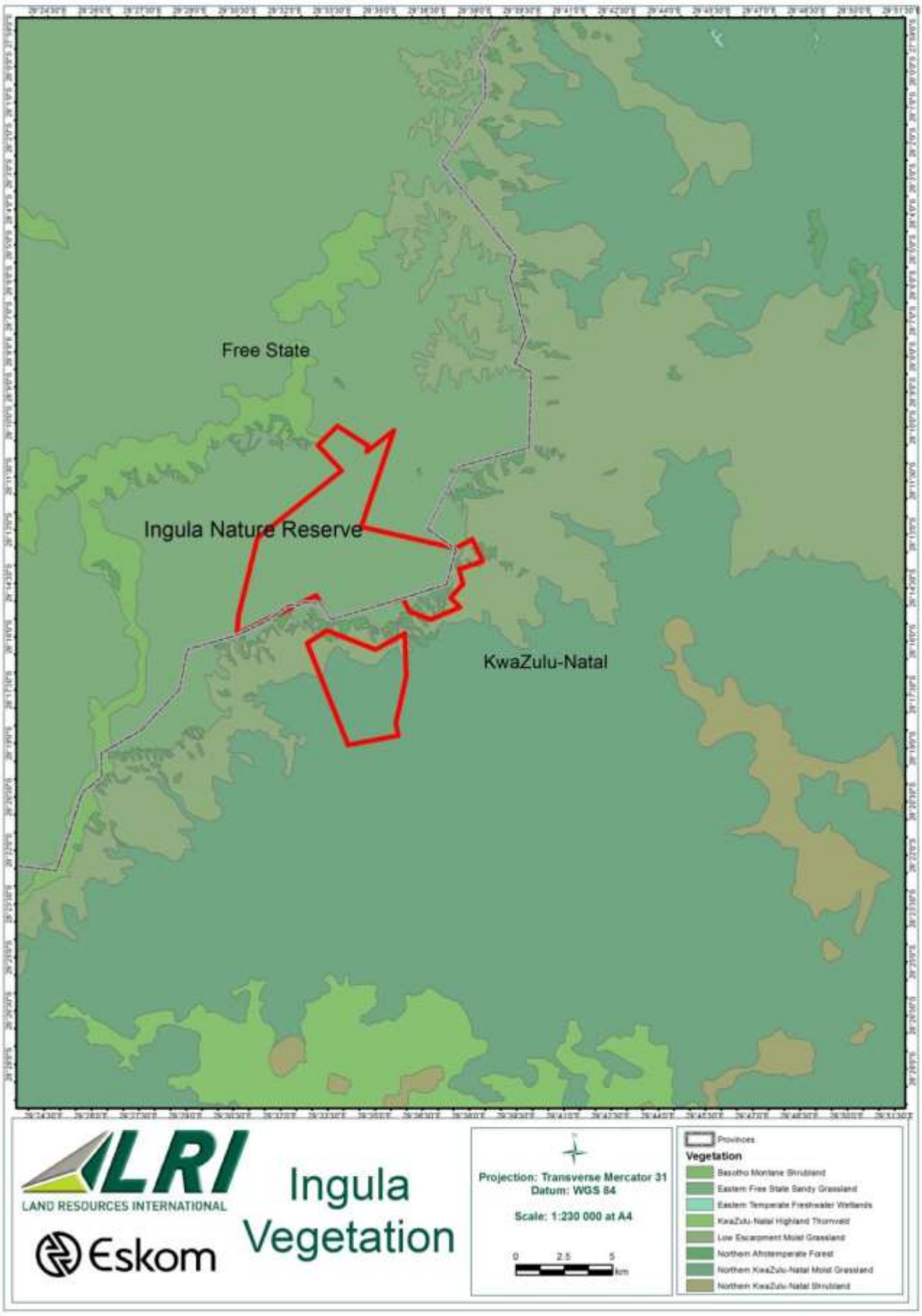


Figure 2.7: Vegetation types represented and protected by the Ingula Nature Reserve.

Table 2.2: Characteristic species belonging to the Eastern Free State Sandy Grassland

Small Trees and Shrubs:	*Helichrysum melanacme* (d), *Anthospermum rigidum* subsp. *pumilum*, *Euphorbia striata* var. *cuspidata, Gnidia kraussiana*, *Helichrysum dasycephalum*, *Polygala hottentotta, Tephrosia capensis* var. *acutifolia*.
Herbs:	*Barleria monticola* (d), *Berkheya onopordifolia* var. onopordifolia (d), *b. speciosa* (d), *Dicoma anomala* (d), *Helichrysum psilolepis* (d), *Acalypha angustata, A. peduncularis, Ajuga ophrydis, Anthispermum herbaceum, Berkheya pinnatifida, B. setifera, Boophone disticha, Crabbea acaulis, Crinum bublispermum, Cycnium racemosum, Cyrtanthus stenanthus, Dianthus basuticus, Drimiopsis maculata, Eucomis autumnalis* subsp. *autumnalis, Gladiolus dalenii, G.papilio, Haplocarpha scaposa, Hebenstretia dentata, H. dura, Helichrysum ammitophylum, h.aureonitens, H. caespiitium, H. cephaloideum, H. herbaceum, H. nudifolium var. nudifolium, H. nudifolium var. pilosellum, H. oreophilum, H. rugulosum, H. spiralepis, Hermannia depressa, Hirpicium armeriooides, Hypoxis rigidula* var. *pilosissima, Ipomoea crassipes, I. pellita, Kohautia amatymbica, Lactuca inermis,* *Ledebouria ovatifolia, Nolletia ciliaris, Pelargonium luridum, Pentaisia prunelloides* subsp. *prunelloides, Rhynchosia totta, Selago densiflora, S. galpinii, Senecio coronatus, S. erubescens* var. *crepidifolius, S. inornatus, Sonchus nanus, Tolpis capensis*, *Trifolium burchellianum*, *Vernonia natalensis, V. oligocephala, Watsonia lepida, Xysmalobium involucratum*, *X. undulatum*.
Graminoids (grasses):	*Aristida junciformis* subsp. *galpinii* (d), *Cymbopogon pospschilii* (d), *Digitaria monodactyla* (d), *D. tricholaenoides* (d), *Elionurus muticus* (d), ***Eragrostis chloromelas*** (d), ***E. curvula*** (d), ***E. plana*** (d), ***E. racemosa*** (d), ***Harpochloa falx*** (d), ***Heteropogon contortus*** (d***), Hyparrhenia hirta*** (d), ***Michrochloa caffra*** (d***), Monocymbium ceresiiforme*** (d***), Setaria sphacelata*** (d), ***Themeda triandra*** (d), ***Tristachya leucothrix*** (d), *Andropogon appendiculatus,* ***A. schirensis***, ***Aristida congesta***, *A. diffusa*, ***Brachiaria serrata***, ***Cymbopogon caesius***, ***Cynodon dactylon***, *Cyperus obtusiflorus* var. *flavissimus*, *C. obtusiflorus* var. *obtusiflorus*, ***Diheteropogon amplectens***, *Ehrharta capensis*, ***Eragrostis capensis***, *Helictotrichon natalense*, *H. turgidulum*, *Koeleria capensis*, *Panicum gilvum*, *Setaria nigrirostris*, ***Trachypogon spicatus***, *Trichoneura grandiglumis.*

Bold denotes species identified on site; (d) denotes dominant species for vegetation type

Northern KwaZulu-Natal Moist Grassland (Gs4) -

The Northern KwaZulu-Natal Moist Grassland is characterised by hilly and rolling landscapes supporting tall tussock grassland usually dominated by *Themeda triandra* and *Hyparrhenia hirta*. Open *Acacia sieberiana var. woodii* savannoid woodlands encroach up the valleys, usually on disturbed (strongly eroded) sites. Important taxa are listed in Table 2.3.

Table 2.3: Characteristic species belonging to the Northern KwaZulu-Natal Moist Grassland

Small Trees and Shrubs:	*Anthospermum rigidum* subsp. *pumilum, Erica oatesii, Euphorbia pulvinata, Hermannia geniculata*.
Herbs:	*Acanthospermum australe* (d) *Argyrolobium speciosum* (d), Chlorophytum haygarthii (d), *Eriosema kraussianum* (d), *Geranium wakkerstroomianum* (d), *Pelargonium luridum* (d), *Acalypha peduncularis*, *Chamaecrista mimosoides*, *Dicoma anomala, Eurypos transvaalensis* subsp.*setilobus*, *Gladiolus aurantiacus* (d) Aloe ecklonis, *Asclepias aurea*, *Cyrtanthus tuckii* var. *transvaalensis*, *Gladiolus crassifolius*, *Helichrysum caespitosum*, *H. rugulosum*, *Hermannia depressa*, *Hypoxis colchifolia, H. multiceps*, *Ipomoea crassipes*, *Lopholaena segmentata, Moraea brevistyla*, *Pearsonia grandifolia*, *Pentanisia prunelloides* subsp. *latifolia*, *Sebaea grandis*, *Senecio inornatus*, *Thunbergia atriplicifolia*, *Zaluzianskya microsiphon, Zantedischia rehmanii*.
Graminoids (grasses):	*Alloteropsis semialata* subsp. *eckloniana* (d), ***Aristida congesta*** (d***), Cynodon dactylon*** (d), *Digitaria tricholaenoides* (d), *Elionurus muticus* (d), *Eragrostis patentissima* (d), ***E. racemosa*** (d), ***Harpochloa falx*** (d), ***Hyparrhenia hirta*** (d), ***Themeda triandra*** (d), ***Tristachya leucothrix***

	(d), *Abildgaardia ovata*, *Andropogon appendiculatus*, *A. eucomus,* ***A. schirensis****, Aristida junciformis* subsp. *galpinii,* ***Brachiaria serrata, Cymbopogon caesius****, C. Pospischilii, Cynodon incompletus, Digitaria monodactyla, D. sanguinalis,* ***Diheteropogon amplectens****, D. filifolius,* ***Eragrostis chloromelas, E. plana****, E. planiculmis, E. sclerantha, Festuca scabra,* ***Heteropogon contortus****, Hyparrhenia dregeana, Melinis nerviglumis,* ***Michrochloa caffra, Panicum natalense****, Paspalum scrobiculatum, Setaria nigrirostris,* ***Sporobolus africanus****.*

Bold denotes species identified on site; (d) denotes dominant species for vegetation type

Low Escarpment Moist Grassland (Gs3) -

The Low Escarpment Moist Grassland is a complex mountain topography with steep, generally eastand south-facing slopes, with large altitudinal range. It is a closed grassland and is dominated by *Hyparrhenia hirta* and *Themeda triandra*. Patches of *Protea caffra* communities and patches of *Leucosidea* scrub feature at higher altitudes. Important taxa are listed in Table 2.4.

Table 2.4: Characteristic species belonging to the Low Escarpment Moist Grassland

Small Trees and Shrubs:	*Anthospermum rigidum* subsp. *pumilum*, *Chaetacanthus burchellii*, *Clutia pulchella*, *Gnidia kraussiana*, *Helichrysum hypoleucum*, *H. infaustum, Phyllanthus glaucophyllus*.
Herbs:	*Acanthospermum australe* (d), *Vernonia natalensis* (d), *Acalypha depressinerva, Adenocline acuta, Berkheya rhapontica* subsp. *rhapontica, Cochorus confusus, Corycium dracomontanum, C. nigrescens, Crabbea acualism, Cucumis zeyheri, Eriosperma cordatum, Gladiolus crassifolius, Graderia* scabra, *Habenaria dives*, *Haplocarpha scaposa, Helichrysum miconiifolium, H. oreaphilum, H. psilolepis, H. rugulosum, H. spiralepis, Hypoxis hemerocallidea, H. multiceps, H. rigidula var. pilosissima, Kohautia amatymbica*, *Lotonis procumbens, Nidorella anomala*, *Pentanisia prunelloides* subsp. *latifolia, Pteridium aguilinum, Rhynchosia totta, Selago densiflora*, *Senecio venosus*, *Zaluzianskya microsiphon*.
Graminoids (grasses):	*Alloteropsis semialata* subsp. *eckloniana* (d), ***Andropogon schirensis*** (d), *Diheteropogon filifolius* (d), ***Eragrostis plana*** (d), ***Hyparrhenia hirta*** (d), ***Monocymbium ceresiiforme*** (d), ***Themeda triandra*** (d), ***Trachypogon spicatus*** (d), ***Tristachya leucothrix*** (d), *Andropogon appendiculatus*, ***Brachiaria serrata***, *Brachypodium flexum,* ***Cynodon dactylon***, *C. transvaalensis*, *Digitaria diagonalis*, *D. monodactyla, D. Trichoalaenoides,* ***Diheteropogon amplectens, Eragrostis capensis, E. chloromelas, E. curvula, E. gummuflua, E. racemosa, Harpochloa falx, Hyparrhenia tamba****, Koeleria capensis,* ***Loudetia simplex****, Panicum ecklonii,* ***P. natalense****.*

Bold denotes species identified on site; (d) denotes dominant species for vegetation type

Northern Afrotemperate Forest (Foz2) -

These relatively species-poor forests occur in the Low Escarpment region and are of afromontane origin. Some of them still show clear afromontane character. They are found as small patches in kloofs and on sub-ridge scarps at high altitudes (1500 – 1900m). Canopy reaches up to 20m and is dominated usually by *Podocarpus latifolius, Olinia emarginata, Halleria lucida, Scolopia mundii* and rarely also *Widdringtonia nodiflora*, in drier faces also by *Pittosporum viridiflorum, Celtis Africana, Mimusops zeyheri, Nuxia congesta* and *Combretum erythrophyllum. Xymalos monospora* sometimes dominates patches of species-poor mistbelt forests of northern KwaZulu-Natal. Important taxa are listed in Table 2.5.

Table 2.5: Characteristic species belonging to the Northern Afrotemperate Forest

Tall trees:	*Acalypha glabrata* (d), *Afrocarpus falcatus*, *Buddleja salvifolia* (d), *Calpurnia aurea* (d*), Celtis Africana* (d), *Combretum erythrophyllum* (d), *Dais cotonifolia*, *D. Whyteana* (d), *Euclea crispa* subsp. *crispa* (d), *Halleria lucida* (d), *Ilex mitis*, *Isoglossa grantii* (d), *Myrsine Africana* (d), *Olinia emarginata* (d), *Pittosporum viridiflorum* (d), *Podocarpus latifolius* (d), *Rothmannia capensis* (d), *Scolopia mundii*, *Widdringtonia nodiflora* (d), *Bowkeria verticillata*, *Canthium ciliatum*, *Cliffortia nitidula*, *Diospyros lycioides* subsp. *guerkei, Leucosidea sericea*, *Hypoestes aristata*, *Plectranthus fruticosus* and *Scolopia flanaganii*.
Herbs:	*Asplenium aethiopicum*; *Blechnum attenuatum* (d); *Cassinopsis ilicifolia* (d), *Peperomia retusa*; *Plectranthus grallatus* (d); *P. hereroensis* (d); *Polystichum luctuosum*, *Streptocarpus haygarthii*; *S. pusillus.*
Graminoids (grasses):	*Cyperus albostriatus*; *Schoenoxiphium lehmannii*; *Thamnocalamus tessellates*.

Bold denotes species identified on site; (d) denotes dominant species for vegetation type

Management implications –

The main agricultural activity that took place on the upper site of the escarpment was extensive animal production, and no irrigated or rain-fed agriculture was evident. The lower region of the site on the other hand had a well-developed infrastructure for intensive irrigated agriculture. Although irrigation there is mainly in support of livestock where fodder is produced for the harsh winter months, it nevertheless, has impacted on the environment. These agricultural activities have created deep donga and gully erosion. Soil derived from the mudstone and sandstone of the Karroo sediment, together with the highly erosive rainfall characteristics of the area, renders the area especially susceptible to erosion.

2.5.7 Fauna

The Ingula Nature Reserve has 34 species of mammals recorded, including 11 carnivores, and 10 antelope species, including the Aardvark, Chacma Baboon, Blesbok, Bushbuck, Bushpig, Caracal, Dassie, Grey Duiker, Black-backed Jackal, Rough-haired Golden Mole, Large Grey Mongoose, Water Mongoose, Yellow Mongoose, Vervet Monkey, Oribi, Cape Springhare, Cape Clawless Otter, Striped Polecat, Porcupine, Common Reedbuck, Grey Rhebok, Mountain Reedbuck, Serval, African Wildcat and a number of small rodents.

More than 306 species of birds have been recorded, including a number of priority species - White-winged Flufftail (*Sarothrura ayresi*), Eurasian Bittern (*Botaurus stellaris*), Blue Crane (*Anthropoides paradisues*), Grey Crowned Crane (*Balearica regulorum*), Wattled Crane (*Bugeranus carunculatus*), Denham's Bustard (Ne*otis denhami*), Secretary Bird (*Sagittarius serpentarius*), African Grass Owl (*Tyto capensis*), Martial Eagle (*Polemaetus bellicosis*) and the Southern Bald Ibis (*Geronticus calvus*).

The Ingula Nature Reserve also has 55 species of Butterflies recorded, and 29 species of reptiles including the Sungazer (also known as 'ouvolk' (*Smaug giganteus*) on adjoining properties that is endemic to the Grassland Biome). See relevant species posters in **Appendix 1**.

2.6 Cultural, Historical and Archaeological context of INGULA NATURE RESERVE

The Ingula Nature Reserve has significant historical, cultural and archaeological value, which can be highlighted by:

1. Its cultural value as it relates to the history of the people of the area and the resulting cultural sites located on the property; and
2. The archaeological fossils discovered on the property.

A number of fossils were uncovered during the construction of the Bedford dam Around 150 vertebrate specimens and plant impressions were recovered, including skulls and partial skeletons of herbivorous and carnivorous therapsids, the distant ancestors of mammals, which lived around 255 million years ago. Fossils of the carnivorous therapsids, known as gorgonopsians, are extremely rare and thus finding several gorgonopsian fossils from one locality is particularly exciting. It is highly unusual to find such a large number of these fossil vertebrates in such a small area. Lastly, there appears to be other smaller reptile fossils amongst the larger therapsids that may represent new species.

One of the skulls represents a Permian dicynodont known as *Dinanomodon rubidgei*. This is a particularly exciting discovery as very few *Dinanomodon* skulls are known. This specimen is also the first to contain a complete lower jaw. The second skull represents a dicynodont, which has yet to be identified. Both skulls were found close to three large blocks containing skeletons and are likely to belong to them. If the second skull is identified as *Dinanomodon*, then the skeleton is also likely of this species. This would be an exceptionally important find, as skeletons of *Dinanomodon* are currently unknown. Further preparation of the second skull is required before they can confirm this possibility.

Unfortunately, a large amount of material taken to the National Museum consists of fragments of bone that cannot be identified or used for any scientific purpose. These will be returned to Ingula to be used for educational purposes. Visitors, particularly children, will be able to see and handle the fossils. This will hopefully promote a sense of awareness and pride in our African heritage and bring about an appreciation for past life on Earth.

Thus, the recovery of these fossils has provided an excellent opportunity for enhancing our knowledge regarding the ancient ancestors of mammals, and as they form an important part of our South African Natural Heritage, these fossils, once exposed to the public, will hopefully instil an appreciation for and emphasise our responsibility to adequately protect our fossil heritage.

For thousands of years people have been living in the area around Ingula. The first people were small mobile bands of Stone Age hunter- gatherers, who created a wealth of rock art, and were the ancestors of the San of historical times. The grasslands above 1500m were not inhabited until the 12th and 13th centuries, when the Bantu-speaking agro-pastoralists began arriving from central Africa. They brought with them an Iron Age culture and domesticated crops. After

establishing themselves in the well-watered eastern coastal region of southern Africa, these farmers spread out across the interior plateau, or 'highveld', where they adopted a more extensive cattle-farming culture.

In 2005 a heritage impact assessment was done for the proposed access roads at Ingula, requiring extensive research. The oldest records discovered were maps dating back to 1812, showing Late Iron Age and Early Historical Period settlements. Ethnographic texts and oral historical references revealed that as far back as the 1700's, different groups of people have been crossing the Drakensberg range using a network of footpaths, trails and passes to move cattle and do trading. The earliest reference to De Beers Pass, which connects Ingula's upper and lower sites, is on a map made by Daumas, printed in 1847. Van Reenens Pass, situated a short distance to the south-west of Ingula, and was built in 1856. The area was used in recent historical times for colonial agriculture, particularly sheep and cattle. It was during these times that the major erosion events occurred.

2.7 Socio-economic context

The Ingula Nature Reserve is located in a highly-impoverished region of the country, with the Maluti A Phofung Local Municipality having been identified as a Presidential poverty node. Due to the rural nature of the region, population densities have been relatively low, the main economic activity being extensive livestock agriculture. As a result, the economic growth potential of the area has been relatively low.

Effective community development is crucial to sound conservation management, and cannot be addressed separately. Tying social development to sound conservation objectives through a coordinated approach will contribute the development of sustainable agriculture, agri-villages and healthy communities, meeting the requirements of the National land reform programme and expectations of both dwellers and land owners. A coordinated approach to social economic development from a conservation platform will benefit all I&APs in the catchment. The development of communities through the development of enterprises in the area is possible through ecotourism development, trails, accommodation in the form of camp sites or traditional units, or even through training as general and bird guides and hosts in the area. Involvement of NGOs involved in the Ingula property in the broader catchment can increase the opportunities for all parties.

On purchasing the properties for the IPSS, Eskom have inherited a number of families (22 families, 16 families on the upper site and 6 families on the lower site) that are resident in the power station and conservation areas. Eskom are engaging with these families in the following manner: -

1. Relocations – A number of community members residing on the property have accepted the offer to move to alternative accommodation outside of the designated conservation area. Six families have moved in the KwaZulu-Natal part of the project, and five families have moved in

the Free State. The balance have opted to remain on Eskom property, and will be housed in an agri-village. It is intended to move the remaining families out of the wetlands to a sustainable agri-village to be created on Eskom property next to the district road on the farm Wilge. This area is included in the zoning plan as “high intensive utilisation”. This area will be more accessible to district services than the units currently occupied, and has a lower environmental impact than the existing housing units. Infrastructure, including water and sewage will be supplied and dwellers will be encouraged to develop sustainable farming practices. Livestock units will be limited through contract, and crop lands will be established. Control will be though a set of rules applicable to all present on Ingula Nature Reserve, and relocated dwellers will be allocated specific areas for grazing. They will have the opportunity to lease additional property from Eskom should they chose to run commercial herds. The above movements will meet the national requirements of on land reform, offering both security of tenure and the opportunity to own land, while limiting impacts on the wetlands and biodiversity of the area. The development of an agri-village will go a long way to establishing sustainable farming practices in the area. Training will be offered to allow the development of families from subsistence to sustainable life styles. This will require major capacity building but is necessary if the political and social aspirations of all land owners and occupiers are to be met.

Community involvement is crucial to the success of the project. Meetings are taking place on a continual basis and the agri-village will be constructed in conjunction with the community. Community members residing in the sensitive areas will be monitored and impacts mitigated until relocation is complete. Houses will be fully rehabilitated once the relocation has taken place. Communities will be allowed access to visit graves in terms of the agreement entered into between members and Eskom.

2. Job creation – Eskom is dedicated to improving the livelihoods of the dwellers on the property and will endeavour to employ the dwellers in conservation management related work. A coordinated approach to land care issues such as erosion and alien vegetation control in the catchment could lead to use of the extended public work programme to offer jobs and reduce environmental impacts in the area. A catchment approach is likely to have success in this area, but coordination between all role players will be essential. Promotion of the area as a conservation area will encourage visitors, which could in turn lead to the development of walking and cycle trails, bird and other guiding opportunities, and other elements leading to job opportunities.

3) STRATEGIC MANAGEMENT FRAMEWORK

The following strategic framework is aimed at providing the basis for the protection, development and operation of the Ingula Nature Reserve over the next five years and has been prepared collaboratively through a process involving Eskom staff, the KZN and Free State provincial conservation authorities, and key stakeholders (BirdLife SA, Middlepunt Wetland Trust, NCC Environmental Services).

The vision describes the overall long-term goal for the operation, protection and development of Ingula Nature Reserve. The objectives and strategic outcomes that follow are intended to provide the basis for the achievement of the vision. The objectives provide a broad description of the goals for each key performance area. The strategic outcomes, which flow from the objectives, set out what is needed to achieve the objectives, based on the management challenges, issues and opportunities described in Section 2 above.

3.1 INGULA NATURE RESERVE Vision and Mission

The NEM: Protected Areas Act requires that the reserve be managed in accordance with the purpose for which it was declared. Hence Eskom will manage the nature reserve in accordance with the vision and mission hierarchy that was derived through consultation with stakeholders, as set out in this section.

VISION -
Ingula Nature Reserve is a sustainable, internationally acclaimed conservation area.

MISSION -
To enable an environment in which a pumped storage scheme can operate sustainably and equitably in a conserved area supported through partnerships.

3.2 Key challenges

The following key challenges have been identified:

- Combining conservation and construction activities
  - Presence of construction activities (until completion), potential environmental impacts associated with construction, currently managed through a certified environmental management system (ISO14001).
  - Major focus on ensuring rehabilitation standards meet the requirements of the nature reserve management.
- Ecological management –

- Fire Management - Historically the area has been burnt on an annual basis, and burning programmes are focused on producing early season nutrition for livestock. The burning programme will need to be revised to improve biodiversity.
- Erosion - Agricultural practices during the last century resulted in significant damage to soils, resulting in major erosion occurring on the property. There is in excess of 100km of G2 (gullies of significant size) and greater erosion, as well as many kilometres of footpaths requiring mitigation.
- Alien plant control - A large area of the property has been invaded by alien vegetation and will be rehabilitated.

- Social issues
  - Once construction is finished there will be major unemployment in the district, and an increase of subsistence farming, with additional pressures on available natural resources in the district and on the reserve.
  - Expectations of the local community for jobs is high, and there will be political demands to create employment.
  - Some dwellers will remain on the property, and will need to be employed and be allowed limited farming activities.
- Sustainability
  - The project will need to balance both the social and natural environments and ensure that all developments and activities are economically, socially and ecologically sustainable.
  - Capacity needs to be developed in the local community to change existing subsistence agriculture practices to sustainable agricultural practices allowing the management of livestock while ensuring no unsustainable impacts occur on the property.

3.3 Summary of management issues, challenges and opportunities

The following section summarises the key management issues and challenges outlined in the descriptive sections above, which must be addressed through the management plan. The issues and challenges have been grouped under key performance areas, which flow through the strategic and operational management frameworks that follow.

Table 3.1: Management challenges, issues and opportunities

Key performance area	Issue that must be addressed
Compliance to legislation and Standards	Proclamation status of the Ingula Nature Reserve
	Maintain ISO14001 certification and associated processes to monitor legal compliance
Security and Law enforcement	Size of the site in relation to staff (low staff numbers within Eskom)
	Remoteness of site / accessibility
	Existing people living on site (farm dwellers and construction crew)
	Unsustainable harvesting impacts
	Medicinal plant collection from forests and grasslands

	Inadequate fencing (boundary)
	IPSS security impacts on conservation area (objectives in conflict)
	Traffic speed law enforcement on site resulting in road kills
Safety	Ensure safe operations of Ingula Nature Reserve
	Safety of people involved in the operational management of IPSS
	Adherence to Eskom “Life Saving” rules
	Staff – animal interactions involving dangerous species
	Safety of visitors on site
Biodiversity Management	
Grazing	Management of livestock numbers (illegal grazing) – excessive numbers
	Commercial stocking rates are higher than ecological stocking rates – impacts
	Livestock grazing on rehabilitation sites
	Stock theft and movement of stock onto property
Fire Management	Arson fires (related to dwellers requiring green grass for grazing stock)
	Inappropriate timing of burning and historic burning practices
	Infrastructure requiring protection from fire, in a fire-climax system
	Forest margins and entire forest patches burnt in hot, dry conditions
Grassland management	Inappropriate fire management, too frequent, wrong time of year
	Unmanaged grazing
	Does not rehabilitate very well
	Muti plant harvesting
	Alien plant infestations
Wetland management	Inappropriate grazing
	Frequency of fires (too frequent, and possible impacts on peat)
	Siltation from erosion
	Maintaining water quantity and flow regime for the upper dam (IPSS)
Forest management	Muti plant harvesting
	Inappropriate fire management at margins
	Alien plant infestations
Priority Species	Implementation of specific management activities to conserve White-winged Flufftail, Wattled, Blue and Grey Crowned Cranes, Southern Bald Ibis, Yellow-breasted Pipit and Oribi (and any other specific grassland / wetland species as identified, e.g. Sungazer).
Wildlife Management	Poaching and unsustainable harvesting (with specific emphasis on dog hunting)
	Road mortalities
	Disease issue (e.g. Black Wildebeest if introduced)
	Power line mortalities
	Bontebok / Blesbok - hybrids
	Wildlife habituation and resulting consequences (to staff and species)
Fish management	site (dams)
	Introduction of alien species

Reintroductions	Timing of introductions
	Permits for introductions
	Access to suitable stock with appropriate genetics (i.e. origin)
Rehabilitation (incl. erosion)	Existing old erosion (previous management)
	Extent of the existing erosion
	Construction-related impacts causing erosion
Water Resources	Water storage and streamflow regulation functions of the wetlands, which benefit a wide spectrum of water consumers
	Maintaining and/or rehabilitating degraded systems
Invasive alien species	Infestations of alien plant species
	Aquatic alien plant infestations (significant risk)
	Appropriate use of legal herbicides and application methods
Infrastructure development and management	IPSS operational environmental management
	Impact of construction activities on conservation infrastructure
	Eskom plans changing (proposal for the area)
	Integrating the operations of the IPSS into the conservation activities
	Road and footpath network
	Zoning of reserve is understood – new infrastructure
	Management of pollution – water, soil, surface, noise
	Management of air quality and dust
	Management of waste
	Minimising physical footprint of the IPSS and construction areas (minimising disturbance and maintaining “no go” areas
	Minimising visual impacts of IPSS infrastructure
	Management of servitudes, possible conflicts with reserve management
	Problem animal control
	Nesting impacts on infrastructure (buildings and power lines)
Social	
Dwellers	Presence on site – poaching, illegal grazing, stock numbers, fires, pollution
	Housing and accommodation
	Access control
	Resource use
	Employment / ownership expectations (entitlement)
Sustainable livelihoods	Jobs - • A large number of people without jobs, will unsustainably utilise the area (illegal activities, poaching, etc.) • Expectation of people to receive benefits from Eskom and the project
	Access - • People use the area as a through-route, dwellers and surrounding communities, landowners (expectations) • Access from communities to cultural sites (graves, etc.)
	Resources use – • Unsustainable use of natural resources

	• Lack of understanding of "sustainable levels" • Control of the resource utilisation is difficult (issuing of permits for wood collection, grass harvesting)
	Capacity building & training – • Mistrust between community and Eskom
	Education & sustainable development – • Funding for activities • Managing the cultural beliefs and superstitions
Cultural and archaeological heritage	Degradation of cultural, paleontological and archaeological sites
	Access from the community to visit cultural sites
Commercial neighbours	Integration of activities with commercial neighbours
Eco-Tourism development	Security of the IPSS activities
	Safety of tourist on site
	Lack of awareness of the ecotourism value of Ingula Nature Reserve
	Identification of suitable tourism products that may be developed to further encourage tourism on the nature reserve
	Development of signage to direct tourists to the nature reserve
	Identification and development of facilities and infrastructure required to support tourism initiatives within the nature reserve
	Disturbance impacts to sensitive species, e.g. Wattled Crane
	Inappropriate recreational usage of the area, e.g. quad bikes
Operational management	Requirements for staffing of the nature reserve
	Staff housing needs
	The condition of the nature reserve's internal roads and their alignment.
	IPSS construction activities – maintain construction and operational EMPs (integration section)
Strategic Management Systems	Implementation of internationally accredited ISO 14001 system to manage the nature reserve
	Alignment with Eskom Strategic objectives
	Alignment with operational needs of the Pumped Storage Scheme
	Engagement with neighbours and surrounding communities
Monitoring and Research	Effective monitoring to ensure adaptive management
	Understanding of the key requirements of the priority species that occur within the reserve
	Guidance on the use of grazing by game and livestock in managing the ecology of the nature reserve's wetlands and grasslands
	Legal monitoring requirements according to the RoD, Operational Management Plan and water-use licence

3.4 Objectives and strategic outcomes

Objectives have been identified for each of INGULA NATURE RESERVE key performance areas, which follow from the management challenges, issues and opportunities, and relate to the important functions and activities necessary to protect, develop and manage it effectively. The objectives have then been translated into strategic outcomes, which form the basis for the management activities and targets set out in the operational management framework, described in Section 6 below. Table 3.2 sets out the key performance areas, the objective for each key performance area and the strategic outcomes, required to realise the objectives.

Table 3.2: Objectives and strategic outcomes for INGULA NATURE RESERVE

Key performance area	Management Objective	Strategic outcome
1. Financial and Human Resources	• Development of a five-year business plan that identifies the resource needs to achieve the objectives for Ingula Nature Reserve. • Ingula Nature Reserve is adequately staffed for its effective management and operation.	Adequate funding and human resources are in place to achieve the reserve objectives.
2. Compliance to legislation and standards	• The entire extent of the Ingula Nature Reserve is legally proclaimed and protected. • To comply with and enforce legislation pertaining to the protection, development and management of Ingula Nature Reserve. • Maintain the ISO14001 certification for IPSS and the Ingula Nature Reserve. • Implement a Management Effectiveness Assessment process.	Ingula Nature Reserve is formally secured through proclamation and maintains full compliance to all legal requirements, and is managed through an ISO certified management system, identifying risks and addressing impacts, being regularly assessed for its management effectiveness.
3. Security and Law enforcement	• Ensure adequate law enforcement within Ingula Nature Reserve - adequate security to prevent illegal activities on the property.	Capacitated law enforcement programme with regular patrols, security activities and access control preventing illegal activities on the property, and contributing to overall monitoring.

Key performance area	Management Objective	Strategic outcome
4. Safety	• Ensure safe operation of Ingula Nature Reserve and IPSS operations.	High levels of safety are maintained at all times and meeting the "zero harm" objective.
5. Regional Planning		
5.1 Buffer zone	• Ensure appropriate land use management strategies implemented in the upper Wilge and Braamhoek catchments.	Minimal impacts occur on the IPSS and Nature Reserve through inappropriate land use surrounding the property.
5.2 Local & Regional Planning	• Determination of buffer zone requirements around Ingula Nature Reserve. • Capture of buffer zone considerations in IDPs and SDFs.	All local and regional planning adequately considers the presence of the Ingula Nature Reserve, and its requirements.
6. Biodiversity Management		
6.1 Fire Management	• Development of an annual fire management plan for Ingula Nature Reserve using the best available scientific knowledge and practice. • Adequate fire safety within Ingula Nature Reserve is ensured.	The Ingula Nature Reserve is legally compliant relating to fire protection and uses fire as an appropriate ecological management tool to improve the biodiversity value of the habitats.
6.2 Grazing	• Develop an understanding of the ecological implications of the use of livestock in managing Ingula Nature Reserve. • Development of a grazing management plan. • Grazing management is implemented as an ecological management tool.	Grazing is managed as an ecological tool to maximize biodiversity on the property.
6.3 Erosion and Rehabilitation	• To develop and implement an effective erosion control strategy.	A well-managed programme rehabilitating all erosion points, and thereby having no impact on the wetland and surrounding habitats.
6.4 Invasive alien species	• Development and implementation of an invasive species control plan for Ingula Nature	Significantly reduced infestations of invasive species on Ingula Nature Reserve, so as not to threaten the protected area objectives.

Key performance area	Management Objective	Strategic outcome
	Reserve (in terms of the requirements of NEM: BA). • Prevent introduction of any aquatic alien weeds.	Improved water supply and quality.
6.5 Priority Species	• To develop and implement specific management programmes for the key priority species identified.	Secured and viable populations of priority species maintained on the reserve.
6.6 Wildlife Management	• Address and mitigate wildlife mortality factors. • Development of a strategy for the introduction and management of wildlife into Ingula Nature Reserve in accordance with best practice (re-introduce species indigenous to the area where circumstances allow, i.e. no species will be introduced outside of their natural range). • Conform to procedures and policies for problem animal control. • Implementation of procedures to manage alien and problem animals found within Ingula Nature Reserve.	A well-managed site with a set of naturally occurring species.
6.7. Fish management	• Prevent introduction of alien fish species into dams. •	Well-managed fishing activities
7. Infrastructure Development and Management	• Existing and new roads, 4x4 tracks and paths in Ingula Nature Reserve are maintained. • All facilities, assets, infrastructure and equipment in Ingula Nature Reserve are adequately maintained. • New infrastructure to be developed by adhering to all relevant legislation and	PSS functions as an integral part of the conservation area and all new infrastructure is developed according to the zonation plan for the reserve.

Key performance area	Management Objective	Strategic outcome
	in accordance with reserve zonation. • Servitudes managed in line with Ingula Nature Reserve management objectives.	
8. Eco-Tourism development	• Prepare and implement a Concept Development Plan outlining the tourism products and facilities that will be developed for Ingula Nature Reserve. • Promote the Ingula Nature Reserve as a destination for non-consumptive tourism.	Ensuring that the general public have access to the conservation area, in an appropriate manner with suitable facilities.
9. Social aspects		
9.1 Dwellers	• To resettle dwellers to a point where infrastructure can be provided • To incorporate the dwellers into the long-term sustainable operations of the reserve.	Dwellers on site are integrated into the management of the protected area and obtain benefits from the project.
9.2 Sustainable livelihoods	• To enable neighbouring landowners and communities to make management inputs into Ingula Nature Reserve management. • To enable neighbouring landowners and communities to derive socio-economic benefits from Ingula Nature Reserve. • To implement an appropriate education programme to improve development of local communities.	People living in the area form an integral part of the conservation programme by being employed and benefit from the activities.
9.3 Access	• To ensure community understanding and cooperation (through agreement) regarding access.	Managed, controlled, and agreed upon access by stakeholders.

Key performance area	Management Objective	Strategic outcome
9.4 Resource use	• To ensure the sustainable utilisation of natural resources on Ingula Nature Reserve (i.e. identifying what resources can and should be used, stipulating quotas, timing and areas).	Sustainable resource utilisation to the benefit of the resource elements and the local community.
10. Cultural and archaeological heritage	• Controlled access for community to visit cultural sites • No degradation of cultural or archaeological sites.	Controlled access for community to visit cultural sites, and no further degradation of sites.

4) OPERATIONAL MANAGEMENT FRAMEWORK

This section translates the Strategic Framework described in Section 3 above into management activities and targets, which will be used to inform annual plans of operation and the resources required to implement them. The management targets will form the basis for monitoring of performance in implementing the plan and are thus measurable.

4.1 Administrative structure

A recommended organisational structure for Ingula Nature Reserve is set out in Figure 4.1.

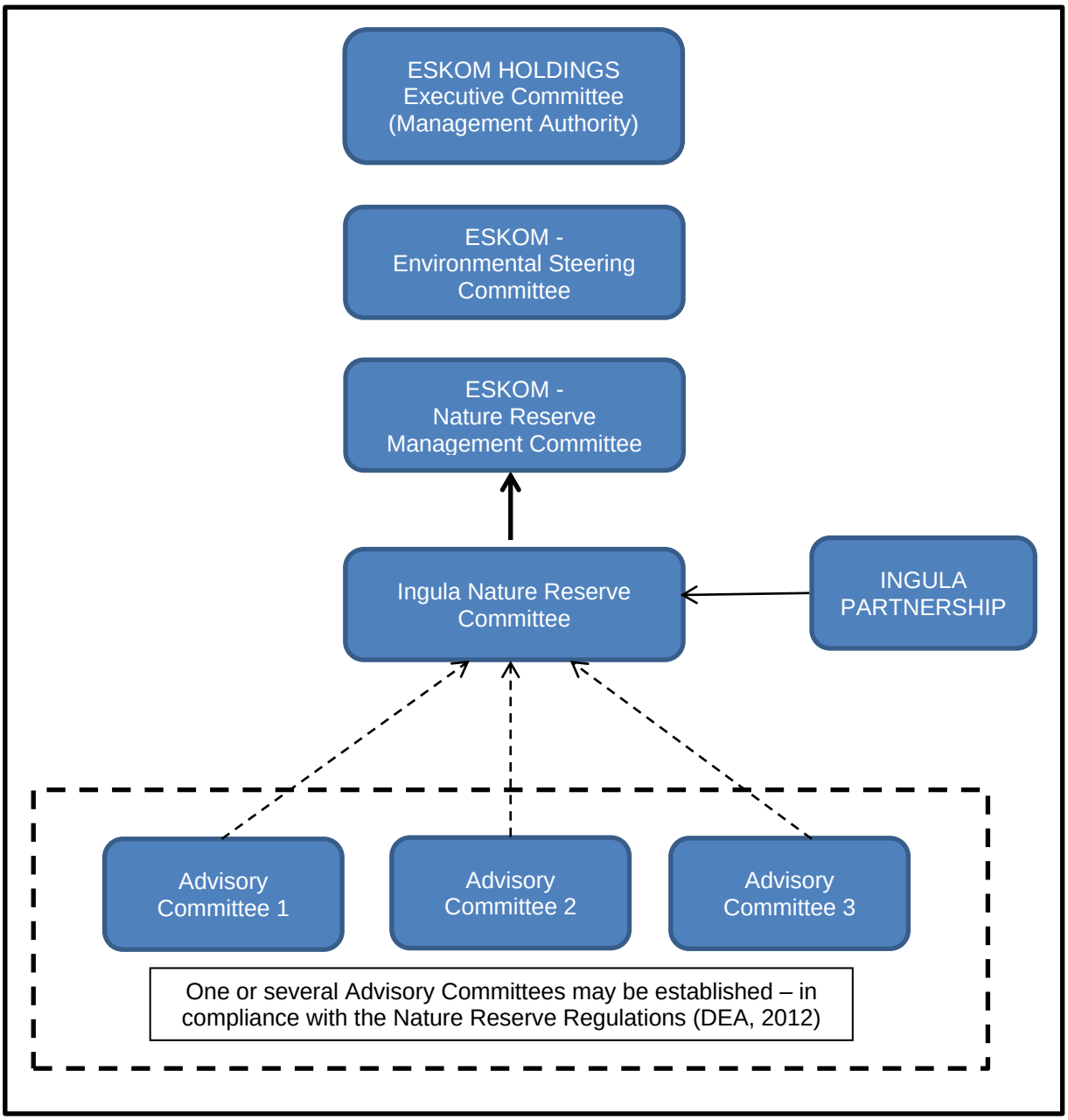


Figure 4.1: Organisational structure for Ingula Nature Reserve

The components of the Administrative Structure include:

i. Eskom Holdings SOC Ltd – Management Authority, as laid out in the declaration agreement.

ii. Eskom Environmental Steering Committee - The Eskom Environmental Steering Committee (ESC) is a sub-committee of the Sustainability System Management Committee (MANCOM), and has been established to provide assistance to the Eskom Environmental manager in developing and managing implementation of the Eskom's Safety, Health, Environmental and Quality Policy (SHEQ) and environmental strategy and policy across the organisation. The Eskom Environmental Steering Committee shall exercise its delegated authority as determined by Sustainability System Management Committee, in accordance with the Delegation of Authority Framework approved by the Board from time to time, subject to the provisions of the Companies Act, Eskom's Memorandum of Incorporation, the Shareholder Compact, the PFMA, and any other applicable legislation.

iii. Eskom Nature Reserve Management Committee – mandated by Eskom Holdings to implement management of all Eskom proclaimed Nature Reserves, including Ingula Nature Reserve. This committee includes Eskom Senior Management representatives who will oversee the management of the nature reserve and will implement decisions as is relevant to the management of the Nature Reserve. A representative member of Eskom's NGO partners may be involved in an observation role within this committee.

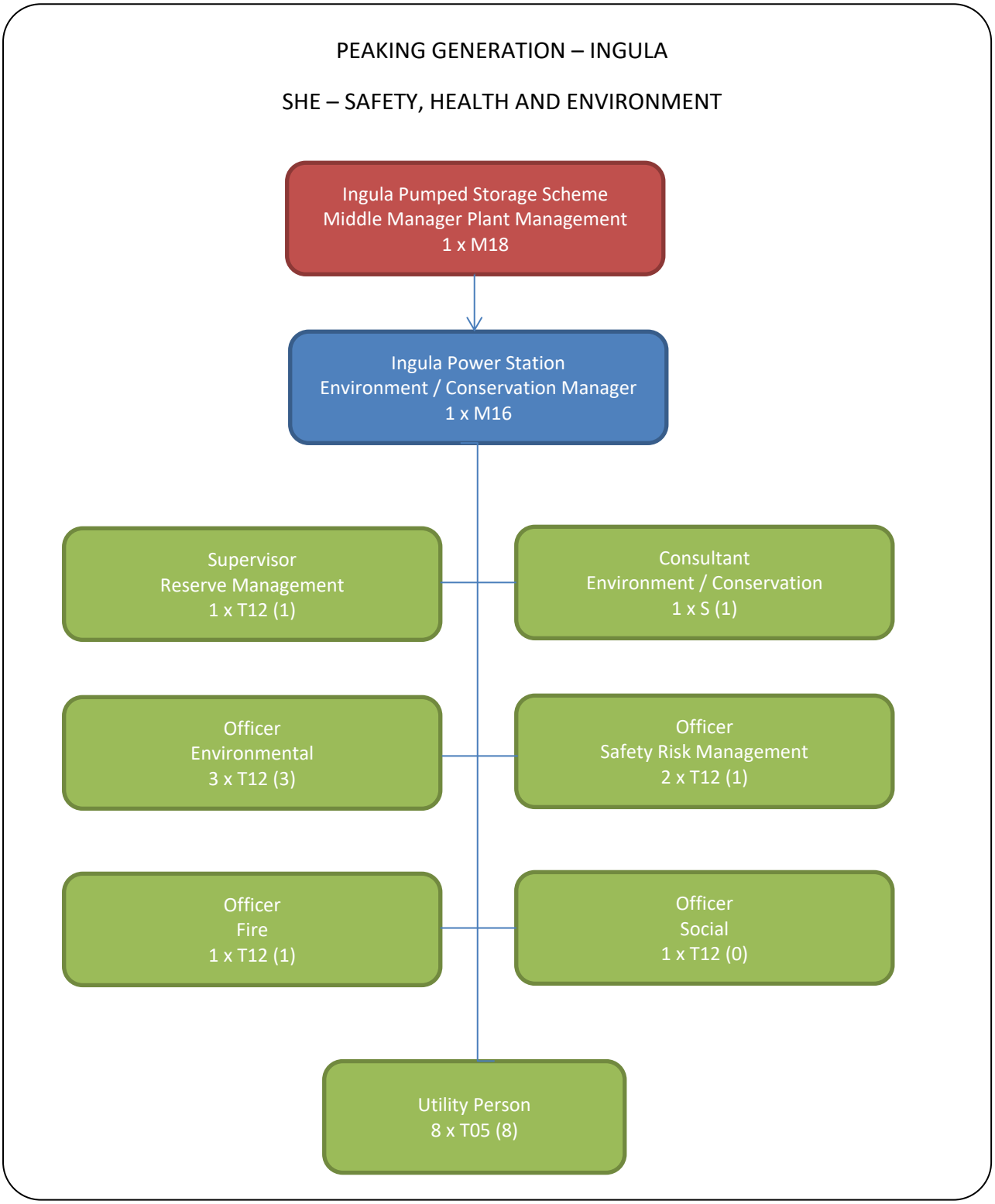
iv. Ingula Nature Reserve Committee – An advisory committee of Eskom representatives (including the Ingula Nature Reserve Environmental / Conservation Manager) and Ingula Partnership representatives, as well as other interested and affected parties who will provide suitable advice towards the management of the nature reserve.

v. Ingula Partnership Steering Committee – A steering committee that was established to oversee the management and monitoring of all environmental impacts as identified in the environmental authorisation. The Ingula Partnership will provide environmental advice to the Ingula Nature Reserve Committee with respect to the management of the Nature Reserve and will also be an independent body outside of the Nature Reserve Management committee to monitor the implementation of the management plan objectives. This committee consists of the following representatives:
   - Eskom
   - Middelpunt Wetland Trust
   - BirdLife SA

vi. Ingula Nature Reserve Advisory Committees – The Ingula Nature Reserve committee has the ability to establish any number of Advisory Committees, as is deemed necessary to support the implementation of management activities on the Ingula Nature Reserve (according to Chapter 3, Section 9 of the Nature Reserve Regulations, Government Notice No. 35021). This may include Eskom, BirdLife SA, Middelpunt Wetland Trust, Wildlands Conservation Trust, provincial authorities, national authorities, local communities and SANBI as representatives on these advisory committees. The support and input of the Advisory Committees is provided to the Ingula Nature Reserve Committee via the Ingula Environmental / Conservation Manager.

4.2 Staffing structure

The following staff structure has been approved by Eskom Holding SOC Ltd (Peaking Generation) for the SHE management of the Ingula Pumped Storage Scheme -



Note: the number in brackets denotes the number of existing staff in the structure.

4.3 Infrastructure

The Ingula Pumped Storage Scheme is situated on the Ingula Nature Reserve. The scheme is currently under construction, and as such has a number of infrastructural elements. Many of these elements will be removed in the long term and the disturbed areas rehabilitated and included in the nature reserve.

Table 4.1, Figure 4.2 and 4.3 highlight the infrastructure that currently exists on the property, indicating that which will be removed following the completion of the construction of the IPSS, and rehabilitated.

Table 4.1: Infrastructure on Ingula Nature Reserve, indicating the long-term goal for its retention or rehabilitation.

Item	Farm	Area / Size	Long term objective
Road Network	Various		Retain
Bramhoek Dam	Braamhoek KZN	250ha	Retain
Bedford Dam and head race	Bedford FS	256ha	Retain
Administration building and Transmission Sub Station, Tunnel access, stores etc	Braamhoek / Zaaifontein ZN	20 ha	Retain
Contractor lay down areas: and offices KZN	Braamhoek ZN	32 ha	Rehabilitate
Tail race lay down areas	Bramhoek	13 ha	Rehabilitate
Eskom offices and clinic	Braamhoek	4	Retain
Contractor lay down areas: FS	Bedford (FS)	26	Rehabilitate
Wesso Factory	Bedford (FS)	2.5 ha	Rehabilitate
Contractor offices	Bedford (FS)		Rehabilitate
Labour Camp (upper site)	Chatsworth (FS)	9.5 ha	Rehabilitate
Labour Camp (lower site)	Braamhoek (ZN)	18 ha	Rehabilitate
Staff Camp Lower site (junior camp)	Zaaifionten Rem (ZN)	4 ha	Rehabilitate
Dam offices Lower Site	Bramhoek	0.5 ha	Rehabilitate
Dam Offices Upper site (Clinic)	Bedford	0.6 ha	Rehabilitate
Dam Offices Upper site	Bedford	0.4 ha	Retain
Aggregate stockpiles 9	Bramhoek	31ha	Rehabilitate
Treatment plants (sewage)	Bramhoek		Retain
Dweller Housing KZN	Bramhoek	6 units	Rehabilitate
Dweller Housing (FS 16)	Various	16 units	Resettle in village
Dweller village	Wilge	4 ha	To be developed

Powerlines -

The power line network is an integral component of the construction and future operation of the Ingula Pumped Storage Scheme. Those 22kV and 88kV power lines associated with infrastructure to be removed following completion of the construction phase will be decommissioned and removed, while a limited network of 22kV and 88kV power lines will be maintained to support the future infrastructure required on the property. A network of 400kV power lines links the pumped storage scheme to the national grid.

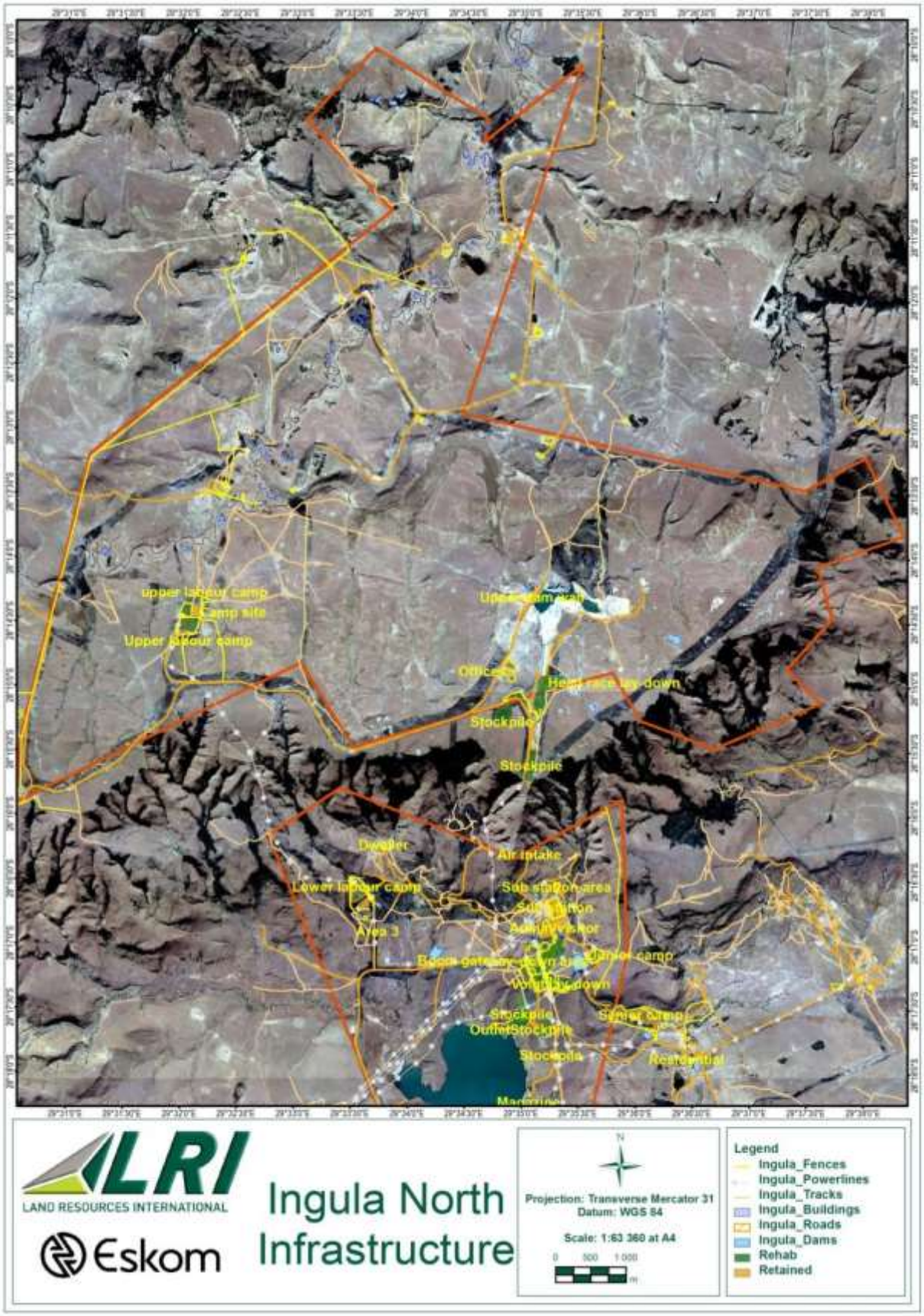


Figure 4.2: Current (2013) and planned (post-construction) infrastructure on Ingula Nature Reserve, include that associated with the construction activities, and highlighting the rehabilitation plan (northern section).

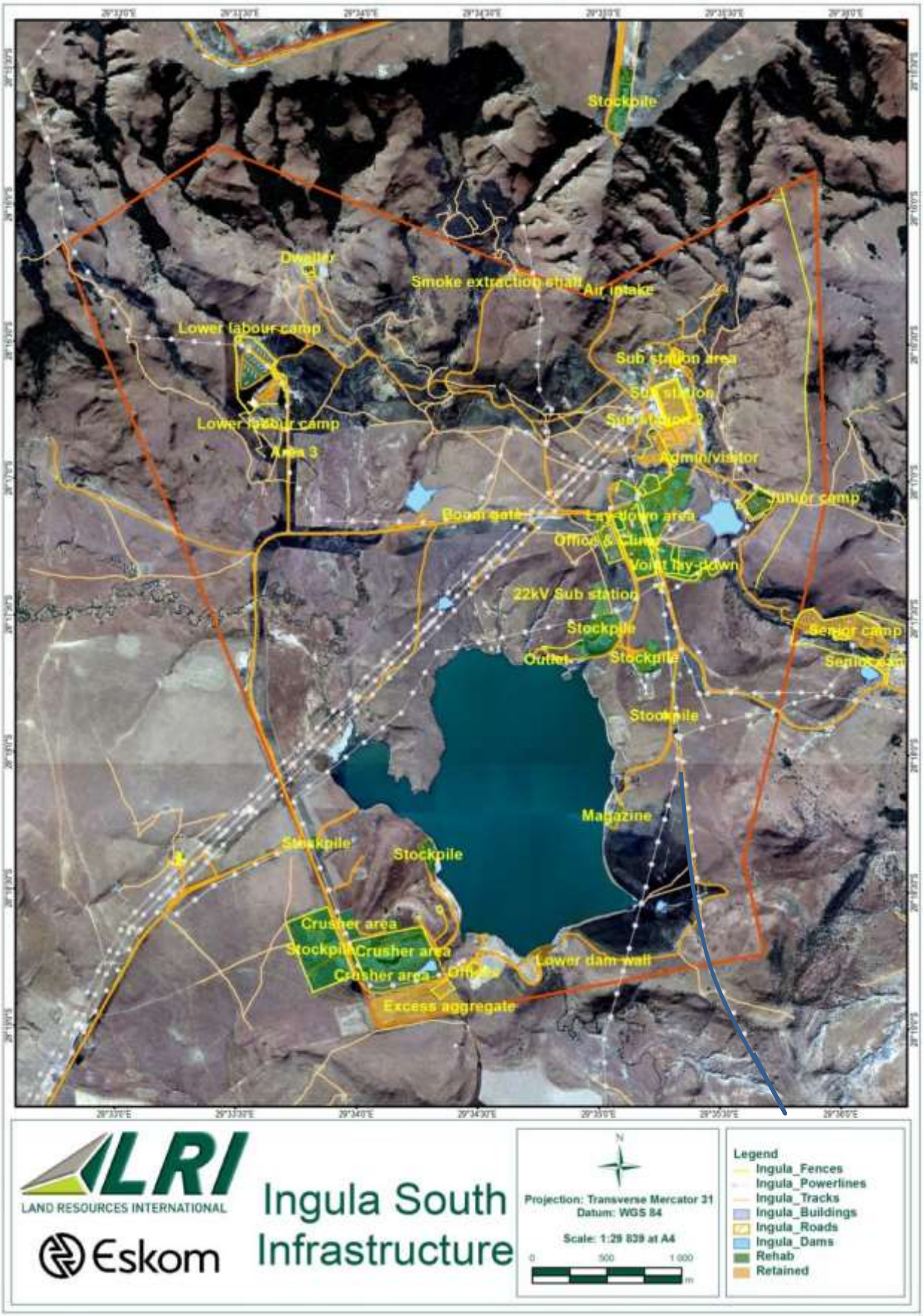


Figure 4.3: Current (2013) and planned (post-construction) infrastructure on Ingula Nature Reserve, include that associated with the construction activities, and highlighting the rehabilitation plan (southern section).

4.4 Zonation plan

The purpose of the zonation of Ingula Nature Reserve is to control the intensity and type of use within it, in efforts to ensure the overriding goals of maintaining the IPSS operations and biodiversity conservation are met. The zonation plan for the Ingula Nature Reserve is shown in Table 4.2 and Figure 4.4.

Table 4.2: Description of the Zones in Ingula Nature Reserve.

Zone	Sub Zone	Description	Permissible Activities	Non-Permissible Activities
Development	Operations and Administrative (including Visitor infrastructure)	All areas and infrastructure required for the operations of PSS, including proposed visitor infrastructure and services.	As per Operational Environmental Management Plan (see **Appendix 2**)	No further limitations
	Construction (*this becomes the Rehabilitation zone from operations of the IPSS*)	Current construction area, much of which will be removed by the end of 2015, to eventually be rehabilitated (see Infrastructure Map, Figure 4.3).	As per Construction Environmental Management Plan 5	No further limitations
	Dweller area	Areas identified for dweller accommodation and agriculture.	Dweller Housing High intensity agriculture Overnight livestock kraals	No further limitations, but any expansion of infrastructure or activities must be done with the permission of Eskom (via the CM)
Natural	High Intensity Utilisation	Areas used for intensive livestock grazing by the Dwellers	Controlled livestock grazing by Dwellers, with stocking rate and grazing system set by CM (in consultation with FS and KZN authorities) Grass harvesting Development of non-consumptive ecotourism facilities, (including non-motorised trails) Motorised management activities	No further construction of dwellers housing. No crop agriculture. As per site rules (see **Appendix 3**)

			required on the property	
	Medium Intensity Utilisation	Areas subject to moderate levels of management and ecotourism / visitor activities.	Controlled livestock grazing at ecologically sustainable LSU. Grass and seed harvesting. Development of non-consumptive ecotourism facilities, (including non-motorised trails, hiking huts, bird hides, rustic campsites and field ranger outposts). Motorised management activities required on the property.	No further Infrastructure development (for PSS or reserve management), without Environmental Authorization. No crop agriculture. As per site rules.
	Low Intensity Utilisation	This zone is designated for areas in which activities are to be limited to low-impact ecotourism uses and specific conservation management interventions.	Low-levels of livestock grazing, only for ecological management purposes. Low intensity eco-tourism activities (non-motorised) and associated infrastructure (i.e. trails / footpaths). Conservation-orientated research.	No crop agriculture. No grass or seed harvesting. Any activity impacting on wetland or water resources. No ecotourism infrastructure (excluding trails / footpaths). No driving off designated tracks.
Resource Protection	Species Protection	Areas / habitats associated with known threatened species presence and nesting sites (e.g. Wattled Crane, White-winged Flufftail), where disturbance levels need to be actively managed. May be temporal in nature	Access under guidance and authority of CM. Any management interventions required to ensure integrity of the site / species habitat. Species management interventions.	Open access and any other activities which may impact on the site or species. No motorised access off designated tracks.

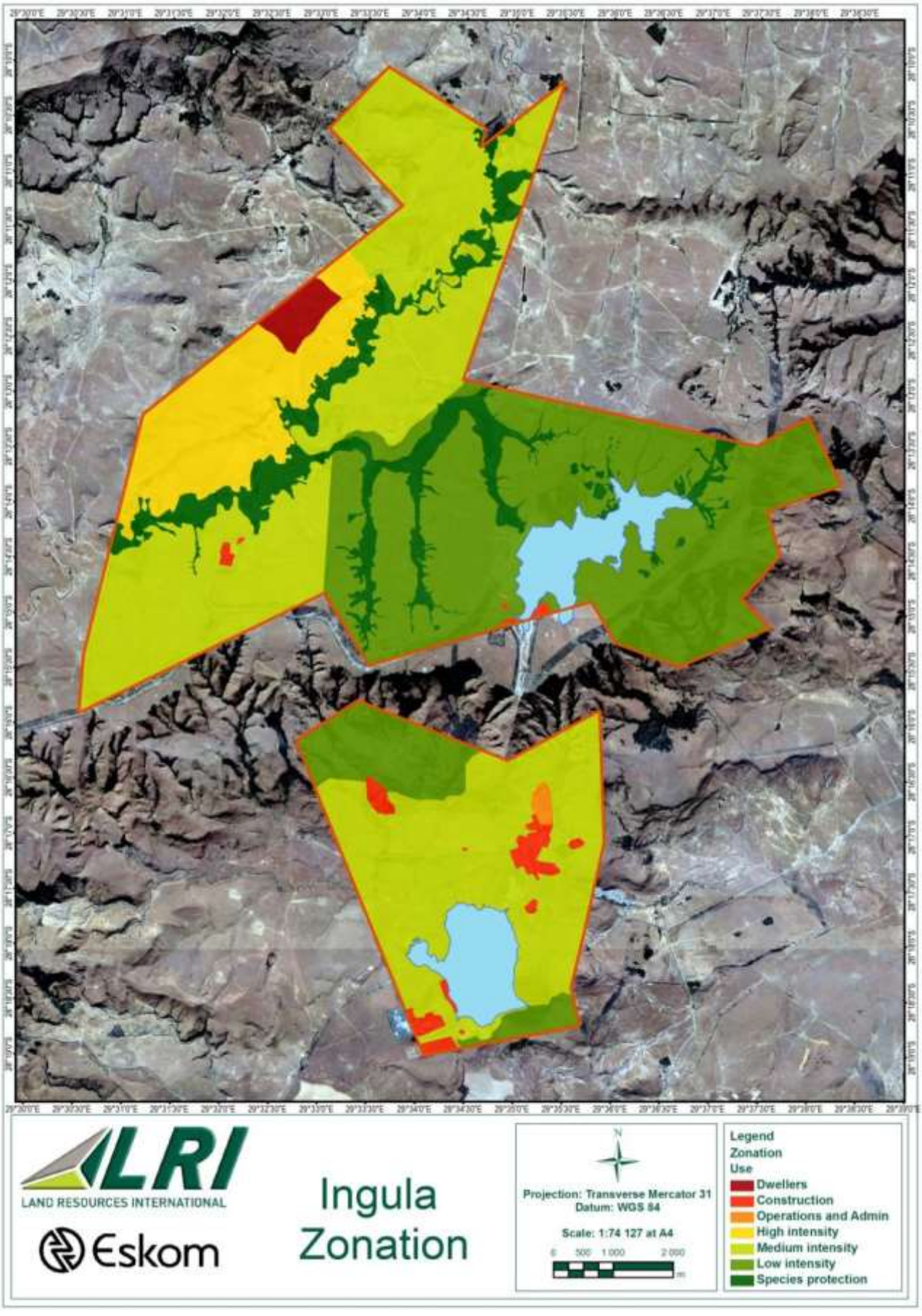


Figure 4.4: Zonation plan for Ingula Nature Reserve

5) OPERATIONAL MANAGEMENT

The Ingula Nature Reserve will be managed by the Ingula Pumped Storage Scheme (under the Eskom Generation Executive Committee), within operational procedures as required by Eskom Holdings.

The existing ISO 14001 management system is used as the foundation for management processes at Ingula, and includes environmental elements from the construction and operational phase of the station, as well as those relating to the nature reserve.

The existing system has been developed with the long-term operation phase of the station and nature reserve in mind, and will be revised at different phases of the stations operation to remain relevant. The system is internationally certified and audited annually.

The system follows a strategic management cycle (Figure 5.1) with the identification of policy and legal and other requirements, used to determine objectives for immediate and long term actions. These are implemented and performance assessed in terms of set criteria on a continual basis. Processes are in place to address non-compliant issues, and ensure all issues identified are resolved.

Figure 5.1: Strategic Management cycle

A full audit process is in place, allowing the identification of problem areas. All issues are considered in the regular planning process.

Full management reviews are undertaken regularly. These reviews will ensure issues relating to the management of the reserve are addressed at the correct level within the organisation.

Determination of priorities for strategic outcomes -

In the tables that follow in this section, a column has been included entitled “Priority”, which is intended to convey the level of priority attached to its strategic outcome. The purpose of prioritising activities is to direct funds and resources to the most important activities, in the event that there are insufficient funds or resources to undertake all of the activities outlined in a particular year. Priorities are ordered in four categories, which have been determined on the following basis:

Priority 1:	Central to the effective protection of Ingula Nature Reserve.
Priority 2:	Fundamental to the protection of the values and purpose of INR (including internal community involvement)
Priority 3:	Contributes towards external community involvement and support for Ingula Nature Reserve, including development of social and / or economic benefits and opportunities for Ingula Nature Reserve and its surrounding communities.
Priority 4:	Indirectly contributes towards the protection of the values and purpose of Ingula Nature Reserve.

The priorities are presented in the tables below using the colour system above, which depicts the level of priority shown for the particular strategic outcome. In addition, a year is indicated in the priorities column for each strategic outcome, which is intended to convey the timing of the implementation of the management activity.

5.1 Financial and human resources

Ingula Nature Reserve cannot be effectively managed without adequate sustained funding and sufficient human resources. In addressing the financial and human resource needs of the nature reserve, the following guiding principles should be adhered to:

- Adequate funding must be provided for the management of the nature reserve to ensure the protection of its biodiversity and cultural values and the continued provision of its ecosystem services.
- The operational expenses will be covered by Eskom as part of the mitigation of the IPSS activities.

- Adequate, properly trained and experienced staff must be employed at the nature reserve to undertake the operations required for its effective management.

Table 5.1 Framework for Financial and Human Resource requirements

Management objective	Management activities	Management targets	Metrics (measurable)	Reporting frequency	Timing	Priority	Responsibility
FINANCIAL RESOURCES							
5.1.a Development of a five-year business plan that identifies the resource needs to achieve the objectives for Ingula Nature Reserve.	Undertake an assessment of past income and expenditure trends in the nature reserve.	Adequate funding to achieve the objectives of the nature reserve.	Annual budget	Annual	**Year 1 and ongoing**	**1**	Ingula CM
	Develop a five-year projection of income and expenditure targets that will allow for the effective achievement of the nature reserve's objectives.						
	Detailed annual budgets must be prepared for each key performance area in the protected area management plan.						
HUMAN RESOURCES							
5.1.b Ingula Nature Reserve is adequately staffed for its effective management and operation.	Undertake a review of current staffing levels to determine the human resource needs to effectively manage the nature reserve.	Appointment of staff in all positions in the nature reserve	Approved Staff structure and all positions filled	Annual	**Year 1 and ongoing**	**1**	Ingula CM
	Employ sufficient, appropriately skilled staff to meet the management and operational requirements of the nature reserve.						
	Undertake regular training and skills development to ensure that staff						

	are able to effectively complete their duties.						

5.2 Legal compliance and standards

As part of the formal proclamation of Ingula Nature Reserve, Eskom, as the landowner and assigned management authority, must ensure that the area is legally protected and that the laws governing the use of the protected area and the prohibition of particular activities are enforced. In fulfilling this role, the managers of Ingula Nature Reserve will adhere to the following guiding principles:

- All reasonable efforts must be made to ensure the effective conservation of biodiversity within and on the boundaries of the nature reserve.
- The operational requirements for legal compliance and enforcement and ensured, as set out in Tables 5.2 below.

CEMP: Construction Environmental Management Plan
The Record of Decision allowing the development of the project requires the development and implementation of an approved Environmental Management Plan. The conditions of the plan, which will differ during the construction and operational phases, form part of the legal framework under which the project may operate, and are audited on a quarterly basis by an external body. Audit reports are sent to DEA and serve as a review of the legislative compliance of the project. The CEMP is shown in **Appendix 4**.

ISO 14001 certification –
The ISO 14001 standard serves as a guideline for the implementation of site management plan. While not a legal requirement, the implementation of a Management plan was recommended in the ROD. Ingula has an international certified management system, with the ISO 14001 checklist shown in **Appendix 5**.

OEMP: Operational Environmental Management Plan
As with the requirements for the CEMP, this plan replaced the CEMP on completion of construction, and is used to govern the operations of the power station in line with legislative requirements. The OEMP is shown in **Appendix** 2.

Table 5.2 Framework for Compliance to Legislation and Standards

Management Objectives	Management activities	Management targets	Metrics (measurable)	Reporting frequency	Timing	Priority	Responsibility
COMPLIANCE TO LEGISLATION AND STANDARDS							
5.2.a The entire extent of the Ingula Nature Reserve is legally proclaimed and protected.	Follow formal proclamation process, in terms of the Protected Areas Act.	Legal protection of the full extent of Ingula Nature Reserve in terms of the Protected Areas Act.	Proclamation notice published	Once off – on proclamation	**Year 1**	**1**	Wildlands / Eskom / DEA
5.2.b To comply with and enforce legislation pertaining to the protection, development and management of Ingula Nature Reserve.	Implement ROD conditions	Full compliance to ROD conditions	% compliance	Audited on quarterly basis	**Ongoing**	**1**	Ingula CM
	Maintain an audited, and relevant management programme	Developed and approved Annual Plan of Operation (APO)	APO approved	Annual	**Year 1**	**1**	Ingula CM
		Annual management meetings to review progress	Review meeting held	Annual	**Year 1 and ongoing**	**1**	Ingula CM
5.2.c Maintain the ISO14001 certification for Ingula Nature Reserve	Maintain the ISO14001 environmental management system	Full compliance	Certification maintained	Annual	**Annual**	**1**	Ingula CM

5.3 Security and Law Enforcement

The Ingula Nature Reserve management will adhere to the following guiding principles in enforcing the laws governing the use of protected areas and the prohibition of particular activities:

- Cooperative structures should be established to enable participation by key stakeholders such as neighbours and the South African Police Service in addressing offences and breaches of the law.
- Law enforcement within the nature reserve will be undertaken through surveillance, monitoring and appropriate reaction in the event of an offence.

Constructive relationships with adjacent landowners and communities are an important aspect of the effective conservation of protected areas. Stakeholder engagement should be aimed at developing a strong sense of partnership between the neighbours and communities around the nature reserve and its managers. The following guiding principles should be adhered to:

- Efforts should be made to ensure that the communities living around the nature reserve are aware of the role that it fulfils in biodiversity protection and the provision of ecosystem services to the region.
- Stakeholder engagement should be undertaken to engender a sense of ownership of the nature reserve, within the communities, and support for its biodiversity conservation objectives.
- A common understanding of the issues that affect both the nature reserve and the surrounding communities should be developed and efforts to resolve them should be undertaken cooperatively.

Table 5.3 Framework for Security and Law Enforcement

Management Objective	Management activities	Management targets	Metrics (measurable)	Reporting frequency	Timing	Priority	Responsibility
SECURITY AND LAW ENFORCEMENT							
5.3.a Ensure adequate law enforcement within Ingula Nature Reserve - adequate security to prevent illegal activities on the property.	Develop a law enforcement programme to ensure adequate security on the reserve, integrated with IPSS security.	Reduce security incidents	No. of security incidents reported	Ongoing	**Year 1 and ongoing**	**1**	Ingula CM
		A set of enforced internal security rules.	Set of approved security rules	Annual	**Year 1 and ongoing**	**1**	Ingula CM
	Collaborate with relevant institutions and local dwellers and surrounding communities in addressing security issues in	Establish and participate in relevant local community fora.	No. of meetings held	Annual	**Year 1 and ongoing**	**1**	Ingula Social Practitioner

	the nature reserve.						
	Implement a programme of patrols of the nature reserve and its boundaries.	Regular patrols covering the full extent of the nature reserve.	Number of security-related incidents	Quarterly	**Year 1 and ongoing**	**1**	Ingula CM
	Ensure that staff are equipped and trained to undertake patrols within the nature reserve for law enforcement purposes.	Adequately resourced and trained law enforcement team	Staff structure filled	Annual	**Year 1 and ongoing**	**1**	Ingula CM
	Ensure conservation area is secured	Adequate perimeter fencing and signage	% boundary adequately fenced	Annual	**Complete by year 5**	**2**	Ingula CM

5.4 Safety

To meet all Eskom safety requirements to ensure the culture of zero harm (ensuring no injuries occur as a result of IPSS operational activities and conservation activities).

Table 5.4 Framework for Safety

Management Objective	Management activities	Management targets	Metrics (measurable)	Reporting frequency	Timing	Priority	Responsibility
SAFETY							
5.4 a Ensure safe operation of Ingula Nature Reserve and IPSS operations	Integrate the safety teams of the IPSS and Nature Reserve	Safety managed as a single unit	Existence of an Integrated programme	Annual (once integrated)	**By end of year 1**	**1**	Ingula Plant Manager
	Implement a safety programme for all conservation staff on site	Zero harm	Number of incidents	Ongoing	**Year 1 and ongoing**	**1**	Ingula CM and Safety Manager
	Adherence to Eskom "Life Saving" rules	Full adherence to rules	Number of disciplinary incidents	Ongoing	**Year 1 and ongoing**	**1**	Ingula CM and Safety Manager

5.5 Buffer zone protection and regional management

5.5.1 Adjoining property land management

In terms of Eskom's management of the IPSS and Ingula Nature Reserve, there is a need to ensure suitable land use management on surrounding properties, particularly in the Wilge and Braamhoek River catchments. Appropriate land use management is encouraged to prevent any impacts on the operations of the IPSS or on the biodiversity value of the Ingula Nature Reserve.

Eskom have identified a number of areas as priorities for protected area expansion around Ingula Nature Reserve. In addition, in order to safeguard the biodiversity within the nature reserve and to counter any threatening processes or edge effects, suitable buffer zones identified and appropriate land uses in these zones encouraged. Appropriate actions may then be taken to secure these buffer zones through protected area expansion mechanisms and local planning tools, in consultation with provincial conservation authorities, as described in Section 5.5.2 below. A catchment management strategy will be developed and implemented to guide interactions with landuse management issues outside of Eskom

5.5.2 Local and regional planning

It is important, in managing the buffer areas around the nature reserve, that Eskom work with local government authorities to ensure that their land use planning considers the biodiversity conservation imperatives of Ingula Nature Reserve. In this regard, it is necessary to ensure that buffer zone considerations are captured in planning tools such as IDPs and SDFs. In developing relationships with the local and district municipality, Eskom will adhere to the following guiding principles:

- Develop appropriate relationships with local government and other provincial and national departments
- Eskom will endeavour to assist the local and district municipality in determining appropriate land uses and development strategies in the areas surrounding the nature reserve.
- Eskom will endeavour to align its plans and strategies with the programmes and strategies of the local and district municipality, where appropriate.

The detailed operational requirements for buffer zone protection and regional management are set out in Table 5.5 below.

Table 5.5 Framework for buffer zone protection and regional management

Management Objective	Management activities	Management targets	Metrics (measurable)	Reporting frequency	Timing	Priority	Responsibility
BUFFER ZONE - ADJOINING LAND USE							
5.5.a Ensure appropriate land use management strategies implemented in the upper Wilge and Braamhoek catchments	Development of a catchment management strategy, identifying risks and appropriate responses in each catchment	Catchment Management Strategy developed and reviewed	Strategy developed	Annual	**Year 1**	**1**	Ingula CM
	Effective interactions with landowners through appropriate fora (Farmers and Fire Protected Associations)	No unsustainable land use activities in catchments	% of catchment under threat And % of catchment under formal protection	Annual	**Year 1**	**1**	Ingula CM
	Determine opportunities for "Education for Sustainable Development" (ESD) and implement where required		ESD Programmes, number of people reached		**Year 2**	**2**	Social Officer
LOCAL AND REGIONAL PLANNING							
5.5.b Determination of buffer zone requirements around Ingula Nature Reserve.	Determine the areas that should be demarcated as buffer zones for the purposes of protecting the biodiversity within the	Identification of threats on the nature reserve's boundary and buffer zone demarcated.	Buffer zone demarcated and communicated	Annual	**Year 1**	**2**	Social and Communication officers

Management Objective	Management activities	Management targets	Metrics (measurable)	Reporting frequency	Timing	Priority	Responsibility
	nature reserve.						
5.5.c Capture of buffer zone considerations in IDPs and SDFs.	Make inputs into the development of local and district municipality IDPs and SDFs in an effort to avoid environmentally harmful land uses in Ingula Nature Reserve's buffer zones; and contribute to any local IEAs	Adoption of and influence environmentally appropriate land uses in IDPs and SDFs in the areas immediately surrounding the nature reserve. Retention of existing benign land uses in the areas immediately surrounding the nature reserve.	% of buffer area with appropriate land use management OR % of buffer area under formal protection	Annual	**Year 1**	**2**	Social officer

5.6 Biodiversity management

5.6.1 Fire management

Fire plays an important role in the ecological dynamics of grasslands and wetlands, and has important effects on vegetation composition, primary productivity and nutrient cycling. In developing burning and fire management strategies for the nature reserve, the following guiding principles should be adhered to:

- Burning should be undertaken in such a way that it maintains spatial and temporal heterogeneity within the landscape.
- A patch mosaic of burnt and un-burnt areas should be maintained.
- The burning of areas should be undertaken in such a way that promotes patchy burns (i.e. within the block being burnt, some patches will remain un-burnt rather than aiming for a complete burn).
- Burning must be undertaken with due consideration to the biodiversity conservation requirements of the nature reserve and the need to protect rare and endangered species.

- Burning and fire management must be undertaken in a safe manner that is legally compliant with the National Veld and Forest Fire Act (No.101 of 1998).

In terms of Section 17 of the National Veld and Forest Fires Act, a landowner (in this case the nature reserve) must have such equipment, protective clothing and trained personnel for extinguishing fires as may be prescribed or, if not prescribed, reasonably required in the circumstances. It is therefore necessary to consider the following in relation to fire-fighting:

- The need to maintain a system of firebreaks to enable the management of controlled burns and to effectively fight wildfires.
- The size of the nature reserve and the requirements necessary to access different areas in the event of a wildfire. This relates to both roads and vehicles.
- The number of personnel necessary to effectively fight wildfires.
- The equipment necessary to effectively fight wildfires. This would include:
    - Water tankers and pressure pumps mounted on or pulled behind tractors.
    - Fire-fighting equipment mounted on the backs of vehicles.
    - Backpack sprayers.
    - Beaters.
    - Safety equipment for personnel involved in fire-fighting.
    - Strategic water supply points.

The detailed operational requirements for fire management are set out in Table 5.6.1 below.

Table 5.6.1 Framework for Biodiversity Management (Fire management)

Management Objective	Management activities	Management targets	Metrics (measurable)	Report frequency	Timing	Priority	Responsibility
FIRE MANAGEMENT							
5.6.1. a Development of an annual fire management plan for Ingula Nature Reserve using the best available scientific knowledge and practice.	The fire management plan developed addressing fire management objectives, legal compliance, and equipment, personnel training requirements, monitoring and research required.	Adoption and implementation of the fire management plan.	Plan developed and reviewed annually	Annual	**Year 1 and ongoing**	**1**	Ingula CM
	Integrate the findings of the VCA into the existing fire	Burning according to VCA	Burns mapped and plan adapted when new information received	Annual	**Ongoing**	**2**	Ingula CM

	management plan	recommendations					
	Review the previous fire season's burns (planned and unplanned) in determining the burning regime for the coming season.	Burning according to the annual plan in accordance with ecological advice.	Number of and extent of unplanned fires	Annual	**Ongoing**	**2**	Ingula CM
5.6.1.b Adequate fire safety within Ingula Nature Reserve is ensured.	Maintain a system of firebreaks within the nature reserve that are of adequate extent, which are prepared at the correct time of the year under the appropriate weather conditions.	Compliance with the National Veld and Forest Fires Act.	% of fire breaks completed as per plan	Annual	**Ongoing**	**1**	Ingula CM
	Ensure that staff appointed are trained and that adequate fire-fighting equipment is available within the nature reserve.		% staff trained	Annual	**Year 1**	**1**	
	Become a member of the local Fire Protection Association, or if one does not exist, champion the creation of one.		Membership	Annual	**Year 1**	**2**	

5.6.2 Grazing management

Grazing by large mammalian herbivores has also been a key process shaping the grassland biome. The abundance and impact of large herbivores would not have been uniform across the biome but would have varied in relation to rainfall and soil characteristics. Indigenous mammalian herbivores have been replaced by livestock, but usually at an abundance far exceeding the former abundance of wildlife with consequent effects of degradation. Livestock have, nonetheless, maintained grazing as an essential ecological process.

Grazing intensity has the most impact of the grazing variables on biodiversity integrity, and extent of grazing the least. Grazing intensity relates to stocking rate, and is thus more of a reflection of management than of grazing system. Although High Intensity Grazing systems will have, on average, a greater negative impact on grassland biodiversity integrity than 'average' conventional or continuous systems, heavy stocking rates of the latter two can cause extreme degradation.

The Ingula Nature Reserve will use grazing by livestock as a management tool to maintain grassland condition and biodiversity vigor, basing management interventions on the three most important principles in veld management in sourveld:

1. Do not exceed the carrying capacity of the veld;
2. Burn regularly (every year to every two years, depending on grazing pressure and conditions) to remove old, moribund material.
3. Rest the veld regularly (every year to every four years, depending on the grazing system, and VCA).

A detailed veld condition assessment has been commissioned in order to guide grazing management on Ingula Nature Reserve (see **Appendix 6**). Armed with this information, the Ingula Nature Reserve will manage grazing with the primary aim of maximising biodiversity, and will only allow livestock where grazing is required for conservation management purposes, or in specific areas allowing the dwellers to graze livestock.

Table 5.6.2 Framework for Biodiversity Management (Grazing)

Management Objective	Management activities	Management targets	Metrics (measurable)	Reporting frequency	Timing	Priority	Responsibility
GRAZING MANAGEMENT							
5.6.2.a Develop an understanding of the	Coordinate the VCA study	VCA completed and recommendations provided	VCA report	5 yearly	**End of year 2017**	**1**	Ingula CM

ecological implications of the use of livestock in managing Ingula Nature Reserve	Understand and quantify the biodiversity implications of livestock grazing on the reserve	Participate in existing research programmes	Ad hoc	Ongoing	**Ongoing**	**2**	Ingula CM
5.6.2.b Grazing management is implemented as an ecological management tool	Develop and manage a detailed livestock and natural herbivore grazing strategy	Appropriate livestock and herbivore numbers on site for conservation outcomes	Existing stocking rate as a % of recommended stocking rate	Annual	**Year 1 and ongoing**	**1**	Ingula CM
		No rehabilitated areas damaged by livestock grazing	% rehabilitated area damaged	Annual	**Ongoing**	**1**	Social Officer

5.6.3 Soil erosion control

A detailed Soil erosion strategy will be developed to meet the objectives and targets of this management plan. The nature reserve strategy will focus on the following priority elements:

- To prevent new erosion occurring, by:
  - reducing the direct causes of current erosion;
  - Managing construction activities to prevent future erosion;
- Stabilise existing erosion features;
- To repair existing erosion to original ground level;
- Maximize job creation opportunities through this process.

In Terms of the Record of Decision issued in favour of construction of Ingula, an erosion control programme needs to be implemented.

The Record of Decision requirement is as follows:

6.2.6 Eskom shall rehabilitate wetlands on the BWP to the extent determined research and experience. This must be done in close cooperation with the relevant provincial department. This rehabilitation shall include rehabilitation of sheet and gully erosion.

The RoD also states:

6.2.11 Eskom must ensure that the upper dam is designed to preserve the quasi-equilibrium of the landscape geomorphic by ensuring that amongst other things:

- Measures are put in place to ensure that the base to which erosion is working does not change.
- Measures are put in place to avoid concentrated flow inputs into the wetland.

While Eskom has a responsibility in terms of the RoD to rehabilitate sheet and gully erosion in the catchment of the Bedford-Chatsworth wetland, from an operational perspective it is also desirable to manage erosion throughout the Eskom owned property.

Table 5.6.3 Framework for Rehabilitation (including erosion)

Management Objectives	Management activities	Management targets	Metrics (measurable)	Reporting frequency	Timing	Priority	Responsibility
EROSION AND REHABILITATION							
To develop and implement an effective erosion control strategy	To update the map of identified existing erosion areas, and identify requirements for stabilization and rehabilitation	Updated map and plan	Map and plan	Annual	**Year 1 and ongoing**	**1**	Ingula CM
	Implement an erosion control plan to address areas identified above	All erosions areas identified rehabilitated	% of erosion areas rehabilitated	Annual	**Year 1 and ongoing**	**1**	Ingula CM
	Undertake preventative measures in high risk area for erosion (to prevent new erosion)	No new erosion sites	Number of new erosion sites	Every 6 months	**Ongoing**	**1**	Ingula CM
	Develop a rehabilitation plan for the reserve, identifying existing erosion areas and resources available	Effectively implemented rehabilitation plan for construction areas	Rehabilitation plan	Annual	**Year 2**	**2**	Ingula CM

	For construction areas, rehabilitate degraded areas to original ground level and functional plant diversity	All construction areas rehabilitated	% of area rehabilitated (total footprint)	Every 6 months	**By end of construction**	**2**	Ingula Environmental Manager

5.6.4 Invasive plant control

A listed invasive species means any species, which is listed in terms of section 70 of the National Environmental Management: Biodiversity Act, whose establishment and spread occurs outside of its natural distribution range. Such plants are considered to be a serious threat to the ecological functioning of natural systems and to water production, and must be strictly controlled. In undertaking invasive plant control, the following guiding principles will be adhered to:

- Invasive plant control will require an ongoing programme that prioritises key infestations along water courses, drainage lines and upper catchment areas.
- Initial clearing efforts should focus on containing infestations that are most likely to spread into new areas.
- All follow-up requirements must be strictly adhered to otherwise the problem will be exacerbated.
- Strategic partnerships and poverty relief programmes such as the Working for Water programme should be utilised in controlling invasive plants.

Table 5.6.4 Framework for Invasive alien species

Management Objective	Management activities	Management targets	Metrics (measurable)	Reporting frequency	Timing	Priority	Responsibility
ALIEN INVASIVE SPECIES							
5.6.4.a Development of an invasive species control plan for Ingula Nature Reserve.	Develop a detailed inventory of the listed invasive species.	Realistic and achievable plan produced	Plan in place and reviewed annually	Annual	**Year 1**	**1**	Ingula CM
	Map the areas and extent of invasive species infestations.						
	Describe previous efforts to control and						

	eradicate invasive plants.						
	Outline the measures required to monitor, control and eradicate the invasive species.						
	Identify measurable indicators of progress and success in implementing control plan.						
5.6.4.b Achievement of a significant reduction in levels of invasive plant infestations in Ingula Nature Reserve.	Implement the control plan for the nature reserve.	No flowering wattle by commissioning in Eskom-owned catchment areas Reduction in all other alien plant species identified	% wattle flowering % reduction of areas of infestation	Annual	**Year 1 and ongoing**	**1**	Ingula CM
	Implement concerted, sustained control efforts in identified areas of heavy invasive plant infestation.						
	Undertake suitable rehabilitation measures, including re-vegetation using indigenous plant species, to prevent soil erosion, following clearing of invasive plant species.	100% areas rehabilitated	% of areas rehabilitated	Annual	**Year 2**	**1**	Ingula CM
	Prevent new alien plant introductions	No new alien plant introductions	Number of new plant species reported on site	Every 6 months	**Year 1 and ongoing**	**1**	Ingula CM
5.6.4.c Prevent introduction of	Ongoing survey of all water bodies on site and near to site	No aquatic weeds on site and catchments	Presence of alien aquatic weeds	Every 3 months	**Year 1 and ongoing**	**1**	Ingula CM

any aquatic alien weeds	Immediate reaction plan to eradicate aquatic alien weeds						

5.6.5 Ecosystem Management

The Ingula Nature Reserve has a number of important vegetation types and ecosystems, which require specific management interventions in order to maintain their ecological viability.

The principles on which all ecosystems will be managed include:

- Maintain the ecological integrity of the ecosystems;
- Maintain all natural processes within each ecosystem;
- Provide suitable habitat for threatened species characteristic of each ecosystem.

Table 5.6.5 Framework for Biodiversity Management (Ecosystem management)

Management Objectives	Management activities	Management targets	Metrics (measurable)	Reporting frequency	Timing	Priority	Responsibility
GRASSLAND MANAGEMENT							
5.6.5.a Maintain the ecological integrity of the grasslands through appropriate management	See fire and grazing management strategies						
WETLAND MANAGEMENT							
5.6.5.b To manage wetlands according to recognised best practice knowledge and guidelines	Identify and rehabilitate any direct erosion threats to wetlands	No active erosion in wetlands	Number of active erosion points	Annual	**Year 1 and ongoing**	**1**	Ingula CM
	Ensure appropriate livestock stocking rates in wetlands	Recommended stocking rates adhered to		Annual	**Year 1 and ongoing**	**1**	Ingula CM
	See fire and grazing management strategies						

5.6.5.c To pursue the application of the area as a Ramsar site	Continue Ramsar application process	Ramsar proclamation	Registered as a Ramsar site	Once-off	**Year 2**	**2**	Eskom Biodiversity COE
FOREST MANAGEMENT							
5.6.5.d Maintain the ecological integrity of the indigenous forests through appropriate management	See fire management, grazing management and resource use plans						

5.6.6 Priority species

Ingula Nature Reserve has a significant number of threatened and red data species that require conservation interventions. Species that are either "critically endangered", "endangered", or highly threatened, or species that are key indicators of the health of systems are the focus of these management interventions.

The following species have been identified for key management interventions and monitoring on Ingula Nature Reserve -

Species	**Reason for Inclusion**
Wattled Crane	Red data status, key indicator of disturbance
Grey Crowned Crane	Red data status
Blue Crane	Red data status
Secretary Bird	Red data status
Denham's Bustard	Red data status
White-Winged Flufftail	Red data status, key indicator of wetland health
Oribi antelope	Red data status
Aardvark	Key indicator (poaching utilisation)
Southern Bald Ibis	Key indicator (grassland specialist)
Yellow-breasted Pipit	Red data status, key indicator of grassland health
Sungazer	Red data status
Protea dracomontana	Rare on site, very limited distribution
Muti Plants	Red data status, unsustainable utilisation
Fairy Shrimp	Specialist recommendation

Table 5.6.6 Framework for Biodiversity Management (Priority species)

Management Objectives	Management activities	Management targets	Metrics (measurable)	Reporting frequency	Timing	Priority	Responsibility
PRIORITY SPECIES							
5.6.6.a To develop and implement specific management programmes for the key priority species identified	Develop management plans for priority species on the reserve (including risk assessments)	2 Management plans for priority species produced per annum	2 Plans developed per annum	Annual	**Year 1 and ongoing**	**2**	Ingula CM
	Adopt procedures for the management of priority species based on available literature and best known practice	Recommendations integrated into management programmes (e.g. burning, grazing, etc.)	Population trends	Annual	**Ongoing**	**2**	Ingula CM
	Conduct population censuses of all identified priority species	Population counts	Population number trends	Annual	**Ongoing**	**2**	Ingula CM

5.6.7 Wildlife management

Management interventions related to indigenous wildlife will be limited to those that are for the purposes of safeguarding populations of rare and endangered species or enhancing the ecological functioning of the Ingula Nature Reserve, to meet set conservation targets. In addition, interventions may be required for problem animal management. In addressing wildlife management, the following guiding principles should be adhered to:

- Wildlife management must be focussed primarily on protecting the ecological functioning of the nature reserve and meeting set provincial conservation targets for species and vegetation types.
- The introduction of indigenous species into the nature reserve must be undertaken in accordance with relevant provincial conservation authority's policies.
- Population management of wildlife species may be required to ensure that such species are not causing ecological degradation of the nature reserve.

- Animals that become a danger or excessive nuisance to persons and property due to either habituation or aberrant behaviour must be managed in accordance with relevant provincial conservation authority policies.

Alien animal control -

Alien animal species can threaten the ecological, genetic or natural aesthetic integrity of Ingula Nature Reserve and can be vectors for the spread of diseases. In dealing with the control of alien animals, procedures to deal with animals that stray into the nature reserve should be developed. In addressing alien animal control, the following guiding principles should be adhered to:

- Domestic animals such as horses and donkeys will only be allowed if kept at the nature reserve for official purposes such as patrolling, or in terms of the approved site rules.
- Domestic livestock such as cattle will be managed, in conjunction with the dwellers, in terms of the site rules, maintaining the principles of ecological management and sustainability.
- Feral animal species that pose a threat to indigenous species will be destroyed (as humanely as practicably possible with due regard to the tourist experience).

Table 5.6.7 Framework for Biodiversity Management (Wildlife management)

Management Objective	Management activities	Management targets	Metrics (measurable)	Reporting frequency	Timing	Priority	Responsibility
WILDLIFE MANAGEMENT							
5.6.7.a Address and mitigate wildlife mortality factors	Identify high risk areas for road mortalities and power line strikes	Risk areas identified	Risk map / register	Every 6 months	**Year 1 and ongoing**	**1**	Ingula CM
	Implement a programme to mitigate mortalities	Zero wildlife mortalities	Number of incidents				
5.6.7.b Development of a strategy for the introduction and management of wildlife into Ingula Nature Reserve in accordance with best practice.	Ensure that any proposals for the introduction of wildlife species conform to provincial policies.	Approved species reintroduction and management programme	Approved programme	Annual	**Year 2**	**2**	Ingula CM
	Ensure that only species known to have historically occurred in the nature reserve						

Management Objective	Management activities	Management targets	Metrics (measurable)	Reporting frequency	Timing	Priority	Responsibility
	are re-introduced.						
	Ensure that species introductions are adequately documented.						
5.6.7.c Conform to procedures and policies for problem animal control.	Undertake preventative measures, such as boundary fence maintenance, to minimise the need for problem animal control.	No problem animal incidents	Number of incidents	Every 6 months	**Year 1 and ongoing**	**2**	Ingula CM
	Apply appropriately humane methods, if problem animals must be destroyed or captured.						
	Effective procedures and relationships with neighbours in dealing with problem animal control.						
5.6.7.d Implementation of procedures to manage alien animals found within Ingula Nature Reserve.	Together with neighbouring communities and provincial authorities, agree on the approach to dealing with stray livestock and domestic animals found in the nature reserve, particularly dogs, which may be used for illegal hunting.	Control of any alien animals found within the nature reserve.	Number of incidents	Every 6 months	**Year 1 and ongoing**	**2**	Ingula CM

5.6.8 Fish Management

Due to the IPSS being characterized by a water transfer scheme between two historically isolated water catchments, aquatic species are managed toprevent the introduction of new alien species to the system.

Table 5.6.8 Framework for Biodiversity Management (Fish management)

Management Objectives	Management activities	Management targets	Metrics (measurable)	Reporting frequency	Timing	Priority	Responsibility
FISH MANAGEMENT							
5.6.8.a Prevent introduction of alien fish species	Manage all fishing on site under permit	All fishing done under permit	No. of fishing activities done under permit	Every 6 months	**Year 1 and ongoing**	**1**	Ingula CM
	Communicate strategy	All stakeholder aware of alien fish issue	Number of incidents	Every 6 months	**Year 1 and ongoing**	**1**	Ingula CM

5.7 Infrastructure development and management

In order for Ingula to operate appropriately, adequate infrastructure needs to be developed and maintained both for management and tourism purposes. In addressing infrastructure needs at the site, the following guiding principles will be adhered to:

- Facilities and infrastructure must be provided to support the eco-cultural tourism activities in the nature reserve.
- Infrastructure must be maintained to avoid any damage to the environment and ensure the safety of staff and visitors to the site.
- Infrastructure must be provided to ensure the effective management and operation of the nature reserve.
- Practical solutions to the provision of electricity should be sought at the nature reserve based on available renewable energy and energy efficiency technologies

The detailed requirements for operational management are set out in Table 5.7 below.

Table 5.7 Framework for Infrastructure development and management

Management Objectives	Management activities	Management targets	Metrics (measure)	Reporting frequency	Timing	Priority	Responsibility
INFRASTRUCTURE DEVELOPMENT AND MANAGEMENT							
5.7.a Existing and new roads, 4x4 tracks and paths in Ingula Nature Reserve are maintained.	Determine and undertake works to rehabilitate or improve roads, 4x4 tracks and paths so that they are safe, do not cause environmental harm and are accessible at all times of the year.	Rehabilitation and maintenance of roads, 4x4 tracks and paths that are unsafe or are causing environmental damage.	% of road safe and not causing, or subject to, erosion	Annual	**Ongoing**	**1**	Ingula CM
	Maintain roads, 4x4 tracks and paths according to standards that ensure safety and avoid environmental harm such as erosion.						
	Undertake regular assessments of the condition of roads, 4x4 tracks and paths to determine scheduled maintenance needs.						
5.7.b All facilities, assets, infrastructure and equipment in Ingula Nature Reserve are adequately maintained.	Ensure that the boundary fence is regularly inspected and adequately maintained to ensure security and to contain game species within the nature reserve.	Regular scheduled maintenance of all facilities, assets, infrastructure and equipment.	% fencing not meeting required standard	Annual	**Ongoing**	**2**	Ingula CM
	Develop and implement a scheduled maintenance programme to maintain facilities, assets, infrastructure and equipment in a condition that meets relevant environmental, health and safety requirements.		Number of maintenance incidents	Annual	**Ongoing**	**2**	Ingula CM
5.7.c New infrastructure to be	Construct all new infrastructure with	No infrastructure developed	Number of incidents	Annual	**Ongoing**	**3**	Ingula CM

developed by adhering to all relevant legislation and reserve zonation	all appropriate planning permissions	against permissions					

5.8 Tourism development

In developing tourism within the Ingula Nature Reserve, the following guiding principles should be adhered to:

- Tourism products must be appropriate to the site's values and must not threaten its biodiversity or ecological function.
- In developing tourism products, requirements for environmental authorisation must be considered and adhered to.
- Tourism products should be designed to capitalise on the unique beauty and biodiversity features of the site.
- Tourism products should be developed in response to tourism market demands and opportunities within the site and should be carefully assessed to determine their viability.

The operational requirements for tourism development are set out in Table 5.8 below.

Table 5.8 Framework for Ecotourism development

Management Objectives	Management activities	Management targets	Metrics (measurable)	Reporting frequency	Timing	Priority	Responsibility
ECOTOURISM							
5.8. a Prepare and implement a concept development plan outlining the tourism products and facilities that will be developed for Ingula Nature Reserve	Develop and implement an environmental interpretation and education programme through the Visitors Centre	Encourage use of the area	Number of people using the area	Annual	**Year 2**	**3**	Ingula CM
	Develop a network of self-guided and guided trails (day trips), sensitively placed and well-maintained	Well-maintained and accessibly trail network	Number of people using trails	Annual	**Year 3**	**3**	Ingula CM
	Meet organization standards with regards to signage, as part of the	Signage compliance with Eskom standard	Number of incidents	Annual	**Year 3**	**4**	Ingula CM

	concept development plan.						
5.8.b Promote the Ingula Nature Reserve as a destination for non-consumptive tourism	Development and implementation of a communication strategy	Communication strategy implemented	Number of users	Annual	**Year 2**	**2**	Ingula CM
	Open the Nature Reserve to organised tourism groups	Use of area	Number of groups	Annual	**Year 2**	**2**	Ingula CM

5.9 Social aspects

The land purchased in terms of the RoD was originally owned by commercial farmers, and was home to a number of communities practicing subsistence farming. Eskom realises the rights of these communities, and in accordance with the National imperatives of land reform and equity, is including the existing dwellers in the development and management of the Ingula Nature Reserve.

People living in the area have few developmental opportunities, and it is intended to use the environmental programmes as a method of social upliftment in conjunction with appropriate national and provincial authorities.

A resettlement programme has been implemented, offering dwellers the opportunity to move to alternative areas on the property or off the property, allowing the provision of basic services and reducing current impacts. The Zoning of the reserve takes existing and future requirements of dwellers into account. Programmes are being established to develop capacity amongst dwellers to allow them to contribute to the sustainable development of the Nature Reserve.

Dwellers will be allowed to continue certain farming practices (in accordance with this management plan), and will be encouraged to develop as sustainable rather than subsistence farmers. Work opportunities will be created and where possible, labour intensive land management programmes implemented to address alien eradication and the rehabilitation of the area. Dwellers will be encouraged to contribute to ecotourism development in the area, and will also have incentives to contribute to the sustainable development of the project.

Traditional access rights will be maintained, and the area developed in conjunction with the existing dwellers.

The social elements implemented within the Ingula Nature Reserve are shown in Tables 5.9.1 to 5.9.4.

Table 5.9.1 Framework for Social aspects (dwellers)

Management Objectives	Management activities	Management targets	Metrics (measurable)	Reporting frequency	Timing	Priority	Responsibility
DWELLERS							
5.9.1.a To resettle dwellers to a central point where infrastructure can be provided	Develop and implement a relocation programme	All dwellers appropriately relocated	Number of dwellers relocated	Annual	**Year 1**	**1**	Eskom Real Estate
5.9.1.b To incorporate the dwellers into the long-term sustainable operations of the reserve	Development of fora with dwellers	All dwellers fully integrated into management activities	Number of projects	Annual	**Year 2**	**2**	Ingula CM
	Implementation of Education for Sustainable Development (ESD) programmes	All dwellers integrated into ESD programmes	Dwellers participation in programmes	Annual	**Year 2**	**2**	Ingula CM

Table 5.9.2 Framework for Social aspects (Sustainable Livelihoods)

Management objectives	Management activities	Management targets	Metrics (measurable)	Reporting frequency	Timing	Priority	Responsibility
SUSTAINABLE LIVELIHOODS							
5.9.2.a To enable neighbouring landowners and communities to make management inputs into Ingula NR management.	Development of fora with communities	Management decisions take into account neighbouring communities requirements	Presence of community members at fora	Annual	**Year 1**	**3**	Ingula CM
5.9.2.b To enable neighbouring	Implementation of ESD projects	Continually increase the number of	Number of local community	Annual	**Year 2**	**3**	Ingula CM

landowners and communities to derive socio-economic benefits from Ingula Nature Reserve.	Provision of support to the communities through training and mentorship	people benefiting from the reserve	members deriving economic benefit from the reserve				
	To create appropriate jobs for communities directly on Eskom land						
5.9.2.c To implement an appropriate education programme to improve development of communities	Engage with appropriate NGOs to identify opportunities			Annual	**Year 3**	**4**	Ingula CM
	Implement an environmental education programme with local communities						

Table 5.9.3 Framework for Social aspects (Access)

Management Objectives	Management activities	Management targets	Metrics (measurable)	Reporting frequency	Timing	Priority	Responsibility
ACCESS							
5.9.3.a To ensure community understanding and cooperation regarding access.	Identify needs and requirements of local communities and neighbours	No unauthorised access	Number of incidents	Every 6 months	**Year 1**	**1**	Ingula CM
	Develop and implement community access plan						
	Draft formal agreements with stakeholders						

Table 5.9.4 Framework for Social aspects (Resource use)

Management Objectives	Management activities	Management targets	Metrics (measurable)	Reporting frequency	Timing	Priority	Responsibility

RESOURCE USE							
5.9.4.a To ensure the sustainable utilization of natural resources on Ingula Nature Reserve	To gain an understanding of the resource utilization potential and thresholds	Potential and thresholds determined	Plan complete	Once off	**Year 1**	**2**	Ingula CM
	To develop and implement a sustainable resource utilisation plan (including muti plants)	Sustainable resource use allowed and monitored	Number of community members deriving benefit	Annual	**Year 1 and ongoing**	**2**	Ingula CM
	To train and mentor communities to sustainably utilize their resources (from subsistence to sustainable use)	Community practices moved from subsistence to sustainable	Number of unsustainable activities	Annual	**Year 3**	3	Ingula CM

5.10 Cultural and Archaeological

Cultural and archaeological resources will be conserved and managed to maximize benefits to all interested and affected parties.

Rights and cultural practices of historical dwellers will be taken into account in the development of access and facilities.

Table 5.10 Framework for Cultural and Archaeological Heritage

Management Objectives	Management activities	Management targets	Metrics (measurable)	Reporting frequency	Timing	Priority	Responsibility
CULTURAL AND ARCHEAOLOGICAL HERITAGE							
5.10.a Controlled access for community to	Control access for communities to visit sites	Controlled access to all sites	Number of unauthorised visits	Annual	**Year 1 and ongoing**	**2**	Ingula CM

visit cultural sites							
5.10.b No degradation of cultural or archaeological sites.	Annual survey of all sites	Annual assessment of all sites	Number of sites degraded	Annual	**Year 1 and ongoing**	**2**	Ingula CM

6) MONITORING AND REPORTING

Monitoring and reporting is a critical component of the adaptive management cycle. It enables the effective assessment of management interventions and, if necessary, can be used to direct modifications of management in an effort to achieve the outcomes required.

6.1 Annual monitoring

The annual monitoring schedule should be designed to monitor the implementation of aspects of the management plan. It should be designed to be straightforward and relatively easy to implement by on-site staff.

Records should be maintained of key management interventions and of problem events or incidents such as uncontrolled access, poaching, illegal plant collection or uncontrolled/arson fires.

Scientific monitoring programmes may be established to monitor specific management interventions such as measures for the protection of flagship species. Most of the outcomes of the monitoring process will be captured in an annual report, which will be used to inform the following year's annual plan of operation.

On this basis, a monitoring schedule for Ingula Nature Reserve is set out in Table 6.1.

Table 6.1 Key Monitoring Requirements/ Monitoring schedule for Ingula Nature Reserve.

Item	Indicator	Units	RMP Ref	Recording frequency	Report Month	Target	Source
Legal Compliance	Audit Findings i.t.o. Meet ROD / CEMP / OEMP requirements	Number	5.2	Quarterly	3, 6, 9, 12	0	Audit reports
Legal Compliance	Audit findings i.t.o. RMP Requirements	Number	5.2	Annual	3, 6, 9, 12	0	Audit Reports
Security	Incidents	Number	5.3	ongoing	1-12	0	Event Register
Safety	Number of incidents	Number	5.4	Monthly	1-12	0	Event Register
Catchment management	Area under formal protection	%	5.5	Annual	3	n/a	Survey
Catchment management	Area under threat	Ha	5.5	Annual	3	0%	Survey
Wetlands	Wetland condition	Biomonitoring	5.6.5	Bi Annual	3, , 9,	various	Survey
Wetlands	Water Clarities	Clarity	5.6.5	Monthly	1-12	100%	Survey
Wetlands	Water Quality	As per Water Use License	5.6.5	Monthly	1-12	As per WUL	Surveys

Item	Indicator	Units	RMP Ref	Recording frequency	Report Month	Target	Source
Wetlands	Wetland Condition	Index	5.6.5	Bi-annual	2, 8		
Wetlands	Bedford and Bramhoek Dam Releases	Litres/second	5.6.5	Monthly	1-12	Monthly IFR met	Dam Monitoring
Fires	Unplanned fires	Number and extent	5.6.1	Annual	11	0	Inspection and GIS
Fire Safety	Fire Breaks	% Complete	5.6.1	Annual	7	100%	
Grazing management	Stocking rates	% Of recommended rate	5.6.2	Annual	2	80-100%	Surveys
Grazing Management	Veld condition	Veld condition assessment	5.6.2	Annual	2	various	Assessment
Disturbed areas	Repair of Erosion	% Rehabilitated	5.6.3	Bi-annual	3,, 9	100%	Survey
Disturbed areas	Active erosion points	Number	5.6.3	Bi-annual	3,9	0	Survey
Disturbed areas	New erosion events	Number	5.6.3	Bi-annual	3. 9	0	Survey
Disturbed areas	Site footprint	(Ha)	5.6.3	Annual	10	0	GIS
Alien eradication	Presence of flowering wattle	% Of predetermined areas with flowing wattle	5.6.4	Annual	10	0	Alien Audit
Alien eradication	Area of growing wattle	Ha	5.6.4	Bi-annual	3, 10	0	Alien Audit
Alien eradication	Rehabilitation Area controlled	Ha	5.6.4	Bi-annual	3, 10	100%	Alien Audit
Alien eradication	List of existing alien plants and animals	Lists	5.6.4	Bi-annual	3	No new sp.	Alien Audit
Alien eradication	Prevention of New terrestrial species	List of existing aliens / Number of new species on site	5.6.4	Bi-Annual	3, 9	0	Inspections
Alien eradication	Prevention of aquatic species	Presence of aquatic alien species	5.6.4	Quarterly	3,6,.9,12	0	Inspections
Priority Species	Population trends	Presence, distribution, numbers	5.6.6	Ongoing	1-12	n/a	Reserve visits
Biodiversity interactions	Interactions with infrastructure	Numbers	5.6.7	Ongoing	1-12	0	Incident register
Biodiversity	Species lists	Lists	5.6.6	Ongoing	1-12	n/a	Surveys
Infrastructure	Tracks and paths condition	% Safe and not eroded	5.7	Ongoing	1-12	100%	Inspections, Register
Infrastructure	Fence conditions	% Of boundary with suitable fencing	5.7	Annual	10	100%	Fencing Register
Tourism	Visitors	Numbers	5.8	Quarterly	3, 6, 9, 12	As per VC requirement	Register
Social	PAPs relocated	Number/%	5.9.1	Annual	3	All/100%	Social Audit

Item	Indicator	Units	RMP Ref	Recording frequency	Report Month	Target	Source
Social	PAP participation in development programmes	Number	5.9.1	Annual	3		Register
Heritage	No degradation of cultural or heritage sites	Number undisturbed areas	5.10	Annual	3	100%	Survey

6.2 Annual protected area management plan implementation review

The purpose of undertaking an annual review of implementation of the protected area management plan will be to:

- Determine how effectively the management plan has been implemented.
- Assist in determining the focus for the annual plan of operation and the setting of appropriate time frames and budgets.
- Enable effective adaptive management by identifying changes and modifying management interventions.

The minutes of the annual management meeting will form the basis of the report on the management plan review. The minutes should include records of recommendations for update/changes to the five-year plan so that when the five-year plan is revised for the subsequent five years, these recommendations can be assessed and included where necessary.

6.3 Protected Area Costing Plan

In line with the legal requirements of protected area management, the management programmes and activities required to achieve the desired state have been costed. The following guiding principles will be adhered to:

Guiding principles -

- Responsibly manage the allocation of budget, revenue raising activities and expenditure;
- Ensure solid financial management to support the achievement of the objectives of this plan;
- Compliance to the Public Finance Management Act as well as Eskom financial policy and procedures.

The Ingula Nature Reserve budget plan consists of three elements –

1. Salaries component, which is covered by Eskom Holdings SOC Ltd, and will ensure salaries are covered according to the approved staff structure;
2. Operational budget (Table 6.2);
3. Capex budget (Table 6.3).

Table 6.2: Annual operational budget of Ingula Nature Reserve (indicative for January 2017 to December 2017)

Cost Elements	Description	Total
400000	Stores material	R 15 000,00
400001	Food and Beverage Material	R 12 000,00
405000	Consumable materials	R 96 000,00
409900	Direct mat purchases	R 20 000,00
422103	Training & seminars (local)	R 8 000,00
422150	Contingency cost allowance	R 6 000,00
425001	Testing and analysis	R 160 000,00
430205	Civil contractor	R 25 000,00
432100	Occupational health services	R 4 000,00
432301	Software annual licensing fee	R 13 500,00
432400	Security services	R 864 000,00
450003	Equipment spares	R 15 000,00
450101	Travel local flight	R 12 000,00
450102	Travel local vehicle	R 4 000,00
450103	Subsistence local other	R 25 000,00
450156	Private vehicle use	R 36 000,00
450202	Fleet Cost - Licenses	R 2 700,00
450203	Fleet costs – fuel	R 84 000,00
450204	Fleet costs - tyres and tubes	R 12 000,00
450205	Fleet costs - repairs and maintenance	R 9 000,00
450315	Environmental expenses	R 780 000,00
450316	Safety gear and equipment	R 8 500,00
450400	Printing, stationery and office expenses	R 12 000,00
451900	Venue costs	R 12 000,00
453101	Food & beverages	R 12 000,00
482000	Assets written off on purchase	R 20 000,00
999827	I/C Office rental and parking	R 36 000,00
620024	Catering	R 12 000,00
	TOTAL	**R 2 300 700,00**

Table 6.3: Capex Budget required for Ingula Nature Reserve

Item	Description	New	Replacement	Timing
Vehicles	4 x vehicles required, currently have 2	R600,000.00	R600,000.00	Within 5 years
Tractor	1 x 4x4 tractor	R400,000.00	N/A	Within year 1
Tractor equipment	Trailer and specialist boom spray	R100,000.00	N/A	Within year 1
Fire equipment	Current – 3 x Bakkie sakkie, beaters	R50,000.00 New – 2 x bakkie sakkie, sprayers, etc.	R50,000.00	Within year 1
Monitoring equipment	Samsung smartphones, and water sampling kits	R50,000.00	N/A	Within year 1
Chemical sprayers (specialist vehicle sprayer)		R30,000.00	N/A	Within year 1

6.4 Financial accounting system

It is accepted that all fiscal management will be guided by the Public Finance Management Act (No.1 of 1999) and Eskom's Finance Policies and Procedures directive. Funding sources not generated internally will be accounted for in the prescribed process as determined by the donor source.

6.5 Financial reporting

Annual and quarterly fiscal accounts will be submitted to the Ingula Nature Reserve Management Committee.

7) INGULA NATURE RESERVE ANNUAL PLAN OF OPERATION

Each year an annual plan of operation will be prepared, based on the objectives, strategic outcomes, management activities and targets contained in the management plan.

7.1 Implementation of the management plan

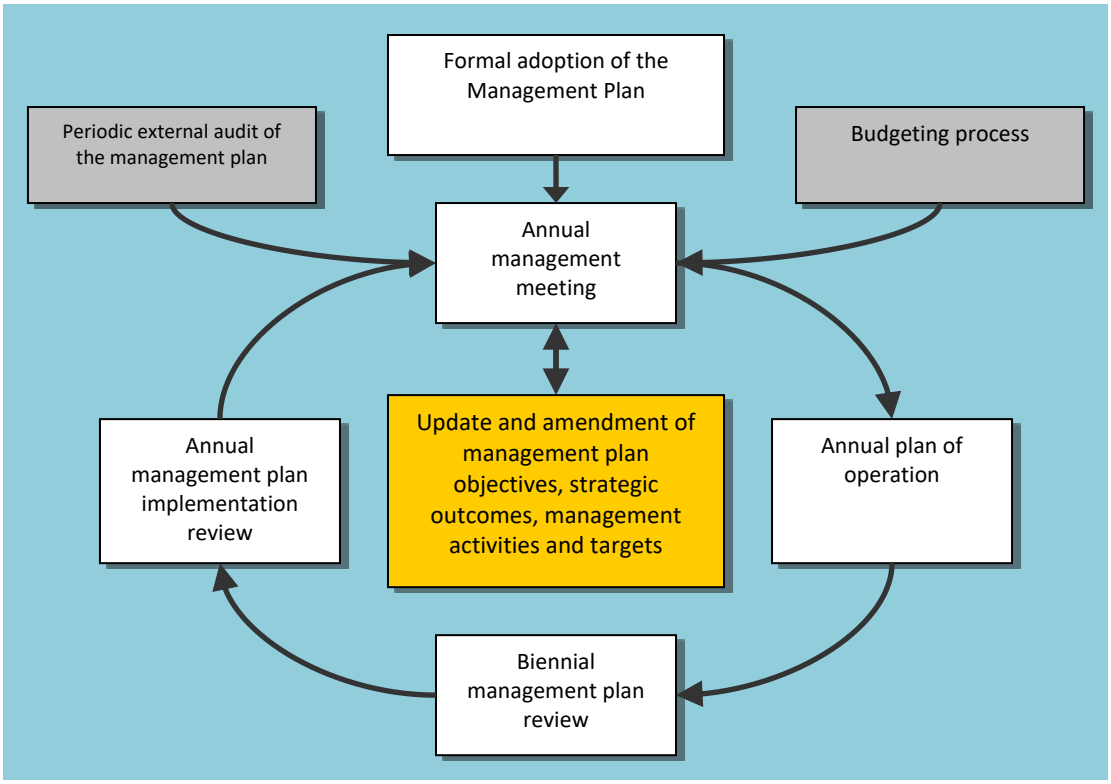


Figure 7.1 Process for the implementation of Management Plans

The detailed implementation of activities is shown in Tables 5.1 to 5.10.

Each year an annual management meeting is to be held for the Ingula Nature Reserve. In terms of the implementation of the management plan, the purpose of the annual management meeting for Ingula nature Reserve will be to:

- Finalise the annual report, as part of the annual management plan review described in Section 6.2 above.
- As part of the annual performance review, determine the need to modify or change any of the management plan's objectives, strategic outcomes, management activities or targets.
- Determine management activities for the coming year and to set goals for the year, based on the key performance areas set out in the management plan.
- Determine how budgets will be spent in an effort to achieve the goals for each of the quarters of the coming year.

The minutes and notes of the annual management meeting will be compiled in an annual plan of operation, which will include all of the information, set out above, and will determine what management activities need to be completed for the coming year, based on the management plan.

The following Tables 7.1 and 7.2 highlight the timing of the implementation of activities in the Ingula Nature Reserve management.

Table 7.1: Timing of strategic activities in the Ingula Nature Reserve.

	Jan	Feb	Mar	April	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Proclamation			x									
Catchment Management Strategy	x	x	x	x	x	x	x	x	x	x	x	X
Involvement in IDP and SDF					x					x		
Ramsar application			x									
Wildlife Introduction Programme plan						x	X	x				
Tourism Plan	x	x	X									
Resettlement										x	x	x

Table 7.2: Timing and implementation of annual operational activities on Ingula nature Reserve

	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Business Plan		x	x									
HR: Salaries	x	x	x	x	x	x	x	x	x	x	x	X
Training	x	x	x	x	x	x	x	x	x	x	x	X
Legal Compliance	x	x	x	x	x	x	x	x	x	x	x	X
ROD Compliance	x	x	x	x	x	x	x	x	x	x	x	X
External ISO Audit			x									
EMS implementation	x	x	x	x	x	x	x	x	x	x	x	x

	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Security patrols	x	x	x	x	x	x	x	x	x	x	x	X
Security Community Liaison			x			x			x			x
Security Fence								x	x			
Catchment Management Strategy: Stakeholders			x			x			x			x
Fire Management				x	x	x	x	x	x			
Grazing Strategy				x								
Research VCA		x										
Grazing: surveys			x			x			x			x
Erosion Strategy										x		
Erosion implementation	x	x	x	x	x	x	x	x	x	x	x	x
Rehabilitation plan	x	x	x								x	x
Invasive alien plant control	x	x	x	x						x	x	x
Invasive alien plant Surveys		x			x			x			x	
Specific Priority Species Survey		x			x			x			x	
General Survey		x			x			x			x	
Problem Animal Survey/ Management						x	x					
Road Maintenance								X	x			
Facility maintenance	x	x	x	x	x	x	x	X	x	x	x	x

	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Internal Communication	x	x	x	x	x	x	x	X	x	x	x	x
Environmental Education	x	x	x	x	x	x	x	X	x	x	x	x
Trail maintenance										x	x	
Signage							x	X				
Community development, ESD			x			x			x			x
Heritage survey									x			

7.2 INGULA NATURE RESERVE resource requirements

In developing annual plans of operation for Ingula Nature Reserve the resource requirements, associated with management activities and targets set out in the operational management framework must be considered and budgeted for. The following section broadly identifies the issues that must be considered in determining adequate human resources, funds and equipment for the site.

7.3.1 Staff and equipment

Annual plans of operation must consider the staff and equipment needs to undertake the following activities:

- Administration and management of the site.
- Patrolling of the site and its boundaries.
- An annual burning programme and fire-fighting response to wildfires.
- An ongoing invasive plant species control programme.
- An ongoing soil erosion control and rehabilitation programme.
- Ecological monitoring and data capture.
- Maintenance of roads, paths and fences within the site.
- Maintenance of facilities and infrastructure within the site.
- Capture of visitor information and statistics.
- Admitting visitors to the site and charging entrance fees.
- Community liaison and cooperation.
- Environmental interpretation and education.

7.3.2 Projects

In addition to the requirements for annual recurrent funding for the issues outlined above, there will be a need to identify funding requirements for the following projects:

- Fencing of the nature reserve.
- Installation of signage directing tourists to the site / Installation of directional and interpretive signage within the site.
- Development of the agri-village.
- Reintroduction of game species.
- Development of an electronic monitoring system.
- Research projects as identified in the management plan.
- Ecotourism infrastructure development.

7.3 Annual financial plan

The annual plan of operation must contain a financial plan, which must be approved by the Ingula Nature Reserve Management Committee. The annual goals, contained in the annual plan of operation, will be prioritised with the approved budget and guided by the strategic direction of the protected area management plan.

8) REFERENCES

Cowan, G.I. and Mpongoma, N. 2010. Guidelines for the development of a management plan for a protected area in terms of the National Environmental Management: Protected Areas Act, 2003. Unpublished document, Department of Environment Affairs, Pretoria. 17pp.

Cowan, G.I. 2006. Guidance for the development of management plans in terms of the National Environmental Management: Protected Areas Act (Act 57 of 2003). Department of Environmental Affairs and Tourism, Pretoria.

Department of Environmental Affairs and Tourism. 2008. The National Protected Area Expansion Strategy 2008-2012. Pretoria.

Mucina, L. and Rutherford, M.C. (eds.) 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19, South African National Biodiversity Institute, Pretoria.

Mentis, M.T. 2002a. Environmental and conservation assessment of the Bedford-Chatsworth wetland. Report prepared for Eskom Holdings Ltd.

Partridge, T.C. 2002. Report on the sediments contained within Bedford-Chatsworth wetlands and some aspects of the scheme that have been nominated as having possible impacts on those wetlands. Report prepared for Eskom Holdings Ltd.

van Wyk, A.E. 1998. Braamhoek pump storage scheme [Eskom]. Environmental Impact Assessment. Botanical survey: part 1, Upper and Lower Reservoir sites.

9) APPENDICES