BMM WHS NOMINATION DOSSIER
APPENDIX F:
NKOMAZI INTEGRATED MANAGEMENT PLAN

NKOMAZI GAME RESERVE (PTY) LTD
REVISED ENVIRONMENTAL MANAGEMENT PLAN
2014 - 2016

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Table of Contents

SECTION 1: OVERVIEW AND BACKGROUND OF THE RESERVE

1. Introduction

Nkomazi Game Reserve (Nkomazi) is owned by the Dubai World Group of companies and 100% control was effected on 13 June 2008 when the remaining 50% shares were acquired from Mr. Fred Daniel and his companies from which 50% was acquired in 2007.

Nkomazi consist of a number of land parcels which is detailed later on in this document and total 14 364 ha. Nkomazi was completed in terms of a predator proof electrical fencing to the standard required by the Mpumalanga Tourism and Parks Agency (MTPA) during 2008 and 2009. A Tented Camp on the Komati River, commenced with trading in 2009 and lion, elephant and cheetah were introduced as well during 2009.

Nkomazi is the subject of Gazetted land claims, which have not been tested in the Land Claim Court as yet. A number of occupiers had to be moved off the Sterkspruit property which was achieved in 2013. Two other occupier groups were fenced out of the reserve in order to introduce the predators and elephant in 2009.

Dubai World also own some 13 101 ha of land South of the Lochiel Road which is undeveloped and does not form part of this plan other than 918 ha being Remaining extent of portion 2 of the farm Vergelegen 728JT and Portion 4 (a portion of portion 2) of the Farm Vergelegen 728JT and known an Inyoni which is adjacent to Nkomazi and included in this plan.

This Management Plan will be revised annually and amended where necessary. It is an adaptive document.

2. Mission Statement

To manage Nkomazi on a long-term sustainable basis in accordance with principals of responsible tourism whilst protecting the environment, providing a wildlife experience suitable for tourism.

3. Location

Nkomazi Wilderness is located in Mpumalanga approximately 20 km northeast of Badplaas between the latitudes of 30°30'00 to 31°00'00 and the longitudes of 25°45'00 to 26°00'00 (Figure 1). The total area is located on the 1:50 000 topographical maps 2530 DC & DD and 2630 AA & AB. Nkomazi is situated near Barberton (Figure 2), which is one of South Africa's areas of high endemism. Hence, many plant species endemic to that region are found on the reserve.

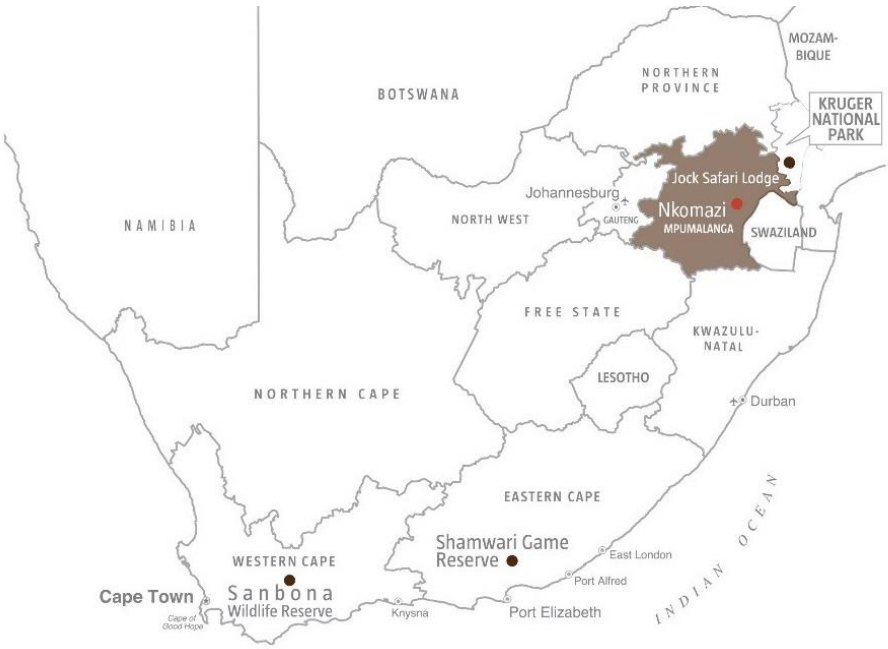

Figure 1. The National location of Nkomazi Game Reserve.

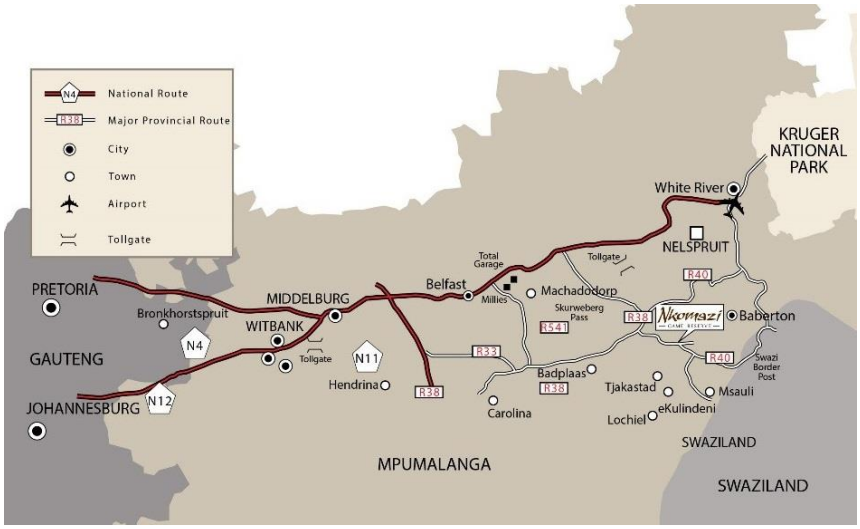

Figure 2. The local location of Nkomazi Game Reserve.

4. Farms of Nkomazi

Nkomazi is made up of 11 farms that were amalgamated to establish the reserve. Table 1 lists the Title Deeds 1 to 11 that make up Nkomazi while No.12, Portion 4/728 (known as Nyoni) currently is not included into the reserve but is planned for inclusion shortly (See Figure 12)

Table 1. The Title Deeds that comprise Nkomazi Game Reserve.

NO	DESCRIPTION OF PROPERTY	TITLE DEED
1	Portion 1 of the Farm Belvue 711 JT	T9181/2008 [Deed of Transfer 9364/06]
2	Portion 1 of the Farm Nkomazi 757 JT	T12007/2008
3	Portion 2 of the Farm Nkomazi 757 JT	T12007/2008
4	Portion 3 of the Farm Nkomazi 757 JT	T12007/2008
5	Portion 4 of the Farm Nkomazi 757 JT	T12007/2008
6	Portion 5 of the Farm Nkomazi 757 JT	T12007/2008
7	The Farm Nkomazi 772 JT	T9181/2008
8	The Farm Cambalala 765 JT (excluding the Cottage Site)	T9180/2008
9	Portion 4 of the Farm Sterkspruit 709 JT	T9182/2008
10	Remaining extent of Portion 1 of the Farm Sterkspruit 709 JT	T9180/2008 [Deed of Transfer 156558/04]
11	Remaining extent of portion 4 of the Farm Theeboom 729 JT	T9183/2008
12	Portion 4 (a portion of portion 2) of the Farm Vergelegen 728 JT	T337037/2007

5. Physical Environment

5.1 Climate

The mean temperature of Nkomazi is 19.7°C fluctuating between the monthly means of 23.9°C and 13.9°C in January and June respectively. The temperature range is between 29.3°C and 5.2°C (Faubert, 2005). Rainfall is generally year round with

definite dry and wet season. The wet season is from October to March (Figure 3). The average annual rainfall for the period 2008 to 2014 is 937mm/year. Despite cold winter mornings and evenings and wet summer months, the climate of Nkomazi is suitable for tourism and has no adverse effects for the wildlife.

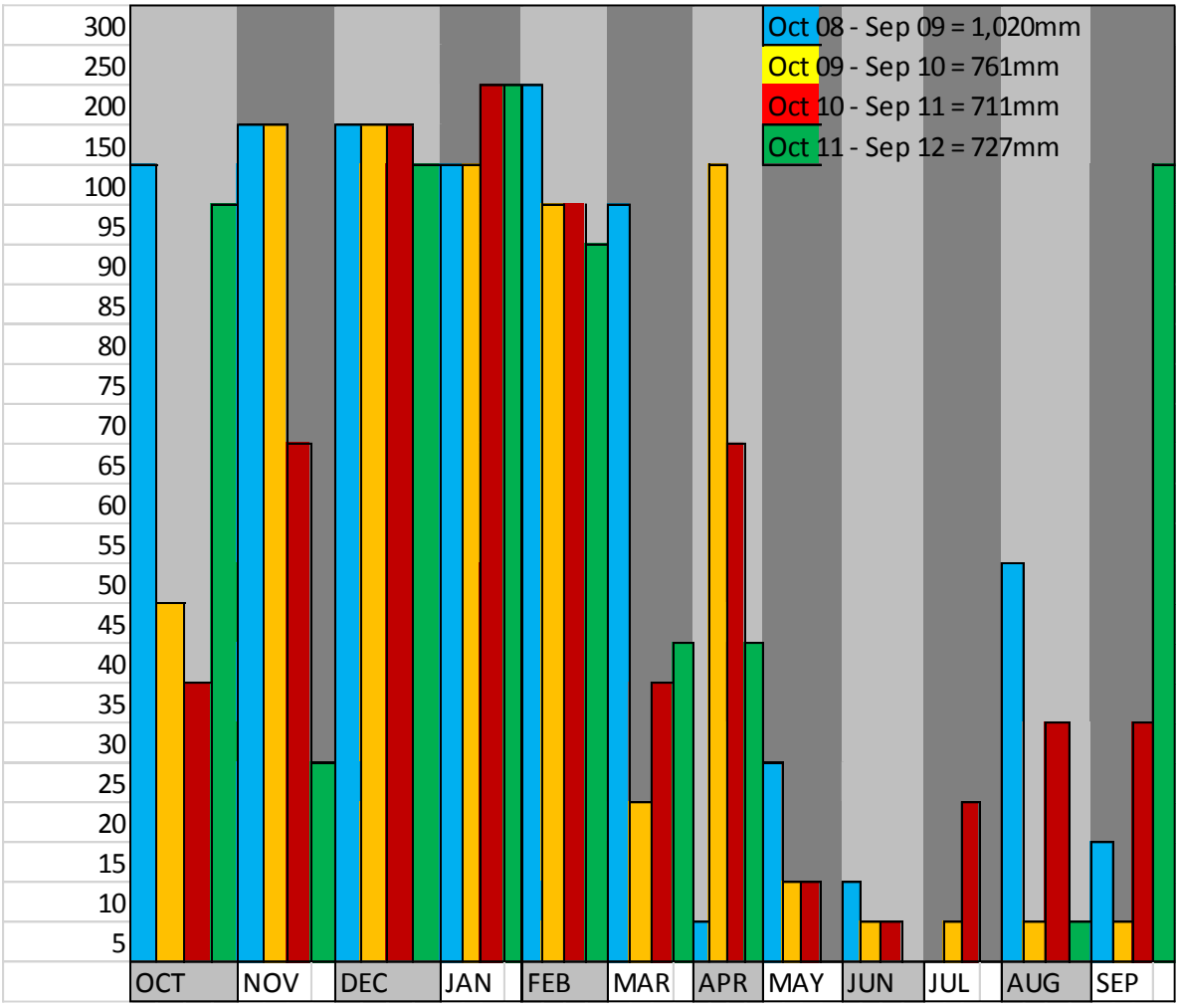

Figure 3. Monthly rainfall on Nkomazi for the period October 2008 to September 2012.

5.2 Conservation Perspective

Nkomazi was declared a Private Nature Reserve in 2001 via Section 85 (a) of The Mpumalanga Nature Conservation Act, Act 10 of 1998 (Figure 4). Furthermore, according to The Mpumalanga Biodiversity Conservation Plan (MBCP) Nkomazi falls in an areas of conservation importance (Figure 5). Nkomazi forms a corridor between the Barbeton Mountainlands in the east and the Badplaas Mountainlands in the

west. It is also the only natural lowland corridor linking Songimvelo Nature Reserve (MTPA) and the Badplaas/Kangwane Mountains.

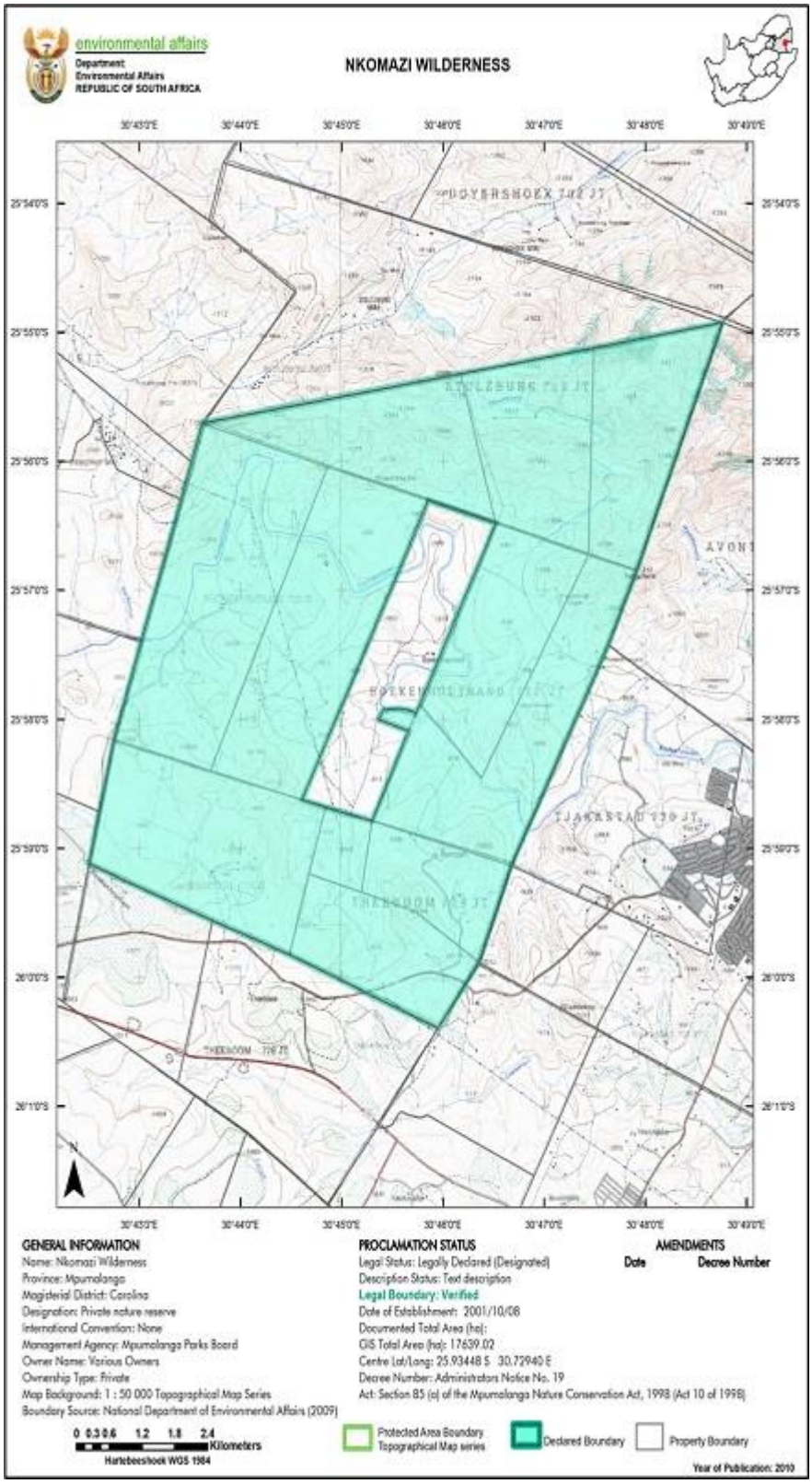

Figure 4. Proclamation status for Nkomazi as a Private Nature Reserve.

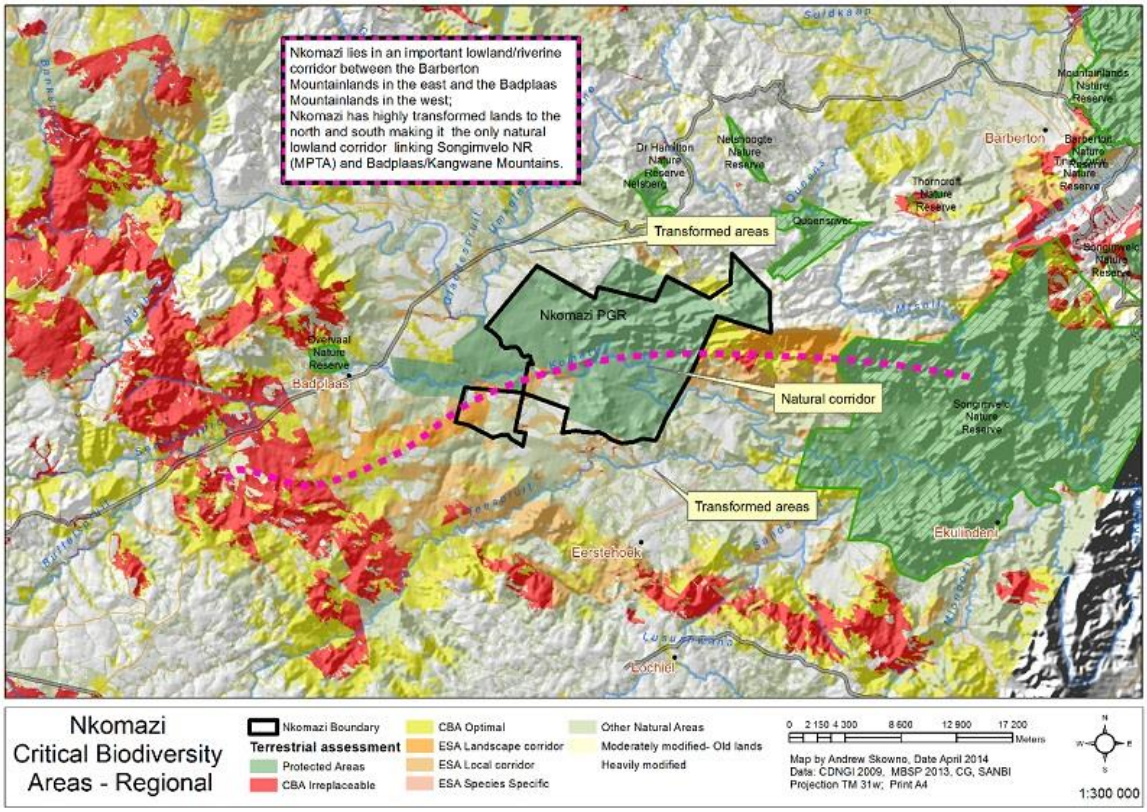

Figure 5. The regional importance of Nkomazi as a natural corridor.

Over and above the Protected Area status Nkomazi is a Critical Biodiversity Area (CBA) with both Irreplaceable and Optimal CBAs within the reserve (Figure 6). The conservation significance is further signified by having 3 Ecological Support Areas (ESA) namely Landscape, Local and Species Specific ESA Corridors.

A CBA is any terrestrial, freshwater or aquatic areas required to meet biodiversity pattern and/or process thresholds.

An ESA is supporting zone required to prevent degradation of Critical Biodiversity Areas and Protected Areas.

Nkomazi also has sensitive areas including National Freshwater Ecosystem Priority Areas (FEPA) priority wetlands and the vulnerable Barberton Mountainlands (Figure 7).

Figure 6. The CBAs and ESAs of Nkomazi.

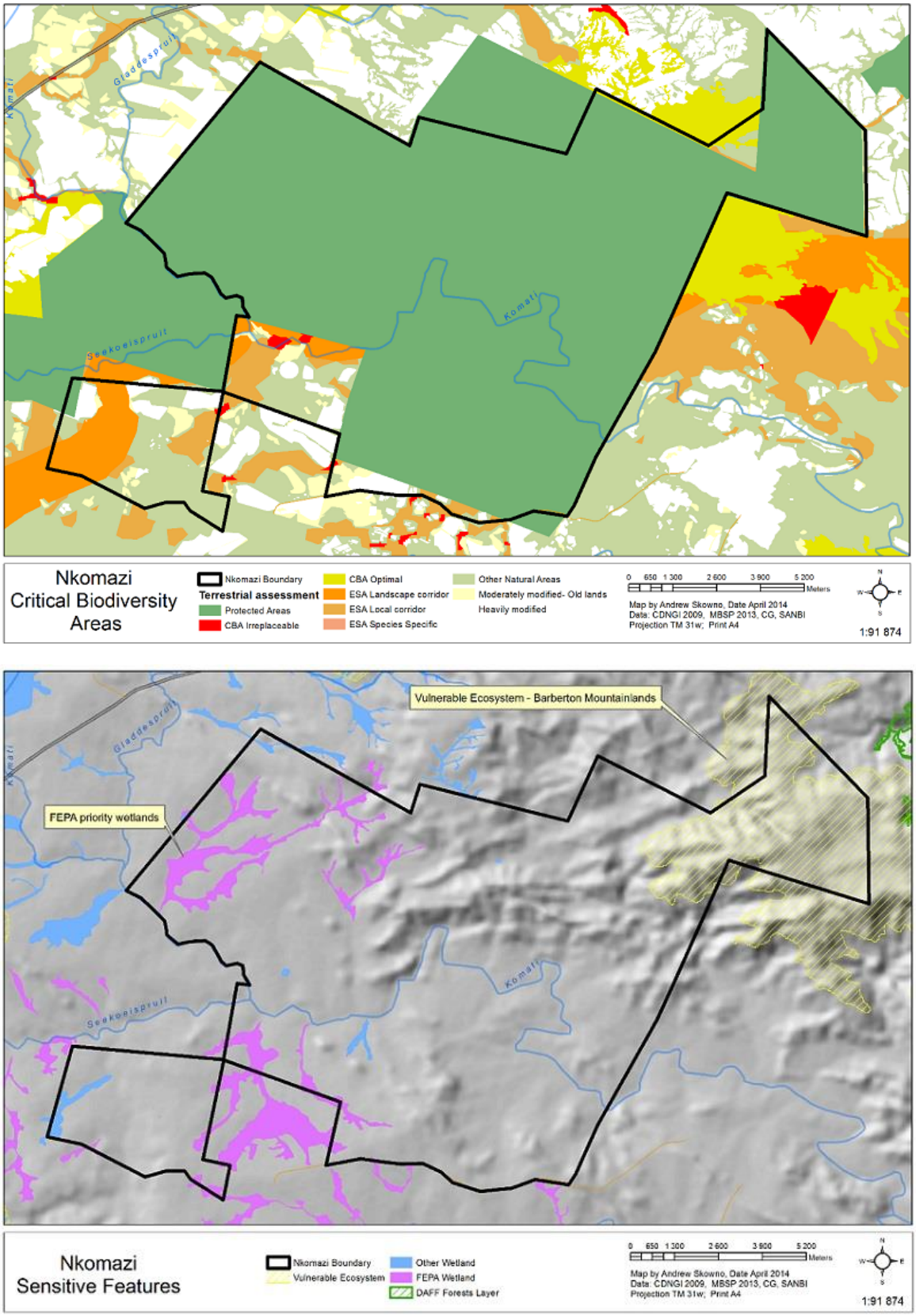

Figure 7. The sensitive features on Nkomazi.

5.3 Topography and Terrain Morphology

The study site of Nkomazi can be divided into four general types of relief. The foothills of the Makhonya Mountains dominate the northern border of Sterkspruit. The southern portion of Sterkspruit, Winklehaak and Vergelegen are characterised by flat and undulating plains with subtle slopes to the Komati and Seekoeispruit Rivers, with the exception of a few isolated koppies and rocky outcrops. (Faubert, K. 2005). The north-eastern regions of Nkomazi Wilderness is dominated by the Mokonja Mountains, the highest peak being 1900 m above sea level, which is a 955 m difference to the Komati River valley at 945 m above sea level (Figure 8 & 9). The difference in vegetation composition between these areas is substantial.

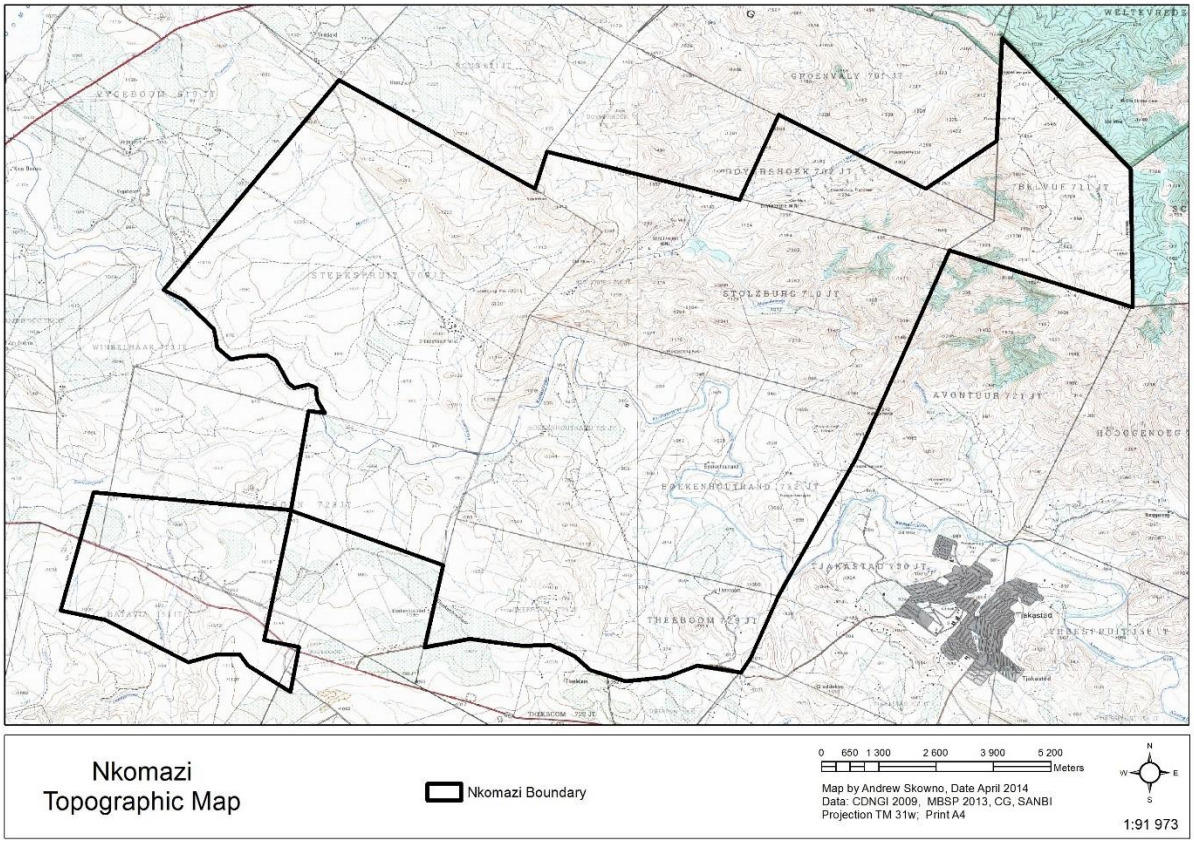

Figure 8.The topography and drainage patterns of Nkomazi North

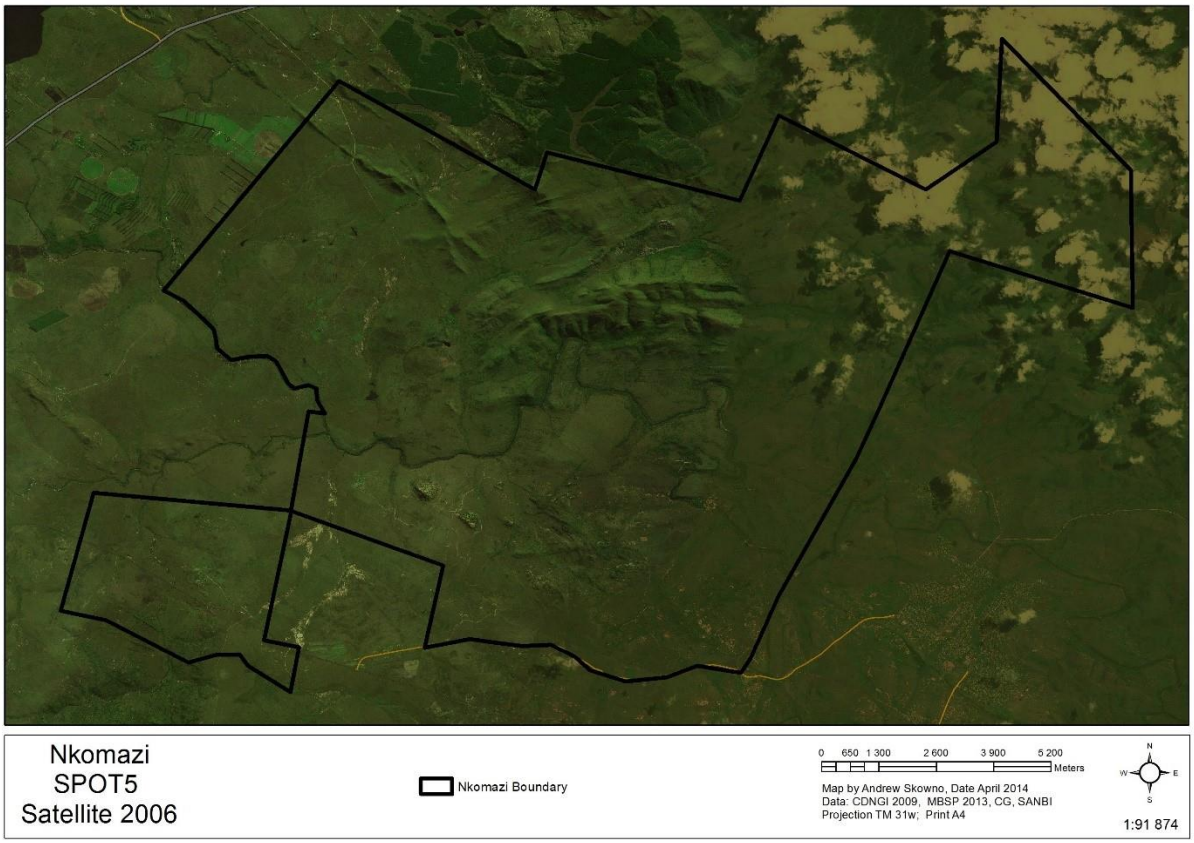

Figure 9. Spot 5 satellite imagery illustrating the main topographic features.

5.4 Geology

The earliest records of how the earth's crust was formed, has been provided by scientific research from the Barberton Mountainlands. Scientists are researching a possible re-dating of when life on earth first occurred. This could possibly be one billion years earlier than estimated. Tidal traces billions of years old are so precisely recorded they allow for calculation of changes in the distance between the earth and the moon. The Barberton Mountainlands is the only place on earth where the development of the early earth crust and evolution of life itself can be studied. This can be safely said to be the place where life on Earth began more than 3.5 billion years ago (Havemann, 2013).

Along the road from Badplaas to Elukwatini and from there into the Songimvelo Nature Reserve, or along the Komati River from the Nkomazi area, just east of Tjakastad, to Kromdraai and beyond, one can visit large outcrops of these old rocks. In the late 1960s Morris and Richard Viljoen discovered an entirely new class of

volcanic rock along these river sections. These rocks are now known as lsquo, komatiites and rsquo; and have been age-dated between 3 470 and 3 482 million years old. The Mpumalanga komatiites became an almost overnight celebrity because they are confined to the history of the early Earth and are unknown from volcanoes of the modern Earth. Komatiites often display spectacular textures of skeletal crystals (known as spinifex textures), which branch out like fern leaves. From these textures, and the chemical makeup of the rocks, it can be deduced that komatiite lavas crystallised exceptionally rapidly from very hot and probably water rich molten magma. For such komatiitic magmas to have reached the Earth's surface as lava flows, the internal conditions of our young planet must have been significantly different from those measured today. Yet more than 35 years since their discovery, the precise origin of komatiite is still hotly debated. Unfortunately, many of the most important outcrops of the Mpumalanga komatiites have been damaged in the past two decades. If they are to remain accessible to future generations, it is vital that their outcrops be recognised soon as a fundamental heritage, before they lose further value (De Wit, 2007).

Figure 10 illustrates how the Lithstrat and Chronstat Geological features have facilitated the course and formation of the Komati River. Table 2 gives a description of the different features.

Table 2. The Lithstrat and Chronstrat geological features of Nkomazi.

LITHSTRAT	LITHRANK	CHRONSTRAT	CHRONRANK	DESCRIPTION
		QUATERNARY	SYS	Alluvium and scree
HOOGGENOEG	FM			Basalt, felsic volcanic rocks, chert
KROMBERG	FM			Basic and acid lava and pyroclastic rocks, banded chert
THEESPRUIT	FM			Basic and subordinate ultrabasic lavas, felsic tuffs, schists, chert
KOMATI	FM			Basic lava (basaltic komatiite, now amphibolite) and ultrabasic lava (komatiite)
		SWAZIAN	ERA	Biotite trondhjemite gneiss
HOOGGENOEG	FM			Chert-carbonate layers
		VAALIAN	ERA	Diabase
SHEBA	FM			Greywacke, shale
KAAP VALLEY TONALITE	NONE			Medium- to coarse-grained, homogeneous hornblende and hornblende -biotite tonalite
SCHOONGEZICHT	FM			Pyroclastic rocks, lavas, greywackes
		SWAZIAN	ERA	Serpentinized dunite, harzburgite, orthopyroxenite and websterite, gabbro and anorthosite
BELVUE ROAD	FM			Siltstone, shale, subordinate greywacke with banded ferruginous chart and a trachytic tuff
CLUTHA	FM			Subgreywacke, shale, quartzite, conglomerate, jaspilite
KEES ZYN DOORNS SYENITE	SUI			Syenite/syenogranite
		SWAZIAN	ERA	Tonalitic migmatite and gneiss
SANDSPRUIT	FM			Ultrabasic lava (serpentinite to tremolite-chlorite schist), subordinate basic lava (amphibolite)
TJAKASTAD	SBGRP			Ultramafic and mafic lavas, tuffs
		QUATERNARY	SYS	Water

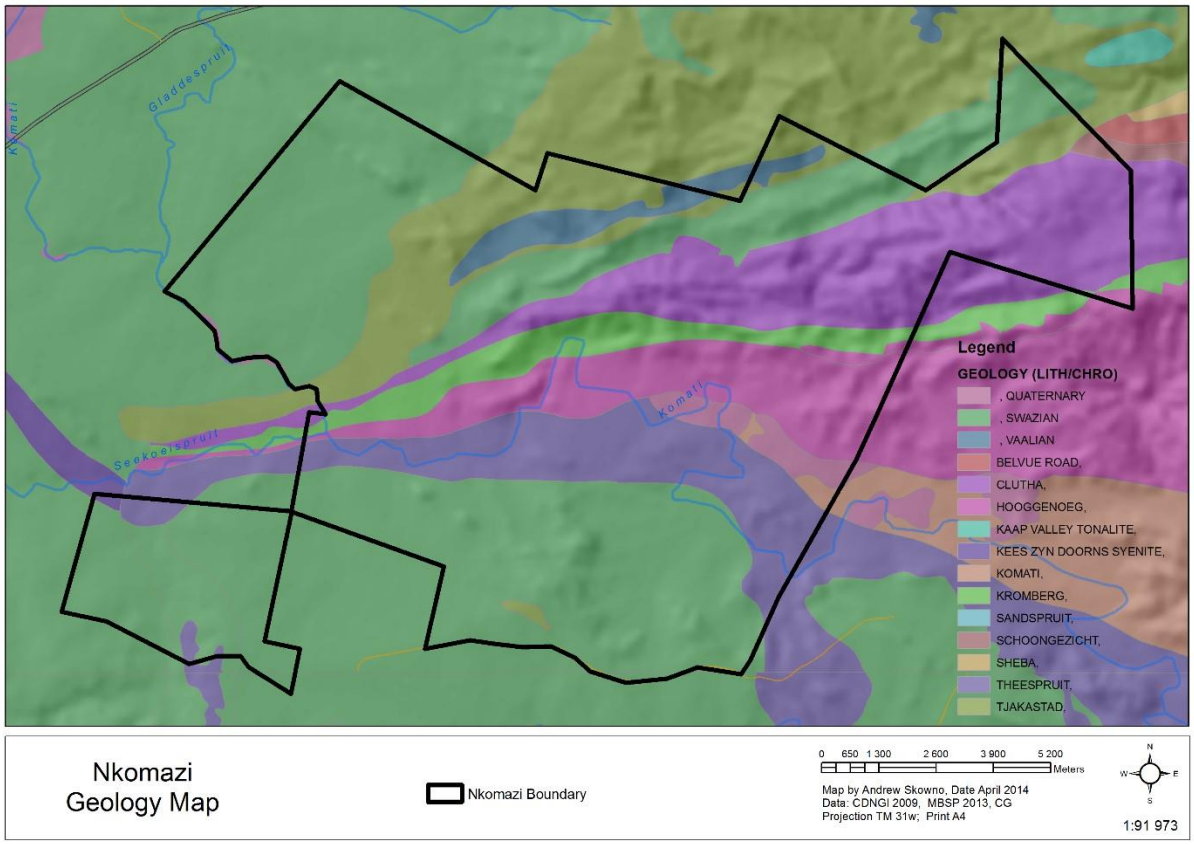

Figure 10. The Lithstrat and Chronstrat geological features of Nkomazi.

5.5 Hydrology and Aquatic Systems

Rivers: A 12km stretch of the perennial Komati River runs through the reserve. An 8km section of the Zeekoei-spruit joins the Komati River on the property. The Komati River is responsible for the water supply at the Tented Camp as well as at the Paperbark offices and staff quarters. Behind the mountain, on the north-eastern border of the reserve, runs the Mawelawela spruit.

Boreholes: The Inyoni borehole is the only borehole used on the reserve and supplies the two houses and staff quarters at Inyoni with water.

Dams: There are two man-made ground dams on the Sterkspruit area, named Sterkspruit-dam 1 and Sterkspruit-dam 2, mainly utilized by animals like hippo.

Fountains: Several very strong fountains occur on the reserve. Jackalberry-house, Boulders house as well as River cottage are all supplied with water drawn from fountains.

6. Biological Environment

6.1 Vegetation Classification

The main vegetation types found in and around the Nkomazi region are (Figure 9): Swaziland Sour Bushveld, Barbeton Montane Grasslands, KaNgwane Montane Grassland and Barbeton Serpentine Sourveld (Mpumalanga Biodiversity Conservation Plan (Mucina & Rutherford, 2006)

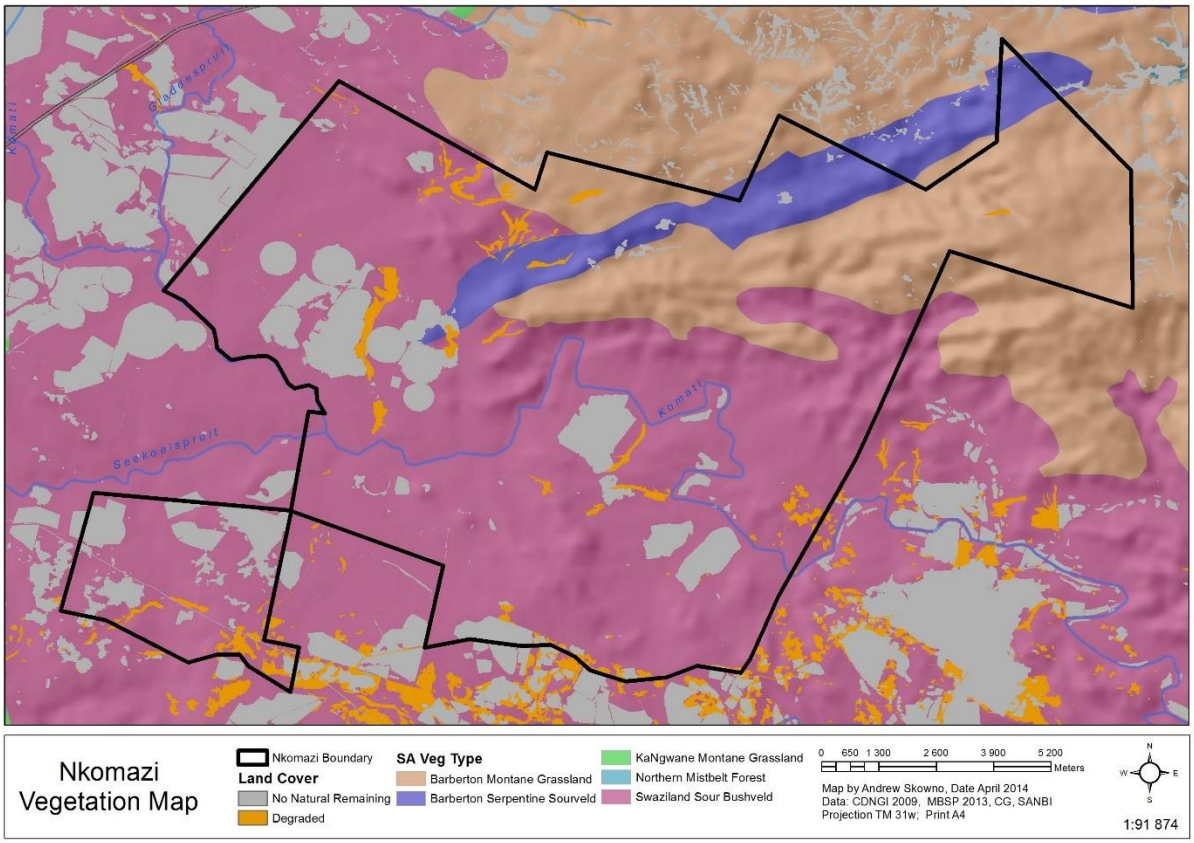

Figure 11. The main vegetation types on Nkomazi (Mpumalanga Biodiversity Conservation Plan).

Nkomazi is dominated by Swaziland Sour Bushveld in the south and west and by the sensitive Barberton Montane Grassland in the north east.

See Appendix 1 for a list of all documented plant species with their conservation status.Table 3 lists the vegetation communities that were identified has having good species diversity.

Table 3: Vegetation communities showing good species diversity (Foubert, 2005)

VEGETATION COMMUNITIES	PLANT SPECIES
Short Closed Woodland	*Acacia davyii, Sporobolus centrifuges, Kalanchloe paniculata, Aloe marlothii*
Short Closed Woodland Sub-community	*Albizia harveyi,Diospyros lycioides*
Low Open Woodland	*Aloe arborescens, Hyperthelia dissolute, Englerophytum magalismontanum, Combretum molle, Teucrium trifidum, Acacia robusta*
Low Closed Bushland	*Arundo donax, Diospyros lycioides, Acacia mearnsii, Diospyros lycioides*
Low Open Bushland	*Protea caffra, Aloe marlothii, Faurea saligna, Themeda triandra*
Short Closed Grassland	*Eragrostis lehmanniana, Eragrostis cilianenis, Monocymbium ceresiiforme, Cymbopogon excavatus, Chamaecrista mimosoides, Melinis repens*
Tall Closed Grassland	*Eragrostis gummiflua, Hyperthelia dissoluta*
Tall Open Grassland	*Pavonia senegalis, Hyperthelia dissolute, Perotis patens, Hyperthelia dissoluta*
Low Closed Herbland	*Chenopodium ambrosioides, Dactyloctenium aegyptium*
Tall Closed Herbland	*Bidens pilosa, Tagetes minuta*

6.1.1 Vegetation Condition

The condition of the vegetation in the Nkomazi area is considerably variable, due to the history of land use. A large part was used as crop fields and this disturbance has affected the grasslands on their periphery. Some areas had cattle and other areas have been almost entirely unaffected by herbivory. The topography of the study site also creates a miss-match of both sweet and sour grass species due to water availability. Consequently, the density and palatability of the grass sward in

various areas differ substantially. In general the vegetation is in a relatively good condition and will thrive under good wildlife management. There is subtle evidence of over browsing in Nkomazi as the browse capacity is relatively limited and the ratio between browse and graze heavily skewed towards grazing.

6.1.2 Exotic Vegetation

There is concern about the amount of exotic and invasive plant species found on Nkomazi. Twenty seven species found on the reserve are on South Africa's List of Declared Weeds and Invader Plants. The species of primary concern are: Black wattle *Acacia mearnsii*, Blue gum *Eucalyptus*, Bug tree *Solanum mauritianum*, Jacaranda *Jacaranda mimosifolia*, Lantana *Lantana camara*, Pine trees *Pinus pinaster*, Prickly pear *Opuntia ficus-indica*, Silver oak *Grevillea robusta*, Sisal *Agave sisalana*, Syringa *Melia azadarch* and Giant reed *Arundo donax*. Of specific concern is the Lantana which is found all along the Komati River and has the ability to choke the river banks. The Black Wattle, Eucalypts and Pine Trees are also threatening the smaller water courses, especially in the new areas to the North West. The old mining sites are often the source of the invasion and as such are the areas most densely infected.

6.2 Carrying Capacity

The grazing and browsing capacity for every South African grazer and browser is near impossible to determine because each species has diverse food requirements and social behaviour patterns. There are several ways of determinging stocking density. Firstly by describing species according to graze animal units (GAU) and browser animal units (BAU). A GAU is the equivalent to one 450 kg animal that grazes exclusively. A BAU is the equivalent of one 140 kg kudu that browses. Every species is described in terms of GAU and BAU's. Knowing the GAU and BAU that an area can carry allows you to determine the number of wildlife that can be stocked. This method however, has severe limitations. It would be preferable to know the number of each species' preferred food

available on the study site, but this is complicated and time consuming. A rule of thumb is that the higher the yearly rainfall, the higher the stocking rate (Faubert 2005).

Alternatively, carrying capacity could be determined according to du Toit's (2002) method of assessing large herbivore biomass with the most determining factors being land size and rainfall. He uses the following equation to determine the kg/km^2 that can be supported on a particular ranch:

Log_{10}Large herbivore biomass (kg/km^2) = 1.685 x log_{10}Mean annual rainfall (mm) – 1.095

Using the animal unit method for Nkomazi the carrying capacity can be calculated for the browsers and grazers independently. The grazing stocking rate equates to approximately 4.1 hectares per GAU, while the browsing stocking rate is far lower at 37.8 ha/BAU. Thus for the total area of 14 844 hectares of Nkomazi Wilderness the total grazing capacity is 3617 GAU and browsing capacity is 393 BAU.

This equates to the following stocking densities for the different sections:

Main Reserve (9672ha)	2359 GAU	256 BAU
Mawelawela (4259ha)	1039 GAU	113 BAU
Nyoni Camp (913ha)	223 GAU	24 BAU

Using du Toit's method, with a 937mm annual rainfall and 9672ha Nkomazi Main Reserve could sustain a large herbivore biomass of 8175kg per km^2 according to his formula above.

7. Current Zoning

Nkomazi is currently zoned into three sections, namely the main reserve, Mawelawela, and Nyoni (Figure 12). The main reserve (9672ha) is currently the area that is available to the mega herbivores and the predators. Mawelawela is as yet not part of the reserve due to the persistence of communal cattle, occupiers, land claims and the potential for high profile

species to “disappear” into the dense vegetation and mountainous areas. The buffalo camp (622ha) has been serving as a quarantine camp for buffalo but has recently been incorporated into the main reserve. Nyoni (918ha) currently houses the workshop, maintenance and firefighting components of Nkomazi.

There are three areas that are excluded from the reserve. The property Nkomati Springs, belonging to Mr Don Shirley (348ha), and as such is an island in the middle of the reserve. Two additional areas to the north west (±400ha) and north (48ha) of the reserve have been excluded due to occupiers.

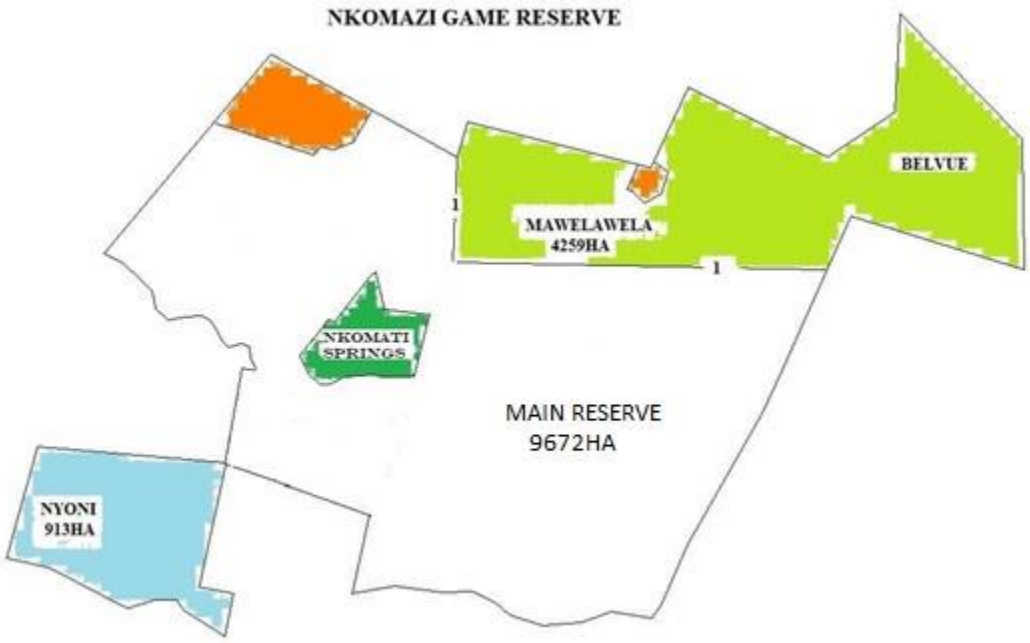

Figure 12. The different units currently comprising Nkomazi.

8. History of Nkomazi Game Reserve

Neolithic or Iron Age activities, dating back to 40,000 BC have been recognized by archaeologists, with evidence of the oldest ochre known mines. Other early human activity dates back to Palaeolithic times and there is evidence that Stone Age man manufactured primitive artefacts from siliceous cherty and quartzitic layers, found in the Barberton mountains. Legend has it that the Dravidians mined gold here 2 000 years ago and ancient ochre and gold mines, stone terraces, structures and celestial calendars are to be found. The area has well preserved Kung bushman paintings.

The Voortrekkers fled British rule in the Cape and colonized the area in the early 1800. When they first looked down from the escarpment on the now De Kaap Valley, these homesick pioneers were reminded of their beloved Cape of Good Hope to such a degree that their nostalgia led them to give various areas names such as De Kaap Valley, Zuid Kaap and Kaapse Hoop.

It was during this time that this area was the battle ground between King Mzilikazi (who fled in terror of Shaka) and Dingaan (the brother of Shaka, ordered to kill the fleeing king). Mzilikazi was able to evade his enemy and hide in the rugged Barberton Mountainlands. When Dingaan could not find Mzilikzi, he raided Swazi settlements and stole many of their cattle with which he tried to console Shaka on his return. Shaka, however, ordered Dingaan to go back and not return until Mzilikzi was dead. Dingaan knew it was impossible to capture Mzilikazi due to the rugged mountains and for fear of failure he camped his army and then doubled back the same night to the area where his brother and his army camped. On his arrival he then proceeded to murder his brother, Shaka. Today the area where Shaka camped is known as Tjakastad, bordering Nkomazi.

The discovery of gold in the district in 1872 led to the founding of the town Barberton in 1882 and the development of a significant gold mine industry where the country's first stock exchange was built. There are Boer war battle sites and concentration camp sites and it is here too where Sir Percy Fitzpatrick lived at the time he wrote his South African classic: "Jock of the Bushveld".

Nkomazi is situated between the areas Badplaas, Barberton and Komatipoort which is known as the "Wild Frontier".

In Dravidian India lives a tribe known as the Komati people. So accomplished as master seafarers were they that the Indian Ocean was named after them. Legend has it that 2 000 years ago these explorers sailed on the East India trade winds from India to the natural harbour of Delagoa Bay, from where they travelled up the Komati River (hence its name) to the interior of Komatiland in order to mine gold. Today the modern meaning of the word Nkomazi is "Place of Water", referring to the Komati River. **Literally** the word Nkomazi

means “the cow which is the source of milk”. **Figuratively** Nkomazi refers to the river as the source of all life and fruitfulness in the same sense that the cow’s milk nourishes the new born calf. In the context of the river, it refers to the life-giving water that feeds and nourishes the land and all life upon it.

The Nkomazi land assembly commenced in 1990 by the previous owner and partner. All farm related infrastructures were removed, roads re-aligned, erosion combated, game fences put up and general game and white rhino released. The old mine at Komati Spring has been rehabilitated, the Sasol gas pipeline moved out and around Nkomazi.

On the 13th June 2008 the Dubai World Group acquired 100% control of the Nkomazi property from Mr Fred Daniel and his companies. Lions, cheetah and elephant were released on Nkomazi in September 2009 and Buffalo in April 2013. The roads, fences, dams, infrastructure, the Tented Camp and vehicle fleet has been upgraded.

9. Reserve Infrastructure

Nkomazi has an adequate infrastructure to achieve its objectives.

Lodges

Nkomazi has only the Komati Tented Lodge, situated adjacent to the Komati River with the Makonjwa Mountain as a backdrop. The lay-out of the camp is set out on the attached map (Appendix 2). The camp provides accommodation for 20 guests and the staff quarters consists of 7 units, providing accommodation for 16 staff.

A guest house, Boulders, is situated close to River cottage. This house is mainly used by company visitors and contractors.

Workshop and stores

The workshop is situated on the north/western side of the property, called Inyoni and has got two stores, as well as two fencing stores. The Working on Fire staff, as well as the Fire/Fencing Manager and the Assistant Maintenance Manager resides next to the

workshop as set out on the attached map. All firefighting equipment and machinery are kept at the workshop as well as the Fire fighting vehicles.

Vehicle Register

The complete vehicle and machinery register of *Nkomazi* is provided as Appendix 3. It includes the vehicles and machinery allocated to the managers on the reserve. All Road working machines, including the Grader, TLB, Bomag and two tractors with trailers, are kept at Jackalberry house under supervision of the Wildlife/APU Manager.

Staff accommodation

The staff accommodation on *Nkomazi* is set out on Annexure D. Allocation of accommodation is as follows:

- Jackalberry house - Wildlife/APU Manager
- Inyoni house 1 - Fire/FencesManager
- Inyoni house 2 - Assistant Maintenance Manager
- Inyoni Working on Fire quarters - Working on Fire and Workshop team
- Paperbark house - Maintenance Manager
- Paperbark Mounted Patrol quarters (2 units) - Mounted patrol and Office assistant
- Tented Camp staff quarters - Manager's house and five units
- APU camp - consists of three tents, occupied by 6 APU members
- Guard posts - occupied by guards along the fence line of the reserve

SECTION 2: MANAGEMENT POLICY FRAMEWORK

10. Administrative and Legal Framework

Nknomazi Game Reserve is responsible to MTPA as the conservation authority. It is the responsibility of reserve management (specifically the Wildlife Manager) to ensure all necessary permits and permissions are in place.

11. Zonation

Nkomazi plans to consolidate Mawelawela into the main reserve. The inclusion of Mawelawela (4259ha) will beincorporated in the mid-term. Once this has been completed the main reserve which will be accessible to the mega-herbivores and predators will comprise 13 931ha (Figure 13).

Nyoni (918ha) will take over the function of the old buffalo camp and will be utilized for the breeding of rare game in the absence of predators.

The possibility of incorporating Nkomati Springs (348ha), which is now under new ownership, into the reserve will be considered as a medium term objective with the new owner Mr. Don Shirley.

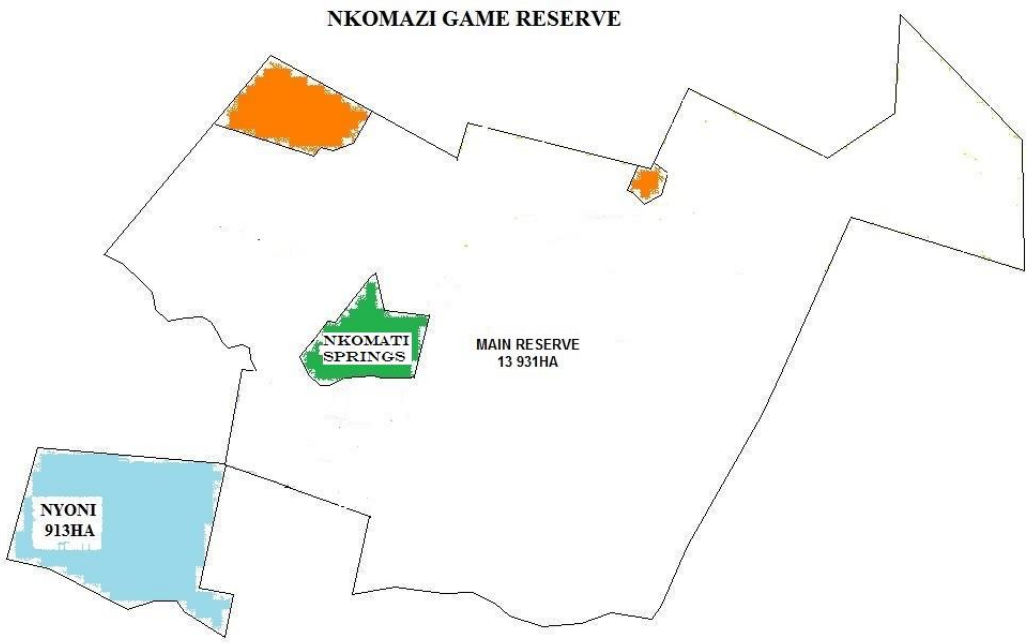

Figure 13. The potential expansion of Nkomazi.

12. Management Policy Framework

12.1 Management Objectives

To manage Nkomazi for the long term in a responsible manner sensitive to the environment and tourism.

12.2 Wildlife Management

12.2.1 Stocking Density

Stocking densities determined by Foubert (2005) are:

- 4.1 hectares per Graze Animal Unit (equivalent to a 450kg cow)
- 37.8 hectares per Browse Animal Unit (equivalent to a 140kg kudu).

While, according to du Toit's large herbivore biomass method Nkomazi Main Reserve could sustain a large herbivore biomass of 8175kg per km^2.

The current stocking density of the main reserve as per the species numbers in Table 4 is 6.34ha/LSU with 1113 GAU and 412 BAU. The grazers are below stocking density however the browsers are way above that as described by Foubert (2005). This however is not necessarily a cause for concern as even by Foubert's (2005) omission the technique for determining browse capacity is far from complete. Foubert's (2005) calculation for browsers needs to be recalculated.

Looking at du Toit's equation, Nkomazi Main Reserve has a current large herbivore biomass is 7093kg/km^2 which is well below the calculated 8175kg/km^2. The current browse/graze split is 37% browse and 63% graze which is relatively representative of the vegetation split.

From the above there is the stocking density for Nkomazi is within acceptable limits. Caution must however be exercised and a vegetation monitoring system be incorporated to assess the impact of the browsers. Over a 1000 head of game was removed in 2013 in excess of 500 in 2014 prior to the game count. Stocking density will be well monitored and actions taken where necessary to reduce density.

Table 4. The species and numbers thereof on Nkomazi as per the 2014 game count.

Species	Main Reserve
Blesbok - Common	859
Bushbuck	1
Cheetah	3
Crocodile	4
Duiker – Grey	11
Eland	81
Elephant	15
Gemsbok	14
Giraffe	49
Hippopotamus	8
Hyena – Brown	7
Impala	355
Klipspringer	5
Kudu	395
Leopard	0
Lion - Common	10
Nyala	115
Oribi	33
Ostrich	31
Red Hartebeest	307
Reedbuck - Common	79
Reedbuck - Mountain	32
Rhinoceros - White	9
Springbuck - Common	4
Steenbok	2
Warthog	697
Waterbuck	212
Wildebeest – Black	0
Wildebeest - Blue	1259
Zebra - Burchells	336
Total	**4933**

The buffalo camp is understocked with a density of 10.7ha/LSU and only 40 GBU present. Mawelawela and Nyoni are currently way understocked.

12.2.2 Game Numbers

From the stocking densities from 12.2.1 above the overall densities are within limits, however marginally so and consideration should be given to a slight reduction so as to buffer for times of drought. This reduction could be implemented by either an increased

predator population or physical offtake (game capture). The latter has been planned for 2014. A further method to reduce animal density is that of adding land. This too is planned for the near future with the inclusion firstly of the buffalo camp and secondly the inclusion of Mawelawela into the main reserve. This will add an additional 4881ha, effectively doubling the size of the reserve. Mawelawela in particular will also contribute significantly to the browsing capacity of the reserve (See Zonation Figure 13).

11.2.3 Herbivore Management

Herbivores, along with fire, have the potential to have the biggest impact on the vegetation. As such their populations need to be kept under control.

12.2.3.1 Elephant

Purpose of introduced elephant.

A family group of nine elephant were introduced onto Nkomazi in September 2009. The elephant came from Shamwari Game Reserve in the Eastern Cape and are all of the Kruger National Park bloodline. The main purpose of the introduction was for tourism objectives.

Preferred elephant density for Nkomazi

There are currently 15 elephant on Nkomazi. There are various recommended stocking rates for elephant in literature. Furstenberg (2003) recommended that elephants are stocked at a maximum density of 270ha per elephant. Gough & Kerley (2006) estimated carrying capacity of elephant in Addo Elephant National Park at between 0.1 and 0.5 elephant per km^2 although it had been up to 4 elephant per km^2. Carrying capacities for elephant will be determined by vegetation type and rainfall amount other factors. According to du Toit (2002) the most important factors determining stocking densities are land size and rainfall. He uses the following equation to determine the kg/km^2 that can be supported on a particular ranch:

Log_{10}Large herbivore biomass (kg/km^2) = 1.685 x log_{10}Mean annual rainfall (mm) – 1.095

Elephant densities according to different formula are:

Furstenberg 36 elephant

Gough & Kerley 29 elephant at 0.3/km^2

With a 937mm annual rainfall and 9672ha Nkomazi could sustain a large herbivore biomass of 8175kg per km^2 according to du Toit's formula above. As per the 2014 game census for Nkomazi (Table 4) the current large herbivore biomass is 7093kg/km^2 with 14 elephants. With the hypothetical increase of elephants to 20 the density increases to 7166kg/km^2 and with 30 elephant the density increases further to 7286kg/km^2, still well below the calculated 8175kg/km^2. Therefore under the current conditions Nkomazi could stock 30 elephant comfortably according to du Toit's calculations.

The National Norms and Standards for the Management of Elephants in South Africa (2008) states that "a stocking density that must equal to or be less than 50% of the future maximum preferred elephant density for the land; and a maximum metabolic biomass of the elephant population that never exceeds 15% of the preferred management biomass, elephants being high impact feeders that modify the habitat in terms of species composition and structure."

With a minimum maximum preferred elephant density of 30 for Nkomazi the current elephant density is less than 50% future potential stocking density. Furthermore, the current elephant population is only 3% of the preferred management biomass for Nkomazi according to du Toit's calculations. At 30 elephant the population will only be at 6.1% of the preferred management biomass.

Therefore, according to the above Nkomazi can sustain a minimum of 30 elephant under the current conditions.

Control of elephant population size.

Nkomazi have identified four methods to control the density of elephant on the reserve in order of preference:

- Addition of extra land
- Live sales
- Contraception
- Culling

Although it is Nkomazi's objective to include Mwelawela (4259ha) into the main reserve timing is uncertain due to political complications of land claims, occupiers and the persistence of communal cattle. As such short to mid-term plans for elephant will be based on the existing 9672ha. Contraception is currently the preferred option of elephant population control.

Contraception should be initiated at p50, i.e. at 50% of the preferred maximum elephant density, by means of immunocontraception. There are two options available:

1) GnRH vaccination of the subadult bull and subsequently the younger bull to down-regulate spermatogenis to render them infertile. Although this procedure (immune castration) is still in the experimental phase, it is proved to be effective.
2) Immunocontraception of the adult female with Porcine Zona Pellucida (PZP) vaccine. This method was extensively tested in various elephant populations in South Africa and proved effective. Females receive an initial vaccine followed by a booster five weeks later and then repeated boosters once a year. The process is reversible once vaccination is terminated.

Although the latter option (immunocontraception) of females with PZP would be the contraception of choice at Nkomazi, the breeding bull has already been contracepted with the vaccine Improvac. As the current population is 14 elephant the timing is within keeping with the p50 recommendation as the population is now roughly 50% of the preferred maximum elephant population.

Contraception by means of Improvac in bulls is maintained by five monthly boosters. It is reversible should the regular boosters be discontinued.

If and how sex and age ratios will be manipulated.

Early studies have shown that the vaccine Improvac is an effective contraception method. As a result there should be no breeding at all after successful vaccination of all breeding bulls and calving of pregnant females. A method of manipulating age and sex structures would be to contracept the females in the future and reverse the bull contraception. Selected females will be allowed to breed to facilitate the age structure. As any plan is

adaptive any of the above methods of elephant density control (4.2) may be reconsidered to keep the numbers and sex structure in check.

12.2.3.2 Giraffe

Giraffe are very visual animals for tourism and as a result their density need not be high from a tourism point of view. Their current density of 56 is high and can be further reduced by means of game capture. Recommended minimum threshold is 20 giraffe.

12.2.3.3 White Rhinoceros

White rhino are a very valuable species for tourism in that they are so visual, specifically when compared to the black rhino. Nkomazi is unfortunately in a hotspot for rhino poaching and as such require high levels of protection. It is recommended to keep their numbers between 7 and 15 maximum. Reduction of rhino must be done through capture and sold to a respectable non hunting reserve.

12.2.3.4 Buffalo

When Dubai World took over Nkomazi there were 119 buffalo in the buffalo camp. All these buffalo were infected with Corridor Disease and were sent back to the seller. The buffalo camp then underwent a two year quarantine period as determined by the State Vet. After the quarantine period was over, cattle were introduced into the buffalo camp to ensure no deaths occurred from Corridor Disease. Thereafter two buffalo bulls were introduced to further test the effectiveness of the quarantine. Unfortunately they died in a fire before they could be tested.

Nkomazi plan on introducing a small breeding herd into Nyoni in the near future for breeding purposes.

12.2.3.5 Hippopotamus

There are currently only five hippo on Nkomazi. However, due to the nature of the flooding of the Komati River and Zeekoei Spruit diligent monitoring of the river crossings is required to ensure no escapes.

11.2.3.7 Predator Management

Just as herbivores have a huge effect on the vegetation so to do the predators have an effect on the herbivores which make up their prey base. According to a PhD study done on predators on small, enclosed reserves O'Brien (2012) found that by using Maximum Sustainable Yield (MSY) of the prey species an indication of predator density can be determined. By using only the main prey species on Nkomazi MSY shows that a minimum of 317 animals can be preyed upon without affecting the prey base (Table 3). This amounts to over 35 tons of food for predators.

One female equivalent for lion (Lion Feeding Unit (LFU)) requires 10.06kg of prey (not meat alone) per day. This would equate to 3 672kg a year per LFU (O'Brien, 2012). Therefore the minimum LFUs Nkomazi can sustain would be 9.6, maximum acceptable limits is double 19.1 LFU as determined by the LFU equation.

Table 5. The MSY for the main prey species on Nkomazi

	Mass	No.	MSY	Available wt (kg)
Kudu	140	322	20	2856
Wildebeest	180	1152	67	11988
Zebra	260	315	16	4134
Blesbok	65	1257	105	6819
Red Hartebeest	120	160	11	1284
Waterbuck	205	225	12	2542
Warthog	57	349	31	1739
Eland	460	78	3	1472
Impala	41	471	46	1902
Nyala	73	71	6	416
			317	35152

Using the following feeding ratios between the large predators as determined by O'Brien (2012) an indication of predator capacities and ratios can be determined:

Lion = 1 LFU

Cheetah = 0.92 LFUs

Leopard = 0.86 LFUs

Therefore the maximum predator densities for Nkomazi in the main reserve are as follows:

Lion	=	6.9 LFUs (maximum pride of 10 with mixed age and sex)
Cheetah	=	6.3 (maximum 6 cheetah)
Leopard	=	5.9 (maximum 5 – 2 female, 2 cubs, 1 male)

As with any prediction the above predator capacities will have to be monitored by observed kills and annual prey game counts.

Lions

As per the 2013 game count there are currently 6 lions on Nkomazi. Lion population control can be achieved either by contraception or by sale to appropriate, respectable reserve. Contraception will be by means of the implant Suprelorin

Cheetah

Nkomazi at present only has a coalition of two male on the reserve plus one surviving male from a previous coalition. Future female introductions will be determined by the effects of the current coalition.

12.2.3.8 Leopard Research

Despite the presence of a few vagrant leopard, Nkomazi is currently busy with the reintroduction of a female leopard onto the reserve. All MTPA permissions are in place. A satellite collar has been fitted. Once released she will be closely monitored and the research results will provide invaluable information of the ecology of leopard in the area.

12.2.3.9 Potential future species Introductions

Other than the introduction of leopard currently in progress the only potential species for introduction in the near future are buffalo and possibly black rhino once Mawelawela has been incorporated into the main reserve.

12.2.3.11 Emergency Plan for Animal Breakout

In the event of a dangerous animal breakout from Nkomazi the MTPA Breakout policy according to Mpumalanga Nature Conservation Act, Act 10 of 1998.

MTPA authorities will immediately be notified by the Wildlife Manager and actions will be according to their instruction.

12.3 Heard Health

General

Veterinary intervention in wild animals is seldom required under well managed wildlife conditions, where animals occur in their natural habitat and natural distribution. The occurrence of diseases and injuries are more prevalent when game densities are above the norm or when game is accommodated in habitat for which they are not adapted to. Some species are more sensitive to changes in habitat or to infections by parasites.

Habitat

The habitat at Nkomazi favours grazers. Due to high rainfall sour grasses are dominant. Limitation of browsing vegetation would be a limiting factor on the carrying capacity of browsers. These factors should be considered in cases of poor weight gains, poor reproductive performance or other erosive diseases.

Minerals

Strategically taken soil samples, vegetation samples and some liver analysis will assist in determining levels of trace elements. This will assist with decisions on nutrition and the use of mineral licks, especially in future breeding projects. Mineral imbalances are important to prevent poor breeding performance as well as issues such as weight loss and disease susceptibility.

Main Reserve

The focus should be towards low veterinary interference, thus managing the reserve as close as possible to a sound ecosystem where natural processes dominate. However issues such as early diagnosis of contagious diseases as well as the prevention of the introduction

of game with subclinical infections are of importance. For this reason necropsies (post mortal examinations) should be done in mortalities where the cause of death is not obvious. Veterinary treatment in high valued or endangered species such as white rhino is advisable. Humane factors as well as the exposure of injured animals to guests should always be considered in injured animals.

- Eland

Although indigenous to the area, eland is susceptible to tick infestations as well as heartwater (a disease transmitted by the bont tick Amblyomma hebraeum). This tick occurs at Nkomazi. The problem will be more severe in thicket and forest. Besides heartwater, severe tick infestations cause infections such as abscesses, foot infections and damage to teats. In severe cases tick controlling devices might be considered.

- Species not indigenous or marginal to the area.

The numbers of species such as springbuck and gemsbok are currently under pressure due to poor adaptation or tick infestations. Their future on Nkomazi may be reconsidered.

Future breeding projects (currently under discussion)

The veterinary approach to semi intensive breeding of valuable species differs substantially to the approach of an extensive ecosystem. Breeding systems should be developed to prevent injuries, infectious diseases and deficiencies due to malnutrition. The most practical valuable game breeding project for Nkomazi would be a semi intensive buffalo breeding system.

Only disease free buffalo are legally allowed at Nkomazi. The diseases of importance to classify a herd as disease free are:

- Foot and mouth disease. Buffalo does not contract symptoms, but may be subclinical carriers of the virus from where it may spread to other cloven hooved animals such as cattle and sheep.
- Corridor disease. This is a protozoal disease (Theileria parva). Buffalo are carriers of the disease from where it may spread to cattle.

- Tuberculosis. Buffalo can contract tuberculosis. It is normally a very prolonged disease in buffalo, and is usually fatal.
- Brucellosis. Caused by a bacterium (Brucella abortis). This is a disease common in cattle and cause abortions, higromas etc.

During buffalo translocation all animals will be tested by a state veterinarian on the farm of origin, the truck sealed during transport and the seal broken on the recipient farm by the local state veterinarian. Once buffalo needs to be sold from Yellowwoods (at a later stage) the same procedures would be required. During disease free testing, animals will be anaesthetised twice. Thus facilities for testing as well as loading will be needed.
Buffalo are hardy animals and not sensitive to infections. Tick infestations are normally not significant. Mortalities are uncommon.
All buffalo breeding projects have to be registered at the Department of Animal Health.

Other veterinary issues of importance.

- Contraception of lions and elephant should be planned in advance. Most of the drugs used are GnRH inhibitors and regulations of the South African Veterinary Council and Medical Controls Council followed.
- Game capture procedures: Mass capture will be done by professional game capturers. During this procedure animals are herded by helicopter through a temporary constructed capture system into a game translocation truck. Prevention of injuries are species specific, e.g. the horns of blesbuck will be protected with pipes immediately after loading to prevent stabbing.

Immobilisation of individual animals by means of darting with opioid drugs (such as m99) has to be done by a veterinarian. This is time consuming and more expensive. It is normally done to test or treat individual animals or small numbers of animals in either captivity or in breeding centres as well as to capture escaped animals.

- Future passive capture systems should be considered for species such as eland, nyala and buffalo.

12.4 Soil Erosion

All areas of soil erosion or erosion threats must be mapped and treated as a priority. Soil is the basic form of conservation.

12.5 Alien Invasive Plant Control

The main areas of high levels of exotic infestation are Lantana along the rivers and the areas around the old mines including bluegums and black wattle. Although control measures are taking place eradication of invasive vegetation is a long term process and must be maintained.

13. Fire Management

Nkomazi lies within a high fire risk area and is actively involved withnthe local FPA and Working for Fire. Staff receive regular training and an annual fire procedure (Appendix 4) policy is followed. Fire teams are established on Nkomazi, equipment regulary maintained and procedures established (Appendix 5).

Controlled fires are practiced at Nkomazi for two reasons. Firstly for purposes of establishing fire breaks to protect the reserve from wild fires. Secondly as a means of vegetation management in order to eliminate moribund grass and stimulate the growth of a new grass sward. The objective of the later is not for control of the woody vegetation components and as such a hot cold burn is used.

14. Management of surface/underground water

The bulk of the surface water area for the reserve is in the form of 2 rivers and smaller drainage lines. The two main rivers are the Komati River and Zeekoei Spruit that runs through the reserve and subdivide the land into three main drainage basins. Both rivers have seasons of high and low flow, although they run year round, with occasional floods. Other streams and drainage lines, as well as plentiful fountains are found throughout the reserve. In general there is ample surface water for the wildlife.

14.1 Threats to water sources/systems

The biggest threat to the reserve's water sources is located in the Komati River, originating from the local communities and the platinum mine, in the form of polluting the water (solid- liquid and chemical waste and littering). A high reading of *E.coli* was detected during water analysis by Labserve.

The infestation of the invasive exotic plant, Lantana *Lantana camara*, is also a risk to the water system and needs to be controlled.

14.2 Water usage for gardens

The policy of the reserve is that water is supplied for the gardens, mainly by summer rain and the river water used to keep the gardens wet. In winter, no water is used in the gardens.

15. The Green Leaf Environmental Standard

Nkomazi should subscribe to "Green Leaf" which is the industry standard to environmental practice. It will ensure that Nkomazi maintains acceptable standards of environmental practice including water sustainability, recycling, environmentally friendly products etc.

Green Leaf is audited annually by independent auditors. Having Green Leaf will be beneficial to the tourism image and can also be used in marketing.

16. Socio-Economic Development

Where necessary all employment for Nkomazi should be from the local communities except for when a specific skill cannot be found locally. Nkomazi must subscribe to the Governments requirements for skills development, equity and good labour practice.
Where possible local industry must be supported.

17. Monitoring

Monitoring is the most important component of wildlife management as it provides a feedback system to assist with management decisions and policies. A dedicated person should be responsible for monitoring.

17.1 Climate

Daily records of at least rainfall and temperature must be kept by the wildlife manager

17.2 Animal Populations

An aerial game census should be ideally conducted annually or at least every second year due to the expense. The game count figures must be compared to the previous figures taking predation, game removals, drought etc into account and management decisions adapted accordingly.

Where appropriate high profile species will have transmitters fitted to accommodate monitoring.

17.3 Predators

Each individual predator must be monitored daily to assess not only no escapes but also to determine their kills and space use. Daily records should be kept of their feeding impacts (species killed, age, sex, percentage eaten) as well as a GPS location of their position.

An accurate identikit must be drawn compiled for each predator with their personal information (origins, date of birth, parentage, sex, mattings, cubs, contraception dates, etc). This will assist in preventing inbreeding and assist management.

17.4 Vegetation

A vegetation monitoring program must be established, ideally through an independent academic institution or by one of the Wildlife Department personal. Specific reference

should be given to establishing a more accurate browsing capacity.

17.5 Water

It is the policy of the reserve not to waste water and to use it sparingly, even though there is ample water available. To this purpose water meters need to be installed at the major areas of infrastructure and monitored monthly.

Labserve, situated in Nelspruit, does the water analyses for the reserve on samples supplied from the taps at the Tented Camp, Inyoni, Jackelberry house, Paperbark and River cottage. The analyses is done once a month and record of the findings kept on file

17.7 Environmental Issues

Nkomazi should subscribe to “Green Leaf”, the industry standard for environmental management. Monitoring will be conducted by independent consultants in the form of annual audits.

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APPENDICES

Appendix 1.

Species list for the Nkomazi region download from POSA (http://posa.sanbi.org) on April 30, 2014, 9:04 am.

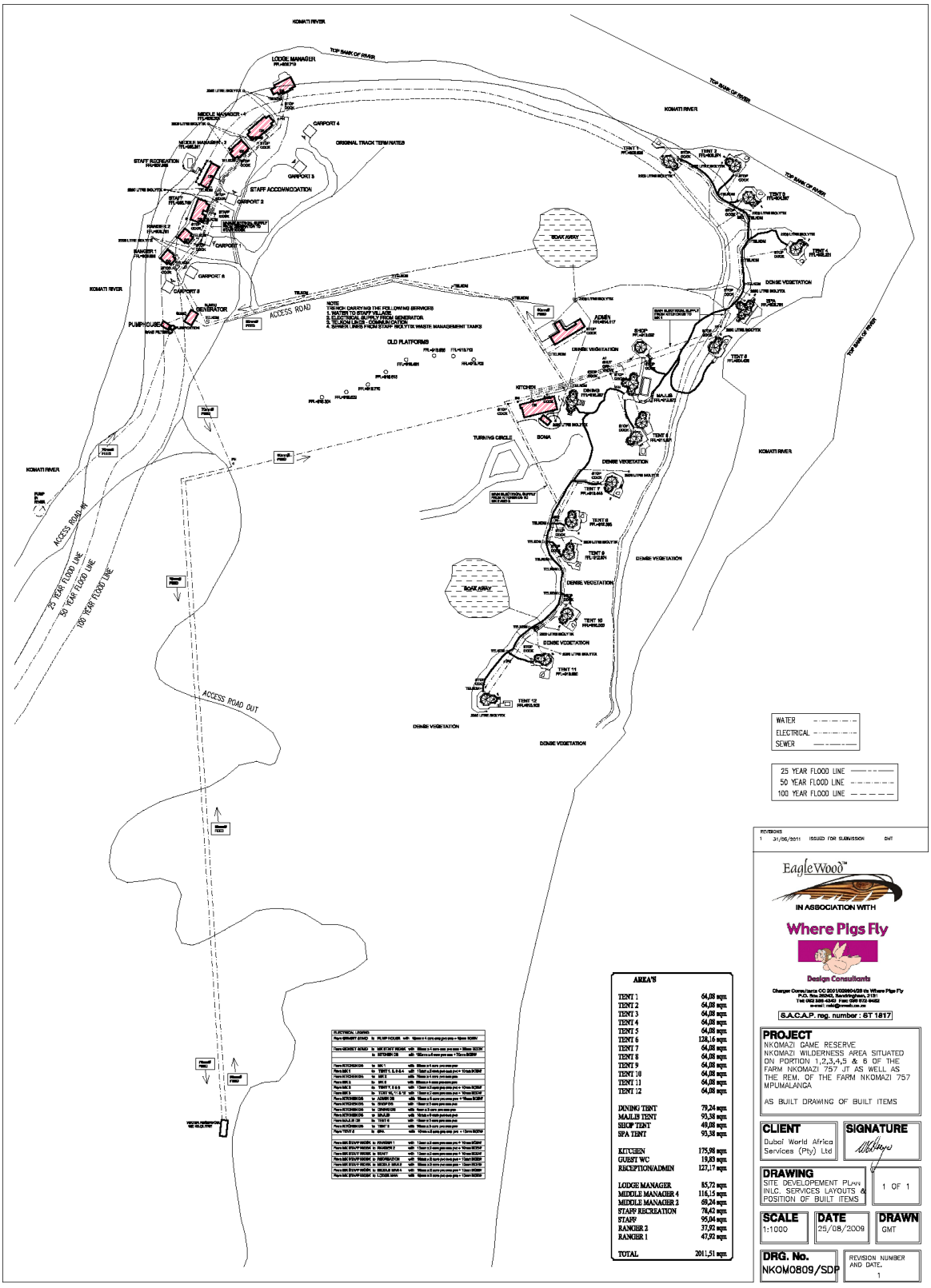
Grid: 2530DD DC. 685 vascular plants with threat status.

Family	Species	Threat status
PROTEACEAE	Protea roupelliae Meisn. subsp. hamiltonii Beard	CR
MALVACEAE	Hermannia cordifolia Harv.	DDD
EUPHORBIACEAE	Acalypha caperonioides Baill. var. caperonioides	DDT
APIACEAE	Alepidea peduncularis A.Rich.	DDT
ASPHODELACEAE	Aloe vryheidensis Groenew.	DDT
MYROTHAMNACEAE	Myrothamnus flabellifolius Welw.	DDT
PASSIFLORACEAE	Adenia gummifera (Harv.) Harms var. gummifera	Declining
ASTERACEAE	Callilepis leptophylla Harv.	Declining
HYACINTHACEAE	Eucomis montana Compton	Declining
MYRSINACEAE	Rapanea melanophloeos (L.) Mez	Declining
ERICACEAE	Erica rivularis L.E.Davidson	EN
ASPHODELACEAE	Aloe reitzii Reynolds var. reitzii	NT
ASPHODELACEAE	Aloe thorncroftii Pole-Evans	NT
CORNACEAE	Curtisia dentata (Burm.f.) C.A.Sm.	NT
PROTEACEAE	Leucospermum gerrardii Stapf	NT
HYACINTHACEAE	Merwilla plumbea (Lindl.) Speta	NT
ASTERACEAE	Berkheya coddii Roessler	Rare
ASPHODELACEAE	Kniphofia triangularis Kunth subsp. obtusiloba (A.Berger) Codd	Rare

ASTERACEAE	Macledium zeyheri (Sond.) S.Ortíz subsp. thyrsiflorum (Klatt) Netnou	Threatened
ASPHODELACEAE	Aloe chortolirioides A.Berger var. chortolirioides	VU
ASPHODELACEAE	Aloe integra Reynolds	VU
ASPHODELACEAE	Aloe kniphofioides Baker	VU
APOCYNACEAE	Brachystelma dyeri K.& M.Balkwill	VU
ZAMIACEAE	Encephalartos paucidentatus Stapf & Burtt Davy	VU
ANACARDIACEAE	Ozoroa barbertonensis Retief	VU
PROTEACEAE	Protea curvata N.E.Br.	VU
ANACARDIACEAE	Searsia pygmaea (Moffett) Moffett	VU
LAMIACEAE	Thorncroftia thorncroftii (S.Moore) Codd	VU

Appendix 2.

Site plan of Nkomazi Tented Camp



Appendix 3.

Assets Register Vehicle & Equipment

Date 05/01/2009

Vehicles	Reg no	Vin no	Model no	Date of Purchase	Year
Toyota Hi Lux	**DYF 014 MP**	Vin no : AHTCR32G208007258	Hi Lux 2.5D SRX R/B N/SP U11	2008-10-10	2008
Toyota Hi Lux	**FDF 494 MP**	Vin no ; AHTCR32G508007237	Hi Lux 2.5D SRX R/B N/SP U11	2008-10-10	2008
Land Cruiser 70	**DYF 009 MP**	Vin no : JTELB71J407076640	L/Cruiser P/UP 4.2D 08 10P SU	16/10/2008	2008
Land Cruiser 70	**DYD 998 MP**	Vin no : JTELB71J207077043	L/Cruiser P/UP 4.2D 08 10P SU	2008-10-10	2008
Land Cruiser 70	**DYD 991 MP**	Vin no : JTELB71J307078153	L/Cruiser P/UP 4.2D 08 10P SU	16/10/2008	2008
Land Cruiser 70	**CLF 450 MP**	Vin no : JTELB71J307010239	L/Cruiser P/UP 4.2D 08 10P SU	13/05/2008	2001
Land Cruiser 70	**CJT 568 MP**	Vin no ; JTELB71J607007836	L/Cruiser P/UP 4.2D 08 10P SU	13/05/2008	2000
Mahindra Thar	**FSB 381 MP**			…/…./2012	2012
Land Rover	**DJN 249 MP**	Vin no : SALLDCPF74V054753	Land Rover Game Veiwer	13/05/2008	2005
Land Rover	**DTG 270 MP**	Vin no : SALLDHAT77A743780	Land Rover 110 PAP 224DT	2007-11-10	2007
Land Rover	**CNT 360 MP**	Vin no ; SALLDHM871V842770	Land Rover 110 TD 5 CSW	13/05/2008	2001
Buffalo unimog	**DSZ 631 MP**	Vin no : 41616210079428	Buffalo Unimog	13/05/2008	1995
Buffalo unimog			Buffalo Unimog	13/05/2008	1995
Toyota Hino	**CA 382811**	Vin no : AHHFG1JGPXXX11382	Hino Super F13 - 234	12/11/2008	2008
Samil 50 Truck			Samil 50	2008	
Tractor & Trailers					
New Holland Trekker	**DSZ 995 MP**	Vin no : NH6610E400377396M	New Holland 10 Series Mexico	13/05/2008	2007
New Holland Trekker	**DJN 244 MP**	Vin no : NH6610E400374256M	New Holland 10 Series Mexico	13/05/2008	2006
New Holland Trekker	**DYN 239 MP**	Vin no : NH6610E400S30152M	New Holland 10 Series Mexico	09/10/2008	2008
Kru Multi Trailer	**DRN 698 MP**	Vin no : AA9T235TM6PYR1003	Krurekpro cc Trailers	13/05/2008	2006
Tanker Trailer	**DRN 705 MP**	Vin no : AA9T118TM6PYR1020	Krurekpro cc Trailers	13/05/2008	2006
Tipper Trailer		Vin no : AHA100A04MW000017	5 Ton Tipper Trailer	09/10/2008	2008
Tipper Trailer Dropsied	**DSZ 962 MP**	Vin no : AAPV0260430435316	Van De Wetering Trailers	13/05/2008	2005
10 Ton Trailer		S/N : KM 002 Model 1316130	Trailer	13/05/2008	2005
Diesel Tanker	**DSZ 986 MP**	Vin no : AA9T175TM7JBR2187	Sedibeng Diesel Tanker	13/05/2008	2007
Diesel Tanker	**DSZ 978 MP**	Vin no : AA9T175TM7JBR2193	Sedibeng Diesel Tanker	13/05/2008	2007
Machines					
Grader 120 H		S/N : 0120HA5FM04800	Caterpiller Grade 120 H		2007
Bomag CS 533 E		S/N :CATCS533CALO2682	Caterpillar Bomag Roller CS 533E		2007
TLB 434 E		S/N : CAT0434EHFSH00718	Caterpiller Backagter Loader 533E		2007
Skid Loader 226 B		S/N : CAT0026BLMJH9777	Caterpiller Skid Steer Loader 226B		2007

Appendix 4.

Annual fire procedures

Nkomazi lies within a high fire risk area and the following annual procedures need to be conducted to ensure readiness and cooperation with all the role players:

January

- Identify all potential fire risks
- Inspect power lines & servitudes
- Update firebreak registers
- Update Fire Plan Procedures, and distribute to Managers
- Schedule fire break plan
- Update Fire Plan
- Update all fire equipment
- Training of Fire teams
- Attend FPA meetings
- Slash landing strip

February

- Prepare chemical tracers
- Finalize firebreak agreement with SAPPI
- Training of employees in fire fighting
- Action plan for upgrading fire breaks
- Slash burning, weather permitting
- Attend FPA meeting

March

- Prepare chemical tracers
- Update neighbours' contact details
- Road slashing
- Check water sources
- Check equipment

- Train employees
- Check insurance warranties
- Slash burning, weather permitting
- Fire related Nkomazi Management Meeting
- Attend FPA meeting

April

- Check radios
- Prepare manual tracers
- Prepare roads bordering fire breaks
- Burn open areas on rotational burning program (get permit)
- Update and drill operational response times & procedures to fire & medical procedures
- Slash burning, weather permitting
- Attend FPA meeting
- Attend meeting with neigbouring Forestry officials (SAPPI, KFL + MONDI)

May

- Commence fire break burning
- Ensure all training completed
- Activate look-outs and preparedness
- Get airstrip operational
- Burn open areas on rotational burning program
- Remind all staff (NB Tented Camp) of fire related dangers
- Ensure that protective clothing is issued
- All roads graded and slashed
- Get Fire hose at Air strip ready
- Attend FPA meeting

June

- Check landing strip & LZ on a weekly basis
- Burn firebreaks as per plan

- Remind all staff of Fire Plan Procedures
- Perform daily checks on equipment using CHECK LISTS
- Ensure constant readiness & response times
- Obtain FDI daily
- Attend FPA meeting

July

- Complete fire breaks
- Remind staff of call-out procedures
- Daily and weekly check-up on equipment, using check lists
- Obtain FDI forecasts
- Check airstrip weekly
- Perform stand-by and reaction drills
- Attend FPA meeting

August

- NO MORE FIRE BREAK BURNING, BLOCK BURNS OR BOMA FIRES ALLOWED
- Remind staff of call-out procedures
- Daily and weekly equipment check, using check lists
- Obtain FDI forecasts
- Check landing strip & LZ weekly
- Perform stand-by and reaction drills
- Attend FPA meeting

September

- NO FIRE BREAK BURNING, BLOCK BURNS OR BOMA FIRES ALLOWED
- Remind staff of call-out procedures
- Daily and weekly equipment checks, using check lists
- Obtain FDI forecasts
- Check landing strip & LZ weekly
- Perform stand-by and reaction drills
- Attend FPA meeting

October

- NO FIRE BREAK BURNING, BLOCK BURNS OR BOMA FIRES ALLOWED
- Remind staff of call-out procedures
- Distribute stand-by roster to all neighbours
- Daily and weekly equipment checks, using check lists
- Obtain FDI forecasts
- Check landing strip & LZ weekly
- Perform stand-by and reaction drills
- Attend FPA meeting

November

- Slash burning, weather permitting
- Block burning, weather permitting
- Clear fence lines (chemical & manual)
- Keep monitoring FDI
- Budget for firefighting operations
- Full service & storage of ALL equipment
- Check landing strip & LZ weekly
- Attend FPA meeting

December

- Finalize budget
- Slash burning, weather permitting
- Block burning, weather permitting
- Clear fence lines (chemical & manual)
- Keep monitoring FDI
- Full service & storage of ALL equipment
- Check landing strip & LZ weekly

Appendix 5.

Fire teams, procedures and equipment

Fire teams

Any fire spotted on the Reserve must be reported immediately to one of the 3 Fire Bosses (Fire + Fences Manager, Wildlife Manager or Assistant Maintenance Manager)

The Firefighting team on duty will be determined by off-days/leave cycle

A-TEAM (Fire + Fences Manager) - When all Fire bosses are on site (i.e. during the week)

B-TEAM (Assistant Maintenance Manager) - When the Fire + Fences Manager is not on site, but the Wildlife Manager is

C-TEAM - (Wildlife Manager) - When both the Fire + Fences Manager and the Asst Maintenance Manager is not on site. Also to assist A+ B TEAM when two fires break out at different areas at about the same time.

The Working on Fire team, consisting of 22 fire fighters, 1 driver and 2 crew leaders, employed by the Government, assist at all times on Fires.

All three Fire Bosses are qualified after their training, and every team member has got a specific duty during firefighting procedures, and has been trained and qualified to perform this duty.

Fire procedures

- The Fire will be reported to the Fire Boss, who will send the Spotter (one of the other Fire Bosses) ahead to evaluate the extent of the fire, while getting the Fire Fighting team together.
- The Fire Boss will contact the Fire Protection Association (FPA), situated at Warberton, to arrange for aircraft assistance, if necessary. Nkomazi Game Reserve is a member of FPA.
- The Fire Boss and firefighting team moves to the fire, with their firefighting equipment, perform their relevant duties, and extinguish the fire as soon as possible
- Health + Safety procedures always applies

- It will take between 20 – 25 minutes to get to the fire, depending on which section of the reserve the fire occurs.
- Radio channel 4 must be kept open while firefighting is in process.
- If the fire is uncontrollable, the FPA will be requested to assist with bomber aircrafts. The Nkomazi Airstrip at Paperbark has been approved by the FPA and is equipped to refill the bomber aircrafts.
- In the event of any fire, the Tented camp and staff accommodation on the reserve must be kept safe, first and foremost, if in danger
- No Nkomazi vehicle's fuel tank is allowed under half a tank full.
- Water bowsers must be kept filled with water, and immediately after firefighting, refilled.
- In the event of a fire in the Southern sector, the Northern sector will assist
- Firefighting crew will only take orders from the Fire Boss on duty
- The neighboring Forestry Officials will be immediately informed in the event of any big fire on Nkomazi property.
- The Tented Camp and all staff quarters are equipped with basic firefighting equipment.

Firefighting equipment

VEHICLES:

1 x SAMUL truck

2 x Unimogs

6 x 4x4 Vehicles

WATER BOWSERS:

1x 5,000litre (on the SAMUL)

2 x 2,500litre (on the Unimogs)

1 x 1 000litre (on trailer)

2 x 250litre containers on 4x4 vehicles

GENERAL FIRE FIGHTING EQUIPMENT

1 x High powered Blower

8 x Knapsacks sprays

20 x Fire beaters

4 x Fire rakes

2 x Drip torches