



BRACKENRIDGE ESTATE

PROPOSAL FOR INTRODUCTION OF FAUNA.

Period: Long term project

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TABLE OF CONTENTS

Overview	3
Glossary	4
Species which occur in area	5
Proposed species	6
Current fauna on estate	7
Carry capacity	8
Vegetation survey	10
Potential impacts	11
Management requirements	12
Bee introduction	13
Appendix A	14
Appendix B	15
Appendix C	16

The Brackenridge Residential Estate is currently undergoing a long-term project to conserve the estate's greenbelts and create a true eco-estate status, setting an example to other housing estates.

Part of this project is looking at the possibility of introducing or re-introducing endemic and/or indigenous fynbos fauna onto the estate's greenbelts with the goal of increasing their diversity and population numbers.

The purpose of this proposal is to underline the processes which need to be undertaken leading up to the introduction of fauna onto the estate and will outline the following:

- A list of species known to be endemic or indigenous to the estate.
- A list of species and species numbers currently found on the estate.
- Information on the proposed species for introduction.
- Process to determine carrying capacity of the estate.
- Whole-estate vegetation survey to determine percentage palatable and non-palatable species.
- Potential impacts introduced fauna may have on estate.
- Proposed timeline, resources required and budget.

Any questions, concerns or suggestions may be communicated to either the estates general manager or the environmental control officer.

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GLOSSARY

CR	Critically endangered
EN	Endangered
VU	Vulnerable
NT	Near-threatened
LC	Least concern
DD	Data deficient
EF	Endemic to Fynbos
ESA	Endemic to South Africa
ECO	Environmental control officer
EMC	Environmental management committee
HOA	Home owners association
LSU	Large stock unit
EMP	Environmental management plan

SPECIES INFORMATION

The following antelope species are found in the Fynbos biome.



Cape Grysbok
Raphicerus melanotis



LC

ESA

Habitat - found across Fynbos biome, favour dense vegetation



Klipspringer
Oreotragus oreotragus



LC

Habitat - restricted to mountainous and rocky outcrops, hill or gorges, absent from flat areas lacking structures.

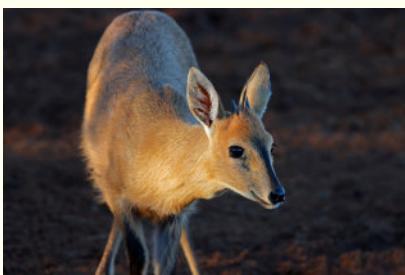


Steenbok
Raphicerus campestris



LC

Habitat - drier, more open areas, generally absent from dense, wetter vegetation areas.



Common Duiker
Sylvicapra grimmia



LC

Habitat - found across Fynbos biome, favour areas with sufficient vegetation cover



Bontebok
Damaliscus pygargus pygargus



VU

EF

Habitat - Overberg coastal plains.



Grey Rhebok
Pelea capreolus



NT

ESA

Habitat - favours rocky hillside and mountain slopes within Fynbos biome.

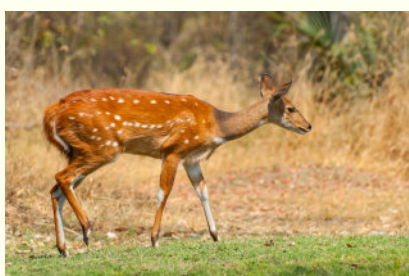
In October 2023 an environmental audit of Brackenridge was conducted by Professor Patricia Holmes and a revised environmental management plan (EMP) was drawn up.

Given the current state of the Fynbos on the estate (a fire management plan is in progress to rehabilitate the Fynbos), a finer scale of what Fynbos communities occur on the estate could not be determined.

Professor Holmes did suggest in her audit that the warmer north and west-facing slopes of the estate is where Grassy Fynbos communities likely occurred, and the wetter south and east-facing slopes likely supported Ericaous (Heathland) Fynbos communities. There are also two small Forest community patches, a Wetland Floodplain and some Fynbos Riparian Scrub communities.

Based on the above information regarding the vegetative habitat on the estate and what is known about the life histories of the antelope species commonly found in the Fynbos biome, the Cape Grysbok and Common Duiker are the best suited species to be introduced onto the estate.

There may be potential to introduced Southern Bushbuck (*Tragelaphus sylvaticus*) into the denser thicket and forest patches, which are their preferred habitat, but this will depend on the carrying capacity of these areas.



Southern Bushbuck
Tragelaphus sylvaticus



LC

Habitat - southern coastal areas of Fynbos biome, favour suitable thick vegetation.

SPECIES CURRENTLY FOUND ON ESTATE

Antelope species which have been confirmed on the estate is the Cape Grysbok and Common Duiker. Apart from antelope, there may be other species which make use of vegetation as a food source and could include, bushpig (*Potamochoerus larvatus*), porcupine (*Hystrix africaeaustralis*), honey badger (*Mellivora capensis*), baboon (*Papio ursinus*) and a range of rodent species.

The ECO will first have to determine what species of fauna are currently found on the estate and also determine an approximate number of individuals for each of the species observed. The following procedure is recommended by the ECO:

- Determine key areas throughout estate for monitoring and make use of the camera trapping method to collect data.
- Purchase at least two camera traps with black flash (does not disturb wildlife when capturing pictures at night).
- Working on a two-week rotational schedule, set up the camera traps at each site, checking and clearing the SD cards once a week. Set camera traps up four times at each site during the course of data collection (gives data for each site for each season).
- Filter through photos and use identifying characteristics to identify individuals and create an accessible data sheet with photos of each individual.
- Encourage involvement from residents and create a citizen science project for the estate where residents record and report any sightings of bushpig, porcupine, antelope, etc.

The data collected from the camera traps will help provide a species list of fauna found on the estate, movement patterns of species, approximate number of individuals of each species and preferred habitat usage for each species.



Suggested camera trap model:

SPARTAN SR4-BK Eclipse - Black flash

- Non cellular.
- 80° wide angle lens.
- High quality colour photos and video during the day.
- Advanced blackout flash
- Monochrome photos and video at night.
- 2 inch front facing LCD screen.
- storage up to 512GB on a micro SD card.
- Has port for connection of a 12V 7AH battery.

The carrying capacity of an environment refers to the maximum number of individuals the environment can sustain over a long period of time without the degradation of the environment.

There are three basic but key factors that determine the carrying capacity of an environment; food availability, water and space. These factors are known as limiting factors and without limiting factors, a population has the potential to grow exponentially. Limiting factors can be divided into abiotic (non-living) and biotic (living) factors.

- Abiotic limiting factors - sunlight, temperature, soil, water, oxygen availability etc.
- Biotic limiting factors - food, disease, competition, predation etc.

When working out carrying capacity it is important to determine the ratios and numbers of bulk feeders, mixed feeders and grazers that the area can suitably sustain without affecting the quality of the habitat they are being introduced into. One must also take into consideration the habitat preference, food preference, territoriality and interspecies competition of each of the species the estate wants to introduce.

A vegetation survey of the whole estate will need to be conducted during every season to get an as accurate as possible vegetation species list. Once the species list has been compiled, the percentage palatable to non-palatable species and their total coverage of the estate's greenbelt will need to be determined.

Once the total number of hectares of greenbelt has been calculated the large stock unit of each species to be introduced must be calculated. A L.S.U. was developed for the cattle industry to help determine how many cattle per hectare a farmer can sustain on their land. These L.S.U.'s have been converted for game species to allow game reserves to more accurately determine carrying capacity.

CARRYING CAPACITY

An example of calculating carrying capacity using L.S.U.'s.

Kalahari sandveld can have 6 to 7 L.S.U.'s per 100 hectares. If the reserve's total area is 5 000 hectares, it would be able to sustain 300 L.S.U.'s (ecological capacity).

$$5\ 000/100 = 50$$

$$50 \times 6 = 300$$

If the reserve is used for Gemsbok game farming, it could have 536 individuals at any one time.

L.S.U. for one Gemsbok is 0.56

$$300/0.56 = 536 \text{ individuals.}$$

One thing to note is that using the L.S.U. method does not take into consideration whether the species is a browser, grazer or mixed feeder. If 12 grazers can occupy 100 hectares, it does not necessarily mean the same for browsers or mixed feeders.

A second method which takes into consideration grazing, browsing and mixed feeding is the energy method. The energy method uses the energy requirements of a particular species and uses the following equation:

$$A = B \times C/D$$

A - ecological capacity.

B - available feed (g/ha).

C - amount of metabolisable energy in feed (KJ/g).

D - amount of metabolisable energy required by the species per day.

Grazing unit (GU) = $(450)^n \times (\text{average body mass})^n \times (\% \text{ graze})$

Browsing unit (BU) = $(140)^n \times (\text{average body mass})^n \times (\% \text{ browse})$

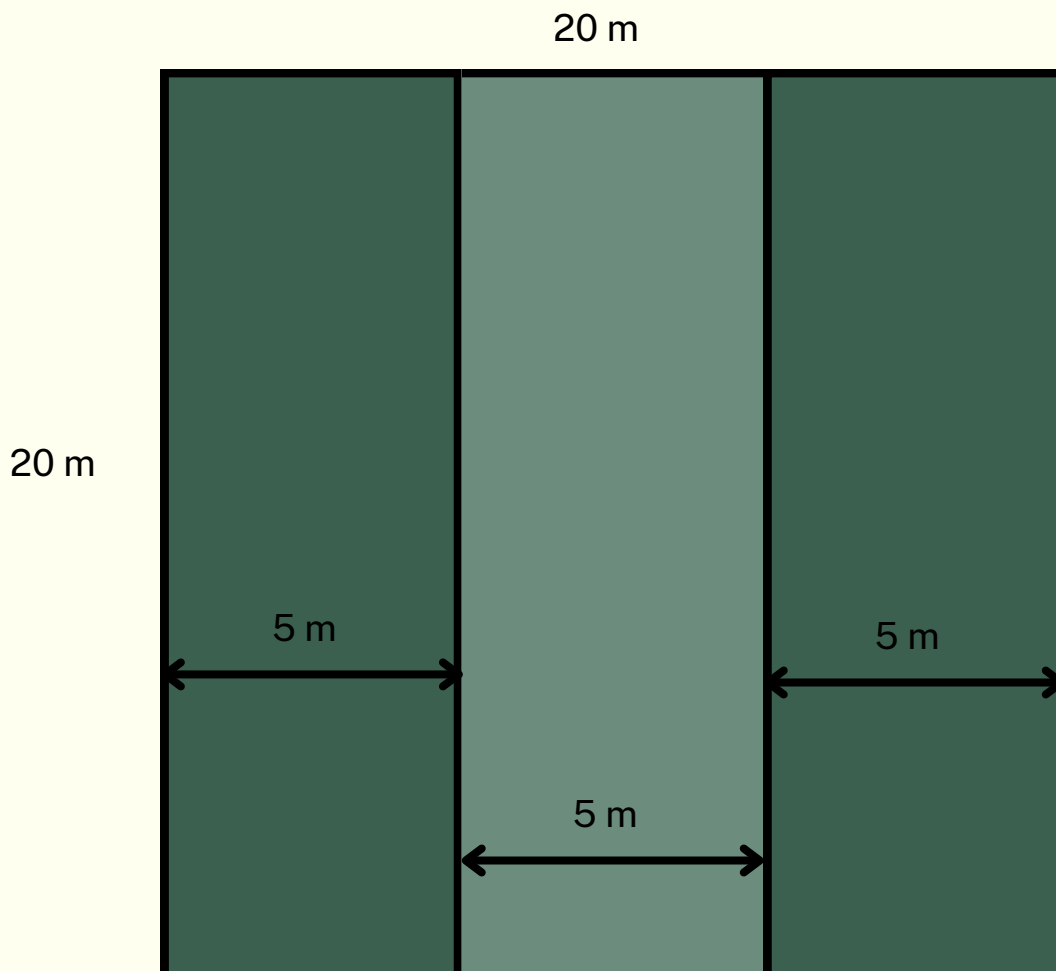
Note: first n = 0.75, second n = -0.75

VEGETATION SURVEY

In order to ensure that a thorough vegetation survey of the whole estate is conducted, the ECO recommends the following:

- Split the greenbelt into 20m x 20m manageable blocks.
- Use an uninterrupted belt transect method to survey each block.
- Mark out each belt transect (four per 20m x 20m block) with string or danger tape as a guideline to follow.
- Sampling needs to be done in all seasons for each block (not sure if one week a month is going to be sufficient).
- Take photos with GPS location and upload onto iNaturalist for species confirmation.
- Once completed, use data to map out the greenbelt on GIS to get an accurate spread of species for carrying capacity.
- Determine the palatability of each species for carrying capacity.
- Develop a flower field guide for the estate for residents.

Example of an uninterrupted belt transect



There are some potential impacts that could occur with introducing more antelope onto the estate.

- What impact will the antelope have on private gardens? The ECO stayed on a golf estate in Mossel Bay and the garden of the property was not fenced in. There were frequent visits from the duiker to the garden and they would eat the flowers off the plants. This may not be appreciated by some residents.
- Would an increase in fauna impact the safety of residents and tenants? Many of the residents make use of the walking paths and cycle around the estate.
- Would an increase in fauna make them more vulnerable? Cape Grysbok adapt to small urban environments but are prone to attacks from dogs.
- Would an increase in fauna aid or hamper the restoration efforts of the Fynbos on the estate? When would be an ideal time to introduce fauna?

There are requirements when introducing fauna onto a reserve or an estate.

- Permits need to be obtained from Cape Nature.
- A management plan for fauna will need to be drawn up.
- A temporary boma will need to be constructed on sight to house the animals for a period of four to six weeks before allowing them to free roam the estate. This is done to ensure that the animals acclimatise to their new environment and allows management to monitor their condition during that period.
- Depending on the type of species you are introducing, certain types of fencing are required to be in place before release.
- Based on the amount of natural water resources available on the estate, permanent watering stations may need to be installed to ensure there is enough water.
- Whilst in the boma, supplement feeding may be required while the animals are acclimatising.
- The estate will need to continually monitor the number of individuals on the estate to ensure numbers do not exceed the carrying capacity of the estate. If the threshold has been met, the estate will either have to capture, then move or sell individuals to other locations or implement culling to bring numbers down.
- To ensure genetic diversity of the population, there needs to be a rotation of individuals, taking out some of the population and replacing them with new individuals to maintain genetic diversity and avoid inbreeding.
- Depending on the estate objectives with the introduction of fauna i.e. how much interference once the population has established, there will need to be budget for veterinary costs.
- If the estate wishes to keep track of each individual released, budget will need to be put aside for monitoring.

The estate would like to look into the possibility of releasing natural bees. Below is the ECO's recommendations:

- The rehabilitation effort of the Fynbos on the estate will allow the natural return of bees and other insects.
- To ensure you acquire the correct species of bee, contact a local, well-established beekeeper to purchase a colony.
- The ECO has a local contact who makes beehives and harvests honey. An arrangement could be made that in exchange for maintaining the beehives after the purchase, the contact can collect and sell the honey.
- If the estate decides to manage the beehives, an individual on the management team is recommended to attend bee keeping classes and there will be an additional cost of purchasing the equipment needed to maintain the beehives.
- The location of the hive or hives will need to be at least 50 m away from people and the area chosen must have food and water available to the colony within 5 km of the hive.
- As there are a large number of people who are allergic to bees, buy in from residents is a necessity, as the estate could be held liable should some get stung and have an allergic reaction.

Table 1: L.S.U.'s for antelope species.

Species	Browser	Grazer	Mass (kg)	L.S.U
Cape Grysbok <i>Raphicerus melanotis</i>	Yes	Ocassional	10	0.06
Klipspringer <i>Oreotragus oreotragus</i>	Yes	No	13	0.07
Common Duiker <i>Sylvicapra grimmia</i>	Yes	No	19	0.09
Grey Rhebok <i>Pelea capreolus</i>	Yes	No	20	0.10
Steenbok <i>Raphicerus campestris</i>	Yes	Yes	11	0.06
Southern Bushbuck <i>Tragelaphus sylvaticus</i>	Yes	No	30	0.13
Bontebok <i>Damaliscus pygargus pygargus</i>	No	Yes	55	0.21

Table 2: Estimated budget for fauna introduction project.

Table 3: Estimated timeline for fauna introduction project.