

**The Environmental Management plan for the Cheetah Conservation Fund's guest lodges,
Otavi constituency, Otjozondjupa Region**



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1. Introduction

The Cheetah Conservation Fund (CCF) Environmental Management Plan (EMP) aims to provide a management framework for the activities of the CCF. It aims to ensure not only compliance with the Namibian Environmental Management Act but to meet global standards of best practice in conservation.

CCF founded in 1990, has as its mission “to be an internationally recognized centre of excellence in research and education on cheetahs and their eco-systems, working with all stakeholders to achieve best practice in the conservation and management of the world’s cheetahs”. CCF maintains a major public education programme and creates and disseminates education materials worldwide; conducts programs of community upliftment and predator conflict resolution; assists in the management of captive and free-ranging cheetah throughout the world; and publishes scientific papers on its research findings.

1.1 CCF organizational structure

CCF is an international organisation with registered not for profit organisations in several countries and international headquarters in Namibia. In 1991 CCF in Namibia became a Namibian Voluntary Trust and in 2002 completed registration as a not-for-profit Namibian Section 21 Company. CCF’s Namibian Board of Directors is comprised of leaders in the local community, business, and academic sectors. Additionally, there is an International Science Advisory Board that assists in planning and advising on research projects. CCF’s Executive Director is assisted in the management and operations of CCF by a core professional staff, short-term volunteers, and students.

CCF’s base of operations is in Namibia, which has the largest and one of the few sustainable populations of free-ranging cheetah in the world. The cheetah’s survival depends on a total ecological system of farmland management, prey species management, and habitat stability. CCF’s Namibian focus is to work with livestock farming communities in order to develop ways to reduce conflict. This is achieved by devising a conservation plan that secures habitat for the species, while still accommodating farmers’ land use needs. CCF carries out scientific research programs in areas such as cheetah population biology, cheetah ecology, cheetah health and reproduction, and human impacts on the cheetah. CCF researchers develop, test, and promote alternative land-management practices such as conservancy development, non-lethal predator control, relocation of problem cheetahs, and eco-tourism. Additionally, CCF conducts both Namibian and international education programs to raise awareness of the cheetah’s endangered status. These illustrate ways in which the species can be protected and encourage worldwide support.

CCF strives to promote Namibia’s vision 2030 through the sustainable utilisation and management of natural resources in accordance with the Forest act 2001, and the Namibia forest development policy of 1998. To that end CCF operates a model farm and goat dairy and has created the BUSHBLOK program which promotes the sustainable use of Namibian thornbush. This program is run by CCF Bush Pty Ltd, which also has a published Management Plan. That plan prescribes

methods of harvesting, suggests harvesting targets, multiple monitoring programs (ecologic, & socio-economic), and land use objectives.

To assure that both plans meet international criteria for conservation CCF has obtained and maintained Forest Stewardship Council certification since 2005. This requires an annual audit by one or more outside environmental professionals.

1.2 Operating principles

1.2.1 Management

Goal: a management process that ensures a sustainable approach to achieve the Vision.

On behalf of the Board of Directors the Executive Director manages the staff through a General Manager and Assistant Director – Research. Staff have contracts and CCF is registered with the EEC. Yearly goals are promulgated at a general meeting and annual and mid-year reports are published. Finances are audited by a registered Namibian firm.

1.2.2 Conservation activities

Goal: to be a centre of excellence in conservation practices.

Conservation is our core business. In addition to our extensive on-campus and outreach education and activities such as the Livestock Guarding Programme and Bushblok habitat restoration, we act as the research advisor to the Waterberg Conservancy and help organize their conservation efforts. All conservation activities are outlined in the CCF annual reports available at www.cheetah.org.

1.3 Location and Environment

CCF's International research and education centre is located in prime cheetah habitat within the Waterberg Conservancy, which encompasses over 175,000 hectares of private farmland surrounding the Waterberg Plateau Park: a national game park dedicated to rare and endangered species. The conservancy's farmers cooperatively manage the land's wildlife for long-term sustainability that in turn provides habitat and prey base for the cheetah. The Waterberg conservancy is a member Greater Waterberg Landscape, an area comprising 16,000 km², or close to 2 million hectares, around the Plateau and four communal conservancies including Ozonahi, Okamatapati, Otjituuo and African Wild dog. Both Cheetah view and Babson guest lodges are located on farm Elandsvreugde, located approximately 44 km on D2440. Other farms include Osonanga, Boskop (Khayam's Kopje), Cheetah View, Padberg, Bellebenno, Otjenga, Janhelpman, and Bynadaar, totaling 57639.5 hectares. CCF's Centre provide a

model for farmers and relevant stakeholders to

demonstrate that they can live harmoniously with cheetahs.

Table 1. Farm Statistics and immediate neighbours

Farm name	Project type	Project area (ha.)	Ownership	Land use	Livestock	Waterpoints	Farm owner Contact	Immediate Neighbor Contact
Elandsvreugde 16° 39' 0" E, 20° 28' 12" S	A. Guest Lodges i) Cheetah View lodge ii) Babson	<0.5ha	Private	Livestock Wildlife Ecotourism Wood biomass	Goats = 258 Sheep = 93 Cattle = 0 Horse = 7	Boreholes = 2 Earthdams = 9 Water troughs = 2	Bruce Brewer (General manager) Tel: 067 306225 Cell: 0811247799	Harry Shneider Waterberg Waterberg Guest Farm 149, Farm Okosongomongo Otjiwarongo District Namibia Tel, +264811246688

The most common land-use practices are integrated farming with wildlife, livestock, ecotourism, and the harvesting and processing of encroaching bush biomass for energy purposes. Cattle farming is practiced on farms Cheetah View, Boskop,

Bynadaar, Bellebeno and Janhelpmann. No cattle farming is practiced except goats and sheep, on farm Elandsvreugde. Common fauna and flora species and their related conservation status are presented in appendix 1 – 5.

The area receives a mean annual rainfall of 400mm (30 – 40% var.), with the main season occurring between November and April. The overall mean temperature range is 20°C - 21°C (coldest month: 4°C - 6°C, hottest month: 32°C - 34°C) (Mendelsohn & el Obeid, 2005).

The farms have a number of man-made semi-permanent water reservoirs which allow access to surface water for livestock and wildlife year-round. Water resources occurs in two main forms i.e. surface (earth dams and underground water sources). Water availability is disadvantaged by unpredictable climatic conditions and the underlying geology of the area. For most of the CCF farms (apart from Janhelpman) underground water aquifers are weak and have a limited production capacity. Borehole developments on CCF farms were recorded to date back as far as the 1930's. Farm Janhelpman is situated on an underground geologic marble rock formation "Omarrasa" that provides a rich water resource (Naude, 2005 pers.com). The boreholes located on farm Boskop are the primary source of water for CCF's main campus, connected by a ± 6 km pipeline. On farm Elandsvreugde, two earth dams are found in proximity to the CV and Babson guest lodge. A total of six earth dams are found on farm Cheetahview (3 large, and 2 small). On farm Boskop, four large earth dams are found (two are close to the main house). Elandsvreugde has a total of nine (9) earth dams, Bellebenno (1), Osonanga (6), and Janhelpman (1).

The most prominent geological feature is the Waterberg Plateau, located on the eastern periphery of the CCF farms. All CCF farms are located within the *Damara sequence* geologic stratum, the oldest in the Waterberg region formed about 500 - 850 million years ago. Soil types fall into two main associations: - *Eutric Regosols* and *Chromic Cambisols* (MET, 2002). The soil substrate is predominantly sandy loam and loamy sand. The topography is generally flat, with elevation ranges between 1501m – 1701m above sea level (MET, 2002). Consequently, water runoff during the rainy season is slow and is mostly evident in low lying areas near seasonal streams. All farms occur within the *moderate* soil erosion risk region of Namibia (DRFN soil erosion map, undated). Vegetation is classified as semi-arid thornbush savanna, dominated by both Blackthorn (*Senegalia mellifera*) and Sickie bush (*Dichrostachys cinerea*) woody vegetation (de Klerk, 2004). Bush encroachment, the general increase in the biomass of native woody plants from vegetative growth of existing plants and establishments of new individuals in a particular area, is a common phenomenon on CCF farms.

2. Description of the Eco lodge and Tourism project

In 2000, CCF's main campus located on the farm Elandsvreugde (# 367) was officially dedicated to the public following an extensive renovation. The campus was active at this site since 1994. The farm base is in prime cheetah habitat and a wildlife friendly area, with neighboring farmers who believe in conservation ethics. CCF is an active member of the Waterberg conservancy which encompasses over 150,000 ha of commercial farmland adjacent to the Waterberg plateau park.

The CCF main campus is a renovation of a former farm headquarters and all major campus facilities are within 1000 meters of the former farmhouse. The farmland operations have been developed to research and display predator friendly and commercially viable livestock and wildlife programs. The campus also researches and displays innovative business initiatives such as the BushBlok compressed fuel log, and creamery making goat milk products.

The facilities consist of a research veterinary clinic, an education centre, an office complex, genetics laboratory, creamery and visitor centre with toilets and meeting room for hosting conferences. The campus also consists of a farm maintenance unit (farm barn), and

accommodations for staff and students. The campus also houses small-stock and dog breeding pens, cheetah quarantine facilities, and several main cheetah pens. Anatolian and Kangal livestock guarding dogs are bred at the centre as part of the livestock guarding dog program.

The CCF centre is regularly visited by local and international tourists, schools, farmers and the general public. CCF centre has become a popular travel and tourism destination in the region and this is evidenced by the number of guest received. The increase in the number of guests is partly due to the growth experienced in Namibia's tourism sector and CCF's local and international popularity as a leading organisation that is dedicated to cheetah survival. CCF experienced a 60.1% increase in the number of visitors in 2023 (n = 15829) if compared to 2022 (n = 9889) due to the ease in travel restrictions related to the COVID 19 global pandemic (CCF annual report, 2023). Nevertheless, the majority of visitors, specifically tourists are not provided with accommodation and would spend ~ 2hours, due to limited available accommodation. The short visits experienced has impacts towards potential revenue and reduces visitor experience and value of money spent. As an example, daily visitors are only able to participate in a limited number of activities including the centre tour and cheetah drive. High impact visitor experience activities such as the little Serengeti drive, behind the scene tours and cheetah exclusives are only available upon booking to lodge guests.

CCF raises its own operation capital in order to finance the different programs on an annual basis. Adequate revenue remains a challenge, especially to a conservation based non-profit organisation and may hamper successful project development. About 60% of CCF's funding is sourced outside of Namibia, and only 40% is raised in the country. The main sources of revenue in Namibia include livestock farming, donations, bushblok production and tourism. These revenue sources are affected most by climatic conditions, donor availability and financial markets. Thus, a strategic objective to increase income through the different revenue sources is necessary in order to ensure sustainability of the conservation programs.

As part of CCF's strategic goal, diversification of revenue sources and strengthening the current methods and projects is crucial in order to increase local funding and reduce dependence on external sources. Tourism is a key sector for CCF's sustainability, therefore a guest lodge to provide accommodation and tourism activities was identified as a step towards achieving this goal. Four units within the campus, comprising nine bedrooms, are proposed for public accommodation.

3. Description of proposed guest lodges

3.1 Size of area of the lodge location

Both the Cheetah View and Babson lodges are located within the CCF residential area, in proximity to a previously abandoned crop fields of more than 40 years ago (SWA/Nam Geological survey maps, 1974). Past habitat modifications are evident from the sparsely vegetated habitat structure mostly

dominant in this area.

The Cheetah View guest lodge (20°28'55.09"S, 17° 2'1.43"E) facility is located approximately 200 meters from the senior staff housing. Construction of the site was completed in 2017, with the interior facility covering an area size of approximately 315m². The facility consist of four deluxe units with two single beds and one premium unit (Family suite) with two queen beds and a sleeper sofa. Other units are a room for tour guides, a kitchen, laundry room and restaurant (CCF, 2017). The lodge's main building overlooks an open area of ~ 2ha, a watering hole, and the Waterberg Plateau Park towards the east. Regrown bushes were thinned from this area in order to pave for the construction. The Cheetah view lodge site was also thinned in 2007 and 2014 as part of the restoring habitat project by CCF bush PTY LTD. Thinning was done by manual methods and aftercare treatment was applied using an FSC approved herbicide known as Access (Picloram active). Targeted bush species included the *Senegalia fleckii*, *Senegalia mellifera*, *Vachellia reficiens*, *Vachellia tortilis* and *Dichrostachys cinerea*.

Table. Woody species densities and tree equivalents for Farm Elandsvreugde no. 367.

Otjiwarongo	Density (±95%)	Tree equivalents (±95%)
Location	Ind. /ha.	TE. /ha.
Site 1 (Plot 14)*	1782.45 (710.63)	3398.05 (1317.00)
Site 2 (Plot 7)	1337.58 (239.60)	1602.50 (317.82)
Site 3 (Plot 9)	1149.02 (299.57)	1361.93 (315.66)

The Babson guest lodge (20°29'1.79"S, 17° 1'58.12"E) facility is located approximately 20m from the senior staff housing. The Babson house was constructed in 2006 as a private residence and converted into a guest lodge in 2007. The interior facility covers an area size of approximately 230m² and consist of three bedrooms with private bathrooms, a common kitchen and living room. The veranda overlooks the CCF cheetah enclosures and the Waterberg Plateau Park to the east. The same unit housed the CCF's Genome Resource Laboratory before this was relocated to the public centre in 2015.

Prior to the development of the buildings, CCF conducted an internal an environmental impact assessment (EIA) based on the scale of soil disturbing operations as part of the FSC assessments.

3.2 Expected duration of the CCF eco-tourism lodge project (years).

The guest lodge and ecotourism activities are considered central to CCF's long term economic model. Thus, activities will be subjected to constant monitoring and evaluation. Project approval will be based on annual audits which will include key aspects of social, environmental, political and financial domains in order to ensure sustainable development of a conservation program. Based on annual audits, adaptive management strategies will be implemented, and project renewal will be done periodically.

3.3 Equipment / machinery to be used.

Table 2 Inventory list of electrical appliances

Item description	Number of units
Cooling equipment	
a) Bar Fridges (small)	6
b) Deep freezers	4
c)	
d) Fridge	5
Cooking equipment	
a) Gas stove	3
b) Kettle	7
c) Microwave	3
d) Blender	1
Extra room lighting equipment	
Bed lights	12
Transport	
a) Safari vehicle	3
Laundry equipment	
a) Tumble drier	1
b) Washing machine	2
c) Iron (handheld)	2

3.4 Products to be used, chemical and biological composition.

Table 1. List of proposed products

Item description	Composition
<u>Cleaning</u>	
Chlorine bleach	Sodium hypochlorite
Handy Andy	Ammonia
Dishwashing liquid soap	-
Washing powder	-
Pine gel	-
<u>Garden, composting, weed control</u>	
Access	Picloram
Round up	Glyphosate
Effective Microorganisms (EM)	Photosynthesizing bacteria, lactic acid bacteria, yeasts, actinomycetes and fermenting fungi

3.5 Number of staff to be employed.

A total number 16 staff members will be employed by the tourism department. This will include the lodge manager, assistant tourism manager, two hosts, four cooks, two tour guides, scullery and two cleaners.

3.6 Staff recruitment

Available jobs are advertised in local newspapers, on CCF's website www.cheetah.org, tertiary training institutions and via contacts with the tourism department. Once selected, candidates are invited for a job interview by a panel consisting of the CCF's management staff. Successful candidates are informed in writing following the interview. CCF has a non- discriminating policy against sex, race, politic or gender and candidates are selected based on whether they have satisfied the competencies of the job.

3.7 Where staff will live.

About 60% of staff will be accommodated at the CCF residential area and 40% have own permanent housing in Otjiwarongo. Transport is provided daily (Mon – Sat) from town to CCF centre. Staff living at the CCF farm are accommodated in shared flats consisting of single bedrooms per person, with up to three people sharing a house unit. Each housing unit is equipped with running water, electricity, bed, table, cupboard, chair, linen and access to laundry facilities and internet at no cost.

3.8 What contractual arrangements will be made with staff.

Employees will enter into a contract agreement as arranged by the Cheetah Conservation Fund and in accordance with the Labour Act (Act No. 11 of 2007). Probation will be three months, and a permanent contract will be issued afterwards should the employee satisfy all necessary competencies and wish to remain employed by CCF's tourism department.

4. Description of the CCF tourism value-addition project

Detailed descriptions of the different tourism activities are provided in section 15.4. Visitors will have an opportunity to participate in different center based tourism activities and game drives on the CCF farms. Proposed activities include behind the scene tours, the education center, animal clinic, genetic laboratory, livestock husbandry and livestock guarding dogs, cheetah feeding, the cheetah run, cheetah pen drives, and the “Little Serengeti” drive on the farm (Fig.1).



A. External view of the Cheetah View lodge



B. Inside bedroom



C. Cheetah pen drives



D. Restaurant



E. Cheetah Run



F. Education Centre

Figure 1. Tourism activities at CCF.

5. What liquid or solid waste will be generated (type and quantity)

Potential waste associated with the guest lodge accommodation and tourism activities include plastic, glass bottles, wood ash, engine oil, paper, printing cartridges, cigarette butts, metal (tins), batteries, cooking oil, grey water, black water, food leftovers, battery acid, old furniture and linen, Styrofoam.

6. Where the waste will be disposed.

Non-recyclable waste will be disposed in a fenced dumpsite located within 1 km onsite. All recycled



materials are taken offsite e.g. Otjiwarongo, Windhoek. Recycling bins are present in the public area and at the lodge and waste is sorted into labelled waste bins (Fig.2)

Figure 2. Labelled waste bins for recycling

7. Where the water will come from

All water used at the CCF centre is sourced from farm Boskop, also owned by CCF. As aforementioned in previous sections, water is pumped from boreholes which are replenished by seasonal rainfall.

8. Expected amounts of water to be used

Currently, the water consumption for the guest lodge will not exceed 1000L per day.

Consumption for Boskop and Elandsvreugde facility amounts to 40,000 liters per day. Water meters for specific departments have been proposed in later sections of this EMP specifically for the guest lodges.

9. Potential air emissions likely to be generated.

Potential air emission associated with this project include dust, engine emissions from vehicles, chemical emissions from insect repellents, and noise from driving of the vehicles.

10. How the visitors will come to CCF.

Unless pre-arranged and in special cases, all guests will use own vehicle for transport to CCF. All centre tours are done under the supervision of tour guides.

11. Our clients

Entrance to the lodge is by pre-booking. The lodge is open to any local or international guest.

12. Description of the proposed Eco lodge and tourism activities

12.1 Lodge capacity

A total number of 12 beds per night are available at the cheetah View lodge and six beds per night for the Babson house. The combined number of available beds per night does not exceed 18 people. Theoretically, if operating at maximum capacity, the number of available bed nights estimated to be 6,552 per annum (excluding Christmas day). The actual number of bookings during 2023 for the cheetah View (1487) and Babson lodges (104) were 1591, representing 27.4% and 6.1% increase from 2022. Bookings for 2024 look promising, due to the lifting in travel restrictions caused by the COVID 19 global pandemic.

12.2 Lodge operations

The lodge manager maintains an oversight of the guest activities, resources, stock control, bookings and manages the tourism staff including the tour guides, chefs, hosts, and cleaners. In addition the lodge manager monitors and evaluate the usage of lodge resources such as water, electricity, and enforces tourism impact policies related to environmental protection including waste, recycling and reduction of pollution. All maintenance related activities are managed by CCF's maintenance manager who communicates closely with the lodge manager.

Lodge and tourism activities are ongoing, and depend on the number of confirmed bookings, and tourism seasons. Thus, it is expected that the lodges will host more guests during the peak tourism seasons (May – October). Nevertheless, an environmental management plan is necessary to respond to variable guest numbers and their impacts, regardless of the tourism seasons. To identify specific actions for mitigation, lodges and tourism activities will be subjected to ongoing monitoring and evaluation. Annual audits will inform the management to adapt/halt specific activities. The lodge operations are permanent and major project revisions will be conducted as needed.

13. Lodge specific activities and associated environmental impacts

13.1 Logistics

Due to the remoteness of the lodges, large quantities of merchandise is sourced from Otjiwarongo 45 km away on a weekly basis or as needed. This include amongst other, fresh products such as bread, milk, eggs, meat, canned foods, dried food, flour, staple foods. To maintain adequate supply of merchandise, items are kept in a storeroom at the lodges, and fresh products are refrigerated immediately upon arrival from the market. Stock inventory and control is regularly conducted by the lodge manager to prevent the overuse of merchandise and ensure its quality and shelf life. Stock control also ensures that the products do not exceed their expiry dates and wasted, are damaged or react with each other and cause danger to the guests and employees.

The handling and storage of stock requires a specific method to avoid damage keeping products beyond expiry or contaminations. Thus, bad storage and poor stock control can increase pollution from the number of trips to the market, fuel consumption and generate more garbage in the environment.

The following are considered potential risk factors in logistics:

- i. Mishandling of merchandise when offloading or at storage could cause product damage.

- ii. Incorrect labelling and storage of products on the shelves or in the refrigerators.
- iii. Lack of awareness amongst staff regarding correct procedures on merchandise storage on the shelves or in the refrigerators.
- iv. Over/under purchasing of products, leading to shortages or products reaching expiry.
- v. Safety and hygiene in receiving and storing products.
- vi. Increase in the number of town trips, resulting into an increase in energy consumption.

13.2 Lodging and house keeping

All rooms at the lodges have water installed in private bathrooms and electrical appliances including a small fridge and overhead fan. All rooms have mosquito nets constructed over each bed and ozone friendly insect repellent is provided to guests. The rooms are cleaned daily in order to maintain general hygiene. Housekeeping involves changing linen, sweeping, dusting, washing the room and bathroom floors and basins, cleaning window and removing garbage from the rooms. The cheetah View lodge has a laundry facility with a single tumble drier and washing machine. Laundry services are not available to guests and can be availed only in special cases. The rooms or common areas do not have television sets, bathtubs or swimming pools. All lodges are equipped with energy saving lights (Eco friendly Eurolux 4 watts).

There are no electronic air conditioning systems installed in any of the lodges.

The following are considered potential risk factors:

- i. Excessive energy usage: This can be realised by heating water, lights accidentally left on, prolonged laundry cycles, leaving refrigerators open, and having multiple electrical appliances.
- ii. Excessive water usage: This can be realised if guests take longer showers, leaving taps open, dripping taps and toilets, frequent flushing of the toilets and pipe leaks. In addition, laundry cycles and frequency of washing will have an impact on the water consumption.
- iii. Frequent housekeeping that involves the use of water, cleaning products and electricity may increase the consumption of these resources and increase environmental pollution.
- iv. Lack of environmental awareness amongst staff especially the use of water, cleaning products, electricity, recycling or what to do in cases when spillages of cleaning products or cooking oils are encountered.
- v. Health and safety. All lodge employees should have basic first aid knowledge and what procedures to follow in cases of accidents or environmental emergencies e.g. fire incidences, gas leaks in the kitchen, injuries, chemical spillage.

13.3 Kitchen and meals

Guests are provided with breakfast and dinner, prepared at the lodges. However, there are options available to guests to buy own breakfast and lunch at the Cheetah Caffé' which is located at the public centre. Depending on the type of relationship with CCF (e.g. donors), guests can also join other staff and volunteers for dinner at the CCF common kitchen, also known as the "Hotspot". Most food ingredients are sourced from town, and locally produced products include vegetables, salads and goat cheese.

The following are considered potential risk factors:

- i. Excessive energy usage: This can be realised if the stoves are accidentally left on, overcooking, leaving refrigerators open, and storing hot/warm foods in the fridge.
- ii. Excessive water usage: This can be realised if taps are accidentally left open, dripping taps, washing dishes under running water instead of filling the sink with water.
- iii. Overuse of detergents, dishwashing soaps and frequent washing.
- vii. Safety and hygiene in preparing and storing foods.
- iv. Health and safety. All lodge employees should have basic first aid knowledge and what procedures to follow in cases of accidents or environmental emergencies e.g. fire incidences, gas leaks in the kitchen, injuries, chemical spillage. The kitchen may attract pests such as cockroaches and rodents and pest control will be needed.
- v. Burning of gas while cooking releases air emissions.

13.4 Tourism activities

Visitors have an opportunity to participate in different centre-based tourism activities and game drives on the CCF farms. All activities are guided by CCF staff, no self-guided tours exist. The behind the scenes tours are pre-booked and involve interacting with CCF staff while performing their duties. This exposes the guests to the tasks involved in saving the cheetah and provide first-hand experiences in various projects namely cheetah care, the education centre, animal clinic, genetic laboratory, livestock husbandry and livestock guarding dogs. The CCF centre tours are done on foot and guests have an opportunity to view resident cheetah in enclosures, visit the education program museum and visit the livestock guarding project. Feeding of resident cheetah is an activity done at 14:00 on Monday – Friday and at 12:00 on Saturday and Sunday. Only staff are allowed to interact with the captive animals. The cheetah run is an enrichment activity done to maintain physiological health amongst the cheetah at the centre. Cheetah runs are done with an electric motor which pulls a string with a cloth attached as a visual stimulus, over a circuit covering an area of not more than 0.5 ha. Cheetah run activities are also booked in advance.

The cheetah drive in the captive cheetah enclosures is done with a safari vehicle. And last for almost one hour. This activity provides an opportunity to view the cheetahs from within the same area without any fence barriers.

Another activity the "Little Serengeti" drive is done ~ 7km away with a safari vehicle in an open habitat known as the big field. The big field provide an opportunity to photograph the local wildlife

in their natural environment and against the magnificent Waterberg Plateau during in the late afternoon hours.

The following are considered potential risk factors:

- i) Excessive usage of fuel (Petrol, Diesel): This is dependent on the frequency of the tours, number of guests per vehicle and distances travelled on game drives in the field or cheetah enclosures when using the safari vehicles.
- ii) Health and safety. Interacting with wildlife and captive animals could expose guests and staff to injuries. Additionally, captive cheetahs may sustain injuries during the exercises or by the safari vehicles when guests are on cheetah drives. Wildlife may be run over by safari vehicles during the Serengeti game drives.
- iii) Veld fire incidences: any activity such as throwing away ignited cigarette butts while on tour may cause fire.
- iv) Smoking while on tour is a health risk to other people near.
- v) Pollution from littering while on tour e.g., cigarette butts, bottles, cans plastic.
- vi) Adequate training in tour guiding and basic ecology of the local area and common wildlife.

13.5 Purchasing policy

An eco-friendly purchasing policy is required in order reduce pollution and wastage of resources, while at the same time promoting “green products” such as predator friendly beef, game meat and organically grown vegetables. As aforementioned, merchandise is sources from town. CCF has procedures in place regarding the number of trips made to town per week. Town trips are done ones per week, usually on Fridays. Eco friendly equipment that utilizes less water and energy are bought and installed e.g. energy saving bulbs, amount of water being flushed by the toilets, ozone friendly and biodegradable products.

- i) The following are considered potential risk factors:
- ii) Buying products from shops that do not support environmentally friendly practices or biodiversity conservation.
- iii) Buying eco non- friendly products that do not support environmental conservation or products that cannot be recycled locally.
- iv) Buying products with a lot of packaging instead of single material packaging.
- v) Using the equipment and products of the lodges in a rational way (i.e., overuse leads to more trips to town.
- vi) Inadequate stock taking, leading to multiple trips to town.

13.6 Garden and local integration

There is a rock garden with local succulent plants including aloe species common in the local

environment and some unidentified non-succulents. No grass lawn is present at the lodges and all shade trees are from the local area. The rocks in the front garden were all sourced locally and together with the succulent plants, integrates the lodge with the local scenery.

The following are considered potential risk factors:

- i) Excessive water usage especially when watering the garden. The non-succulent plants are more water dependent.
- ii) Introducing alien plants which may spread into the local habitat.
- iii) Chemical weed control.
- iv) The rock garden may attract wildlife including venomous snakes, scorpions, and spiders as examples. Therefore, it is necessary to always implement precautionary measures such as leaving doors closed.
- v) Lack of awareness amongst employees regarding alien invasive species or value local flora.
- vi) Health and safety.

14. Detailed Environmental Management actions

14.1 Energy Management

Goal: Maximize use of renewable energy while minimizing overall energy consumption.

The campus is beyond the grid. Mains power is currently produced by diesel genset and a 75kw Photovoltaic power source on the roof of the CCF visitor center. Batteries have been installed so the gensets do not run continuously. Water is heated by solar collectors. Some borehole pumps are solar-powered.

Energy-saving fixtures and appliances are used wherever possible. Efforts are made to constrain campus development within a 1000-meter radius to minimize vehicular impact. Air conditioning is only for laboratories and food storage.

Table 4. Avoid excessive consumption of energy resources and reduce carbon footprint

Impact /potential risk description		Mitigation measure	Indicators	Priority (1-3; low – High)	Responsible person	Deadline
Logistics	Improper storage of merchandise	Correct labelling of products	Product label placements in the storeroom	3	Tourism manager	Monthly
	Frequent town trips	Regular stock control	Stock control records, Purchase lists records	3	Tourism manager	Monthly, ongoing
Lodging and housekeeping	Heating water	Monitor energy consumption of the guest lodge	Install Energy consumption meters.	2	Tourism maintenance manager	1 month

			Periodic records on energy consumption			
	Prolonged laundry cycles and increase in the use of washing machines	Set washing cycles to “Eco” Fill washing machines to maximum load when doing laundry. Do laundry during “off peak” periods in energy use.	Labels with instructions are placed in the laundry room.	3	Tourism Manager	1 week, ongoing
	Electrical appliances and lights left on without use.	Avoid turning appliances on while not in use Develop awareness amongst cleaners and kitchen staff on how to save energy	Label reminders on energy use, instructions on how to use electrical appliances are placed in guest rooms and staff rooms Energy saving training provided to cleaners and kitchen staff	3	Tourism manager	1 week, ongoing
	Multiple electrical appliances	Avoid too many appliances such as	Number of fridges, capacity and energy	3	Tourism Manager	1 month, ongoing

		personal fridges in the rooms Regular defrosting of freezers (1 per month) Switch off freezers when not in use	consumption is monitored periodically		Tourism Maintenance Manager	
Kitchen and meals	Stoves switched on for no apparent purpose i.e. no pots placed on stove.	Avoid switching stoves on without any cooking.	Instructions on energy conservation provided to kitchen staff. Training on energy consumption provided to kitchen staff	3	Tourism Manager	Ongoing
	Stoves switched on at maximum	Only use required temperature to cook meals and avoid overcooking foods Use pots whose dimeters are compatible with the cookers or burners	Instructions on meal preparations and methods on cooking provided to kitchen staff. Training on energy consumption provided to kitchen staff	3	Tourism manager	1 month, ongoing
	Refrigerator doors open for an extended period	Avoid leaving fridge doors open for a longer period as this will increase	Instructions on energy conservation	3	All kitchen staff and cleaners	Ongoing Training = 3 months

		temperature consumption.	provided to kitchen staff. Training on energy consumption provided to kitchen staff			
	Storing warm foods in fridge	Avoid placing hot foods in fridge	Instructions on proper storage of foods provided to kitchen staff.	2	Tourism manager All kitchen staff and cleaners	Ongoing
Tourism activities	Increase in fuel consumption from the “little Serengeti” game drives on the bigfield and cheetah pen drives	Seek alternative game drive options that rely on renewable energy e.g. solar powered vehicles. Combine game drives and cheetah pen drives between lodge guests and day visitors	The energy consumption is efficiently related to the number of game drives, number of guests, and kilometers travelled.	2	Tourism Manager	6 months
	The use of the cheetah run lure would increase energy consumption e.g.	Avoid using old batteries as these do not hold charge over long periods	Use high quality battery brands with a longer lifespan.	1	Tourism Manager	Ongoing, 1 month

	charging of car batteries and vehicle used when ferrying guests from the lodge to the cheetah pens.	<p>Monitor the battery acid and water levels regularly and fill when needed.</p> <p>Encourage guests to use own vehicles between the lodge and CCF center</p> <p>Encourage guests to walk between the lodge and CCF center</p>	<p>Higher number of lodge guests willing to walk between the facilities.</p> <p>Higher number of lodge guests using own vehicles</p>			
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14.2 Water management

Goal: promote the wise use of water resources. Water is sourced from boreholes and staff and visitors are reminded that it is a scarce resource. System pressure is kept low to minimize leaks. Swimming pools and bathtubs are forbidden. Garden watering is minimal and at proper times. Grey water is collected and used for gardens and compost watering.

Impact /potential risk description		Mitigation measure	Indicators	Priority (1-3; low – High)	Responsible person	Deadline
Lodging	Water wastage from prolonged showers.	Avoid taking longer showers Closing the taps when applying shampoo or soap Install showerheads that are water efficient. Inform guests about the importance of saving water.	Label reminders on water use placed in guest rooms and at taps. Efficient water showerheads installed.	3	Tourism Manager	1 month

	Water wastage due to broken taps, pipe leaks, or not properly closing the taps.	Regular maintenance inspections Remind guests about the importance of saving water. Reduce water pressure. Install durable taps and pipelines Report broken taps to the Tourism maintenance manager.	Records of maintenance jobs done and number of incidences are kept up to date. All reported cases are repaired immediately.	1	Tourism maintenance manager	Ongoing
	Water wastage from flushing the toilet frequently.	Encourage guests to reduce the number of flushing events and only do it when necessary Install water efficient cistern.	Water efficient toilet cisterns are installed Labels reminding guests on efficient water use are	2	Tourism Manager	Ongoing, 1 week

			present in all bathrooms.			
	Water wastage when using washing machines, especially if longer washing cycles are selected.	Use water efficient washing machines Use eco- friendly settings. Use maximum laundry loads and avoid washing single items or less loads. Reuse grey water for composting and garden	Efficient water machines are purchased, Instructions on how to operate the washing machines is provided to cleaner staff	1	Tourism Manager	Ongoing
	Excessive water use and wastage during housekeeping.	Reduce the amount of detergents and other cleaning products added to cleaning water in order to minimize rinsing.	Instructions on proper usage of water and cleaning products given to cleaner staff.			

		Only use required amounts of water when cleaning. Only clean with water if needed. Reuse grey water for composting				
	Water wastage from Washing laundry or dishes under a running tap	Avoid washing dishes without filling water in a sink or bucket.	Instructions on proper usage of water Labels reminding	2	Tourism Manager All kitchen and cleaner staff	1 month, ongoing
Kitchen and meals	Water wastage from Washing dishes or performing other activities under a running tap	Close taps tightly. Avoid washing single items and combine wash loads.	cooks and cleaner staff on efficient water use are present at all water installations	2	Tourism Manager All kitchen and cleaner staff	1 month, ongoing
	Water wastage due to broken taps, pipe leaks, or not properly closing the taps.	All broken/leaking should be reported to the tourism	Records of maintenance jobs done and number of incidences	1	Tourism Maintenance Manager	Ongoing

		<p>maintenance manager.</p> <p>Close taps tightly</p>	<p>are kept up to date.</p> <p>All reported cases are repaired immediately.</p>			
	Excessive use of water during rinsing	<p>Reduce the amount of soap and other cleaning products added to water.</p> <p>Reuse grey water for composting and garden.</p>	<p>Proper instructions of product use are provided</p> <p>Stock records are kept on product use.</p>	2	<p>Tourism Manager,</p> <p>All kitchen and cleaner staff</p>	1 month
Garden and local integration	Excessive water use for garden irrigation	<p>Install drip irrigation system to control water use</p> <p>Avoid watering on windy or hot times of the day.</p>	<p>Drip irrigation system installed</p> <p>Water dependent species removed</p> <p>No irrigation if windy or hot.</p>	3	<p>Tourism maintenance Manager,</p> <p>All farm staff</p>	3 months, ongoing

		Plant only species that are locally adapted and require less water for survival. Recycle grey water for garden use				
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14.3 Waste management

Goal: reduce pollution and minimize use of resources. Grey water is collected and used for gardens and compost watering. Black water goes into local sewage tanks at each facility. Bio waste from the kitchen and paper is collected and composted. Recycling containers and signage is prevalent. Metal and glass are recycled in Otjiwarongo. Printer cartridges and E-waste are taken to Windhoek. Non-recyclable waste is buried in our own, fenced, trash pit.

Table 6. Prevent pollution on the land, water and air

Impact /potential risk description		Mitigation measure	Indicators	Priority (1-3; low – High)	Responsible person	Deadline
Logistics	Frequent town trips generates air pollution	Avoid unnecessary town trips Stock control Rational use of merchandise	Number of trips and kilometers travelled are kept on record and updated regularly.	1	Tourism Manager	Ongoing
Lodging and housekeeping Kitchen and meals Logistics	Pollution of soil and water: Accumulation of contaminants derived from the frequent use of soaps, bleaching agents and other cleaning products.	Use biodegradable products and encourage eco-friendly cleansers. Ban the use of hazardous products Effective microorganism (EM) used to speed up biological decomposition	Biodegradable products use encouraged. Water and soil quality tests are done (Obtain initial test results and use it as baseline to	3	Tourism Manager	Ongoing, 3 months

		Recycle grey water for garden and composting	compare with follow up tests).			
Lodging and housekeeping Kitchen and meals Logistics	Pollution of soil and water from waste products (e.g. bottles, metal, plastic, cooking oil, cigarette butts, Styrofoam)	Recycle waste products e.g. a) Cooking oil is organic and can be composted. Adding small amounts to the compost piles would be ideal. b) Non-recyclable waste products should be disposed of at a designated site. Hazardous products should be contained in such a	Biodegradable products use encouraged. Water and soil quality tests are done (Obtain initial test results and use it as baseline to compare with follow up tests). Recycling bins with labels placed at the guest lodges.	1	Tourism Manager	Ongoing, 3 months

		<p>manner that no leakages into water and soil occur.</p> <p>c) Start an initiative where guests are encouraged to take their generated waste on their day of departure.</p>				
Tourism activities	Pollution of soil and water from waste products (cigarette butts, electronic equipment batteries, plastic, bottles)	<p>Use recyclable water bottles</p> <p>Recycle waste</p> <p>Encourage the use of rechargeable batteries</p> <p>Start initiative where guests are encouraged to take their generated</p>	<p>Biodegradable products use encouraged.</p> <p>Water and soil quality tests are done (Obtain initial test results and use it as baseline to</p>	1	Tourism Manager	3 months

		waste on their day of departure.	compare with follow up tests). Recycling bins with labels placed at the guest lodges.			
	Pollution of soil, water and air from waste products (e.g. carbon monoxide, oil leaks, noise, dust) generated by the Safari drive vehicles	Regular maintenance of the safari vehicles to prevent oil leaks, exhaust pipe noise. Integrate lodge guests safari drives with other drives specified for daily visitors. Enforce speed limits to avoid dusty conditions.	All Safari vehicles are serviced on time and records kept up to date. Distances travelled vs. the number guests transported by the safari vehicles are compared Feedback from guests regarding their satisfaction of the drive	1	Tourism Maintenance Manager	1 month, ongoing

	Pollution of air from smoking cigarettes	Restrict smoking in public or near non-smokers Designate smoking areas.	Non-smoking signs are placed in the public places Guests are informed that all tours are non-smoke	1	Tourism Manager	3 months,
	Pollution of soil and water from chemicals (e.g. battery acid while setting up the cheetah run lure, weed control using herbicides at the lodge, control of pests at the lodge).	Caps on the cheetah run lure should be tightened before the batteries are moved. Only use FSC approved herbicides e.g. Access (Picloram active), Roundup (Glyphosate)	Periodic surveys to sample water and soil contaminants in local areas.	1	Tourism Manager	3 months, ongoing

14.4 Human resources

Goal: a staff that is trained and empowered to achieve the Vision.

Where skills are available CCF, employ local labor resources, thus ensuring the local distribution of employment and benefits. Interns are trained in both the sciences and vocational skills, a safe and harmonious working environment for employees is created thereby encouraging a prosperous, loyal and productive workforce. CCF invests in Health and Safety and enforce a Code of Conduct and have a fair disciplinary structure.

Table 7 Follow health and Safety Precautions

Impact /potential risk description		Mitigation measure	Indicators	Priority (1-3; low – High)	Responsible person	Deadline
Logistics Lodging and housekeeping	Product damage and loss of quality during delivery or storage (e.g. foods in fridges, foods in the storage, delivery of merchandise).	Provide awareness on proper storage methods. Acquire delivery cart at the lodge and enforce its use during offloading.	Evidence of records detailing training offered Delivery cart acquired and present.	3	Tourism Manager	1 month, ongoing
	Injuries sustained while on duty,	Provide protective gear as a preventive method against injuries and enforce its use (e.g. gloves, overalls, safety glasses)	Evidence of protective clothing on record.			
Logistics Lodging and housekeeping Kitchen and meals	Lack of knowledge about the environment (e.g. goals of CCF, basic ecosystem	Provide environmental education training to all at levels of the guest lodge employees Expose all staff to partake in field exposure trips	Evidence of records detailing training offered, or excursions taken.	2	Tourism Manager	6 months, ongoing

Tourism activities	principles, sustainability, recycling)	(conservation area, tourism area) to gain first hand experiences.				
Purchasing policy						
Garden and local integration						
Logistics	Inadequate knowledge on health and safety	Provide first aid training at all levels of the guest lodge employees	Evidence of records detailing training offered	3	Tourism Manager	3 Months
Lodging and housekeeping						
Kitchen and meals	e.g. the use of different chemicals, storage of products, how to respond to injuries, medical condition emergencies, snake bites, scorpions, insect bites.					
Tourism activities						
Garden and local integration						

<p>Lodging and housekeeping</p> <p>Kitchen and meals</p> <p>Tourism activities</p> <p>Garden and local integration</p>	<p>Loss of life/injuries e.g. from, snake bites, local predators.</p>	<p>No staff is allowed to approach, disturb, or handle any snake, scorpion or other dangerous wildlife.</p> <p>Report all sightings to the tourism management</p> <p>Walking at night or before sunrise is discouraged.</p>	<p>Evidence of incidences is kept on record</p>	<p>3</p>	<p>Tourism Manager,</p> <p>All guests, Tourism staff</p>	<p>Ongoing,</p>
	<p>Injuries during the cheetah runs or cheetah drives</p>	<p>No entry in the cheetah enclosures by minors or persons < 1.5m unless in a Safari vehicle</p> <p>Cheetah keepers and husbandry team follow safe protocols</p> <p>Tour guides follow Safe protocols</p>	<p>Evidence of the number of accident events on record.</p> <p>Evidence of protocols</p>	<p>3</p>	<p>Tourism Manager</p> <p>All cheetah keepers and husbandry team,</p> <p>All tour guides</p>	<p>1 month, ongoing</p>
<p>Logistics</p>	<p>Injuries sustained while on duty (e.g.</p>	<p>Health and safety precautions is strictly</p>	<p>Evidence of incidence</p>	<p>1</p>	<p>Tourism Manager</p>	<p>Ongoing</p>

Lodging and housekeeping	minor burns in the kitchen, spills in the eyes while handling different products, falling, injuries from captive cheetahs, injuries from game drives)	adhered to while on duty and interacting with guests a) Protective clothing is mandatory while at work b) Protocols on how to interact with animals is followed.	events on record All staff concerned are using the required protective gear.			
Kitchen and meals						
Tourism activities						
Garden and local integration						

14.5 Avoid disturbance to wildlife

Goal: Protection of species, conservation of the environment.

CCF is concerned about the loss of prey due to poaching since this affect habitat suitability. Lack of prey escalates human wildlife conflict, illegal use of wildlife is non-sustainable.

Table 8. List of impacts to wildlife and mitigation measures

	Impact /potential risk description	Mitigation measure	Indicators	Priority (1-3; low – High)	Responsible person	Deadline
Tourism activities Lodging Tourism staff	Loss of wildlife due to poaching	No guests or lodge employees are allowed to collect any wildlife or kill without approval from the management. This is a criminal offence and is liable for prosecution. Guests are not allowed to bring weapons or firearms at the lodges without informing the management.	Evidence of the number of poaching events linked to tourism staff and guests is on record. Evidence of compliance i.e. a list of staff and guests with weapons is kept.	2	Tourism Manager,	Ongoing
	Disturbances of sensitive	Approach animal sightings with care	Evidence of the number of roadkill, on the	3	Tourism Manager,	Ongoing

	habitat and animals	<p>especially on game drives</p> <p>Respect that animals have a right of way</p> <p>Enforce a specified speed limit while driving in the reserve 40km/h</p> <p>Provide basic training to tour guides on animal behavior and the ecology of the CCF farms</p>	<p>tourism roads is on record.</p> <p>Evidence of training given is kept on record</p>		Tour guides	
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Appendix 1. List of Mammal species found on CCF Farms

Kingdom: Animalia
Phylum: Chordata
Class: Mammalia

Order	Family	Subfamily	Scientific Name	Common name	Status
Artiodactyla	Bovidae	Antilopinae	<i>Madoqua damarensis</i>	Damara dik dik	LC
		Cephalophinae	<i>Sylvicapra grimmia</i>	Common Duiker	LC
		Bovinae	<i>Taurotragus oryx</i>	Eland	CD
		Hippotraginae	<i>Oryx gazella</i>	Gemsbok	LC
		Alcelaphinae	<i>Alcelaphus caema</i>	Red Hartebeest	CD
		Bovinae	<i>Tragelaphus strepsiceros</i>	Greater kudu	LC
		Antilopinae	<i>Antidorcas marsupialis</i>	Springbok	LC
		Antilopinae	<i>Raphicerus campestris</i>	Steenbok	LC
		Giraffidae	<i>Giraffe camelopardalis</i>	Giraffe	CD
		Suidae	<i>Phacochoerus africanus</i>	Warthog	LC
Carnivora	Canidae	Caninae	<i>Otocyon megalotis</i>	Bat-eared Fox	LC
			<i>Vulpes chama</i>	Cape fox	LC
			<i>Canis mesomelas</i>	Black - backed jackal	LC
			<i>Caracal caracal</i>	Caracal	LC
	Felidae	Felinae	<i>Acynonyx jubatus</i>	Cheetah	V
			<i>Panthera pardus</i>	Leopard	V
			<i>Leptailurus serval</i>	Serval	LC
			<i>Felis lybica</i>	African wild cat	LC
		Protelinae	<i>Proteles cristatus</i>	Aardwolf	LC
	Hyaenidae	Hyaeninae	<i>Parahyaena brunnea</i>	Brown hyena	NT
			<i>Crocuta crocuta</i>	Spotted hyena	LC

	Mustelidae	Mellivorinae	<i>Mellivora capensis</i>	Honeybadger	LC
		Mustelinae	<i>Ictonyx striatus</i>	Striped polecat	LC
	Viverriidae	Hespetinae	<i>Geneta maculata</i>	Small Spotted genet	DD
		Hespetinae	<i>Mungos mungo</i>	Banded mongoose	LC
		Hespetinae	<i>Galerella sanguineus</i>	Slender mongoose	LC
		Hespetinae	<i>Cynictis penicilata</i>	Yellow mongoose	LC
Lagomorpha	Leporidae		<i>Lepus saxatilis</i>	Cape scrub hare	LC
			<i>Equus burchelli</i>	Burchel Zebra	CD
Perissodactyla	Equidae		<i>Equus Zebra</i>	Mountain Zebra	VU
Perissodactyla	Rhinocerotidae		<i>Diceros bicornis</i>	Black rhino	CE
Pholidota	Manidae		<i>Manis temminckii</i>	Savanna pangolin	V
Primate	Cercopithecidae		<i>Papio ursinus</i>	Chachma baboon	LC
	Losiridae		<i>Galago moholi</i>	Southern African bush baby	LC
	Hystriidae		<i>Hystriis afriaeaustralis</i>	Southern African porcupine	LC
Rodentia	Pedetidae		<i>Pedetes capensis</i>	Spring hare	LC
	Sciuridae		<i>Xerus inaurus</i>	Cape ground squirell	LC
Tubulidentata	Orycteropidae		<i>Orycteropus afer</i>	Aardvark	LC
Order	Family	Subfamily	Scientific Name	Common name	Status
Rodentia	Cricetidae	Cricetomyinae	<i>Saccostomus capenstris</i>	Pouched mouse	LC
		Dendromurinae	<i>Steatomys pratensis</i>	Fat mouse	LC
		Dendromurinae	<i>Malacothrix typica</i>	Large eared mouse	LC
		Gerbillinae	<i>Tatera leucogaster</i>	Bushveld gerbil	LC
		Gerbillinae	<i>Tatera brantsii</i>	Highveld gerbil	LC
		Gerbillinae	<i>Gerbillurus paeba</i>	Pygmi hairy footed gerbil	LC
		Gerbillinae	<i>Desmodillus auricularis</i>	Short tailed gerbil	LC
		Gliridae	<i>Graphiurus parvus</i>	Lesser Savanna dormouse	LC

			<i>Graphiurus platyops</i>	Rock doormouse	LC
			<i>Graphiurus murinus</i>	Woodland dormouse	LC
		Murinae	<i>Thallomys nigricauda.</i>	Black tailed tree rat	LC
			<i>Mus inditus,</i>	Desert pygmy mouse	LC
			<i>Mus musculus</i>	House mouse	A
			<i>Aesthoms namaquensis</i>	Namaqua rock mouse	DD
	Muridae		<i>Aethomys chrysophilus</i>	Red veld rat	LC
			<i>Mus setzeri</i>	Setzer's pygmy mouse	LC
			<i>Lemniscomys rosalia,</i>	Single striped mouse	LC
			<i>Rhabdomys pumilio</i>	Striped mouse	LC
			<i>zelotomys woosnami</i>	Woosnam Desert rat	LC
Insectivora	Macroscelididae	Macrocelidinae	<i>Elephantulus intuffi</i>	Bushveld elephant shrew	LC
	Soricidae		<i>Crocidura hiirta</i>	White toothed shrew	LC

Conservation status key

Alien	A
Conservation dependent	CD
Data deficient	DD
Least concern	LC
Secure	S
V	Vulnerable

Appendix 2. List of avian species found on CCF farms.

Type	Common name (English)	Scientific name	Status
Babbler	Pied	<i>Turdoides bicolor</i>	
Barbet	Acacia pied	<i>Tricholeama leucomelas</i>	LC
	Black collared (need conformation)	<i>Lybius torquatus</i>	LC
Batis	Pririt	<i>Batis pirit</i>	LC
Bee - eater	Swallowtailed	<i>Merops hirundineus</i>	LC
	European	<i>Merops apiaster</i>	LC
Boshop	Yellow-crowned	<i>Euplectes afer</i>	LC
Bittern	Dwarf	<i>Ixobrychus sturmii</i>	LC
Brubru	Brubru	<i>Nilaus afer</i>	LC
Bulbul	African red eyed	<i>Pycnonotus nigricans</i>	LC
	Cinnamon -breasted (rock)	<i>Emberiza tahapisi</i>	LC
Bunting	Goldenbreasted	<i>Emberiza flaviventris</i>	LC
	Larklike	<i>Emberiza impetuani</i>	LC
Bustard	Black korhaan	<i>Eupodotis melanogaster</i>	LC
	White winged	<i>Eupodotis afraoides</i>	LC
	Kori	<i>Ardeotis kori</i>	NT
	Redcrested	<i>Eupodotis ruficrista</i>	LC
Buttonquail	Kurricane	<i>Turnix sylvaticus</i>	LC

Buzzard	Steppe	<i>Buteo buteo</i>	LC
Canary	Blackthroated	<i>Serinus astrogularis</i>	LC
	Yellow	<i>Serinus flaviventris</i>	LC
Chat	Ant eating	<i>Myrmecocichla formicivora</i>	LC
	Familiar	<i>Cercomela familiaris</i>	LC
Cisticola	Rattling	<i>Cisticola chiniana</i>	LC
	Desert	<i>Cisticola aridulus</i>	LC
	Tinkling	<i>Cisticola rufilata</i>	LC
Coot	Redknobbed	<i>Fulica cristata</i>	LC
Cormorant	Great cormorant (White breasted)	<i>Phalacrocorax carbo</i>	LC
	Bronzewinged	<i>Rhinoptilus chalcopterus</i>	LC
Courser	Doublebanded	<i>Rhinoptilus africanus</i>	LC
	Temminck's	<i>Cursorius temminckii</i>	LC
Crombec	Long billed	<i>Sylvietta rufescens</i>	LC
Cuckoo	African	<i>Cuculus gularis</i>	LC
	Black	<i>Cuculus clamosus</i>	LC
	Diederik	<i>Chrysococcyx caprius</i>	LC
	European	<i>Cuculus canorus</i>	LC
	Great spotted	<i>Clamator glandarius</i>	LC
	Jacobin	<i>Clamator jacobinus</i>	LC
	Klass's	<i>Chrysococcyx klass</i>	LC
Dabchick	Dabchick	<i>Tachybaptus ruficollis</i>	LC
Dikkop	Spotted (thick-knee)	<i>Burhinus capensis</i>	LC
Dove	Cape Turtle	<i>Streptopelia capicola</i>	LC
	Laughing	<i>Streptopelia senegalensis</i>	LC
	Namaqua	<i>Olea capensis</i>	LC
Drongo	Forktailed	<i>Dicrurus adsimilis</i>	LC
Duck	Knobbilled	<i>Sarckidiornis melanotos</i>	LC
	Maccoa	<i>Oxyura maccoa</i>	NT
	Whitefaced	<i>Dendrocygna viduata</i>	LC

Eagle	Martial	<i>Polemaetus bellicosus</i>	Endangered
	Brown snake	<i>Circaetus cinereus</i>	LC
	African hawk	<i>Hieraaetus spilogaster</i>	LC
	Bateleur	<i>Terathopius ecaudatus</i>	Endangered
	Verreaux's	<i>Aquila verreauxii</i>	LC
	Blackbreasted snake	<i>Circaetus gallicus</i>	LC
	Tawny	<i>Aquila rapax</i>	VU
	Wahlberg's	<i>Aquila wahlbergi</i>	LC
Egret	Cattle	<i>Bubulcus ibis</i>	LC
	Little	<i>Egretta garzetta</i>	LC
Eremomela	Yellowbellied	<i>Eremomela icteropygialis</i>	LC
Falcon	Rednecked	<i>Falco chicquera</i>	LC
	Western red footed	<i>Falco vespertinus</i>	NT
	Pygmy	<i>Polihierax semitorquatus</i>	LC
Finch	Melba (green winged pitilia)	<i>Pytilia melba</i>	LC
	Red headed	<i>Amadina erythrocephala</i>	LC
	Scaly feathered	<i>Sporopipes squamifrons</i>	LC
Flamingo	Greater	<i>Phoenicoptera ruber</i>	LC
Finchlark	Greybacked	<i>Erempterix verticalis</i>	LC
Flycatcher	Marico	<i>Melaenornis mariquensis</i>	LC
	African Paradise	<i>Terpsiphone viridis</i>	LC
	Spotted	<i>Muscicapa striata</i>	LC
	Crested	<i>Francolinus sephaena</i>	LC
	Orange river	<i>Scleroptila levaillantoides</i>	LC
Francolin	Redbilled	<i>Francolinus adspersus</i>	LC
	Swainson's	<i>Francolinus swainsonii</i>	LC
Goose	Egyptian	<i>Alopochen aegytiaca</i>	LC
Goshawk	Gabar	<i>Micronisus gabar</i>	LC
	Pale Chanting	<i>Melierax canorus</i>	LC
Grebe	Blacknecked	<i>Podiceps nigricolis</i>	LC

Greenshank	Common	<i>Tringa nebularia</i>	LC
Guineafowl	Helmeted	<i>Nimida meleagris</i>	LC
Gymnogene	Gymnogene	<i>Polyboroides typus</i>	LC
Hamerkop	Hamerkop	<i>Scopus umbreta</i>	LC
Harrier	Pallid	<i>Circus macrourus</i>	LC
Heron	Blackheaded	<i>Ardea melanocephala</i>	LC
	Grey	<i>Ardea cinerea</i>	LC
Hobby	European	<i>Falco subbuteo</i>	LC
Honey guide	Lesser	<i>Indicator minor</i>	LC
Hoopoe	African	<i>Upupa epops</i>	LC
Hornbill	Yellowbilled	<i>Tockus flavirostris</i>	LC
	Bradfield's	<i>Tockus bradfieldi</i>	LC
	Grey	<i>Tockus nasutus</i>	LC
	Monteiro's	<i>Tockus monteiri</i>	LC
	Redbilled	<i>Tockus erythrorhynchus</i>	LC
	Damara	<i>Tockus damarensis</i>	LC
Kestrel	Rock	<i>Falco tinnunculus</i>	LC
	Lesser	<i>Falco naumani</i>	Vulnerable
Kingfisher	Woodland	<i>Halcyon senegalensis</i>	LC
Kite	Yellowbilled	<i>Milvus migrans parasitus</i>	LC
	Black	<i>Milvus migrans</i>	LC
	Blackshouldered	<i>Elanus caeruleus</i>	LC
Lourie	Grey	<i>Corythaixoides concolor</i>	LC
Lovebird	Rosefaced	<i>Agapornis roseicollis</i>	LC

Martin	Brownthroated (plain)	<i>Riparia paludicola</i>	LC
	House	<i>Hirundo foligula</i>	LC
	Rock	<i>Hirundo fuligula</i>	LC
Moorhen	Moorhen	<i>Gallinula chloropus</i>	LC
Mousebird	Red faced	<i>Urocolius indicus</i>	LC
	White backed	<i>Colius colius</i>	LC
nightjar	European	<i>Caprimulgus europaeus</i>	LC
	Freckled	<i>Camprimulgus tristigma</i>	LC
	Rufouscheeked	<i>Caprimulgus rufigena</i>	LC
Oriole	European golden	<i>Oriolus oroulus</i>	LC
Ostrich	Ostrich	<i>Struthio camelus</i>	LC
Owl	Spotted eagle	<i>Bubo africanus</i>	LC
	Whitefaced	<i>Otus leucotis</i>	LC
	African Scops	<i>Otus senegalensis</i>	LC
	Pearlspotted	<i>Glaucidium perlatus</i>	LC
	Barn	<i>Tyto alba</i>	LC
	Giant Eagle	<i>Bubo lacteus</i>	LC
Parrot	Ruppell's	<i>Poicephalus rueppellii</i>	LC
Pidgeon	Rock	<i>Columba livia</i>	LC
	Speckled	<i>Columba guinea</i>	LC
Pipit	African	<i>Anthus cinnamomeus</i>	LC

	Buffy	<i>Anthus vaalensis</i>	LC
Plover	Blacksmith	<i>Vanellus armatus</i>	LC
	Common ringed	<i>Charadius hiaticula</i>	LC
	Crowned lapwing	<i>Vanellus coronatus</i>	LC
	Three banded	<i>Charadrius tricollaris</i>	LC
Prinia	Blackcheded	<i>Prinia flavicans</i>	LC
Quail	Common	<i>Coturnix coturnix</i>	LC
	Harlequin	<i>Coturnix delegorguei</i>	LC
Quailfinch	African	<i>Ortygospiza atricollis</i>	LC
Quelea	Redbilled	<i>Quelea quelea</i>	LC
Robin	Kalahari	<i>Erythropygia paena</i>	LC
Roller	European	<i>Coracias garrulus</i>	LC
	Lilacbreasted	<i>Coracias caudata</i>	LC
	Purple	<i>Coracias spatulata</i>	LC
Ruff	Ruff	<i>Philomachus pugnax</i>	LC
Sandgrouse	Namaqua	<i>Pterocles namaqua</i>	LC
	Burchell	<i>Pterocles burcelli</i>	LC
	Double banded	<i>Pterocles bicinctus</i>	LC
Sandpiper	Common	<i>Actitis hypoleucos</i>	LC
	Marsh	<i>Tringa stagnatilis</i>	LC
	Wood	<i>Tringa glareola</i>	LC
Secretarybird	Secretarybird	<i>Sagittarius serpentarius</i>	Endangered

Shrike	Lesser grey	<i>Lanius minor</i>	LC
	Redbacked	<i>Lanius collurio</i>	LC
	Crimsonbreasted	<i>Lanius atrococcineus</i>	LC
Sparrow	Great	<i>Passer motitensis</i>	LC
Sparrow	Southern greyheaded	<i>Passer diffusus</i>	LC
Sparrow - weaver	Whitebrowed	<i>Plocepassar mahali</i>	LC
Spoonbill	African	<i>Platalea alba</i>	LC
Starling	Wattled	<i>Creatophora cinerea</i>	LC
	Violet-backed	<i>Cinnyricinclus leucogaster</i>	LC
	Burchell's glossy	<i>Lamprotornis australis</i>	LC
	Cape glossy	<i>Lamprotornis nitens</i>	LC
Stilt	Blackwinged	<i>Himantopus himantopus</i>	LC
Stint	Little	<i>Calidris minuta</i>	LC
Stork	Abdim's	<i>Ciconia abdimii</i>	LC
	White	<i>Ciconia ciconia</i>	LC
	Wooly-necked	<i>Ciconia episcopus</i>	LC
	Maribou	<i>Leptotilos crumeniferus</i>	LC
Sunbird	Dusky	<i>Nectarinia fusca</i>	LC
	Mariqua	<i>Cinnyris mariquensis</i>	LC
	White bellied	<i>Cinnyris talatala</i>	LC
Swallow	Greater Striped	<i>Hirundo cocullata</i>	LC
	Lesser Striped	<i>Hirundo abyssinica</i>	LC

	Redbreasted	<i>Hirundo semirufa</i>	LC
	European	<i>Hirundo rustica</i>	LC
	White throated	<i>Hirundo albigularis</i>	LC
Swifts	Alpine	<i>Tachymartia melba</i>	LC
	Bradfield's	<i>Apus bradfieldii</i>	LC
	European	<i>Apus apus</i>	LC
	Little	<i>Apus affinis</i>	LC
	Palm	<i>Cypsiurus parvus</i>	LC
	Whiterumped	<i>Apus caffer</i>	LC
Tchagra	Brown-crowned	<i>Tchagra australis</i>	LC
	Black-crowned	<i>Tchagra senegalus</i>	LC
Teal	Cape	<i>Anas capensis</i>	LC
	Redbilled	<i>Anas erythrorhynchos</i>	LC
Tern	Whitewinged	<i>Chlidonias leucopterus</i>	LC
	Whiskered	<i>Chlidonias hybrida</i>	LC
Thrush	Groundscraper	<i>Psophocichla litsitsirupa</i>	LC
	Short - toed rock	<i>Monticola brevipes</i>	LC
Tit	Ashy	<i>Parus cinerascens</i>	LC
Titbabbler	Chestnutvented	<i>Parisoma caeruleum</i>	
Vulture	Cape	<i>Gyps coprotheres</i>	V
	Lappedfaced	<i>Torgos tracheliotus</i>	Endangered
	Whitebacked	<i>Gyps africanus</i>	Critically endangered
Warbler	African Barred wren	<i>Cameroptera fasciola</i>	LC
	Bleating (green backed cameroptera)	<i>Eurypytila subcinnamomea</i>	LC

	Willow	<i>Philoscopus trochilus</i>	LC
Waxbill	Black-cheeked	<i>Estrilda erythronotos</i>	LC
	Blue breasted cordonbleu	<i>Uraeginthus angolensis</i>	LC
	Common grenadier	<i>Uraeginthus granatinus</i>	LC
Weaver	Redbilled Buffalo	<i>Bubalornis niger</i>	LC
	Sociable	<i>Philetairus socius</i>	LC
	Southern masked (Lesser masked)	<i>Ploceus velatus</i>	LC
	Chestnut (Tanzanian masked-weaver)	<i>Ploceus rubiginosus</i>	LC
Whydah	Long tailed paradise (Eastern Paradise)	<i>Vidua paradisea</i>	LC
	Queen (Shaft - tailed)	<i>Vidua regia</i>	LC
Woodhoopoe	Red-billed	<i>Phoeniculus purpureus</i>	LC
	Common Scimitar-bill (schimitar bill)	<i>phoeniculus cyanomelas</i>	LC
Woodpecker	Bearded	<i>Thripias namaquus</i>	LC
	Cardinal	<i>Dendropicos fuscencens</i>	LC
	Golden tailed	<i>Campethera abingoni</i>	LC

Status Key

Endangered

E

Least concern

LC

Near threatened

NT

V

Vulnerable

Appendix 3. List of reptile species found on CCF farms.

Species	Common Name	Status
<i>Geochelone pardalis</i>	Leopard tortoise	LC
<i>Psammobates occuliferus</i>	Namaqualand Tent Tortoise	V
<i>Pachydactylus punctatus</i>	Speckled Gecko	LC
<i>Pachydactylus capensis</i>	Cape Gecko	LC
<i>Pachydactylus bibronii</i>	Bibron's gecko	
<i>Lygodactylus bradfieldii</i>	Namibian dwarf gecko	LC
<i>Pachydactylus waterbergensis</i>	Waterberg Gecko	DD
<i>Agama aculeata</i>	Common ground agama	LC
<i>Chameleo dilepsis</i>	Flat-neck Chameleon	LC
<i>Lygosoma sundevallii</i>	Common writhing skink	LC
<i>Mabuya striata</i>	Striped skink	LC
<i>Mabuya varia</i>	Variable skink	LC
<i>Heliobolus lugubris</i>	Bushveld Lizard	LC
<i>Ichnotropis capensis</i>	Cape rough-scaled lizard	LC
<i>Ichnotropis squamulosa</i>	Common rough scaled lizard	LC
<i>Gerrhosaurus auritus</i>	Kalahari plated lizard	LC
<i>Varanus albigularis</i>	Veld leguaan (monitor)	CD
<i>Zygaspis quadrifrons</i>	Kalahari round-headed worm lizard	LC
<i>Monopeltis ancietae</i>	Angolan spade-snouted worm Lizard	LC
<i>Monopeltis capensis</i>	Cape Spade -snouted worm lizard	
<i>Dendroapsis polylepsis</i>	Black mamba	LC
<i>Naja nivea</i>	Cape Cobra	LC
<i>Naja anchietae</i>	Angolan Cobra	LC
<i>Naja Mozambica</i>	Mozambican spitting Cobra	LC
<i>Bitis arietans</i>	Puff adder	LC
<i>Bitis caudalis</i>	Horned adder	LC

<i>Python natalensis</i>	Southern African python	CD
<i>Lamprophis fuliginosus</i>	Brown house snake	LC
<i>Philothamnus semivariegatus</i>	Spotted bush snake	LC
<i>Dasypeltis scabra</i>	Rhombic egg eater	LC
<i>Dispholidus typus</i>	Boomslang	LC

Status Key

Alien	A
Conservation dependent	CD
Data deficient	DD
Least concern	LC
Secure	S
V	Vulnerable

Appendix 4. List of common amphibian species found on CCF farms.

Order	Family	Scientific Name	Common	Status	Habitat
Anura	Pipidae	<i>Xenopus laevis</i>	Common Platana	Least concern	Aquatic
	Microhydae	<i>Phrynomantis bifasciatus</i>	Banded rubber frog	Least concern	Semi aquatic on water banks
	Brevicipitidae	<i>Breviceps adsperus</i>	Bushveld rain Frog	Least concern	Economic plots, wet season 2008
	Hyperoliidae	<i>Kassina senegalensis</i>	Bubbling Kassina	Least concern	Semi aquatic on Water banks
	Pyxicephalidae	<i>Phxicephalus adspersus</i>	Giant Bullfrog	Least concern	Water bodies during wet season
	Pyxicephalidae	<i>Cacosternum Boettgeri</i>	Boettger's froglet	Least concern	Semi aquatic on water banks
	Pyxicephalidae	<i>Tomopterna cryptotis</i>	Cryptic Sand Frog	Least concern	Anywhere during wet season
	Bufonidae	<i>Bufo (Amietophrynus) poweri</i>	Western Olive (power's) Toad	Least concern	Anywhere during wet season
	Bufonidae	<i>Bufo (Poyntonophrynus) poweri</i>	Pygmy Toad	Least concern	Anywhere during wet season

Appendix 5. List of Plant species found on CCF farms.

Common name	Scientific name	Status
Warm-cure albizia	<i>Albizia anthelmintica</i>	F
Shepherds tree	<i>Boscia albitrunca</i>	F
Brandy bush	<i>Grevia flava</i>	
Flame acacia	<i>Acacia ataxacantha</i>	
Camel thorn	<i>Vachellia erioloba</i>	F
Blue thorn	<i>Senegalia erubescens</i>	
Blade thorn	<i>Senegalia cinerea</i>	
Candle pod acacia	<i>Vachellia hebeclada</i>	
Mountain thorn	<i>Vachellia hereroensis</i>	
	<i>Vachellia luederitziae</i>	
Black thorn	<i>Senegalia mellifera subsp. Detinens</i>	
False umbrella thorn	<i>Vachellia reficience</i>	
Umbrella thorn	<i>Vachellia tortilis</i>	
	<i>Aloe littoralis</i>	NC CII
Zebra aloe	<i>Aloe zebrine</i>	P
White bauhinia	<i>Bauhinia petersiana</i>	
Smelly shepherd's tree	<i>Boscia foetida</i>	P
Trumpet thorn	<i>Catophractes alexandri</i>	
Kudu bush	<i>Combretum apiculatum</i>	
Bushwillow	<i>Combretum collinum</i>	
Lead wood	<i>Combretum imberbe</i>	P
Sand commiphora	<i>Commiphora angolensis</i>	P
Brandy bush	<i>Grevia flava</i>	
Common commiphora	<i>Commiphora pyracanthioides</i>	
Lavender bush	<i>Croton gratissimus subsp. Gratissimus</i>	

Sickle bush	<i>Dichrostachys cinerea subsp. Africana</i>	
	<i>Ehretia rigida</i>	
Rough-leaved raisin	<i>Grevia flavescens</i>	
	<i>Lyceum eeni</i>	
Kalahari apple-leaf	<i>Philenoptera nelsii</i>	F
Bead maerua	<i>Maerua schinzii</i>	F
	<i>Maerua juncea</i>	
Common resin tree	<i>Ozoroa paniculosa</i>	P
Stink bush	<i>Pechuel loeschea – leubnitziae</i>	
African wattle	<i>Peltophorum africanum</i>	F
	<i>Phaeoptilum spinosum</i>	
Karee	<i>Rhus lancea</i>	F
Bitter karee	<i>Rhus marlothii</i>	
	<i>Rhus volky</i>	E
Yellow rhizozum	<i>Rhygosum brevispinosum</i>	
Camphor bush	<i>Tarconanthus camphorates</i>	P
Purple pod terminalia	<i>Terminalia prunioides</i>	
Silver terminalia	<i>Terminalia sericea</i>	P
Blue green sour plum	<i>Ximenia Americana</i>	
Buffalo thorn	<i>Ziziphus mucronata</i>	F
	<i>Pseudogaltonia clavata</i>	
	<i>Mundulea sericea</i>	
Tumble weed	<i>Acrotome inflata</i>	
Pig weed	<i>Amaranthus sp.</i>	
Wild asparagus	<i>Asparagus sp.</i>	
Tsama/ melon	<i>Citrullus lanatus</i>	
Wild cucumber	<i>Coccinea sessilifolia</i>	
	<i>Corchorus asplenifolius</i>	

Flame lily	<i>Gloriosa superba</i>
	<i>Tribulis terrestris</i>
	<i>Solanum delagoense</i>
Gemsbok bean	<i>Tylosema esculentum</i>
	<i>Blepharis diversispina</i>
(Forb)	<i>Cyperus fulgens</i>
	<i>Cyperus fulgens</i>
	<i>Ledebouria spp.</i>
Wild sesame	<i>Sesamum triphyllum</i>
Elephant's ear	<i>Abutilon angulatum</i>

Status key:

Protected=P

CITIES= CI(Convention on International Trade in Endangered Species of Fauna and Flora) appendix 1

CITIES=CII (Convention on International Trade in Endangered Species of Fauna and Flora) appendix 2

E=Endemic (plants believed only to occur within the political boundaries of Namibia)

F= Protected in Namibia under the Preservation of Trees and Forests Ordinance of 1952 and the proclamation of SWA Administration, No.486 in 1972)

NC= Protected in Namibia under the Nature Conservation Ordinance of 1975 and 247 of 1977

NE= near endemic, plants that occur largely only within the political boundaries of Namibia or just beyond