Mushara
LODGE

ENVIRONMENTAL MANAGEMENT PLAN

April 2021

Application for Environmental Clearance

by Mushara Lodge CC

for Mushara Lodge

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INFORMATION SHEET

PROJECT

Application for Environmental Clearance: Mushara Lodge

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TABLE OF CONTENTS

TABLE OF FIGURES

LIST OF TABLES

ABBREVIATIONS

Abbreviations used in this report are listed here.

EC	Environmental Clearance
ECC	Environmental Clearance Certificate
EMP	Environmental Management Plan
MEFT	Ministry of Environment, Forestry and Tourism
Mushara	Mushara Lodge CC, the business
The lodge	Mushara Lodge, the infrastructure and activities

1 INTRODUCTION

This document contains a project description and Environmental Management Plan for an existing safari lodge in the low impact/high income market. The lodge was built before 2012, the year when the Environmental Management Act, 2007 came into effect.

1.1 Background

Mushara Lodge CC owns and manages three lodges on the privately owned farm Kleinbegin in the Oshikoto Region: Mushara Lodge, Mushara Outpost and Mushara Bushcamp. Mushara Lodge (the lodge) opened in 1998 and is aimed at a target market of international tourists who require luxury accommodation while visiting the east side of Etosha National Park. Pricing is in the high-income range.

Kleinbegin farm is dedicated to conservation, and eco-tourism is the only commercial activity that takes place on the game-fenced property.

1.2 Scope of this report

The Environmental Assessment Practitioner (EAP) visited the site for three days (24 – 28 March 2021, during which the owner provided information and a guided tour of the facilities.

Google Earth Pro was used to study the geographic context of the site. Information gathered during the site visit, meetings with the owner and lodge manager, as well as in follow-up communication with the owner was used to compile the current report.

This report contains a description of the lodge infrastructure and activities, followed by an EMP in table format. The EMP table includes an evaluation of factors that could potentially have a negative impact on the environment, as well as management actions that aim to prevent or mitigate each potential impact.

2 PROJECT DESCRIPTION

2.1 Location

The 2,500 ha farm Kleinbegin is located 80 km northwest of Tsumeb and 8 km east of the Von Lindequist gate of Etosha National Park with access from the C38 road (Figure 1).

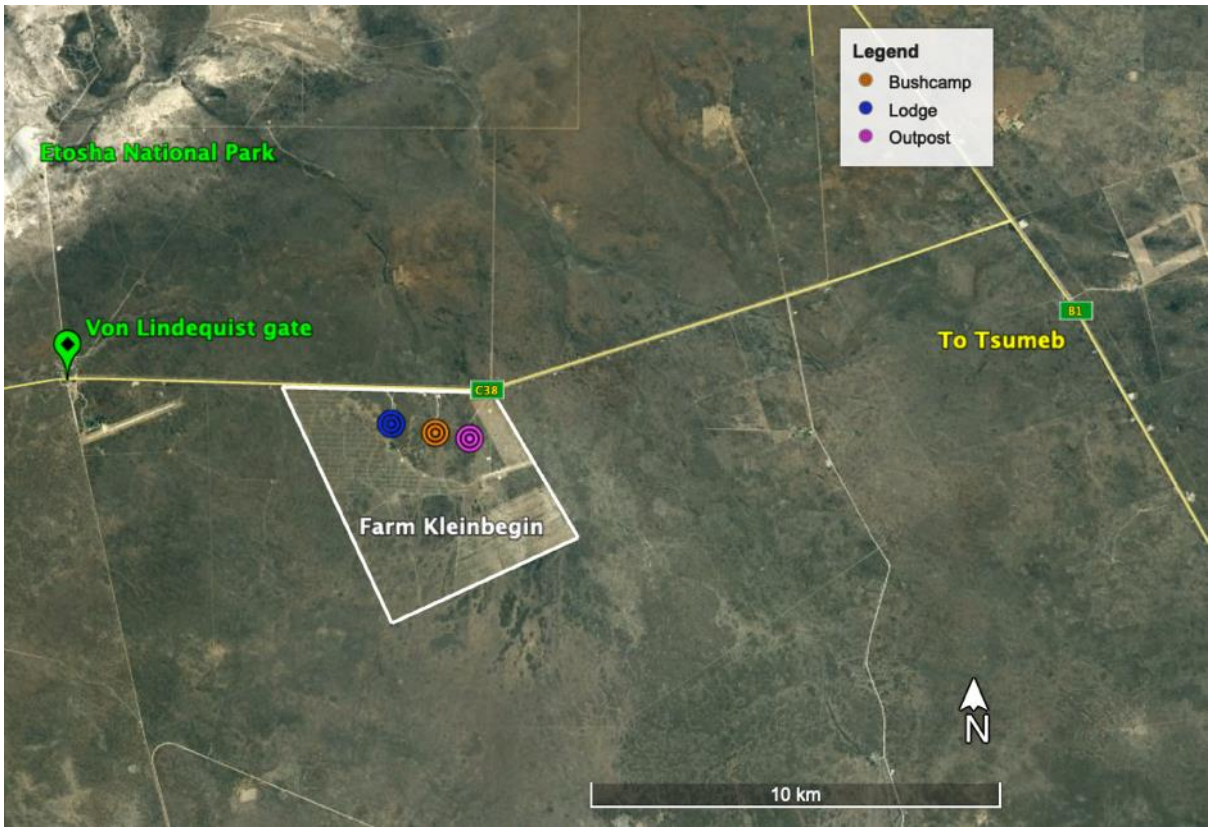

Figure 1. Location of the farm Kleinbegin in the Oshikoto Region.

2.2 Activities

The following activities are offered by and operated from the lodge.

- Accommodation and meals
- Game drives into Etosha
- Sunset drives on the farm. Offered only in the dry season when the limited road network on the farm is navigable.

The farm is surrounded by game fencing and contains general savanna game such as zebra, giraffe, eland, kudu, oryx, red hartebeest, impala, dik-dik and grey duiker. Lions may occasionally move through the property from neighbouring farms and leopards are present but seldom seen.

2.3 Infrastructure

Total footprint of the lodge and its support structures is approximately 5 ha. The layout of infrastructure is given on a Google Earth map in Figure 2.

Figure 2. Layout of Mushara Lodge.

1 Staff village
2 Workshop and 4 solar panels
3 Game drive complex (rented out)
4 Management accommodation
5 Parking x8
6 Parking x6
7 Water tanks
8 Laundry and canteen
9 Storage shed
10 Main building
11 Family house (2 bedrooms)
12 Guest parking
13 Guest rooms (ten separate, free-standing units)
14, 15 Villa 1 and 2
16 Guest room complex (six rooms under one roof)

2.3.1 Main area and kitchen

The 950 m² main area (#10 in Figure 2) is a thatched, plastered brick structure with a concrete floor and contains all the guest common areas as well as the kitchen and its storerooms (Figure 3).

The guest areas comprise a lounge, bar, library, curio shop, dining area, two restrooms and two sets of offices (Figure 5 and Figure 6). There is also an open-air dining terrace with a slasto paved floor (Figure 4), and a swimming pool surrounded by lawn (Figure 7).

The kitchen is part of the same building as the guest main area and consists of the kitchen, 2 pantries, a cold room, a freezer room and two storerooms. Its walls are brick and plaster, and the floor is a tiled concrete slab.

Figure 3. The thatched main area.

Figure 4. Paved terrace.

Figure 5. Inside the main area: bar and lounge.

Figure 6. Library and curio shop in the main area.

Figure 7. Swimming pool.

2.3.2 Guest rooms

Mushara Lodge can accommodate a total of 36 guests. Although the accommodation structures vary in size and layout, they all have plastered brick walls, set on concrete slabs and have thatched roofs. All rooms are air-conditioned.

- Ten free-standing rooms with thatched roofs, each consisting of a double bedroom, bathroom and veranda (Figure 8 and #13 in Figure 2).
- One self-contained family house of 228 m² with two en suite bedrooms, a dining room, kitchen and lounge (Figure 9 and #11 in Figure 2).
- Two luxurious villas of 148 m² each. Each villa consists of a lounge/dining area, bedroom, bathroom, patio, outside shower and plunge pool (Figure 10 and #11 in Figure 2).
- A 222 m² guest room complex with one triple and two single rooms, plus three single rooms for paying guides. All these rooms are en suite (Figure 11 and #16 in Figure 2).

Pathways are paved with interlock bricks and clearly demarcated. All foot traffic at the lodge, both staff and guests, is confined to these raised pathways (Figure 12).

Figure 8. A free-standing guest room.

Figure 9. The two-bedroom family house.

Figure 10. A villa with its own plunge pool.

Figure 11. The guest room complex with six rooms.

Figure 12. Paved pathways to carry foot traffic.

2.3.3 Staff accommodation

The staff village is approximately 100 m from the lodge and accommodates 35 staff members in separate blocks (#1 in Figure 2). Each block consists of a veranda, laundry basin, two bedrooms and a bathroom with shower, toilet and basin (Figure 13).

There are 4 en suite bedrooms for senior staff (chefs and guides) (Figure 14).

Management staff are housed in 5 units, each with a bedroom, bathroom, lounge and kitchen.

Pathways to and inside the staff village are clearly demarcated, bordered by stones and covered in gravel (Figure 15).

No cooking is done in the staff village. Staff meals are prepared in the lodge kitchen and served in the canteen next to the laundry (#8 in Figure 2).

Figure 13. A staff village block with two bedrooms, a bathroom and veranda.

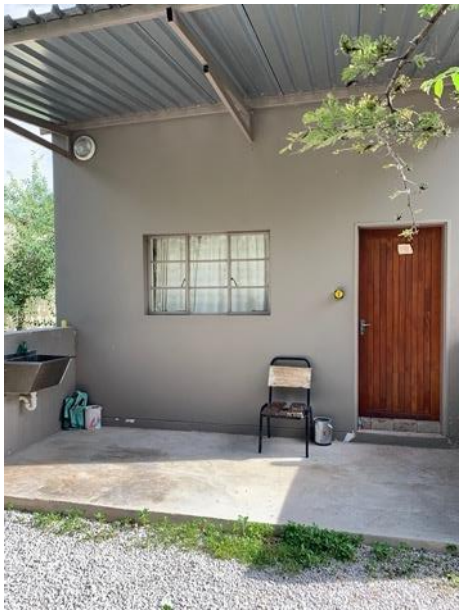

Figure 14. En suite bedroom for senior staff.

Figure 15. Gravel pathways in the staff village.

2.3.4 Lodge support infrastructure

Laundry

Next to the kitchen is a 180 m² plastered brick building with concrete floor housing the laundry (Figure 16) and staff canteen (Figure 17 and #8 in Figure 2).

The lodge has a dedicated staff chef who prepares their meals in the lodge kitchen. Staff meals are served in a canteen next to the laundry room.

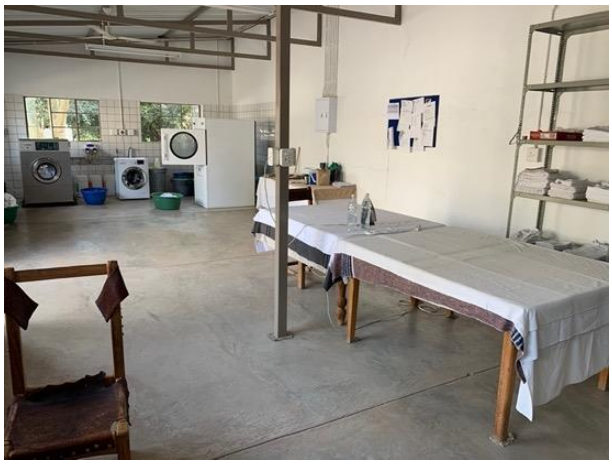

Figure 16. Laundry.

Figure 17. Staff canteen

Storage shed

A 326 m² building of plastered brick with a concrete floor and IBR roof (#9 in Figure 2). The shed is divided into separate storage areas:

- Housekeeping (Figure 21)
- Pool cleaning materials
- Fuel. 2 x 5,000 litre tanks mounted on steel frames on a sealed concrete floor. Mushara Bushcamp and Outpost also bring their vehicles here to be refuelled (Figure 19).
- Basic maintenance equipment (Figure 20)
- Workshop for general lodge maintenance
- Generator (discussed in Section 2.4.4)
- 5 parking bays (Figure 18)

Figure 18. Paved floor in the storage shed.

Figure 19. Fuel tanks and the door to the generator room.

Figure 20. Well-lit and ventilated maintenance storeroom in the shed.

Figure 21. Laundry store inside the shed.

Workshop

Vehicles are taken to Tsumeb for servicing (every 10,000 km) and repairs. The workshop behind the lodge is used for basic maintenance such as cleaning and tyre changes. The chances of a significant oil spill are close to zero because no oil changing, servicing, repairs or specialist maintenance work is done on the property.

The workshop shed comprises 81 m² and has plastered brick walls, a concrete floor and corrugated iron roof (Figure 22 and Figure 23).

Figure 22. Workshop for basic vehicle maintenance.

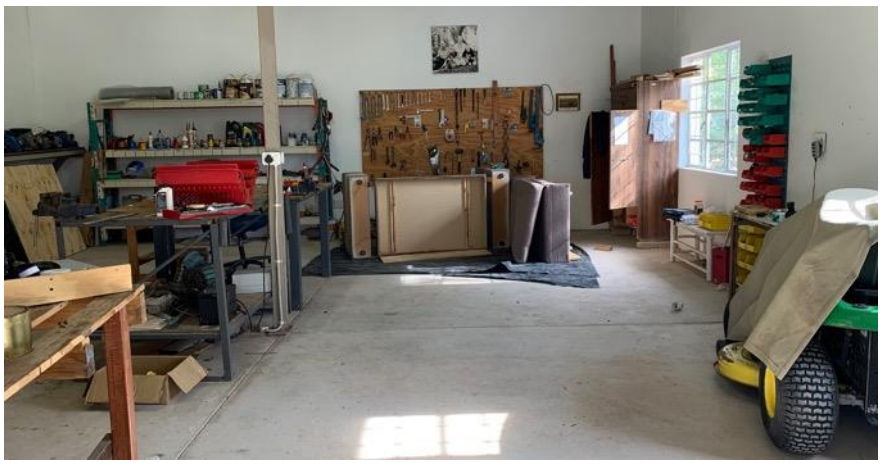

Figure 23. Inside the workshop.

Vehicle parking

- Guest vehicles are parked on gravel at the lodge entrance (Figure 24).
- Lodge vehicles are parked on a gravel surface in a 175 m² carport consisting of a steel frame covered with IBR sheeting. There are 12 parking bays in the carport and it is located at the back of house next to the storage shed (Figure 25).
- Lodge game drive vehicles are parked in a steel and concrete structure covered with IBR sheeting. This structure has 6 parking bays (Figure 26).

The car wash is under shadecloth on a concrete surface (Figure 27).

Figure 24. Paved entrance road with gravel parking bays on both sides for guest cars.

Figure 25. Carport with 12 parking bays.

Figure 26. Structure with 6 parking bays.

Figure 27. The car wash area with sloping floor and drainage ditch.

Airstrip

Approximately 2 km from the lodge is an airstrip that services Mushara Lodge, Bushcamp and Outpost. It is 1.3 km long, 30 m wide and has a turnaround and run-up pad at both ends (Figure 28).

There is an Afgas storage shed that is kept locked, a toilet, water tank and shaded waiting area (Figure 29 and Figure 30).

Figure 28. The airstrip.

Figure 29. Afgas shed. Toilet and water tank are visible on the left.

Figure 30. Shaded waiting area with gravel floor.

2.3.5 Game drive complex

A complex comprising 3 accommodation units and a shed for 20 vehicles is rented out in its entirety to *Etosha Game Viewers*, a business that does game drives inside Etosha National Park. This business is separate and independent from Mushara Lodge CC and its clients are pre-booked groups that do not come onto the farm. The only connection between *Etosha Game Viewers* and Mushara is the rent of the premises.

The structures are relevant to this report because they are located inside the lodge footprint and are serviced by the water, electricity and sewerage systems of the lodge. However, the activities (game drives) take place off-site and are not relevant to this report.

An open-sided steel frame, covered with IBR sheeting and with a gravel surface, houses a variety of vehicles converted for game drives (Figure 31), as well as a workshop for vehicle maintenance (Figure 32).

Three accommodation units, built of stone and plastered brick with concrete floors and IBR roof sheets, house 8 people (Figure 33):

- 3 bedrooms, 2 bathrooms, kitchen, lounge/dining, covered veranda, 2 storerooms.
- 1 bedroom, bathroom, kitchen/lounge.
- 3 bedrooms, 1 bathroom.

Figure 31. Shed for 20 converted vehicles in the game drive complex.

Figure 32. The shed also contains a space with tools for vehicle maintenance.

Figure 33. Vehicle shed and a stone house in the game drive complex.

2.4 Services

2.4.1 Water supply and reticulation

The water table on the farm is shallow at 12 m and boreholes reach to a depth of 30 m. From 2 boreholes located at the lodge, water is pumped 50 m to 6 storage tanks of 10,000 litres each on a concrete surface (Figure 34). Booster pumps take the water from the tanks to points of use. All water pumps are electric.

A large-scale descaling system removes excess lime from the water before it enters the reticulation system.

Figure 34. Six water tanks.

2.4.2 Wastewater and sewage

There are 17 independent sewerage systems for treating sewage and wastewater at the lodge. Each system consists of sealed, concrete, 3-chamber French drains with a capacity of 40 m³. The contents of the last chamber are pumped out regularly to drain into the ground near the drains (Figure 37).

All the wastewater from showers, basins, kitchen and laundry goes into the sewerage system. Swimming pool backwash water drains into the soil.

The French drains are located as follows:

- Guest rooms - 8 (Figure 38)
- Laundry and kitchen - 1 (Figure 35)
- Staff village - 6 (Figure 36 and Figure 37)
- Game drive complex - 2

A fat trap is installed at the kitchen drain to prevent fatty substances from entering the sewerage system (Figure 39).

Figure 35. French drain for kitchen, laundry and car wash.

Figure 36. The staff village sewage drains into two systems.

Figure 37. The staff village sewerage systems drain to a fenced in soak-away.

Figure 38. One of eight French drains servicing the guest rooms.

Figure 39. Fat trap at the kitchen drain outlet.

2.4.3 Solid waste

All solid waste is disposed of on the farm. There is no recycling depot in Tsumeb, and Mushara considers the Tsumeb landfill not suitable for the safe and efficient disposal of waste, saying it is not wind-proof and there is no fence, resulting in waste flying outside the perimeter of the landfill. In addition, people, domestic and wild animals have free access to the rubbish, creating a health and safety hazard.

Refuse is separated into bins at source (Figure 40 and Figure 41). From the bins, rubbish goes directly to one of three disposal sites: the incinerator, the farm landfill or the "animal restaurant".

- Plastic, paper and everything flammable is burnt in an incinerator at the lodge. This is done twice daily (or more if needed), eliminating the need for temporary waste storage cages.
- Glass and tins go to the farm landfill.
- Vegetable waste from the kitchen is used either for compost in the garden or taken to a secluded spot on the farm for consumption by wild animals.

The incinerator (next to #6 in Figure 2) is enclosed by a 1.8 m high wall with a secure sliding door and is inaccessible to mammals (Figure 42). The risk of fly-blown rubbish is eliminated by standard operating procedure: flammable waste is brought to the incinerator in closed bins; from the bins it goes directly into the incinerator and the door is then shut. The fire is never left unsupervised. No waste is stored in the incinerator enclosure: whatever is brought here, is burnt immediately. The ash is taken to the farm landfill every day.

Figure 40. Rubbish bins in the kitchen have lids and are clearly marked.

Figure 41. Bins marked for organic waste: coffee grounds and vegetable refuse.

Figure 42. The incinerator, secured by high walls and a sliding gate.

The farm landfill is surrounded by a 2.2 m high fence (Figure 43). One a year when road maintenance is done, the rubbish is bulldozed into a compact heap on one side of the landfill. There are no fly-away items or rubbish being blown by the wind because only heavy materials are dumped here (metal, glass and rubber) (Figure 44).

Figure 43. Gate to the fenced in farm landfill.

Figure 44. The landfill for solid materials such as glass, rubber and metal.

2.4.4 Energy

Nampower (Cenored) grid is the source of electricity. Solar panels produce 60 kW/day, amounting to 70% of the energy requirements of the lodge, a limit currently set by Nampower (Figure 45).

Energy generated by the solar panels is used directly by the lodge and the surplus goes into the grid, eliminating the need for batteries.

A back-up generator of 175 KVA is turned on when the grid power is out. The generator is housed in a plastered brick room with sound-proof sealing and air ducts for ventilation and cooling. It is mounted on an impermeable concrete floor.

Cooking is done with gas. This includes staff meals, which are prepared in the lodge kitchen by a dedicated staff chef (Figure 46).

Figure 45. Four solar panels feed into the grid.

Figure 46. Gas is used for cooking.

2.4.5 Roads and tracks

There is a limited track network on the farm, since 99% of activities consist of drives into Etosha National Park. Access to the lodge is on a 1.3 km constructed limestone gravel road with camber and drainage ditches (Figure 47). Once a year a professional road maintenance contractor is hired to grade the road, and repair and maintain speed bumps and culverts.

Water seeps away relatively quickly in this flat landscape with its lime soils, and there is seldom standing water in the roads. In the rainy season when the ground is wet, only the main access roads are used. No sundowner drives on the farm are offered in the wet season either. These protocols limit erosion and damage to roads and tracks.

Figure 47. The access roads are gravelled and professionally maintained by contractors.

2.5 Design and landscaping

Buildings were designed to blend in with the natural landscape by using thatch, stones sourced on the farm, and painting the units in natural colours.

Apart from lawns around the main area, the natural vegetation has been retained (Figure 48). Interlock paved pathways help conserve the indigenous vegetation by ensuring that staff and guests have an easy walk. In the back-of-house area and the staff village, well-maintained and demarcated gravel pathways perform the same function.

Figure 48. Lawns surround the main area.

3 ENVIRONMENTAL MANAGEMENT PLAN

Environmental aspects associated with a lodge include:

- Soils, land capability and land use
- Topography
- Biodiversity
- Groundwater resources
- Visual environment
- Sewage and waste water management
- Energy efficiency
- Machinery/vehicles on site
- General environmental issues

3.1 Aims

The Environmental Management Plan (EMP) has three main aims:

- identify possible impacts associated with the project
- propose measures to prevent or mitigate negative impacts, and enhance positive impacts
- detail the actions required to carry out the proposed mitigation measures

The EMP demonstrates the commitment of Mushara to follow current best practices for sustainable tourism, and it forms an environmental contract between Mushara and the Government of the Republic of Namibia in its capacity as guardian of the country's natural resources.

The EMP is a living document that will be updated as new information, policies, authority guidelines and technologies develop.

3.2 Table headings

This section explains the table headings used in the EMP tables.

Nature of impact

Description of potential risk sources (impacting activities) and the mechanisms through which an impact may occur are described.

Mitigation

Mitigation measures are proposed for each identified impact. These measures take the form of specific management actions that aim to avoid, minimise or remedy negative impacts, together with adjustments to respond to unforeseen impacts.

Responsibility

Successful implementation of an EMP relies on defined roles and responsibilities. Mushara has allocated duties to individuals and teams (Table 1), and they are responsible for carrying out the management actions listed in the column *Mitigation*.

Table 1. Responsible individuals and teams.

Person/Team	Responsibilities
Owner	Overall responsibility for implementation of EMP. Support to lodge staff for implementation of environmental management measures.
Maintenance team (Maint)	Maintenance of buildings, vehicles, machinery, sewerage and solid waste systems.
Lodge Manager (Mgr)	Overall management of lodge. Supervision of maintenance team, guides and other lodge staff.
Guides	Transport of guests. Ensuring appropriate human-wildlife interactions.

3.3 The EMP

3.3.1 Construction

Since the lodge is already in operation, the construction phase refers to potential future expansion or upgrade activities.

The owner will inform all contractors in writing about the requirements of this EMP and of the management measures that the contractor will be expected to carry out.
Once construction starts, the owner will inspect the site daily to ensure that the contractor implements all the management measures.
A final inspection will be done upon completion of the lodge to monitor that the contractor has satisfied all the requirements set out in this EMP.

NATURE OF IMPACT	MITIGATION	RESPONSIBILITY
Soil		
Compaction of and damage to soils	Motorised access will be limited to existing tracks and defined development areas. As far as possible, no new roads or tracks should be developed within the camp area.	Owner & Contractor
	Prevent the compaction of soil or destruction of protective vegetation through the restriction of heavy vehicle movements.	Owner & Contractor
Soil erosion	No construction or activities within areas containing highly erodible dispersed, fine-particle, sodic etc. soils	Owner & Contractor
	Prevent water runoff from concentrating unnaturally in any one area.	Contractor
	Any water pipes shall be installed in such a way as to minimise the chance of erosion.	Contractor
Soil contamination	The mixing and use of concrete and cement must take place in designated areas so as not to contaminate the site in any way.	Contractor
	All hydrocarbons and chemicals must be stored, handled and dispensed so as not to contaminate the site in any way.	Contractor
	Any spillage must be contained and cleaned up with 24hrs of occurrence. The resulting waste must be sealed and disposed of properly.	Owner & Contractor
Soil resources and land capability	The boundaries of construction sites that extend beyond already impacted areas must be clearly demarcated. Where construction will take place within or close to sensitive features, these should be demarcated.	Owner & Contractor
	No construction activities are to take place outside of the defined infrastructure footprint areas.	Contractor
	Quarries/borrow pits may be dug only with formal permission.	Owner
	Quarries/borrow pits may be dug only where indicated by the owner, and in such a way as specified by him.	Owner
	The movement of construction crew must be within the demarcated site boundaries at all times.	Owner & Contractor
	An area must be chosen and demarcated for stockpiling construction material and mixing. This area must be located in a previously transformed or disturbed place.	Owner & Contractor

NATURE OF IMPACT	MITIGATION	RESPONSIBILITY
	Access routes from the stockpiling areas to the building sites should be demarcated and their use must be enforced. Existing roads should be used for these purposes.	Owner & Contractor
	Sand and rocks used for construction must be from defined and already impacted areas. These sites must be identified and approved by the owner.	Owner & Contractor
	Once construction work is completed, all excess material must be removed and the site suitably rehabilitated.	Contractor
	The use of graders should be strictly controlled because they gouge roads below the level of the surrounding surface.	Owner & Contractor
Topography		
Significant alterations to the shape of the landscape	Site levelling and landscaping takes place only where required by the designs.	Owner & Contractor
	Construction site office and facilities to be dismantled and removed once construction is completed	Contractor
Animals		
Death of amphibians, reptiles, birds	Avoid any sites with nests, burrows, dens etc. of protected species.	Owner & Contractor
Habitat destruction	See under SOIL	Owner & Contractor
Poaching, especially tortoises and small mammals	The greater area around building sites should be searched for snares during the construction phase and after construction is complete.	Owner & Contractor
	Restriction of contractor staff movement	Owner & Contractor
	Inspection of contractor staff housing	Owner & Contractor
Vegetation		
Damage to/removal of protected species	Continuous monitoring to ensure that no protected species are impacted.	Owner
Damage to vegetation	Motorised access should be limited to existing tracks and defined development areas. As far as possible, no new roads or tracks should be developed within this area.	All
	The clearance of or damage to trees and shrubs beyond the development footprint must be prevented.	All
	As many trees and shrubs as possible should be retained within the development area.	All
	All mature trees and shrubs remain.	All
	Ensure that only permitted access roads and paths are used by construction workers and vehicles at all times.	All
	No firewood may be collected.	All
Spread of invasive vegetation	No alien invasive or plants that do not occur locally will be planted.	All
	Introduced construction materials must be free from seedlings and seeds of invasive vegetation.	Contractor
Landscape disturbance from construction activities	Upon closure of construction, site must be rehabilitated using only indigenous vegetation.	Contractor
Hydrology		

NATURE OF IMPACT	MITIGATION	RESPONSIBILITY
Groundwater contamination	No construction activities may take place within 1:100 year flood line of any watercourse, or within 50m of a spring.	All
Surface water contamination	The mixing and use of concrete and cement must take place in designated areas only.	Owner & Contractor
	All hydrocarbons and chemicals must be stored, handled and dispensed so as not to contaminate the site in any way.	Contractor
Negative visual impact		
Vehicle tracks	As far as possible, no new roads or tracks should be made. Construction vehicles should use existing roads and tracks.	Contractor
Construction structures and facilities	The site office and facilities are dismantled and removed upon completion of construction.	Contractor
Solid waste, sewage and waste water discharge		
Ecological damage from solid waste	Littering is not permitted and all waste must be placed in marked bins with lids.	All
	The contractor will provide an animal proof receptacle to contain daily refuse until it is transported to the farm landfill.	Owner & Contractor
	Hydrocarbons, used oils and workshop waste are stored in sealed receptacles and dispatched to an appropriate waste facility.	Owner & Contractor
Ecological damage from sewage and waste water discharge	Fat traps are installed at kitchen outlets.	Owner & Contractor
	Adequate temporary ablutions are provided for workers.	Contractor
	Ablutions are regularly serviced and the sewage disposed of at a suitable designated location and in an environmentally appropriate manner.	Contractor
Unpleasant odours	Regular maintenance of sewerage system.	Owner & Contractor
	Should unpleasant odours be identified, the source of the odours must be identified and remedied within 1 week.	Contractor
Machinery & vehicles		
Noise pollution	Efficient, modern, silenced generator only.	Contractor
Contamination of soil and water by hydrocarbons	The contractor will ensure that all equipment is in good working order and serviced regularly.	Owner & Contractor
	Drip trays are placed under any leak.	Owner & Contractor
	Vehicles and machinery with fuel, oil or hydraulic fluid leaks must be removed from service and repaired.	Contractor
	No servicing or major vehicle/machinery repair may take place on site.	Contractor
Damage to roads and tracks	All vehicles remain on designated roads at all times. No off road driving is allowed.	All
	All vehicles are operated with low tyre-pressure to minimise negative impacts on tracks and roads.	All
Construction staff damage local environment		
Disruption of ecological processes through physical acts and/or pollution	The contractor and his employees shall adhere to rules and regulations prescribed by the relevant authority, as well as to the management measures presented in this document.	Contractor

NATURE OF IMPACT	MITIGATION	RESPONSIBILITY
	The contractor will ensure the proper supervision of employees at all times and their compliance with rules and regulations.	Contractor
	All employees will be educated to the need to refrain from the destruction of plants and animals, as well as from indiscriminate defecation, waste disposal and pollution of soil and water resources.	Contractor
	Access to the site is restricted to contractor's employees only.	Contractor
Bush fires: destruction of habitat and death of animals		
Outbreak of fire	Train all employees how to prevent fires, how to fight fires, where the firefighting equipment is, and how to use this equipment.	Owner & Contractor
	Gas canisters are housed in Bureau of Standards approved structures.	Owner & Contractor
Fire in construction area spreads to bush	Fire extinguishers strategically located throughout construction area.	Owner & Contractor
	Bush firefighting equipment is placed with easy access and all employees know where this is.	Owner & Contractor

3.3.2 **Operations**

NATURE OF IMPACT	MITIGATION	RESPONSIBILITY
BIODIVERSITY		
Impacts associated with human-wildlife interaction	Guests and employees are made aware that they are in a sensitive environment, and are taught the appropriate way to interact with wildlife.	Manager
Damage to animal habitats and to plants	No harvesting of plants or collection of firewood is permitted. No plants or animals may be disturbed, violated, destroyed or removed.	All
	Employees are educated to refrain from the destruction of plants and animals, indiscriminate defecation, waste disposal and pollution of soil and water.	Owner, mgr
Protected animal species are affected by operational activities.	Avoid nests, burrows, dens etc. of protected species.	All
Poaching by staff, contractors or neighbouring communities	The greater area around the lodge should be regularly searched for snares.	Mgr, Maint
Protected plant species are affected by operational activities.	No protected, rare or endangered plants are disturbed, damaged or removed.	All
Damage to plants	Only permitted access roads and paths are used by employees, guest and vehicles at all times.	All
	No off-road driving is allowed.	All
Spread of invasive vegetation	The area is kept free of invasive vegetation.	All
SOLID WASTE		
Large volumes of rubbish are generated	Minimise waste by buying supplies in bulk and using re-usable packaging.	Owner, mgr
	Minimise water bottle waste by promoting local tap water and providing re-usable water bottles to guests.	Owner, mgr
Waste management	Appropriate waste bins are provided at the point of source. All waste bins are covered and secured to be wind and animal proof.	Mgr
	No waste is buried in depressions, drainage lines or omurambas.	Mgr, Maint
	Burnable waste goes from the bins directly to the incinerator twice daily. Metal, glass and rubber is taken from the bins to the farm landfill at least once a day.	Mgr, Maint
	Incinerator enlosure is kept free of materials that can be wind-blown. Incinerator is maintained. Burning is always supervised.	Mgr, Maint

NATURE OF IMPACT	MITIGATION	RESPONSIBILITY
	Organic waste is composted or burnt.	Mgr, Maint
Hydrocarbons cause soil and groundwater contamination	Used hydrocarbons are collected at point of use and stored in sealed containers.	Mgr, Maint
	Used hydrocarbons are despatched to an appropriate waste facility.	Mgr, Maint
ENERGY		
Excessive use of fossil fuels	Energy use (electricity, diesel, gas) is metered and monitored. Readings are compared with target usage to ensure optimum efficiency.	Mgr
	Generator is used as back-up only.	Mgr
	A 60 kW/day solar system generates 70% of the energy requirements of the operation.	
	Gas stoves are used for cooking.	Mgr
	All electrical appliances are energy-efficient models. Fridge and freezer doors seal tightly and are kept closed.	Mgr
Generator noise disturbs the natural quiet	Generator is housed in noise-limiting container; use generator only as back-up; use generator only during daylight or for limited hours.	Mgr
Firewood collection affects ecosystems and denudes the landscape	Firewood is collected from de-bushing sites. Fires are made for ambience and braai only. Guest and staff cooking is done on gas stoves in the kitchen.	Mgr
WATER CONSUMPTION AND RETICULATION		
Loss of water through leaks in reticulation system	Maintenance programme for pipes and tanks is in place. Leaks and faults are repaired immediately upon detection.	Mgr, Maint
Water conservation measures	Water conservation is actively promoted among guests and staff. Guests are informed of water scarcity and encouraged to participate in water conservation.	All
	Water usage is measured and recorded, then compared with targets to ensure optimum efficiency.	Mgr
SEWAGE AND WASTEWATER		
Contamination of soil, as well as surface water and groundwater, due to sewage and waste water discharge	Sewerage system is monitored and maintained.	Mgr, Maint
	All point source discharges from the French drain systems are further than 100m from any waterway, drainage line or borehole.	Owner

NATURE OF IMPACT	MITIGATION	RESPONSIBILITY
	Bio-degradable cleaning chemicals are used to preserve bacteria in the septic system	Mgr
Ecological impacts	Fat traps at kitchen outlets are maintained.	Mgr, Maint
	Septic tanks and soak-aways are maintained.	Mgr, Maint
Unpleasant odours	Qualitative monitoring of odours.	All
	The source of unpleasant odours are identified and remedied within 1 week of identification.	Mgr, Maint
VEHICLE USAGE		
Erosion of roads and tracks	Regular maintenance of roads and tracks.	Owner, Maint
	Culverts are made to disperse concentrated water flow.	Owner, Maint
Damage to roads and tracks	Low tyre pressure on all operational vehicles.	Mgr, Guides
	Operational vehicles are 4-wheel drive and of standard width.	Owner
Off-road driving causes compaction of and damage to soil	No off-road driving is allowed. Only permitted access roads and paths are used by employees, guests and vehicles.	All
	Making tracks next to a road is not allowed. Taking shortcuts is not allowed.	Mgr, Guides
	New roads and tracks have to be authorised and are developed according to the road plan.	Owner
	Vehicles are parked only in designated parking areas.	Mgr
Exhaust emissions cause air pollution	Vehicles are serviced regularly and monitored for excessive exhaust emissions.	Mgr, Guides
Driving in pans, depressions, rivers, omurambas and other drainages disrupts surface water hydrology	No off road driving is allowed on the farm.	All
Driving over flooded or moist areas disrupts surface water hydrology	No driving in seasonally inundated areas when flooded or moist.	All
OPERATIONAL ACTIVITIES		
Toiletries and cleaning chemicals cause contamination of the soil, as well as surface and ground water	Kitchen and housekeeping soaps and detergents are biodegradable and eco-friendly.	Mgr
	Biodegradable guest amenities are provided.	Owner
Vehicle parking, servicing and other workshop activities cause soil and groundwater contamination	Vehicles are serviced and repaired off-site.	

NATURE OF IMPACT	MITIGATION	RESPONSIBILITY
Fuel storage and refuelling procedures cause soil and groundwater contamination	Fuel is stored in mounted, sealed tanks on an impervious surface in storage shed.	Mgr, Guides, Maint
	Fuel is dispensed over impervious surface in storage shed.	Mgr, Guides, Maint
Machinery use disturbs the natural quiet	Graders, tractors and power tools are used during daylight only.	Owner, Mgr
Contamination of soil by herbicides and pesticides	Used according to manufacturer's specifications. Care is taken to avoid spills and unnecessary contact with soil, water, vegetation and animals. Decanting is done over a drip tray to prevent spillage and further than 40 m of any natural water source.	Mgr, Maint
Contamination of soil by paint, thinners, varnish, turpentine, detergents, etc.	These substances are stored in sealed, clearly marked containers and only in designated store rooms. Care is taken to avoid spills and unnecessary contact with soil, water, vegetation and animals. Decanting is done over a drip tray to prevent spillage and further than 40 m of any natural water source.	Mgr, Maint
DESIGN AND LANDSCAPING		
Buildings intrude upon the landscape and sense of place.	Infrastructure is designed to blend with the surrounding landscape.	Owner
Light pollution at night	Subdued lighting is used. Lights are directional and angled downwards.	Owner, Mgr
Towers, raised tanks, telecomms and other support infrastructure have negative visual impacts	Building and maintenance structures and equipment are out of sight of the public	Owner, Mgr
HEALTH AND SAFETY		
Labour policies	The company is in compliance with all national legislation and regulations governing workplace equity and diversity.	Owner, Mgr
Staff and guest health and safety	The company is in compliance with all national legislation and regulations governing health and safety measures.	Owner, Mgr
	Protective clothing, as appropriate to operations, is provided to employees.	Mgr
	Adequate first aid kits are available and regularly maintained. A suitable number of employees are trained in first aid.	Mgr
	On-site staff housing is secure, clean, and provided with water, sanitation and energy.	Owner, Mgr
	Employees and guests are made aware of procedures to follow in the event of an emergency, e.g. which person to contact, how to contact him/her during the night, evacuation routes.	Mgr

NATURE OF IMPACT	MITIGATION	RESPONSIBILITY
	Employees responsible for guest transport have valid licences and public driving permits.	Mgr
Fire	All precautions are taken to prevent the outbreak and spread of fires. Employees are trained and aware of these precautions.	Owner, Mgr
	Firefighting equipment is available and regularly maintained. Employees are trained how to use this equipment.	Owner, Mgr
	Fire hydrants, water pumps and their pipelines are maintained.	Owner, Mgr
	Gas canisters are stored in Bureau of Standards approved structures.	Owner, Mgr

3.3.3 Closure

There is no intention to cease operations or decommission Mushara Lodge. Since tourism is a non-consumptive activity with an indefinite projected lifespan; and since the land, immovable assets and business are privately owned and the owners have a vested interest in the success of the operation, there is currently no decommissioning plan.

However, should closure and decommissioning be required, an extensive decommissioning plan will be drawn up and meticulously followed according to the highest standards of environmental management best practices. The priority for closure will be to return the land as closely as possible to the pre-construction condition. Measures will be taken to prevent soil erosion and provide protection for colonising vegetation. A site assessment will be carried out after closure to ensure that no structures remain, and that site rehabilitation has been fully achieved.

Rehabilitation and Closure Objectives

There are four primary closure objectives.

1. Protect public health and safety, as well as health and safety of fauna and flora.
2. Alleviate or eliminate environmental damage.
3. Return the site to its original, pre-development condition.
4. If possible, ensure that social and economic benefits resulting from the project are sustainable after closure.

4 MONITORING

Compliance with the EMP (Section 3.3) is monitored regularly. Key aspects to monitor are given in Table 2, but the lodge manager and owner may add to these and may delegate specific tasks as required by the lodge operations.

Table 2. Monitoring schedule

Component to monitor	Measurable aspect	Frequency of monitoring	Responsibility
Groundwater quality	Fitness for human consumption; fitness for livestock consumption	Annually	Owner
Groundwater supply	Level of water in boreholes	Monthly	Manager
Sewage breakdown system	Septic tanks: level, draining of overflow	Daily	Manager
Sewerage pipes	Leaks	Daily	Manager
Grey water pipes	Leaks. Efficient drainage.	Daily	Manager
Fat traps	Functioning equipment	Weekly	Manager
	Empty when full	Daily	Manager
Water installations	Functioning of descaling equipment	Weekly	Manager
Solid waste	Secure storage of solid waste	Daily	Manager
Roads	Erosion	Daily	Manager, Guides
Grid electricity	Nampower records: usage per bednight *	Monthly	Manager
Diesel	Fuelling records (at storage tanks)	Daily. Monthly summary	Manager
Gas	Usage	Monthly summary	Manager
Gas pipes and fittings	Wear and tear, leaks	Daily	
Vehicles	Oil leaks, emissions, tyres	Daily	Manager, Guides

* Bednights include everyone using lodge resources: guests, staff, managers, scientists, contractors

Water monitoring protocol

- Surface water

Point source discharge is monitored monthly for surface water accumulation. This is unlikely as all sewage water and waste water collect in sealed, three-chambered septic tanks. Point source water discharges are underground, except for discharge from the third chamber which is on the surface.

Considering the shallow water table (12 metres), it is essential to prevent groundwater contamination through percolation by ensuring that septic tanks are sealed and leak-free.

- Groundwater

Groundwater levels in the boreholes are monitored weekly to ensure availability of water.

Groundwater quality is monitored annually at a point of use (tap in the kitchen or bathroom) to analyse for fitness for human consumption, seeing as staff drink borehole water and guests are encouraged to drink it. Groundwater samples are also taken from the boreholes that are used for abstraction in order to monitor contamination from all lodge discharges, both point source and non-point source.

5 CONCLUSION

This Environmental Management Plan describes the management measures that are implemented with the aim of preventing or mitigating negative environmental impacts and enhancing positive impacts that the lodge activities may have. It is a legal document that commits Mushara Lodge CC to comply with all the management measures, monitoring programmes and other plans as presented in this document. The EMP will be implemented throughout the lifecycle of the lodge, including operation and decommissioning.

The EMP is intended as a practical, working protocol to be used in accordance with the principles of adaptive management. As new information, technologies and methods become available, the management measures set out in this document may be adjusted to conform with current best practice guidelines, while staying within the economic means of the business.