

ENVIRONMENTAL MANAGEMENT PLAN
FOR THE PROPOSED CHARCOAL HARVESTING AND
CONSTRUCTION OF A CHARCOAL PRODUCTION PLANT AT M'BELA
NO.201 FARM ET AL., OKAHANDJA DISTRICT, OTJOZONDJUPA
REGION, NAMIBIA



ENVIRONMENTAL MANAGEMENT PLAN

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6.1 INTRODUCTION

As stated in the preceding chapter, the projected charcoal production project will have environmental consequences. This section describes the Environmental Management Plan (EMP) for impacts associated with the proposed development. The EMP stipulates the management of environmental programs in a systematic, planned and documented manner. The Environmental Management Plan (EMP) outlines the organizational structure, planning, and monitoring for environmental protection at the anticipated project area and adjacent locations where it has effect. The aim is to ensure that the proponent maintains adequate control over the project operations to:

- To prevent negative impacts where possible;
- Reduce or minimise the extent of impact during project life cycle;
- Prevent long term environmental degradation.

6.2 EMP ADMINISTRATION

There is a strong need to clearly outline the roles and responsibilities of all stakeholders to ensure that the EMP is fully implemented. There is also a need for the proponent to appoint an overall responsible person (project manager) to ensure the successful implementation of the EMP as highlighted below

Table 6-1: Roles and Responsibilities in EMP Implementation

ROLE	ENVIRONMENTAL RESPONSIBILITIES
Kudu Biomass	Responsible to enforce EMP implementation to contractors
Environmental Control Officer	Implement, review and update the EMP. <ul style="list-style-type: none"> • Ensure all reporting and monitoring required under EMP is undertaken, documented and distributed as needed • Conduct environmental site training (tool box talks) and inductions with the support of an environmental consultant. • Conducts environmental audit at work site with the support of environmental consultant. • Close out all non-conformances. • Ensure materials being used on site are environmental friendly and safe.
The Department of Environmental Affairs	Approve the EMP and any amendments to the EMP. <ul style="list-style-type: none"> • Approve reports of environmental issues and non-conformances as issued. • Review and approve environmental reports submitted as part of EMP implementation
Environmental Consultant	Conduct and monitor actions required by the EMP if required <ul style="list-style-type: none"> • Conduct environmental site training (tool box talks) and inductions if assistance is required • Conducts environmental audit at work site • Ensure materials being used on site are environmental friendly and safe.
Site Technical Team	Control and monitor actions required by the EMP. <ul style="list-style-type: none"> • Report all environmental issues to Environmental Control Officer. • Ensure documented procedures are followed and records kept on site.

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ROLE	ENVIRONMENTAL RESPONSIBILITIES
	<ul style="list-style-type: none"> • Ensure any complaints are passed onto the management within 24 hours of receiving the complaint.
Workers	<p>Follow requirements as directed by site technical.</p> <ul style="list-style-type: none"> • Report any potential environmental issues to site engineer/project manager, indicating spilt oil, excess waste, excessive dust generation, dirty water running off the site and other possible non-conformances

Table 6-2: Construction and Operation EMP (C&O EMP)

Impact	Description	Effects	Class	Time frame	Responsibility	Action	Phase
Noise pollution	Noise will be generated through: - Construction and establishment of project infrastructure e.g. access roads, retort carbonisers, etc - Operation of wood harvesting machinery - Moving vehicles.	- The health of working personnel could be disturbed. - Community residents could be disturbed by the noise. - General annoyance - Driving away of local animals species near the project site	Environmental	Throughout all the project phases	- Environmental Control Officer - Project Manger	- Workers will be issued earplugs to protect them from excessive noise. - Public will be notified through printed timetable stating planned construction/operational activities. - Site notices will be erected on, around the site- notifying visitors, and nearby residents of different hazards on site. - No go areas marked as sensitive environments, especially for birds needs to be avoided during construction and operation.	Construction & Operation

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Impact	Description	Effects	Class	Time frame	Responsibility	Action	Phase
Dust Generation	Dust will accumulate because of the land preparation, onsite movements of vehicles and machines, wind blowing on loose material	<ul style="list-style-type: none"> - Can lead to respiratory illnesses especially to those working in the area. - General air pollution. - Nuisance to nearby residents - The process can also drive away wild animals within the project area surroundings 	Environmental	Throughout the project operations	<ul style="list-style-type: none"> - Environmental Control Officer - Project Manger 	<ul style="list-style-type: none"> - Where necessary dust suppression will be done through watering dust sources surfaces. - Watering down dusty surfaces, - Ensure that protective equipment such as dust masks/respirators are distributed to employees, and ensure their use. - Site notices to be erected in and around the site to inform visitors and surrounding residents. 	Construction & Operation
Loss of Biodiversity	- Vegetative plants on site will be removed	- Damage/loss of range lands, large trees and any	Environmental	Throughout all the project phases	- Environmental Control Officer	- All the major trees will be preserved and the layout plan will fit into the environment without	Construction & operation

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Impact	Description	Effects	Class	Time frame	Responsibility	Action	Phase
	- Habitat destruction/alteration for both ground dwelling species and tree dwelling species.	<ul style="list-style-type: none"> protected trees species - Disturbance of sensitive plant habitats - The clearing of vegetation and over-harvesting will result in ecological imbalance and the breaking of the ecosystem processes in the area. - Loss of aesthetic value of the proposed project area. 			- Project Manger	<p>affecting the trees. The aim is bush thinning not entire vegetation clearance; the thinning exercise will leave a veld with a heterogeneous mix of trees and bush. In order to provide a variety of habitats this is to include different size classes of tree species (including a healthy number of encroacher species); and a spaced veld so that there is mixture of dense and spaced patches.</p> <ul style="list-style-type: none"> - With the exception of bush encroacher species, trees taller than 4m, or greater 	

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Impact	Description	Effects	Class	Time frame	Responsibility	Action	Phase
		<ul style="list-style-type: none"> - The ecosystem food chain on and around the area will be broken. 				<ul style="list-style-type: none"> - than 18cm diameter at the base are to be retained. - All protected species must not be removed must be clearly marked. - Cutting of bush/trees in sensitive areas is to be prohibited. Consideration is to be given to preservation of plant communities within 100m of wetlands, drainage areas or any other identified sensitive ecosystems. - Revegetation of disturbed areas is to take place. - Unnecessary vegetation clearance is to be avoided and existing tracks and 	

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Impact	Description	Effects	Class	Time frame	Responsibility	Action	Phase
						roads are to be utilised where possible. - During vegetation clearing avoid killing and/or hunting of animals.	
	Disturbance to wildlife and livestock	<ul style="list-style-type: none"> - Habitat destruction and/or alteration. - Disturbance of sensitive animals and birds - Loss of livestock or wildlife due to damaged fences and/or gates left open. - Possible poaching of wildlife and livestock 	Environmental	Throughout all the project phases	<ul style="list-style-type: none"> - Environmental Control Officer - Project Manger 	<ul style="list-style-type: none"> - Nesting sites for large birds are to be avoided. - Work personnel are to look out for sensitive fauna species such as slow moving animals like tortoises and pythons. - Fences and gates are to be regularly maintained and ensured that they not damaged in order to avoid their escape. - Prohibition of killing of livestock and wildlife. 	Construction & operation

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Impact	Description	Effects	Class	Time frame	Responsibility	Action	Phase
						- Training of employees on proper wood biomass harvesting techniques.	
Loss of soil fertility and soil erosion	Site establishment activities and bushing thinning activities -	- Loss of topsoil and soil disturbance - Destabilisation of river/drainage banks	Environmental	Throughout all the project phases	- Environmental Control Officer - Project Manger	- Bush cutting in steep slopes is to be avoided. Caution is to be taken in working on slopes within or greater the following range (5 – 12.5%) - Bush harvesting machinery is to be ensured that it will move along the slope contours rather than upwards and/or downwards. Caution is to be taken in conducting work activities in watercourses/wetlands/drainage areas.	Construction & operation

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Impact	Description	Effects	Class	Time frame	Responsibility	Action	Phase
Greenhouse gas emissions	Green House Gasses (GHGs) emissions and particular matter will be produced from emissions generated from retort carbonisers and vehicles/machinery.	<ul style="list-style-type: none"> - Air pollution - Global climate change 	Environmental	Throughout all the project phases	<ul style="list-style-type: none"> - Environmental Control Officer - Project Manger 	<ul style="list-style-type: none"> - Regular maintenance and improvement in the efficiency of the charcoal production process so that less gaseous emissions are produced. - Training of work personnel on environmentally friendly work practices 	Construction &Operation
Waste Generation	Construction and operation is associated with a lot of raw material and activities that results in pollution	<ul style="list-style-type: none"> - Chemical pollution from oil spills resulting from the handling of various machineries - Construction rubble, empty packaging containers/bags 	Environmental	Throughout all the project phases	<ul style="list-style-type: none"> - Environmental Control Officer - Project Manger 	<ul style="list-style-type: none"> - Where appropriate, the 4Rs of waste management (Reduce, Reuse, Recycle, Reclaim) e.g. ash may be redistributed in harvested areas, this allows nutrients to be returned to the soil - Where necessary ensure that all waste from construction activities is 	Construction &Operation

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Impact	Description	Effects	Class	Time frame	Responsibility	Action	Phase
		<p>and materials remnants.</p> <ul style="list-style-type: none"> - Workers can also pollute the surrounding environs if they are not provided with adequate toilet facilities and a waste management system for domestic waste. 				<p>stored and contained in designated containers and transported to Okahandja/Windhoek waste disposal site.</p> <ul style="list-style-type: none"> - Bulky waste such as building rubbles must be collected and disposed of for landfilling. - Hazardous waste storage bin will be on site and an independent hazardous waste transporting company will be contracted to collect hazardous waste storage bin whenever it is full. - Visual inspections monitoring 	

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Impact	Description	Effects	Class	Time frame	Responsibility	Action	Phase
						<ul style="list-style-type: none"> - All waste will be managed by proponent and the developer will ensure that domestic waste handling facilities such as labelled dustbins will be available. - Waste separation will be provided for to allow for recycling of recyclable materials i.e. glass, hazardous waste, paper, bio-degradable waste. 	
Hydrocarbons release into the environment	There will be no storage of oils and fuel on site, however there is risk of spillage of hydrocarbons from vehicles and machinery	<ul style="list-style-type: none"> - Washing away of contaminated soils by rains into nearby rivers - Pollution of soil and affecting small living organisms 	Environmental	Throughout all the project phases	<ul style="list-style-type: none"> - Environmental Control Officer - Project Manager 	<ul style="list-style-type: none"> - Implement a maintenance programme to ensure all vehicles, machinery and equipment are and remain in proper working order - Vehicle/machinery maintenance should be conducted in designated 	Construction & Operation

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Impact	Description	Effects	Class	Time frame	Responsibility	Action	Phase
	operations, maintenance through leakages and spillages which may result in environmental contamination	<p>habituating the soil</p> <ul style="list-style-type: none"> - Result in possible groundwater pollution. - Possible fire risk on and around the site 				<p>areas only, preferably off-site.</p> <ul style="list-style-type: none"> - If maintenance is to be conducted on site, these areas should be designed to contain spillages i.e. maintenance site must be bunded and paved and the use of chemicals must be controlled. - Waste oil, fuels and other chemicals from drip trays on stationery vehicles and machinery will be stored appropriately and disposed of as hazardous waste at a licensed facility by a specialist hazardous waste handler. 	

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Impact	Description	Effects	Class	Time frame	Responsibility	Action	Phase
						<ul style="list-style-type: none"> - Oil residue will be treated with oil absorbent material such as Drizit or bio-remediation and removed to an approved waste disposal site - Spill kits will be easily accessible and workers will be trained in the use thereof. - Staff and contractors will be trained in the handling and storage of oils, fuels, chemicals and other hazardous substances - No bins containing organic solvents such as paint and thinners shall be cleaned on site, unless containers 	

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Impact	Description	Effects	Class	Time frame	Responsibility	Action	Phase
						for liquid waste disposal are provided on site.	
Safety and Health risks	Construction and operation related Safety and Health hazards e.g. bites and/or stings from insects, scorpions, snakes; HIV/AIDS infection due to risky sexual behaviour;	<ul style="list-style-type: none"> - Ill-health and/or fatalities - Injuries to workers such as Occupational dermatitis, slips and fall of humans and objects, musculoskeletal disorders, etc. 	Health and safety	Throughout all the project phases	<ul style="list-style-type: none"> - Environmental Control Officer - Project Manager 	<ul style="list-style-type: none"> - Equip workers with Personal Protective Equipment (PPE), provide trainings on how to effectively use the PPE. - Provide for fully equipped first aid kits in all working areas which includes important items such anti-venom kits. - Ensure that housing and dwelling areas are kept clean, garbage stored and disposed safely in order to avoid attracting vermin and insects. - Provide platforms for briefings and meetings 	Construction and operation

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Impact	Description	Effects	Class	Time frame	Responsibility	Action	Phase
						about possible safety and health hazards in the work place - Provide site signs warning and informing about different hazards on site. - Provide free condoms as well as HIV/AIDS and sexually transmitted diseases awareness information to workers.	
	- Traffic accidents - Machinery accidents	Injury/fatalities	Health and safety	Throughout all the project phases	- Environmental Control Officer - Project Manager	- Ensure that vehicles and machinery are road worthy and properly maintained. - Machine operators are to know and comply with machine instruction manuals. - Drivers are to comply with all road safety regulations,	Construction and Operation

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Impact	Description	Effects	Class	Time frame	Responsibility	Action	Phase
						including wearing safety belts; avoiding overloading and speeding; etc. - Vehicles are to travel with lights switched-on along gravel roads. - Drivers are to be instructed in road safety and this is to be repeated periodically.	
Veld/bush fires	Fire outbreaks and veld/bush fires.	- Biodiversity loss. - Land degradation. - Air pollution. - Burns/fatalities. - Reduced grazing area for livestock and wildlife.	Environmental; Health and safety	Throughout all the project phases	- Environmental Control Officer - Project Manager	- Put in place a fire management programme. This should include fire outbreak prevention and response strategies. - Construction of fire guards. For example an area of at least 3 metres must be cleared of grass around the plant area.	Construction and Operation

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Impact	Description	Effects	Class	Time frame	Responsibility	Action	Phase
						<ul style="list-style-type: none"> - Combustible refuse maybe burnt in a drum and an area of 3 metres must be cleared of grass around such a drum. The drum may not be left unattended until the fire is extinguished and a lid has been placed on the drum. - Provide regular training for work employees on fire prevention and control, especially in the dry season. - No cigarette stubs, matches or any other burning object may be thrown into the veld/bush. 	

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Impact	Description	Effects	Class	Time frame	Responsibility	Action	Phase
Population Influx	The project will bring in skilled and unskilled workforce into the area from other places increasing population density in the area.	There is potential for cultural systems conflict between locals and new people in the area -Potential for rife prostitution and spread of HIV/AIDS and other STDs	Socio-economic	Construction and operation phase	Project Manger	<ul style="list-style-type: none"> - Train and brief employees to respect local cultures and leaders, - Engage on massive sexual health training and awareness and providing contraceptives such as condoms, as well as provide means counselling for those that are affected by HIV/AIDS and other STDs, 	Construction and Operation
Resources consumption	Water usage and consumption	The project can result in a strain on available water resources,	Socio-economic and environmental	Throughout all the project phases	<ul style="list-style-type: none"> - Environmental Control Officer - Project Manager 	- Minimise water wastage and inefficiencies	Construction and Operation
Powerlines and	Damage to infrastructure	Disturbance or damage to the	Socio-economic	Throughout all the	- Environmental	- Consultation with relevant authorities and	Construction and Operation

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Impact	Description	Effects	Class	Time frame	Responsibility	Action	Phase
telecommunication lines that run through the project site		power supply and telecommunication s		project phases	Control Officer - Project Manager	departments for best possible actions to take when working in areas close the power and telecommunications lines.	
Area of archaeological & cultural significance e.g. graves	Preservation of areas of archaeological & cultural significance	Destruction of areas or items of archaeological & cultural significance	Social	Throughout all the project phases	- Environmental Control Officer - Project Manager	- Raise awareness in the required cultural values with company employees and other business partners - Consult on action to take when archaeological and historic features of significance are identified	Construction and Operation
Positive Impacts							
Land use change	Improved ecosystem services as a result of bush control activities	Increased livestock production, groundwater recharge, biodiversity, etc	-Social -Terrestrial environment	Permanent	- Environmental Control Officer	Ensure proper planning and implementation of the bush control activities in order to ensure maximum benefits are	Construction and operation

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Impact	Description	Effects	Class	Time frame	Responsibility	Action	Phase
					- Project Manger	obtained from the project activities	
Employment creation	The development provides an opportunity of outsourcing work	Improves disposable income to those employed and their immediate families.	Socio-economic	Throughout all the project phases	Project Manger	Work with local leadership (councillor) on acquiring non-skilled labour from the residents.	Construction and operation
Business linkages	Raw materials acquiring and contracting companies provide an opportunity for businesses.	<ul style="list-style-type: none"> - Local suppliers will be presented with an opportunity to empower their businesses. - Construction workers can be provided with accommodation, food and services from the local community 	Socio-economic	Throughout all the project phases	Project Manger	- The proponent will outsource most of its materials and services.	Construction and operation

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Impact	Description	Effects	Class	Time frame	Responsibility	Action	Phase
		increasing business activities.					
Infrastructure development	The development presents a unique opportunity for infrastructure development in Northern Namibia area.	<ul style="list-style-type: none"> - Existing roads will be upgraded which will benefit the local community. - Development of the facilities will also pave way for future developers to grow interests in the area and result in ripple effects and quick growing of the area. 	Socio-economic	Throughout all the project phases	Project manager	Development such as road upgrading will not only be limited up until the project site, but it will be extended to service other the connecting roads when there is need.	Construction and operation

6.3 ENVIRONMENTAL MONITORING PLAN

Monitoring component is very important for identifying successfulness of mitigation measures formulated for the significant impacts identified. The monitoring works will identify impacts that have not been foreseen and give enough time to analyse the situation and formulate measures to minimise impact. Survey records and results must be maintained for these monitoring and inspections, highlighting any problems and the measures taken to address it. The table below shows the monitoring plan for the project.

An ECO should be contracted to conduct quarterly reports before the triennial renewal period.

Table 6-3: Environmental Monitoring Plan

Aspect	Responsibility	Indicator	Frequency	Activities
Soil erosion	- Environmental Control Officer - Project Manger	Gullies, siltation downstream, land degradation and other signs of erosion.	Frequently – especially during and after the rainy season. It is also important to be wary of erosion during windy periods.	Inspections and checks of vulnerable areas such as areas of high gradient and disturbed sites.
Vegetation	- Environmental Control Officer - Project Manger	- Correct level of harvesting, adequate numbers of trees and islands. - No protected trees are to be cut - Depletion of vegetation cover	Quarterly.	Inspect debushed areas for bush density; vegetation and undergrowth conditions; etc.
Biodiversity	- Environmental Control Officer - Project Manger	- Evidence of thriving, sick or dead wildlife, fauna and flora - No livestock or wildlife escape from the project site due to	Quarterly	Checking biodiversity state as well as remains of dead animals around the project sites.

Aspect	Responsibility	Indicator	Frequency	Activities
		damaged fences or gates left open by project staff.		
Surface and ground water contamination	- Environmental Control Officer - Project Manger	Pollution of water and effects on water users.	Quarterly.	- Check results for signs of pollution and where necessary collect water samples for analysis.
Air Monitoring	- Environmental Control Officer - Project Manger	- Fall of dust to vegetation, land and surface water pollution - Complaints about air pollution	Quarterly.	- Monitor air quality
Resource utilisation	- Environmental Control Officer - Project Manger	Water wastages and inefficiencies	Every two weeks	- Monitor usage of water
Waste Management	- Environmental Control Officer - Project Manger	- Housekeeping, - Implementation of the 4Rs of waste management before disposal	Every day	Adopt and implement the 4 Rs (Reduce, Reuse, Recycle, Rethink) of waste management.
Employee and Community Relations	Project Manager	- Level participation on the community area development projects - Land use suggestions	Every Quarter	- Hold feedback and consultative meetings about the project - Engage the community as per capabilities on livelihood requirements

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APPENDICES

Appendix A: Public Consultation Documents

1. Background Information Document
2. Newspaper Adverts
3. Site Notice
4. Meeting Attendance Register
5. Meeting Minutes
6. Questionnaires

Appendix B: Site Information

1. Land ownership
2. Locality Map
3. Site Layout Plan
4. List of Farms within the 30km radius

Appendix C: Consultancy Team resumes