

**PROPOSED CATTLE FEEDLOT IN THE
KAVANGO EAST REGION, KAYENGONA
TEYA DISTRICT, NAMIBIA**

**FINAL: ENVIRONMENTAL
MANAGEMENT PLAN (EMP)**



***FOR THE PROPOSED ESTABLISHMENT OF
AN CATTLE FEEDLOT IN THE KAVANGO
REGION, KAYENGONA TEYA AREA, NAMIBIA***

PROJECT DETAILS

TITLE: FINAL ENVIRONMENTAL MANAGEMENT PLAN FOR THE PROPOSED ESTABLISHMENT OF AN ANIMAL FEEDLOT IN THE KAVANGO EAST REGION, KAYENGONA TEYA AREA, NAMIBIA

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DECLARATION

I hereby declare that:

- a. I have the knowledge of and experience in conducting assessments, including knowledge of the Acts, regulations, and guidelines that are relevant to the proposed feedlot project.

- b. I have performed the work relating to the application in an objective manner, even if this results in views and findings that are not favorable to the applicant.

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REPORT/DOCUMENT CONTROL FORM

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ABBREVIATIONS AND ACRONYMS

CBNRM	Community Based Natural Resource Management
DEAF	Department of Environmental Affairs and Forestry
DoF	Directorate of Forestry
DWAF	Department of Water Affairs
DWSSC	Directorate of Water Supply and Sanitation Coordination
EA	Environmental Assessment
EIA	Environmental Impact Assessment
MEFT	Ministry of Environment, Forestry and Tourism
MAWLR	Ministry of Agriculture, Water and Land Reform
NACSO	Namibian Association of CBNRM Support Organisation
NGO	Non-Governmental Organisation
NNF	Namibia Nature Foundation
NRM	Natural Resource Management
PPE	Personal Protection Equipment

1. ENVIRONMENTAL MANAGEMENT PLAN

1.1. BACKGROUND

The proponent is proposing to establish a cattle feedlot in Kayengona Teya area, Kavango East Region.

An Environmental clearance certificate is required In line with the Environmental Management Act No.7 of 2007 and its Environmental Impact Assessment Regulation of 2012 for the proposed project to commence. An environmental assessment was carried out for the proposed project, to ensure the protection of the environment and community members found in that particular vicinity of the proposed project area. HJGeo-enviro Consulting and trading Cc was appointed to undertake an Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for the construction and operation phases of the proposed Cattle feedlot, in the Kayengona Teya area, Kavango East region, Namibia.

1.2. SUMMARY OF THE PROPOSED ACTIVITIES

The environmental issues related to feedlot establishment are mostly local and minimal. These issues include oil spillage, dust or air pollution, impact on biodiversity, and land disturbance, impact on water quality and also social-economic impacts. The feedlot operational processes and associated activities will include the receiving, feeding, fattening of cattle, healthily, to be sold for beef, as well as providing support to farmers.

1.3. WHAT IS AN EMP

An Environmental Management Plan (EMP) can be defined as *“an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the*

construction, operation and decommissioning of a project are prevented; and that the positive benefits of the projects are enhanced". EMPs are therefore important tools for ensuring that the management actions arising from Environmental Impact Assessment (EIA) processes are clearly defined and implemented through all phases of the project life-cycle (construction and operation phase).

1.4. OBJECTIVES OF THIS EMP

The Environmental Management Plan (EMP) provides a detailed plan of action required in implementation of the mitigation measures for minimizing and maximizing the identified negative and positive impacts respectively. This EMP gives commitments including financial and human resources provisions for effective management of the likely environmental liabilities construction and operation of the feedlot. The specific objectives of this EMP are:

- Ensuring compliance with regulatory authority stipulations and guidelines;
- To formulate measures that will mitigate the adverse impacts of the proposed project on various environmental components, which have been identified during the environmental impact assessment.
- To formulate measures to protect environmental resources where possible.
- To formulate measures to enhance the value of environmental components where possible.
- Responding to changes in project implementation not considered in the EIA;
- Responding to unforeseen events; and
- Providing feedback for continual improvement in environmental performance.

1.5. SCOPE OF THIS EMP

To achieve the above objectives, the scope of this EMP will include the following:

- Definition of the environmental management objectives to be realized during the life of a project (i.e. construction, and operation phases) in order to enhance benefits and minimize adverse environmental impacts.
- Description of the detailed actions needed to achieve these objectives, including how they will be achieved, by whom, by when, with what resources, with what monitoring/verification measures, and to what target or performance level.
- Clarification of institutional structures, roles, communication, and reporting processes required as part of the implementation of the EMP.
- Description of requirements for record-keeping, reporting, review, auditing and updating of the EMP.

1.6. HIERACHY OF MITIGATION MEASURES IMPLEMENTATION

This EMP have adopted a hierarchy of methods for mitigating significant adverse effects identified in order of preference and as follows:

- i. Enhancement, e.g. provision of new habitats;
- ii. Avoidance, e.g. sensitive design to avoid effects on ecological receptors;
- iii. Reduction, e.g. limitation of effects on receptors through design changes, and;
- iv. Compensation, e.g. community benefits

1.7. MITIGATION MEASURES IMPLEMENTATION

The EMP provides a detailed plan of action required in the implementation of the mitigation measures for minimizing and maximizing the identified negative and positive impacts respectively. The EMP also provides the management actions with roles and responsibilities requirements for the implementation of environmental

management strategies by the proponent through the contractors and subcontractors who will be undertaking the construction and operation activities

1.8. WHAT ARE THE LEGAL IMPLICATIONS AND OBLIGATIONS UNDER THIS PLAN?

The EMP will be sent to the Directorate of Environmental Affairs and Forestry (DEAF) of the Ministry of Environment, Forestry and Tourism (MEFT) for approval. Once the DEAF is satisfied with the contents of the EMP, they will issue an Environmental Clearance Certificate (ECC) to the Proponent to carry out the exploratory study to quarry for Marble in the Karibib district Area. The ECC is linked with the recommendations of the Environmental Management Plan.

Once the ECC is issued, the EMP becomes a legally binding document and each role-player including contractors and sub-contractors are made responsible to implement the relevant sections of the EMP and is required to abide by the conditions stipulated in this document.

2. ANTICIPATED ENVIRONMENT IMPACTS

2.1. POSITIVE IMPACTS

2.1.1. EMPLOYMENT/JOB CREATION

2.1.1.1. CONSTRUCTION PHASE

The proposed development will create a number of employment opportunities for individuals in the surrounding area. The positive impact of this phase is limited as it is temporary, however, the skills acquired are long-lasting. The construction impact on employment opportunities is indicated in Table 1 below.

Table 1: Construction Impact on Employment Opportunities

Potential Opportunities	Impact:	Employment	Magnitude	Extent	Reversibilit	Duration	Probability	Significance	Character	Confidence	
Without Mitigation			2	1	3	2	3	24	Low	(+)	High
With Mitigation			2	2	3	2	4	36	Medium	(+)	High
Mitigation and Enhancement Measures			<ul style="list-style-type: none"> • The project must aim to use local labour in order to benefit the local community. • Train employees to gain skills they can use in the future. • Consult with local communities to boost local business. • Tender processes to demonstrate promotion and prioritisation of local contractors and labour (through advertisements, identification of local contractors etc. 								

2.1.1.2. OPERATIONAL PHASE

If managed correctly, the proposed project could (mainly in the long term) have a significant positive impact on the social and economic environments. The proposed feedlot will have a positive impact on the Agricultural community as the production of good quality meat will be promoted. The proposed development is supported by several national, local, and government policies, frameworks, and documents. This project leads to permanent jobs on the feedlot as well as the potential growth of other supporting businesses to the feedlot to service their needs on supplies or waste to mention a few. The operational impact of the project on employment and socio-economic benefits is indicated in Table 2 below.

Table 2: Construction Impact on Employment Opportunities

Potential Impact: Employment and Socio-Economic Benefits	Magnitude	Extent	Reversibility	Duration	Probability		Significance Character	Confidence
Without Mitigation	3	2	3	4	3	36	Medium (+)	High
With Mitigation	4	3	3	4	4	56	Medium (+)	High
Mitigation and Enhancement Measures	<ul style="list-style-type: none"> The project must aim to use local labour in order to benefit the local community; Train employees to gain skills they can use in the future; Consult with local communities to boost local business; and Tender processes to demonstrate promotion and prioritisation of local contractors and labour (through advertisements, identification of local contractors, etc. 							

2.2. NEGATIVE IMPACTS

2.2.1. AIR QUALITY (GENERATION OF DUST AND PARTICULATE MATTER)

2.2.1.1. CONSTRUCTION PHASE

During the construction phase, dust and vehicular emissions will be released as a result of trucks transporting construction material. The emissions will however, have short term impacts on the immediate surrounding areas which can be easily mitigated and thus the authorisation of such emissions will not be required. A buffer zone should be maintained around the feedlot to prevent manure and associated concentrated farming

smells from affecting the nearest communities. The impact of the construction phase on the generation of dust and PM is shown in **Table 3** below.

Table 3: Construction Impact on air quality (Generation of Dust and PM)

Potential Impact: Generation of Dust and PM	Magnitude	Extent	Reversibilit	Duration	Probability		Significance	Character	Confidence
Without Mitigation	3	2	3	1	5	45	Medium	(-)	High
With Mitigation	2	1	3	1	4	28	Low	(-)	High
Mitigation and Management Measures	<ul style="list-style-type: none"> • Implement dust suppression methods during construction to minimise dust emissions from the site activities; • All stockpiles must be restricted to designated areas and may not exceed a height of two (2) metres; • Ensure that all vehicles and machines are adequately maintained to minimise emissions; • It is recommended that the clearing of vegetation from the site should be selective and done just before construction so as to minimise erosion and dust; • All materials transported to the site must be transported in such a manner that they do not fly or fall off the vehicle. This may necessitate covering or wetting friable materials. • No burning of waste, such as plastic bags, cement bags, and litter is permitted; and • All issues/complaints must be recorded in 								

	the complaints register.
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2.2.1.2. OPERATION PHASE

All air quality impacts will be minimised with the implementation of dust control measures contained within the EMP and the dust impacts will be short-term in nature.

2.2.2. ODOUR

2.2.2.1. CONSTRUCTION PHASE

No emission of odour is expected during the construction phase of the project.

2.2.2.2. OPERATION PHASE

The main concern with odour is its ability to cause an effect that could be considered 'objectionable or offensive'. An objectionable or offensive effect can occur either where an odorous compound is present in very low concentrations, usually far less than the concentration that could harm physical health, or when it occurs in high concentrations. Where the offensive odour is caused by high concentrations, contaminants in the odour may also be causing direct health effects such as skin, eye or nose irritation, and these should be considered in addition to any potential odour impacts. Repeated or prolonged exposure to odour can lead to a high level of annoyance, and the receiver may become particularly sensitive to the presence of the odour. The proposed feedlot will produce odorous emissions owing to the storage of manure, however, since the proposed site is on a farm and downwind of neighboring community, the number of sensitive receptors is low. The operational impact of odour on the nearest receptors is indicated in Table 4 below.

Table 4: Operation impacts on odour

Potential Impact: Odour	Magnitude	Extent	Reversibilit	Duration	Probability		Significance	Character	Confidence
Without Mitigation	3	2	3	1	5	45	Medium	(-)	High
With Mitigation	2	1	3	1	4	28	Low	(-)	High
Mitigation and Management Measures	<ul style="list-style-type: none"> • Maintain feedlot in a clean state; and • Maintain the manure storage area. 								

2.2.3. NOISE EMISSIONS

2.2.3.1. CONSTRUCTION PHASE

Elevated noise levels are likely to be generated by the construction activities (machinery and vehicles) and the workforce. It is important to note that noise impacts (nuisance factor) may vary in the different zones as a result of the surrounding land uses and will be temporary in nature. Given, that the site is in a remote area, noise impacts are not regarded as a significant impact. The construction impact on noise is indicated in Table 5 below..

Table 5: Construction Impact on Noise

Potential Impact: Noise	Magnitude	Extent	Reversibilit	Duration	Probability		Significance	Character	Confidence
Without Mitigation	2	1	3	1	4	28	Low	(-)	High
With Mitigation	2	1	1	1	3	15	Low	(-)	High
Mitigation and Management Measures	<ul style="list-style-type: none"> – The equipment must be in good working order, within service dates, and inspected before use; 								

- Install noise-reducing fittings on machinery (if required); and
- Undertake construction activities between 07:00 and 17:00.

2.2.3.2. OPERATION PHASE

There are no anticipated noise impacts during the operational phase.

2.2.4. SOIL EROSION

2.2.4.1. CONSTRUCTION PHASE

During the construction phase, temporary measures should be implemented to manage stormwater and water flow on the site. If the stormwater and water flow is not regulated and managed on-site it could cause significant erosion of soil, as well as the pollution and siltation of water bodies.

During the construction phase, the installation of services could leave soils exposed and susceptible to erosion. The construction impact on soil erosion is indicated in Table 6 below

Table 6: Construction impact on Soil erosion

Potential Impact: Soil Erosion	Magnitude	Extent	Reversibilit	Duration	Probability	Significance	Character	Confidence	
Without Mitigation	2	1	3	2	3	24	Low	(-)	High
With Mitigation	1	1	3	2	2	14	Low	(-)	High

Mitigation and Management Measures

- Only the identified areas should be cleared of vegetation. This should be done in stages as construction works progress;
- Implement temporary stormwater management measures that will help to reduce the speed of the water. These measures must also assist with the prevention of water pollution, erosion, and siltation;
- All removed soil and material must not be stockpiled within the system. Stockpiling should take place outside of the buffer areas. All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds;
- Temporary and permanent erosion control methods may include silt fences, flotation silt curtains, retention basins, detention ponds, interceptor ditches, seeding and sodding, riprap of exposed embankments, erosion mats, and mulching;
- Any exposed earth should be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses) to protect the exposed soil;
- Erosion control measures should be implemented during the construction phase on large exposed areas and where storm water is temporarily channelled.
- If excavations or foundations fill up with storm water, these areas should immediately be drained and measures to prevent further

water from entering the excavations should be implemented;

2.2.4.2. OPERATIONAL PHASE

The The operational phase erosion impacts will be limited since the feedlot will be paved and with drains designed to drain into the manure dam. This will limit the impact of soil erosion. The operational impact on soil erosion is indicated in **Table 7** below.

Table 7: Operational Impact on Soil Erosion

Potential Impact: Soil Erosion	Magnitude	Extent	Reversibilit	Duration	Probability	Significance	Character	Confidence	
Without Mitigation	2	1	3	4	2	20	Low	(-)	High
With Mitigation	1	1	3	4	1	9	Low	(-)	High
Mitigation and Management Measures	<ul style="list-style-type: none"> • All canals on the feedlot development should always function correctly and be in good condition. After heavy rain, repairs should be done and the canals cleaned; • Regarding disposal of solid waste over land, vegetation cover should be maintained on the disposal area to prevent soil erosion and to enhance nutrient uptake; and • Remove erosion and sediment controls only if all bare soil is sealed, covered, or re-vegetated. Sweep roadways clean and remove all debris from kerb and butter areas. Do not wash into drains. 								

2.2.5. POLLUTION TO SURFACE AND GROUND WATER

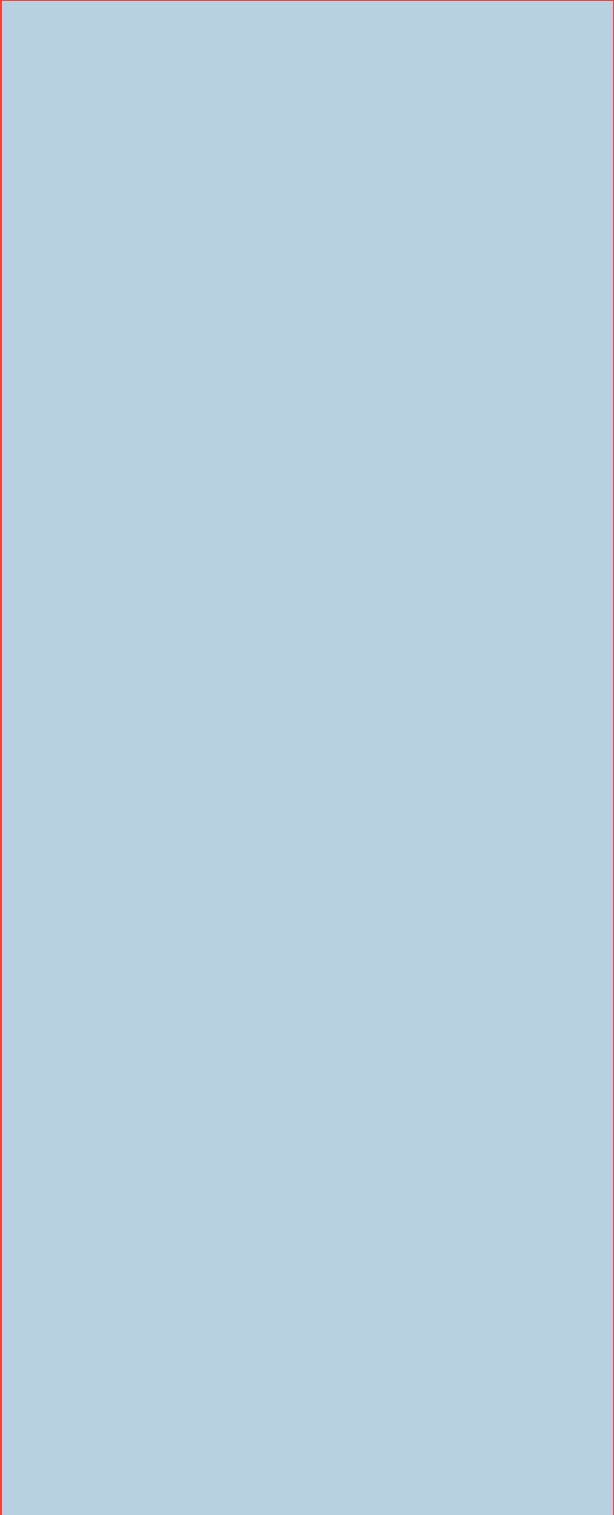
The project site is located in area which receive a lot of rainfall (400-600mm/a), good potential groundwater which is susceptible to pollution due to shallow water table. During operation phase, waste in the form of mixture of manure and soil-forming, animal carcasses, and agrochemical waste will be generated. If these waste is not properly handled and stored on site, it will lead to surface water (through runoff) and groundwater pollution (through seepage). The nearby tributaries rivers flows into the Kavango River, and any waste which will be introduced in the runoff could end up in the Kavango River, which could pollute the surface water. The groundwater levels in the project site is very shallow, at 30m. Seepage of pollutants from the waste which will be generated on site, could potential cause groundwater pollution. Activities which pose a threat to water resources pollution relate to the overflow of the oxidation ponds and the leakage of sewage water into the underlying water bearing layers.

The following threats are posed by the proposed activity during the construction and operational phases: There is a potential to contaminate groundwater resources through the infiltration of any fuels, oils or lubricants used by construction vehicles and machines. Washing of any vehicles on the site will impact the groundwater resources as well as any potential contaminants that can seep into underground water sources. There is a potential to affect the ground and surface water quality in the area, especially around the wetland in the area. This is influenced by spills and leaks, the storage of chemicals, mixes and fuel, location and protection of stockpiles, onsite waste management, and the management of stormwater. The stormwater runoff will wash the potential contaminants to surface water resources while any contaminants that are not cleaned from the ground will seep into underground water resources. The impact of construction and operation on change in water quality is shown in Table 8 and 9 below.

2.2.5.1. CONSTRUCTION PHASE

Table 8:Construction impact on change in water quality

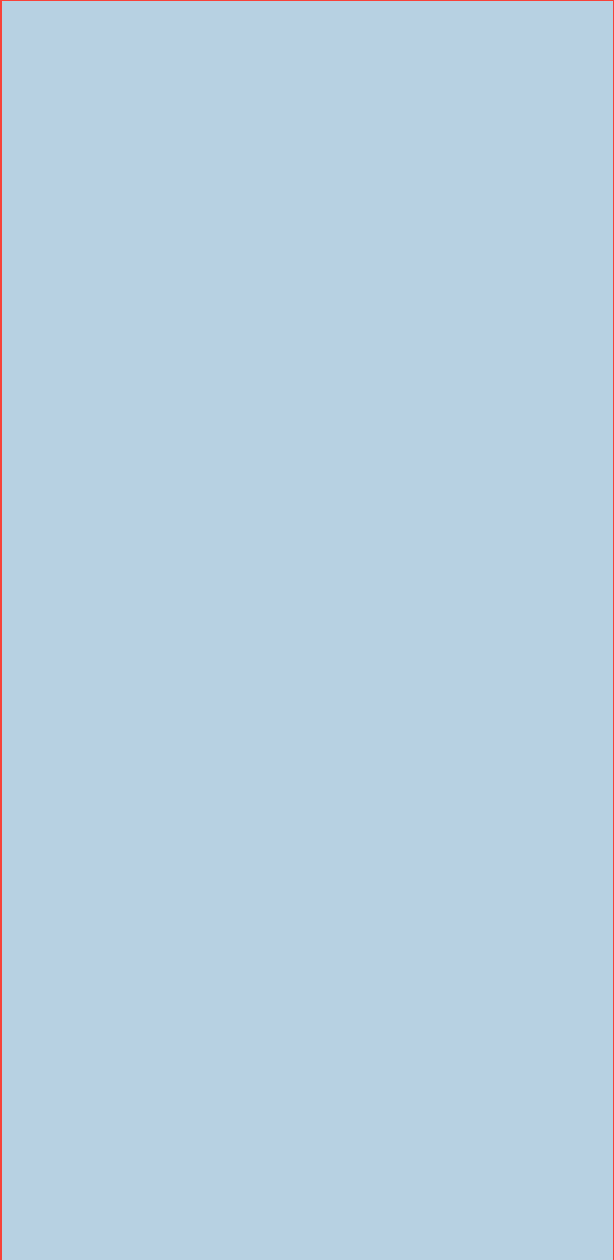
Potential Impact: Change in Water Quality	Magnitude	Extent	Reversibility	Duration	Probability		Significance	Character	Confidence
Without Mitigation	3	2	3	2	3	30	Medium(-)		High
With Mitigation	2	2	3	2	2	18	Low	(-)	High
Mitigation and Management Measures	<ul style="list-style-type: none"> – The recommended buffer zones should be strictly adhered to. Any aspect of the proposed surface infrastructure that impedes the wetlands, drainage lines, or their buffers should be relocated; – Construction areas should be demarcated, and wetland areas marked as “restricted” in order to prevent the unnecessary impact to and loss of these systems; – Laydown yards, camps and storage areas must be beyond the wetland areas and associated buffers where applicable; – Stormwater channels and preferential flow paths should be delineated, filled with aggregate and/or logs (branches included) to dissipate and slow flows limiting erosion; – During construction contractors used for the project must have spill kits available to ensure that any fuel or oil spills are clean-up and discarded correctly; – A suitable storm water management plan must for formulated for the project. The plan must ensure that clean and dirty water are separated, that only clean water is diverted into the wetlands (where required) and that the discharge of water will not result in scouring and erosion of the receiving systems; 								

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- The storm water management plan should incorporate “soft” engineering measures as much as possible, limiting the use of artificial materials. These measures may include grassy swales, bio-retention ponds / depressions filled with aquatic vegetation or the use of vegetation to dissipate flows at discharge locations;
 - As much material must be pre-fabricated and then transported to site to avoid the risks of contamination associated with mixing, pouring and the storage of chemicals and compounds on-site;
 - All chemicals and toxicants during construction and operation must be stored in bunded areas;
 - All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site;
 - All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good “housekeeping”;
 - Adequate sanitary facilities and ablutions on the servitude must be provided for all personnel throughout the project area. Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation); and
 - Have action plans on site, and training for contactors and employees in the event of spills, leaks and other impacts to the aquatic systems.

2.2.5.2. OPERATIONAL PHASE

Table 9: Operation impact on change in water quality

Potential Impact: Change in Water Quality	Magnitude	Extent	Reversibilit	Duration	Probability		Significance		Confidence
Without Mitigation	3	2	3	3	3	33	Medium(-)		High
With Mitigation	2	2	3	2	2	18	Low (-)		High
Mitigation and Management Measures	<ul style="list-style-type: none"> • Operation areas should be demarcated, and wetland areas marked as “restricted” in order to prevent the unnecessary impact to and loss of these systems; • Stormwater channels and preferential flow paths should be delineated, filled with aggregate and/or logs (branches included) to dissipate and slow flows limiting erosion; • Ensure that the lagoon and overspill dam liner integrity is maintained; • Spill kits must be available to ensure that any fuel or oil spills are clean-up and discarded correctly; • A suitable storm water management plan must for formulated for the project. The plan must ensure that clean and dirty water are separated, that only clean water is diverted into the wetlands (where required) and that the discharge of water will not result in scouring and erosion of the receiving systems; • The storm water management plan should incorporate “soft” engineering measures as much as possible, limiting the use of artificial materials. These measures may include grassy 								



swales, bio-retention ponds / depressions filled with aquatic vegetation or the use of vegetation to dissipate flows at discharge locations;

- All chemicals and toxicants during d operation must be stored in bunded areas;
- All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site;
- All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks, and general good “housekeeping”;
- Adequate sanitary facilities and ablutions on the servitude must be provided for all personnel throughout the project area. Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation); and
- Have action plans on-site, and training for contractors and employees in the event of spills, leaks, and other impacts to the aquatic systems.

2.2.6. BIODIVERSITY (FAUNA AND FLORA)

2.2.6.1. CONSTRUCTION PHASE

The construction phase involves the clearance of vegetation which leads to further loss and fragmentation of the vegetation community as well the destruction of a portion of

an endangered vegetation type (NBA, 2012). The construction activities might lead to displacement, direct mortalities, and disturbance of the faunal community due to habitat loss and disturbances (such as dust and noise), however, this is very minimal due to the lack of presence of fauna in the study area. The construction impact on the loss and fragmentation of flora and displacement of fauna is indicated in Table 10 below.

Table 10: Construction impact on loss and fragmentation of flora and displacement of fauna


Potential Impact: Loss and Fragmentation of Flora, and displacement of fauna	Magnitude	Extent	Reversibilit	Duration	Probability		Significance	Character	Confidence
Without Mitigation	3	3	2	5	4	52	Medium	(-)	High
With Mitigation	2	2	2	5	2	22	Low	(-)	High

Mitigation and Management Measures

- Prevent the further loss and fragmentation of this vegetation community (listed as Vulnerable) within and adjacent to the project site;
- Prevent the loss of species of conservation concern which are known to occur within the project area;
- Limiting the construction area to the defined project areas and only impacting those areas where it is unavoidable to do so otherwise;
- As far as possible, the proposed developments should be placed in areas that have already been disturbed (low sensitivity areas as defined in this report), and no further loss of secondary grassland or wetlands should be permitted;
- Areas of indigenous vegetation, even secondary communities should under no circumstances be fragmented or disturbed further or used as an area for dumping of waste;
- It should be made an offence for any staff to bring any plant species into any portion of the project site, including offices. No plant species whether indigenous or exotic should be brought into the project area, to prevent the spread of exotic or invasive species;
- A qualified environmental control office must be on site when construction begins to identify species that will be directly disturbed and to relocate fauna/flora that are found during construction (this includes all species of flora

and fauna such as snakes);

- Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes wetting of exposed soft soil surfaces and not conducting activities on windy days which will increase the likelihood of dust being generated;
- Areas of indigenous vegetation should be delineated, and rehabilitation measures implemented in areas where the indigenous community is still present but degraded;
- Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events. This will also reduce the likelihood of encroachment by alien invasive plant species;
- All dumping of waste material, especially bricks and contaminated materials or soils, must be prevented; and
- Compilation of and implementation of an alien vegetation management plan for the entire site, including the surrounding project area.
- Prevent the loss of species of conservation concern which are known to occur within the project area;
- Limiting the construction area to the defined project areas and only impacting those areas where it is unavoidable to do so otherwise;
- If any faunal species are recorded during construction, activities should temporarily cease, and an appropriate specialist should be consulted to identify the correct course of



action. This is applicable to all species, even smaller species such as rodents, reptiles and amphibians;

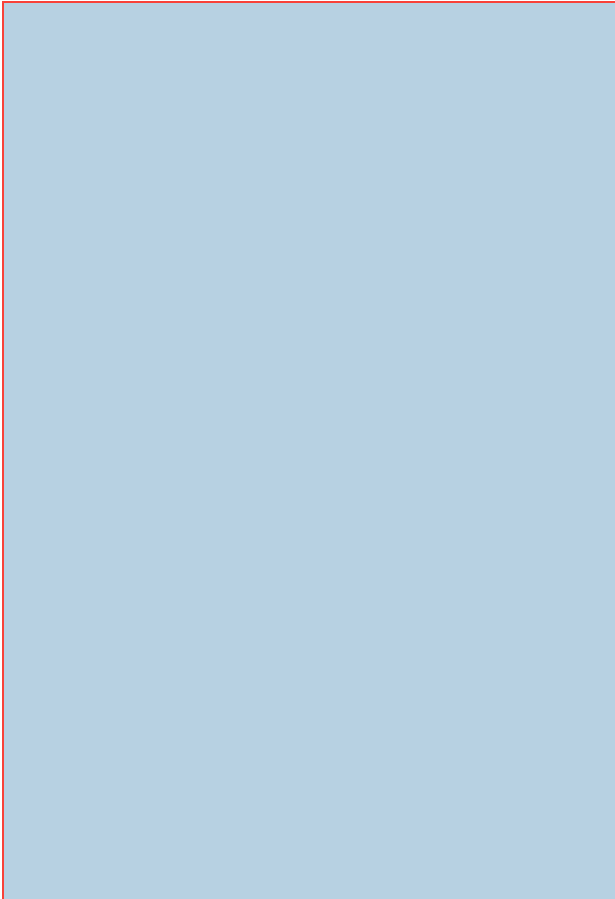
- Staff should be educated about the sensitivity of faunal species and measures should be put in place to deal with any species that are encountered during the construction process. The intentional killing of any animals including snakes, lizards, birds or other animals should be strictly prohibited;
- An alien invasive plant management plan needs to be compiled and implemented prior to construction to control and prevent the spread of invasive aliens;
- The areas outside the defined project area, should be declared a 'no-go' areas during the construction phase and operational phase and all efforts must be made to prevent access to this area from construction workers and machinery;
- No domestic animals are to be allowed in to the project area under any circumstances, especially any dogs and cats. Any and all feral cats which may enter the project area must be removed immediately.

2.2.6.2. OPERATIONAL PHASE

The operational phase might see displacement of indigenous vegetation community by alien invasive plant species in the area surrounding the feedlot. The operational impact on continual encroachment of flora is indicated in **Table 11** below,

Table 11: Operation impact on loss and fragmentation of flora and displacement of fauna

Potential Impact: Loss and Fragmentation of Flora, and displacement of fauna	Magnitude	Extent	Reversibilit	Duration	Probability		Significance	Character	Confidence
Without Mitigation	3	3	3	5	4	56	Medium (-)		High
With Mitigation	2	2	2	2	3	24	Low (-)		High
Mitigation and Management Measures	<ul style="list-style-type: none"> • Prevent the further loss and fragmentation of this vegetation community (listed as Vulnerable) within and adjacent to the project site; • Prevent the loss of species of conservation concern which are known to occur within the project area; • Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events. This will also reduce the likelihood of encroachment by alien invasive plant species; and • Compilation of and implementation of an alien vegetation management plan for the entire site, including the surrounding project area. • Prevent the loss of species of conservation concern which are known to occur within the project area; • Staff should be educated about the sensitivity of faunal species and measures should be put in place to deal with any species that are encountered during the 								



construction process. The intentional killing of any animals including snakes, lizards, birds or other animals should be strictly prohibited;

- The areas outside the defined project area, should be declared a 'no-go' areas during the construction phase and operational phase and all efforts must be made to prevent access to this area from construction workers and machinery;
- All livestock must be kept out of any wetland and grassland areas in order to prevent overgrazing of potential SCC avifauna habitat; and
- No domestic animals are to be allowed in to the project area under any circumstances, especially any dogs and cats. Any and all feral cats which may enter the project area must be removed immediately.

2.2.7. EMPLOYEE HEALTH AND SAFETY

2.2.7.1. CONSTRUCTION PHASE

During construction, the employees are exposed to health and safety hazards from the mechanical machines and equipment used on the site.. The construction impact on health and safety is indicated in **Table 12** below.

Table 12: Construction Impact on Employee Health and Safety

Potential Impact: Employee Health and Safety	Magnitude	Extent	Reversibilit	Duration	Probability	Significance	Character	Confidence

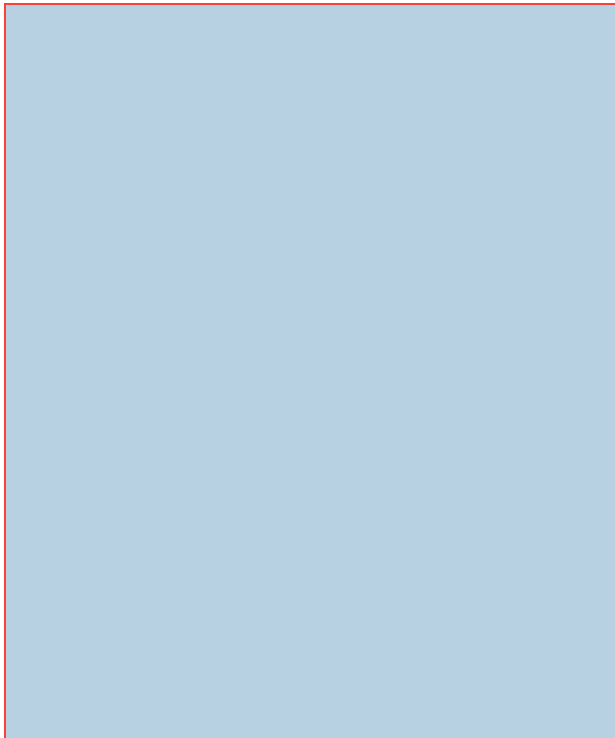
Without Mitigation	4	2	3	4	4	52	Medium	(-)	High
With Mitigation	2	1	3	4	2	20	Low	(-)	High
Mitigation and Management Measures	<ul style="list-style-type: none"> • An Health and safety officer is to be appointed who will monitor safety conditions during construction activities; • Ensure employees are properly trained to use specific equipment or machinery; • Provide suitable personal protective equipment (PPE). • Conduct site and safety induction to raise awareness of the risks associated with the site. • Conduct regular toolbox talks as refreshers to improve health and safety. • Develop safe work instruction method statements that should be used by employees in completing their tasks. • Train all relevant personnel on handling, use and storage of hazardous substances. • All visitors should undergo site induction and be made aware of the risks associated with the site. 								

2.2.7.2. OPERATIONAL PHASE

The biggest risk during the operational phase of the feedlot is on employee health from potential pathogens from the animals. This comes up when employees are not using the appropriate PPE and are not hygienic following operations on the feedlot. The operational impact on employee health and safety is indicated in **Table 13** below.

Table 13: Operational Impact on Employee Health and Safety

Potential Impact: Employee Health and Safety	Magnitude	Extent	Reversibilit	Duration	Probability	Significance		Character	Confidence
Without Mitigation	4	2	3	4	4	52	Medium	(-)	High
With Mitigation	2	1	3	4	2	20	Low	(-)	High
Mitigation and Management Measures	<ul style="list-style-type: none"> • An HSE officer is to be appointed who will monitor safety conditions during construction activities; • Ensure employees are properly trained to use specific equipment or machinery; • Train personnel on how to deal with snake encounters; • Employees must wear appropriate PPE, especially gloves, during their activities on the feedlot to minimise contact with potential pathogens; • Employees must thoroughly wash their hands with detergents after activities and before eating; • Conduct site and safety induction to raise awareness of the risks associated with the site; • Conduct regular toolbox talks as refreshers to improve health and safety; • Develop safe work instruction method statements that should be used by 								



employees in completing their tasks;

- Train all relevant personnel on handling, use and storage of hazardous substances;
- Ensure that all exposed personnel are treated without delay;
- Train personnel on handling animal carcasses before they are collected by the waste contractor;
- Provide MSDS for all hazardous substances kept onsite; and
- All visitors should undergo site induction and be made aware of the risks associated with the site.

2.2.8. WASTE

2.2.8.1. CONSTRUCTION PHASE

Construction waste is not expected to be in large quantities. General waste will be generated primarily from the construction team. Any waste entering the demarcated working area will be cleared on an “as required” basis and disposed of in a permitted landfill site. In the unlikely event that waste being washed into the project site is excessive, a skip will be brought to site for the duration of the construction phase. If any hazardous waste (oily rags, empty oil containers, etc.) is produced onsite, it will be kept in a labeled and lidded container and disposed of in a permitted hazardous waste landfill site. The construction impact on waste is indicated in **Table 14** below.

Table 14: Construction Impact on Waste

Potential Impact: Waste	Magnitude	Extent	Reversibili	Duration	Probability	Significanc	Character	Confidence

Without Mitigation	2	1	3	1	4	28	Low	(-)	High
With Mitigation	2	1	1	1	3	15	Low	(-)	High
Mitigation and Management Measures	<ul style="list-style-type: none"> • Place general and hazardous waste bins on the site. • Any hazardous waste must be taken away by a registered contractor and taken to a registered landfill. • Ensure that safe disposal certificates are issued for any hazardous waste taken away from the site and waste manifests available for general waste. • No dumping of construction material on-site may take place. • All waste generated on-site during construction must be adequately managed. Separation and recycling of different waste materials should be supported. 								

2.2.8.2. OPERATIONAL PHASE

During the operational phase, there will be a generation of general waste as well as the potential for animal carcasses that will arise following the death of cattle. The proposed feedlot will not have a carcass pit or an incinerator, therefore, the disposal of any carcasses will have to be done appropriately to avoid affecting the site personnel with pathogens. The operational impact on waste is indicated in **Table 15** below.

Table 15: Operational Impact on Waste

Potential Impact: Waste	Magnitude	Extent	Reversibilit	Duration	Probability	Significance	Character	Confidence
Without Mitigation	4	2	3	4	4	52 Medium	(-)	High
With Mitigation	2	1	3	1	3	21 Low	(-)	High
Mitigation and Management Measures	<ul style="list-style-type: none"> Place general and hazardous waste bins on the site; Hazardous waste must be taken away by a registered contractor and taken to a registered landfill; Train personnel on handling animal carcasses before they are collected by the waste contractor; and Ensure that safe disposal certificates are issued for any hazardous waste taken away from the site and waste manifests available for general waste. 							

2.2.9. DISTURBANCE TO HERITAGE

Based on the field study conducted, only disturbed little natural vegetation is present on the site and the chances of finding any heritage-related features are extremely slim. Nothing of heritage significance was found during the site visit. there are no impacts expected with regards to heritage resources.

Construction activities should be conducted carefully and all activities ceased if any archaeological, cultural, and heritage resources are discovered.

The Proponent should consider having a qualified and experience archaeologist on standby during exploration work and sampling phase and as required during the entire operational phase. This action will be to assist on the possibility of uncovering sub-surface graves or

other cultural/heritage objects and advise the Proponent accordingly. Identified graves or any archaeological significant objects on the site should not be disturbed, but are to be reported to the project Environmental officer or National Heritage Council offices. If discovery of unearthened archaeological remains to be uncovered, the following measures (chance find procedure) shall be applied:

- Works to cease, area to be demarcated with appropriate tape by the site supervisor, and the Site Manger to be informed
- Site Manager to visit the site and determine whether work can proceed without damage to findings, mark exclusions boundary
- If work cannot proceed without damage to findings, Site Manager is to inform the Environmental Manager who will get in touch with an archaeologist for advice
- Archaeological specialist is to evaluate the significance of the remains and identify appropriate action, for example, record and remove; relocate or leave in situ (depending on the nature and value of the remains) - Inform the police if the remains are human, and
- Obtain appropriate clearance or approval from the competent authority, if required, and recover and remove the remains to the National Museum or National Forensic Laboratory as appropriate.

3. ENVIRONMENTAL MANAGEMENT PLAN ORGANIZATION AND IMPLEMENTATION

During the construction phase, contractors, as well as site-in-charge, will be responsible for implementing all the mitigation measures mentioned above. In the operational phase, the work will be continued along with post-monitoring. In the preceding sections, the environmental aspects which may be affected by the proposed project

have been categorized into negative and positive impacts. As an extension of the preceding sections, this section summarizes the objectives, indicators to be observed, schedules to adhere to, and the roles and responsibilities of various stakeholders to the EMP. The following tables give the mitigation measure to be undertaken during the exploration & operational phase respectively with the agency responsible for implementation.

The following abbreviations are used to indicate who is responsible for what impact mitigation objective:

- **Contractor Environmental Coordinator** CENC
- **Site Foreman** SF
- **Project manager** PM
- **Project Proponent** PP
- **Environmental Commissioner** EC

Table 16: Project Planning and Implementation

Objectives	Indicators	Schedule	Responsibility
Establish a strong environmental protocol from project implementation to final closure to ensure the least possible impacts on the environment	Resources (Financial, human, equipment and safety gear) are provided for the awareness, meetings, monitoring, and reporting.	At the beginning of the quarrying phase.	PP
	Expedite the appointment of a senior person to assume the	At the planning stage or at the	PP

To maximize the economic spin-off into the local economy.	responsibility of an environmental coordinator (ENC)	beginning of the implementation phase of the quarrying phase	
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4. MONITORING EMP

Monitoring of the EMP performance for the proposed project by the Contractor emphasizes early dictation, reporting, and corrective action. It is divided into three parts, namely:

- Monitoring of project activities and actions to be undertaken by the Environmental Coordinator (ENC) appointed by the Contractor.
- The Environmental Coordinator (ENC) shall report all incidents and situations which have the potential of jeopardizing compliance of statutory provisions as well as provisions of this EMP to the Project Proponent.
- The Environmental Coordinator (ENC) shall take corrective prompt measures, adequate and long-lasting in addressing non-compliance activities or behavior.

To ensure compliance of the Contractor ENC to the implementation of the EMP, it is highly recommended that an External Environmental Expert is appointed by the proponent to ensure the implementation of the EMP. The tables (5-9) provided below are to be used for monitoring purposes by the Contractor’s ENC.

Table 17: Solid waste disposal: wire, paper, and human waste

Mitigation	Compliance	Follow up Action Required	By Whom	When	Date Completed
Are disposal drums/bins available or full?					
Is there any litter around the site and its surroundings?					

Table 18: Oil spillage or used oil

Mitigation	Compliance	Follow up Action Required	By Whom	When	Date Completed
Are disposal drums available or full?					
Is there any oil spills around the site and its surroundings?					

Table 19: Land and Soil Disturbance

Mitigation	Compliance	Follow up Action Required	By Whom	When	Date Completed
Are there any deviations from the provisions of the EMP on land and soil disturbance?					
Are car track barricades in					

place?					
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Table 20: Dust generation on-site and gravel roads stretch

Mitigation	Compliance	Follow up Action Required	By Whom	When	Date Completed
Are there any deviations from the provisions of the EMP on dust pollution?					
Are the fume and particulate levels acceptable?					

Table 21: Biodiversity (fauna and flora)

Mitigation	Compliance	Follow up Action Required	By Whom	When	Date Completed

Mitigation	Compliance	Follow up Action Required	By Whom	When	Date Completed
Are there any deviations from the provisions of the EMP on biodiversity?					
It is traipses harvesting plant taking place feeding of animal or introduction of animals?					

Table 22: Noise emission on-site

Mitigation	Compliance	Follow up Action Required	By Whom	When	Date Completed
Are there any deviations from the provisions of the EMP on noise and vibration on-site?					
Are there any complaints from					

Mitigation	Compliance	Follow up Action Required	By Whom	When	Date Completed
the surroundings neighbor about noise emanating from the sites or tracks transporting materials/produce?					

Table 23: Compliance

Mitigation	Compliance	Follow up Action Required	By Whom	When	Date Completed
Are there any deviations from the provisions of the EMP on noise and vibration on-site?					
Are there any complaints from the surroundings neighbor about noise emanating from the sites or tracks transporting materials/produce?					

5. ENVIRONMENTAL CODE OF CONDUCT

The Code of Conduct outlined in this section of the EMP applies and is not limited to, subcontractors, visitors, permanent and temporal workers. Therefore, anybody who finds him or herself within the boundaries of the proponent must adhere to the Environmental Code of Conduct as outlined in this section of the EMP.

- The Contractor ENC will implement on-site environmental guidelines and has the authority to issue warnings as well as discipline any person who transgresses environmental rules and procedures. Persistent transgression of environmental rules will result in a disciplinary hearing and thereafter continued noncompliance behavior will result in permanent removal from the construction sites.

Natural environment management guidelines

- a. Never feed, tease or play with, hunt, kill, destroy or set devices to trap any wild animal (including birds, reptiles and mammals), livestock or pets. Do not bring any wild animal or pet to the construction sites;
- b. Do not pick any plant or take any animal out of the construction area EVER. You will be prosecuted and asked to leave the project area;
- c. Never leave rubbish and food scraps or bones where it will attract animals, birds or insects. Rubbish must be thrown into the correct rubbish bins or bags provided;
- d. Protect the surface material by not driving over it unnecessarily;
- e. Do not drive over, build upon, or camp on any sensitive habitats for plants and animals;
- f. Do not cut down any part of living trees/bushes for firewood;
- g. Do not destroy bird nest, dens, burrow pits, termite hills, etc. or any other natural objects in the area.

Vehicle use and access guidance

- i. Never drive any vehicle without a valid license for that particular vehicle and do not drive any vehicle that appears not to be road-worthy;
- ii. Never drive any vehicle when under the influence of alcohol or drugs;
- iii. DO NOT make any new roads without permission. Stay within demarcated areas;
- iv. Avoid U-Turns and large turning circles. 3-point turns are encouraged. Do not ever drive on rocky slopes;
- v. Stay on the road, do not make a second set of tracks and do not cut corners;
- vi. DO NOT SPEED - 30 km per hour for normal vehicles and 20km per hour for heavy trucks on gravel roads and around the site;
- vii. No off-road driving is allowed;
- viii. Vehicles may only drive on demarcated roads;
- ix. Adhere to speed limits and drive with headlights switched on along any gravel road.

Control of dust guidance

- a. Do not make new roads or clear any vegetation unless instructed to do so by your Contractor or the Environmental Coordinator or Site Manager;
- b. Do not try to disturb the surface of the natural landscape as little as possible.
- c. Do not speed on gravel roads and around the construction sites, and adhere to the speed limits.
- d. Apply water to suppress dust were the generation of the dust on either gravel roads or construction sites is beyond control.

Health and safety guidance

- a. Drink lots of water every day, but only from the freshwater supplies;
- b. Take the necessary precautions to avoid contracting the HIV/AIDS virus;
- c. Never enter any area that is out of bounds, or demarcated as dangerous or wander off without informing or permission of team leader;
- d. Never climb over any fence or trespass on private property without permission of the landowner or consultation with the Environmental Coordinator, Site Manager.
- e. Report to your Contractor if you see a stranger or unauthorized person in the construction area;
- f. Do not remove any vehicle, machinery, equipment or any other object from the construction campsite or along with the profile or at a seismic testing station without permission of your Contractor or Site Manager;
- g. Wear protective clothing and equipment required and according to instructions from your Contractor or Site Manager;
- h. Don not engages in sexual relations with minors and also adheres to zero tolerance to spread HIV/AIDS.

Preventing pollution and dangerous working conditions guidance

- I. Never throw any hazardous substance such as fuel, oil, solvents, etc. into streams or onto the ground;
- II. Never allow any hazardous substance to soak into the soil;
- III. Immediately tell your Contractor or Environmental Coordinator when you spill or notice any spillage of hazardous substance anywhere in the field or camp;
- IV. Report to your Contractor or Environmental Coordinator when you notice any container, which may hold a hazardous substance, overflow, leak or drip;

- V. Immediately report to your Contractor or Environmental Coordinator when you notice overflowing problems or unhygienic conditions at the ablution facilities, vehicles, equipment and machinery, containers and other surfaces.

Disposal of solid and liquid waste guidance

- a. Learn to know the difference between the two main types of waste, namely: General Waste; and Hazardous Waste.
- b. Learn how to identify the containers, bins, drums or bags for the different types of wastes. Never dispose of hazardous waste in the bins or skips intended for general waste or construction rubble;
- c. Never burn or bury any waste on the camp or in the field;
- d. Never overfill any waste container, drum, bin or bag. Inform your Contractor or the Environmental Coordinator/ Site Manager if the containers, drums, bins or skips are nearly full;
- e. Never litter or throwaway any waste on the site, in the field or along any road.
- f. No illegal dumping;
- g. Littering is prohibited.

Dealing with environmental complaints guidance

- a. If you have any complaint about dangerous working conditions or potential pollution to the environment, immediately report this to the Environmental Coordinator
- b. If any person complains to you about noise, lights, littering, pollution, or any other harmful or dangerous condition, immediately report this to your Contractor.

Environmental Personnel Register

Table 11 presents the Environmental Personnel Register to be signed by every person who receives or attends the Environmental Awareness Training or who has the training material explained to him or her or in possession of the training material.

Table 24: Environmental Personnel Register

Date	Name	Company	Signature

6. SITE CLOSURE AND REHABILITATION

Based on the proposed project plan, the life of the project is considered to be indefinite and as such no closure or rehabilitation phase was considered. It is envisaged that the feedlot development, once completed, will exist into perpetuity. However, impacts during decommissioning are likely to be similar in nature to those identified for the construction phase and will be managed in cognisance of the applicable legislation

7. CONCLUSION AND RECOMMENDATIONS

7.1. CONCLUSION

The fundamental principle behind environmental assessments (EAs) is to ensure a balance in social, economic and environmental needs, particularly when proposed projects are of such a nature that they negatively affect some needs at the expense of the other. Ultimately, EAs should enhance proposed projects' propensity towards being more beneficial and important by suggesting measures, designing and implementing programs and plans to that effect.

Against this background, it is anticipated that this project will be beneficial and important to the proponent, national economy, the local social conditions, and the local economy if the guidelines and mitigation measures suggested in this EMP are implemented. However, it should be acknowledged that disturbance to the environment will be incurred, but that will be minimal and within legally acceptable levels.

This EMP should be viewed as a framework for integrating mitigation measures and applicable legal tools to ensure both compliance and sustainability. It is therefore very important that the proponent provides adequate resources (human, financial, tangible and intangible assets) for the implementation of the plan.

7.2. RECOMMENDATION

The proposed quarry project may go ahead provided that all the provisions of the EMP, as well as all issued permits, are followed. Recommended actions to be implemented by the proponent as part of the management of the likely impacts through implementations of the EMP are:

- Contract an Environmental Coordinator / Consultant / suitable in-house resources person to lead and further develop, implement and promote environmental culture through awareness-raising of the workforce, contractors and sub-contractors in the field during the whole duration of the proposed mining program period;
- Provide with other support, human and financial resources, for the implementation of the proposed mitigations and effective environmental management during the planned mining activities ;
- Develop a simplified environmental induction and awareness program for all the workforce, contractors and sub-contractors;
- Where contracted service providers are likely to cause environmental Impacts, these will need to be identified and contract agreements need to be developed with costing provisions for environmental liabilities;
- Implement internal and external monitoring of the actions and management strategies developed during the mineral exploration and possible mining duration and a final Environmental Monitoring report be prepared by the Environmental Coordinator / Consultant / Suitable in-house resource person and to be submitted to the regulators and to end the proposed quarry project;

- Develop and implement a monitoring program that will fit into the overall company's Environmental Management Systems (EMS) as well as for any future EIA for possible quarrying projects.

It is hereby recommended that proponent take all the necessary steps to implement all the recommendations of the EMP for the successful implementation and completion of the proposed quarry project for claims **69059 – 69060** situated in the Karibib district, Erongo Region, Namibia.

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