ENVIRONMENTAL MANAGEMENT PLAN (EMP)

FOR

LUSU SUGARCANE PLANTATION FARMING PROJECT AT LUSU COMMUNAL AREA, ZAMBEZI REGION

(APP-001188)

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1. ENVIRONMENTAL MANAGEMENT PLAN

The Environmental Impact Assessment Regulations require the developer to provide an Environmental and Social Management Plan. An EMP is a document where all the measures that are required for environmental protection, which will include the mitigation measures and the monitoring plan, will be found for easy reference. The aim of an environmental management plan is to avoid, minimize, or ameliorate effects or impacts resulting from project implementation and where possible, enhance beneficial effects.

This EMP seeks to limit the interaction of disturbed with undisturbed lands at Lusu Sugarcane plantation farm project site and through the various processes of project implementation, restore the disturbed land to a predetermined form of land-use or to a productivity level similar to that occurring prior to disturbance.

The Environmental Management Plan for the management of the identified environmental impacts associated with this project consists of three main components:

1. Implementing the Impact Mitigation Plan.
2. Monitoring the implementation of the EMP.

1.1 Impact Mitigation Plan

The impact mitigation plan allocates the responsibilities for implementation of the proposed mitigation measures to the various stakeholders and indicates at what stage in the project they should be performed. The Plan is presented in this section and it addresses the negative impacts generated by the project and presents the associated cost estimates of mitigating the adverse impacts. The key components of the proposed impact mitigation plan are:

(i) Surface and ground water quality management

(ii) Soil erosion Control

(iii) Vegetation and Flora

(iv) Wildlife and Fauna Habitats

1. Bush fires
2. Noise and vibrations
3. Occupational Health and safety
4. Land use and Soil
5. Air Quality
6. Landscape, land use and Aesthetics

Socio-economic components of the mitigation plan include:

(i) Cultural and Historic Sites

(ii) Employment and conditions of service

1.2 Surface and ground water management

Surface and ground water are an important component of agricultural, ecological and human use of the land in the farming unit. The aim of the water management program is to ensure that where practical, flows into and through the project sites is maintained and that ground water sources (water reservoirs within the farms) are used efficiently to prevent inconsistent draw down of water during abstraction. The following will be undertaken to protect surface and ground water:

1. An effective drainage system will be put in place to capture all waste water.
2. Oil spillages from vehicles and machinery will be avoided on site. Compliance with the Hazardous Waste Regulations will be priority.
3. A good and effective monitoring system will be put in place during operations. Regular surface and ground water samples will be collected and analysed. Bi-annual results will be submitted to the Namibian Environmental directorate.
4. Ensuring that boreholes and septic tanks are at least 60 meters apart.

1.3 Soil erosion control

The Desert Lusu Salk Sugar project farming area have soils with less likelihood of soil erosion. However, the nature of the soil in high rainfall or winds may be prone to erosion. The plantation methods to be employed by Desert Lusu Salk Sugar will ensure less risk of soil erosion and runoff water to nearby farms and settlements

1.4 Vegetation and Flora

The Project Site has large portions of disturbed or open floodplain arable land that has been used for cultivation. Most of the flora was removed by the constant effects of floods and some were cleared by farmers for purposes of cultivating crops during farming season. A number of management initiatives shall be implemented to reduce further potential impacts and disturbance to flora and vegetation. These include clearly marking and restricting access to areas of high conservation value; concentrate the farming operations to already cleared land for cultivation purposes.

1.5 Wildlife and Fauna habitats

Due to previous farming and other anthropogenic activities in the project area, the area has minimum large animals that will be disturbed or likely to migrate due to the farming activities to be undertaken Desert Lusu Salk Sugar. However, in the event that the small identified animals are threatened, it is most likely that the species will tend to migrate from the areas of greatest activity during site preparation and operation but will return during the night and more stable years of the operations. The selected potential impacts on fauna will be reduced by restricting disturbance and clearing of habitats to the minimum required for safe and efficient operations of the farm and progressively rehabilitating disturbed areas to re-establish habitats for the animals.

1.6 Bush fires

The impact of bush fires is more significant in the dry season as the risk of flora and fauna disturbance and threat is high. This is so because the flora and grass are dry and of little moisture likely to provide more means of fuel for ignition. Other than ignition, and fuels, other factors such as season, wind pattern and proximity with human settlements will play an important role in open burning. Such factors will need to be ascertained as appropriate timing of burning may facilitate a good burn and at the same time

minimize air pollution impact. Consideration of the regional factors will enable classification of the area in terms of air pollution risks. All workers will be warned of the dangers of deliberate ignition of fires and its impact on wildlife, crops and other natural resources.

1.7 Noise and vibrations

Operation of machinery at the farm will have little impact on the local surrounding community as the noise levels to be emitted will be within the acceptable audible levels. The settlements around the farm are at reasonable distances unlikely to receive destructive noise levels. The team will also ensure that only well serviced machinery, trucks and tractors are used to avoid generating noise levels that are above the recommended limit. Operations will be limited to day time only.

1.8 Employment and conditions of service

Desert Lusu Salk Sugar will employ up close to +-1000 workers at full implementation of the project. In accordance with its employment policy, this will constitute thirty (30%) of women. The company will uphold the government directive under the labour laws to pay all workers the stipulated minimum wage. Further, the company will observe all labour related regulations pertaining to normal working hours and other conditions of employment.

1.9 Cultural and Historic Sites

Lusu Sugarcane plantation farm have no cultural, historical or archaeological sites within the farm area that may be disturbed by the project implementation from pre-construction to decommissioning phases.

2. THE IMPLEMENTATION OF THE ENVIRONMENTAL MANAGEMENT PLAN (EMP)

Table below outlines the management of the environmental elements during the planning and operational phases. Section 2 provides a brief summary of the management of the farming project. Contents of these tables could be incorporated into a HSEQ management system. The proponent would be responsible to assign the responsibilities and ensure that the tasks are executed

Environmental Aspect	Objectives	Monitoring frequency	Mitigation and enhancement measures	Responsible person	Monitoring costs (N$)
PREPARATION & CONSTRUCTION PHASE					
Surface Water Quality	To protect contamination of storm water.	Seasonal	Construction of proper drains alongside access roads and drains within the farm land and operation areas.	Operations Director	4,200
Ground Water Quality	To protect ground water contamination from oil spills and chemical run off.	Quarterly	Drip trays will be used when removing used oils from equipment waiting servicing.	Farm Manager	3,400
			Fuel storage tanks will be placed in a banded wall and concreted surface. The bunding shall have a volume equivalent to 110% the volume of the fuel tank. A sump shall be constructed in such a way as to drain any oil that has spilled	Farm Manager	
			Used oil storage facility shall be kept under lock and key, concreted and bunded	Farm Manager	
			Drainage systems in the farm will be constructed to prevent chemical runoff during irrigation and rainy season	Farm Manager	
Drawdown	To reduce the impact of draw down.	During borehole drilling & test pumping	Boreholes shall be located and drilled in such a way as not to increase the impact of drawdown. Boreholes will be sighted in areas within the farm away from shallow wells to protect shallow wells from drawdown.	Farm Manager	

Ambient Air Quality	Reduction of gas and fumes from borehole drilling and diesel machines	Quarterly	Diesel equipment to be equipped with gas absorbers	Farm Manager	2,200
			Use of low Sulphur content fuel (diesel) will be prioritised	Farm Manager	
	Suppression of dust from construction sites and access roads	Weekly	The farm shall have a water bowser which shall be used to suppress dust on the main road and other access roads and construction sites where there is dust.	Farm Manager	
			If available molasses will be sprayed on roads and construction sites to suppress dust formation. Emissions and dust levels will be monitored by way of periodical air sampling using mobile dragger pump. Results will be submitted to DEA quarterly.	Farm Manager	1,400
Soil Contamination	To protect soil from contamination from fresh and used oil spills, and fuel.	Quarterly	Refuelling & repair of construction equipment will be done in designated areas and periodic maintenance will be done on all equipment to avoid oil leaks getting into the soil	Farm Manager	
			Drip trays will be used in maintenance areas to drain used oil from equipment.	Farm Manager	
			Fresh and used oil will be stored in separate and lockable shades whose floors shall be concreted	Workshop manager	
			A bioremediation plan shall be established for the purpose bioremediation of oil contaminated soils.	Farm Block Manager	3,000

Soil Erosion	To protect the soil from erosion	Monthly	Storm water drains will be constructed around construction sites to collect storm water and there by prevent soil erosion	Farm Manager	
			Access roads and the plant periphery will be left with trees and this will protect soil erosion	Farm Manager	
Noise	Minimise Noise to acceptable levels	Monthly	All farm equipment will be subject to a routine maintenance to ensure they are in good working order, hence minimising noise levels. Restrict operations to day time only.	Farm Manager	
			Employees shall wear ear muffs or ear plugs and other necessary Personal Protective Equipment (PPE).	Farm Manager	3,000
	To protect workers from noise exceeding acceptable levels	Monthly	Periodical monitoring of noise levels shall be conducted.	Farm Manager	
			Selection of low noise level equipment when purchasing farm and workshop equipment will be first priority.	Farm Manager	
			Trees along access and periphery roads shall left intact to shield and reduce noise levels	Farm Manager	
Land Use	To rehabilitate the farm area and try to restore to its original state.	Annually	The mitigations here shall only come at closure. Buildings like the farm house, workers houses, fuel storage facility, used oil storage shed and the mini workshop will be demolished, area cleared and rehabilitated. The centre pivot shall be removed and the other irrigation equipment	Operations director	1,000

			removed also. Pumps shall be roved and boreholes caped. The farm land shall be re-vegetated and or allowed to naturally re-vegetate.		
Flora	To protect the local flora where possible.	Quarterly	The project will be implemented mostly to utilise spaces or land which was already cleared in the farm blocks	Farm Manager	1,800
Fauna	To protect local fauna.	Quarterly	Noticed fauna in the proposed project site will be preserved by taking it to areas that will remain undisturbed.	Farm Manager	1,200
Archaeology and cultural sites	To protect cultural heritage from damage	Project Inception	Any cultural heritage site discovered during construction will be preserved and the cultural heritage commission informed accordingly.	Farm Manager	1,500
Public Safety	To minimise health and safety risks.	Quarterly	Pre-employment and regular medical examinations will be carried out on all farm employees to ascertain their health.	Farm Manager	1,450
			All plant equipment will be subject to a routine maintenance programme to ensure they are in good working order, hence minimising health and safety risks.	Farm Manager	
			All workers including contractors will be subject to wearing appropriate personal protective equipment (PPE) depending on the work type and place	Farm Manager	
			All workers to go through safety and health inductions upon employment.	Farm Manager	

	To protect members of the public from hazards associated with construction activities.		Only authorised workers will be allowed to enter construction areas. No members of the public will be allowed to enter construction sites as well as the farm premises	Farm Manager	
			"Danger" warning signs to be placed in different points along the boundary of the farm and along the access road.	Farm Manager	
			Warning signs to be written in symbols, English and Vernacular language for easy interpretation.	Farm Manager	
Landscape and Visual characteristics	To protect visual characteristics of the landscape.	Project inception	Where there shall be no roads and buildings, the visual characteristics of the landscape shall not be altered.	Farm Manager	1,100
Hazardous Waste	To safely keep generated hazardous waste and dispose of appropriately	Throughout Project	Used oil and used batteries storage areas shall be constructed according to environmental guidelines. Lockable, concreted and bunded shed shall be constructed.	Farm Manager	1,200
Sewerage Waste	To protect sewer waste from contaminating the soil and or ground water	Throughout Project	A septic soak way system shall be constructed to treat sewer waste since farming block & surrounding areas are not serviced by municipal infrastructure	Farm Manager	1,250
Solid Waste	Dispose solid waste at construction site accordingly	Throughout Project	Metallic and timber off cuts will be stored in designated areas and sold or given to authorised scrap metal dealers or given to the locals for domestic use.	Health officer	1,450

			Cement empty bags and containers will be re-used or returned to supplier for re-use.	Farm Manager	
Occupational health and safety issues	Protection and safety of workers during construction	Throughout the project	Number of construction workers provided with protective equipment such as helmets, safety shoes, gloves and eye glasses as appropriate. Number of injuries, lost days, and fatalities of construction workers and others.	Contractor's Occupational Health and Safety Officer	1,450
Loss of residential & business housing units, and other properties	Compensation for loses	Construction phase	Pay compensation for the affected properties based on the current market value or according to the Regulations	Developers (Desert Lusu Salk Sugar)	Upon evaluation of the loses& agreement
Loss of farmlands	Compensation for loses	Construction phase	Pay compensation for the loss of income benefits from affected farmlands according to the Regulations	Developers (Desert Lusu Salk Sugar)	Upon evaluation of the loses & agreement
OPERATIONAL PHASE					
Surface and ground Water Quality	To protect contamination of surface and ground water	Quarterly	Proper maintenance of storm water drains along access roads and drains within the farm land	Operations Director	
			The transport of hazardous materials to and from farm will be done in accordance with laid down procedures. Requirements will Include: documentation and inventory control through chain of custody; emergency response training for spills.	Farm Manager	

			Only designated transport routes shall be used to transport chemicals such as fertiliser, fungicides, herbicides, fuel, used oil, fresh oil, lime and pesticides to and from the farm.	Farm Manager	
			Contracted transporters of chemicals shall be licenced with Ministry of Mines & Energy	Farm Manager	
			Contracted transporters of petroleum products shall be licenced with the Energy Regulation Board	Farm Manager	
			Application of fertilisers, fungicides, pesticides and herbicides will be in accordance will the law and guidelines.	Farm Manager	
Drawdown	To protect the locals from being affected by the effect of drawdown on their water supply wells.	Monthly	A drawdown monitoring programme will be put in place	Farm Manager	
			Locals will be informed how far from the farm should they put their wells.	Farm Manager	
			Boreholes in the farm to located far away from residential areas where locals are likely to put boreholes. A minimum of 300 metres away is recommended.	Farm Manager	
Ambient Air Quality	To prevent contamination of air due to dust emissions	Quarterly	The farm shall have a water bowser which shall be used to suppress dust on access roads and construction sites where there is dust.	Farm Manager	1,250

	from vehicles and trucks operating on dirt roads		If available molasses will be sprayed on roads and construction sites to suppress dust formation	Farm Manager	
	Low fume and gas emissions		Trees will be left along access roads and on the periphery of the proposed project site to act as a wind breaker and thereby reduce dust levels	Farm Manager	
			Diesel equipment to be equipped with gas absorbers	Farm Manager	
Soil	Protection of soil from contamination by hazardous waste	Quarterly	Hazardous waste shall be kept in a lockable, concreted and bunded storage facility	Farm Manager	
	Protection of Soil from contamination by fertiliser, pesticides, fungicides and herbicides	Quarterly	Pesticides. Herbicides, fertiliser and fungicides shall be kept in a properly constructed area with proper ventilation, concreted floor, bunded and lockable shed	Farm Manager	
			Application of these chemicals shall follow the right procedures	Farm Manager	
Soil Erosion	To protect the soil from erosion	Quarterly	Storm water drains will be periodically maintained to collect storm water and there by prevent soil erosion.	Farm Manager	
			Access roads and the plant periphery will be left with trees and this will protect soil erosion	Farm Manager	

Noise	To minimise noise levels to acceptable levels	Quarterly	All farm equipment will be subject to a routine maintenance programme to ensure they are in good working order, hence minimising noise levels.	Farm Manager	1,450
	To protect workers from noise exceeding acceptable levels		Employees will wear appropriate ear protection in workplaces where noise levels exceed the minimum requirement Desert Lusu Salk Sugar management will enforce the use of PPE in the farm.	Farm Manager	
			Trees left along access roads and the farm periphery will not only act as a wind breaker but also sound proof.	Farm Manager	
Land Use	Protect land from being used in other ways	Throughout project life	The Lusu farm will be strictly for commercial farming of crop, vegetables and other items such as soya beans, wheat, maize. Any other use will be prohibited.	Farm Manager	
Flora	To protect the local flora where possible	Throughout project life	All the trees left after the construction phase shall not be cut for whatever reason. A procedure for cutting of trees shall be put in place. Progressive planting of trees shall be carried out and encouraged in areas where trees had been carelessly cut.	Farm Manager	
	Extinction of endangered plant species.		Identified Endangered plant species shall be preserved and planted elsewhere at all costs if possible.	Farm Manager	
	Protection from introduction of invasive species		No invasive or alien species shall be introduced on this farmland in accordance with the invasive species act.	Farm Manager	

Fauna	To protect local fauna.	Throughout project life	Noticed fauna in the proposed project sites will be preserved relocating it to areas that will remain undisturbed	Farm Manager	
Archaeology and cultural sites	To protect cultural heritage from damage	Throughout project life	Any cultural heritage site discovered during operational phase other than the existing grave site will be preserved and the cultural heritage commission informed accordingly	Farm Manager	
Public Safety	To minimise health and safety risks.	Throughout project life	Pre-employment and regular medical examinations will be carried out on all farm employees	Farm Manager	3,000
	To protect members of the public from hazards associated with construction activities		All plant equipment will be subject to a routine maintenance programme to ensure they are in good working order, hence minimising health and safety risks	Farm Manager	
			All workers whether contractor or not will be subject to wearing appropriate personal protective equipment (PPE) depending on the work type and place	Farm Manager	
			All workers to go through safety and health inductions when just employed	Farm Manager	
	To protect members of the public from hazards associated with construction activities	Throughout project life	Only authorised workers will be allowed to enter construction areas. No members of the public will be allowed to enter construction sites.	Farm Manager	
			"Danger" warning signage to be placed in different points along the boundary of the farm.	Farm Manager	

			Warning signs to be written in symbols, English and vernacular language.	Farm Manager	
Landscape and Visual characteristics	To protect visual characteristics of the landscape	Throughout project life	Where there shall be no roads and buildings, the visual characteristics of the landscape shall not be altered	Farm Manager	
Loss of farm and grazing lands	Compensation to loses	Throughout the project	Pay compensation for loss of land, structures, and income benefits from affected lands	Developers (Desert Lusu Salk Sugar)	
Hazardous Waste	To safely store and handle generated hazardous waste	Throughout project life	Used oil and batteries storage areas shall be maintained according to environmental guidelines. Lockable, concreted and bunded shed shall be used.	Farm Manager	
Sewerage & effluent Waste	To protect sewer waste from contaminating the soil and/or ground water	Throughout project life	A septic soak way system shall be used to treat sewer waste. HDPE lined effluent ponds will be constructed on the farm for bio-treatment of effluent.	Farm Manager	
Solid Waste	Disposal of solid waste	Throughout project life	Biomass from the plants will be stored and energy generation options evaluated	Farm Manager	
			Domestic solid waste will be disposed of at the Katima Mulilo disposal site in accordance with the waste management regulations	Farm Manager	

Unforeseen impacts	Unexpected impacts	Throughout project life	Identify unforeseen socio-environmental impacts of the project and propose remedial measures and/or Advise construction contractor regarding unforeseen environmental issues of the project	Farm Manager	
DECOMMISSIONING AND CLOSURE PHASE					
Ambient Air Quality	Contamination of ambient air with dust	Quarterly	Progressive and natural re-vegetation shall be done and this will protect land from winds and that result into generating of dust.	Farm Manager	
Soil Erosion	To protect the soil from erosion	Quarterly	Storm water drains will be periodically maintained to collect storm water and there by prevent soil erosion	Farm Manager	
			Access roads and the plant periphery will be left with trees and this will protect soil erosion	Farm Manager	
Land Use	Change of land use	Bi-annual	Demolition of all surface infrastructures, grading and re-profiling of the surface and re-vegetation will be done. If possible, land use will change to the original one.	Farm Manager	
Public Safety	Danger to the community from farm equipment	Monthly	All farm equipment removed and infrastructure will be demolished. Areas requiring rehabilitation rehabilitated. Bore holes shall be caped.	Farm Manager	3,000
Landscape and Visual characteristics	Change to landscape and visual characteristics	Quarterly	Demolition of all surface infrastructures, grading and re-profiling of the surface and re-vegetation will change the landscape and visual characteristics	Farm Manager	

Solid Waste	Generation of Domestic Waste	Quarterly	Domestic solid waste will be disposed of at Katima Mulilo disposal sites according to the waste management regulations.	Farm Manager	
Sewerage Waste	To protect sewer waste from contaminating the soil and or ground water	Quarterly	A septic tank-soak way system shall be used to treat sewer waste	Farm Manager	

3. DECOMISSIONING PHASE

Upon the successful operation of the farm by Desert Lusu Salk Sugar, the closure objective will be to restore the farm site to its natural state. This will be a transitional change over a period of time in order to restore the land to its original state. Lusu Sugarcane plantation farm will have to be restored to a condition which is safe, stable and minimizes environmental impacts on the flora, fauna, water, and soil and air quality. The area must as a minimum not negatively affect the socio-economic status of the local residents close to the project areas. Other objectives of the closure plan are to:

1. Protect future human, flora and fauna health and safety.
2. Minimize or prevent biophysical and social environmental degradation.
3. As far as practical, return the site to the pre-farming land use (sustainable woodland) or another appropriate alternative, and
4. Minimize any adverse socio-economic impacts. Generally, closure objectives covering public health and safety, landform (soils) and vegetation will be developed as outlined in the table below.

Desert Lusu Salk Sugar intends to undertake the Sugarcane plantation farming project through the 25-year lease as stipulated by the Namibian government land Reform Act no 5 of 2002. All relevant local and regional regulatory bodies such as Namibian Environmental Management commission, Zambezi Regional Council, government departments and other relevant local authorities and/or interested parties will be informed beforehand when the event that Desert Lusu Salk Sugar decides to abandon the implementation of the project for any predicted or unforeseen circumstances. A detailed final closure plan will be submitted for approval to the Ministry of Environment, directorate of Environmental Affairs.

The following sections describe the activities to be undertaken by Desert Lusu Salk Sugar to successfully bring the project to a close taking into consideration all the environmental, physical and socio-economic impacts that may arise during this phase.

Dismantling of equipment and farm machinery

All the farm machinery, and auxiliary equipment on site will be dismantled to manufacturer specifications in a well-planned manner in order to avoid contamination of soil, air and water and to eliminate the physical hazards associated with the equipment and machinery to be dismantled and relocated

Movement of re-usable farm machinery

Desert Lusu Salk Sugar does not operate any other ventures in Namibia that will require the use of the machinery relocated from the Zambezi region Farm project. The machinery salvaged from Zambezi region farming units will be moved, lease or sold to an appropriate farming operation that will utilise the equipment.

Demolition of the Farm infrastructure

The administration building, storage, workshop, chemical stores, farm house, workers quarters and other concrete related infrastructure will be demolished accordingly. This will be done systemically in order to recover as much reusable construction material as possible. The rabble resulting from this demolition will be used to level the ground and refill and re-profile the septic tanks and soak away system that will be utilized as a sewerage management facility during the operation phase. General cleaning of the areas formerly occupied by the demolished structures will be conducted to be coupled with grading and levelling the ground to pave way for tree replanting.

Installation of warning signage and symbols

In order to maintain safety and reduce the risk of physical accidents from trespassers, the areas considered to pose accident risks will have warning signage installed to prevent injury and restrict access to the site. This will also be done for the main access road that traverses through the farm.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusion

Agricultural production has proven itself time and again as a powerful instrument for socio-economic development. Community farming and irrigation projects are important tool in alleviating poverty and providing alternative livelihoods, especially in Namibia's community areas with a low rate of unemployment.

These specific areas have a lot of potential as an agricultural crop production. And there is need for more some irrigation farm establishments that do not only provide economic benefits to the communities but also offer socio-economic benefits to the local communities with minimised ecological impacts.

Since the proposed site falls within the Zambezi region which is rated as a second poorest region according to the regional poverty profile (NPC, 2004) the surrounding communities can only benefit from the proposed agricultural in terms of increased long-term quality of life.

4.2 Recommendations

Development related impacts must be prevented or mitigated by implementing strict monitoring and control. All permits and approval must be obtained from the relevant ministries or authorities for the operation of the farm. It is imperative that the mitigation measures as set out in the ESMP be implemented during the planning (layout design) construction and operational phases to prevent unnecessary damage to the natural environment.

The ESMP should be added to all contractors' agreements and be signed by such contractors. The recommendations made in this report places the developer under a legal obligation to ensure that all mitigation measures are implemented and followed through during construction and operation of the farms

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