

APP-004474

**IRRIGATION BASED AGRICULTURAL AND THE CULTIVATION OF
GENETICALLY MODIFIED MAIZE ON FARM OLD SMITHFIELD, OSHIKOTO
REGION**

ENVIRONMENTAL MANAGEMENT PLAN



Assessed by:



Assessed for:

Adrenalin Safari CC

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Project:	IRRIGATION BASED AGRICULTURAL AND CULTIVATION OF GENETICALLY MODIFIED MAIZE ON FARM OLD SMITHFIELD OSHIKOTO REGION: ENVIRONMENTAL MANAGEMENT PLAN	
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Prepared for: (Proponent)	Adrenalin Safari CC P O Box 1432 Tsumeb	
Lead Consultant	Geo Pollution Technologies (Pty) Ltd PO Box 11073 Windhoek Namibia	TEL.: (+264-61) 257411 FAX.: (+264) 88626368
Main Project Team:	Quzette Bosman (BA. Geography/Sociology); (BA Environmental Management) André Faul (B.Sc. Zoology/Biochemistry); (B.Sc. (Hons) Zoology); (M.Sc. Conservation Ecology); (Ph.D. Medical Bioscience) Johann Strauss (BA. Geography/Psychology/Environmental Management) Stefan Short Health and Safety Supervisor/GIS Technician	
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1 BACKGROUND AND INTRODUCTION

Geo Pollution Technologies (Pty) Ltd was appointed by Adrenalin Safari CC (the Proponent) to undertake an environmental assessment and management plan for the existing and proposed agricultural activities on the Farm Old Smithfield No. 1233 located in the Abenab area of the Oshikoto Region. The main commercial activities of the Proponent are crop cultivation and livestock farming (mainly cattle). An additional planned activity by the Proponent is the cultivation of genetically modified (GM) maize. For purposes of crop cultivation, the Proponent utilizes approximately 137 ha for irrigation and dryland farming. Pending the outcome of a hydrogeological specialist study, the total hectares of land to be irrigated simultaneously, may be increased. Irrigation is from a production borehole by means of centre pivot irrigation systems.

2 ENVIRONMENTAL MANAGEMENT PLAN

The EMP provides management options to ensure impacts of the agricultural and related activities on the farming unit are minimised. An EMP is a tool used to take pro-active action by addressing potential problems before they occur. This should limit corrective measures needed, although additional mitigation measures might be included if necessary. The environmental management measures are provided in the descriptions below. For the GMO specific management plan please refer to the EIA. These management measures should be adhered to during the execution of various activities on the farming unit. All personnel taking part in the operations of the farm should be made aware of the contents of this section, so as to plan the operations accordingly and in an environmentally sound manner.

The objectives of the EMP are:

- ◆ to include all components related to operational and possible construction activities of the farming unit;
- ◆ to prescribe the best practicable control methods to lessen the environmental impacts associated with the farm;
- ◆ to monitor and audit the performance of operational personnel in applying such controls; and
- ◆ to ensure that appropriate environmental training is provided to responsible operational personnel.

2.1 IMPLEMENTATION OF THE EMP

Various potential and definite impacts will emanate from the operations, maintenance/construction and decommissioning phases. The majority of these impacts can be mitigated or prevented. The impacts, risk rating of impacts, as well as prevention and mitigation measures are listed below.

As depicted in the tables below, impacts related to the operational phase are expected to mostly be of medium to low significance and can typically be mitigated to have a low significance. The extent of impacts are largely site specific to local and are not of a permanent nature. Due to the nature of the surrounding areas, cumulative impacts are possible and the most important of these are potential groundwater and biodiversity/ecological impacts.

2.1.1 Planning

During the phases of planning for the operations, maintenance/construction and decommissioning of the farming unit, it is the responsibility of the Proponent to ensure they are and remain compliant with all legal requirements. The Proponent must also ensure that all required management measures are in place prior to, and during all phases, to ensure potential impacts and risks are minimised. The following actions are recommended for the planning phase and should continue during all other phases of the project:

- ◆ Ensure that all the necessary permits from the various ministries, local authorities and any other bodies that governs the operations, maintenance/construction and decommissioning activities on the farm remain valid. These include the water abstraction permit, consumer installation certificate and permit for environmental release of GM maize.
- ◆ Ensure all appointed contractors and employees enter into an agreement, which includes the EMP. Ensure that contractors, sub-contractors, employees and all personnel present on site understand the contents of the EMP.
- ◆ Make provisions to have a Health, Safety and Environmental (HSE) Coordinator to implement the EMP and oversee occupational health and safety as well as general environmental related compliance.
- ◆ Make provision for a community liaison officer to deal with complaints.
- ◆ Have the following emergency plans, equipment and personnel on site, where reasonable, to deal with all potential emergencies:
 - EMP, risk management plan, emergency response plan and HSE manuals;
 - Adequate protection and indemnity insurance cover for incidents;
 - Procedures, equipment and materials required for emergencies (e.g. firefighting, first aid, etc.).
- ◆ Establish and maintain a fund for future ecological restoration, specifically for instances of environmental damage caused during operations including pollution remediation where required. Should project activities cease completely, and future land-use will not involve agriculture, the funds should be utilised to remove all redundant infrastructure and waste.
- ◆ Establish and/or maintain a reporting system to report on aspects of operations, maintenance/construction, and decommissioning as outlined in the EMP.
- ◆ Keep monitoring reports on file for bi-annual submission to MEFT in support of environmental clearance certificate renewal applications. This is a requirement by MEFT.
- ◆ Appoint a specialist environmental consultant to update the EA and EMP and apply for renewal of the environmental clearance certificate prior to expiry.

2.1.2 Revenue Generation in the Professional Sector

Consulting and professional services are engaged with for assistance in applications for new permits and renewal for existing permits such as the water permits, fuel storage and environmental clearance certificates. In addition, specialist irrigation systems, pumps and implements used by the agricultural project require specialist and professional services. Such services may further be extended to pest control for operations and accounting and legal services for administrative processes. All of these services are paid for and therefore the agricultural project contributes to revenue generation in the local and national sectors. In addition, during many of these processes, such as per the renewal of water permits, information is generated which informs and facilitates planning of the Proponent as well as affected parties and governmental agencies.

Desired Outcome: Contribution to national treasury and increased economic resilience in the local and national professional sector.

Actions

Enhancement:

- ◆ Contract local Namibians where possible.
- ◆ Adhering to permit conditions on reporting.
- ◆ Deviations from this practice must be justified.

Responsible Body:

- ◆ Proponent

Data Sources and Monitoring:

- ◆ Service providers' contracts or agreements or records be kept.
- ◆ All reporting, monitoring and information sharing records kept on file.

2.1.3 National Development Goals: Water, Agriculture and Land use Planning

The agricultural project pins down key development goals and challenges which were identified as part of the Namibian development goals. It may be considered as an agricultural / irrigation project which aims at generating income from foreign sectors by providing the most value per resource (water, soil & labour). In addition, the project is located in line with the regional planning initiatives which identified the location as an area for irrigation development. The project will further contribute to the national climate change combatting initiatives through crop diversification and proposed resilient crop cultivation. Developing of the agricultural sector was identified as one of the core plans within the NDPs for Namibia. The agricultural project therefore is considered to be a positive contributor to achieving national development goals.

Desired Outcome: Continued contribution to the development of the Region as well as implementation of project activities in line with NDPs and Vision 2030.

Actions

Enhancement:

- ◆ Liaison with regional and national governmental agencies through appropriate financial and social responsibility reporting.
- ◆ Increase recycling initiatives and incorporate additional greenhouse gas reduction activities such as conservation tillage and climate smart agriculture.
- ◆ Infrastructure maintenance and development such as, road servitude, water- and sanitation system developments (provision to employees) and node development. Where possible, public and private partnership regarding projects should be considered.

Responsible Body:

- ◆ Proponent

Data Sources and Monitoring:

- ◆ All project contributions towards regional development, inclusive of communications held with relevant authorities, to be kept on file.
- ◆ Monitoring of borehole water levels and water abstraction (monthly) and submit to the relevant custodian on a quarterly basis.

2.1.4 Skills and Development

During the operations and maintenance/construction phases, some training is provided to a portion of the workforce, to allow them to conduct certain tasks according to the required standard. Skills are transferred to an unskilled workforce for general tasks and irrigation-related operations. Development of people and technology are key to economic development and the success and safety of operations. The Proponent plays a role in promoting and sustaining the agricultural industry in the area.

Desired Outcome: To see an increase in skills of local Namibians, as well as development and technological advancements in the agricultural industry.

Actions

Enhancement:

- ◆ Sourcing of employees and contractors must first be at local level and if not locally available, regional or national options should be considered. Deviations from this practice must be justified.
- ◆ Skills development and improvement programs must be made available as identified during performance assessments of employees.
- ◆ Inform employees about parameters and requirements for references upon employment.
- ◆ Provide managerial references for unofficial training or skills transfer.

Responsible Body:

- ◆ Proponent
- ◆ Contractors

Data Sources and Monitoring:

- ◆ Keep records of all training provided to employees.
- ◆ Ensure that all training is certified or managerial references provided (proof provided to the employees) inclusive of training attendance, completion and implementation.
- ◆ Include all information in a bi-annual report.

2.1.5 Revenue Generation and Employment

Skilled and unskilled labour are required for the operations and maintenance/construction activities associated with the farm. Livelihoods are thus sustained and the spending power of the local community increased. Revenue is generated through the sale of products (such as maize and vegetables) on national and international markets. Planting of certain GM crops, such as Round-Up Ready maize, can lead to reduced labour requirements to perform certain tasks (e.g. manual hoeing of weeds). This may offset possible job losses resulting from the planting of GM crops. Planting of the GMO crops will require less input in terms of pesticide application (including fuel and water) and labour, depending on the GM events planted. Therefore, producers will make time available for additional revenue generating activities to be considered. Many of the farming units in Namibia have diverse agricultural production units, which include agronomy, livestock farming, charcoal production and tourism.

Desired Outcome: Contribution to national treasury and provision of employment to local Namibians.

Actions

Enhancement:

- ◆ The proponent must employ local Namibians where possible.
- ◆ If the skills exist locally, employees must first be sourced from the area, then the region and then nationally.
- ◆ Deviations from this practice must be justified.
- ◆ Opportunities for additional income generating activities to be investigated in order to sustain employment.
- ◆ Where feasible, employment of the same seasonal and/or temporary workforce year on year.

Responsible Body:

- ◆ Proponent

Data Sources and Monitoring:

- ◆ Bi-annual summary report based on employee records.

2.1.6 Demographic Profile and Community Health

Farming activities rely on labour. Jobseekers migrating to the Tsumeb area may lead to increased unemployment and expansion of informal settlements. Here, factors such as communicable disease like HIV/AIDS as well as alcoholism and drug abuse may thrive. These are typically aggravated when an influx of seasonal workers, and possible foreign construction teams and contractors, occur. An increase in foreign people in the area, linked to unemployment, may potentially increase the risk of criminal and socially/culturally deviant behaviour. However, since the farming unit is well established with an existing employee base, it is not foreseen that the project will result in significant migration to the Tsumeb area.

Desired Outcome: To prevent the occurrence of social ills and prevent the spread of diseases such as HIV/AIDS.

Actions:

Prevention:

- ◆ Appointment of reputable contractors where applicable.
- ◆ Adhere to all local authority by-laws relating to environmental health, which includes, but is not limited to, sanitation requirements for employees.
- ◆ Provide educational, awareness information for employees on various topics of social behaviour and HIV/AIDs.
- ◆ Disciplinary steps, within the legal parameters of Namibia, to be taken for socially deviant behaviour at the employee-housing compound or during working hours should be clearly stipulated in employment contracts.

Mitigation:

- ◆ Take disciplinary action against employees not adhering to contractual agreements with regard to socially deviant behaviour (e.g. alcohol or drug abuse during working hours).

Responsible Body:

- ◆ Proponent

Data Sources and Monitoring:

- ◆ Summary report based on educational programmes and training conducted.
- ◆ Employee contracts on file.
- ◆ Bi-annual report and review of employee demographics.

2.1.7 Agricultural Produce

The project is in line with the objectives of Namibia's NDPs and contributes to the economy of, and food security in, Namibia. Locally produced crops decrease the amount of crops that needs importing. GMO cultivation has the potential to safeguard crops against pests, thereby increasing the overall yield. This could (considering GMO maize), increase the amount of food available locally, if and when such crops are plagued by pests. The overall gain would be an increase in food security.

Desired Outcome: Maximum contribution to the food security and economy of Namibia. Provide a positive contribution to the trade balance of Namibia by reducing the amount of imported produce and exporting higher value products.

Actions:

Enhancement:

- ◆ Teach employees on sustainable farming practices to enable the spread of knowledge and skills and thereby increase the productivity of small-scale farming as well.
- ◆ Diversification and continuous improvement to maximise sustainability of the farm.

Responsible Body:

- ◆ Proponent

Data Sources and Monitoring:

- ◆ Bi-annual report on educational programmes and training conducted.

2.1.8 Traffic

Potential traffic impacts will mostly be limited to the turnoff from the main road to the farm. Traffic is mostly related to the transport of staff, the delivery of fertilizers and seed, as well as the transport of crops to markets. As this is an existing operation, an increase in traffic impacts is expected to be unlikely. The turnoff from the C42 main road to the farming unit is a key section of concern. As this is an existing operation, an increase in traffic impacts is expected to be unlikely in the near future. The farming unit accommodates one power line, therefore access to the farm is also open to government officials. Additional and uncontrolled access to the farming unit will result in enhancing the potential security risk related to poaching and farm attacks.

Desired Outcome: Minimum impact on traffic and no transport or traffic related incidents.

Actions

Prevention:

- ◆ Erect clear signage regarding access and exit points at the farm as well as speed limits on the gravel roads within the farm where required.
- ◆ Only licenced drivers who are well trained to be allowed on the national roads.

Mitigation:

- ◆ If any traffic impacts are expected, possibly as a result of delivery of equipment or construction material, traffic management should be performed.

Responsible Body:

- ◆ Proponent

Data Sources and Monitoring:

- ◆ Record all traffic related complaints and the actions taken to prevent impacts from repeating itself.
- ◆ Compile a bi-annual report of all incidents reported, complaints received, and actions taken.

2.1.9 Health, Safety and Security

Daily operational and intermittent maintenance and construction activities on the farm are reliant on human labour. Such activities have varying degrees of health and safety risks. Examples include the operation of vehicles and machinery with moving parts, such as harvesters, and the handling of hazardous chemicals with inherent health hazards, such as pesticides and fuel, when ingested, inhaled or physical contact occur. Encounters with wild animals, and especially venomous species like snakes, may pose risks to employees. Security risks relates to unauthorized entry on the farming unit, theft and sabotage.

Desired Outcome: To prevent injury, health impacts and theft.

Actions

Prevention:

- ◆ Implement and maintain an integrated health and safety management system, to act as a monitoring and mitigating tool.
- ◆ Comply with all health and safety standards as specified in the Labour Act and related legislation.
- ◆ Clearly label dangerous and restricted areas as well as dangerous equipment and products.
- ◆ Lock away or store all equipment and goods on site in a manner suitable to discourage criminal activities (e.g. theft).
- ◆ Provide all employees with required and adequate personal protective equipment (PPE) where required.
- ◆ Ensure that all personnel receive adequate training on the operational procedures of equipment and machinery and the handling of hazardous substances.
- ◆ Train selected personnel in first aid and ensure first aid kits are available on site.
- ◆ The contact details of all emergency services must be readily available.
- ◆ Implement a maintenance register for all equipment whose malfunction can lead to injury or exposure to hazardous substances.
- ◆ Apply and adhere to all industry specific health and safety procedures and regulations applicable to the handling of food produce for markets.

Mitigation:

- ◆ Treat all minor work related injuries immediately and obtain professional medical treatment if required.
- ◆ Assess any safety problems and implement corrective action to prevent future occurrences.

Responsible Body:

- ◆ Proponent
- ◆ Contractors

Data Sources and Monitoring:

- ◆ Record any incidents with the actions taken to prevent future occurrences.
- ◆ Compile a bi-annual report of all incidents reported. The report should contain dates when training was conducted and when safety equipment and structures were inspected and maintained.

2.1.10 Fire

Construction activities, failing electrical infrastructure, lightning and fires outside of designated areas may increase the risk of the occurrence of uncontrolled fires which may spread into the nearby fields and surrounding farms. Lightning may cause natural fires during the dry season. Farming operations do not present the same fire risk as operations which include charcoal production in the greater Abenab area. Uncontrolled fires which have generated in other areas will present a risk to existing and proposed operations.

Desired Outcome: To prevent property damage, avoid fires, possible injury and impacts caused by uncontrolled fires.

Actions:

Prevention:

- ◆ Prepare a holistic fire protection and prevention plan. This plan must include evacuation plans and signage, an emergency response plan and a firefighting plan.
- ◆ Personnel training (safe operational procedures, firefighting, fire prevention and responsible housekeeping practices).
- ◆ Ensure all flammable chemicals are stored according to material safety data sheet (MSDS) and SANS instructions and all spills or leaks are cleaned immediately.
- ◆ Maintain regular site, mechanical and electrical inspections and maintenance.
- ◆ Maintain firefighting equipment and promote good housekeeping.
- ◆ Clean and maintain firebreaks at strategic locations on the properties, especially where vulnerable to external fire.
- ◆ Notify the farmers' association as well as all surrounding farmers if planned burns (e.g. to create firebreaks) are planned.
- ◆ Allow fires used for purposes such as cooking (by staff) in designated areas only.

Mitigation:

- ◆ Implement the fire protection and firefighting plan in the event of a fire.
- ◆ Quick response time by trained staff will limit the spread and impact of fire.

Responsible Body:

- ◆ Proponent
- ◆ Contractors

Data Sources and Monitoring:

- ◆ Maintain a register of all incidents on a daily basis. Include measures taken to ensure that such incidents do not repeat themselves.
- ◆ Compile a bi-annual incidents report. The report should also contain dates when fire drills were conducted and when firefighting equipment were tested and training given.

2.1.11 Noise

Noise is generated by various operational and possible construction activities. Machinery like generators, machinery, vehicles and harvesters cause elevated noise levels that may result in hearing impairment after long term exposure. Activities are generally remote from receptors other than the Proponent, his employees and their families residing on the farming unit. The nature of the noise is related mainly to the ongoing operation (for maintenance records) and mechanical maintenance typically on a farm.

Desired Outcome: To prevent any nuisance and hearing loss due to noise generated.

Actions

Prevention:

- ◆ Follow Health and Safety Regulations of the Labour Act and/or World Health Organization (WHO) guidelines on maximum noise levels (Guidelines for Community Noise, 1999) to prevent hearing impairment.
- ◆ Regularly service all machinery to ensure minimal noise production.

Mitigation:

- ◆ Hearing protectors as standard PPE for workers in situations with elevated noise levels.

Responsible Body:

- ◆ Proponent
- ◆ Contractors

Data Sources and Monitoring:

- ◆ Health and Safety Regulations of the Labour Act and WHO Guidelines.
- ◆ Maintain a complaints register.
- ◆ Bi-annual report on complaints and actions taken to address complaints and prevent future occurrences.

2.1.12 Waste Production

Various waste streams result from the operational and possible construction and maintenance activities. Waste may include hazardous waste associated with hydrocarbon products and chemicals, as well as soil and water contaminated with such products. Construction waste may include building rubble and discarded equipment. Domestic waste will be generated by the residents and employees on the farm. Waste presents a contamination risk and when not removed regularly may become a health and/or fire hazard and attract wild animals and scavengers. Sewage is a form of liquid biological waste that needs disposal. Since no official waste disposal facilities, especially for hazardous waste, are available, all waste that cannot be re-used are burned at dedicated waste sites.

Desired Outcome: To reduce the amount of waste produced and prevent pollution and littering.

Actions

Prevention:

- ◆ Implement waste reduction measures. All waste that can be re-used/recycled must be kept separate.
- ◆ Ensure adequate temporary storage facilities for disposed waste are available.
- ◆ Prevent windblown waste from entering the environment.
- ◆ Prevent scavenging (human and non-human) of waste at the storage facilities.
- ◆ Educate employees on the importance of proper waste handling and disposal.

Mitigation:

- ◆ Waste should be disposed of regularly and at appropriately classified disposal facilities, this includes hazardous material (empty chemical containers and contaminated materials, soil and water)
- ◆ Discarded waste should be disposed of and burned regularly at a dedicated site to reduce health and pollution risks.
- ◆ Empty chemical containers that may present a contamination/health risk must be treated as hazardous waste. Workers should not be allowed to collect such containers for purposes of storing water or food. This can be achieved by puncturing or crushing such containers prior to disposal.
- ◆ Liaise with the applicable authorities regarding waste and handling of hazardous waste.
- ◆ Ensure all ablution facilities are connected to properly constructed septic tank systems to prevent groundwater contamination.

Responsible Body:

- ◆ Proponent
- ◆ Contractors

Data Sources and Monitoring:

- ◆ Maintain a register of disposal of hazardous waste. This should include type of waste, volume as well as disposal method/facility.
- ◆ Record any complaints received regarding waste with notes on actions taken.
- ◆ All information to be included in a bi-annual report.

2.1.13 Ecosystem and Biodiversity Impact

Agriculture and related activities are ongoing at the farming unit. Possible expansion is planned on existing cleared areas and no further impacts on vegetation are thus expected from additional land clearing. Pollution of the environment may however impact on the ecosystem and biodiversity. Poaching and illegal collection of plant and animal materials may occur. Irresponsible pesticide use, for example as method of vermin control, may impact on scavengers such as vultures and in the long run on top predators through biomagnification in higher trophic levels. Pesticides by nature are harmful to the environment, planting Bt crops that targets specifically Lepidopterans, reduce the need for spraying insecticides. This result in an increased biodiversity as compared to fields treated with traditional insecticides. Over abstraction of groundwater may detrimentally affect endemic species linked to the groundwater and related caves.

Desired Outcome: To avoid pollution of, and impacts on, the ecological environment.

Actions.

Prevention:

- ◆ Strictly adhere to pesticide application instructions and use pesticides only for the purposes for which it is registered and marketed. Importantly, pesticides should not be used to kill vermin unless specifically registered for that purpose, and even then alternative, environmentally friendly methods should be investigated and used.
- ◆ Prevent pesticides from ending up in the hands of potential poachers.
- ◆ Educate all contracted and permanent employees on the value of biodiversity and strict conditions prohibiting harvesting and poaching of fauna and flora must be part of employment contracts. Include prohibitions or regulations on the collection of firewood.
- ◆ Regular inspection of fences, game footpaths and other sites for snares, traps or any other illegal activities.
- ◆ Prevent spray drift by applying pesticides during calm weather conditions.
- ◆ Proper training of operational personnel.
- ◆ Over-abstraction of groundwater may potentially have devastating effects on plant and animal populations reliant on it. It not only include the drying up of springs, dying of trees and migration or dying of animals but also the lowering of cave water levels.
- ◆ Ensure all waste oil handling is conducted on impermeable or bunded areas.

Mitigation:

- ◆ For construction activities, if any, contain construction material to a designated laydown area and prevent unnecessary movement out of areas earmarked for clearing and construction.
- ◆ Report any extraordinary animal sightings to the Ministry of Environment, Forestry and Tourism.
- ◆ Prevent scavenging of waste by fauna.
- ◆ Take disciplinary action against any employees failing to comply with contractual conditions related to poaching and the environment.

Responsible Body:

- ◆ Contractor
- ◆ Proponent

Data Sources and Monitoring:

- ◆ Report on all extraordinary animal or plant sightings or instances of poaching.
- ◆ Keep frequent records of borehole water levels and abstracted water volumes to identify any trends or consistent reduction in water levels.
- ◆ Compile a bi-annual report on all monitoring results.

2.1.14 Groundwater, Surface Water and Soil Contamination

Leakages and spillages of hazardous substances from vehicles, waste oil handling and accidental fuel, oil or hydraulic fluid spills during the operational phase may contaminate the environment. Increase of nutrient levels (from over application of fertilizers or pesticides) in the soil that can leach to the groundwater. Volumes of pesticides used are in fact lower for GM crops, especially for insecticides. Pollution due to sewerage system overflow or leakage may further put the groundwater at risk.

Desired Outcome: To prevent the contamination of groundwater, surface water and soil.

Actions

Prevention:

- ◆ Appoint reputable contractors.
- ◆ Vehicles may only be serviced on a suitable spill control structure.
- ◆ Regular inspections and maintenance of all vehicles to ensure no leaks are present.
- ◆ All hazardous chemicals and fuel should be stored in a sufficiently bunded area, as per MSDS requirements.
- ◆ Ensure all waste oil handling is conducted on impermeable or bunded areas.
- ◆ Follow prescribed dosage of fertilizers and pesticides / herbicides and to avoid over application.
- ◆ Maintain sewerage systems and conduct regular monitoring.
- ◆ All hazardous waste must be removed from the site and disposed of timeously at a recognised hazardous waste disposal facility, including any polluted soil or water.

Mitigation:

- ◆ All spills must be cleaned up immediately.
- ◆ Consult relevant Material Safety Data Sheet (MSDS) information and a suitably qualified specialist where needed.

Responsible Body:

- ◆ Proponent
- ◆ Contractors

Data Sources and Monitoring:

- ◆ Maintain Material Safety Data Sheets for hazardous chemicals.
- ◆ Soil should be sampled and analysed annually to ensure the correct amounts of fertilizer is applied and soil and groundwater quality is maintained.
- ◆ Groundwater should be sampled and analysed to test for nitrate concentrations from the fertilizer and for traces of chemicals used in pesticides and herbicides.
- ◆ Registers be kept by the Proponent on the type, quantities and frequency of application of fertiliser, pesticides and any other chemicals utilised in crop production.
- ◆ A register of all incidents must be maintained on a daily basis. This should include measures taken to ensure that such incidents do not repeat themselves.
- ◆ All spills or leaks must be reported on and cleaned up immediately.

2.1.15 Groundwater Abstraction

Groundwater abstraction is a very sensitive topic in a dry country where the value of land is drastically reduced if no or unusable groundwater is present on the land. Abstraction of groundwater must be done in a sensible way not to impact on other groundwater users that depend on such groundwater. This includes water abstracted for human and animal use, irrigation, and also ecosystems that depend on groundwater.

In a typical groundwater environment, a water balance would consist of inflow and outflow of the groundwater system. Over time, an equilibrium (or steady state) is normally reached with rising water tables following good recharge events and declining water tables when recharge is below average. Inflow into the system would typically be from infiltration following rainfall in the area and in upstream areas. Outflow would be comprised of water leaving the system through springs and as outflow over the lower boundary of the groundwater system as well as evapotranspiration losses. Groundwater abstraction through boreholes is important as this is normally necessary to sustain human and animal demands where such users became essentially dependant on the abstracted groundwater as a reliable and sustainable source.

Typical consequences of over abstraction will include a lowering in the water table. This may further lead to the drying up of boreholes, springs, and shallow wells. Vegetation will also be impacted where such vegetation has access to groundwater.

Desired Outcome: To utilise the groundwater sustainably.

Actions

Prevention:

- ◆ Spread the water abstraction points over a larger area to diffuse the impact.
- ◆ Monthly water level monitoring.
- ◆ Maintain safe abstraction rates prescribed by test pump evaluations (an abstraction permit with prescribed rates from the MAWLR is a requirement for this project).

Mitigation:

- ◆ Reduce abstraction when the water levels nears 5 m below the average rest water level of each borehole.

Responsible Body:

- ◆ Proponent

Data Sources and Monitoring:

- ◆ Monthly boreholes rest water level monitoring.
- ◆ Baseline values should be reviewed every three years based on all historic water level data.
- ◆ A summary report on all monitoring results must be prepared.
- ◆ The Proponent supply monitoring returns to the MAWLR, as required by the permit.

2.1.16 Visual Impact

This impact relates to the aesthetic appearance of the site during operations. This impact will be minimal due to the area already being disturbed and widely utilised for agricultural activities. The impact will therefore mostly relate to poor housekeeping and waste not disposed of timeously. Operations at the farm are well kept with the highest standard of neatness and cleanliness exhibited throughout all components of the operations, inclusive of employee housing.

Desired Outcome: To minimise aesthetic impacts associated with the farm.

Actions

Mitigation:

- ◆ Regular waste disposal, good housekeeping and routine maintenance on infrastructure will ensure that the longevity of structures are maximised and maintain a low visual impact.

◆ **Responsible Body:**

- ◆ Proponent
- ◆ Contractors

Data Sources and Monitoring:

- ◆ Compile a bi-annual report of all complaints received and actions taken.

2.1.17 Cumulative Impact

Possible negative cumulative impacts (i.e. the build-up of minor impacts to become more significant) associated with the operational phase and any maintenance/construction activities are mainly linked to traffic, reduction in soil and groundwater quality and groundwater availability. The cumulative increase in employees in the area may put more pressure on biodiversity as a result of poaching or harvesting of plant and animal products. The cumulative positive impacts from farming in the Oshikoto Region relates to increased and sustained employment, revenue generation and overall improved living conditions and livelihoods as a result of increased spending power.

Desired Outcome: To minimise cumulative all impacts associated with the farm.

Actions

Mitigation:

- ◆ Addressing each of the individual impacts as discussed and recommended in the EMP would reduce the cumulative impact.
- ◆ Reviewing biannual reports for any new or re-occurring impacts or problems would aid in identifying cumulative impacts. Planning and improvement of the existing mitigation measures can then be implemented.

Responsible Body:

- ◆ Proponent

Data Sources and Monitoring:

- ◆ Reviewing monitoring results based on all other impacts will give an overall assessment of the impacts of the operational phase.

2.2 DECOMMISSIONING AND REHABILITATION

Closure and decommissioning of agricultural and related activities on the farm as a whole is not foreseen during the validity of the environmental clearance certificate or in the near future. However, it is more likely that certain components may be decommissioned. Decommissioning is therefore included for this purpose as well as the fact that construction activities may also include modification and decommissioning of infrastructure. Future land use after decommissioning should be assessed prior to decommissioning and rehabilitation initiated if the land would not be used for future purposes. Should decommissioning occur at any stage, rehabilitation of the area may be required. Decommissioning will entail the complete removal of all infrastructure including buildings and irrigation infrastructure. Any pollution present on the site must be remediated. The impacts associated with this phase include noise and waste production as structures are dismantled. Noise must be kept within Labour Act and/or WHO standards. Waste should be contained and disposed of at a dedicated waste disposal site and not dumped in the surrounding areas. The EMP for the farm will have to be reviewed at the time of full decommissioning to cater for changes made to the site and to implement guidelines and mitigation measures.

2.3 ENVIRONMENTAL MANAGEMENT SYSTEM

The Proponent could implement an environmental management system (EMS) for their operations. An EMS is an internationally recognized and certified management system that will ensure ongoing incorporation of environmental constraints. At the heart of an EMS is the concept of continual improvement of environmental performance with resulting increases in operational efficiency, financial savings and reduction in environmental, health and safety risks. An effective EMS would need to include the following elements:

- ◆ A stated environmental policy which sets the desired level of environmental performance;
- ◆ An environmental legal register;
- ◆ An institutional structure which sets out the responsibility, authority, lines of communication and resources needed to implement the EMS;
- ◆ Identification of environmental, safety and health training needs;
- ◆ An environmental program(s) stipulating environmental objectives and targets to be met, and work instructions and controls to be applied in order to achieve compliance with the environmental policy; and
- ◆ Periodic (internal and external) audits and reviews of environmental performance and the effectiveness of the EMS.
- ◆ The EMP.

3 CONCLUSION

The EMP should be used as an on-site reference document for the operations of the farm. Parties responsible for transgression of the EMP should be held responsible for any rehabilitation that may need to be undertaken. The Proponent could use an in-house Health, Safety, Security and EMS in conjunction with the environmental management plan. All operational personnel must be taught the contents of these documents.

Should the Directorate of Environmental Affairs (DEA) agree with the impacts and related mitigation measures; they may issue an environmental clearance certificate to the Proponent. The environmental clearance certificate will render this document legally binding on the Proponent. The assessment process's aim is not to stop the activity, or any of its components, but to rather determine its impact and guide sustainable and responsible development as per the spirit of the EMA.