APP-001182
NAM OYSTER FARM
PROPOSED OYSTER MARICULTURE FARM AT LÜDERITZ

ENVIRONMENTAL MANAGEMENT PLAN

Prepared by:

Prepared for:

Nam Oyster Farm CC

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Project:	**NAM OYSTER FARM: PROPOSED OYSTER MARICULTURE FARM AT LÜDERITZ: ENVIRONMENTAL MANAGEMENT PLAN**	
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1 INTRODUCTION

Nam Oyster Farm CC requested Geo Pollution Technologies (Pty) Ltd to prepare an environmental management plan (EMP) for their proposed oyster mariculture activities at Lüderitz. The EMP includes activities related to development and operations of the oyster farm.

2 OBJECTIVES OF THE EMP

The EMP provides management options to ensure impacts of the construction and operations are minimised. An EMP is a tool used to take pro-active action by addressing potential problems before they occur. This should limit the corrective measures needed, although additional mitigation measures might be included if necessary. The EMP acts as a stand-alone document, which can be used during the various phases (planning, construction, operational and decommissioning) of any proposed activity or development.

All contractors and sub-contractors taking part in both the construction and operations associated with the project should be made aware of the contents of the EMP, so as to plan the relevant activities accordingly, in an environmentally sound manner.

The objectives of the EMP are:

- to prescribe the best practicable control methods to lessen the environmental impacts associated with the planning, construction, operation and decommissioning activities;
- to monitor and audit the performance of the operational personnel in applying such controls; and
- to ensure that appropriate environmental training is provided to responsible personnel and contractors.

3 IMPLEMENTATION OF THE EMP

Section 4 outline the management of the environmental elements that may be affected by the different activities. Impacts addressed and mitigation measures proposed are seen as minimum requirements which have to be elaborated on. Delegation of mitigation measures and reporting activities should be determined by the proponent and included in the EMP. The EMP is a living document that must be prepared in detail, and regularly updated, by the proponent as the project progress and evolve.

The EIA, EMP and Environmental Clearance Certificate (ECC) must be communicated to the site managers. A copy of the ECC and EMP should be kept on site. All monitoring results must be reported on as indicated. Reporting is important for any future renewals of the ECC and must be submitted to the Ministry of Environment, Forestry and Tourism. Renewal of ECC will require six monthly reports based on the monitoring prescribed in this EMP.

4 MANAGEMENT OF IMPACTS

4.1 CONSTRUCTION AND OPERATIONS

The following section provide management measures for both the operational phase as well as construction activities related to development of the mariculture activities.

4.1.1 Planning

During the phases of planning for future construction, operations and decommissioning, 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 various other phases of the project:

- Ensure that all necessary permits from the various ministries, local authorities and any other bodies that governs the construction activities and operations of the project are in place and remains valid.

- Ensure all appointed contractors and employees enter into an agreement which includes the EMP. Ensure that the contents of the EMP are understood by the contractors, sub-contractors, employees and all personnel present or who will be present on site.
- Make provisions to have a Health, Safety and Environmental Coordinator to implement the EMP and oversee occupational health and safety as well as general environmental related compliance at the site, by both the employees and the contractors and their employees.
- Have the following emergency plans, equipment and personnel on site where reasonable to deal with all potential emergencies:
    - Risk management / mitigation / EMP/ Emergency Response Plan and HSE Manuals;
    - Adequate protection and indemnity insurance cover for incidents;
    - Comply with the provisions of all relevant safety standards;
    - Procedures, equipment and materials required for emergencies.
- Establish and / or maintain a reporting system to report on aspects of construction activities, operations and decommissioning as outlined in the EMP.
- Submit monitoring reports every six months to allow for environmental clearance certificate renewal applications. This is a requirement of the Department of Environmental Affairs.
- Update the EIA and EMP if required and apply for renewal of the environmental clearance certificate prior to expiry.

4.1.2 Revenue Generation and Employment

Employment will be created and an increase of skilled and professional labour will take place if the project realises. This will result in increased economic resilience and spending power of employees which in turn will benefit the town.

Resources will be produced locally and then exported internationally, contributing to the economy and trade balance of Namibia. Employment will be sourced locally while skilled labour/contractors may be sourced from other regions.

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

Actions

Mitigation:

- The proponent must employ local Namibians where possible. Deviations from this must be justified.
- If the skills exist locally, employees must first be sourced from the town, then the region and then nationally.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- Bi-annual report based on employee records (include details on demographic profile parameters such as number of male vs. female, local vs. foreign, and disabled employees).

4.1.3 Skills, Technology and Development

During various phases of construction and operations, training will be provided to employees in order to maintain and operate various features of the mariculture farm. Skills will be transferred to an unskilled workforce for general tasks. Development of people and technology are key to economic development. Continuous improvements in the industry may lead to technological development.

Desired outcome: To see an increase in skills of local Namibians, as well as development and technology advancements in the mariculture industry.

Actions

Mitigation:

- If the skills exist locally, contractors must first be sourced from the town, then the region and then nationally. Deviations from this practice must be justified.
- Training and skills development must be focussed on Namibians.
- Skills development and improvement programs to be made available as identified during performance assessments.
- Employees to be informed about parameters and requirements for references upon employment.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- Record should be kept of all training provided to employees.
- Ensure that all training is certified or managerial reference provided (proof provided to the employees) inclusive of training attendance, completion and implementation.
- Bi-annual report based on records kept.

4.1.4 Demographic Profile and Community Health

The farm is reliant on labour during the operational phase. It is not foreseen that the project will create a change in the demographic profile of the local community, as employment will be sourced locally as far as possible. Community health may still to some extent be exposed to factors such as communicable disease like HIV/AIDS and alcoholism/drug abuse associated with unemployment and transport industries. Should an increase in foreign people (e.g. migrant workers) in the area take place, this may potentially increase the risk of criminal and socially/culturally deviant behaviour.

Desired Outcome: To prevent the spread of communicable diseases and prevent / discourage socially deviant behaviour.

Actions:

Prevention:

- Employ only local people from the area, deviations from this practice should be justified appropriately.
- Adhere to all municipal by-laws relating to environmental health, such as sanitation requirements for the work environment.

Mitigation:

- Educational programmes for employees on HIV/AIDs and general upliftment of employees' social status.
- Appointment of reputable contractors.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- Bi-annual summary report based on employee demographics, educational programmes provided and training conducted.

4.1.5 Traffic

Transport requirements include the transport of equipment, of employees, and of oysters to various markets. This may cause a slight increase of traffic to and from the site and increase congestion and increase the risk of incidents and accidents in the town. Traffic on the road near schools are of specific concern where school children cross the road. Due to the scale and location of the proposed operations, these impacts are expected to be minimal.

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 facility.
- Proper route determination to avoid problem areas.
- Training and information sharing with drivers of vehicles to ensure vigilance at hot spots like schools.

Mitigation:

- If any traffic impacts are expected, traffic management should be performed to prevent these.
- The placement of signs to warn and direct traffic where necessary will mitigate traffic impacts.

Responsible Body:

- Contractors
- Proponent

Data Sources and Monitoring:

- Any complaints received regarding traffic issues should be recorded together with action taken to prevent impacts from repeating itself.
- A bi-annual report should be compiled of all traffic related incidents reported, complaints received, and action taken.

4.1.6 Health, Safety and Security

Activities associated with the construction and operational phases are reliant on human labour and therefore exposes them to health and safety risks. Injuries can occur due to incorrect lifting of heavy equipment and materials, drowning, stacked items tipping over, getting caught in moving parts of machines, accidents involving vehicles, drowning, etc. Security risks are related to unauthorized entry, theft (poaching) and sabotage.

The quality of oysters should be maintained in order to ensure no health risks to consumers.

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

Actions

Prevention:

At minimum the proponent must:

- Clearly label dangerous and restricted areas as well as dangerous equipment and products.
- Equipment that will be locked away on site must be placed in a way that does not encourage criminal activities (e.g. theft).
- Provide all employees with required and adequate personal protective equipment (PPE). This includes life jackets at sea.
- Ensure that all personnel receive adequate training on operation of equipment / handling of hazardous substances.
- All health and safety standards specified in the Labour Act should be complied with.
- Sampling as per the existing standard for mariculture industry in Namibia as performed by the Namibia Standards Institution. See **Error! Reference source not found.**.
- Develop a security protocol for transport of oysters which can include monitoring of vehicle movements (GPS tracking), emergency procedures, etc.
- Strict security that prevents unauthorised entry and theft.

Mitigation:

- Selected personnel should be trained in first aid and a first aid kit must be available on site. The contact details of all emergency services must be readily available.
- Security procedures and proper security measures must be in place to protect workers and clients.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- Sampling as per the existing standard for mariculture industry in Namibia as performed by the Namibia Standards Institution (see **Error! Reference source not found.**.
- All monitoring and analysis reports kept on file.
- Any incidents must be recorded with action taken to prevent future occurrences.
- A bi-annual report should be compiled of all incidents reported and all monitoring/analysis results. The report should contain dates when training were conducted and when safety equipment and structures were inspected and maintained.

4.1.7 Noise

Some noise will be generated during construction / maintenance activities. Noise generated from the operational activities will be minimal and isolated to for example pressure washing of baskets and occasional trucks.

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

Actions

Prevention:

- Follow World Health Organization (WHO) guidelines on maximum noise levels (Guidelines for Community Noise, 1999) to prevent hearing impairment.
- All machinery must be regularly serviced 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:

- WHO Guidelines.
- Maintain a complaints register.
- Bi-annual report on complaints and actions taken to address complaints and prevent future occurrences.

4.1.8 Waste Production

During construction / maintenance waste in the form of building material, rubble and empty packaging material will be produced. Minimal waste will be produced during operations of the facility. Waste generated will include domestic waste, sewage, old baskets and equipment no longer required or recyclable/reusable, and biofouling on baskets and shells. Contaminated soil and water may be considered as hazardous waste. Unconfined wastes / litter such as empty bags may be blown away by strong winds and end up in the surrounding environment.

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

Actions

Prevention:

- Waste reduction measures should be implemented and all waste that can be re-used / recycled must be kept separate.
- Ensure adequate disposal storage facilities are available.
- Ensure waste cannot be blown away by strong wind.
- Prevent scavenging (human and non-human) at waste storage.

Mitigation:

- Waste should be disposed of regularly and at appropriately classified disposal facilities, this includes hazardous materials (empty chemical containers, contaminated rugs, paper water and soil), if any.
- See the material safety data sheets available from suppliers for disposal of contaminated products and empty containers.
- Liaise with the municipality regarding waste and handling of hazardous waste.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- A record should be kept of any disposal of hazardous waste.
- Any complaints received regarding waste should be recorded with notes on action taken.
- All information and reporting to be included in a bi-annual report.

4.1.9 Terrestrial Ecosystem and Biodiversity Impact

Construction activities, if any, will be within an already disturbed urban environment. As such no impact on the environment is expected. The nature of the operational activities will be such that the probability of creating a habitat for flora and fauna to establish is low. Lighting may occasionally be used at night and may blind birds like flamingos which fly at night, especially if directed upwards. This may result in disorientation of birds and collisions with structures.

Desired Outcome: To reduce disturbance and destruction of the ecological environment.

Actions.

Prevention:

- Lights used at the site should be directed downwards to the working surfaces to prevent disorientation of birds flying at night and it should not impact on neighbours. Proper installation should be considered from the start.

Mitigation:

- Report any extraordinary ecological sightings to the Ministry of Environment and Tourism.
- Keep record of any bird collisions / dead birds on site and investigate the causes and improve the conditions to prevent future occurrences.
- Mitigation measures related to waste handling should limit ecosystem and biodiversity impacts.
- Avoid scavenging of waste by fauna, mainly birds.
- The establishment of habitats and nesting sites at the facility should be prevented where possible.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- All monitoring information (e.g. bird strikes, extraordinary animal sightings) to be included in a bi-annual report.

4.1.10 Impacts on Marine and Coastal Biota

Potential negative impacts include entanglement of large marine mammals in the long lines, temporary seabed disruption for anchor placement, physical pollution, injury of non-target species and disease and pest introduction.

Grow-out baskets acts as refuges for many marine organisms which may have a positive influence on local diversity.

Desired Outcome: To minimise destruction, degradation and disturbance of the ecological environment.

Actions.

Prevention:

- Maintain spacing between long lines as per proven industry standard to minimize the chances of marine mammal entanglement.
- Non-target species in grow-out baskets must be returned to the water as soon as possible.

Mitigation:

- Report any extraordinary sightings or occurrences to the Ministry of Environment and Tourism.
- Ensure regular sampling of oysters to ensure no diseases are present and the water quality remains adequate (see **Error! Reference source not found.**).
- Ensure stocking densities in baskets are optimised to ensure a healthy, stress-free environment for oysters.
- Lüderitz Harbour should be monitored to ensure no major changes in the local ecosystem and biodiversity takes place, including settlement and proliferation of oysters. This should be a collective effort involving the mariculture industry and the Ministry of Fisheries and Marine Resources.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- Sampling as per the existing standard for mariculture industry in Namibia as performed by the Namibia Standards Institution (see **Error! Reference source not found.**).
- Regular environmental monitoring (e.g. diving) to monitor benthic communities and rocky shore ecosystems for changes.
- Monitoring and analysis reports on file.
- All information and reporting to be included in a bi-annual summary report.

4.1.11 Surface Water and Soil Contamination

During onshore construction and maintenance activities, spillages or illegal dumping of waste may lead to surface water (ocean) and soil contamination. Localised reduction in seawater quality can occur when pollutants including high organic loads enter the ocean. High nutrient levels and organic loads may increases the chemical oxygen demand (COD) and biological oxygen demand (BOD).

Desired Outcome: To prevent the contamination of water and soil, and to prevent impacts on the seawater quality.

Actions

Prevention:

- Any contaminated water must be prevented from entering the ocean and environment and must be discarded as hazardous waste where required.
- All chemicals, if any, must be handled according to their respective material safety data sheet instructions.
- Use of reputable and well trained contractors / employees are essential.
- Should any chemicals be used for cleaning that may enter the wastewater stream, the chemicals should either be in low enough quantities that no impacts on the environment occur, be environmentally friendly and biodegradable, or should be discarded at an approved site. The relevant MSDS should be consulted.

Mitigation:

- All spills must be cleaned immediately.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- A report should be compiled bi-annually of all pollution incidents and corrective action taken.

4.1.12 Visual Impact

This is an impact that not only affects the aesthetic appearance, but also the integrity of the infrastructure and the visual landscape character. The offshore infrastructure (buoys on long lines) has become part of the seascape character and is of interest to tourists.

Desired Outcome: To enhance aesthetically pleasing attributes of the existing landscape character and prevent degradation.

Actions

Prevention:

- Regular waste disposal, good housekeeping and routine maintenance on infrastructure will ensure that the longevity of structures are maximised and a low visual impact is maintained.
- All structures and infrastructures, if painted, should be in line with the visual character of the landscape.

Mitigation:

- Any damage to structures or decommissioning of unused elements should be removed from site and the areas rehabilitated.
- All un-used elements should be removed from site or stored in an appropriate facility.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- A bi-annual report should be compiled of all complaints received and actions taken.

4.1.13 Cumulative Impact

Cumulative impacts during construction will include increased traffic and possibly noise. Possible cumulative impacts associated with the operational phase include increased traffic in the area. This will have a cumulative impact on traffic through Lüderitz. The increasing number of farms that are operational in the Lüderitz Bay area may impact on water quality and the amount of pollutants entering the environment. The cumulative visual impact is related to the buoys at sea and the land based infrastructure. Employment and economic contributions are positive cumulative impacts.

Desired Outcome: To minimise negative and enhance positive cumulative impacts associated with the facility.

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 and help in planning if the existing mitigations are insufficient.
- Should a reduction in seawater quality be expected, it is recommended that all industries in the area utilising seawater and discharging effluent into the ocean implement a joint monitoring program to ensure the localized water quality does not decrease.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- Bi-annual reports provides a summary of the impacts of the operational phase and highlights cumulative impacts.

4.2 DECOMMISSIONING AND REHABILITATION

Decommissioning is not foreseen during the validity of the environmental clearance certificate. Decommissioning was however assessed. Should decommissioning occur at any stage, rehabilitation of the area may be required. Decommissioning will entail the complete removal of all infrastructure including buildings, underground infrastructure and offshore long lines. 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 WHO standards and waste should be contained and disposed of at an appropriately classified and approved waste facility and not dumped in the surrounding areas. Future land use after decommissioning should be assessed prior to decommissioning and rehabilitation initiated appropriately. The environmental management plan for the facility will have to be reviewed at the time of decommissioning to cater for changes made to the site and implement guidelines and mitigation measures.