

**Expansion, Operation, Maintenance and Decommissioning of
the Aquaculture (Fish Farming) Project at Okashaningwa
Village in the Omusati Region.**

Environmental Management Plan

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List of Acronyms

AIDS	Acquired Immune Deficiency Syndrome
BID	Background Information Document
dB	Decibels
DEAF	Directorate of Environmental Affairs and Forestry
DRP	Decommissioning and Rehabilitation Plan
EA	Environmental Assessment
EAP	Environmental Assessment Practitioner
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
EMS	Environmental Management System
HACCP	Hazard Critical Control Point
HIV	Human Immunodeficiency Virus
I&APs	Interested and Affected Parties
MAWLR	Ministry of Agriculture, Water and Land Reform
MEFT	Ministry of Environment, Forestry and Tourism
MFMR	Ministry of Fisheries and Marine Resources
MSDS	Material Safety Data Sheet
NHC	National Heritage Council
NamWater	Namibia Water Corporation
PPE	Personal Protective Equipment
ToR	Terms of Reference
WHO	World Health Organization

i. Project Applicant

The proponent, Cubia Green Fields cc intends to apply for an Environmental Clearance Certificate (ECC) for the expansion, operation, maintenance and decommissioning of the Aquaculture (Fish Farming) Project at Okashaningwa Village in the Omusati Region.

Table 1: Details of the project applicant

Applicant	Cubia Green Fields cc
Contact Person	Mr. Ismael Nalitye Kapuka
Postal Address	P O Box 16083 Oshihole
Contact Number	081 262 1111 / 085 262 1111

ii. Environmental Assessment Practitioners (EAPs)

Green Gain Consultants cc was appointed by Cubia Green Fields cc to facilitate the Environmental Impact Assessment (EIA) process and subsequently apply for an Environmental Clearance Certificate (ECC), in accordance with the requirements of the Environmental Management Act (Act No. 7 of 2007). The Environmental consulting firm boast of professional practitioners in the environmental field, thus offering cross cutting solutions to environmental issues.

Table 2: Details of the EAPs

Name of Firm	Green Gain Consultants cc	
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Phone	+264811422927 or +264813380114	
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Environmental Assessment Practitioners		
Name	Qualifications & Experience	Responsibility
Mr. Joseph K. Amushila	Master Environmental Management	Lead EAP
Ms. Lovisa Hailaula	Honours Degree: Fisheries and Aquatic Sciences	EAP

1. INTRODUCTION

Cubia Green Fields cc (herein after referred to as “the proponent”), has been operating a fish farm and small-scale vegetable garden at Okashaningwa village near the town of Ruacana in the Omusati Region since 2016. The fish farm currently has one open water pond approximately 2800 m² on average in size and it is stocked with 1000 North African Catfish (*Clarias gariepinus*) and 15000 Three Spotted Tilapia (*Oreochromis andersonii*). The proponent intends to construct an additional seven (7) open water ponds with 2800 m² on average, hence the open ponds will be eight (8) in total. The existing activity and proposed additions will be developed on a 2.2-hectare parcel of land which was previously used as a Pearl millet (Mahangu) field and is owned by the proponent. No new land will be sourced nor cleared. The farm is located about 200m east of the Etunda irrigation scheme. It is situated at approximately 16km along the main road (C46) from Ruacana to Outapi.

Aquaculture development has recently become a priority topic in many Southern African countries, as the traditional supplies of fish (capture fisheries) is declining and aquaculture has various potential positive economic gains that it can generate such as food security, employment creation, poverty alleviation, improved national economies and other associated socio-economic gains. The main aim of the project is to enhance food security at the local and regional level through high quality freshwater fish production. The wastewater from the fishponds will be used for irrigation purposes.

In accordance with the Environmental Management Act (EMA No. 07 of 2007) and its Regulations (GN No.03 of 2012) all “construction of facilities for aquaculture production, including mariculture and algae farms where structures are not situated within aquaculture development zone declared in terms of the Aquaculture Act, 2002” cannot be undertaken without an Environmental Impact Assessment (EIA) being undertaken and an Environmental Clearance Certificate being obtained. Hence, Green Gain Consultants cc was appointed to undertake the EIA process and apply for an ECC from the Ministry of Environment, Forestry and Tourism for the proposed expansion, operation, maintenance and decommissioning of the aquaculture (fish farming) project.

This EMP synthesises all the proposed mitigation and monitoring measures, laid out according to the various stages of the project life cycle, with clearly defined follow-up actions and specific assigned responsibilities. It provides a link between the impacts identified in the EIA process and the required environmental management on the ground during the project implementation and operations. It is important to note that an EMP is a legally binding document and has been drafted in accordance with the Environmental Management Act (No. 7 of 2007) and its Environmental Impact Assessment Regulations (2012).

This EMP details the mitigation and monitoring actions to be implemented during the following phases of the project:

- Construction – the period, during which the proponent begins with the construction of the additional fishponds and related infrastructure.
- Operation and Maintenance – the period during which the services offered by Cubia Green Fields cc will be fully functional and maintained.
- Decommissioning – this phase is not envisaged however if it should be considered, recommendations will be outlined in this report.

2. PURPOSE OF THE EMP

The purpose of this document is to guide environmental management throughout the lifecycle stages of the proposed development. Furthermore, it is to ensure that impacts on the environment due to the proposed development are minimised. The EMP has the following objectives:

- Assess the suitability of the proposed developments on the proposed development site;
- To identify possible impacts of the proposed activity on the environment and mitigation thereof.
- Define details of who, what, where and when environmental management and mitigation measures are to be implemented.
- Ensuring compliance with regulatory stipulations and guidelines which may be national /local /international.
- Providing feedback for continual improvement in environmental performance.
- To provide guidelines for the management of the identified environmental issues;
- Formulate measures which will mitigate adverse impacts on various environmental components, protect environmental resources where possible, and enhance the value of environmental components where possible; and
- To provide guidelines to the responsible person to follow appropriate contingency plans in the case of possible impacts.

Cubia Green Fields cc may choose to implement an Environmental Management System (EMS) which is a structure that provides guidance to measure and achieve compliance with the environmental protection set to improve the regulatory performance and therefore lower risks and fines for noncompliance with environmental legislation.

An effective EMS should include:

- 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 to achieve compliance with the environmental policy; and
- Periodic (internal and external) audits and reviews of environmental performance and the effectiveness of the EMS.

3. EMP METHODOLOGY

The stipulated EIA procedures in terms of the EMA, No.7 of 2007 and its Regulations 2012 was followed. The following key activities and tasks have been undertaken as part of the EIA and EMP development process:

- Solicited initial input from main stakeholders. This is essential toward the development of an all-inclusive plan. Since no resource lies in isolation, an EMP can affect a number of other parties. For the best adherence and acceptance of a plan, input is needed to address concerns early in the planning process.
- Identify the problems and/or questions associated with the proposed development. Clearly defined objectives were identified in order to remain centred on a plan.
- Make a list of applicable criteria, standards and principles for construction as required by legislation, regulation, policies etc.
- Established the extent of the plan and what the proponent must do. It is easy for a plan to end up in someone's hands and never be executed; and
- Seek public input through advertisement of the EIA process in the two widely circulated newspapers and continuous engagements with registering as I&APs.

This environmental management plan was written to guide short-term goals and decision making and will provide environmental related guidelines. By having this plan in place, the proponent and contractors will have means to make informed decisions.

4. EMP RESPONSIBILITIES

It is the core responsibility of the proponent to ensure the successful implementation of this EMP and any condition to be imposed by the competent authority (Ministry of Fisheries and Marine Resources) and the Ministry of Environment and Tourism. The implementation of the EMP also requires the involvement of various role players, each with specific responsibilities to ensure that the development is operated in an environmentally sensitive manner.

Table 3: EMP Responsibilities

ROLE	ENVIRONMENTAL RESPONSIBILITIES
Proponent/Owner	Responsible to enforce EMP implementation to contractors and employees.
Environmental Control Officer (ECO)	<ul style="list-style-type: none"> ▪ To oversee and monitor compliance with and the implementation of the EMP. ▪ Implement, review and update the EMP. • Ensure all reporting and monitoring required under EMP is undertaken, documented and distributed as needed • Conduct environmental site training and inductions with the support of an environmental consultant. • Liaise with the community, proponent, contractors and authorities. ▪ Conducts environmental audit at work site with the support of environmental consultant. • Close out all non-conformances to the EMP requirements. • Ensure materials being used on site are environmentally friendly and safe. ▪ Recording and reporting of environmental incidents and notifying relevant authorities immediately.
DEA	<ul style="list-style-type: none"> ▪ Approve the EMP and any amendments to the EMP. • Approve reports of environmental issues and non-conformances as issued. • Review and approve environmental reports submitted as part of EMP implementation.
Environmental Consultant	<ul style="list-style-type: none"> ▪ Conduct and monitor actions required by the EMP if required. • Conduct environmental quarterly audits and biannual reports for submission to MEFT. • Conducts environmental audit at the project site. • Ensure materials being used on site are environmentally friendly and safe.
Site Engineers & Contractors	<ul style="list-style-type: none"> ▪ Control and monitor actions required by the EMP. • Report all environmental issues to the ECO. • Ensure documented procedures are followed and records kept on site. • Ensure any complaints are passed onto the management within 24 hours of receiving the complaint.

<p>Authorities</p>	<ul style="list-style-type: none"> ▪ The competent authority through the respective departments, should provide supervisory and monitoring roles to ensure compliance to national and local legislation. ▪ Other government ministries should also provide necessary assistance in terms of monitoring, supervision, information, or expertise as case maybe which are required for the successful implementation of this EMP. ▪ The identified ministries should continue with their respective duties in cooperation with the proponent and other relevant authorities whenever deemed necessary.
<p>Employees</p>	<ul style="list-style-type: none"> ▪ Follow requirements as directed by site engineers. • Report any potential environmental issues to site engineer or project manager, indicating spillages, excess waste, excessive dust generation, dirty water running off the site and other possible non-conformances.

5. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

5.1 Overview

The pursuit of sustainability by an organization is operationalized by a sound policy and legislative framework that gives operating parameters within its sphere of operation. An important part of the EIA is identifying and reviewing the administrative, policy and legislative situation concerning the proposed activity, to inform the proponent about the requirements to be fulfilled during the operations, expansion, maintenance and decommissioning of the lifespan of the project.

This section looks at the legislative framework within which the project will operate under. The focus is on the compliance with the legislation during all phases of the project. Relevant legislations, policies and international statutes applying to the project are highlighted in the table below as specified in the Environmental Management Act, 2007 (Act No.7 of 2007) and the regulations for Environmental Impact Assessment as set out in the Schedule of Government Notice No. 30 (2012).

The proposed project will trigger activities listed under the Environmental Management Act, No. 07 of 2007 and its Regulations (No. 03 of February 2012) as stipulated in the table below.

Table 4: Listed Activity triggered by the project

Proposed activities	Listed activities triggered
Aquaculture activities	No. 7. Agriculture and Aquaculture activities 7.1 Construction of facilities for aquaculture production, including Mariculture and algae farms where structures are not situated within aquaculture development zone declared in terms of the Aquaculture Act, 2002

5.2 Legal Instruments

Table 5: Legislative, Policy and Administrative Framework

Legislation	Relevant Provisions	Relevance to the Project
Namibian Constitution First Amendment Act 34 of 1998	<ul style="list-style-type: none"> – “The State shall actively promote and maintain the welfare of the people by adopting policies that are aimed at maintaining ecosystems, essential ecological processes and the biological diversity of Namibia. It further promotes the sustainable utilisation of living natural resources basis for the benefit of all Namibians, both present and future.” (Article 95(I)). 	<ul style="list-style-type: none"> – Sustainable development should be at the forefront of the management of the fish farm activities. – Through implementation of the environmental management plan, the proponent will ensure conformity to the constitution in terms of environmental management and sustainability.
Environmental Management Act 7 of 2007	<ul style="list-style-type: none"> – Requires that projects with significant environmental impacts are subject to an environmental assessment process (Section 27). – Requires for adequate public participation during the environmental assessment process for interested and affected parties to voice their opinions about a project (Section 2(b-c)). – Detail’s principles which are to guide all EIAs. 	<ul style="list-style-type: none"> – This Act and its regulations should inform and guide this EIA process.
EIA Regulations GN 57/2007 (GG 3812)	<ul style="list-style-type: none"> – Identifies and lists activities that cannot be undertaken without an ECC being obtained (GN 29). – Details requirements for public consultation within a given environmental assessment process (GN No 30 S21). ^[11] _[SEPA] – Details the requirements for what should be included in a Scoping Report (GN No 30 S8) an EIA report (GN No 30 S15). 	<ul style="list-style-type: none"> – This Act and its regulations should inform and guide this EIA process.
Aquaculture Act 18 of 2002 and the Aquaculture (Licensing)	<ul style="list-style-type: none"> – This Act is the primary legal framework for the aquaculture industry in Namibia and provides for the establishment, administration and conduct of aquaculture in water and on land. 	<ul style="list-style-type: none"> – The management of this project should be informed by the Aquaculture Act and its Regulations.

<p>Regulations adopted in 2003</p>	<ul style="list-style-type: none"> - The Act regulate and control aquaculture activities; to provide for the sustainable development of aquaculture resources; and to provide for related matters. - The Act applies to matters related to licensing, health management, disease control, access to land and water and environmental protection. 	
<p>Pollution and Waste Management Bill (draft)</p>	<ul style="list-style-type: none"> - This bill defines pollution and the different types of pollution. It also points out how the Government intends to regulate the different types of pollution to maintain a clean and safe environment. - The bill also describes how waste should be managed to reduce environmental pollution. Failure to comply with the requirements considered an offence and is punishable. 	<ul style="list-style-type: none"> - The project is being executed in harmony with the requirements of the act to reduce negative impacts on the surrounding environs from waste pollution within regional boundaries.
<p>Soil Conservation Act 76 of 1969</p>	<ul style="list-style-type: none"> - This act makes provision for combating and for the prevention of soil erosion, it promotes the conservation, protection and improvement of the soil, vegetation, sources and resources of the Republic of Namibia. 	<ul style="list-style-type: none"> - The soil should not be polluted or left unrehabilitated during and after the fish farm operations cease.
<p>Atmospheric Pollution Prevention Ordinance, 1976</p>	<p>The Act aims at managing air quality, mineral waste, biodiversity and health and safety.</p>	<ul style="list-style-type: none"> - The pollution of water resources should be avoided during the operations of the fish farms.
<p>Water Act 54 of 1956</p>	<ul style="list-style-type: none"> - The Water Resources Management Act 24 of 2004 is presently without regulations; therefore, the Water Act No 54 of 1956 is still in force: - Prohibits the pollution of underground and surface water bodies (S23(1)). - Liability of clean-up costs after closure/ abandonment of an activity (S23(2)). 	<ul style="list-style-type: none"> - The pollution of water resources should be avoided during the operations of the fish farms.

	<ul style="list-style-type: none"> - Protection from surface and underground water pollution 	
Water Resources Management Act No. 11, 2013	<p>This Act provides for the management, protection, development, use and conservation of water resources and the regulation and monitoring of water services and for incidental matters. (Department of Water Affairs).</p>	<ul style="list-style-type: none"> - The pollution of water resources should be avoided during the operations of the fish farms.
Labour Act (No 11 of 2007) in conjunction with Regulation 156, 'Regulations Relating to the Health and Safety of Employees at work'.	<ul style="list-style-type: none"> - This act emphasizes and regulates basic terms and conditions of employment, it guarantees prospective health, safety and welfare of employees and protects employees from unfair labour practices. 	<ul style="list-style-type: none"> - The proponent will employ several people from the local and shall ensure securing a safe environment and preserving the health and welfare of employees at work.
Public Health and Environmental Act, 2015	<ul style="list-style-type: none"> - The Act provides a framework for a structured uniform public and environmental health system in Namibia. - Under this act, in section 119: "No person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health." 	<ul style="list-style-type: none"> - The fish farm operations will ensure that there is adequate compliance to the Act through strict compliance to prevention of public hazard nuisance. - It is however imperative to note that the project itself is a positive drive towards preservation and protection of public health.
National Heritage Act 27 of 2004	<ul style="list-style-type: none"> - Section 48(1) states that "A person may apply to the Namibia Heritage Council (NHC) for a permit to carry out works or activities in relation to a protected place or protected object" 	<ul style="list-style-type: none"> - Any heritage resources discovered would require a permit from the NHC for relocation.
Convention on Biological Diversity (1992)	<ul style="list-style-type: none"> - Article 1 lists the conservation of biological diversity amongst the objectives of the convention. 	<ul style="list-style-type: none"> - The fish farm should consider the impact it will have on the biodiversity of the area.

6. MANAGEMENT REQUIREMENTS

6.1 Method Statement

A method statement outlines construction activities to be undertaken with mitigation measures, which should be prepared by all contractors. The contractor must give a written statement to the resident engineer at least two weeks before the activity so that any irregularities can be handled before construction commences and communicated to the employees. The format of the method statement should clearly indicate the following:

- Construction and Operational Procedures
- Materials and Equipment used
- How and where materials will be stored
- When actions will be undertaken

Based on the EMP specifications, the following method statements are required as minimum:

- Site layout and establishment
- Security and access control to the site
- Storage of hazardous substances and accidental spillages of hazardous substances
- Waste management procedures and storage
- Wastewater management procedures
- Traffic accommodation
- Erosion remediation and control
- Storm water management
- Fire control and emergency procedures.

6.2 Environmental Awareness Training

All contractors should ensure that adequate environmental awareness training of senior site personnel takes place and that all construction workers and new employees receive an induction presentation on the importance and implications of the EMP prior to the work commencing. The presentation should be conducted by the ECO, in the employees' language of choice.

The contractor must take all reasonable measures to ensure the safety of people in the surrounding area. There should be signage, flagmen. Barriers or warning signs provided on site with the approval of the ECO. All unattended open excavations should be adequately demarcated, and adequate protective measures must be implemented to prevent unauthorized access to the working area.

6.3 Record Keeping

The Contractor should keep records of all environmental training sessions, including names, dates and the information presented. Records of environmental incidents report, training records, audit reports and public complaints register should be kept at the site office during the period of the project. It is advised that photographs of the site should be taken before, during and after-construction as visual references.

6.4 Non-compliance and Penalties

In case of transgressions and non-compliance to the EMP by the contractor, there should be a penalty fine. Transgressions should be recorded in a register and be kept at the site office for the duration of the project. The resident engineer will issue the penalties in terms of the severity on the environment.

Adherence to this EMP during the phases of the project will ensure that the environmental impacts associated with the proposed development will be mitigated to a greater extent thus promoting sustainable development. The commitment and co-operation of the identified responsible person(s) will ensure effective implementation of the EMP.

7. IDENTIFIED IMPACTS AND MITIGATIONS

The construction phase is the most critical component of environmental management because it is normally associated with several impacts. There will be several impacts that will occur daily or other sequential routine. The operational & maintenance phase forms the basis of an EMP. The major impacts identified by this study for the construction, operational and maintenance phase are detailed below. All monitoring results must be reported on as indicated.

The proponent should play a pivotal role in implementing this EMP. This section provides a manner in which the EMP is to be implemented and also outlining responsibilities of all parties involved perform their respective roles in accordance with this EMP.

Table 6: Construction Phase Management Actions

ASPECT	ISSUES	MITIGATION MEASURES	RESPONSIBILITY	MONITORING
EMP implementation	To ensure that construction activities are carried out causing the least possible disturbance to existing amenities.	<ul style="list-style-type: none"> ▪ The contractor should educate all employees & supervisory staff on all relevant environmental laws and protection requirements. ▪ The contractor shall implement all the necessary environmental protection measures in all work areas before the work commences. 	Contractor	Proponent
Environmental awareness	To ensure that all employees and sub-contractors are informed of their environmental obligations.	<ul style="list-style-type: none"> ▪ Feedback should be provided to staff on their day-to-day environmental performance and issues requiring attention. 	Contractor	Proponent
Health and safety	To reduce the risks posed by the project to the public and the personnel.	<ul style="list-style-type: none"> ▪ The site should be locked to limit unauthorised public access to the site. ▪ The contractor should ensure that all personnel are provided with personal protective (PPE), such as gloves, safety boots, to protect them from hazards being presented and that will allow them to work without risking their health. ▪ Safety signs complying with relevant construction standards should be placed onsite in a manner clearly visible to the public. 	Contractor	Proponent

		<ul style="list-style-type: none"> ▪ Construction methods should adhere to the Occupational Health and Safety clause of the National Labour Act. ▪ Construction workers should be trained on how to handle materials and equipment on site to avoid injuries. ▪ A safety officer should be appointed prior to commencement of construction. ▪ No workers should be allowed onsite if they are intoxicated. ▪ All building materials and equipment are to be stored only within set out and demarcated work areas. ▪ Separate toilets should be available for men and women and should clearly be indicated as such. ▪ Portable toilets (i.e. easily transportable) should be available at every construction site at a maximum ration of 1 toile per 15 workers and situated within walking distance of the site. ▪ Ablution facilities should be kept in a good state and serviced at intervals to ensure that they are kept in a sanitary condition. 		
Dust	To minimize dust levels	<ul style="list-style-type: none"> ▪ Construction vehicles should only use designated roads. ▪ During windy conditions, the work must cease until the wind has calmed down. ▪ Cover any stockpiles with a suitable material, such as plastics or shade-cloth, to minimise windblown dust. 	Contractor	Proponent
Noise	To minimize noiset levels	<ul style="list-style-type: none"> ▪ Construction activities should be limited to 07H00 - 18H00 during weekdays and weekends. Employees should not make excessive noise especially during late hours. ▪ Equipment used in the operation of the proposed development must be kept in a good state of maintenance so that noise is minimized. ▪ WHO guidelines on maximum noise levels to prevent hearing impairment for workers on site should be followed. 	Contractor	Proponent

		<ul style="list-style-type: none"> ▪ Noise level as recommended by the WHO guidelines should be adhered to during the operational phase. ▪ No amplified sound such as hooters, sirens etc., shall be allowed on site other than in emergency situations. 		
Waste Management	Cleanliness and mismanagement of waste	<ul style="list-style-type: none"> ▪ The site should be always kept tidy. ▪ No waste may be buried or burned on site or in the surroundings. ▪ All domestic and general construction waste produced on a daily basis should be cleaned and contained daily. ▪ Separate waste containers/bins for hazardous and domestic/general waste must be provided onsite. The waste containers should be emptied after construction and removed from site to the waste disposal site. ▪ The site should have enough bins with secured lids. 	Contractor	Proponent
Access Routes and traffic	Erosion and dilapidation of the access route. To control traffic and ensure minimal disruption to normal road users.	<ul style="list-style-type: none"> ▪ Maintain the access road used during construction to an acceptable condition. ▪ Proper maintenance should be done to ensure the quality of the access road. ▪ Ensure that vehicles associated with the project remain on the designated routes and within designated working times. ▪ Ensure that proper signage is on the site and the driving speed is clearly indicated. 	Contractor	Proponent
Hazardous substances	Any hazardous substance is stored appropriately.	<ul style="list-style-type: none"> ▪ Hazardous substances used during construction shall be stored in secondary containers and the relevant Material Safety Data Sheet (MSDS) should be available on site. ▪ Leaking/damaged equipment/vehicles shall be repaired immediately or removed from site. 	Contractor	Proponent

		<ul style="list-style-type: none"> ▪ Drip trays shall be provided in construction areas for stationary and parked equipment/vehicles as well as for the emergency servicing of vehicles. ▪ All liquid fuels should be stored in tanks or mobile bowsers with firmly closed lids, and they should be situated in bunded areas. ▪ The contractor shall ensure that there is adequate fire-fighting equipment at the fuel storage areas. 		
Burrow Pits	Burrow pits or trenches should be appropriately demarcated and secured.	<ul style="list-style-type: none"> ▪ Avoid sensitive areas (e.g., areas with high biodiversity, protected archaeological sites, rivers or drainage lines). ▪ When excavating, topsoil should be stockpiled in a demarcated area. Stockpiled topsoil should be used to rehabilitate the nearest borrow area (existing borrow pits), if such an area is located less than 20 km from the stockpile. ▪ Borrow pits are to be fenced-off with steel wire fencing. ▪ Ensure they are demarcated securely and regularly monitored to ensure that pedestrian and vehicles access to those areas are strictly prohibited. 	Contractor	Proponent
Water and Electricity supply	Excess to potable water and electricity.	<ul style="list-style-type: none"> ▪ Potable water must be available at the construction site. ▪ Minimise the power supply cables & ensure the safety of the workers and neighbouring residents. ▪ All health and safety laws and regulations should be adhered to. 	Contractor	Proponent
Emergency procedures such as fire control	All personnel are aware of the emergency procedures.	<ul style="list-style-type: none"> ▪ Fires are only permitted in designated areas and should not be left unattended. ▪ Fire extinguishers shall be readily available. 	Contractor	Proponent

		<ul style="list-style-type: none"> ▪ Contractor should ensure that the employees are aware of the procedures to be followed when dealing with leaks and spills. 		
Erosion and storm water management	To prevent or remediate damage to the environment resulting from the work being done on site.	<ul style="list-style-type: none"> ▪ Contractor should take reasonable steps to remediate or prevent damage to the environment resulting from the work being done on site. ▪ Storm water should be managed appropriately. 	Contractor	Proponent

Table 7: Operational and Maintenance Management Actions

ASPECT	ISSUES	MITIGATION MEASURES	RESPONSIBILITY	MONITORING
EMP implementation	Non-compliance during maintenance	<ul style="list-style-type: none"> ▪ All employees should be educated on all relevant environmental laws and protection requirements. ▪ All necessary environmental protection measures should be implemented during maintenance and operation work. 	Proponent	Proponent
Electricity, water supply & communication	Service delivery and safety impacts	<ul style="list-style-type: none"> ▪ The existing electrical network should be extended to the proposed expansion development. ▪ Energy efficiency measures should be adopted to reduce consumption of electricity. ▪ The electrical work should comply with Occupational Health and Safety procedures of the Labour Act. ▪ Network and electrical installations should be managed and maintained to ensure that the environment is safe for the personnel working around the facility. ▪ Installations and modifications to internal electricity network should be performed by qualified electricians and should adhere to best practices concepts. ▪ The facilities infrastructure, operations and activities on the aquaculture site may not interfere with overhead or electrical and communication networks. ▪ Water for landscaping should be used sparingly and should be sourced from aquaculture discharges or from grey water generated by washing and other non-sewage activities. ▪ Water should be used sparingly, and taps should be closed when not in use. Taps and pipes should be maintained to prevent leakage. ▪ Non-hazardous wash water must be led into the sewage system, where legally possible and appropriate, where there is no potential environmental risk. Contaminated water with hazardous chemicals may not be disposed in the environment and should rather be disposed at a suitable hazardous disposal site. 	Proponent	Proponent
Soil erosion	Management of erosion	<ul style="list-style-type: none"> ▪ Ensure appropriate drainage within the areas. ▪ The layout of the area should be optimized to limit the erosion potential. 	Proponent	Proponent

		<ul style="list-style-type: none"> ▪ Erosion control measures should be implemented to minimise further erosion and to reduce the safety hazards created by the dangerous slopes. 		
Surface and groundwater	Maintain good water quality	<ul style="list-style-type: none"> ▪ Ensure that all facilities are constructed in line with the requirements stipulated from MAWLR. ▪ Ensure that the facility is inspected regularly and supervised by a suitably experienced person. ▪ Where possible, water reclamation systems shall be installed. ▪ Ensure that the above systems are properly installed and maintained. ▪ Wastewater will be used for agricultural purposes and will not be sold or given to other parties. 	Proponent	Proponent
Aesthetic view of the area	Maintain an attractive and aesthetically pleasing environment.	<ul style="list-style-type: none"> ▪ The site must be clear of litter and all waste must be removed and disposed of properly. ▪ Spoil heaps should be flattened to the similar adjacent ground, to prevent soil erosion, thus encouraging natural vegetation. ▪ All excavations should be backfilled, levelled and compacted. ▪ The original site topography should be restored as much as possible. ▪ All disturbed areas should be vegetated with indigenous grass to ensure progressive plant succession. Topsoil should be applied at cleared areas and where material was stockpiled for this purpose. ▪ It is recommended that green technologies must be implemented in the building designs of the project where possible. ▪ 	Proponent	Proponent
Health and safety	To reduce the risks posed by the project to the public and the personnel.	<ul style="list-style-type: none"> ▪ Provision of appropriate PPE (e.g. waterproof overalls) to all employees. ▪ Provide ablution facilities onsite for both male and female and they should be clearly marked. ▪ Ablution facilities should be kept in a good state and serviced at intervals to ensure that they are kept in a sanitary condition. ▪ Conduct thorough safety training to personnel on the use of the protective wears and the correct handling of 	Proponent	Proponent

		<p>material and the safe use of all equipment where necessary.</p> <ul style="list-style-type: none"> ▪ First aid treatment and emergency medical assistance must be available and training in this regard must be conducted for all employees. ▪ A register for all the training offered and of all the incidents must be kept. ▪ Adhere to the national and local legislation. ▪ Prevent extended working hours. ▪ Safety signs complying with relevant standards should be placed onsite in a manner clearly visible to the public. ▪ Provision for clean drinking water for all employees. ▪ An area must be provided where employees may store personal belongings. ▪ Relevant emergency service contact numbers must be clearly displayed on all facilities. ▪ Basic training in aquaculture and environmental awareness must be encouraged for all employees. 		
Noise	To minimize noise levels	<ul style="list-style-type: none"> ▪ Employees should not make excessive noise especially during late hours. ▪ Equipment used in the operation of the proposed development must be kept in a good state of maintenance so that noise is minimized. ▪ WHO guidelines on maximum noise levels to prevent hearing impairment for workers should be followed. ▪ Noise level as recommended by the WHO guidelines should be adhered to during the operational phase. ▪ No amplified sound such as hooters, sirens etc., shall be allowed on site other than in emergency situations. ▪ Continuous monitoring of noise levels should be conducted to make sure noise levels do not exceed acceptable limits. 	Proponent	Proponent
Waste Management	Cleanliness and mismanagement of waste	<ul style="list-style-type: none"> ▪ The site should be always kept tidy. ▪ No waste may be buried or burned on site or in the surroundings. 	Proponent	Proponent

		<ul style="list-style-type: none"> ▪ All domestic waste produced on a daily basis should be cleaned and contained daily. ▪ Separate waste containers/bins for hazardous and domestic/general waste must be provided onsite. ▪ The site should have enough bins with secured lids. ▪ Aquaculture activities produces various waste streams such as general waste (fish feed bags, paper, plastic, etc.), production related organic waste (e.g old feed, dead organism, etc), sewage and non-production related waste, production related wastewater, postproduction & processing waste and hazardous waste materials & chemicals. ▪ Waste management must be formalised to ensure that it does not cause pollution and potential environmental degradation. ▪ General waste should be collected into suitable water, wind and animal proof containers and it should be taken to the disposal site on a regular basis. Where possible, general waste should be separated into glass, paper, plastics, etc. for possible recycling purposes. ▪ A culture of waste reduction, collection and disposal must be instilled in all personnel. ▪ Old feed should be disposed of via composting or a formalised waste disposal system and filter system should be composted and not disposed of via postproduction. ▪ Postproduction and processing waste (e.g., intestines, gills, heads, scales, etc.) generated in small volume a system of liming and burying or incineration may be utilised, if it does not cause groundwater pollution or other impacts. In large volumes, it is recommended that a silage system must be utilised, which can liquefy and stabilise waste material by grinding and lowering the pH. This silage 		
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		<p>maybe incorporated into animal feed as a high protein supplement.</p> <ul style="list-style-type: none"> ▪ A suitable bulk service provider may be contracted to remove processing waste equipped to deal with the type of waste. 		
Employment opportunities	Positive impact of short- and long-term employment for locals.	<ul style="list-style-type: none"> ▪ Local labour (specialists & general) should be employed as a priority. ▪ The proponent should source materials from local supplier to enhance the local economy. 	Proponent	Proponent
Cumulative Impacts		<ul style="list-style-type: none"> ▪ Addressing each of the impacts individually as outlined and recommended in the EMP, would reduce the cumulative impact. 	Proponent	Proponent
Access Routes and security	Erosion and dilapidation of the access route. To control traffic and ensure minimal disruption to normal road users.	<ul style="list-style-type: none"> ▪ Access to aquaculture facilities should be controlled for security purposes and to prevent uncontrolled movement of individuals and vehicles that may cause environmental degradation. ▪ The access road into and around the facility should be stable, safe and erosion free. ▪ Prohibition of entry of unauthorised persons should be displayed and enforced. ▪ Perimeter fence and boundary should prevent access of unauthorised persons. ▪ Facility should be locked after hours & when not occupied. ▪ Dust on the road should be maintained by watering or other forms of surface stabilisation. 	Proponent	Proponent
Hazardous substances	Any hazardous substance is stored appropriately.	<ul style="list-style-type: none"> ▪ The use of hydrocarbon fuel should be managed as it can severely impact on the environment, affect the organisms and cause chemical residues in the aquaculture products. 	Proponent	Proponent

		<ul style="list-style-type: none"> ▪ The use and storage of all chemicals and fuels should be done in a responsible manner to ensure environmental safety. ▪ Bait type pesticides should be used with care to prevent poisoning of non-target species. ▪ Chemicals must be stored in a dry, well ventilated, secure and lockable area. They should be recorded in a chemical register indicating the date of purchase, use and expiry. ▪ Chemicals and fuels may not be used near water, or in waterlogged areas as it poses a threat to aquatic ecosystems (excluding chemicals specifically for use in water). ▪ Absorbents and remedial materials should be available and used on any spills. ▪ PPE and gear must be provided to employees that work in dangerous chemicals. ▪ Hazardous substances used during construction shall be stored in secondary containers and the relevant Material Safety Data Sheet (MSDS) should be available on site. ▪ Leaking/damaged equipment/vehicles shall be repaired immediately or removed from site. ▪ All liquid fuels should be stored in tanks or mobile bowzers with firmly closed lids, and they should be situated in bunded areas. ▪ The contractor shall ensure that there is adequate fire-fighting equipment at the fuel storage areas. 		
Ablution facilities and sewerage		<ul style="list-style-type: none"> ▪ Provision must be made for the management and treatment of sewerage. Infrastructure should be well planned and well maintained. ▪ Sewerage pipes must be buried at an appropriate depth so that they do not interfere with the surface 	Proponent	Proponent

		<p>activities, while practically accessible for maintenance.</p> <ul style="list-style-type: none">▪ Conservancy tanks should be emptied regularly to prevent overflowing and spillage. The use of recognised biological accelerators in conservancy tanks and soak away systems is recommended.▪ Ablution facilities should be kept clean, neat and in hygienic condition.▪ Hazardous chemicals, dead organisms and other non-sewerage materials may not be dumped into sewerage systems.		
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8. AQUACULTURE MEASURES

The inland aquaculture sector has various production techniques in culture systems such as tanks, ponds, cage culture etc. For the purpose of this project only the pond culture will be utilized. Pond culture typically refers to earth ponds, but various plastics, concrete and other pond linings are common. All aquaculture systems are managed with the interest of the production organisms and the surrounding environment. To be sustainable, the host environment must have adequate capacity in terms of the required environmental resources and services.

8.1 General concept of production systems

There are various general concepts of production systems that should be considered, such as:

- a) Production systems should be designed and constructed in a manner that allows for the safety of employees, the farmed organisms and the surrounding environment and should be readily accessible for daily operations
- b) They should be designed and constructed in a manner that prevents the escape of the cultured organisms.
- c) Production systems should be structurally sound, should not leak unnecessarily.
- d) Where electricity is utilized, the electrical installations must be safe and maintained regularly.
- e) To prevent environmental degradation through aquaculture generated water pollution, it is recommended that the sustainable production capacities of an operation be determined in relation to the available water resources.
- f) Aquaculture proponents should keep detailed records which allow for forward-looking production estimates to ensure that sustainable production capacities are maintained.

8.2 Pond culture systems

There are various general concepts of pond culture systems that should be considered, such as:

- a) Aquaculture ponds must be designed and constructed to allow for complete drainage.
- b) The pond should have adequate overflow capability and flood protection and should also allow for early detection of rising water levels that could potentially cause flooding. The inflow and outflow control mechanisms are very important.
- c) The inner walls must be made of a suitable slope to prevent internal erosion and collapse. The effects of surface wind and wave erosion must be combated by vegetation establishment or stone packing.
- d) If sediments are removed, they should be disposed of in a responsible manner.

- e) Trees and other large plants should not be permitted to grow on retaining walls of the ponds as their roots may weaken the structure.
- f) Adequate control measures should be put in place to prevent moles and crabs from digging into the retaining walls of earth ponds. Thus, they may destabilize the structure.
- g) Aeration apparatus, pumps and water inlets should be placed and managed to prevent internal erosion of the ponds.
- h) Electrical installations associated with the pond culture system should be kept safe and well maintained.
- i) The limiting production factor in pond culture is often oxygen, but this depends largely on the pond size to biomass ratio, climate, rate of water displacement and any oxygen addition through aerators.
- j) Where water discharge takes place, care must be taken that the legal water quality criteria are met.

8.3 Production activities

Although production capabilities are determined by many factors, it is often limited by the availability of oxygen and water. Where oxygen is the limiting factor, over utilization of the environment can be ignored as oxygen depletion by aquaculture is relatively limited and re-oxygenation is usually rapid. Where water is the limiting factor, over utilization of the environment is relevant as water pollution can cause environmental degradation. Whatever the limiting factor, it is important to operate within the sustainable production capacities to prevent environmental degradation. Environmental capacity determination for aquaculture is not a once off exercise and requires continuous monitoring, decision-making and adaptive management.

Table 8: Aspects associated with the operations of a fish farm (aquaculture)

Aspects	Measures	
Water monitoring and management	<ul style="list-style-type: none"> ▪ Aquaculture activities adds nutrients, metabolites and other wastes to the water column, which creates the potential for water quality deterioration. ▪ These impacts could include the creation of eutrophic zones, fluctuations in dissolved oxygen, algal blooms and changes in species composition. ▪ Water quality and quantity management is of importance in aquaculture. 	<ul style="list-style-type: none"> ▪ The use of water in aquaculture must be legally authorised and limited to the quantities allowed by MAWLR. ▪ The quality of water that enters the facility should be comparable with the quality of water that exits the operation. Discharge water must be within the quality standards stipulated by MAWLR (this includes discharge of water with the same quality as that in the canal). ▪ In certain instances the treatment of discharges water may be required to achieve the stipulated discharge quality criteria. This treatment may include sedimentation, decantation, biological oxidation, filtration, water recycling, nitrification, foam fractionation, carbon absorption, ion exchange, algal systems, ozone, etc. ▪ Nutrients or suspended solids can be removed by filter-feeding organisms where practical. ▪ Feeding must be strictly controlled through a specific feeding regime that maximises feed conversion efficiency, limits direct feed wastage and above normal faecal and metabolite releases from the production organisms. ▪ Aquaculture feeds should be as low as possible in phosphorus (should be attainable through digestion and absorption), low in inedible components such as fines and water stable (highly digestible to the production species). ▪ Samples of the inlet and outlet water of production facilities should be analysed at a laboratory that has been accredited by the regulatory organ (NamWater).
Managing species and species escape	<ul style="list-style-type: none"> ▪ The global redistribution of species is not well controlled and has caused irreparable environmental damage in certain areas. 	<ul style="list-style-type: none"> ▪ Only indigenous species may be used and care must also be taken that secondary species are not accidentally introduced with the target species.

	<p>Coupled with the unseen and unpredictable ability of some species in escaping from production facilities.</p>	<ul style="list-style-type: none"> ▪ No live freshwater organisms may be transported to or from the facility without a transport permit from MFMR. ▪ Species that are able to hybridise should not be farmed together, while species that are able to hybridise with indigenous species in the surrounding environment should not be used as production candidates. ▪ Prior to the purchase and stocking of any organisms, the disease and parasitic status and risk of the species must be investigated in context of its origin, the area where it will be taken and the degree to which any potential disease may pose a threat to the surrounding environment. ▪ Operators must make specimen of the production organisms available to authorities that need to determine the species, diseases status or genetic characteristics. ▪ Adequate steps must be taken to prevent the escape of production organisms. Regular inspection of production infrastructure and barriers must be conducted. ▪ Barriers should be adequate to prevent escape during flooding, overflows and unforeseen circumstances. Escape barriers may include netting, grids, sand & other filters, predator ponds, chemical treatment areas, soak away systems, etc. ▪ Aquaculture species are generally propagated from a tailored gene pool and are not suitable for restocking of natural stocks.
<p>Feed management</p>	<ul style="list-style-type: none"> ▪ The management and responsible use of feed is not only an important consideration, but it is also a key factor in determining the financial viability of most aquaculture ventures. ▪ Recently, aquaculture feeds in Namibia have significantly improved to reduce their environmental impact. 	<ul style="list-style-type: none"> ▪ Only registered aquaculture feeds should be purchased from recognised feed companies that produce high quality feeds. Operators should be familiar with the nutrient make-up, the primary ingredients and production techniques for the feeds used. ▪ Feed producers should provide the date of manufacture, idle storage conditions and estimated shelf life. ▪ Feeds should be stored in a lockable room to prevent theft. They should be stored & used on a “first in first out” basis to prevent unnecessary deterioration of quality. ▪ Feed storage areas should be well ventilated, dry and free of vermin that that can damage, contaminate and consume feeds. Dampness and heat can also damage feed. ▪ Feeds should be stored on individually stacked pallets that allow for full ventilation of bags that would otherwise be in direct contact with floor and wall surfaces. ▪ Feed types and feeding strategies are specific to each species, to culture conditions, climate and growth stage. Feed types and feeding rates should be recorded daily so that feed conversion efficiency can be calculated and monitored.

		<ul style="list-style-type: none"> ▪ Water quality monitoring should be correlated and checked against feeding rates and production biomass so that adjustments can be made to the feeding program. ▪ Palatable feeds of the correct pellet or grain size should be used to ensure low levels of feed loss. Other factors such as feed position (e.g., floating/sinking) and feeding time of day must also be considered to minimise feed wastage. ▪ Feeding tempo and methods should be suited to the specific species, while feed distribution in a production unit must be even to ensure that all individuals are fed. ▪ Uneaten feed is a sign of over-feeding, and this should be corrected on the feed program. ▪ Employees that are responsible for feeding should be well trained in feed application so that they are able to detect changes in feeding behaviour. If feeding is not active it may be necessary to suspend, delay or modify the feeding program. ▪ Water current speed, flow rate, turbidity, barometric pressure, oxygen levels, wind, territorial behaviour, etc. may influence feeding and thus the feeding strategy should be flexible and adaptive to ensure optimal intake and minimal wastage. ▪ Where automated or demand feeding devices are used, care must be taken to prevent over feeding and the feed application monitored in relation to production performance. ▪ Where unprocessed feeds are used, special care must be taken to prevent over feeding and maintenance of water quality. ▪ When fertilization is used to enhance algal and plankton blooms on which aquaculture organisms may feed, it must be done within the capacity of the water resource and in a manner that prevents the release of enriched water to the surrounding environment.
<p>Disease monitoring, control and treatment</p>	<ul style="list-style-type: none"> ▪ Aquaculture disease is a threat due to the potential impact on production and to the potential of infecting downstream populations and the environment. ▪ Operators should be aware of the impacts that diseases could have and should manage towards prevention and preparedness for any outbreaks that may occur. ▪ Namibia subscribes to the Aquatic Animal Health Code, issued by the Office International des Epizooties (OIE) and 	<ul style="list-style-type: none"> ▪ No aquaculture organisms should be introduced from an unrecognised source. ▪ No live freshwater organisms may be transported to or from the facility without a transport permit from MFMR. ▪ Prior to the purchase and stocking of any organisms, the disease and parasitic status and risk of the species must be investigated in context of its origin, the area where it will be taken and the degree to which any potential disease may pose a threat to the surrounding environment. ▪ When juveniles or brood stock are caught wild, it is recommended that these be quarantined to diagnose, investigate, monitor and treat potential diseases and parasites.

	<p>therefore the international disease code applies. Hence, the identified diseases in this code are not permitted by law.</p> <ul style="list-style-type: none"> ▪ It is almost impossible to eliminate all bacteria and parasites from an aquaculture facility. Hence, disease management requires a holistic approach and it includes the management of water quality, hygiene, feed, stocking densities, stress, predators, husbandry techniques, etc. 	<ul style="list-style-type: none"> ▪ Operators should monitor the health status of aquaculture organisms as part of the daily operational activities. This includes behavioural monitoring, sampling, diagnostic dissection, microscopic investigation, etc. ▪ It is recommended that a health assessment be conducted on the aquaculture facilities by an aquaculture pathologist, at least twice a year. The assessment must be diagnostic, with recommendations of treatments or management of any diseases or parasites. ▪ If an identified disease on the OIE Aquatic Animal Health Code is detected, the nearest State Veterinarian must be informed immediately, where after quarantine, culling and stock disposal measures may be implemented. ▪ Treatment of aquaculture diseases must be done by recognised methods and under the guidance of a qualified aquaculture pathologist. All treatments must be recorded in detail to reflect the date, treatment methods, substances, dosages, etc. ▪ The storage and use of aquaculture chemicals and medications must be done in a safe and responsible manner as per their respective MSDS. ▪ When a disease breakout occurs, production systems should be isolated from each other and the surrounding environment. A qualified aquaculture pathologist should be consulted to assist with further management inputs and treatments. ▪ To reduce the risk of aquaculture diseases these practices may be implemented; screening or quarantine of brood stock for known pathogens & parasites, appropriate treatment of brood stock prior to entering the hatchery environment, isolation of production sectors with independent water supplies and equipment, installation and use of foot baths and hand washing facilities for employees, regular disinfection of equipment and working areas, restrictions on access to foreign vehicles and people, management of bird and predator populations that could be disease carrier and minimising the potential for disease vector hosts to enter the aquaculture system.
<p>Managing mortalities</p>	<ul style="list-style-type: none"> ▪ It is normal occurrence for some aquaculture organisms to die from natural or production induced causes. The rate of such mortalities must be monitored to ensure that the numbers remain within acceptable limits. 	<ul style="list-style-type: none"> ▪ The disposal of dead organisms must be done in an environmentally responsible manner. ▪ As a general norm, no more than 1% of the total number of individuals in a single production unit should die in a 24-hour period. ▪ If mortalities are detected the behaviour of the remaining stock must be monitored carefully. If large numbers die, the first step is to check the physical and chemical characteristics of the water (e.g., temperature, pH, oxygen content, etc.) and implement the necessary corrective measures. If no adverse water conditions are detected, a recognised aquaculture pathologist should be consulted.

		<ul style="list-style-type: none"> ▪ Orderly notes should be kept of the numbers of dead organisms and the behavioural patterns of the population. ▪ Dead organisms must be removed from the production systems as soon as they are detected. ▪ Dead organisms in small numbers can be disposed via a subterranean pit, dug out in an area that is poor in groundwater. Each disposal must be followed by copious amounts of lime and one pit should not receive more than 30 kg of biomass per month. ▪ If large numbers die, the cause of death must be determined before disposal. Dead organisms can be disposed of by incineration if done responsibly, safely and with prior notification to local and district authorities and surrounding landowners.
Grading, moving and harvesting	<ul style="list-style-type: none"> ▪ Aquaculture organisms are regularly graded for uniformity in size, growth monitoring and the prevention of cannibalism. This requires a degree of handling, which must be done in a manner that causes the least possible stress or injury and eliminates the potential of organisms to escape. 	<ul style="list-style-type: none"> ▪ No live freshwater organisms may be transported to or from the facility without a transport permit from MFMR. ▪ Organisms should not be graded and moved unnecessarily. ▪ Grading and moving should be preceded by a period of starving so that the metabolism of the organisms does not impede their stress tolerance. Metabolites and faecal mater also have the potential of fouling the water in which organisms are moved. ▪ Where possible, grading and moving should be done at lower temperatures to reduce metabolic rates and stress. ▪ Grading, moving and harvesting equipment and techniques should not cause unnecessary injury and stress and should be adequate to prevent organisms from escaping. ▪ Harvesting and killing must be done using the most humane method possible.
Managing postproduction and processing activities	<ul style="list-style-type: none"> ▪ Much of the handling and processing of aquaculture organisms is guided by national and international code of practice, laws, health standards and quality control procedures (e.g. Hazard Analysis and Critical Control Point (HACCP)). ▪ The applicability of these is determined by the type or level of processing, product, target market and ability (technically and financially) of the aquaculture operators. 	<ul style="list-style-type: none"> ▪ Harvesting equipment and techniques should not cause unnecessary injury and stress and should be adequate to prevent organisms from escaping. ▪ Harvesting and killing must be done using the most humane method possible. ▪ Depuration or purging could be used to remove pathogens, chemicals or treatment residues and taints from harvested organisms where possible. ▪ Post-harvest products should be chilled and handled with care to prevent deterioration of quality. Phytosanitary responsibility must be maintained throughout the harvest chain and potential contact with microbiological contaminants be eliminated. ▪ Harvest cycle and processing chain should be kept as short as possible and end products should be chilled or frozen soon after processing as possible. ▪ Processing should be done in a chilled environment and under roof. ▪ Personnel involved in processing should be trained for the task and be fully briefed on the phytosanitary risks associated with personal hygiene.

		<ul style="list-style-type: none"> ▪ A high degree of phytosanitary and hygienic cleanliness should be maintained in the processing area. ▪ Wastewater from the processing activities should be strained, filtered and disposed of in a capable sewerage system or another sanctioned route of discharge. ▪ Where possible, all processing waste should be ensiled by grinding and lowering the pH so that a stable liquid is formed which can be incorporated into animal feeds as a high protein supplement. If not possible, burying or incineration of waste may be used provided it is legally permitted and not detrimental to the environment.
Managing and controlling predation	<ul style="list-style-type: none"> ▪ Predatory animals are attracted to aquaculture facilities as the high concentrations of prey items lessen the effort of obtaining a meal. ▪ The intention is to prevent predatory access while not injuring, harming or killing these animals in the process. 	<ul style="list-style-type: none"> ▪ Netting is commonly used to keep birds from entering aquaculture facilities. The netting should be clearly visible and prevent entanglement, injury or death. ▪ Where possible and environmentally acceptable, the elimination of perches for birds around aquaculture facilities can reduce the occurrence of predator birds. ▪ Electrified fences around aquaculture facilities should discourage access rather than injure animals. ▪ Traps may not be used to injure any predators. They may only be used if the animals can be caught live and without injury, for translocation to alternative areas. ▪ No poison may be set as a trap for predators and no animals may be shot. ▪ Birds should be discouraged by cover netting. Dogs can also be used effectively in discouragement of birds while other scare tactics are less effective. ▪ Frogs and crabs may be kept out of the facility by curtain fencing and the screening of water inlets and outlets.
Production records	<ul style="list-style-type: none"> ▪ Records are a cornerstone to a viable operation, and it is an important aspect of best practice. 	<ul style="list-style-type: none"> ▪ Fish farming records should be written or electronically logged in a logical, and tidy manner. ▪ Records should be kept safely and accessible for daily management and reference. ▪ Where possible, records should be supported by photographs, water quality analysis reports, incident reports, MSDSs and other information that may be relevant.

8.4 Environmental contingency planning

Environmental best practice includes the development of environmental contingency plans. An emergency is an unplanned event when a project operation loses control, or could lose control, of a situation that may result in risks to human health, property, or the environment, either within the facility or in the local community. The plan must be communicated to all employees, applicable local and district authorities and emergency services. Contingency plans are site and project specific and may cover many aspects. Below are some examples to the actions in such plans:

- a) In the event of contaminated water reaching an aquaculture facility:
 - Disconnect incoming water supplies.
 - Identify and isolate area of contamination.
 - Activate internal water reticulation and re-circulation.
 - Increase oxygenation and stop feeding.
 - Identify contaminant type and solution.
 - Remove dead organisms and dispose appropriately.

- b) If polluted water is discharged from an aquaculture facility without prior treatment:
 - Disconnect discharge water flows
 - Identify the nature of the pollutant and extent of pollution.
 - Notify the authorities as required.

- c) If the escape of aquaculture organisms is detected:
 - Identify the escape route and repair to prevent it from happening once again.
 - Remove organisms from affected production units if necessary.
 - Determine how many organisms have escaped.
 - Notify the authorities as required.

- d) If a disease breakout is detected:
 - Isolate affected production units if possible.
 - Identify the disease if possible.
 - Consult a fish pathologist if necessary.
 - Apply treatment based on diagnosis.
 - Remove dead or infected organisms and dispose appropriately.
 - Monitor effects of treatment.
 - Quarantine if necessary.
 - Notify the authorities as required.

e) If a fire breaks out:

- Identify affected areas and evacuate employees.
- Notify emergency services if necessary.
- Apply fire control measures.

Cubia Green Fields cc is advised to compile specific contingency plans for all potential risk areas that can be identified in the project. These plans should be documented and kept in an accessible area.

8.5 Monitoring of EMP Implementation

The correct and successful implementation of impact mitigation measures to lessen adverse impacts on environmental conditions needs to be ensured by a proper monitoring programme. Monitoring of the general implementation of or adherence to the EMP shall be the responsibility of EMA. Reporting on adherence/compliance to provisions as communicated to proponent, shall take place during scheduled site meetings.

9. DECOMMISSIONING PHASE

When the project site has been deemed to be unsustainable anymore or its operating capacity has been reached, it must be decommissioned. A decommissioning management plan will have to be developed along with rehabilitation procedures by a team of environmentalists and environmental engineers, to ensure that the site will not become a hazard in the future as well as restoring the area into a condition that it was like before, or even better than it was ecologically.

Given the nature and purpose of this project, it is unlikely to be decommissioned in the foreseeable future. But if it is discontinued by the proponent, the infrastructure should be made available or sold to the surrounding land users.

9.1 Removal of the aquaculture organisms & infrastructure

The applicable authorities must be informed when activities are terminated. Such authorities include MFMR, MAWLR, MEFT: DEAF and local & district authorities that are applicable. The decommissioning procedures must be explained to the authorities and copied into the results of a post-decommissioning audit.

All aquaculture organisms must be removed by either sales, donations or humane killing. This eliminates the risk for redistribution into areas where they are not environmentally compatible. If organisms are killed, they should be disposed of responsibly and in consultation with local authorities. Any insecure or unsafe infrastructure should be demolished during decommission. All waste from the demolition activities must be appropriately disposed of before the area is stabilized and vegetated. The post-decommissioning site should resemble a state similar to that prior to commencement of the project.

9.2 Site rehabilitation

Following the removal of infrastructure, the receptive of the soil for re-vegetation should be enhanced by means of ripping and topsoil application. Fully rehabilitate (e.g., clear and clean area, rake, pack branches etc.) all disturbed areas and protect them from erosion. Fast growing, indigenous plant species that provide stability must be established. Only indigenous plants which can establish easily and will need less maintenance because they have already adapted to the local conditions should be considered. Before final decisions about the choice of plant species are taken the forestry extension officer should be approached for their advice.

9.3 Environmental audit

To ensure that decommissioning and rehabilitation is acceptable, an external audit should be conducted. It should be conducted immediately after decommissioning and rehabilitation and second audit after six (6) months.

10. CONCLUSION

Based on the findings of this EIA study and proposed mitigation measures outlined in this EMP, Green Gain Consultants cc is confident that the proposed operations, expansions, maintenance and decommissioning of the aquaculture (fish farming) project at Okashaningwa Village will not result in significant environmental impacts, provided that this EMP is implemented and that all the legal requirements pertaining to this development are complied with.

Upon approval by the authorities, this EMP shall be considered legally binding and any deviation or transgression is punishable by law as per the Environmental Management Act, No. 07 of 2007. A copy of this EMP shall be kept by the proponent always. Although the implementation of this EMP requires a multitude of administration, the project proponent should play a pivotal role in its implementation. The proponent should therefore ensure proper coordination with other stakeholders and may provide training to all parties involved when necessary. The proponent should also ensure to avail necessary resources (i.e., human, financial etc.) and collaborations to the implementation of this EMP. This EMP is valid until the project has been successfully implemented and thus the competent authority is mandated to conduct regular monitoring and inspections at different project phases.