

ENVIRONMENTAL MANAGEMENT PLAN FOR MARINE AQUACULTURE (MARICULTURE) DEVELOPMENTS IN WALVIS BAY



ENVIRONMENTAL MANAGEMENT PLAN

September 2023

APP NUMBER 221127000493

Prepared for:

Ministry of Fisheries and Marine Resources
Private Bag 13355
Windhoek
Namibia.
Tel: +264 61 205 3911

Prepared by:

KPM Environmental Consulting
P.O. Box 26328
Windhoek, Namibia
Tel: +264 85 747 2222
Email: kpm.consult@outlook.com

PROJECT DETAILS:

Project	EIA and EMP for the Development of Aquaculture (Mariculture) Activities in Walvis Bay, Erongo Region, Namibia
Report Version	Final
Date	September 2023
Prepared for:	Ministry of Fisheries and Marine Resources (MFMR) (in collaboration with the Benguela Current Convention - BCC)
Environmental Consultant	KPM Environmental Consulting
Project Team	Festus Kapembe (Project Manager) Ruth Nuujoma (Environmental Specialist) Dr. J. Kinahan (Archaeological Specialist) Martin Tjipute (Marine Specialist)

TABLE OF CONTENTS

1	INTRODUCTION TO THE EMP FOR SWAKOPMUND	1
1.1.	PROJECT BACKGROUND.....	1
1.2.	OBJECTIVES OF THE EMP	2
1.3	PROJECT LOCATION.....	3
1.4.	PROJECT DESCRIPTION.....	3
1.4.1	Marine Baseline Information – Swakopmund	3
1.5	REMINDER OF THE PROJECT	4
1.6	UPDATING THE EMP.....	4
1.7	STRUCTURE THE EMP	4
1.8	MONITORING AND REPORTING	5
2	RESPONSIBILITIES FOR IMPLEMENTATION OF THE ESMP.....	7
2.1	RESPONSIBLE PARTIES	7
2.2	WATER RESOURCES AND SUPPLY - MANAGEMENT PLAN	8
2.2.1	Scope of the EMP	8
2.2.2	Objectives of the Water Resources and Supply Management Plan.....	8
2.2.3	Project Standards and Permits	8
2.2.4	Management Action Plan	8
2.2.5	Monitoring and Reporting	13
2.3	WASTEWATER MANAGEMENT PLAN.....	13
2.3.1	Scope of the EMP	13
2.3.2	Objective of the Management Plan	13
2.3.3	Roles and Responsibilities	14
2.3.4	Project Standards	14
2.3.5	Management Action Plan	14
2.3.6	Monitoring and Reporting	15
2.4	ENERGY AND CLIMATE CHANGE MANAGEMENT PLAN	15
2.4.1	Scope of the EMP	15
2.4.2	Objective of the Management Plan	16
2.4.3	Roles and Responsibilities	16
2.4.4	Project standards.....	16
2.4.5	Management Action Plan	16
2.4.6	Monitoring and Reporting	18
2.5	SOLID WASTE MANAGEMENT PLAN	18
2.5.1	Scope of the EMP	18
2.5.2	Objectives of the Solid Waste Management Plan	18
2.5.3	Roles and Responsibilities	18
2.5.4	Project Standards and Permits	19

2.5.5	Management Action Plan	19
2.5.6	Monitoring and Reporting	23
2.6	AIR EMISSIONS MANAGEMENT PLAN	23
2.6.1	Scope of the EMP	23
2.6.2	Objectives of the Emissions to Air Management Plan.....	23
2.6.3	Roles and Responsibilities	23
2.6.4	Project Standards and Permits	23
2.6.5	Management Action Plan	24
2.6.6	Monitoring and Reporting	24
2.7	BIODIVERSITY MANAGEMENT PLAN.....	24
2.7.1	Scope of the EMP	24
2.7.2	Objectives of the Management Plan.....	25
2.7.3	Roles and Responsibilities	25
2.7.4	Project Standards	25
2.7.5	Management Action Plan	25
2.7.6	Monitoring and Reporting	26
2.8	VISUAL AND LANDSCAPE MANAGEMENT PLAN.....	26
2.8.1	Scope of the EMP	26
2.8.2	Objectives of the Management Plan.....	26
2.8.3	Roles and Responsibilities	26
2.8.4	Project Standards	27
2.8.5	Management Action Plan	27
2.8.6	Monitoring and Reporting	27
2.9	TRAFFIC AND TRANSPORT MANAGEMENT PLAN	27
2.9.1	Scope of the ESMP	27
2.9.2	Objectives of the Traffic and Transport Management Plan.....	27
2.9.3	Roles and Responsibilities	28
2.9.4	Project Standards and Permits	28
2.9.5	Management Action Plan	28
2.9.6	Monitoring and Reporting	28
2.10	NOISE AND VIBRATION MANAGEMENT PLAN	29
2.10.1	Scope of the EMP	29
2.10.2	Objectives of the Management Plan.....	29
2.10.3	Roles and Responsibilities	29
2.10.4	Project Standards	29
2.10.5	Monitoring and Reporting	31
2.11	HAZARDOUS MATERIALS MANAGEMENT PLAN	31
2.11.1	Scope of the EMP	31

2.11.2	Objectives of the Solid Waste Management Plan	31
2.11.3	Roles and Responsibilities	31
2.11.4	Project Standards	32
2.11.5	Management Action Plan	32
2.11.6	Monitoring and Reporting	35
2.12	SOCIO-ECONOMIC ASPECTS AND AFFORDABILITY - MANAGEMENT PLAN.....	35
2.12.1	Scope of the EMP	35
2.12.2	Roles and Responsibilities	35
2.12.3	Project Standards	35
2.12.4	Management Action Plan	36
2.12.5	Monitoring and Reporting	36
2.13	LOCAL EMPLOYMENT PLAN	37
2.13.1	Scope of the EMP	37
2.13.2	Objectives of the Management Plan.....	37
2.13.3	Roles and Responsibilities	37
2.13.4	Project Standards	37
2.13.5	Management Action Plan	38
2.13.6	Monitoring and Reporting	41
2.14	COMMUNITY HEALTH, SAFETY AND SECURITY MANAGEMENT PLAN	41
2.14.1	Scope of the EMP	41
2.14.2	Objectives of the Management Plan.....	41
2.14.3	Roles and Responsibilities	41
2.14.4	Project Standards	41
2.14.5	Management Action Plan	41
2.14.6	Monitoring and Reporting	42
2.15	CULTURAL HERITAGE MANAGEMENT PLAN.....	42
2.15.1	Scope of the EMP	42
2.15.2	Objectives of the Management Plan.....	43
2.15.3	Roles and Responsibilities	43
2.15.4	Project Standards	43
2.15.5	Management Action Plan	43
2.15.6	Monitoring and Reporting	44
3	CONCLUSION.....	44

LIST OF FIGURES:

Figure 1:	Proposed areas for Mariculture Farms in Swakopmund	2
------------------	--	---

LIST OF TABLES:

Table 1: List of triggered activities identified in the EIA Regulations which apply to the proposed project	2
Table 2: Planning and Construction - Water Resources and Supply Management Plan	10
Table 3: Operation - Wastewater Management Plan	14
Table 4: Operation - Energy and Climate Change Plan	17
Table 5: Construction - Solid Waste Management Plan	20
Table 6: Operation - Solid Waste Management Plan.....	21
Table 7: Construction – Emissions to Air Management Plan	24
Table 8: Construction - Biodiversity Management Plan	25
Table 9: Operation - Biodiversity Management Plan	26
Table 10: Construction and Operation - Visual and Landscape Management Plan	27
Table 11: Construction, Operation and Decommissioning -Traffic and Transport Management Plan.....	28
Table 12: Construction and decommissioning - Noise and Vibration Management Plan	30
Table 13: Operation - Hazardous Materials Management Plan.....	33
Table 14: Operation - Socio-Economic Aspects and Affordability Management Plan	36
Table 15: Construction - Local Employment Plan	38
Table 16: Operation - Local Employment Plan.....	39
Table 17: Construction and Decommissioning - CHSS Management Plan.....	41
Table 18: Construction, Operation and Decommissioning - Cultural Heritage Management Plan.....	43

Abbreviations

CHSS	Community Health, Safety and Security
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
H&S	Health and Safety
HR	Human Resources
IUCN	International Union for the Conservation of Nature
KPI	Key Performance Indicator
MAWLR	Ministry of Agriculture, Water and Land Reform
MEFT	Ministry of Environment, Forestry and Tourism
MoLIREC	Ministry of Labour, Industrial Relations and Employment Creation
MWT	Ministry of Works and Transport
O&M	Operation and Maintenance
PPE	Personal Protective Equipment
RO	Reverse osmosis
SEP	Stakeholder Engagement Plan
SWM	Solid Waste Management
WHO	World Health Organisation
BCC	Benguela Current Conventions

1 INTRODUCTION TO THE EMP FOR SWAKOPMUND

1.1. PROJECT BACKGROUND

The Ministry of Fisheries and Marine Resources (MFMR) in collaboration with the Benguela Current Commission (BCC) undertakes to develop marine aquaculture in Namibia specifically in the coastal towns of Swakopmund, Walvis Bay (Erongo Region) and Lüderitz in //Karas Region.

The marine aquaculture ("mariculture") sector is small and has been growing sub-optimally in relation to the potential and expectations for economic growth, job creation and poverty reduction. It remains a priority for the Namibian Government and even more so now as a viable climate change adaptation option in the fisheries sector.

The marine aquaculture operates in the above-mentioned towns, within the nutrient rich Benguela Current Large Marine Ecosystem (BCLME). This presents the sector with competitive advantages for the prospective operators as it is highly beneficial for the filter feeders such as oysters and mussels but can also be disastrous at times due to low oxygen and unfavourable events such as sulphur eruptions which may cause mortalities among bivalves.

The Environmental Impact Assessment (EIA) study was undertaken to unlock the potential for prospective operators to be able to operate aquaculture farms offshore and onshore without the prolonged requirements of conducting the impact assessment process. This study, therefore, would enable the Ministry of Environment, Forestry and Tourism (MEFT) to approve the operations of mariculture activities in the three identified coastal areas. Prospective operators would thus only be required to submit their site-specific Environmental Management Plan (EMP) to apply for environmental clearance certificates (ECCs).

This Environmental Management Plan is for the Mariculture facility for the Walvis Bay.

The EMP provides:

- Strategies and plans to manage environmental impacts identified during the EIA to avoid, reduce, or mitigate potential adverse impacts to minimal or insignificant levels.
- Measures that could enhance positive impacts.
- A grievance procedure whereby I&AP could register grievances with the proponent.
- A method for auditing and monitoring implementation and operation of recommended measures, thereby ensure compliance with the EMP.

- Assignment of responsibilities with regard to measures to be implemented.

1.2. OBJECTIVES OF THE EMP

To minimise the potential negative impacts, and enhance the positive impacts, of the Project to implement a Marine Aquaculture facility in Walvis Bay.

This Generic Environmental Management Plan (GEMP) addresses the management of environmental impacts associated with the construction and operation of the proposed marine aquaculture in Namibia specifically in the coastal towns of Swakopmund Walvis Bay (Erongo Region) and Lüderitz in //Kharas Region. The document should be used as a guideline for managing, mitigating and monitoring the environmental impacts related to the pre-construction (design), construction and operational phases of the project. The Environmental Assessment Report compiled for this project should be valuable as a reference source for understanding this GEMP and for placing it into perspective.

Given the nature of the proposed project, specific operational EMPs needs to be compiled once the specific activities to be undertaken by each operator are known and can be properly managed.

In terms of the Environmental Management Act No 7 of 2007 (EMA), certain activities have been identified, which could have a substantially detrimental effect on the environment. These listed activities require an Environmental Clearance Certificate (ECC) from the competent environmental authority, i.e. Ministry of Environment and Tourism: Department of Environmental Affairs (MEFT:DEA), prior to commencing. The following activities identified in the EIA Regulations (**Table 1**) apply to the proposed project:

Table 1: List of triggered activities identified in the EIA Regulations which apply to the proposed project

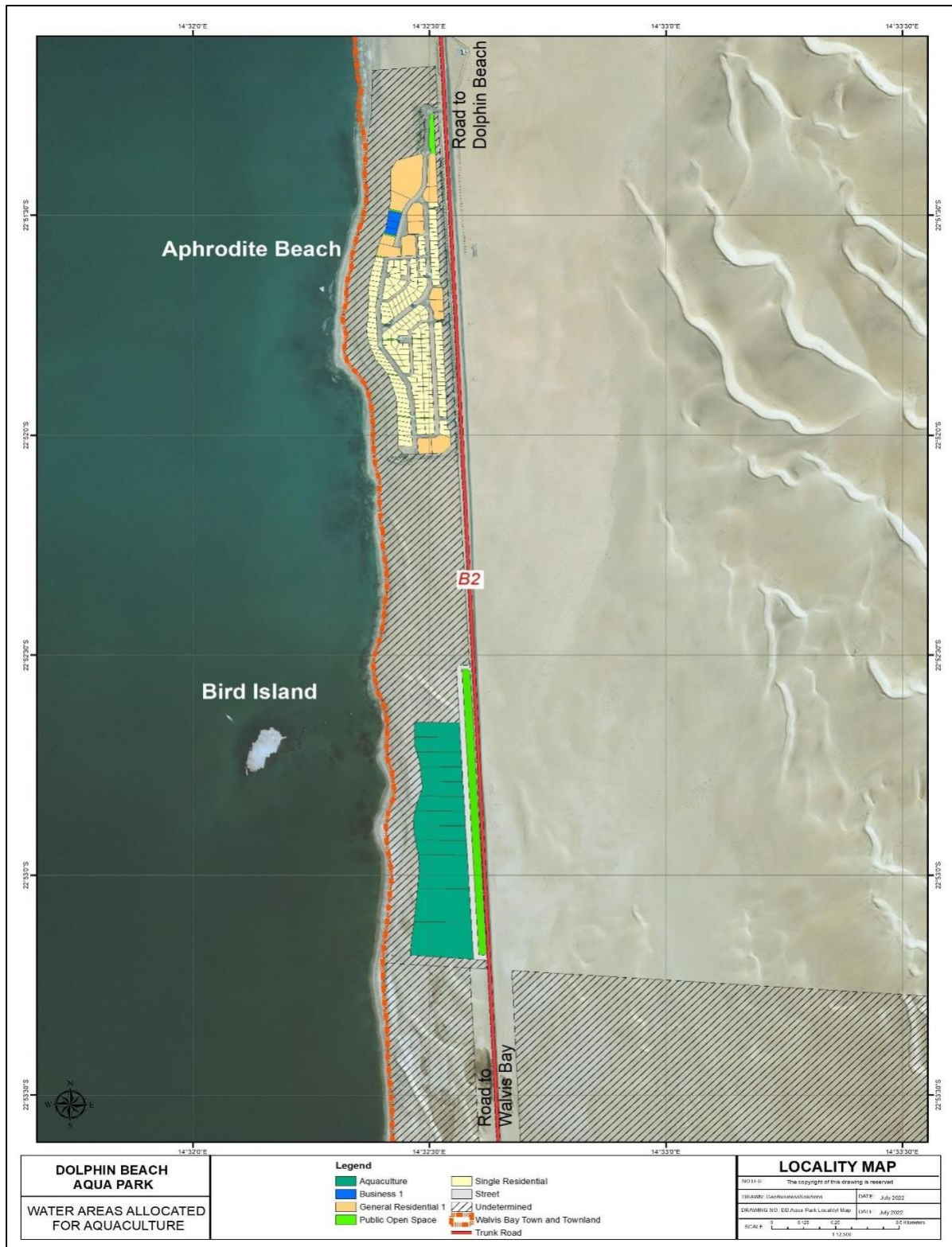
ACTIVITY DESCRIPTION	DESCRIPTION OF RELEVANT ACTIVITY	DEVELOPMENT ACTIVITIES THAT RELATE TO THE APPLICABLE LISTED ACTIVITY
Activity 5.1 (Land Use and Development Activities)	The rezoning of land from; - (d) Use of nature conservation or zoned open space to any other land use.	The proposed project entails the rezoning of land from open space to be developed for mariculture activities.
Activity 7.1 (Agriculture and Aquaculture Activities)	Construction of facilities for aquaculture production, including mariculture and algae farms where the structures are not situated within an aquaculture development zone declared in terms of the Aquaculture Act, 2002.	The proposed project entails the development and demarcation of mariculture farms within aquaculture zones.



1.3 PROJECT LOCATION

Walvis Bay is a port town located on the coast of Namibia with an estimated population of 62,096 inhabitants. The town is sheltered by the Pelican Point sand spit with the harbour that is regularly busy with different types of vessels.

The proposed mariculture development activities will be located between the Walvis Bay town and the Aphrodite beach. The initial proposal by the Ministry of Fisheries and Marine Resources was to undertake the EIA focusing on existing and future areas dedicated for mariculture operations. However, after consultations with the operators and other key stakeholders such as the three local authorities and Namibia Ports Authority (Namport), it was decided that the study should assess the entire areas of Walvis Bay.



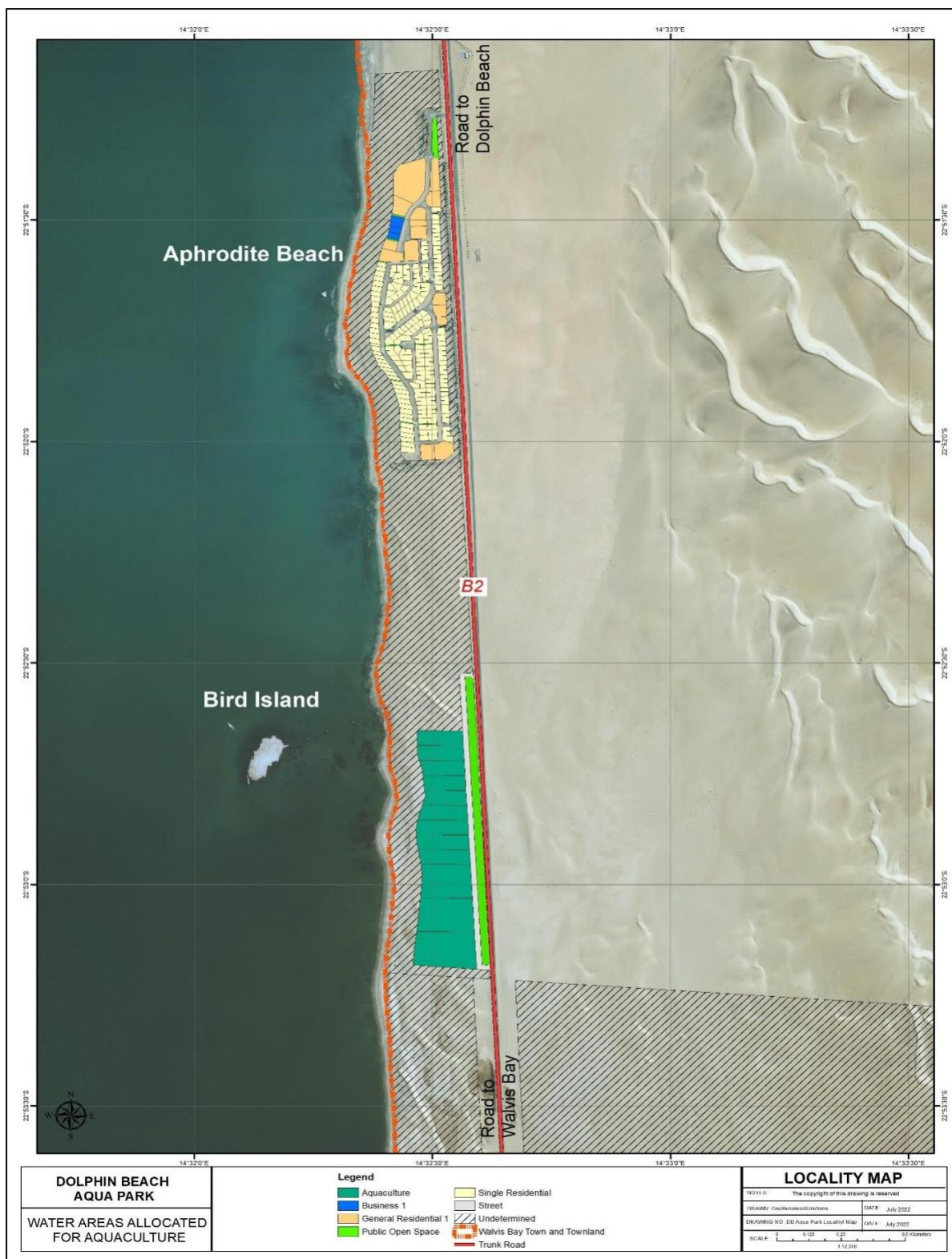


Figure 1: Proposed areas for Mariculture Farms in Walvis Bay

1.4. PROJECT DESCRIPTION

The proposed activity has the potential to improve the livelihood of the coastal communities through direct and indirect benefits to the operators. Marine Aquaculture has the potential to generate a wide range of benefits as a viable, sustainable and scalable climate change adaptation option. The Marine Aquaculture development initiative holds the unexplorable potential to improve food and livelihood security for the Walvis Bay residents to contribute to the social and economic well-being of the coastal communities.

The project seeks to enable prospective operators who are interested in Marine Aquaculture to acquire permits and authorisations to operate mariculture at designated areas allocated by the Walvis Bay Municipality. The project will create employment opportunities for those interested in working on fish farms, especially the many unemployed youths who were retrenched as a result of the changes in legislation that left many companies lost out on their quotas.

The proposed mariculture development includes designs, construction, operational and decommissioning stages of the aquaculture farms. Specific activities at each stage of mariculture development are outlined in the marine assessment report. The marine specialist assessment reports have outlined various designs that can be used for offshore and onshore mariculture's systems. Construction methods also various between aquaculture farms on land and one offshore.

1.4.1 Marine Baseline Information – Walvis Bay

Globally, the aquaculture industry is regarded as one that is experiencing the fastest growth among all the food-producing industries. This can be attributed to a number of factors, amongst that includes a combination of a strong increasing demand for seafood products and depleted fish stocks in the world's water bodies and oceans, availability of large areas with, seemingly, unproductive potential for other agri-businesses (marine and brackish water), suitability of aquaculture as small-scale family managed operations that can be integrated with agriculture, better understanding of species biology and rapid improvements in fish culture technology.

Namibian marine aquaculture industry is capital intensive and has concentrated on oyster farming for the most part, but there are new trends indicating that the sub-sector is moving towards diversification from shellfish to include finfish and seaweeds to allow for future growth and stability. For most of the Namibian coast, marine aquaculture is restricted to onshore farming in ponds or tanks. This is relatively expensive, and therefore limits cultivation to higher-value species, destined mainly for the export market. There are, however, few sheltered bays that provide excellent sites for marine aquaculture development.

1.5 REMINDER OF THE PROJECT

The Ministry of Fisheries and Marine Resources with support from the Benguela Current Conventions are implementing the Mariculture development in Swakopmund, Walvis Bay and Lüderitz. The Mariculture Development will provide important technical, environmental, and financial data and information, as well as experience and lessons related to social aspects. This proposed mariculture development will also improve the livelihood of the coastal areas through employment creations and the potential positive or negative impacts on the socio-economic situation in coastal communities including vulnerable groups such as women-headed households.

The EIA and EMP have been prepared in line with the Environmental Management Act (Act No.7 of 2007) and the related Environmental Impact Assessment Regulations (No.30 of 2012), as well as in compliance with the Environmental and Social international best practices.

1.6 UPDATING THE EMP

The EMP will be reviewed and updated on an annual basis, or more frequently as necessary. The updated EMP should be shared with all parties responsible for implementation as well as the Swakopmund Municipality and the MEFT.

1.7 STRUCTURE THE EMP

There are several EMPs in this document covering different environmental and social aspects of the Project. The EMPs are:

1. Water resources and supply
2. Wastewater effluent.
3. Energy use and climate
4. Solid waste management.
5. Emissions to air
6. Biodiversity.
7. Visual impacts.
8. Traffic and transport
9. Noise and vibration
10. Hazardous materials
11. Socio-economic baseline and affordability.
12. Local employment and livelihoods.
13. Community health, safety, and security.
14. Cultural heritage.
15. Stakeholder engagement plan (SEP).

The priority EMPs are considered to be: Water resources and supply (1); Energy use and climate (3); Socio-economic baseline and affordability (11); and Stakeholder



engagement plan (SEP) (15). The SEP includes the Community Grievance Mechanism.

1.8 MONITORING AND REPORTING

The Mariculture Development for the Walvis Bay area will be implemented inland located on the northern side of Walvis Bay. Therefore, because of the nature of activities that will be involved from construction to implementation, there will be extensive monitoring and reporting throughout implementation, and this is already included in the project design and implementation plan.

The monitoring and reporting will particularly cover water quality measurements and volumes of water used at the mariculture facility. It will include monitoring of the performance of the technology. Much of this monitoring will be automated.

In addition, monitoring and reporting on implementation of the EMP will be important, including the Stakeholder Engagement Plan. Although the main key performance indicators (KPIs) will be associated with the water quality and the performance of the mariculture plant, a number of specific KPIs will be reported as part of the implementation of the EMP.

Key Performance Indicators (KPIs) for the EMP

- **Water Quality**
 - set of water quality monitoring data including concentrations of fluorides and possible contaminations from the facility; total hardness and turbidity; compared to adopted national drinking water quality standards.
- **Water Availability**
 - quantity of sea water and fresh water required by the facility.
- **Solid Waste Management:**
 - Quantity of waste disposed at the waste disposal site at Swakopmund.
 - Quantity of salt disposed at the Swakopmund/Walvis Bay waste disposal site.
 - Quantity of hazardous waste delivered to the hazardous waste facility.
- **Traffic and Transport:**
 - Number of vehicle accidents per year to and from the facility.
- **Hazardous Materials:**
 - Number of incidents with hazardous materials per year.
- **Socio-Economic Aspects and Affordability:**
 - Total number of households in Swakopmund.
 - Number of vulnerable households in Swakopmund.
 - Total number of businesses in Swakopmund.
- **Local Employment:**
 - Total number of months per year of employment of persons from the local community.
 - Number of lost-time accidents.
- **Community Health, Safety and Security (CHSS):**
 - Number of CHSS incidents per year.
- **Stakeholder Engagement:**
 - Average time taken (in days) to resolve grievances between Mariculture operator and the community.

2 RESPONSIBILITIES FOR IMPLEMENTATION OF THE ESMP

2.1 RESPONSIBLE PARTIES

The respective operators to be selected by the Walvis Bay Municipality will be the ultimate responsible party for the implementation of the EMP. The part of the EMP relevant to construction will be part of the contract documents for the construction contractor. In practice, many of the specific actions in the EMP will be the responsibility of the Contractor and the Operator at the site. Walvis Bay Municipality and the Ministry of Environment, Forest, and Tourism (MEFT) will provide oversight monitoring of the EMP implementation.

2.2 WATER RESOURCES AND SUPPLY - MANAGEMENT PLAN

2.2.1 Scope of the EMP

The water resources and supply management plan for Mariculture facility in Swakopmund includes measures during planning, construction, and operation of the Facility.

Summary of Impacts

- The Project will require sea water to fill up the ponds and the water will be sources directly from the ocean through pipes.
- The positive impacts on water quality could be neutralised if the problems with water availability are not addressed on a sustainable basis.
- Operators will need to have technical skills to ensure that wastewater does not run back into the sea. If operation and maintenance are not carried out properly, then there is a risk that the water supply will be interrupted and/or the water quality will be affected and at times potentially not achieve the standards.

2.2.2 Objectives of the Water Resources and Supply Management Plan

- To ensure the positive impacts of the Project on water quality and quantity are sustained.
- To improve water availability for the facility without compromising the quality from the source.

2.2.3 Project Standards and Permits

The Water Resources Management Act (Act No. 24 of 2004) sets out requirements for the management and protection of water resources and planning for their use (MAWF, 2004). The Ministry of Agriculture, Water and Land Reform in Namibia has proposed updated water quality standards in draft Water Resources Management Regulations (2013) under the Water Resources Management Act (Act No. 11 of 2013).

The Environmental and Social Impact Assessment (EIA) for the Project has been carried out in line with international Environmental and Social best practices.

2.2.4 Management Action Plan

There are no expected impacts during construction of the mariculture facilities in relation to water resources and supply. However, several of the interventions in this management plan are addressing the long-term problems with the establishment of the mariculture facilities in the coastal towns of Namibia, and the potential for increased impacts on livelihood. Therefore, there are actions in the planning and construction phase related to water availability. These and other actions will be ongoing during operation. No actions are included for decommissioning because it is



assumed that the plant will be upgraded or replaced with one that provides similar or better water quality and supply.

Table 2: Planning and Construction - Water Resources and Supply Management Plan

Aspect	Potential impact	Action	Timescales	Responsibility
Water availability	Effective establishment of the mariculture facility.	Detailed demand assessment using norms and identifying different uses.	Demand assessment completed before tender for construction, but actions to address water availability for the mariculture facility.	Walvis Bay Municipality
		Explore other options for reusing the use Swakopmund Municipality d water from the mariculture plant.	Ongoing commitment to sustainability.	Walvis Bay Municipality
		Awareness campaign on water conservation will be ongoing. Swakopmund Municipality will implement awareness campaigns on the ground under the direction of Operator and the Ministry of Fisheries and Marine Resources.	Start campaign at the latest at the start of plant operation.	Walvis Bay Municipality.

Operation - Water Resources and Supply Management Plan

Aspect	Potential impact	Action	Timescales	Responsibility
Water quality	Possible water pollution at the source where the mariculture plant will be drawing water.	Publish results of water quality monitoring to the Swakopmund Municipality to raise awareness and encourage sustainability and conservation.	Ongoing during operation.	Walvis Bay Municipality
Water availability	Positive impact as the proposed mariculture plant is located within short distance from the shore.	Actions to reduce the risk of unsustainable use of water availability:		Walvis Bay Municipality
		Extensive monitoring programme of water use and updating the assessment on abstraction rates.	Ongoing during operation.	Walvis Bay Municipality
		Ongoing awareness campaign on water saving.	Ongoing during operation.	Walvis Bay Municipality
		Identify more water uses that do not need potable water and assess feasibility of options for diverting raw water or preferably RO effluent to these water users.	Ongoing during operation.	Walvis Bay Municipality
		Continue programmes to reduce distribution losses, working with Swakopmund Municipality to advise them in relation to pipework under their responsibility.	Ongoing during operation.	Walvis Bay Municipality
		Implement the community grievance mechanism.	Ongoing during operation.	Walvis Bay Municipality
Water quality and availability	Poor plant operation and maintenance would lead to reductions in	Actions to ensure high standards of operation and maintenance:		



	operationalisation of the mariculture plant.	Detailed training of at least two employees to ensure proper technical skills and continuity.	Before start of operation.	Walvis Bay Municipality
		Supervision and monitoring of staff.	Ongoing during operation.	Walvis Bay Municipality
		Extensive monitoring programmes of operation and water quality as part of the pilot project.	Ongoing during operation.	Walvis Bay Municipality

2.2.5 Monitoring and Reporting

The proposed marine aquaculture development is being implemented in three coastal towns of Swakopmund, Walvis Bay and Lüderitz to enable operators to have access to the marine species. Therefore, because this is a new project, there will be extensive monitoring and reporting throughout implementation, and this is already included in the project design and implementation plan.

The monitoring and reporting will particularly cover water quality measurements and volumes of water pollution and supplied. It will include monitoring of the performance of the technology. Much of this monitoring will be automated.

2.3 WASTEWATER MANAGEMENT PLAN

2.3.1 Scope of the EMP

The wastewater management plan for Marine Aquaculture facility in Walvis Bay includes measures during operation of the Project and particularly the evaporation ponds.

Summary of Impacts

- The main potential impact of the Project related to wastewater will be the risks from the effluent. This effluent will not be hazardous, but will have high concentration, and discharge to the environment could have impacts on groundwater.
- Evaporation ponds will be included in the design. There are risks of leakage from damage to the ponds or the feeder pipes, and risks of flooding during extreme rainfall events.
- The pre-treatment stages of the new plant will include flocculation and filtration. Low quantities of sludge and wastewater from the flocculation and from washing of the filtration tanks will be generated and might decrease availability of water. These will not be hazardous but will contain salts and some traces of chemicals used in water treatment. These chemicals are widely used in water treatment and would not be hazardous at the planned dilution levels. There will be potential risks in terms of impacts on groundwater and the environment from the sludge and backwash through leakage of these effluents from pipes if they become blocked or damaged.
- Impacts during the short construction period related to wastewater will not be significant, and the same for decommissioning.

2.3.2 Objective of the Management Plan

- To minimise the potential impacts to the environment from effluent and other wastewater effluents from the treatment process.

2.3.3 Roles and Responsibilities

Position	Main responsibilities in the Management Plan
Swakopmund Municipality / Operator.	• Overall responsibility for implementation of the Wastewater Management Plan.
Swakopmund Municipality / Operator.	• Implement extensive monitoring programme of the evaporation ponds and pipework. • Supervise teams clearing the ponds.

2.3.4 Project Standards

The Ministry of Environment and Tourism (MET) is responsible for the development and implementation of national policy on environmental protection and climate change in Namibia. The Environmental Management Act (Act No. 7 of 2007) provides the detailed framework for the implementation of the environmental objectives including environmental protection from discharges of wastewater and other effluents (MEFT, 2007).

The Ministry of Agriculture Water and Land Reform (MAWLR) is responsible for the overall policy and regulation of the water cycle and water resources in Namibia. The Water Resources Management Act (Act 24 of 2004) sets out requirements for the management and protection of water resources.

The Environmental and Impact Assessment (EIA) for the Project has been carried out in line with best practices on Environmental and Social practices. The most relevant Principles for water resources are on:

- Pollution Prevention and Resource Efficiency.
- Public Health.
- Lands and Soil Conservation.

2.3.5 Management Action Plan

The Project includes evaporation ponds in the design for management of effluent generated during operation. There are no expected significant impacts during construction or decommissioning with respect to wastewater.

Table 3: Operation - Wastewater Management Plan

Aspect	Potential impact	Action	Timescales	Responsibility
Effluent	Potential impacts on groundwater from leakages of effluent from the evaporation ponds or feeder pipes.	• Include a controlled overflow channel in the design of the evaporation ponds.	During final design.	Walvis Bay Municipality / Operator.
		• Plan and implement a robust monitoring schedule to identify potential leakages from ponds and pipes.	Implement from start of operation.	Walvis Bay Municipality / Operator.

		• Training and supervision of workers that clear the dried salt from ponds, using plastic brushes and plastic shovels.	Ongoing during implementation.	Walvis Bay Municipality / Operator.
Effluent from pre-Treatment	Potential impacts on groundwater from pipe leakages of sludge and backwash from the pre-treatment.	• Training of workers so that pipes do not become blocked from incorrect practices.	Ongoing during implementation.	Walvis Bay Municipality / Operator.
		• Dilution of the sludge to prevent blockage to pipes.	Ongoing during implementation.	Walvis Bay Municipality / Operator.
		• Plan and implement a robust monitoring schedule to identify leakages from pipes and carry out repairs at an early stage.	Implement from start of operation.	Walvis Bay Municipality / Operator.

2.3.6 Monitoring and Reporting

Monitoring will be a very important aspect of the Wastewater Management Plan in terms of monitoring the evaporation ponds and pipework to identify any leakages as early as possible.

2.4 ENERGY AND CLIMATE CHANGE MANAGEMENT PLAN

2.4.1 Scope of the EMP

The energy and climate change management plan for the Marine Aquaculture development in Swakopmund includes measures during the operation phase, but the initial programme of interventions can be planned at an earlier stage.

Summary of Impacts

- The main direct potential impacts on climate change include energy use for operation of the Marine Aquaculture plant.
- Greenhouse gas emissions during the Project will mainly be during the construction phase (e.g., heavy plant at the construction sites) but will be relatively insignificant.
- The need for saving water will further increase in future because of the forecast impacts on climate change on water resources and because of the increasing cost of water supply.
- There is much time during the Project lifetime for wider adaptation programmes to be planned and tested in terms of supporting vulnerable households in poor urban communities in Walvis Bay to adapt to climate change, particularly related to water resources.

2.4.2 Objective of the Management Plan

- To minimise the potential impacts to the local community of climate change on water resources.

2.4.3 Roles and Responsibilities

Position	Main responsibilities in the Management Plan
Swakopmund Municipality / Operator.	• Overall responsibility for implementation of the Management Plan. • Set up of a task team for planning and implementation of a programme on adaptation measures.
Swakopmund Municipality / Operator.	• Day-to-day management of the programme on adaptation measures at local level, in co-operation with the Walvis Bay Municipality. • Monitoring and reporting on the programme.

2.4.4 Project standards

The Water Resources Management Act (Act No. 11 of 2013) sets out requirements for the management and protection of water resources. The Water Supply and Sanitation Policy was adopted in 2008 through the Ministry of Agriculture Water and Forestry (MAWF) and the core objective is to improve the provision of water supply in order to contribute to improved public health, reduce the burden of collecting water, promote community based social development taking the role of women into special account, support basic water needs, stimulate economic development, and promote water conservation (MAWF, 2008).

The Environmental and Impact Assessment (EIA) for the Project has been carried out in line with Environmental and Social Policies of international best practices. The Policy includes requirements related to 15 Environmental and Social Principles. The most relevant Principles for this EMP are on Climate Change, and Pollution Prevention and Resource Efficiency.

2.4.5 Management Action Plan

The long period of implementation of the Project lifetime, and the fact that this is a pilot project, lend themselves to the opportunity to develop and test a programme of interventions to support communities in terms of wider climate change adaption related to water resources. The EMP focuses on such a programme on adaptation, which can start to be planned in parallel to the construction phase, working closely with the Swakopmund Municipality.

Table 4: Operation - Energy and Climate Change Plan

Aspect	Potential impact	Action	Timescales	Responsibility
Climate Change Adaptation	Impacts of climate change on water resources for urban communities, including vulnerable groups, and the need for adaptation.	• Planning and implementation of a research and development programme on climate change adaptation in rural communities, testing interventions over the time period of the Project, with a focus on water availability and vulnerable households, particularly gender aspects.	Programme planned by start of operation; implemented and monitored throughout operation.	Walvis Bay Municipality / Operator.
		• Plan objectives, work streams and budgets for the programme.	By start of operation.	Walvis Bay Municipality / Operator.
		• Establish task team to manage the programme.	By start of operation.	Walvis Bay Municipality / Operator.
		• Identify partners for the programme, such as universities.	Ongoing during operation.	Walvis Bay Municipality / Operator.
		• Develop pilot interventions for research and development as part of the programme.	Ongoing during operation.	Walvis Bay Municipality / Operator.
		• Implementation and monitoring of the programme.	Ongoing during operation.	Walvis Bay Municipality / Operator.
		• Prioritising projects for wider roll-out of the more effective interventions.	Ongoing during operation.	Walvis Bay Municipality / Operator.

2.4.6 Monitoring and Reporting

The local interventions on adaptation will be monitored by the Walvis Bay Municipality. A set of KPIs for the programme will be developed as part of planning the details.

2.5 SOLID WASTE MANAGEMENT PLAN

2.5.1 Scope of the EMP

The solid waste management plan covers waste generated during construction, operation and decommissioning of the Marine Aquaculture facility. It covers the management of the effluent generated from the evaporation ponds to be implemented as part of the project as well as domestic waste. It does not cover management of sludge from the pre-treatment of water because this is included in the section on wastewater effluent.

Summary of Impacts

- The main aspect assessed in the engineering design and EIA is the disposal of brine salt from the evaporation ponds, which would not be disposed at the local disposal site and would need to be driven to the lined landfill facility in Windhoek.
- A small amount of hazardous waste will be generated as used chemical containers, and it is important that these are properly managed so that they do not get into the hands of the local community, because they will contain traces of chemicals and might be used by the community to store drinking water.
- Solar panels and lithium-ion batteries will be classified as hazardous waste at their end-of-life. No commercial scale recycling technology is currently available but there is extensive research effort happening worldwide on development of recycling, and it is expected that technology would be available by the time of the end-of-life of these items or the decommissioning of the site.

2.5.2 Objectives of the Solid Waste Management Plan

- To minimise the quantities of waste generated at the water treatment plant during construction, operation and decommissioning.
- To protect the environment, and the health and safety of employees and the community, during the handling, storage, treatment and disposal of wastes.
- To ensure that the management of solid wastes are carried out in line with the Environmental Management Act and future solid waste regulations adopted in Namibia.

2.5.3 Roles and Responsibilities

Team	Main responsibilities in the Management Plan
Contractor.	• Overall responsibility for implementation of the Solid Waste Management Plan.
Walvis Bay Municipality / Operator.	• Include waste management requirements in bid documents and contract.

	• Monitor activities of contractor.
Walvis Bay Municipality / Operator.	• Management of brine salt in terms of storage and transport to Windhoek. • Ensure proper storage and management of hazardous wastes, including solar panels and batteries, and used containers of chemicals. • Record waste quantities and other KPIs. • Regular communication and co-operation/support to the Walvis Bay Municipality. Office about solid waste management practices.
Walvis Bay Municipality / Operator.	• Include waste management requirements in bid documents and contract. • Monitor activities of contractor.

2.5.4 Project Standards and Permits

Solid waste management has been covered under the Environmental Management Act (No.7 of 2007) and the Environmental Impact Assessment Regulations (No.30 of 2012). In early 2018, the Government of Namibia adopted the first National Solid Waste Management Strategy (MEFT, 2018). Solid waste management regulations are being planned by MEFT for adoption in late 2019.

One of the key standards that applies relates to the management of solid waste by contractors, which must be licensed by the relevant government regulatory agencies, and that chain of custody documentation to the final mariculture.

2.5.5 Management Action Plan

The overall strategy on waste management is to implement measures in line with the waste hierarchy, focusing first on waste minimization, re-use and recycling, before treatment and disposal. The strategy covers all activities related to the waste disposal arrangement already in place at the Walvis Bay Municipality including contractors working at the site. Walvis Bay Municipality will continually look to improve solutions in waste management, recognizing that for some waste streams the options for environmentally sound recycling or treatment that are currently available in the market. When using contractors, the Operator will carefully monitor and audit their practices. This includes waste transport and waste management contractors.

Operational procedures for Mariculture operator and its contractors will include requirements on solid waste management, including a ban on burning waste, and requiring practices in line with the waste hierarchy, with a focus on waste minimisation as a priority.

Table 5: Construction - Solid Waste Management Plan

Aspect	Potential impact	Action	Timescales	Responsibility
Construction Waste	Impacts on groundwater from all types of construction waste.	Include waste management requirements in the contract for the construction company.	By start of tender process.	Contractor.
Construction waste (domestic)	Impacts of domestic waste from the construction camp.	Provision of at least three wheelie bins; agree collection by the Settlement Office.	By start of construction activities.	Contractor.
Construction Waste (Recyclable Materials)	Impacts of recyclable wastes.	If applicable, identify potential opportunities for recycling metal and other wastes, and include in requirements of the construction contractor and plans for operation.	By start of construction activities.	Operator.
Construction Waste (Inert waste materials)	Impacts of inert waste.	If applicable, discuss with Walvis Bay Municipality the use of inert waste for covering an area of the Walvis Bay disposal site to improve environmental performance at that site.	By start of construction activities.	Operator.
Construction Waste	Impacts on groundwater from all types of construction waste.	Monitoring of the activities of the construction contractor with respect to solid waste.	During construction.	Walvis Bay Municipality.

Table 6: Operation - Solid Waste Management Plan

Aspect	Potential impact	Action	Timescales	Responsibility
Waste management procedures	Impacts of solid wastes in general.	Develop solid waste management procedures covering operational activities and ensure training of operation staff covers these procedures.	Before start of operation.	Operator.
Waste records	Impacts of solid wastes in general.	Include monitoring and recording of waste quantities in the procedures, including number of solar panels, batteries, truck journeys of salt, etc.	Before start of operation.	Operator.
Monitoring contractors	Impacts on groundwater or communities of all wastes.	Only work with licensed contractors for waste management and monitor delivery of wastes to the intended location through use of chain of custody documents.	Ongoing during operation.	Operator.
Recyclable materials	Impacts of recyclable wastes.	Ongoing actions to identify potential opportunities for recycling metal and other wastes.	Ongoing during operation.	Operator.
Used chemical containers	Potential impact of hazardous waste on groundwater or the community.	Develop and supervise procedures for the separation, storage, proper labelling of hazardous wastes, and transport to a licensed hazardous waste facility when the quantities stored are appropriate.	By start of operation.	Operator.



Used chemical containers	Potential impact of hazardous waste on groundwater or the community.	Hazardous waste should be disposed off at an appropriate hazardous waste site .	Ongoing during operation.	Operator.
---------------------------------	--	---	---------------------------	-----------

2.5.6 Monitoring and Reporting

Monitoring of waste management practices will cover checking of waste segregation practices, housekeeping, equipment, transport, disposal, contractor practices, storage of hazardous waste, etc. It will include monitoring of the waste transport / management contractors, including chain of custody documentation for waste transport.

Key performance indicators (KPIs) will be monitored and reported, including:

- Quantity of waste disposed at the waste disposal site in Swakopmund or Walvis Bay waste disposal area.
- Quantity of hazardous waste delivered to the hazardous waste facility in Swakopmund or Walvis Bay.

2.6 AIR EMISSIONS MANAGEMENT PLAN

2.6.1 Scope of the EMP

The emissions to air management plan for Mariculture Development in Walvis Bay includes measures during construction, operation, and decommissioning of the evaporation ponds.

Summary of Impacts

- The main potential impact in relation to air emissions is the risk of dust emissions and their impact on workers during construction of the evaporation ponds.

2.6.2 Objectives of the Emissions to Air Management Plan

- To minimise the potential impacts of emissions to air during construction, operation and decommissioning of the evaporation ponds.

2.6.3 Roles and Responsibilities

Position	Main responsibilities in the Management Plan
Operator.	• Overall responsibility for implementation of the Emissions to Air Management Plan.
Operator.	• Include requirements on PPE related to dust emissions in bid documents and contract. • Monitor activities of contractor.
Operator.	• Include requirements on PPE related to dust emissions in bid documents and contract. • Monitor activities of contractor.

2.6.4 Project Standards and Permits

The Environmental Management Act (Act No. 7 of 2007) covers all waste management including emissions to air (MEFT, 2007). The Atmospheric Pollution Ordinance (No.11 of 1976) covers the regulations in regard to dust.

The Environmental Impact Assessment (EIA) for the Project has been carried out in line with Environmental and Social best practices. The most relevant Principles for emissions to air are on Pollution Prevention and Resource Efficiency and Public Health.

2.6.5 Management Action Plan

The potential impacts on air quality due to emissions to air during construction, operation and decommissioning are likely to be not significant as assessed in the EIA. However, the Operator will ensure a cautious approach such that, the contractors will be supervised to ensure usage of dust masks and a community grievance mechanism will be operated by the Operator.

Table 7: Construction – Emissions to Air Management Plan

Aspect	Potential impact	Action	Timescales	Responsibility
Construction of ponds	Generation of dust emissions from vehicles and plant working on the construction of the ponds.	• Ensure that workers are always wearing dust masks during the construction of the evaporation ponds.	During construction.	Operator.
		• Monitor use of PPE at the construction site.	During construction.	Operator.

2.6.6 Monitoring and Reporting

Monitoring will mainly cover the supervision of contractor practices during construction (and decommissioning) of the evaporation ponds. No KPIs are associated with this management plan.

2.7 BIODIVERSITY MANAGEMENT PLAN

2.7.1 Scope of the EMP

The biodiversity management plan for the Mariculture Development in Swakopmund includes measures during construction, operation and decommissioning of the evaporation ponds.

Summary of Impacts

- The Project includes construction of mariculture ponds with a total fenced area required of about 50m x 74m. This area will require bush clearance. However, the bushes in the area of the evaporation ponds are spread out, and no protected species were identified during the baseline assessment.
- There is a potential risk to biodiversity during operation of the mariculture plant in terms of potential access of birds and mammals to drink from the evaporation ponds. The salty water might have an impact on the health of the animals and birds. However, such species quickly identify with salty water and avoid the water if it is not suitable for drinking. The water would be salty but with no hazardous chemicals.

2.7.2 Objectives of the Management Plan

- To minimise the potential impacts to biodiversity during construction, operation and decommissioning of the evaporation ponds.

2.7.3 Roles and Responsibilities

Team	Main responsibilities in the Management Plan
Operator.	• Overall responsibility for implementation of the Biodiversity Management Plan.
Operator.	• Include requirements on site clearance in bid documents and contract. • Monitor activities of contractor.
Operator.	• Record any bird species identified at the evaporation ponds.
Operator.	• Include requirements in bid documents and contract. • Monitor activities of contractor.

2.7.4 Project Standards

The Nature Conservation Ordinance Act (No.4 of 1975), and its amendments of 1990 and 1996, provide the main legal basis in terms of protection of biodiversity and are relevant at site clearance. The original Act does provide lists of specially protected wildlife species including animals and plants (Government of Namibia, 1975). The International Union for the Conservation of Nature (IUCN) List of Threatened Species (IUCN (2019) continues to provide the core international reference related to threatened species.

The Forest Act (No.12 of 2001) is also relevant in terms of site clearance near rivers. A licence is required for removal of trees, bushes or shrubs within 100m of any river.

The Environmental Impact Assessment (EIA) for the Project has been carried out in line with Environmental and Social best practices. The most relevant Principles for biodiversity are: Protection of Natural Habitats; Conservation of Biological Diversity; Lands and Soil Conservation.

2.7.5 Management Action Plan

The potential impacts on biodiversity of site clearance for evaporation ponds, and impacts during operation, where assessed as likely to be not significant in the EIA. However, the Operator will ensure a cautious approach is taken by contractors, the contractors will be supervised, and biodiversity observations will be recorded during construction, operation and decommissioning.

Table 8: Construction - Biodiversity Management Plan

Aspect	Potential impact	Action	Timescales	Responsibility
	Clearance of trees and shrubs.	Include requirements in tender specifications and contract	By start of tender activities.	Operator.

Site Clearance		documents for the contractor to: • Only clear the area of the evaporation ponds. • Save the topsoil for use on the bunds. • Start clearance with machinery and wait 48 hours before the area of the burrow is cleared.		
	Impacts from site clearance.	Monitoring of the activities of the construction contractor with respect to biodiversity.	During construction.	Operator.

Table 9: Operation - Biodiversity Management Plan

Aspect	Potential impact	Action	Timescales	Responsibility
Access to site by mammals and birds	Potential impacts from animals / birds drinking the salty water.	Monitoring the fencing for damage, recording bird species observed at the site.	Ongoing during operation.	Operator.

2.7.6 Monitoring and Reporting

Monitoring will mainly cover the supervision of contractor practices during construction (and decommissioning) of the evaporation ponds.

The fact that the potential impacts on biodiversity are not significant means that intensive monitoring is not needed during operation, but bird species identified at the evaporation ponds will be recorded and cross-checked against their status as classified under the IUCN Red List of Threatened Species.

2.8 VISUAL AND LANDSCAPE MANAGEMENT PLAN

2.8.1 Scope of the EMP

The visual and landscape management plan for Mariculture Facility in Walvis Bay includes measures during construction, operation, and decommissioning.

Summary of Impacts

- Only minor mitigation actions are needed, for example to check the detailed design and construction to ensure there are no impacts from sunlight reflection from the solar panels.

2.8.2 Objectives of the Management Plan

- To minimise the potential visual and landscape impacts of the Project.

2.8.3 Roles and Responsibilities

Position	Main Responsibilities in the Management Plan
----------	--

Operator.	• Overall responsibility for implementation of the Management Plan.
Operator.	• Implementation of actions on-the-ground.

2.8.4 Project Standards

The Ministry of Environment, Forestry and Tourism (MEFT) is responsible for the development and implementation of national policy on environmental protection and climate change in Namibia. The Environmental Management Act (Act No. 7 of 2007) provides the detailed framework for the implementation of environmental protection (MET, 2007).

The Environmental Impact Assessment (EIA) for the Project has been carried out in line with environmental and social international best practices.

2.8.5 Management Action Plan

Table 10: Construction and Operation - Visual and Landscape Management Plan

Aspect	Potential impact	Action	Timescales	Responsibility
Visual Impacts	Reflection of sunlight from solar panels.	• Checking the direction of solar panels should be to catch the most sunlight and design of the solar panels to ensure no sunlight reflection to drivers on the B1 road or households. • If there is some reflection, then fencing screens can easily be put up around part of the solar panels.	During construction or early operation.	Operator.

2.8.6 Monitoring and Reporting

Monitoring will mainly cover the supervision of contractor practices during construction and decommissioning.

2.9 TRAFFIC AND TRANSPORT MANAGEMENT PLAN

2.9.1 Scope of the ESMP

The Traffic and Transport Management Plan for Mariculture Facility in Walvis Bay includes measures during construction, operation, and decommissioning of the Project. It does not cover aspects related to climate change.

Summary of Impacts

- The main potential impact in relation to traffic and transport is the risk of vehicle accidents during all phases of the project.

2.9.2 Objectives of the Traffic and Transport Management Plan

- To minimise the potential impacts from traffic and transport during construction, operation and decommissioning of the Project in Swakopmund.

2.9.3 Roles and Responsibilities

Position	Main Responsibilities in the Traffic and Transport Management Plan
Operator.	Overall responsibility for implementation of the Traffic and Transport Management Plan.
Operator.	Include safety requirements on transport and driving in bid documents and contracts.
Operator.	Monitor activities of contractors.

2.9.4 Project Standards and Permits

The Road Traffic and Transport Act (No.22 of 1999) covers the control of traffic on public roads, the licensing of drivers, the registration and licensing of vehicles, and the control and regulation of road transport across borders (MWT, 1999).

The Environmental Management Act (Act No. 7 of 2007) provides the detailed framework for environmental protection (MEFT, 2007).

2.9.5 Management Action Plan

The potential impacts on Traffic and Transport during all three phases are unlikely because of the small volumes of traffic associated with the Project. However, the Operator will include transport and driving safety specifications in contract documents for all contractors.

Table 11: Construction, Operation and Decommissioning -Traffic and Transport Management Plan

Aspect	Potential impact	Action	Timescales	Responsibility
Vehicle Accidents	Potential road traffic accidents while transporting equipment and materials to site and the workers.	Include the following requirements for the contractor in tender specifications and contract documents: - Daytime driving. - Driver's licences. - Wearing of seat belts. - Restrictions on maximum driving time per day and breaks from driving. - Use of revolving lights near the construction site. (Similar requirements will be implemented for construction vehicles and drivers).	During construction, operation, and decommissioning	Operator.

2.9.6 Monitoring and Reporting

Monitoring will mainly cover the checking of contractor practices. The KPIs associated with this management plan will be the number of vehicle accidents per year.

2.10 NOISE AND VIBRATION MANAGEMENT PLAN

2.10.1 Scope of the EMP

The noise and vibration management plan for Walvis Bay Mariculture Facility includes measures during construction and decommissioning.

Summary of Impacts

- The only potential source of noise and vibration is likely to be during construction and decommissioning of the mariculture ponds and mariculture plant. This impact mainly relates to contractor employees.

2.10.2 Objectives of the Management Plan

- To minimise the potential impacts to the local community and construction workers of noise and vibration during construction, operation and decommissioning of the mariculture plant, solar facility, and evaporation ponds.

2.10.3 Roles and Responsibilities

Team	Main responsibilities in the Management Plan
Operator.	• Overall responsibility for implementation of the Management Plan.
Operator.	• Include specifications in bid documents and contract. • Monitor activities of contractor.
Operator.	• Include specifications in bid documents and contract. • Monitor activities of contractor.

2.10.4 Project Standards

The Ministry of Environment, Forestry and Tourism (MEFT) is responsible for the development and implementation of national policy on environmental protection and climate change in Namibia. The Environmental Management Act (Act No. 7 of 2007) provides the detailed framework for environmental protection from noise and vibration (MET, 2007).

The Environmental and Social Impact Assessment (ESIA) for the Project has been carried out in line with environmental and social international best practices. The most relevant Principle for noise and vibration is on Pollution Prevention and Resource Efficiency.

Table 12: Construction and decommissioning - Noise and Vibration Management Plan

Aspect	Potential impact	Action	Timescales	Responsibility
Noise	Potential risk of noise impacts to residents.	- Contract for the construction company (and for decommissioning) will include specifications to adopt certain measures and standards. - Include specifications of working hours (e.g., not working at night). - Truck deliveries would not be allowed at night.	By start of tendering for construction.	Operator.
	Potential impacts on construction workers.	Contract for the construction company (and for decommissioning) will include specifications on PPE requirements for construction workers (e.g., ear protectors).	By start of tendering for construction.	Operator.
	Potential noise impacts during construction (or decommissioning).	Monitor the practices of the contractors.	During construction (and decommissioning).	Operator.
	Potential noise impacts during construction (or decommissioning).	Implementation of the community grievance mechanism.	During construction, operation and decommissioning.	Operator.

2.10.5 Monitoring and Reporting

Monitoring will mainly cover the supervision of contractor practices during construction (and decommissioning).

2.11 HAZARDOUS MATERIALS MANAGEMENT PLAN

2.11.1 Scope of the EMP

This management plan covers the hazardous materials used during the operation of the mariculture development at Walvis Bay.

Some chemicals will be used in the pre-treatment of the sea water for removal of suspended solids, the control of scaling, and the periodical cleaning of the reverse osmosis (RO) membranes. The chemicals will be securely stored at the Mariculture plant.

Summary of Impacts

- The quantities of chemicals to be used for the treatment plant will be low. These chemicals are widely used in water treatment.
- The materials do have properties that could cause harm to the environment as a result of spills, and there are health and safety risks from unprotected exposure to humans.

2.11.2 Objectives of the Solid Waste Management Plan

- To protect the environment, and the health and safety of employees and the community during the transport, handling, storage and use of the hazardous materials.
- To safely manage hazardous materials in order to reduce the risks of potential accidents.
- To ensure that the Operator complies with the regulations/guidance for the management of hazardous materials.

2.11.3 Roles and Responsibilities

Team	Main Responsibilities in the Management Plan
Operator.	• Overall responsibility for implementation of the hazardous materials Management Plan. • Development of Hazardous Materials Management Procedures related to handling, loading and unloading, storage, and use of all hazardous materials; and regular review and updating of procedures as required. • Development and management of monitoring programme on hazardous materials. • Ensuring provision of training to staff at site.
Operator.	• Responsibility for the day-to-day implementation of Hazardous Materials Management Procedures. • Ensuring PPE is available and used for the handling of the chemicals.

	Monitoring compliance of contractors with the Hazardous Materials Management Procedures.
--	--

2.11.4 Project Standards

The manufacturing, storage, handling or processing of a hazardous substance defined in the Hazardous Substances Ordinance, 1974. This Ordinance addresses the manufacture, sale, use, disposal and dumping of hazardous substances, including licensing requirements (Government of Namibia, 1974).

The draft Hazardous Waste Regulations are likely to be adopted by MEFT in 2019, and are relevant to management of hazardous wastes such as used chemical containers, out-of-date chemicals, end-of-life batteries and solar panels, etc.

The Environmental Impact Assessment (EIA) for the Project has been carried out in line with Environmental and Social best practices. The most relevant Principles for biodiversity are:

- Protection of Natural Habitats.
- Conservation of Biological Diversity.
- Lands and Soil Conservation.

2.11.5 Management Action Plan

This management plan is associated with the transport, handling, storage and use of acid, alkali and other chemicals during operation of the mariculture plant. It also covers actions that could be applicable during the decommissioning phase.

Table 13: Operation - Hazardous Materials Management Plan

Aspect	Potential impact	Action	Timescales	Responsibility
Hazardous Materials Management Procedures	Potential health and safety impacts on employees, plus environmental impacts of spillages, etc.	Development of Hazardous Materials Management Procedures related to handling, loading and unloading, storage, and use of all hazardous materials; and regular review and updating of procedures as required. Include spills response procedures.	By the start of operation.	Operator.
		Development and implementation of a training programme for employees on the Hazardous Materials Management Procedures.	By the start of operation.	Operator.
Hazardous Materials Storage and Handling	Potential health and safety impacts on employees, plus environmental impacts of spillages, etc.	Supervise the construction of secure storage facilities specialised for hazardous material storage, including signage and labelling.	By the start of operation.	Operator.
		Obtain and renew licences if needed in relation to storage and use of chemicals.	Ongoing from the start of operation.	Operator.
		Maintain a record of materials stored at site and ensure Material Safety Data Sheets (MSDS) are available for all materials.	Ongoing from the start of operation.	Operator.
		Usage of Personal Protective Equipment (PPE) provided to employees.	Ongoing from the start of operation.	Operator.



Monitoring	Potential health and safety impacts on employees, plus environmental impacts of spillages, etc.	Monitor the performance of contractors (e.g., transport companies delivering materials) in compliance with procedures required in their contracts (e.g., licensing, labelling, handling, storage in vehicles, etc).	Ongoing from the start of operation.	Operator.
Minimisation	Potential health and safety impacts on employees, plus environmental impacts of spillages, etc.	Identify opportunities to minimise the quantity of chemicals used in processes and stored on site Phase out the use of hazardous / toxic chemicals where alternatives are available.	Ongoing from the start of operation.	Operator.

2.11.6 Monitoring and Reporting

The Hazardous Materials Management Procedures will be implemented by the Operations Manager at site, and tasks in the procedures will include monitoring of the quantities of hazardous materials delivered, stored and used. The Operations Manager will also monitor the compliance of contractors with procedures. The Operations Manager will report any spillages to the Environmental Manager at Swakopmund Municipality. The key performance indicator will be the number of incidents with hazardous materials per year.

2.12 SOCIO-ECONOMIC ASPECTS AND AFFORDABILITY - MANAGEMENT PLAN

2.12.1 Scope of the EMP

This management plan for Mariculture Development at Walvis Bay mainly covers affordability during operation of the Mariculture plant.

Summary of Impacts

- The Project will result in a positive impact on water quality, bringing it in line with the adopted drinking water quality standards. This is likely to have a positive impact on the community.
- However, the increased operating costs of the treatment plant will potentially require increase in tariffs for water supply.
- The improvement in livelihood of the Walvis Bay community due to the mariculture Project could result in investors being more prepared to invest in Swakopmund (and create associated employment).

2.12.2 Roles and Responsibilities

Team	Main responsibilities in the Management Plan
Operator.	• Overall responsibility for implementation of the Management Plan on socio-economic aspects and affordability.
Operator.	• Communication with the Settlement Office and local stakeholders, including the communities, on water supply tariffs.
Operator.	• Calculation of tariffs to take into account affordability aspects and the local socio-economic situation.

2.12.3 Project Standards

The Environmental Impact Assessment (EIA) for this Project has been carried out in line with **Environmental Management Act of Namibia (Act No. 7 of 2007)**. The most relevant Principles related to this section on the socio-economic baseline and affordability are on:

- Access and Equity.
- Marginalised and Vulnerable Groups.
- Gender Equality and Women's Empowerment.
- Indigenous Peoples.

2.12.4 Management Action Plan

There are no impacts related to affordability and the socio-economic situation during construction. The main impacts relate to tariff increases during operation, and potentially positive socio-economic impacts from improved water quality.

At the end of the pilot project, it is assumed that the plant will be either upgraded or replaced, and tariffs will be reviewed at that time (in 15 to 20 years) to take account of the local socio-economic situation.

Table 14: Operation - Socio-Economic Aspects and Affordability Management Plan

Aspect	Potential impact	Action	Timescales	Responsibility
Affordability	Negative impacts on poor and vulnerable households of tariff increases.	• Monitor the operational costs of the Project.	Ongoing during operation.	Operator.
		• Work with the Swakopmund Municipality on an awareness campaign in the community on the importance of mariculture sector.	2020-2022	Operator.
		• Develop a plan for increase in tariffs from mid-2022.	March 2022	Operator.

2.12.5 Monitoring and Reporting

The monitoring and reporting will particularly cover water quality measurements and volumes of water treated and supplied. Monitoring will include the operational costs of the plant. It will also include wider aspects such as the local socio-economic situation, affordability, tariff collection rates, feedback from the community, etc. KPIs will include the total number of households, number of vulnerable households, total number of businesses, tariff levels, number of households receiving subsidies for water tariffs, tariff collection rate (i.e., % of total tariff income collected on time).

2.13 LOCAL EMPLOYMENT PLAN

2.13.1 Scope of the EMP

The Local Employment Plan for the development of Mariculture Facility at Walvis Bay covers construction, operation and decommissioning of the mariculture plant.

Summary of Impacts

- The Project will involve minimal local employment directly, but even low levels of additional local employment will have a positive impact on the local community. There will be opportunities to develop local skills and capacity.

2.13.2 Objectives of the Management Plan

- To enhance local employment directly and indirectly through the Project during construction and operation of the mariculture plant.
- To ensure high standards of working conditions and occupational health and safety.

2.13.3 Roles and Responsibilities

Team	Main responsibilities in the Management Plan
Operator.	• Overall responsibility for implementation of the Local Employment Plan.
Operator.	• Include specifications in bid documents and contract on local employment and occupational health and safety. • Monitor activities of contractor.
Operator.	• Day-to-day implementation of the Local Employment Plan.
Operator.	• Include specifications in bid documents and contract on local employment and occupational health and safety. • Monitor activities of contractor.

2.13.4 Project Standards

The Environmental Impact Assessment (EIA) Regulations were adopted by the Government of Namibia under the Environmental Management Act (Act No. 7 of 2007). The EIA Regulations require coverage of the social, economic and cultural aspects of the environment that may be affected by the proposed activity, including potential positive or negative impacts on the communities.

The Labour Act (No.11 of 2007) provides the legal framework in Namibia for employment, including occupational health and safety (MOL, 2007).

2.13.5 Management Action Plan

Table 15: Construction - Local Employment Plan

Aspect	Potential impact	Action	Timescales	Responsibility
Local Employment	Positive impact of some local employment for unskilled roles during construction.	• Include specifications on local employment in the bid documents for the construction contractor and tender evaluation criteria to favour more local employment. • Include specifications on training for the roles.	Before tendering for construction.	Operator
		• Monitor local employment of contractor.	During construction.	Operator
Occupational Health and Safety	Occupational H&S risks to the construction team.	• Include requirements for contractors in the tender documents: - To demonstrate their H&S policy, procedures and training in their bids. - To train the team in H&S. - To provide and use PPE.	Before tendering for construction.	Operator
		• Monitor H&S practices of contractor.	During construction.	Operator
Working Conditions	Risks that the temporary workforce will be in an accommodation camp with poor living conditions and have poor working conditions.	• Include requirements in the bidding documents related to HR policy, working conditions and the construction camp, to ensure suitable standards and compliance with Namibian regulations, and that the contractor implements a grievance procedure for employees.	Before tendering for construction.	Operator

		• Monitor working conditions and related practices of contractor.	During construction.	Operator
--	--	---	----------------------	----------

Table 16: Operation - Local Employment Plan

Aspect	Potential impact	Action	Timescales	Responsibility
Local Employment	Positive impacts on the community of some local employment for part-time roles for specific tasks that would be unskilled.	• The Operator will prioritise local employment for these roles and consider prioritising women and vulnerable households.	Ongoing during operation.	Operator
		• Identify opportunities to enhance local skills and capacity for alternative livelihoods through the operational tasks that require part-time local employment.	Ongoing during operation.	Operator
Occupational Health and Safety	Occupational H&S risks to the operation team.	• The Operator will implement its health and safety policy, procedures and training programmes. • PPE will be provided and used.	Ongoing during operation.	Operator
Increased Interest in Local Investment	Improvement in water quality might result in more local investment in development projects and associated local employment.	• Support Swakopmund Municipality to identify and promote opportunities to encourage local investment and develop local capacity to strengthen local economy.	Ongoing during operation.	Operator
		• Support the Swakopmund Municipality to identify opportunities to encourage local	Ongoing during operation.	Operator



Aspect	Potential impact	Action	Timescales	Responsibility
		capacity development, particularly local people from vulnerable households.		

2.13.6 Monitoring and Reporting

Monitoring will mainly cover the supervision of contractor practices during construction (and decommissioning). KPIs include number of months per year of employment of persons from the local community, and number of lost-time accidents.

2.14 COMMUNITY HEALTH, SAFETY AND SECURITY MANAGEMENT PLAN

2.14.1 Scope of the EMP

The Community Health, Safety and Security (CHSS) Management Plan for Swakopmund covers construction, operation and decommissioning of the mariculture plan.

Summary of Impacts

- CHSS is unlikely to be a potential risk during the Project provided some basic interventions are implemented.

2.14.2 Objectives of the Management Plan

- To ensure high standards of risk management and conduct related to community health, safety and security.

2.14.3 Roles and Responsibilities

Team	Main responsibilities in the Management Plan
Operator.	Overall responsibility for implementation of the CHSS Management Plan.
Operator.	- Include specifications in bid documents and contract on CHSS. - Monitor activities of contractor.
Operator.	Day-to-day implementation of the CHSS Management Plan.
Operator.	- Include specifications in bid documents and contract on CHSS. - Monitor activities of contractor.

2.14.4 Project Standards

The Environmental Impact Assessment (EIA) Regulations were adopted by the Government of Namibia under the Environmental Management Act (Act No. 7 of 2007). The EIA Regulations require coverage of the social, economic and cultural aspects of the environment that may be affected by the proposed activity, including potential positive or negative impacts on the communities.

The most relevant Principles related to local employment are on: Marginalised and Vulnerable Groups; and Gender Equality and Women's Empowerment.

2.14.5 Management Action Plan

Table 17: Construction and Decommissioning - CHSS Management Plan

Aspect	Potential impact	Action	Timescales	Responsibility
		Include specifications on community safety in the bid	Before tendering for construction.	Operator.

Aspect	Potential impact	Action	Timescales	Responsibility
Community Safety	Community safety from construction activities.	documents for the construction contractor, such as fencing and signage at the construction site, and the requirement to carry out awareness measures on safety (related to construction sites) in the community and at the schools.		
		• Monitor community safety activities of the contractor against the requirements in the specifications.	During construction.	Operator.
Community Health and Safety	CHSS risks related to construction team interactions with the local community, including risks to women in the community.	• Include requirements for contractors in the tender documents to implement a code of conduct for construction employees.	Before tendering for construction.	Operator.
		• Monitor CHSS practices of contractor as appropriate.	During construction.	Operator.

2.14.6 Monitoring and Reporting

Monitoring will mainly cover the supervision of contractor practices during construction (and decommissioning). The Operational Manager will report any CHSS incidents to the Operator and Walvis Bay Municipality. The key performance indicator for this aspect will be the number of CHSS incidents per year.

2.15 CULTURAL HERITAGE MANAGEMENT PLAN

2.15.1 Scope of the EMP

The Cultural Heritage Management Plan for Mariculture Facility covers construction, operation and decommissioning of the mariculture plant.

Summary of Impacts

- According to the Archaeological Assessment study conducted for the Mariculture development in Walvis Bay there are no archaeological sites or artefacts near by the proposed site for the mariculture plant in Swakopmund. It is however, recommended that should the contractor come across any artefacts or materials of any historical importance, these should be reported to National Heritage Council of Namibia.
- There are no expected impacts of the proposed mariculture development on cultural heritage. A simple chance finds procedure will be implemented by the construction contractor as a precaution (Attachment 1).

2.15.2 Objectives of the Management Plan

- To mitigate against cultural heritage impacts, including through implementation of a chance finds procedure.

2.15.3 Roles and Responsibilities

Team	Main responsibilities in the Management Plan
Operator.	• Overall responsibility for implementation of the Cultural Heritage Management Plan.
Operator.	• Include specifications in bid documents and contract on cultural heritage. • Monitor activities of contractor.
Operator.	• Day-to-day implementation of the Cultural Heritage Management Plan including the Chance Finds Procedure.
Operator.	• Include specifications in bid documents and contract on cultural heritage. • Monitor activities of contractor.

2.15.4 Project Standards

The National Heritage Act (No. 27 of 2004) aims to protect and conserve places and objects of heritage significance (Ministry of Education, Arts and Culture, 2004). Under the Act, the National Heritage Council of Namibia was set up with the mission to identify, protect and manage the natural and cultural heritage of Namibia (National Heritage Council, 2019).

The most relevant principle related to this section is the Principle on Physical and Cultural Heritage. This requires that projects supported by the Fund to be designed and implemented in a way that avoids the alteration, damage, or removal of any physical cultural resources, cultural sites, and sites with unique natural values recognised as such at the community, national or international level.

2.15.5 Management Action Plan

Table 18: Construction, Operation and Decommissioning - Cultural Heritage Management Plan

Aspect	Potential impact	Action	Timescales	Responsibility
Cultural Heritage	Risk of damage to cultural heritage items during construction, operation and decommissioning.	• Include specifications in the bid documents for the construction contractor to implement a chance finds procedure (Attachment 1). • Workforce to be trained on implementation of procedures.	Before tendering for construction. (Also applies for decommissioning)	Operator.
		• Monitor cultural heritage activities of the contractor in terms of chance finds.	During construction.	Operator.

		• The Operator will implement the chance finds procedure during operation if needed (e.g., during maintenance of infrastructure).	During Operation	Operator.
--	--	---	------------------	-----------

2.15.6 Monitoring and Reporting

Monitoring will mainly cover the supervision of contractor practices during construction (and decommissioning). The Operational Manager will report any chance finds to Walvis Bay Municipality and the National Heritage Council of Namibia. The key performance indicator for this aspect will be the number of chance finds per year.

3 CONCLUSION

In conclusion it should be noted that this EMP should be regarded as a living document and changes should be made to the EMP as required by project changes while maintaining the principles and objectives on which the EMP is based.

This EMP has incorporated impacts and mitigation measures from the Environmental Scoping Report, as well as incorporating principles of best practice in terms of environmental management.

In addition, this is a Generic EMP and may not necessary be applicable to site specific activities for the marine aquaculture operators. It is therefore recommended that the marine aquaculture operators appoint an environmental consultant to compile site specific Operational Environmental Management Plan (OEMP) for their site-specific operations.

Attachment 1 - Community Grievance Mechanism

The Community Grievance Mechanism will be accessible to all stakeholders and the prospective Operator will ensure that the community is informed about the grievance procedure. The Operator will manage a simple internal system as part of the procedure to record and track grievances to ensure they are resolved. One important aspect will be communication during the resolution process with the complainant to explain actions being taken. The Key Performance Indicator (KPI) on average time taken (in days) to resolve grievances will be monitored and reported.

Grievance Form

Grievance reference number: _____

Date grievance received: _____

Complainant name: _____

Complainant contact details: _____

Name of the person with responsibility for grievance: _____

Details of grievance: _____

Actions taken: _____

Date grievance resolved: _____



Grievance log

Grievance reference number	Date grievance received	The person with responsibility for grievance:	Date grievance resolved	Number of days to resolve grievance