APP-002724

ABALONE RANCHING AT LÜDERITZ
ENVIRONMENTAL ASSESSMENT SCOPING REPORT

Assessed by:

Assessed for:

Benguella Wealth Farming CC

August 2021

Project:	**ABALONE RANCHING AT LÜDERITZ: ENVIRONMENTAL ASSESSMENT SCOPING REPORT**	
Report: **Version/Date:**	Final August 2021	
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Report Approval	 **André Faul** Conservation Ecologist	

SUMMARY

Benguella Wealth Farming CC requested Geo Pollution Technologies (Pty) Ltd to undertake an environmental assessment for the proposed ranching of abalone at selected offshore locations, south of Lüderitz. The areas earmarked by the Proponent lies between Grosse Bucht and Elisabeth Bay, inclusive of the areas around North Long Island and South Long Island. Ranching of South African abalone (*Haliotis midae*) is not new to Namibia and has already been practiced at Lüderitz for many years, mainly around Penguin and Seal Islands. Through the envisioned project, Benguella Wealth Farming proposes to train entrepreneurs in the abalone ranching industry, and thus will provide opportunities to local communities to get involved.

Abalone ranching involves divers releasing (resettling) juvenile abalone at suitable areas in the sea. Adequately sized areas, with suitable benthic habitat, are required to viably ranch abalone. As such selected areas within the larger area will be suitable for abalone ranching, and only those areas where suitable habitat is present, will be targeted. The targeted water will be an approximately 50 m wide area, with its landside border being the spring low water mark of the coastline or islands. Factors such as water depth and sea conditions (swell, waves, current) will influence the exact width of the areas. The abalone feed on mainly drift kelp (seaweed), and once they reach a marketable size, are collected by divers. Abalone, if resettled responsibly, are not expected to have a significant negative impact on the local ecosystem. Since the resettling of abalone is expensive, it is also not in the best interest of the Proponent to stock areas too densely. Overstocking may result in slow growth or higher mortality rates and thus a decrease in the financial viability of the project.

The environmental assessment is conducted to determine all environmental, safety, health and socio-economic impacts associated with the proposed abalone ranching. Relevant environmental data was compiled by making use of secondary data and from a reconnaissance site visit. Potential environmental impacts and associated social impacts were identified and are addressed in this report. Due to the nature of the proposed operations, impacts can be expected on the surrounding environment, see summary impacts table below. The majority of activities related to abalone ranching, and thus expected impacts, will take place offshore, while only acclimation and processing will take place onshore. Acclimation will be in purpose-built concrete tanks within the area earmarked for mariculture, next to Second Lagoon. Processing of harvested abalone will be in existing fish processing factories of third parties already established in Lüderitz. It is recommended that environmental performance be monitored regularly to ensure regulatory compliance and that corrective measures be taken if necessary.

Mariculture, including abalone mariculture and its ranching, is advocated in various plans of the Ministry of Fisheries and Marine Resources as well as the national development plans and Vision 2030. The proposed project will contribute to the economic development of Lüderitz and generate income at local, regional and national level through the export of abalone to international markets. It will provide much needed employment and aid in the development and training of local people in the abalone ranching industry. Furthermore, it will provide a platform for community members who wish to enter the mariculture industry, and are otherwise not able to do so, to embark on such a venture with the assistance and guidance of the Proponent, who has many years' experience in this field. The main concerns that have been raised related to the project are that of potential poaching of abalone, harm to birds on rocky shores and sandy beaches, disease and parasite introduction, ecosystem changes, and health and safety risks to workers, especially divers. The Proponent has more than 19 years' experience in the abalone ranching industry and has a known record of safe and responsible practices. His knowledge on the local environment, together with adherence to permit and environmental management plan requirements, will prevent or adequately minimize potential impacts. By appointing local contractors and employees and implementing educational programs, the positive socio-economic impacts can be maximised while mitigating any negative impacts.

The environmental management plan (EMP) and an in-house health, safety and environment plan should be used as an on-site reference document during development and operational activities of the mariculture farm. This document and its supporting impact assessment should be reviewed on a regular basis, in order to ensure that it is still relevant to the activities executed on site. Parties responsible for transgression of the EMP should be held responsible for any rehabilitation that may need to be undertaken. Operators and responsible personnel must be taught the contents of these documents.

Impact summary class values – Prior to Mitigation/Prevention

Impact Category	Impact Type	Operations
	Positive Rating Scale: Maximum Value	5
	Negative Rating Scale: Maximum Value	-5
EO	Skills, Technology and Development	3
EO	Revenue Generation and Employment	4
SC	Demographic Profile and Community Health	-2
SC	Traffic	-2
SC	Health, Safety and Security	-2
PC	Noise	-1
PC	Waste Production	-2
BE	Terrestrial Ecosystem and Biodiversity Impact	-2
BE	Impacts on Marine Ecology	-3
PC	Surface Water Contamination	-2
SC	Visual Impact	-2
	Cumulative Impact	-3

BE = Biological/Ecological EO = Economical/Operational PC = Physical/Chemical SC = Sociological/Cultural

TABLE OF CONTENTS

List of Appendices

LIST OF FIGURES

LIST OF PHOTOS

LIST OF TABLES

LIST OF ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
BE	Biological/Ecological
BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand
DEA	Directorate of Environmental Affairs
DSP	Diarrhetic Shellfish Poisoning
DWA	Department of Water Affairs
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EMA	Environmental Management Act No 7 of 2007
EMP	Environmental Management Plan
EMS	Environmental Management System
EO	Economic/Operational
ES	Environmental Classification
GPT	Geo Pollution Technologies
HIV	Human Immunodeficiency Virus
HSE	Health, Safety and Environment
IAPs	Interested and Affected Parties
ISO	International Standards of Operation
IUCN	International Union for Conservation of Nature
m/s	Metre per second
mbs	Metres below surface
MET	Ministry of Environment and Tourism
mm/a	Millimetres per annum
MSDS	Material Safety Data Sheet
NIMPA	Namibian Islands Marine Protected Area
PC	Physical/Chemical
PPE	Personal Protective Equipment
ppm	Parts per million
PSP	Paralytic Shellfish Poisoning
SC	Sociological/Cultural
UNFCCC	United Nations Framework Convention on Climate Change
WHO	World Health Organization

GLOSSARY OF TERMS

Alternatives - A possible course of action, in place of another, that would meet the same purpose and need but which would avoid or minimize negative impacts or enhance project benefits. These can include alternative locations/sites, routes, layouts, processes, designs, schedules and/or inputs. The "no-go" alternative constitutes the 'without project' option and provides a benchmark against which to evaluate changes; development should result in net benefit to society and should avoid undesirable negative impacts.

Aquaculture - The farming and ranching of aquatic organisms.

Assessment - The process of collecting, organising, analysing, interpreting and communicating information relevant to decision making.

Biota - The animal and plant life of a specific region, habitat, or geological period.

Competent Authority - means a body or person empowered under the local authorities act or Environmental Management Act to enforce the rule of law.

Construction - means the building, erection or modification of a facility, structure or infrastructure that is necessary for the undertaking of an activity, including the modification, alteration, upgrading or decommissioning of such facility, structure or infrastructure.

Cumulative Impacts - in relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

Environment - As defined in the Environmental Assessment Policy and Environmental Management Act - "land, water and air; all organic and inorganic matter and living organisms as well as biological diversity; the interacting natural systems that include components referred to in sub-paragraphs, the human environment insofar as it represents archaeological, aesthetic, cultural, historic, economic, palaeontological or social values".

Environmental Impact Assessment (EIA) - process of assessment of the effects of a development on the environment.

Environmental Management Plan (EMP) - A working document on environmental and socio-economic mitigation measures, which must be implemented by several responsible parties during all the phases of the proposed project.

Environmental Management System (EMS) - An Environment Management System, or EMS, is a comprehensive approach to managing environmental issues, integrating environment-oriented thinking into every aspect of business management. An EMS ensures environmental considerations are a priority, along with other concerns such as costs, product quality, investments, PR productivity and strategic planning. An EMS generally makes a positive impact on a company's bottom line. It increases efficiency and focuses on customer needs and marketplace conditions, improving both the company's financial and environmental performance. By using an EMS to convert environmental problems into commercial opportunities, companies usually become more competitive.

Evaluation – means the process of ascertaining the relative importance or significance of information, the light of people's values, preference and judgements in order to make a decision.

Hazard - Anything that has the potential to cause damage to life, property and/or the environment. The hazard of a particular material or installation is constant; that is, it would present the same hazard wherever it was present.

Interested and Affected Party (IAP) - any person, group of persons or organisation interested in, or affected by an activity; and any organ of state that may have jurisdiction over any aspect of the activity.

Mariculture - The farming and ranching of specifically marine organisms.

Mitigate - The implementation of practical measures to reduce adverse impacts.

Non-native – a plant or animal introduced to an environment that is not the location of its natural occurrence

Proponent (Applicant) - Any person who has submitted or intends to submit an application for an authorisation, as legislated by the Environmental Management Act no. 7 of 2007, to undertake an activity or activities identified as a listed activity or listed activities; or in any other notice published by the Minister or Ministry of Environment & Tourism.

Public - Citizens who have diverse cultural, educational, political and socio-economic characteristics. The public is not a homogeneous and unified group of people with a set of agreed common interests and aims. There is no single public. There are a number of publics, some of whom may emerge at any time during the process depending on their particular concerns and the issues involved.

Scoping Process - process of identifying: issues that will be relevant for consideration of the application; the potential environmental impacts of the proposed activity; and alternatives to the proposed activity that are feasible and reasonable.

Significant Effect/Impact - means an impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment.

Stakeholder Engagement - The process of engagement between stakeholders (the proponent, authorities and IAPs) during the planning, assessment, implementation and/or management of proposals or activities. The level of stakeholder engagement varies depending on the nature of the proposal or activity as well as the level of commitment by stakeholders to the process. Stakeholder engagement can therefore be described by a spectrum or continuum of increasing levels of engagement in the decision-making process. The term is considered to be more appropriate than the term "public participation".

Stakeholders - A sub-group of the public whose interests may be positively or negatively affected by a proposal or activity and/or who are concerned with a proposal or activity and its consequences. The term therefore includes the proponent, authorities (both the lead authority and other authorities) and all interested and affected parties (IAPs). The principle that environmental consultants and stakeholder engagement practitioners should be independent and unbiased excludes these groups from being considered stakeholders.

Sustainable Development - "Development that meets the needs of the current generation without compromising the ability of future generations to meet their own needs and aspirations" – the definition of the World Commission on Environment and Development (1987). "Improving the quality of human life while living within the carrying capacity of supporting ecosystems" – the definition given in a publication called "Caring for the Earth: A Strategy for Sustainable Living" by the International Union for Conservation of Nature (IUCN), the United Nations Environment Programme and the World Wide Fund for Nature (1991).

1 BACKGROUND AND INTRODUCTION

Geo Pollution Technologies (Pty) Ltd was appointed by Benguella Wealth Farming CC (the Proponent) to undertake an environmental assessment for the proposed ranching of abalone, along the West Coast of Namibia, at Lüderitz. Three main areas are earmarked for the ranching of abalone, although only selected pockets within these areas will ultimately be suitable and thus utilized. Onshore operations will require the establishment of infrastructure next to Lüderitz Harbour / Second Lagoon, within the area earmarked by the authorities for such activities. The onshore project location, and the three areas to be targeted, are indicated in Figure 2-1. Ranching of South African abalone (*Haliotis midae*) is already practiced at Lüderitz, mainly around Penguin and Seal Islands. In short, it involves releasing (resettlement) of juvenile abalone into suitable areas of the sea by divers, allowing them to grow to a marketable size, and then collecting them for mainly export purposes.

As part of the abalone ranching, the Proponent intends to provide opportunities to entrepreneurs who wish to enter the mariculture industry. This will be achieved by providing training, skills development and assistance with resettlement and harvesting of abalone in allocated areas within the proposed abalone ranching areas.

A risk assessment was undertaken to determine the potential impact of the proposed activities on the environment. The environment being defined in the Environmental Management Act as "land, water and air; all organic and inorganic matter and living organisms as well as biological diversity; the interacting natural systems that include components referred to in sub-paragraphs, the human environment insofar as it represents archaeological, aesthetic, cultural, historic, economic, paleontological or social values".

The environmental assessment was conducted to apply for an environmental clearance certificate in compliance with Namibia's Environmental Management Act (Act No 7 of 2007).

Project Justification – Mariculture is one of the key aspects of the "Fishery Strategies and Desired Outcomes, 2017 – 2022", forming part of the National Development Plan 5 (NDP 5) of Namibia. The strategy promotes mariculture as a viable economic option and NDP 5 promotes investment in the mariculture sector. This is in line with Namibia's Vision 2030, which recognises the potential of the mariculture industry and promotes its development. Specifically, the draft Master Plan for Marine Aquaculture in Namibia of 2012 promotes abalone mariculture and specifically also ranching (www.mfmr.gov.na). It states: "***The project [abalone ranching] has relatively low fixed capital requirements and extremely high margins and profitability once in full production. The project should therefore over time provide very high levels of returns that compensate for the initial high risk.***"

Through the establishment of additional abalone ranching projects into new areas, the mariculture industry will diversify and become more resilient by expanding operations and will also open up new markets for Namibian exports. Benguella Wealth Farming will contribute to employment and development in Lüderitz. Benefits of the proposed activities include:

- Economic development, diversification and resilience in Lüderitz and Namibia as a whole.
- Contribution to the economy and export trade of Namibia.
- Employment, training and skills development.
- Opportunities for entrepreneurs to establish themselves in the mariculture industry.

2 SCOPE

The scope of the environmental assessment is to:

1. Determine the potential environmental impacts emanating from the proposed activities.
2. Identify a range of management actions which could mitigate the potential adverse impacts to acceptable levels.
3. Comply with Namibia's Environmental Management Act (2007).
4. Provide sufficient information to the Ministry of Environment, Forestry and Tourism and related authorities to make an informed decision regarding the proposed mariculture activities.

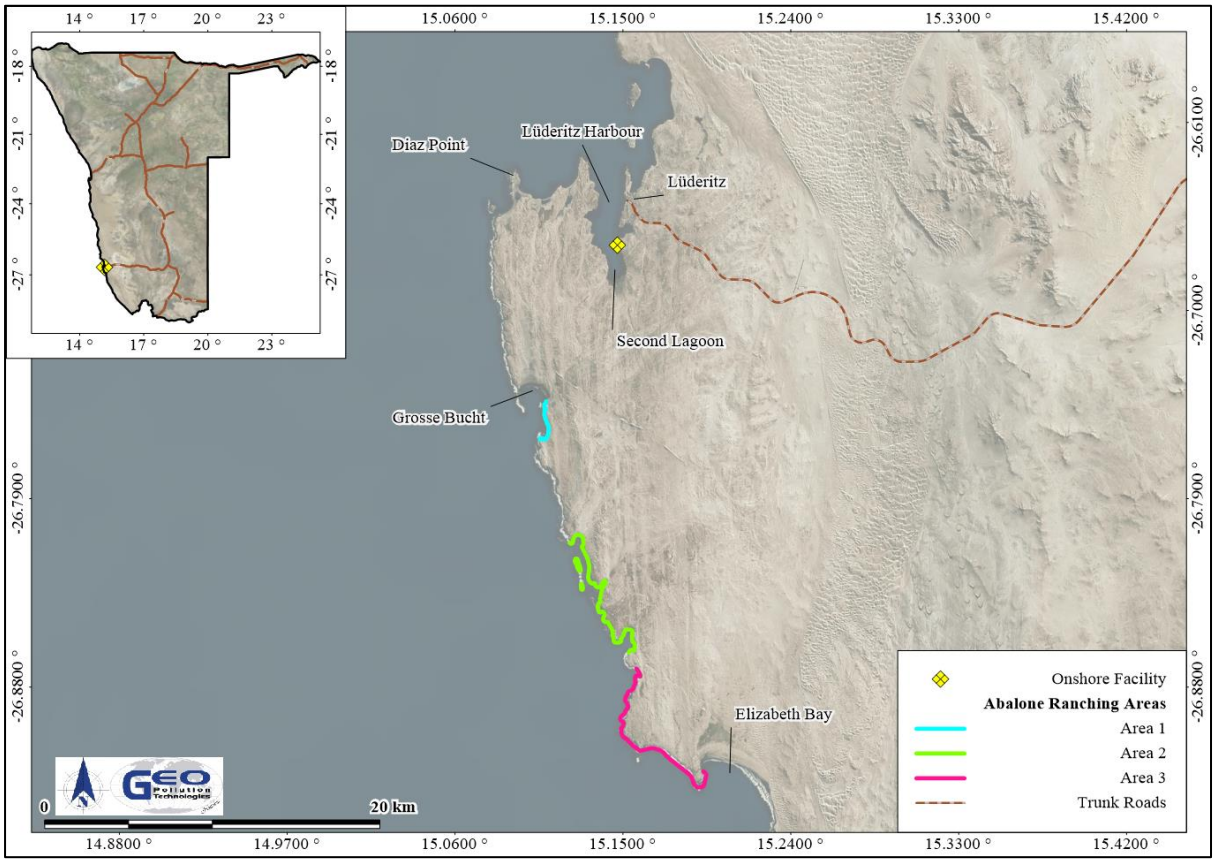


Figure 2-1. Proposed abalone mariculture areas and location of onshore infrastructure

3 METHODOLOGY

The following methods were used to investigate the potential impacts on the social and natural environment:

1. Baseline information about the site and its surroundings was obtained from existing secondary information as well as primary information obtained during various previous site visits by the consultant.
2. As part of the scoping process to determine potential environmental impacts, interested and affected parties (IAPs) were consulted about their views, comments and opinions and these are put forward in this report.
3. Based on gathered information and public and stakeholder consultation, an assessment of potential impacts was conducted and a management plan prepared.

4 DEVELOPMENT AND OPERATIONS

Benguella Wealth Farming was registered as a closed corporation in Namibia in 2019. Ownership is JL Erasmus (70%) who has more than 19 years' experience in abalone farming and ranching at Lüderitz, and a community trust (30%), consisting of previously disadvantaged Namibians. It is the Proponent's objective to establish an abalone mariculture venture, where Benguella Wealth Farming provides opportunities for entrepreneurs who wish to enter the mariculture industry. The Proponent will be able to supply technical advice and expertize to potential abalone ranchers and ultimately also supply them with juvenile abalone for resettlement purposes.

The following steps outline the process that Benguella Wealth Farming proposes:

- Identify the offshore areas for abalone ranching and get all approvals and permits.
- Establish an onshore facility with acclimation tanks.
- Source and acclimatize juvenile abalone and resettle such abalone at selected locations.

- Collect grown-out abalone and export to international markets.
- Assist new abalone ranchers to establish themselves in the industry.

The assistance that will be provided to new ranchers will include support to resettle and harvest abalone, training and marketing. During the initial phases, significant capital expenditure will be required which will only show a return on the investment after seven years, when the first resettled abalone will become marketable. The Proponent's intention is to commence with the proposed activity as soon as environmental clearance and the necessary permit from the Ministry of Fisheries and Marine Resources are obtained.

4.1 GENERAL BIOLOGY

Abalones are gastropods or marine snails belonging to the phylum Mollusca and family Haliotidae. All abalones belong to the genus *Haliotis* and they have worldwide distribution except for the South American Pacific coast, North American Atlantic coast, the Arctic and Antarctica. The South African abalone (*H. midae*), naturally occurs along the South African coastline from Cape Columbine on the West Coast to north of Port St. Johns on the East Coast (Wood, 1993). It is the largest of the South African abalone species (Wood, 1993).

Abalone are dioecious broadcast spawners which means they have male and female reproductive organs in separate individuals, and they release their gametes into the environment where fertilisation takes place (Wood, 1993; Visser-Roux, 2011). Larvae are not protected and go through various stages of development until the veliger larvae settles on the seafloor after about a week.

Abalone are herbivores that inhabit rocky substrates in the subtidal zone (mainly shallow intertidal and subtidal reefs) with a high degree of niche specialisation (Wood, 1993). Niche specificity is determined by both availability of food and the presence of predators. Abalone are nocturnal. Smaller abalone hide for safety during the day, while larger abalone rely on their thick, strong shells for protection from predators. Small abalone (spat) graze on diatoms and algae, while large individuals mainly feed on drift kelp by trapping it under their muscular foot (Visser-Roux, 2011; Zeeman et al., 2012).

4.2 CURRENT STATUS AND MARICULTURE

Abalone is a sought after delicacy, especially in the Asian countries of Hong Kong and China. As a result of high prices paid for abalone, the wild populations of *H. midae* are severely exploited through illegal poaching. Although not listed as a threatened species by the International Union for the Conservation of Nature (IUCN), most natural populations have been decimated through illegal trade.

The commercial culturing of abalone is a major mariculture activity in South Africa. In 2019, 14 abalone farms were active and the cumulative production was 1,657 tons worth N$1 billion (https://pmg.org.za). The industry sustained about 2,000 permanent jobs, but the COVID-19 pandemic has negatively impacted this (https://pmg.org.za). Abalone however remains the most productive aquaculture organism in South Africa.

Haliotis midae is a non-native to Namibian waters and was introduced to Lüderitz in the early 2000's. Lüderitz is situated about 730 km north of the northernmost fringe of its natural habitat at Cape Columbine, South Africa (Figure 4-1). In-between Cape Columbine and Lüderitz, *H. midae* has been ranched in the vicinity of Port Nolloth and Kleinzee, outside of its natural habitat, for many years (Figure 4-1). Furthermore, the South African Department of Forestry, Fisheries and the Environment has as recently as 28 May 2021, invited applicants to apply for the right to ranch abalone in a 7 km stretch of sea between Doring Bay and Strandfontein, also outside of its natural habitat (Republic of South Africa Government Gazette No. 44636).

In Namibia, abalone is both cultured on land and ranched within the sea at Lüderitz. For sea-based ranching, juvenile abalone has to be produced on land and then released into the ocean (resettled) at suitable habitats. Once grown-out, the abalone are retrieved by divers for onshore processing and export. This resettlement of abalone is an ongoing process, since they do not

reproduce and proliferate naturally in the water around Lüderitz. The same is true for the ranching projects in the Northern Cape of South Africa (Massie et al., 2018). Thus, abalone has not in the past, nor is it expected to in future, naturally establish or become invasive around Lüderitz.

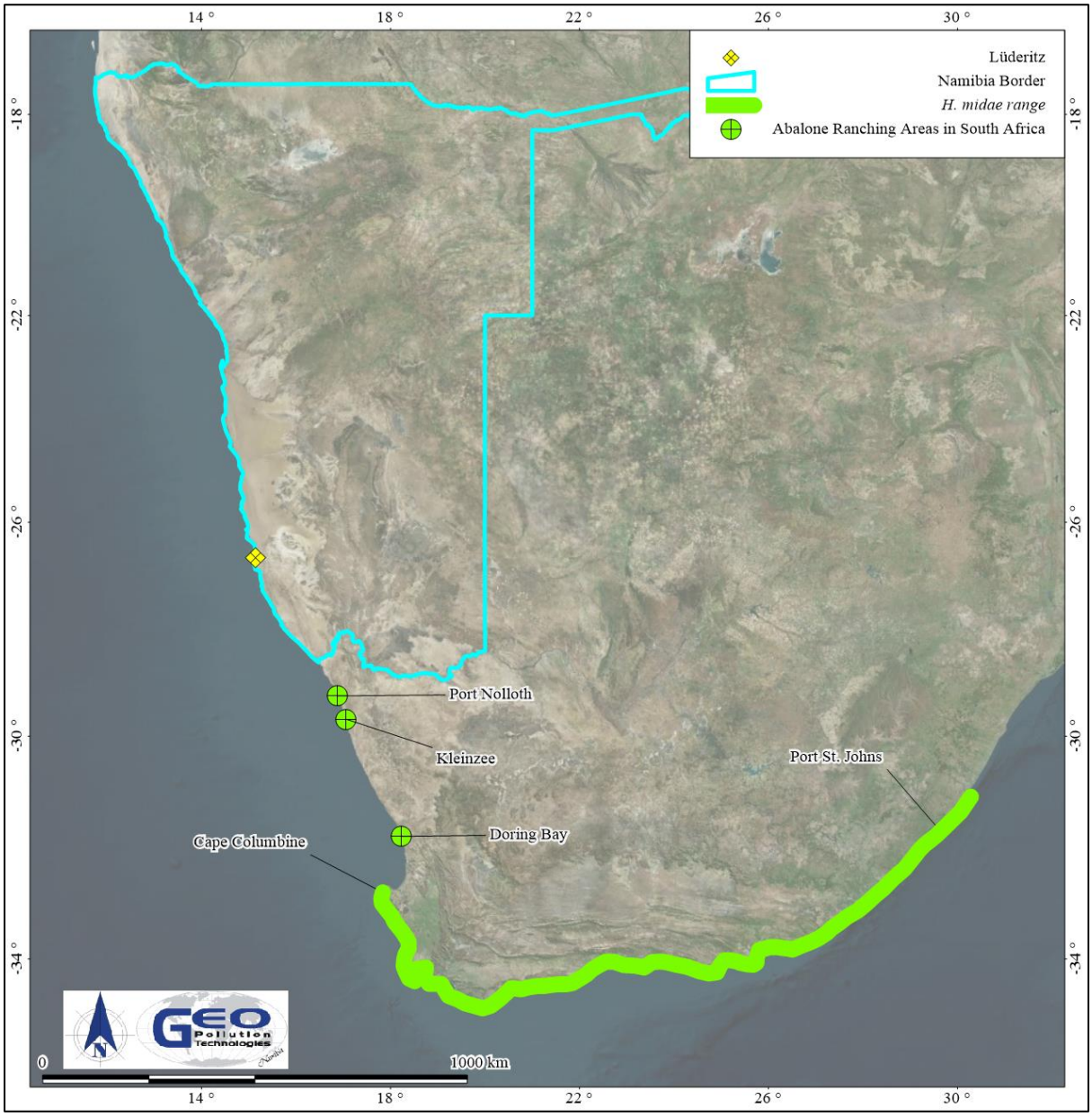


Figure 4-1. Natural range of *H. midae* and existing ranching areas outside of the natural range in South Africa, in relation to Lüderitz

4.3 ONSHORE INFRASTRUCTURE

The onshore infrastructure will be constructed on a plot that will be obtained from the Lüderitz Town Council, in the area earmarked for mariculture activities, next to Lüderitz Harbour / Second Lagoon. Infrastructure will mainly consist of 12 concrete holding tanks, a pump station and office related infrastructure. The exact design of the facility will be finalised once all approvals are obtained and it will be designed and constructed according to Town Council requirements. It will be similar to existing mariculture infrastructure operational in the same area.

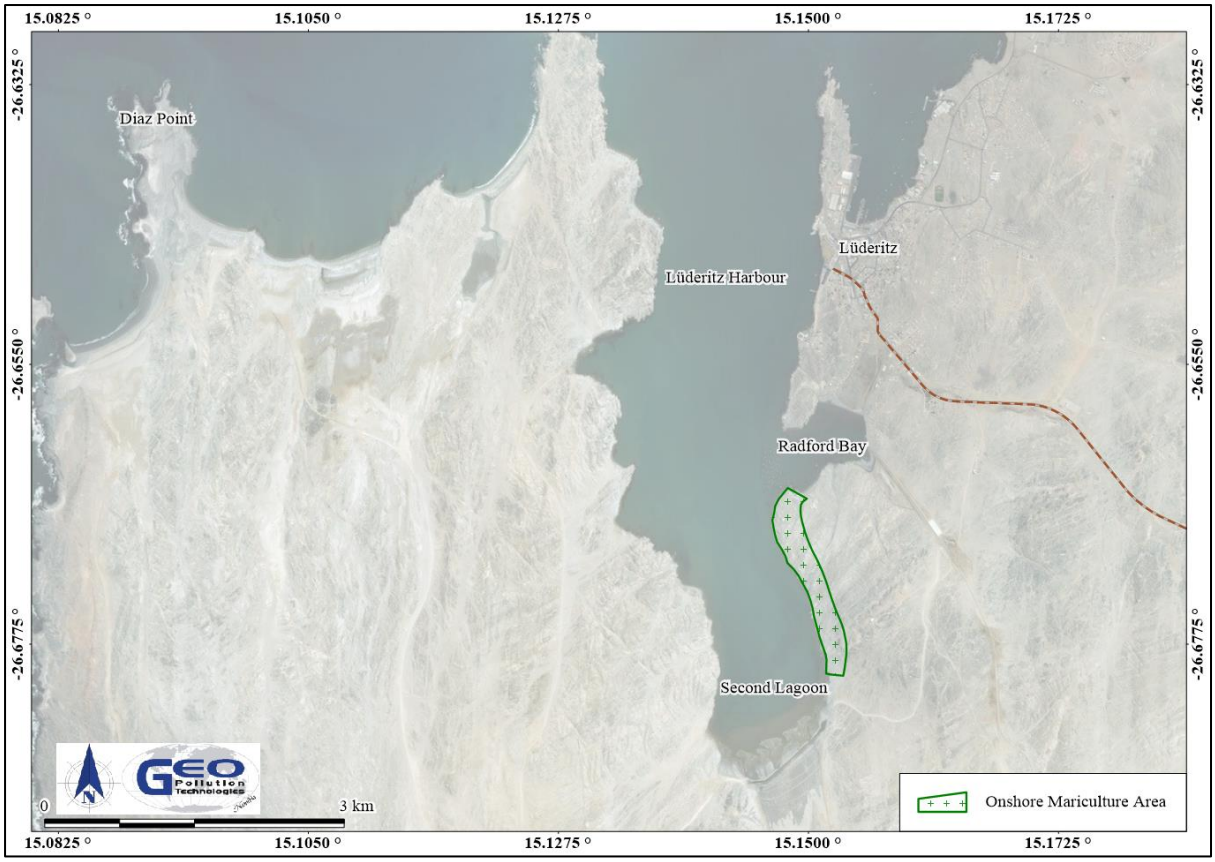


Figure 4-2. Area earmarked by the authorities for onshore mariculture infrastructure

4.4 SOURCING OF JUVENILE ABALONE AND ACCLIMATION

Juvenile abalone will be sourced from abalone mariculture farms in South Africa according to the procedures as prescribed by the Ministry of Fisheries and Marine Resources, mainly as contained in Government Notice No. 71 of 2010: Regulations Relating to Import and Export of Aquatic Organisms and Aquaculture Products: Aquaculture Act, 2002. As part of the phytosanitary requirements (issuing of a health certificate) for the importing of living organisms, all abalone will be vetted for any pathogens or other pathologies in South Africa. Once certified disease free and healthy, an import permit will be issued in Namibia and an export permit in South Africa, and the abalone will be transported to Lüderitz. Once at Lüderitz, they will be placed into the seawater containing holding tanks. It will be a flow through system pumping seawater at a volume of 5 to 7 m^3/hour. The tanks will contain several baskets that will be populated with the juvenile abalone. They will be fed with fresh, beach cast seaweed (macroalgae) and allowed to acclimatize for a period of one to two weeks, depending on their size. Because juvenile abalone will be obtained at a frequency of about once a month, and due to their small size and short period kept in the tanks, relatively small volumes of seaweed will need to be collected to feed them. An estimated 40 to 50 kg of seaweed is expected to be collected per day and the Proponent is already in possession of an ECC to collect seaweed around Lüderitz.

4.5 PROPOSED ABALONE RANCHING

The Proponent has identified three areas along the coast, south of Lüderitz, where suitable habitat is present for abalone ranching (Figure 4-3). Area 1 is an approximately 3 km stretch of coastline, located to the south of Grosse Bucht. Area 2 is approximately 12.5 km and lies from Wolfbaai to Abenteuerbaai (Bains Bay), inclusive of the water areas around North Long Island and South Long Island. The southernmost area, Area 3, comprises approximately 11 km, from just south of Abenteuerbaai to Elizabeth Bay. Within the three areas, a 50 meter wide water area will be targeted which will have its landside border located at the spring low water mark. Not all areas will eventually be 50 m wide, since water depth is a limiting factor in the establishment of

abalone. *H. midae* are most frequently found in water up to 10 m deep, but may be deeper in certain locations (Barkai & Griffiths, 1986). As they feed on photosynthesising algae which require sunlight, and the water off the coast of Namibia is relatively turbid, only shallower water will have enough food available to sustain the abalone. Ultimately, the sites that will be targeted within the three broader areas will depend on, among others, habitat suitability, accessibility and wave exposure.

Carrying capacity for abalone will vary between locations and will mostly depend on the availability of food, shelter and the type of substrate. In South Africa, the density of natural populations of *H. midae* ranges between 0.08/m^2 and 11.45/m^2 (individuals per square meter) with an average of 3/m^2 (South African Government Gazette 334720 of 2010). The "Guidelines and Potential Areas for Marine Ranching and Stock Enhancement of Abalone *Haliotis midae*" of the South African Department of Agriculture, Forestry and Fisheries (South African Government Gazette 334720 of 2010), also suggest 3/m^2 as the indicated density to consider for ranching. It then further suggests that frequent monitoring be conducted to ensure optimum stocking density in the long term. The Proponent, based on years' of experience in abalone ranching at Lüderitz, will assess food abundance at areas earmarked for resettlement while diving. Resettlement density will then range from 1/m^2 in areas will little food, 2/m^2 to 3/m^2 in areas with more food and 4/ m^2 to 5/m^2 in areas with an abundance of food. Abalone size will mainly range between 20 mm and 30 mm when they are resettled. Once the ranching project is in progress, the Proponent will adjust stocking densities based on continuous visual observations made with respect to abalone growth and health as well as habitat condition. As a monitoring measure the Proponent will keep a photo record of the abalone ranching areas to determine changes to the environment over time, if any. Should changes be detected, the ranching protocol will be revised.

The placement of juvenile abalone will be performed by hand. Divers with bags of abalone will visit potential sites, identify suitable substrate, and physically place abalone and ensure they attach to the substrate. This allows for very specific control over the density and locations of placement. New juvenile abalone will be introduced at regular intervals (about every three months) to ensure an eventual, continuous supply of marketable sized abalone. Once the project start, the first location to be populated in the proposed ranching area will be visited and abalone released. About three months later, the next site will be populated, and this process will then be repeated every three months. The three month period may be shortened or extended depending on specific weather conditions experienced. By the time the entire area is populated, the abalone from the first populated area should be marketable size and can be harvested. That area is then ready to be re-populated with juvenile abalone, and a continuous supply of abalone is then available.

Divers will regularly visit the areas to monitor their growth and the condition of the benthic environment. It is expected that the first marketable sized abalone will only be available after seven years. Abalone will be harvested by divers, placed in bags, and offloaded in the Lüderitz harbour. From there it will be transported to one of the local, existing fish processing facilities where space and equipment will be hired for the duration of processing and packaging. During processing, abalone are washed, some of them shucked, packaged and placed in blast freezers. Abalone are then temporarily stored until they are transported to the Hosea Kutako International Airport from where they are shipped to China and Hong Kong.

4.6 BIOSECURITY AND DISEASE MANAGEMENT

Namibia does not have a biosecurity plan in place for aquaculture activities. Instead the onus is on individual farms to establish their own protocols with some guidance from the Ministry of Fisheries and Marine Resources and the various National Acts and Regulations (see Table 6-1 and Table 6-2). Protocols and procedures that will be followed by the Proponent are contained in Appendix A. The measures contained in Appendix A are continuously improved and updated as new information is obtained. Conditions that will be stipulated in the various permits and licences to be obtained by the Proponent will also be added. Regular sampling and testing of abalone will be conducted according to the prescribed Molluscan Shellfish Sampling Schedule as issued by

the Ministry of Fisheries and Marine Resources. The 2021/2022 schedule is attached in Appendix B.

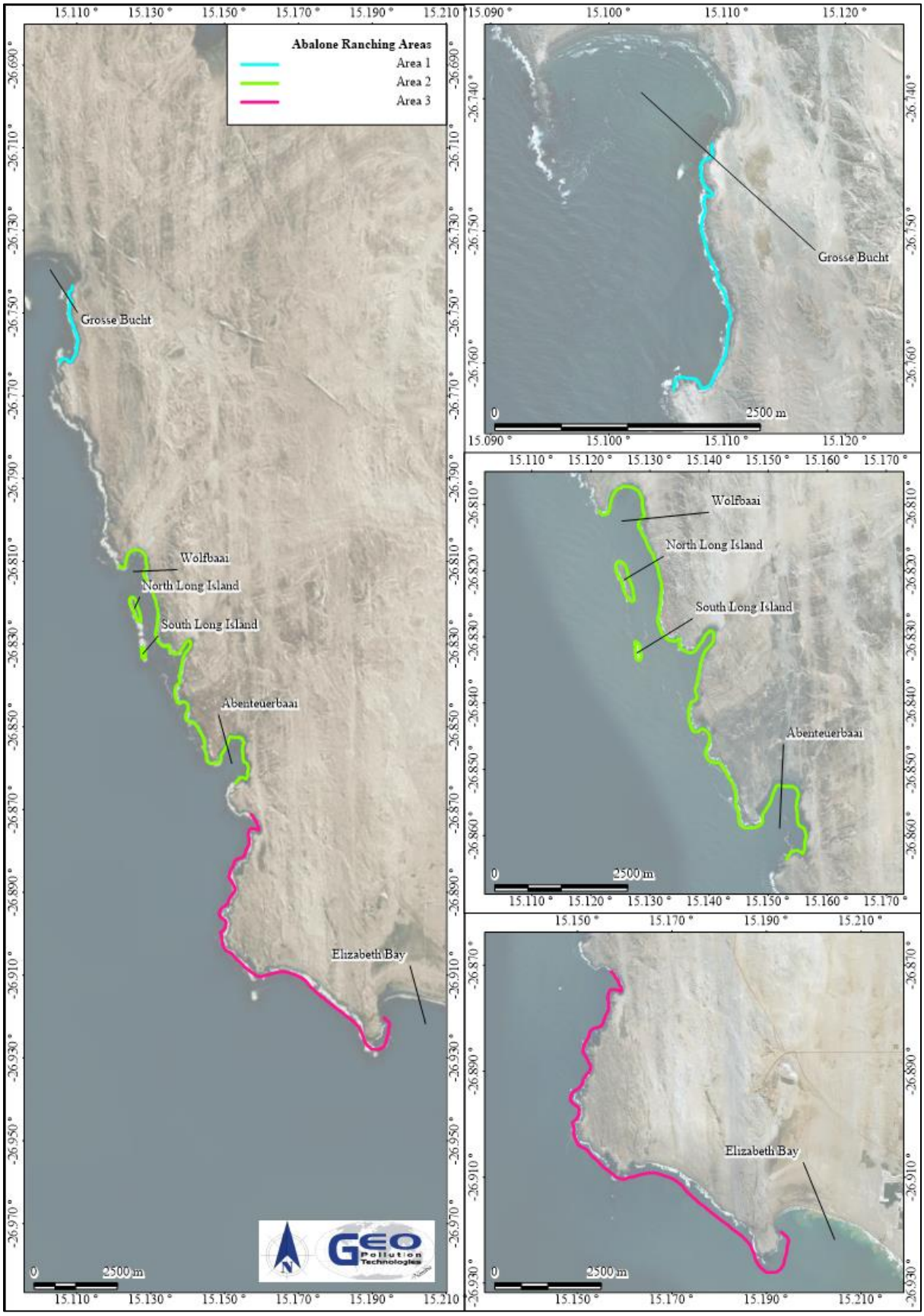


Figure 4-3. Abalone ranching areas

Photo 4-1. Adult *Haliotis midae* ranched at Lüderitz (Photo: J Erasmus)

Photo 4-2. *Haliotis midae* close-up (Photo: Adelle Roux)

4.7 GENERAL

Initially, employment will be offered to about 30 local Namibian citizens. This will include employment at the onshore facilities as well as boat crew and divers. Once more entrepreneurs enter the industry, more employment opportunities will ensue. This may then also include the addition of a local hatchery to produce abalone for own use and to supply other abalone ranchers in the area.

5 ALTERNATIVES

Various alternatives were considered for the proposed abalone ranching project. Table 5-1 presents some of the alternatives considered during the planning phase of this project.

Table 5-1. Alternatives comparison table

Alternative Description	Advantages	Disadvantages	Preferred Alternative
Land based mariculture	♦ Increased security possible to prevent theft ♦ Better control and less natural losses	♦ Expensive infrastructure to be built ♦ Requires time to build mariculture farm ♦ Requires significant volumes of seawater to be abstracted at significant cost ♦ Requires large areas of land that may come at great cost	♦ Ranching to reduce initial investment costs and to fast-track the commencement of the project. Land-based mariculture can be considered in future in addition to ranching.
Ranching	♦ No expensive infrastructure ♦ Can commence immediately ♦ Utilising a sustainable natural resource of Namibia (the environment) that will provide benefits in terms of employment, training, revenue generation, etc.)	♦ Possibility of theft ♦ More natural losses (e.g. predation) ♦ Difficult and sometimes dangerous conditions at sea for the resettlement and collection of abalone	
Source juvenile abalone from South Africa	♦ No specialised infrastructure required for abalone hatchery ♦ Reduced initial investment costs ♦ Juvenile abalone available immediately	♦ Cumbersome import process ♦ Transport of juvenile abalone causes unnecessary stress to the animals ♦ Complete reliance on third-party suppliers can cause supply disruptions	♦ Initially source juvenile abalone from South Africa. Once the project is established and finances are generated investments can be made

Alternative Description	Advantages	Disadvantages	Preferred Alternative
Produce abalone spat locally	♦ No import processes to obtain juvenile abalone ♦ Proponent in control of the supply of juvenile abalone ♦ Once the hatchery is established, abalone can be supplied to other abalone farms / ranchers	♦ High initial investment costs to construct the hatchery ♦ Time required to establish the hatchery will cause delays in the project	into the establishment of a hatchery
No-go Alternative	♦ No potential impacts on the environment	♦ Reduced revenue generation for Namibia ♦ No contributions to employment in the town ♦ Sub-optimal utilisation of Namibia's sustainable resources	♦ Ranching of abalone in an environmentally responsible manner with frequent monitoring and corrective action where needed (e.g. reducing stocking density if needed)

6 ADMINISTRATIVE, LEGAL AND POLICY REQUIREMENTS

To protect the environment and achieve sustainable development, all projects, plans, programmes and policies deemed to have adverse impacts on the environment require an environmental assessment, as per the Namibian legislation. The legislation and standards provided in Table 6-1 to Table 6-2 govern the environmental assessment process in Namibia and/or are relevant to the facility.

Table 6-1. Namibian law applicable or of specific interest

Law	Key Aspects
The Namibian Constitution	♦ Promote the welfare of people. ♦ Incorporates a high level of environmental protection. ♦ Incorporates international agreements as part of Namibian law.
Environmental Management Act Act No. 7 of 2007, Government Notice No. 232 of 2007	♦ Defines the environment. ♦ Promote sustainable management of the environment and the use of natural resources. ♦ Provide a process of assessment and control of activities with possible significant effects on the environment.
Environmental Management Act Regulations Government Notice No. 28-30 of 2012	♦ Commencement of the Environmental Management Act. ♦ List activities that requires an environmental clearance certificate. ♦ Provide Environmental Impact Assessment Regulations.
Marine Resources Act Act No. 27 of 2000	♦ Prevents the discharge of anything that may be injurious to marine resources or may disturb ecological balance in any area of the sea or which may detrimentally affect the marketability of marine resources, or which may hinder their harvesting. ♦ Regulates the conservation of marine resources and ecosystems. ♦ Regulates the protection of the Namibian Islands' Marine Protected Area.

Law	Key Aspects
Regulations Relating to Namibian Islands' Marine Protected Area: Marine Resources Act, 2000 Government Notice No. 316 of 2012	♦ Delineates the Namibian Islands' Marine Protected Area. ♦ Zones the Namibian Islands' Marine Protected Area into an all-encompassing buffer zone further divided into four zones of increasing protection status as islands and shorelines are approached. ♦ Declares that a person may not land on or access any island, islet or rock in the Namibian Islands' Marine Protected Area unless the person is in possession of a valid permit obtained from the regional office of the Ministry of Fisheries and Marine Resources in Lüderitz. ♦ Provides for the option of mariculture in permitted areas and under certain conditions.
Aquaculture Act Act No. 18 of 2002	♦ Regulates aquaculture activities to ensure sustainable development. ♦ Provides for water quality monitoring to protect aquaculture activities.
Aquaculture (Licensing) Regulations: Aquaculture Act, 2002 Government Notice No. 246 of 2003	♦ Provides regulations dealing with licensing, record keeping and reporting, health management, disease control and protection of the aquatic environment in so far as aquaculture facilities are concerned.
Regulations Relating to Import and Export of Aquatic Organisms and Aquaculture Products: Aquaculture Act, 2002 Government Notice No. 71 of 2010	♦ Provides regulations dealing with the import, export, quarantine and inspection of aquatic organisms and aquaculture products.
The Water Act Act No. 54 of 1956	♦ Remains in force until the new Water Resources Management Act comes into force. ♦ Defines the interests of the state in protecting water resources. ♦ Controls the disposal of effluent. ♦ Numerous amendments.
Water Resources Management Act Act No. 11 of 2013	♦ Provide for management, protection, development, use and conservation of water resources. ♦ Prevention of water pollution and assignment of liability. ♦ Not in force yet.
Animal Health Act Act No. 1 of 2011	♦ Provide for the prevention, detection and control of animal disease. ♦ Provide for the maintenance and improvement of animal health. ♦ Regulates the importation and exportation of animals, animal products and restricted material into Namibia.
Local Authorities Act Act No. 23 of 1992, Government Notice No. 116 of 1992	♦ Define the powers, duties and functions of local authority councils. ♦ Regulates discharges into sewers.
The Namibian Ports Authority Act Act No. 2 of 1994	♦ Provide for the establishment of the Namibian Ports Authority and its functions. ♦ Responsible to protect the environment within its areas of jurisdiction.

Law	Key Aspects
Public Health Act Act No. 36 of 1919	♦ Provides for the protection of health of all people.
Public and Environmental Health Act Act No. 1 of 2015, Government Notice No. 86 of 2015	♦ Provides a framework for a structured more uniform public and environmental health system, and for incidental matters. ♦ Deals with Integrated Waste Management including waste collection disposal and recycling; waste generation and storage; and sanitation.
Labour Act Act No 11 of 2007, Government Notice No. 236 of 2007	♦ Provides for Labour Law and the protection and safety of employees. ♦ Labour Act, 1992: Regulations relating to the health and safety of employees at work (Government Notice No. 156 of 1997).
Pollution Control and Waste Management Bill (draft document)	♦ Not in force yet. ♦ Provides for prevention and control of pollution and waste. ♦ Provides for procedures to be followed for licence applications.
Prevention and Combating of Pollution of the Sea by Oil Amendment Act (No. 24 of 1991)	♦ Amends the Prevention and Combating of Pollution of the Sea by Oil Act of 1981 to be more relevant to Namibia after independence.

Table 6-2. Relevant multilateral environmental agreements for Namibia

Agreement	Key Aspects
Stockholm Declaration on the Human Environment, Stockholm 1972	♦ Recognizes the need for a common outlook and common principles to inspire and guide the people of the world in the preservation and enhancement of the human environment.
United Nations Framework Convention on Climate Change (UNFCCC)	♦ The Convention recognises that developing countries should be accorded appropriate assistance to enable them to fulfil the terms of the Convention.
Convention on Biological Diversity, Rio de Janeiro, 1992	♦ Under article 14 of The Convention, EIAs must be conducted for projects that may negatively affect biological diversity.
Benguela Current Convention of 2013	♦ The Convention is a formal treaty between the governments of Angola, Namibia and South Africa that sets out the countries' intention "to promote a coordinated regional approach to the long-term conservation, protection, rehabilitation, enhancement and sustainable use of the Benguela Current Large Marine Ecosystem, to provide economic, environmental and social benefits.
Abidjan Convention of 1981	♦ The Convention for Cooperation in the Protection, Management and Development of the Marine and Coastal Environment of the Atlantic Coast of the West, Central and Southern Africa Region ♦ Provides an overarching legal framework for all marine-related programmes in West, Central and Southern Africa.
National Marine Pollution Contingency Plan of 2017	♦ Coordinated and integrated national system for dealing with oil spills in Namibian waters.

6.1 THE ENVIRONMENTAL MANAGEMENT ACT

The project is listed as an activity requiring an environmental clearance certificate as per the following points from Section 7 and 10 of Government Notice No. 29 of 2012 of the Environmental Management Act:

- 7.1 “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 ranching of abalone per se does not require the establishment of facilities for mariculture, but a hatchery may be established in future and acclimation tanks will be located at an onshore site).
- 7.8 “The introduction of alien species into local ecosystems.” (Abalone is non-native, but it has been released into the sea and ranched at Lüderitz for many years).

7 ENVIRONMENTAL CHARACTERISTICS

This section lists pertinent environmental characteristics of the study area and provides a statement on the potential environmental impacts on each.

7.1 LOCALITY AND SURROUNDING LAND USE

The project will have onshore and offshore components. The onshore facility will be located in the area set aside by the authorities for mariculture along Second Lagoon (Figure 4-2). This area falls within the Lüderitz Townlands. Processing and freezing of abalone will take place in an existing, third party seafood processing facility in town. Abalone ranching will take place offshore, below the high water mark, and thus falls under the jurisdiction of the Ministry of Fisheries and Marine Resources. Above the high water mark is under the jurisdiction of the Ministry of Environment, Forestry and Tourism (Tsau //Khaeb (Sperrgebiet) National Park), but will not be accessed by the Proponent. The offshore areas for abalone ranching and the areas

immediately onshore from that fall within two mining licence (ML) areas, ML-45 and ML-36E (Figure 7-2). The mining licence holders are Sperrgebiet Diamond Mining (ML-45) and Samicor Diamond Mining (ML-36E).

Implications and Impacts

The Proponent will apply for a mariculture licence from the Ministry of Fisheries and Marine Resources. Permission from the respective mining licence holders will have to be obtained, but initial correspondence with them indicated that this process for obtaining permission should only be initiated once the ECC and aquaculture licences have been obtained.

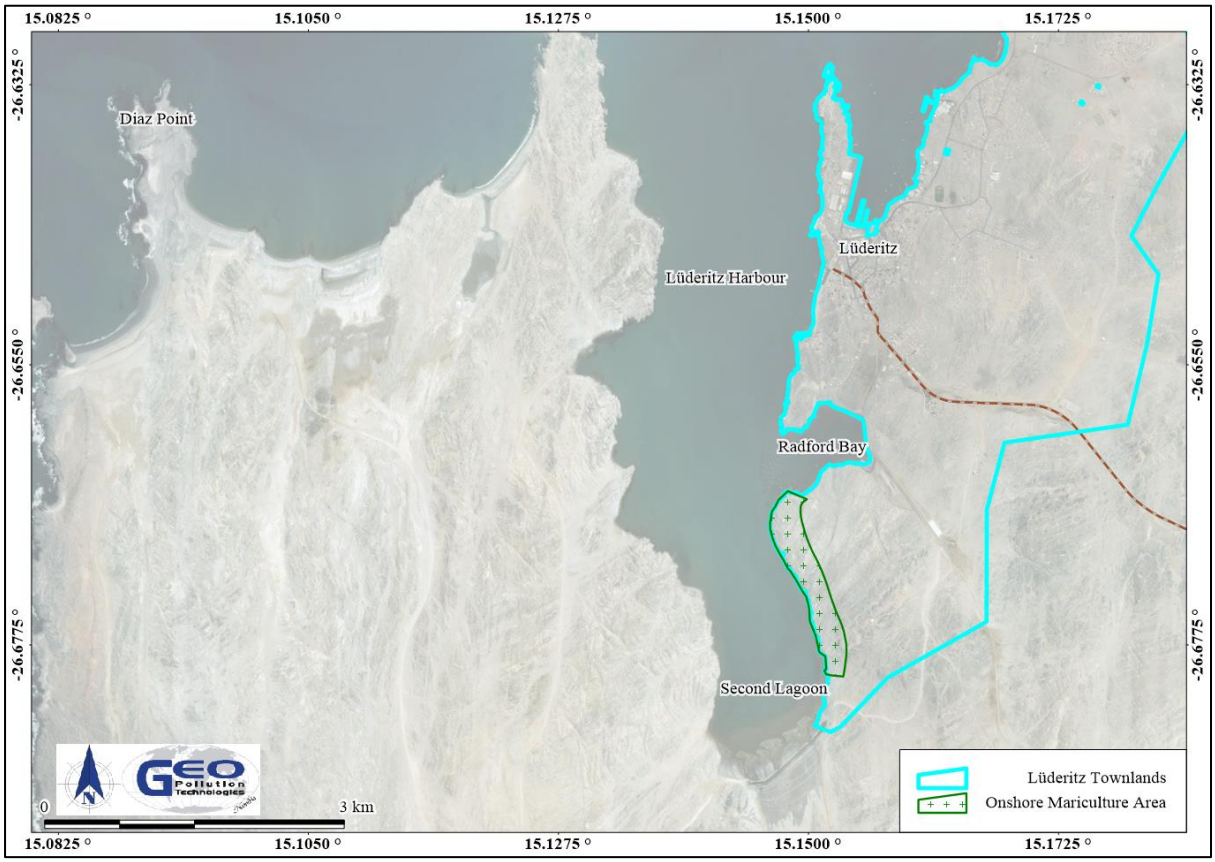


Figure 7-1. Lüderitz Townlands

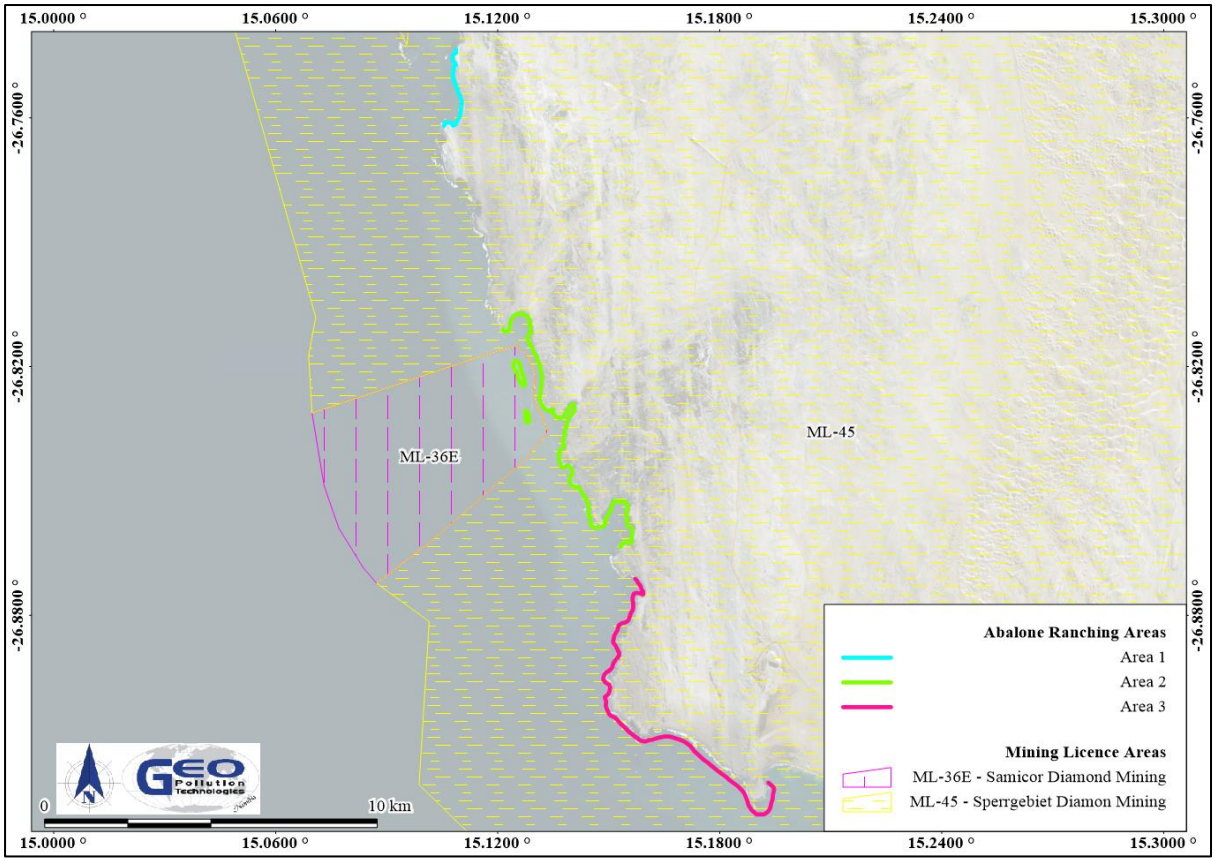


Figure 7-2. Mining licence areas

7.2 CLIMATE

Lüderitz is located on the Namibian coastline in the arid Namib Desert. The arid conditions are as a result of dry descending air and upwelling of the cold Benguela Current. As a result, thick fog or low stratus clouds are a regular occurrence in Lüderitz. This is due to the influence of the Benguela Current and forms a major source of water for the flora in the Namib Desert.

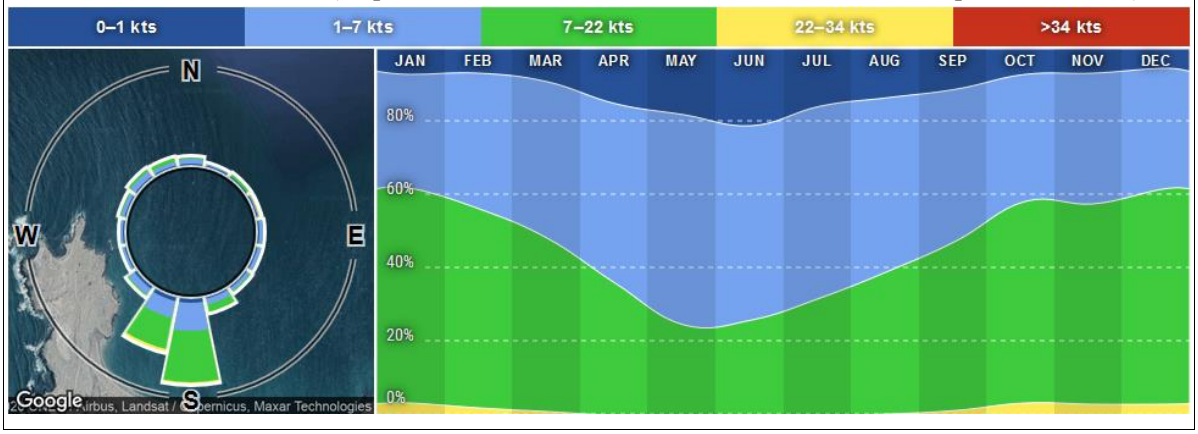
Namibia is situated within an anti-cyclone belt of the southern hemisphere. Winds generated from the high-pressure cell over the Atlantic Ocean blow from a southerly direction when they reach the Namibian coastline. As the Namibian interior is warm (particularly in summer), localised low-pressure systems are created which draws the cold southerly winds towards the inland desert areas. These winds manifest themselves in the form of strong prevailing south to south-westerly winds, which range from an average of 20 knots (37 km/h) during winter months to as high as 60 knots (111 km/h) during the summer. Table 7-1 presents wind data of the Lüderitz airport. Although conditions over the ocean will be somewhat different, it does present a general idea of the expected wind conditions. Daily fluctuations in wind speed are characterised by calmer winds in the morning with strong wind from late morning to late afternoon. During winter, the east winds generated over the hot Namib Desert have a strong effect on temperature, resulting in temperatures in excess of 30 °C. Such winds also tend to transport plenty of sand. Table 7-1 presents a summary of climate conditions in the Lüderitz area. Rainfall is typically limited with an average of less than 50 mm per annum. However, occasional cloud bursts do occur and this can result in rainfall of more than 100 mm in a short time.

Implications and Impacts

Strong winds may lead to rough seas with safety risks for the crew of small watercraft when there are large swells. This will also present increased safety risks to divers.

Table 7-1. Summary of climate data (Digital Atlas of Namibia)

Average annual rainfall (mm/a)	0-50 mm; half of the rainfall occurs from May to June
Variation in annual rainfall (%)	80 – 90%
Average annual evaporation (mm/a)	2,400-2,600
Water deficit (mm/a)	1,701-1,900
Temperature	Average maximum: Between 24 °C in March/April and 19.3 °C in September Average minimum: Between 16.5 °C in February and 9.1 °C in August Average annual >16 °C
Fog	Approximately 126.7 days of fog per year
Wind	Prevailing wind strong south-westerly
Wind data for Diaz Point (https://www.windfinder.com/windstatistics/diaz_point_luderitz)	



7.3 PUBLIC WATER SUPPLY

The NamWater Koichab water supply scheme supplies Lüderitz with potable water. It consists of about nine production boreholes, supplying groundwater from the alluvial aquifer formed in a paleo-channel of the Khoichab River. Water supply to Lüderitz has been relatively constant over the last two decades (Figure 7-3). During 2019/2020 the actual volume of water sold by NamWater was 975,170 m^3. The potential supply of the scheme is 1,460,000 m^3. Since 2019/2020, no additional industries have been developed which are major consumers of potable water and the potential supply is assumed to be very similar.

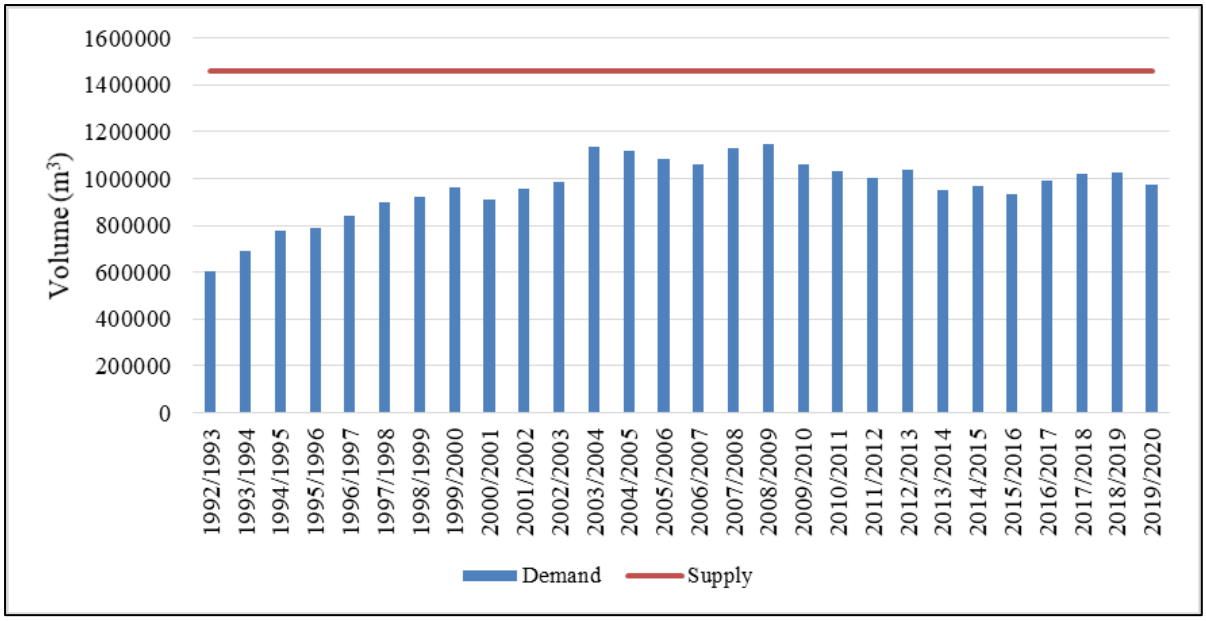


Figure 7-3. Lüderitz potable water supply and demand statistics (Source: NamWater)

Implications and Impacts

The limited amount of water that will be used by the proponent for its acclimation facility and processing activities is not expected to have an impact on the public water supply. Disruptions in potable water supply may however impact on their operational efficiency.

7.4 ECOLOGY

The terrestrial environment at Lüderitz and onshore of the ranching areas are part of the Succulent Karoo Biome with a succulent steppe vegetation type and dwarf shrubland structure (Atlas of Namibia Project, 2002). Apart from the Lüderitz Townlands, the land area is part of the Tsau //Khaeb National Park (Figure 7-4). The Succulent Karoo is a biodiversity hotspot and has the world's richest succulent diversity which is also characterised by high reptile and invertebrate diversity (CEPF, 2005). All land-based activities of the Proponent will take place within Lüderitz's Townlands, which is located in the Lüderitz Peninsula vegetation zone, but due to the towns development this vegetation zone is highly degraded within the urban area. Brown hyena, jackal, springbok, porcupines and oryx are some of the mammals that utilize the areas surrounding Lüderitz.

The Namibian marine coastal environment is characterised by relatively low species diversity with high abundance. It is typically also a dynamic ecosystem with relatively high resilience against impacts, when compared with the more tropical waters of for example the east coast of southern Africa. The Namibian coastline is characterised by the cold, northward flowing Benguela Current. Strong upwelling of cold, nutrient rich water along the Namibian coast is one of the key environmental characteristics of the Benguela Current. The magnitude of upwelling is strongly influenced by wind and it leads to high biological productivity supporting significant fish populations (O'Toole, 1997; Pulfrich, 2010). Lüderitz is reported to be situated within the most intense upwelling system (O'Toole, 1997; Pisces, 2003). An abundance of nutrients are brought from the sediments on the sea floor by this upwelling system to the photic zone. Large amounts of dead phyto- and zoo-plankton, which bloom as a result of this nutrient flux, settle on the seafloor together with silt, and contributes to anoxic conditions in the vicinity of Lüderitz and result in the occasional hydrogen sulphide eruption (Pulfrich, 2010; NSI, 2012).

The upwelling of nutrients results in a very productive ecosystem. This also includes the abundant growth of algae (micro- and macro- algae), the food source of abalone. Species occurring around Lüderitz like *Ecklonia maxima* and *Ulva* spp. have for example been shown to form an important part of *H. midae* diet (Barkai & Griffiths, 1986).

Islands and the rocky shorelines along the coast around Lüderitz act as important sanctuaries for various bird species and form part of the Important Bird Area (IBA) NA017, the Lüderitz Islands IBA. The IBA consist of the four islands; Halifax, Penguin, Seal and Flamingo Island, as well as the rocky shoreline of the mainland. The island support more than 10,000 birds while the rocky shorelines of the mainland support more than 14,000 shorebirds (BirdLife International 2021). Historically anthropogenic pressures on many of the bird species have led to a steep decline in their numbers. This was largely as a result of guano harvesting, egg collection and habitat alteration and loss. A number of species that are red listed occur along the coast. These include birds like the African penguin, bank cormorant, crowned cormorant, cape cormorant, African oyster catcher, Damara tern, lesser flamingo, Cape gannet, etc. They, and numerous other species, typically populate the islands forming the Namibian Islands Marine Protected Area (NIMPA) (Figure 7-4) such as North Long Island, South Long Island, Halifax, Ichaboe, Possession, Mercury, etc. On the islands most of the birds' numbers are declining despite the islands being protected and off-limits to the general public. Events such as the significant number of penguin deaths recorded in 2019 furthermore takes its toll on the species long term sustainability.

Some important species that are considered endangered, vulnerable or near threatened, and occurring within or near the project area, are presented in Table 7-2, with some notes on their status and threats (https://www.iucnredlist.org/; BirdLife International 2021).

Multiple cetaceans also occur along the Namibian coast. Cetaceans occurring in Lüderitz include species such as the Common Bottlenose Dolphins, the Namibian endemic Heaveside's Dolphins, Dusky Dolphins, Humpback Whales and Southern Right Whales as well as the Cape Fur Seals. This includes migratory, resident and semi-resident species.

Table 7-2. Key bird species in IBA NA017 (list not exhaustive)

Common Name (Scientific Name)	Range	Status (Last Assessed)	Comments	Current Threats
African Penguin (*Spheniscus demersus*)	Endemic to southern Africa (Namibia; South Africa; Angola; Mozambique)	Endangered (2019)	Rapid population decline with no sign of reversal	Commercial fishing and shifts in prey populations
Bank Cormorant (*Phalacrocorax neglectus*)	Native to Namibia and South Africa	Endangered (2018)	Very rapid decline in small population	Human disturbance, displacement by seals, food shortages and low quality food
Damara Tern (*Sternula balaenarum)*	Breeding resident in Namibia	Vulnerable (2018)	Decreasing population	Habitat disturbance and mining
Curlew Sandpiper (*Calidris ferruginea)*	Namibian resident with wide global distribution	Near Threatened (2016)	Decreasing population	Habitat loss and degradation, human disturbance
Red Knot (*Calidris canutus)*	Namibian native with wide global distribution	Near Threatened (2018)	Decreasing population	Habitat loss and human disturbance
Lesser Flamingo (*Phoeniconaias minor*)	Namibian native with relatively wide global distribution	Near Threatened (2018)	Decreasing population	Mining, power generation and transmission
White-chinned Petrel (*Procellaria aequinoctialis*)	Non-breeding native to Namibia with wide global geographic	Vulnerable (2018)	Decreasing population	Commercial fishing

African Oystercatcher (*Haematopus moquini*)	Native to Namibia and South Africa	Near Threatened (2016)	Small population, probably increasing population	Human disturbance e.g. off-road driving on beaches
Crowned Cormorant (*Microcarbo coronatus*)	Native to Namibia and South Africa	Near Threatened (2016)	Small but stable population	Disturbance and marine pollution
Cape Gannet (*Morus capensis*)	Native to southern Africa	Endangered (2018)	Decreasing population	Food shortage, storms, habitat loss, marine pollution, etc.

Source: The IUCN Red List of Threatened Species Website https://www.iucnredlist.org/; BirdLife International 2021

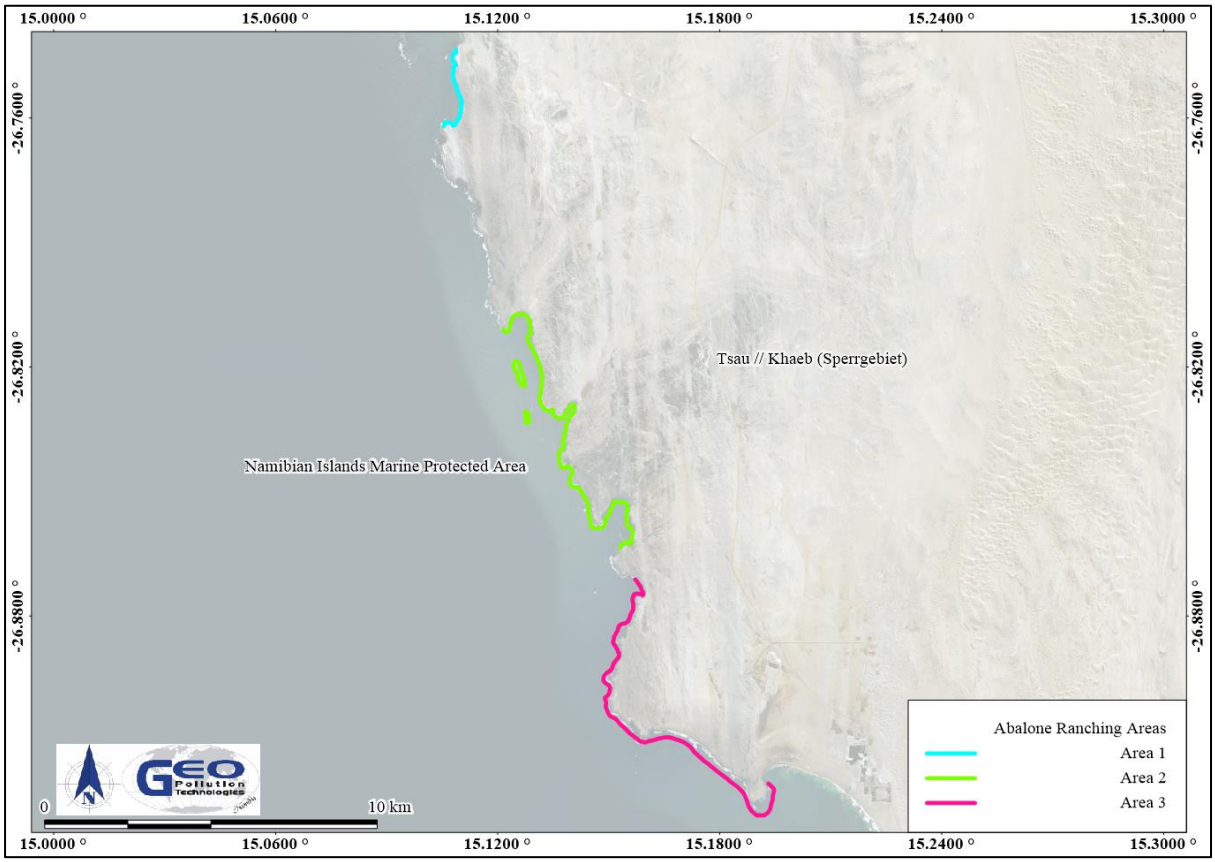


Figure 7-4. Abalone ranching areas in relation to protect areas

Implications and Impacts

Human presence on or near the islands in the NIMPA may further impact on already declining bird populations. However, the nature of abalone ranching is such that there is no need to access the rocky shores of the islands or the mainland.

Concerns exist that resettlement of abalone along the coast may potentially have varying degrees of impacts depending on stocking density and the potential introduction of diseases and parasites.

Introducing abalone into the system may provide a food source to for example rock lobsters, but this can in turn result in financial losses by the Proponent.

7.5 DEMOGRAPHIC AND ECONOMIC CHARACTERISTICS

From 2001 to 2011, the //Karas Region showed a population increase of 1.1%. This is less than the Namibian intercensal growth rate of 1.4%. For the same period Lüderitz showed a decline in population size of 5.6% and had a population size of 12,537 in 2011 (Namibia Statistics Agency, 2011). The remoteness of Lüderitz and the lack of employment and economic diversification opportunities possibly contributes to this decline. This may lead to some inhabitants relocating to other urban centres offering better prospects. Lüderitz has an unemployment rate of 28.2% which is slightly lower than the rate of 32.2% of the //Karas Region (Namibia Statistics Agency, 2011).

Lüderitz developed in the early 20th century mainly as a result of the diamond mining industry. Today however, the sustaining industries in Lüderitz are fishing and mariculture, mining and tourism. The majority of employment is provided by the fishing industry which mainly exports fisheries products to Europe. Rock lobsters are one of the key fisheries products. Mariculture of abalone and oysters are also actively pursued. Diamond mining used to be a major part of the mining industry with zinc mining being the other major component.

The Port of Lüderitz, as operated by Namport, is central to the fishing and mining industries. During the period April 2016 to March 2017 156,458 tons of zinc product and 15,070 tons of lead concentrate were exported via the Port of Lüderitz. Zinc oxide is also imported in small quantities for refining purposes at the Rosh Pinah mines. The Rosh Pinah mines requires sulphur for their refining process and during the 2016/2017 period 92,078 tons of sulphur was imported via the port. During 2019 the export of manganese ore via Lüderitz, originating from South Africa, was initiated. The anticipated export volumes are in the range of 80,000 to 90,000 tons per month in three separate shipments.

Tourism plays an important part in the local economy, unfortunately a very small percentage of tourists visiting Namibia also visits Lüderitz. Main attractions are Kolmanskop, Diaz Point and the historic buildings of the town. Passenger liners call in the Port of Lüderitz from time to time with approximately 35 calling in port between 2015 and 2018.

Table 7-3. Demographic characteristics of Lüderitz Bay, the //Karas Region and Nationally (Namibia Statistics Agency, 2011)

	Lüderitz	//Karas Region	Namibia
Population (Males)	6,300*	37,400	1,021,912
Population (Females)	6,200*	37,000	1,091,165
Population (Total)	12,500	74,400	2,113,077
Unemployment (15+ years)	N/A	32.9%	33.8%
Literacy (15+ years)	N/A	93.2%	87.7%
Education at secondary level (15+ years)	50%	55.2%	51.2%
Households considered poor	N/A	15.3%	19.5%

**Data available from preliminary results only (National Planning Commission, 2012)*

Implications and Impacts

The project will initially provide employment to about 30 full time employees in the area, but this may increase should more people enter the abalone mariculture business. Some skills development and training will benefit employees during the operational phase.

Sustained and increased employment opportunities will have a positive impact and result in an increase in revenue generation for Lüderitz as well as Namibia in general. The project therefore will have a positive contribution to demographic and economic aspects of Lüderitz.

7.6 CULTURAL, HERITAGE AND ARCHAEOLOGICAL ASPECTS

Lüderitz and surroundings has a rich history and the town has some of the oldest buildings in Namibia, many declared as National monuments. The proposed abalone ranching activities of the Proponent will not impact on any of the known archaeological and heritage sites in the town itself. However, along the coastline there are scattered artefacts of historical significance and there may be shipwrecks present in areas proposed for abalone resettlement.

Implications and Impacts

The project will not impact on any of the cultural or historically significant areas or buildings in Lüderitz. Scattered artefacts of importance is present along the coastline and shipwrecks, mainly fishing vessels, may be encountered during diving activities.

8 PUBLIC CONSULTATION

Consultation with the public forms an integral component of an environmental assessment investigation and enables interested and affected parties (IAPs) e.g. neighbouring landowners, local authorities, environmental groups, civic associations and communities, to comment on the potential environmental impacts associated with projects and to identify additional issues which they feel should be addressed in the environmental assessment.

Public participation notices were advertised twice for two weeks in the national papers: Republikein and Namibian Sun on 05 and 12 February 2020. A site notice was placed at the Proponents onshore facility. Based on previous work performed in Lüderitz for the mariculture industry, and various other projects, an extensive database of IAPs has been developed for projects in the town. Interested and affected parties were identified from this database and notified of the project. Among others, the Lüderitz Town Council, Ministry of Fisheries and Marine Resources, Namport, members of the mariculture industry, the Lüderitzbucht Foundation and various other stakeholders and potential IAPs were notified. See Appendix A for proof of the public participation processes. The only concerns received were related to poaching, congestion in the mariculture areas with resulting deterioration of seawater quality, disturbance of birds on islands. These are addressed in section 10 and in the appendices.

9 MAJOR IDENTIFIED IMPACTS

During the scoping exercise potential environmental impacts were identified. The following section provides a brief description of the most important of these impacts.

9.1 SOCIO-ECONOMIC IMPACTS

Benguella Wealth Farming will provide direct employment to about 30 employees. Should the hatchery realise, and more entrepreneurs join the mariculture industry because of the services that will be supplied by the Proponent, it is foreseen that a significant workforce will be sustained in future. The Proponent will thus contribute to employment as well as much needed economic sustainability and development in Lüderitz. Some training and skills development will take place. True value addition and contribution to the Namibian economy will be achieved by processing and packaging abalone in Lüderitz and then transporting the products to international markets.

The draft Master Plan for Marine Aquaculture in Namibia (2012) of the Ministry of Fisheries and Marine Resources (www.mfmr.gov.na) promotes abalone mariculture and specifically also ranching. It states: "***The project [abalone ranching] has relatively low fixed capital requirements and extremely high margins and profitability once in full production. The project should therefore over time provide very high levels of returns that compensate for the initial high risk.***" The risk referred to is the relatively high mortality experienced when resettling abalone spat.

9.2 HEALTH, SAFETY AND SECURITY IMPACTS

Similar to bivalves, abalone can also contain bacteria or can cause paralytic shellfish poisoning (PSP) and diarrhetic shellfish poisoning (DSP). Both types of poisoning result when shellfish consume certain toxic microalgae. Health effects are thus also possible to the consumers of

abalone. Regular testing and monitoring according to the Namibia Standards Institution will minimize the risks associated with PSP and DSP and various other contaminants (Appendix B).

Poaching of specifically abalone is possible and is a huge threat to naturally occurring abalone populations in South Africa. Should large scale abalone ranching be conducted in Namibian waters, the likelihood of poaching will increase. However, access to the project location is made very difficult due to the presence of the restricted diamond mining areas on the land side of the proposed ranching areas. The areas will thus only be accessible by boat, which will have to travel relatively far, through often rough seas, from the nearest possible launch areas. Even then, diving conditions are difficult and the exact areas where abalone is resettled in the much larger operational area, will not be known by potential poachers.

The greatest risk to workers will be the exposure to elements during visits to the abalone ranching areas and diving. Rough seas can be dangerous to vessels and cause them to capsize. Exposure to cold water of the seas can very quickly result in hypothermia.

9.3 WASTE PRODUCTION AND POLLUTION

Very little waste will be produced by the activities of the Proponent. Waste will mainly relate to packaging material and abalone shells. Abalone shells can however be used beneficially as for example ornaments and jewellery. Pollution of the marine environment as a direct result of abalone ranching is not possible. Small watercraft accessing the ranching sites may in unlikely events be the cause of pollutants when there are fuel or oil spills or leaks.

9.4 IMPACTS ON MARINE AND COASTAL BIOTA

9.4.1 Diseases and Parasites

Mariculture activities may lead to the introduction of non-target species into the environment. The occurrence of disease causing agents and parasites and pathogens in the juvenile abalone, and the spread thereof to the natural environment, may have negative impacts on the operations as well as the environment. The spread of diseases, parasites and pathogens are mostly related to the transfer thereof between the same species, although species such as sea urchins and bivalves (oysters, mussels) may also be affected (Bower, 1996; Bower, 2004; Bower et al. 1994). Diseases posing high economical risks to the operations, as well as potential environmental and health risks, include withering foot syndrome, *Vibrio* spp. infections, the oomycete *Halioticida noduliformans*, and sabellid polychaete infestations (Bower, 2017; Mouton, 2008). As abalone do not occur naturally in the Namibian coastal waters, abalone that are not carefully vetted and introduced into the environment may host these species, and introduce them to the new environment. Strict phytosanitary protocols are implemented by the Namibian government with respect to the import of any living organisms. All imported abalone will thus have to be accompanied by the necessary phytosanitary documents (health certificates) that certifies them as being disease and parasite free. Once a hatchery is constructed, spat will be produced locally, without the risk of bringing new diseases from elsewhere.

9.4.2 Ecosystem and Biodiversity Impacts

Ranching of abalone may have potential impacts on the marine and coastal ecosystem. These risks are mainly related to habitat degradation as abalone introduced into the environment may compete with indigenous benthic species for space and food. However, *H. midae* is not considered an invasive species and with proper management of stocking densities according to the environments' carrying capacity, and regular monitoring, this is not expected to pose any real risk. Furthermore, it has been shown that adult abalone mostly feed on drift kelp with 95-98% of their diet consisting thereof (Zeeman et al., 2012). Subadults prefer feeding on drift kelp, but when it is not available, they do graze on microalgae. The study by Zeeman et al. (2012) concluded ***"Collectively, this evidence indicates that any ecosystem effects that subadults and adults of H. midae have as grazers will be weak because they feed mainly by***

***trapping drift material, and the frequency of grazing and the incidence of consumption of attached algae are low.*"**

Experience has shown that *H. midae* is not able to reproduce along the west coast of southern Africa, outside of its natural habitat north of Cape Columbine (Massie et al., 2018; Hutchings et al., 2019). Should monitoring show that ranching is having a significant negative effect on the ecosystem, introduction of juveniles will be halted, and the system should in all likelihood, eventually return to baseline conditions after the life span of the last batch of introduced juvenile abalones has elapsed.

10 ASSESSMENT AND MANAGEMENT OF IMPACTS

The purpose of this section is to assess and identify the most pertinent environmental impacts that are expected from the project An EMP based on these identified impacts are also incorporated into this section. For each impact an environmental classification was determined based on an adapted version of the Rapid Impact Assessment Method (Pastakia, 1998). Impacts are assessed according to the following categories: Importance of condition (A1); Magnitude of Change (A2); Permanence (B1); Reversibility (B2); and Cumulative Nature (B3) (see Table 10-1).

Ranking formulas are then calculated as follow:
Environmental Classification = A1 x A2 x (B1 + B2 + B3)
The environmental classification of impacts is provided in Table 10-2.

The probability ranking refers to the probability that a specific impact will happen following a risk event. These can be improbable (low likelihood); probable (distinct possibility); highly probable (most likely); and definite (impact will occur regardless of prevention measures).

Table 10-1. Assessment criteria

Criteria	Score
Importance of condition (A1) – assessed against the spatial boundaries of human interest it will affect	
Importance to national/international interest	4
Important to regional/national interest	3
Important to areas immediately outside the local condition	2
Important only to the local condition	1
No importance	0
Magnitude of change/effect (A2) – measure of scale in terms of benefit / disbenefit of an impact or condition	
Major positive benefit	3
Significant improvement in status quo	2
Improvement in status quo	1
No change in status quo	0
Negative change in status quo	-1
Significant negative disbenefit or change	-2
Major disbenefit or change	-3
Permanence (B1) – defines whether the condition is permanent or temporary	
No change/Not applicable	1
Temporary	2
Permanent	3
Reversibility (B2) – defines whether the condition can be changed and is a measure of the control over the condition	
No change/Not applicable	1
Reversible	2

Irreversible	3
Cumulative (B3) – reflects whether the effect will be a single direct impact or will include cumulative impacts over time, or synergistic effect with other conditions. It is a means of judging the sustainability of the condition – not to be confused with the permanence criterion.	
Light or No Cumulative Character/Not applicable	1
Moderate Cumulative Character	2
Strong Cumulative Character	3

Table 10-2. Environmental classification (Pastakia 1998)

Environmental Classification	Class Value	Description of Class
72 to 108	5	Extremely positive impact
36 to 71	4	Significantly positive impact
19 to 35	3	Moderately positive impact
10 to 18	2	Less positive impact
1 to 9	1	Reduced positive impact
0	-0	No alteration
-1 to -9	-1	Reduced negative impact
-10 to -18	-2	Less negative impact
-19 to -35	-3	Moderately negative impact
-36 to -71	-4	Significantly negative impact
-72 to -108	-5	Extremely Negative Impact

10.1 RISK ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PLAN

The EMP provides management options to ensure impacts of the proposed project are minimised. An EMP is a tool used to take pro-active action by addressing potential problems before they occur. This should limit the corrective measures needed, although additional mitigation measures might be included if necessary. The environmental management measures are provided in the tables and descriptions below. These management measures should be adhered to during the various phases of the operation of the development. This section of the report can act as a stand-alone document. All personnel taking part in project should be made aware of the contents in this section, so as to plan the operations accordingly and in an environmentally sound manner.

The objectives of the EMP are:

- to include all activities of operations;
- to prescribe the best practicable control methods to lessen the environmental impacts associated with the project;
- to monitor and audit the performance of operational personnel in applying such controls; and
- to ensure that appropriate environmental training is provided to operational personnel.

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

As depicted in the tables below, impacts are expected to mostly be of medium to low significance and can mostly be mitigated to have a low significance.

10.1.1 Planning

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

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

10.1.2 Revenue Generation and Employment

An increase in semi-skilled, skilled and professional labour will result from the addition of the mariculture activities to the local industry. Increased economic resilience will realise for employees residing in Lüderitz.

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

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Daily Operations	Employment and contribution to local economy	3	2	2	2	2	36	4	Definite
Indirect Impacts	Decrease in unemployment, contribution to national trade balance	3	2	2	2	2	36	4	Definite

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

Actions

Mitigation:

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

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- Bi-annual report based on employee records.

10.1.3 Skills, Technology and Development

Training will be provided to employees in order to perform various functions for successful implementation and execution of the project. Skills will be transferred to an unskilled workforce for general tasks. The Proponent further intends to provide opportunities to entrepreneurs who wants to enter the mariculture industry. This will be achieved by providing them with training and skills development and assisting them with resettlement and harvesting of abalone in allocated areas within the proposed abalone ranching area. New technologies are often investigated and introduced into the industry, thus aiding in operational efficiency. Development of people and technology are key to economic development.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Daily Operations	Technological development and transfer of skills	2	2	2	3	2	28	3	Definite

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

Actions

Mitigation:

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

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

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

10.1.4 Demographic Profile and Community Health

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

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Daily Operations	Social ills related to unemployment	2	-1	1	2	2	-10	-2	Improbable

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

Actions:

Prevention:

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

Mitigation:

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

Responsible Body:

- Proponent

Data Sources and Monitoring:

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

10.1.5 Traffic

Limited traffic impacts are expected. Transport requirements are largely limited to the collection of processed abalone and the transport thereof to Windhoek.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Daily Operations	Increase traffic, road wear and tear and accidents	2	-1	2	2	1	-10	-2	Improbable

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

Actions

Prevention:

- All drivers must be properly trained with valid driver's licences.
- Erect clear signage regarding access and exit points at the processed product collection points.
- Proper route determination to avoid problem areas if required.
- Training and information sharing with drivers of vehicles to ensure vigilance at hot spots. This include the town centre, schools and areas with occasional animal crossings (e.g. brown hyena).

Mitigation:

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

Responsible Body:

- Contractors
- Proponent

Data Sources and Monitoring:

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

10.1.6 Health, Safety and Security

Activities associated with abalone ranching relies on human labour and therefore exposes them to potential health and safety risks. The major risks involved with the proposed activities are drowning, hypothermia, decompression sickness, physical injury such as accidental cuts, vehicle accidents, etc. Security risks are related to unauthorized entry, theft of abalone and theft) and sabotage. The quality of abalone is important as cases of increased levels of heavy metals may occur and PSP and DSP can be serious issues in shellfish.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Daily Operations	Physical injuries and criminal activities	1	-2	3	3	2	-16	-2	Probable

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

Actions

Prevention:

At minimum the proponent must:

- Provide adequate training to employees or ensure competent employees and contractors are appointed. This include certified divers and licenced vehicle drivers.
- Where applicable, clearly label dangerous and restricted areas as well as dangerous equipment and products.
- Provide all employees with required and adequate personal protective equipment (PPE).
- All health and safety standards specified in the Labour Act should be complied with.
- Sampling as per the existing standard for mariculture industry in Namibia, as performed by the Namibia Standards Institution (see Appendix B).
- Develop a security protocol for transport of abalone which can include monitoring of vehicle movements (GPS tracking), emergency procedures, etc.
- Regularly patrol areas where abalone is resettled for poachers.

Mitigation:

- Selected personnel should be trained in first aid and a first aid kit must be available. The contact details of all emergency services must be readily available.
- Security procedures measures must be in place to protect workers.
- Report any suspicious activity that takes place offshore to the relevant authorities.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- Sampling as per the existing standard for mariculture industry in Namibia as performed by the Namibia Standards Institution.
- Monitoring and analysis reports on file.
- Any incidents must be recorded with action taken to prevent future occurrences.
- A bi-annual report should be compiled of all incidents reported and all monitoring/analysis results. The report should contain dates when training were conducted and when safety equipment and structures were inspected and maintained.

10.1.7 Noise

Noise generated will be minimal and isolated to for example vehicle noise, construction activities of the onshore facility and the seawater pump.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Daily Operations	Noise generated from the operational activities – nuisance	1	-1	2	2	1	-5	-1	Improbable

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

Actions

Prevention:

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

Mitigation:

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

Responsible Body:

- Proponent

Data Sources and Monitoring:

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

10.1.8 Waste Production

Minimal waste is expected from the project. Waste that will be generated will mainly include domestic waste, sewage, shells and dead abalone, and limited biofouling when cleaning abalone shells. Unconfined wastes / litter such as empty bags may be blown away by strong winds and end up in the surrounding environment.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Daily Operations	Excessive waste production, littering, contaminated materials	2	-1	2	2	2	-12	-2	Probable

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

Actions

Prevention:

- Waste reduction measures should be implemented and all waste that can be re-used / recycled must be kept separate.
- Beneficial use of shells is promoted e.g. as source of calcium carbonate, additive to feed, ornamental use, jewellery, etc.
- Ensure adequate waste storage facilities are available where applicable.
- Ensure waste cannot be blown away by strong wind.
- Prevent scavenging (human and non-human) at waste storage.

Mitigation:

- Waste should be disposed of regularly and at appropriately classified disposal facilities, this includes hazardous materials (empty chemical containers, contaminated rugs, paper water and soil), if any.
- A contingency plan must be developed to handle any hazardous biological waste, for example disease-bearing organisms. This should include proper disposal methods to prevent spread of contamination or scavenging by animals or humans.
- Liaise with the municipality regarding waste and handling of hazardous waste (if any).

Responsible Body:

- Proponent

Data Sources and Monitoring:

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

10.1.9 Terrestrial Ecosystem and Biodiversity Impact

Terrestrial impacts may occur on the rocky shores and beaches where seaweed will be collected. Since only limited amounts of seaweed will be collected for juvenile abalone this impact is not expected to be significant. Impacts may include trampling of sensitive areas or bird breeding areas if workers are not properly trained/educated. Birds nesting or roosting on islands and the rocky shore may be disturbed by human activity.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Daily Operations	Impact on terrestrial fauna and flora.	2	-1	2	2	2	-12	-2	Improbable

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

Actions.

Prevention:

- No person may land on, or access any island, islet or rock within the Namibian Islands' Marine Protected Areas. Where access to the islands are required, a permit must be obtained from the Ministry of Fisheries and Marine Resources and special care must be taken in these areas to ensure no nesting sites are damaged.
- If and when access to the Tsau //Khaeb National Park is required for access to the beaches, permission from the MEFT is required.
- Educate all workers on the value of biodiversity and promote vigilance while accessing rocky shores and beaches to avoid trampling any sensitive areas or bird nests.

Mitigation:

- Workers to report any extraordinary ecological sightings (e.g. dead washed out fish or marine mammals, birds or other animals entangled in waste, oil covered birds, etc.) to the MEFT and/or Ministry of Fisheries and Marine Resources.
- Beach driving should be prevented where possible, and where required, should remain on existing tracks, if /where possible to reduce the ecological impact. Vehicle tyres should be sufficiently deflated when beach driving is required to minimise pressure impacts on the sand and invertebrates living in it.
- Mitigation measures related to waste handling should limit ecosystem and biodiversity impacts.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- All monitoring information and extraordinary animal sightings to be included in a bi-annual report.

10.1.10 Impacts on Marine Ecology

Impacts in the marine environment include introduction of diseases and disturbance of the benthic environment where abalone are resettled.

Abalone mainly feed on drift kelp and significant competition with other species for food is not expected. Density of abalone resettlement will be carefully determined according to available food resources and this will prevent benthic impacts. Although outside of its natural range, abalone has been ranched at Lüderitz for many years.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Daily Operations	Impact on marine ecology	2	-2	2	3	2	-28	-3	Improbable

Desired Outcome: To minimise destruction, degradation and disturbance of the marine ecological environment and prevent the introduction of diseases.

Actions.

Prevention:

- Implement a biosecurity and disease management plan (Appendix A). This plan should continuously be improved and updated.
- All abalone are vetted prior to importation according to the requirements of Namibia and are certified disease and pathogen free.
- Benthic communities should be monitored to ensure no major changes in the local ecosystem and biodiversity takes place, including proliferation of abalone. Prior to resettlement, three areas within ranching Areas 1 to 3 must be identified, marked and photos taken as record of the pre-ranching condition of the benthic ecosystem. After release of abalone into those areas, photos must be taken of the same areas every six months for comparison purposes.
- Resettle abalone according to the availability of resources and restrict it to an upper limit of $5/m^2$.
- Employees must be restricted from illegal harvesting of any marine resources.

Mitigation:

- Report any extraordinary sightings or occurrences to the MEFT and Ministry of Fisheries and Marine Resources.
- Ensure regular sampling of abalone according to the requirements of the Namibia Standards Institution (Appendix B).
- If changes in the benthic ecosystem that can be ascribed to the presence of abalone are detected, the ranching protocol must be adjusted. This may include reducing the number of individuals or excluding some areas altogether.

Responsible Body:

- Proponent
- Contractors

Data Sources and Monitoring:

- Biosecurity and disease management guidelines
- Sampling as per the existing standard for mariculture industry in Namibia as performed by the Namibia Standards Institution.
- Regular environmental monitoring (diving) with photo record to monitor benthic rocky shore ecosystems for changes.

- Monitoring and analysis reports on file. All information and reporting to be included in a bi-annual summary report.

10.1.11 Surface Water Contamination

Spillages or illegal dumping of waste that may lead to surface water (ocean) contamination. Seawater abstraction and return from the onshore facility require an abstraction and effluent disposal permit from the Department of Water Affairs.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Daily Operations	Seawater pollution	2	-1	2	2	2	-12	-2	Probable

Desired Outcome: To prevent the contamination of seawater.

Actions

Prevention:

- All forms of waste must be prevented from entering the ocean and environment and must be discarded at appropriately classified disposal facilities, this includes the correct disposal of hazardous waste.
- Regularly service any motorised craft to prevent any oil or fuel from entering the water.
- Seawater return streams must comply with effluent disposal permit conditions.

Responsible Body:

- Proponent

Data Sources and Monitoring:

- Ministry of Agriculture, Water and Land Reform water abstraction and effluent permit conditions.
- A report should be compiled bi-annually of all pollution incidents and corrective action taken, inclusive of water quality monitoring if so required by the various permitting conditions.

10.1.12 Visual Impact

The onshore infrastructure are earmarked for a dedicated mariculture area. If not properly maintained it may become aesthetically unpleasing. The mariculture facilities presents the opportunity for tourist activities in the area.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Daily Operations	Aesthetic appearance	2	-1	2	2	1	-10	-2	Probable

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

Actions

Prevention:

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

Mitigation:

- Any damage to structures or decommissioned elements should be removed from site.

Responsible Body:

- Proponent

Data Sources and Monitoring:

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

10.1.13 Cumulative Impact

Possible cumulative impacts associated with the operational phase include slightly increased traffic in the onshore area. The cumulative visual impact is related to the onshore infrastructure. Employment is a positive cumulative impact. Combined collection of seaweed by different parties may have a cumulative impact on biodiversity. Cumulative impacts on seawater quality arise from mariculture activities, fish processing and port operations.

Project Activity / Resource	Nature (Status)	(A1) Importance	(A2) Magnitude	(B1) Permanence	(B2) Reversibility	(B3) Cumulative	Environmental Classification	Class Value	Probability
Daily Operations	The build-up of minor impacts to become more significant	2	-2	2	2	2	-24	-3	Improbable

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

Actions

Mitigation:

- Addressing each of the individual impacts as discussed and recommended in the EMP would reduce the cumulative impact.
- Reviewing biannual reports for any new or re-occurring impacts or problems would aid in identifying cumulative impacts and help in planning if the existing mitigations are insufficient.

Responsible Body:

- Proponent

Data Sources and Monitoring:

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

10.2 DECOMMISSIONING AND REHABILITATION

Decommissioning is not foreseen during the validity of the environmental clearance certificate. Decommissioning was however assessed. Should decommissioning occur at any stage, all onshore infrastructure must be removed. During the last abalone collection outings no new abalone will be resettled. It is unlikely that all abalone will be collected, but due to abalone's inability to proliferate in the area, they will eventually be predated or die-off. The EMP for the project will have to be reviewed at the time of decommissioning to cater for changes made to the site and implement guidelines and mitigation measures.

10.3 ENVIRONMENTAL MANAGEMENT SYSTEM

The proponent may subscribe to an environmental management system that ensure ongoing incorporation of environmental constraints. At the heart of an EMS is the concept of continual improvement of environmental performance with resulting increases in operational efficiency, financial savings and reduction in environmental, health and safety risks. An effective EMS would need to include the following elements:

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

11 CONCLUSION

The proposed abalone ranching has the potential to have a significant positive impact on Lüderitz and Namibia as a whole by creating much needed employment opportunities and revenue generation, see Table 11-1. In addition to employment and revenue generation, the ranching will contribute locally to the transfer of skills and training which in turn develops the local workforce.

Negative impacts can successfully be mitigated. The implementation of a biosecurity protocol and disease management plan should mitigate the potential risk of pathogens and parasites. This mainly involves vetting of abalone as disease free as part of the import permitting process. Abalone should be sampled and analysed regularly to ensure the quality is maintained. Any waste produced must be disposed of at an appropriate facility or re-used or recycled where possible. Hazardous waste, if any, must be disposed of at an approved hazardous waste disposal site. A detailed contingency plan is required to make provision for the safe disposal of abalone that requires discarding, especially during the events of a disease outbreak.

No significant impact is expected on local communities if overstocking of the benthic environment with abalone is prevented. Stocking density must not exceed $5/m^2$. Abalone being drift kelp feeders reduces competition with other species for food. Due to the specific requirements of abalone to reproduce, they are not expected to become invasive. This is also evident after more than two decades of abalone ranching in the Lüderitz area. Careful monitoring of the marine environment is however still recommended and corrective action should be taken if ecosystem changes are detected.

The EMP should be used as an on-site reference document for all the operational activities. Parties responsible for transgression of the EMP should be held responsible for any rehabilitation that may need to be undertaken. Benguella Wealth Farming should use and in-house health, safety and environment plan and related policies and standards in conjunction with the EMP. It is imperative that all construction and operational personnel are taught the contents of these documents to ensure better environmental practises all round.

Should the Directorate of Environmental Affairs (DEA) find that the impacts and related mitigation measures, which have been proposed in this report, are acceptable, an environmental clearance certificate may be granted to the Proponent. The environmental clearance certificate issued, based on this document, will render it a legally binding document which should be adhered to. Focus should be placed on Section 10, which includes an EMP for this project. It should be noted that the assessment process's aim is not to stop the activity, or any of its components, but to rather determine its impact and guide sustainable and responsible development as per the spirit of the EMA.

Table 11-1. Impact summary class values – Prior to Mitigation/Prevention

Impact Category	Impact Type	Operations
	Positive Rating Scale: Maximum Value	5
	Negative Rating Scale: Maximum Value	-5
EO	Skills, Technology and Development	3
EO	Revenue Generation and Employment	4
SC	Demographic Profile and Community Health	-2
SC	Traffic	-2
SC	Health, Safety and Security	-2
PC	Noise	-1
PC	Waste Production	-2
BE	Terrestrial Ecosystem and Biodiversity Impact	-2
BE	Impacts on Marine Ecology	-3
PC	Surface Water Contamination	-2
SC	Visual Impact	-2
	Cumulative Impact	-3

BE = Biological/Ecological EO = Economical/Operational PC = Physical/Chemical SC = Sociological/Cultural

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Appendix A: Draft Biosecurity and Disease Management Guidelines

BIOSECURITY AND DISEASE MANAGEMENT GUIDELINES

ANIMALS

Objective: to minimise the risk of Pathogen (disease and parasite) introduction and spread by stock (e.g. spat, juvenile abalone and broodstock) and animal movement. New stock introduced to onshore facilities or ranching areas present the most significant risk for introducing pathogens, especially if the health status of the stock is unknown. Introductions and movements should be managed carefully to minimise the risk of introducing and spreading pathogens.

Onshore	Offshore
♦ All new stock is vetted and certified pathogen free and healthy as part of the import requirements of Namibia. ♦ All animals are inspected when received. ♦ Mortalities or unwanted stock are incinerated No dead or unwanted stock is returned to the environment or accessible to scavengers (e.g. birds). ♦ Animals with health problems (suspected diseases) are investigated with assistance from aquatic animal health professionals. ♦ All temporary holding tanks are regularly cleaned. ♦ Animal stress is kept to a minimum by maintaining good water quality in temporary holding tanks, good hygiene, optimum stocking density and minimum handling of animals. ♦ Quarantine tanks are isolated and the water does not form part of the normal return water to the ocean. If a disease is present, such water must first be sterilized before being returned to the ocean. ♦ Domestic animals (e.g. cats and dogs) do not have access to onshore facilities at any time. ♦ Vermin baiting occurs as necessary (i.e. if live rodents, droppings or nests are observed).	♦ Potential ranching habitats are inspected and classified according to potential stocking density. ♦ Resettlement of abalone is performed according to each habitat's stocking density and then carefully monitored. Stocking densities of habitats are adjusted based on monitoring, if required. ♦ Staff are trained in, and aware of, their role and responsibility in reporting signs of disease, parasites and high mortality. ♦ Sampling and testing is performed according to the Molluscan Shellfish Sampling Schedule ♦ Relevant authorities are informed of any significant, unexplained mortality event or suspected reportable disease immediately and the necessary tests conducted to determine the presence of disease. The authorities and mariculture industry must, if a disease is identified, develop and action plan to monitor the extent of infection and the procedures for elimination of the disease.

PEOPLE

Objective: to minimise the risk of pathogen introduction and spread through the movement of people. The risk of people introducing pathogens is greatest if other farms, or environments potentially containing diseases of concern, have recently been visited. Contaminated skin, clothing and footwear can all potentially spread disease.

Onshore	Offshore
♦ Farm entry requirements are clearly displayed to visitors at the sign-in point. ♦ Access for visitors must be approved by the farm manager. ♦ Visitors must sign-in on arrival (by completing the farm visitor log) and undergo a farm biosecurity induction. ♦ Footbaths (or the ability to change into zone specific boots) and hand sanitation stations are located at the processing facility entrance/exit so as to provide for effective disinfection at all times. ♦ Staff/visitors who visit other aquaculture sites or seafood processors prior to facility entry go through a thorough disinfection process and wear clean overalls and PPE. ♦ Boots worn in onshore facilities are not worn or taken outside the specific area to which they are designated. ♦ Staff attend work in laundered, clean clothes each day. ♦ Only designated staff are permitted to routinely enter quarantine areas. ♦ Visitor access to quarantine zones is restricted. ♦ Routine maintenance work required within quarantine area/s is, where possible, conducted by contractors between batches and prior to final disinfection. ♦ Visitors are at all times accompanied when on site.	♦ Staff goes through a disinfection process prior to going out on sea to dive for abalone resettlement, harvesting or monitoring (unless appropriate disinfection has occurred).

EQUIPMENT, VEHICLES AND VESSELS

Objective: to minimise the risk of pathogen introduction and spread by equipment, vehicle or vessel movement. Depending on the history of use, contaminated equipment, vehicles or vessels can carry and spread pathogens.

Onshore	Offshore
♦ All surfaces, tanks, containers where disease carrying organisms, or those suspected of carrying disease, were kept or handled, are disinfected immediately once the abalone are removed. ♦ Equipment used in the quarantine area are not removed and used elsewhere in the processing facility. ♦ All areas are regularly cleaned and kept free of rubbish and clutter. ♦ Contractor tools are cleaned before entry and free of dust/organic matter.	♦ All equipment that will be used for resettlement, harvesting or monitoring purposes are disinfected prior to being loaded onto the vessel ♦ Any containers which held diseased or potentially diseased animals are returned to shore for adequate cleaning and disinfection. ♦ Seagoing vessels that transported any diseased or potentially diseased animals are disinfected immediately upon removal of such animals. ♦ Seagoing vessels that may potentially be contaminated by disease causing organism may not go near any other mariculture areas before being cleaned and disinfected.

RECORD KEEPING

Objective: to record information necessary to support good biosecurity practices, in accordance with the biosecurity plan.

Good record keeping is necessary for farm biosecurity plan auditing and to provide demonstrable proof that biosecurity protocols are being followed. In the event of a disease outbreak records are used to trace the potential source of disease, identify breakdowns in adherence to biosecurity protocols and aid in the review and improvement of practices and protocols.

The minimum information that should be recorded is outlined below.

12.1.1 Stock Movements

Objective: Detailed stock records, regarding stock movements and inventory, are maintained and readily accessible. Records of stock movements and inventory are essential for forward and backward tracing activities in the event of a disease outbreak.

Suggested minimum details include:

- Source of stock, including original and most recent source (if different).
- Movement of stock within (for movement between different zones e.g. acclimation tanks and ranching areas).
- Movement of stock to other farms or to processors.

Records for each movement should include the following at a minimum:

- Date of movement
- Batch or other identifier
- Number of individuals
- Buyer (for sales) or stock origin, including contact details

12.1.2 Stock Health, Mortality and Water Quality Records

Objective: Detailed stock health, mortality and quality records are maintained and readily accessible. Health and performance records provide evidence that regular stock monitoring is occurring. Records, especially of mortalities, assist monitoring for unusual health problems. For ranching, mortality monitoring may be difficult as animals do move around. The presence of shells is an indication of mortality.

Suggested minimum details include:

- Mortalities (quantities, including the method of disposal and if any samples have been archived)
- Details of any poorly performing abalone
- Results of laboratory testing - associated with clinical disease or undertaken for the purpose of health certification.

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Appendix B: Molluscan Shellfish Sampling Schedule

MOLLUSCAN SHELLFISH SAMPLING SCHEDULE: FY 2021 to 2022 (April 2021 to March 2022)

	Jan	Feb	Mar	April	May	June	July	August	Sept	Oct	Nov	Dec
Sun								1				
Mon								2			1	
Tues		1	1			1		3			2	
Wed		2	2			2		4	1		3	1
Thurs		3	3	1		3	1	5	2		4	2
Fri		4	4	~~2~~		4	2	6	3	1	5	3
Sat	1	5	5	3	1	5	3	7	4	2	6	4
Sun	2	6	6	4	2	6	4	8	5	3	7	5
Mon	3	7	7	~~5~~	~~3~~	7	5	9	6	4	8	6
Tues	4	8	8	6	~~4~~	8	6	10	7	5	9	7
Wed	5	9	9	7	5	9	7	11	8	6	10	8
Thurs	6	10	10	8	6	10	8	12	9	7	11	9
Fri	7	11	11	9	7	11	9	13	10	8	12	~~10~~
Sat	8	12	12	10	8	12	10	14	11	9	13	11
Sun	9	13	13	11	9	13	11	15	~~12~~	10	14	12
Mon	10	14	14	12	10	****14	12	16	13	11	15	13
Tues	11	15	15	13	11	15	13	17	14	12	16	14
Wed	12	16	16	14	12	16	14	18	15	13	17	15
Thurs	13	17	17	15	~~13~~	17	15	19	16	14	18	16
Fri	14	18	18	16	14	18	16	20	17	15	19	17
Sat	15	19	19	17	15	19	17	21	18	16	20	18
Sun	16	20	20	18	16	20	18	22	19	17	21	19
Mon	17	21	~~21~~	19	17	21	19	23	20	18	22	20
Tues	18	22	22	20	18	22	20	24	21	19	23	21
Wed	19	23	23	21	19	23	21	25	22	20	24	22
Thurs	20	24	24	22	20	24	22	~~26~~	23	21	25	23
Fri	21	25	25	23	21	25	23	27	24	22	26	24
Sat	22	26	26	24	22	26	24	28	25	23	27	25
Sun	23	27	27	25	23	27	25	29	26	24	28	26
Mon	24	28	28	26	**24	28	26	30	27	25	29	27
Tues	25		29	27	~~25~~	29	27	31	28	26	30	28
Wed	26		30	28	26	30	28		29	27		29
Thurs	27		31	29	27		29		30	28		30
Fri	28			30	28		30			29		31
Sat	29				29		31			30		
Sun	30				30					31		
Mon	31				31							
	LIP, PST, MICRO		Cd, LIP, PST		LIP, PST		AST, LIP, PST, MICRO		HM, LIP, PST		~~LIP, PST, PAH, PCBs, RAD~~	

ACRONYMS:
HM = Heavy Metals (Arsenic, Cadmium, Lead, Mercury); AST= Amnesic shellfish toxin; RAD = Radionuclides
LIP= Lipophilic toxins (DSP toxins); Cd = Cadmium; PAH = Polycyclic aromatic hydrocarbon; MICRO = (Microorganisms = E. coli, Salmonella, vibrio)
PSP= Paralytic shellfish toxin; PCBs = Polychlorinated biphenyls

Vibrio Testing is for screening purposes only for MFMR to determine prevelence. To be tested montly basis	
ABALONE:	1. PST - To be sampled every two weeks *(see Sampling Schedule 2021/22 Review Report)*
	2. AST and LIP - To be sampled based on phytoplankton alert by MFMR *(see Sampling Schedule 2021/22 Review Report)*
NOTE:	(**) Sampling and request for testing on 24/05/2021 shall include Cadmium Tesing
	(****) Sampling and request for testing on 14/06/2021 shall include Arsenic
NOTE: (X) PAH, PCBs & RAD testing Done for 2021 in FY2020/2021	

Compiled by: Tobias Kuugongelwa

Updated on 30 July 2021

Approved by: Dr Heidi Skrypzeck

30/07/2021

Appendix C: Public Consultation

Notified IAPs

Name	Organisation
Anja Kreiner	Ministry of Fisheries and Marine Resources
Aunie Gebhard	Lüderitz Town Council
Cherilee Fortuin	Namdeb
C Kamupingene	Luderitz Town Council
Christaline Kaangundue	Lüderitz Town Council
Crispin Clay	Chairman Lüderitzbucht Foundation
David C Dennis	Lüderitz Town Council
Dr Hashali Hamukuaya	Benguela Current Commission (BCC)
Elzevir Gelderbloem	Port Engineer, NamPort
Erich Maletzky	Ministry of Fisheries and Marine Resources
F Druker	Coastways Tours Luderitz Pty Ltd.
Ferdie de Villiers	Novaship / Port Users Association
Foibe Nghoongoloka	Ministry of Fisheries and Marine Resources
Frikkie Botes	Ministry of Fisheries and Marine Resources
Gerd Kessler	Lagoon Aquaculture
H. Ludwicht	Office of the President
Heinz Manns	Namib Offroad Excursions
Hon. Rev. Jan A. Scholtz	Karas Regional Council
Howard Head	CEO Ghost Town Tours, Member Luderitz Tourism Forum, Member Ocean Grown (Oysters)
I.N. Tjipura	Lüderitz Town Council
Ingrid Wiesel	Brown Hyena Research Project
J. Wiese	Seaflower
Jason Burgess	Lüderitz Mariculture
Jean Paul Roux	Ministry of Fisheries and Marine Resources
Jessica Kemper	Conservation Biologist and Lüderitz Resident
Johannes Isaaks	Namport
Joyce Katjirua	Namdeb
Kolette Grobler	Ministry of Fisheries and Marine Resources
La Toya Shivute	Ministry of Fisheries and Marine Resources
Luqman Cloete	The Namibian
Manu Namukomba	NovaNam
Marion Schelkle	Lüderitz Safaris & Tours
Max Cooper	Namport
Michael Mackenzie	NovaNam
Michael Viljoen	Hangana Seafood
Ms Thandiwe Gxaba	Benguela Current Commission
Nicolaas De Wee	Lüderitz Town Council
Pinehas N. Auene	Ministry of Works and Transport
Reginald Hercules	Community Member

Rian Jones	Ministry of Fisheries and Marine Resources
Rodney Braby	Marine Spatial Management and Governance Project - MARISMA
Rudi Cloete	Ministry of Fisheries and Marine Resources
Seafo (South East Atlantic Fisheries Organisation)	
Simon Elwen	Namibia Dolphin Project
Stefanus Gariseb	Namport
Suzan Ndjaleka	COSDEC
Tim Eiman	NamPort
Ulf Grünewald	General Manager, Lüderitz Nest Hotel
Wayne Handley	Ministry of Environment and Tourism
Wetupa Nakathingo	Lüderitz Town Council

Ministry of Fisheries and Marine Resources Notification

GEO Pollution Technologies

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To: **The Executive Director**
Ministry of Fisheries and Marine Resources
P/Bag 13355
Windhoek

31 January 2020

Re: **Environmental Scoping Assessment and Environmental Management Plan for Mariculture Activities at Lüderitz**

Dear Sir

Geo Pollution Technologies (Pty) Ltd was appointed to undertake an environmental assessment for **proposed** mariculture activities at Lüderitz. The assessment will be conducted according to the Environmental Management Act of 2007 and its regulations as published in 2012.

Project: Environmental Scoping Assessment and Environmental Management Plan for Mariculture and Kelp Collection, Luderitz

Proponents: Benguella Wealth Farming CC

Environmental Assessment Practitioner: Geo Pollution Technologies (Pty) Ltd

The Proponent intends to ranch abalone and to culture black mussels on long lines installed in the ocean. It is further proposed that kelp which washes ashore be collected by the proponent. All processing of abalone and mussels will occur in an existing third-party factory, under agreement with one of the fish processing companies. Kelp will be dried and milled in an existing processing plant in the industrial area, before being shipped to clients.

All Interested and Affected Parties (I&APs) are invited to register with the environmental consultant to receive further documentation and communication regarding the project. By registering, I&APs will be provided with an opportunity to provide input that will be considered in the drafting of the environmental assessment report and management plan.

Please register as an I&AP and provide comments by **18 February 2020**. To register, please contact: **Fax:** 088-62-6368, **E-Mail:** mariculture@thenamib.com or contact Geo Pollution Technologies at telephone 061-257411 for more information.

MINISTRY OF FISHERIES & MARINE RESOURCES
OFFICE OF THE EXECUTIVE DIRECTOR
10 FEB 2020
RECEIVED
By: Thapalo

Thank you in advance.

Sincerely,

André Faul
(Conservation Ecologist)

Newspaper Advertisements

2 sun NEWS WEDNESDAY FEBRUARY 5 2020

Editor's corner

spent on objectively analysing how the ruling party has been weakened to such an extent that it plummeted from 80% in 2014, while Geingob himself shed a massive 30% of his vote tally.

Contact details

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Samherji

part to contain the public wage bill. Geingob's initial cabinet included over 30 people made up of a vice-president, prime min-

"These properties may include cabinet because of the legacy of apartheid.

"The size of the cabinet will be reduced. It was adopted be-

atives met with the affected fisher- mance very high. We expect ministers to perform."

Geingob said ministers were welcome to disagree with one another at cabinet meetings but once a decision had been taken, it becomes a collective cabinet decision.

"You are allowed to disagree in this chamber. I did it myself, I left government," he said. Geingob had resigned in 2002 after he had been demoted to minister of regional and local government and housing by founding president Sam Nujoma. He had been prime minister prior to the demotion.

Geingob criticised some of his ministers, saying that they were not engaging the general public.

"Some don't even listen to call-in programmes. I listen to them, that is why sometimes I even called. Ministers can call in and correct the situation. You don't listen, and you don't

already been paid according to ple ... I will try my best now. That is what I want to hear from you."

Geingob also encouraged his ministers to declare their assets as he and finance minister Calle Schlettwein had done in the past.

"If we declare our assets, we must also improve on the asset declaration. People just say no, no, no I have nothing no, no, no ... that doesn't help. If we can improve on it and declare, these are the things that will help us to correct the image that has been destroyed by Fishrot."

While dubbing 2020 'The Year of Introspection', Geingob argued that contrary to the claims of some analysts that the loss of Swapo's two-thirds majority in parliament by one seat during last year's general election was a big failure, it indeed received a massive mandate of 66% and 63 seats.

PUBLIC PARTICIPATION NOTICE

ENVIRONMENTAL ASSESSMENT: MARICULTURE ACTIVITIES OF BENGUELLA WEALTH FARMING AT LÜDERITZ

Geo Pollution Technologies (Pty) Ltd was appointed to undertake an environmental assessment for proposed mariculture activities at Lüderitz. The proponent, Benguella Wealth Farming CC, intends to ranch abalone and to culture black mussels on long lines installed in the ocean. It is further proposed that kelp, which washes ashore, be collected by the proponent. The background information document which contains the location of the project is available at:

http://www.thenamib.com/projects/projects.html.

The environmental assessment will be according to the Environmental Management Act of 2007 and its regulations as published in 2012.

All interested and affected parties are invited to register with the environmental consultant. By registering you are provided with the opportunity to share any comments, issues or concerns related to the project, for consideration in the environmental assessment. Additional information can be requested from Geo Pollution Technologies.

All comments and concerns should be submitted to Geo Pollution Technologies by **18 February 2020.**

André Faul
Geo Pollution Technologies
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Fax: +264-88626368
E-Mail: mariculture@thenamib.com

Endgame

CONTINUED FROM PAGE 1

"Both parties have provided strong arguments against and for... and of course the issue here at heart is really the type of evidence presented warranting the nullification of the election and of course the type of arguments by those who opposed the application," Kamwanyah said.

Asked what the outcome could mean for the country, Kamwanyah said if the presidential election results were nullified it would mean a "new territory for Namibia".

"And that would come with a lot of implications in terms of cost, in terms of rerunning the election, but also in terms of the reactions of the parties involved. So it would be new territory for us. If the election is not nullified then of course it will be business as usual and we proceed with our politics and proceed with the inauguration of the president and his new government in March," Kamwanyah added.

NAMIBIA WEATHER FORECAST Today's weather: Windhoek 08° 25° | Aranos 05° 24° | Gobabis 06° 27° | Rehoboth 07° 26° | Otjinene 8° 25° | Okongo 09° 28° | Sunrise in Windhoek: 06H54 Sunset in Windhoek: 18H15

4 sun AGRICULTURE WEDNESDAY FEBRUARY 12 2020

Agriculture

REDUCE CROP YIELD

Ravenous armyworms wreak havoc

and the number of pests identified should be recorded, said Abraham.

purchase the pesticides are urged to meet the government halfway."

PUBLIC PARTICIPATION NOTICE

ENVIRONMENTAL ASSESSMENT: MARICULTURE ACTIVITIES OF BENGUELLA WEALTH FARMING AT LÜDERITZ

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Boere met bosbeheer

kettings vir indringerbosprodukte soos bosvoer verken moet word. Opleidingsmateriaal moet ook ontwikkel word en beste praktyke vir die oes van indringerbos moet oorgedra word.

Terselfdertyd sal die twee partye die samewerkingsooreenkoms. Saam met hulle is mnr. Johannes Lauts van GIZ. FOTO VERSKAF

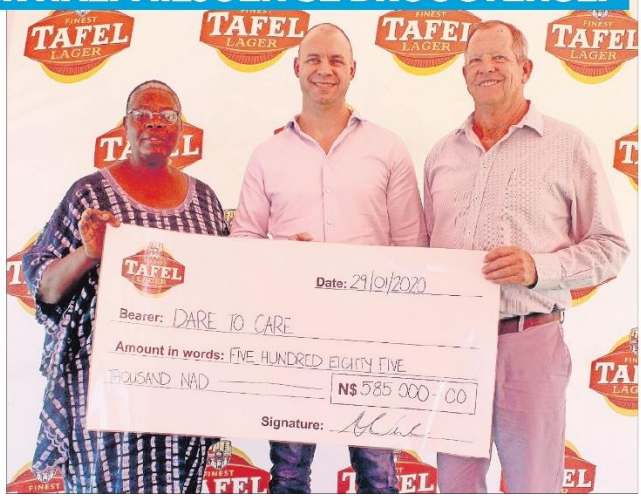
ontwikkeling te bevorder, het hy gesê.

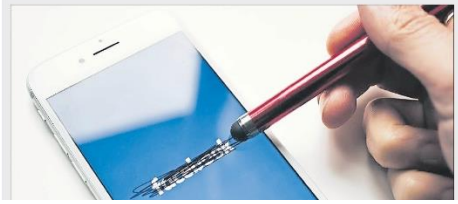
pese rakke wil sien," het hy gesê. Volgens Antila sal die EU

verandering en die jeug betref," het sy gesê. - augetto@republikein.com.na

NBL SKENK HALFMILJOEN SE DROOGTEHULP

Namibia Breweries Limited (NBL), 'n filiaal van die Ohlthaver & List (O&L)-groep, het meer as 'n halfmiljoen aan die Dare to Care-droogte-rampfonds geskenk. Dit volg nadat die maatskappy verlede jaar 'n kliënteveldtog van stapel gestuur het waarin talle pryse gewen is. Tog is nie al die prysgeld gewen nie en het Tafel Lager besluit om die oorblywende N$585 000 ten bate van droogtehulp te skenk. Dare to Care word gesamentlik deur die Namibië Landbou-unie (NLU) en die Namibië Ontluikende Kommersiële Boere-unie (Necfu) bestuur en subsidieer veevoer aan beide kommersiële en kommunale boere. Op die foto oorhandig NBL se besturende direkteur, mnr. Marco Wenk (middel), 'n tjek aan die landbou-unies se presidente, dr. Ndahafa Nghifindaka (links) en mnr. Piet Gouws. FOTO VERSKAF





Facebook is simpel, sê Musk

› Petrus Malherbe

Die Suid-Afrikaans gebore sakeman Elon Musk het opnuut sy misnoeë met Facebook te kenne gegee deur op Twitter die sosiale platform as "simpel" te beskryf.

Dit is ook nie die eerste keer dat Musk teen Facebook uitvaar nie

inligting verkry.

Musk het kort daarna op Twitter gevra: "Wat is Facebook?"

Sy jongste twiet was in reaksie op 'n plasing van die akteur Sacha Baron Cohen waarin hy gevra het dat Facebook beter gereguleer moet word. Musk het daarop gereageer en gesê: "#DeleteFacebook. It's

wêreld dieselfde mag toegelaat word nie.

"Facebook moet deur regerings gereguleer word en nie deur 'n keiser regeer word nie!"

Facebook het nog nie op Baron Cohen of Musk se kritiek gereageer nie. Ondanks sy haat jeens Facebook bedryf Musk steeds sy eie Instagram-blad. Facebook besit Instagram.

Hy het al voorheen gesê Instagram is "waarskynlik oorraait" mits dit

Waarom verkies swendelaars e-pos? Omdat die swendelaar gewoon-

op boodskappe te reageer. Swak spelling en taalgebruik is duidelike tekens

kan sien waar die boet dit waarskynlik gekry het.

- Netwerk24

Site Notice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Environmental Scoping Assessment and
Environmental Management Plan for
Mariculture Activities at Lüderitz

Appendix D: Registered IAPs and Comments Received

Registered IAPs

Name	Organisation	Date Registered
Jessica Kemper	Ministry of Fisheries and Marine Resources	2020-02-07
Julien Cloete	Namdeb Diamond Corporation	2020-03-06
Jürgen Fleidl	Five Roses Aquaculture	2020-02-13
La-Toya Shivute	Ministry of Fisheries and Marine Resources	2020-02-07
Ursula Witbooi	Namdeb Diamond Corporation	2020-03-06

Communication Received

Note: The comments received were for abalone ranching, mussel farming and seaweed collection. Only those remarks related to abalone farming are addressed in this table

Communication	Response
Jessica Kemper (Biologist) – 11 February 2020	
Where is the location where abalone is to be ranched? How susceptible will the location be to poaching attempts? Where is the company planning to put the lines for growing mussels? What is the potential for entanglement of dolphins, whales and turtles in the chosen location? Fresh washed-up kelp is already being harvested daily at some selected beaches around the Luederitz peninsula. It must be ensured that current operations are not being compromised and that additional kelp collection on the peninsula doesn't have a negative influence on the local shorebird community that feeds on invertebrate biota associated with washed-up kelp, i.e. some beaches should be left untouched. The reason I am interested in the location of the abalone ranching is the potential for poaching. You are probably aware that there are sophisticated abalone poaching syndicates in the southern Cape that are going rampant on the wild abalone there, including on abalone growing around Dyer Island. With the result that there are poachers on and around the island at night, and in the process causing major disturbance to seabird colonies. I doubt whether Luederitz will become an abalone poaching hotspot, but given the value of abalone it's not inconceivable that poaching will take place and I therefore don't want to see any abalone ranching around Halifax or the two harbour islands.	Locations are provided in the report. Concerns related to poaching noted and addressed in the report. Monitoring is crucial and corrective action should be taken if any significant impacts occur.
Jürgen Fleidl (Five Roses Aquaculture) – 13 February 2020	
One of my concerns is the location of the above project to prevent any possible congestion and resulting deterioration of water quality.	Locations are indicated in the report and ranching are removed from the majority of mariculture farms located in Lüderitz Harbour towards Second Lagoon.

Ministry of Fisheries and Marine Resources – 02 September 2020

Comment

PROPOSED ABALONE MARICULTURE:

1. The EAS report on page 3 refers to *"Abalone requires very specific environmental conditions to reproduce and as such is not expected to be able to naturally reproduce along the Namibian coast."*
    - Scientific information must be included in this EAS report to support this statement.
    - Is the spat going to be held in tanks initially to allow the animals to acclimatise? Or the spat will directly be seeded to the bed/habitat? Are specially designed release structures going to be used during seeding?

Response

Scientific information, in the form of scientific publications, with regard to *Haliotis midae*'s ability to reproduce in the water of Lüderitz are not available as this type of research has not been conducted. However, based on two decades of abalone ranching at Lüderitz, as well as abalone ranching along the west coast of the Northern Cape of South Africa, it is evident that abalone do not proliferate in these areas and thus requires regular resettlement in order to sustain introduced populations (Massie et al., 2018; Pers. Comm. JA Esterhuizen; J. Erasmus; J. Burgess. Furthermore, the Ministry of Fisheries and Marine Resources promotes the ranching of abalone at Lüderitz in their draft Master Plan for Marine Aquaculture in Namibia (2012).

Spat will be acclimatised in holding tanks and will be released by hand with no specialised structures (See section 4).

Comment

2. The EAS report on page 3 refers to *"From then on spat will be introduced at regular intervals to ensure an eventual, continuous supply of marketable sized abalone".*
    - 'regular intervals' must be defined

Response

Approximately once every three months, but frequency will be influenced by weather and sea conditions (See section 4).

Comment

3. A detailed biosecurity protocol and disease management plan for each species must be included in this EAS report in order to identify a range of management actions which could mitigate any potential adverse impacts to acceptable levels.

Response

Ideally, preparation of a biosecurity and disease management plan should be spearheaded by the Ministry of Fisheries and Marine Resources and be a collective effort by the mariculture industry. However, guidelines specific to the Proponent's project are included in Appendix A. These guidelines will be adapted and improved continuously and will be updated with any conditions stipulated in the various permits and approvals to be obtained/issued.

Comment

4. The Environmental Assessment on page 32 refers to "***Prevent too dense resettlement of abalone which can negatively influence local ecosystems***."
    - Proponent should elaborate on what is too dense resettlement and the possible negative impacts expected?
    - A detailed sampling plan must be included in this EAS report in order to identify the parameters, the frequency and testing method of the tests.

Response

See section 4 for a discussion on density and carrying capacity. See Appendix B for the sampling schedule which is issued by the Ministry of Fisheries and Marine Resources.

Comment

5. A detailed monitoring plan must be included in this EAS report in order to identify a range of management actions which could mitigate any potential adverse impacts to acceptable levels. [What is to be monitored? When? Who? If there is settlement what are the action steps?]

Response

EMP section (Section 10.1) updated to include additional mitigation, preventative and monitoring actions. This is a living document that will be updated once permits and approvals are issued, inclusive of conditions, and as the project progress. Also refer to Appendix A and Appendix B.

Comment

6. The following should be addressed in the risk assessment under 10.1. undertaken to determine the potential impacts of abalone ranching activities on the environment with management actions.

A. ASSESSMENT OF CARRYING CAPACITY:

- It is important that stocking densities are adhered to and ensure they that do not exceed the environmental carrying capacity of the area where the proposed ranching is to take place.
- While the carrying capacity of an area is unlikely to be reached during pilot ranching operations, an estimate of projected carrying capacity is required to determine seeding numbers.
- The estimation of the ecosystem carrying capacity (size of population or biomass that the environment can support) is vital for the introduction of non-native molluscs at each proposed site.
- Carrying capacity as it applies to mariculture can be defined as the maximum population or biomass that an area will support sustainably, as set by available space, food, and other potentially limiting resources but within the limits set by the capacity of the ecosystem to process biological wastes and by social tolerance for the change in environmental attributes. The concept of carrying capacity is increasingly and appropriately invoked as a quantitative guide to identify limits to stocking densities in mariculture operations.

Response

See Section 4 for a discussion on carrying capacity. Since adult abalone mainly feed on drift kelp, the potential impact on the ecosystem is reduced significantly since very little competition with other organisms are expected. The gradual release of abalone along different locations within the earmarked areas, together with regular monitoring by the Proponent, will guide the resettlement density determinations as the project progress. Since abalone resettlement is an expensive process, and they are slow growing (especially if too little food is available), it is not in the best interest of the Proponent to over-stock suitable habitat as this will result in significant financial losses. The Proponent has about two decades' worth of experience in ranching of abalone at Lüderitz and has been very successful in the past. The Proponent is committed to adhering to stocking densities that relates to the figures as cited in literature (see Section 4).

Comment

B. TROPHIC AND ECOLOGICAL IMPACTS:

- The impact of an introduced species on the ecosystem and species biodiversity needs to be assessed. Competition with other grazers and predation (e.g. by rock lobsters, sea urchins) should be considered.

Response

Abalone mainly feed on drift kelp and as such very little impact is expected on the environment. During resettlement abalone is carefully placed in safe areas to minimize predation on newly introduced abalone. Juvenile abalone then seek shelter during the day and feed at night to avoid predators. Adult abalone relies on their strong shell for protection. The loss of some abalone to predators are however unavoidable, but ranching abalone ranching remains a lucrative industry despite such losses. Due to abalone's ability to avoid or be protected from predators, abalone is not expected to become a major food source to other organisms that may lead in trophic disruptions.

Comment

C. DISEASES, PESTS AND PARASITES:

- Biosecurity plans must be specified in this EAS report for evaluation.
- It is crucial that any imported spat be tested for various diseases, before being placed in the coastal waters of Namibia.
- *Halioticida noduliformans* must be included in disease testing, as there is a reasonable chance that the introduced abalone could act as a host threating the existing abalone stocks in Lüderitz and as a possible threat to the lobster industry, and other endemic species of crustaceans in Namibia.

  [See Ref: Macey BM, Christison KW, Mouton A (2011) Halioticida noduliformans isolated from cultured abalone (Haliotis midae) in South Africa. Aquaculture 315: 187–195. Corey Holt, Rachel Foster, Carly L. Daniels, Mark van der Giezen, Stephen W. Feist, Grant D. Stentiford, David Bass (2018) Halioticida noduliformans infection in eggs of lobster (Homarus gammarus) reveals its generalist parasitic strategy in marine invertebrates, Journal of Invertebrate Pathology, Volume 154, Pages 109-116]

Response

Ideally, preparation of a biosecurity and disease management plan should be spearheaded by the Ministry of Fisheries and Marine Resources and be a collective effort by the mariculture industry. However guidelines specific to the Proponent's project are included in Appendix A. These guidelines will be adapted and improved continuously and will be updated with any conditions stipulated in the various permits and approvals to be obtained/issued. The Government of the Republic of Namibia prescribes the conditions to be met for the import of living organisms and the Proponent must adhere to these requirements.

Comment

D. POTENTIAL AREAS FOR ABALONE RANCHING:

- Abalone ranching further away from Lüderitz, where it is difficult to control human activities i.e. Penguin, Seal, Halifax and Ichaboe Islands should be avoided, as these islands are sensitive seabird breeding sites.
- Specific suitable sites still need to be identified with clear geographical boundaries and seabed/ ecological descriptions of the proposed sites.

Response

The areas for abalone ranching have been refined into three areas located to the south of Lüderitz (see Figure 4-3) and the mentioned islands are outside of the earmarked areas. North Long Island and South Long Island falls within the ranching area, but there is no need for the Proponent to go near the islands' shores. Ranching is possible in, at most, a 50 m wide area with the landside boundary being the spring low tide mark. The width of the area may be less as water depth is a limiting factor. Abalone is rarely found in water deeper than 10 m. Only suitable habitat within each area will be targeted for ranching. A practical approach towards the demarcation and description of suitable sites will be to systematically conduct this as the project progress. As discussed, the resettlement of abalone will not occur all at once over the entire area. It is envisioned that the whole area will only be utilised in five to seven years' time. The Proponent can gather information on the specific sites as they are utilised and provide the information as part of monitoring requirements to the Ministry of Fisheries and Marine Resources. This can be accompanied by photographic records of the benthic environment and can be valuable information gathered.

Appendix E: Consultants' Curriculum Vitae

ENVIRONMENTAL SCIENTIST **André Faul**

André entered the environmental assessment profession at the beginning of 2013 and since then has worked on more than 140 Environmental Impact Assessments including assessments of the petroleum industry, harbour expansions, irrigation schemes, township establishment and power generation and transmission. André's post graduate studies focussed on zoological and ecological sciences and he holds a M.Sc. in Conservation Ecology and a Ph.D. in Medical Bioscience. His expertise is in ecotoxicological related studies focussing specifically on endocrine disrupting chemicals. His Ph.D. thesis title was The Assessment of Namibian Water Resources for Endocrine Disruptors. Before joining the environmental assessment profession he worked for 12 years in the Environmental Section of the Department of Biological Sciences at the University of Namibia, first as laboratory technician and then as lecturer in biological and ecological sciences.

CURRICULUM VITAE ANDRÉ FAUL

Name of Firm	:	Geo Pollution Technologies (Pty) Ltd.
Name of Staff	:	ANDRÉ FAUL
Profession	:	Environmental Scientist
Years' Experience	:	19
Nationality	:	Namibian
Position	:	Environmental Scientist
Specialisation	:	Environmental Toxicology
Languages	:	Afrikaans – speaking, reading, writing – excellent
		English – speaking, reading, writing – excellent

EDUCATION AND PROFESSIONAL STATUS:

B.Sc. Zoology:	University of Stellenbosch, 1999
B.Sc. (Hons.) Zoology:	University of Stellenbosch, 2000
M.Sc. (Conservation Ecology):	University of Stellenbosch, 2005
Ph.D. (Medical Bioscience):	University of the Western Cape, 2018

First Aid Class A	EMTSS, 2017
Basic Fire Fighting	EMTSS, 2017

PROFESSIONAL SOCIETY AFFILIATION:

Environmental Assessment Professionals of Namibia Environmental Assessment Practitioner and Committee Member)

AREAS OF EXPERTISE:

Knowledge and expertise in:

- Water Sampling, Extractions and Analysis
- Biomonitoring and Bioassays
- Biodiversity Assessment
- Toxicology
- Restoration Ecology

EMPLOYMENT:

2013-Date	:	Geo Pollution Technologies – Environmental Scientist
2005-2012	:	Lecturer, University of Namibia
2001-2004	:	Laboratory Technician, University of Namibia

PUBLICATIONS:

Publications:	5
Contract Reports:	+140
Research Reports & Manuals:	5
Conference Presentations:	1

ENVIRONMENTAL GEOLOGIST **Wikus Coetzer**

Wikus has 6 years' experience in environmental science related fields with 4 year experience in conducting environmental impact assessments and preparation of environmental management plans. He holds an honours degree in Environmental Sciences – Environmental Geology from the Northwest-University Potchefstroom (NWU) South Africa. He first completed a B.Sc. degree in Geology and Botany in the required time also from the Northwest University Potchefstroom, South Africa. His honours project focused on the rehabilitation and phytoremediation of various tailings types and soils.

He has working experience as an environmental monitor / assisting environmental officer at Petra Diamonds, Cullinan Diamond Mine (CDM) where he gained a proper understanding of environmental monitoring responsibilities as well as legislations, regulations and the implementation of EMS/ISO14001. He started working at Geo Pollution Technologies in 2017, and regularly conducts/assists and report on environmental impact assessments, environmental management plans and pollution surveys.

CURRICULUM VITAE WIKUS COETZER

Name of Firm	:	Geo Pollution Technologies (Pty) Ltd.
Name of Staff	:	WIKUS COETZER
Profession	:	Environmental Geologist
Nationality	:	South African
Position	:	Environmental Geologist
Specialisation	:	Environmental Geology/ Geochemistry
Languages	:	Afrikaans – speaking, reading, writing
		English – speaking, reading, writing

EDUCATION AND PROFESSIONAL STATUS:

B.Sc. Environmental and Biological Sciences – Geology & Botany:	NWU Potchefstroom 2013
B.Sc. (Hons.) Environmental Sciences – Environmental Geology:	NWU Potchefstroom 2014

First Aid Class A	EMTSS, 2017
Basic Fire Fighting	EMTSS, 2017

AREAS OF EXPERTISE:

Knowledge and expertise in:

- Phytoremediation
- Environmental Geology / Geochemistry
- Environmental Monitoring
- Environmental Compliance
- Environmental Impact Assessments

EMPLOYMENT:

2017 - :	Geo Pollution Technologies
2015 - 2016:	Petra Diamonds CDM – Environmental monitor / Assisting environmental officer
2015:	Petra Diamonds CDM – Graduate program: Environmental Officer
2014:	NWU Potchefstroom department of Geo and Spatial Sciences – Research assistant

PUBLICATIONS:

Contract Reports: +40