

**Environmental & Social Impact Assessment (ESIA) for the  
Proposed Aquaculture Project and Associated Activities  
near Henties Bay Town in the Erongo Region, Namibia**

**Environmental & Social Scoping Report (ESSR)**

**Version - Final for Submission to MEFT**

**ECC Application No.: 240405003146**





03 June 2024

**Proponent: Blue Ridge Aquaculture Africa  
(Pty) Ltd**



# DOCUMENT DATA SHEET

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Client	<p>Blue Ridge Aquaculture Africa (Pty) Ltd</p> <p>Enquiries: Ms. Rebecca Immanuel</p> <p>Tel: +264 81 696 2416</p> <p>E-Mail: <a href="mailto:sancom201808@gmail.com">sancom201808@gmail.com</a></p> 		
Lead Consultant	<p>EnviroPlan Consulting CC</p> <p>Enquiries: Mr. T E. Kasinganeti</p> <p>Tel: +264 81 363 4904</p> <p>E-Mail: <a href="mailto:tendai@enviroplanconsult.com">tendai@enviroplanconsult.com</a></p> 		
Date of Release	03 June 2024		
	Name	Signature	Date
Author/s	Tendai E. Kasinganeti		31 May 2024
	Fredrika N. Shagama		31 May 2024
	Adiel T. Mudzanapabwe		31 May 2024

## EXECUTIVE SUMMARY

Blue Ridge Aquaculture Africa (Pty) Ltd hereinafter to as *Blue Ridge* or the *Proponent* proposes to construct and operate an aquaculture project (farm) near Henties Bay Town in the Erongo Region (*the Project*). The project is located near the turn off of C34 road (Swakopmund-Henties Bay-Uis) about 5km north of Henties Bay Town, but falls within the undeveloped extended boundaries of the Town. The site footprint is 25 hectares (25Ha) or 250,000m<sup>2</sup>.

The propose project will entail the farming of Tilapia (*Oreochromis niloticus*) by means of Recirculating Aquaculture Systems (RAS) which is a technological approach to aquaculture where the entire process is brought indoors into a highly controlled environment. RAS technologies have been in use globally for over 40 years. The RAS systems entails the following components (Blue Ridge Aquaculture Africa, 2024):

- Grow-out tank – large culture tanks with a constant flow of clean water where fish are raised
- Solids removal – the excess to feed and fecal material from fish are removed via mechanical filtration. This process is vital for fish welfare and the stability of other water purification processes.
- Biofiltration - Beneficial bacteria convert ammonias into nitrogen in a process called nitrification.
- Oxygenation / Dissolved gas control - First, carbon dioxide is removed then pure oxygen is injected into the returning water. The reoxygenated water is returned to the grow-out tank.
- Wastewater recovery - As a secondary filtration system, wastewater from the drum filter is filtered by biological processes and ultra-filtration membranes. Once filtered, the “permeate” effluent is re-used within the grow-out tanks.

RAS offers reduced impacts to the environment with no water pollution or disease transfer relative to open system aquaculture production methods when best practices are implemented which includes the following:

- Ideal growing conditions,
- Feed optimization,
- Low environmental impact,
- Location flexibility,

- Production monitoring, and
- Low food miles and no seasonality.

The above-mentioned project and associated activities are however listed activities that cannot be undertaken without an EIA Study done and Environmental Clearance Certificate (ECC) issued in accordance with the 2012 EIA Regulations of the Environmental Management Act No. 7 of 2007.

Subsequently, Blue Ridge Aquaculture Africa appointed EnviroPlan Consulting cc to conduct an ESIA to ascertain the environmental and social implications associated with the proposed project. A holistic approach was adopted to assess biophysical, water resources, culture & heritage, socio-economic and ecological impacts of the project and its associated activities. This report documents the assessment of potential environmental and social impacts from the proposed project. The preliminary findings outlined in this Scoping Report indicate that potential impacts will be of slightly high to medium significance. These potential impacts can be further mitigated by the implementation of an effective Environmental & Social Management Plan.

Based on the information provided in this Report, EnviroPlan is confident the identified risks associated with the proposed project can be reduced to acceptable levels by ensuring effective implementation and monitoring of the measures recommended in the EMP (ESMP). Should the recommendations included in this Report and the ESMP be implemented, the significance of the impacts can be reduced to reasonably acceptable standards and durations while maximizing the benefits of the project. All developments could proceed provided that general mitigation measures as set out are implemented as a minimum.

It is therefore recommended that the proposed aquaculture project and its associated activities receive an Environmental Clearance, provided that the recommendations described above and the developed in ESMP are implemented.

## ENVIRONMENTAL IMPACT ASSESSMENT

This Environmental Scoping Report (ESR) follows the Scope of Work delineated by the Blue Ridge Aquaculture Africa (Pty) Ltd: proposed construction and operation of an aquaculture project (farm) and its associated activities near Henties Bay in Erongo Region, Namibia (*the project*).

Existing information and input from commenting authorities, Interested and Affected Parties (I&APs) and public were used to identify and evaluate potential environmental impacts (both social and biophysical) associated with the proposed project activities.

Environmental flaws associated with the proposed project were identified through an Environmental Scoping Assessment. A conscious decision was made based on the recommendations and guidelines by the Directorate of Environmental Affairs (DEA) Environmental Impact Assessment (EIA) guidelines to assess both significant and less significant environmental impacts stemming from the proposed project. An Environmental and Social Management Plan (ESMP) have been developed for the proposed project listed activities to be effectively implemented by the Proponent, to ensure that adverse environmental impacts are mitigated and managed.

The detailed assessment of the anticipated impacts was undertaken with to highlight any sensitivities regarding the proposed project during its construction, and operation.

This ESSR has been compiled in accordance with the regulatory requirements stipulated in the Environmental Assessment Regulations (2012), promulgated in terms of the Namibian environmental legislation Environmental Management Act (No. 7 of 2007).

The ESIA aims to:

- Provide an overall assessment of the biological, physical and social environments of the area affected by the proposed project,
- Undertake a detailed environmental assessment, in terms of environmental criteria and impacts (direct, indirect and cumulative), and recommend suitable measures based on environmental and social sensitivity),

- Identify and recommend appropriate mitigation measures for potentially significant environmental impacts,
- Undertake an inclusive Public Participation Process (PPP), and
- GIS sensitivity mapping was conducted to identify potential impacts, propose mitigation and inform the sensitivity analysis.

A systematic approach was adopted to successfully complete the ESIA in line with the regulated EIA process.

## ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations underpin the approach to this ESIA study:

- The information received from the stakeholders, desktop surveys and baseline assessments are current and valid at the time of the study,
- A precautionary approach was adopted in instances where baseline information was insufficient or unavailable, and
- Mandatory timeframes will apply to the review and adjudication of the reports by the competent authority and other government departments.

**NB:** *The EAP does not accept any responsibility if additional information comes to light at a later stage of the process. All data from unpublished research utilised for the purposes of this project is valid and accurate. The scope of this investigation is limited to assessing the potential biophysical, social and cultural impacts associated with the proposed project.*

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## ACRONYMS

<b>TERMS</b>	<b>DEFINITION</b>
BID	Background Information Document
EAP	Environmental Assessment Practitioners
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EIA (R)	Environmental Impact Assessment (Report)
ESIA	Environmental and Social Impact Assessment
ESR	Environmental Scoping Report
ESMP	Environmental and Social Management Plan
FAO	Food and Agriculture Organization
GHGs	Greenhouse Gasses
GMO	Genetically Modified Organism
IFC	International Finance Corporation
ISO	International Organization for Standardization
I&APs	Interested and Affected Parties
MEFT: DEA	Ministry of Environment, Forestry and Tourism's Directorate of Environmental Affairs
MFMR	Ministry of Fisheries and Marine Resources
MME	Ministry of Mines and Energy
NGOs	Non-governmental Organisations
NHC	National Heritage Council
NEMA	Namibia Environmental Management Act
SEP	Stakeholder Engagement Plan
ToR	Terms of Reference
UNFCCC	United Nations Framework Convention on Climate Change

## DEFINITION OF TERMS

**Aquaculture** – a breeding, raising, and harvesting fish, shellfish, and aquatic plants. Basically, it is farming in water under controlled conditions. Aquaculture is an environmentally responsible source of food and commercial products, helps to create healthier habitats, and is used to rebuild stocks of threatened or endangered species<sup>1</sup>.

**Consultant** – this refers to the team that is conducting the ESIA and the preparation of the ESMP for the development, i.e., EnviroPlan Consulting.

**Environment** – according to the Environmental Management Act (EMA) No. 7 of 2007, the “environment” is defined as “the complex of natural and anthropogenic factors and elements that are mutually interrelated and affect the ecological equilibrium and the quality of life, including -(a) the natural environment that is the land, water and air, all organic and inorganic material and all living organisms; and (b) the human environment that is the landscape and natural, cultural, historical, aesthetic, economic and social heritage and values.”

**Environmental Management Plan** - As defined in the EIA Regulations (Section 8(j)), a plan that describes how activities that may have significant environments effects are to be mitigated, controlled, and monitored.

**Environmental Sensitivity** - A response of the environment, or part of it, to a change in one or more external factors. It can also be defined as a way in which biophysical and social features of the environment significantly react to developments or changes within their surroundings.

**Fauna and Flora** - All the animals and plants (vegetation) found in an area.

**Interested and Affected Party (I&AP)** - In relation to the assessment of a listed activity includes - (a) any person, group of persons or organization interested in or affected by an activity; and (b) any organ of state that may have jurisdiction over any aspect of the activity.

**Mitigate** - practical measures to reduce adverse impacts.

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<sup>1</sup><https://oceanservice.noaa.gov/facts/aquaculture.html#:~:text=Aquaculture%20is%20breeding%2C%20raising%2C%20and,of%20threatened%20or%20endangered%20species.>

**Mitigation** - The purposeful implementation of decisions or activities that are designed to reduce the undesirable impacts of a proposed action on the affected environment.

**Monitoring** - Activity involving repeated observation, according to a pre-determined schedule, of one or more elements of the environment to detect their characteristics (status and trends).

**Proponent** – as defined in the Environmental Management Act, a person who proposes to undertake a listed activity. Blue Ridge Aquaculture Africa is the Proponent for this project.

**Public Consultation/Involvement** - A range of techniques that can be used to inform, consult or interact with stakeholders affected by the proposed activities.

**Recirculatory Aquaculture System (RAS)** - <sup>2</sup>a technology where water is recycled and reused after mechanical and biological filtration and removal of suspended matter and metabolites. This method is used for high- density culture of various species of fish, utilizing minimum land area and water.

**Scoping** - An early and open activity to identify the impacts that are most likely to be significant and require specialized investigation during the EIA work. Can, also be used to identify alternative project designs/sites to be assessed, obtain local knowledge of site and surroundings, and prepare a plan for public involvement. The results of scoping are frequently used to prepare a Terms of Reference for the specialized input into full EIA.

**Terms of Reference (ToR)** - Written requirements governing full EIA input and implementation, consultations to be held, data to be produced and form/contents of the EIA report. Often produced as an output from scoping.

**Significant 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.

**Stakeholders** – this refers to the people, organisations, NGOs that are directly or indirectly affected and interested by the project.

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<sup>2</sup> [https://nfdb.gov.in/PDF/06\\_Ras%20Booklet%20Eng.pdf](https://nfdb.gov.in/PDF/06_Ras%20Booklet%20Eng.pdf)





# 1. INTRODUCTION AND BACKGROUND

## 1.1. Overview

Blue Ridge Aquaculture Africa (Pty) Ltd hereinafter to as *Blue Ridge* or the *Proponent* proposes to construct and operate an aquaculture facility and associated activities near Henties Bay Town in the Erongo Region (*the Project*). The project is located near the turn off of C34 road (Swakopmund-Henties Bay-Uis) about 5km north of Henties Bay Town, but falls within the undeveloped extended boundaries of the Town as shown on the locality in Figure 2. The site footprint is 25 hectares (25Ha) or 250,000m<sup>2</sup>.

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- Oxygenation / Dissolved gas control - First, carbon dioxide is removed then pure oxygen is injected into the returning water. The reoxygenated water is returned to the grow-out tank.
- Wastewater recovery - As a secondary filtration system, wastewater from the drum filter is filtered by biological processes and ultra-filtration membranes. Once filtered, the “permeate” effluent is re-used within the grow-out tanks.

RAS offers reduced impacts to the environment with no water pollution or disease transfer relative to open system aquaculture production methods when best practices are implemented which includes the following:

- Ideal growing conditions,
- Feed optimization,
- Low environmental impact,

- Location flexibility,
- Production monitoring, and
- Low food miles and no seasonality.

The details on the project description per project phase are provided under Chapter 2.

The Proponent through their operations pride themselves in the execution of the United Nations (UN) Sustainable Development Goals (SDGs). These SDG goals include SDG1 (no poverty), SDG2 (zero hunger), SDG6 (clean water and sanitation), SDG8 (Decent work and economic growth), SDG9 (industry, innovation and infrastructure), SDG12 (responsible consumption and production), SDG14 (life below water) and SDG15 (life on land).

The proposed project (development), i.e., aquaculture and its associated activities are listed activities that cannot be undertaken without an Environmental Clearance Certificate (ECC) in accordance with the Namibia's Environmental Assessment Policy, Environmental Management Act (EMA) No. 7 of 2007 and its 2012 Environmental Impact Assessment (EIA) Regulations (GN 30 in GG 4878 of 6 February 2012). In this respect, proposed development and associated activities require a specific Environmental and Social Impact Assessment (ESIA) Study prior to implementation.

The relevant listed activities that trigger the ESIA Study are as follows:

#### **Listed Activity 7. Agriculture and Aquaculture Activities**

- 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.
- 7.2 The declaration of an area as an aquaculture development zone in terms of the Aquaculture Act, 2002.

#### **Anticipated associated listed activities to the main project**

##### **Listed Activity 8: Water Resource Developments**

- 8.1 The abstraction of ground or surface water for industrial or commercial purposes (as a backup water supply to the project which will mainly rely on desalinated water).

##### **Listed Activity 10. Infrastructure**

- 10.1 The construction of-
  - (a) Oil, **water**, gas and petrochemical and other **bulk supply pipelines**.

To fulfil the requirements of the EMA and its 2012 EIA Regulations, Blue Ridge Aquaculture Africa has appointed EnviroPlan Consulting cc to conduct an Environmental and Social Impact Assessment (ESIA) Study and develop an Environmental & Social Management Plan (ESMP) for the proposed project– Appendix A.

The ESIA study will present the description and analysis of the physical and biological shall address relevant environmental, social and climate change issues within the area, including any changes anticipated before project implementation. The description shall also integrate human conditions including population characteristics and trends, natural resource access and ownership and land use patterns biophysical and socio-economic baseline investigations relating to the proposed project.

All identified impacts will be described and addressed in the Environmental and Social Impact Assessment report and mitigated in the ESMP. These will be in compliance with the EMA of 2007, its 2012 EIA Regulations, and alongside the International Finance Corporation (IFC) standards.

The ESIA process succeeds the application for an Environmental Clearance Certificate (ECC) to the Ministry of Environment, Forestry and Tourism (MEFT): Directorate of Environmental Affairs and Forestry (DEAF) on the MEFT's ECC Portal (online system). In this respect, the Report and ESMP documents will form part of the ECC application to the DEAF's office for the proposed aquaculture project and its associated activities.

This ESIA has been integrated into the EIA process in Namibia as shown in Figure 1.

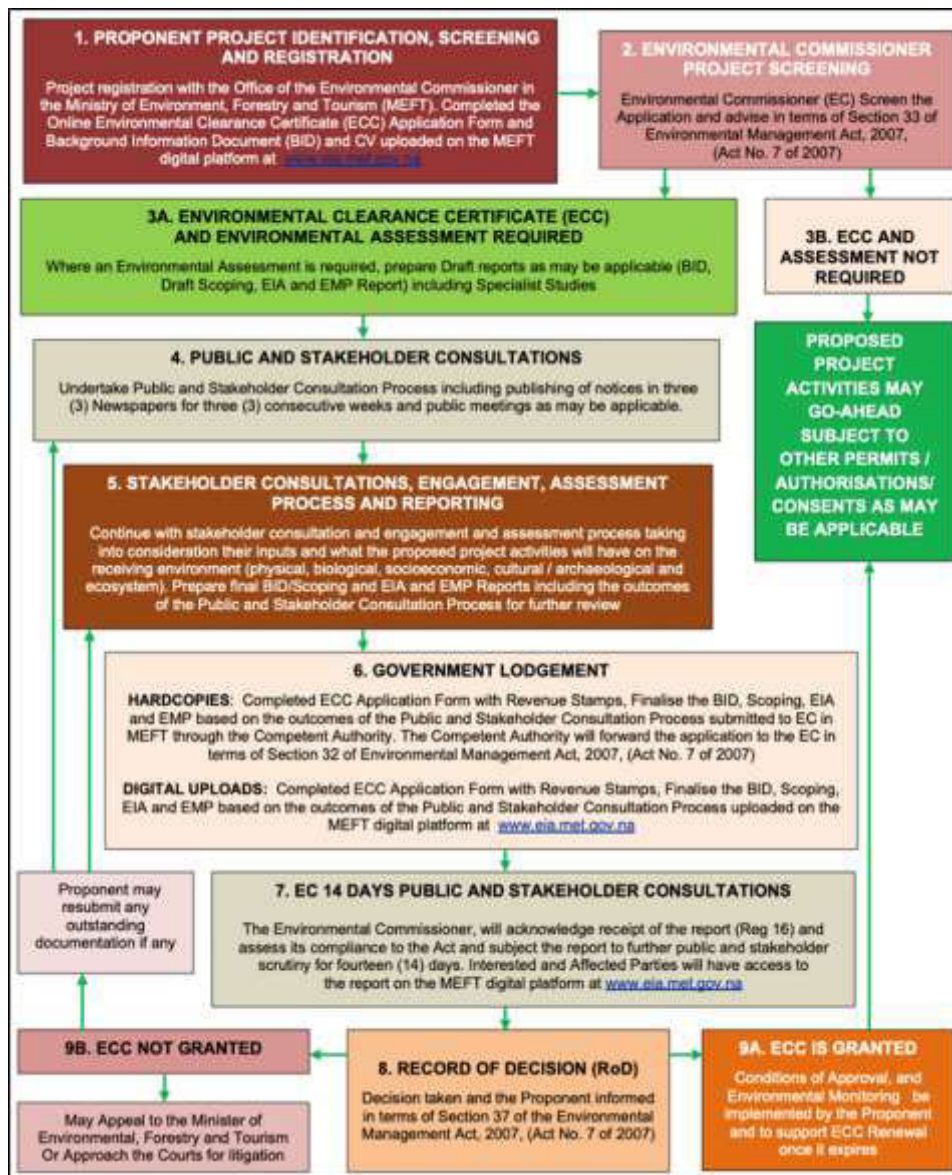


Figure 1: The EIA Process in Namibia to be followed for the project ESIA Study

## 1.2. Project Location

The proposed aquaculture project (farm) will be established and operated within the undeveloped extended boundaries of the Henties Bay Town, about 5km north of Henties Bay Town centre in the Erongo Region. The project is located near the turn off of C34 road (Swakopmund-Henties Bay-Uis) and near the Omaruru River Bridge. The locality map of the proposed project site is shown in Figure 2 below.

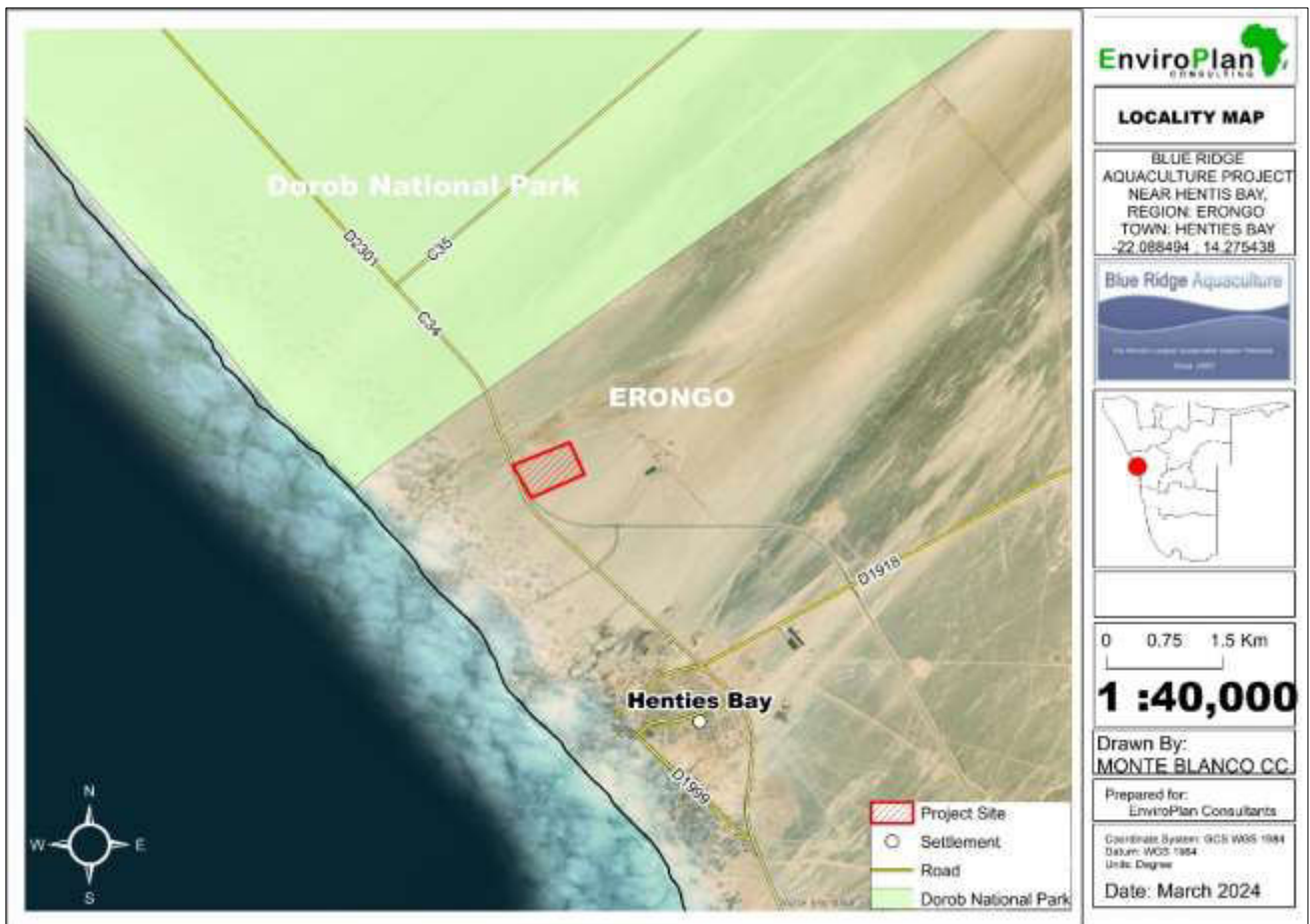


Figure 2: The locality map of the proposed Blue Ridge Aquaculture Africa project in Erongo Region

### 1.3. Aims & Objectives of the ESIA Process

The aims and objectives of the ESIA process are to:

- Comply with Namibia's Environmental Assessment Policy, Environmental Management Act (No. 7 of 2007) with its 2012 EIA Regulations, other national legislations governing the project activities and the International Finance Corporation (IFC) Standards.
- Consult stakeholders, all interested and affected parties (I&APs) such as local communities, directly affected local authorities to ensure that their inputs are considered.
- Record all comments of I&APs and present such comments, as well as responses provided by communities, in the Comments and Responses Report, which will be included in the ESIA report.
- Set up a grievance redressal system.

- Identify and review the institutional, policy and regulatory framework applicable to the project. This will include national, regional and international policies, legislations and IFC requirements relevant to the project. This will cover environmental, social, climate change, health and safety and other aspects to which the project will have to comply with.
- Identify both negative and positive environmental and social impacts (land use requirements and ownership for the planned development) of the proposed development and assess alternatives (location, technological suitability and no-go option).
- Assess the significance of issues and concerns raised
- Develop a clear, concise and practical Environmental and Social Management Plan (ESMP) addressing the following key areas:
  - Waste Management Plan
  - Grievance Redress Mechanism
  - Stakeholder Engagement
  - Pollution Prevention and control
  - Ecosystems and Biodiversity management
- Develop Environmental Control and Monitoring procedures to ensure that the developed ESMP is implemented by the contractors during construction and Blue Ridge Aquaculture Africa during the operational and maintenance phase. The monitoring plan will designate roles and responsibilities, monitoring frequency and indicators for ESMP implementation and compliance enforcement.

#### **1.4. The Environmental Consultant**

Blue Ridge Aquaculture Africa has appointed EnviroPlan Consulting (independent Environmental Consultants) to conduct an independent ESIA for the proposed project to ascertain potential environmental and social impacts (both positive and negative) and establish how to improve or mitigate these impacts. Therefore, the environmental consultant needs to conduct the ESIA study and apply for the ECC on behalf of the Proponent.



Mr. Tendai E. Kasinganeti, Ms. Fredrika Shagama and Mr. Adiel Mudzanapabwe, qualified and experienced Environmental Assessment Practitioners (EAPs) conducted this ESIA process. The CVs of the consultants are attached as Appendix B at the end of this Report.

## 1.5. Need and Desirability of the Project

The project is needed in the country to strengthen the presence of big industries for economic prosperity in Namibia (through the payment of taxes and revenues). The aquaculture project will mainly contribute to the sustainable development pillars of the country; economy (flourishing businesses), environment (environmental preservation through the use of less freshwater, land resources and fewer greenhouse gas emissions required to produce good through aquaculture compared to traditional agriculture). Furthermore, the project will also contribute to the third pillar of sustainable development, which is social (promoting social justice through equal opportunities and employment and fairness).

Namibia will also have a large-scale domestic supply of healthy, sustainable protein (supply of Tilapia). Aquaculture has the potential to significantly address nutritional challenges, especially in developing countries with persistent micronutrient deficiencies, considerable nutritional reliance on aquatic foods (including wild capture and aquaculture), declining marine catches due to overfishing, climate change, and reduced local nutrient supply due to rising exports.

It is for these reasons that the project is needed.

## 1.6. Scope of Work

This scoping study was carried out in accordance with the Environmental Management Act (EMA) (No. 7 of 2007) and its 2012 EIA Regulations (GG No. 4878 GN No. 30).

Upon submitting the application for ECC to the DEAF, the first stage in the EIA process is to submit a Scoping Report. This Report is made up of the following sections as presented in Table 1 below.

**Table 1: Sections of the Scoping Report**

Description	Section of the Report
The need and desirability of the proposed project	Sub-Chapter 1.4
Project description and the need for it	Chapter 2

<b>Description</b>	<b>Section of the Report</b>
Alternatives considered for the proposed project in terms of no- go option, locality, and natural resources	Chapter 3
The relevant laws and guidelines pertaining to the proposed project	Chapter 4
Baseline environment in which the proposed activity will be undertaken	Chapter 5
The public consultation process followed (as described in Regulation 7 of the EMA Act) whereby interested and affected parties (I&APs) and relevant authorities are identified, informed of the proposed activity and provided with a reasonable opportunity to give their concerns and opinions on the project	Chapter 6
The identification of potential impacts, impacts description, assessment, mitigation measures and recommendations	Chapter 7
Recommendations and conclusions to the report	Chapter 8

The description of the planned or proposed project activities are presented under the next chapter.



## 2. PROJECT DESCRIPTION AND ACTIVITIES

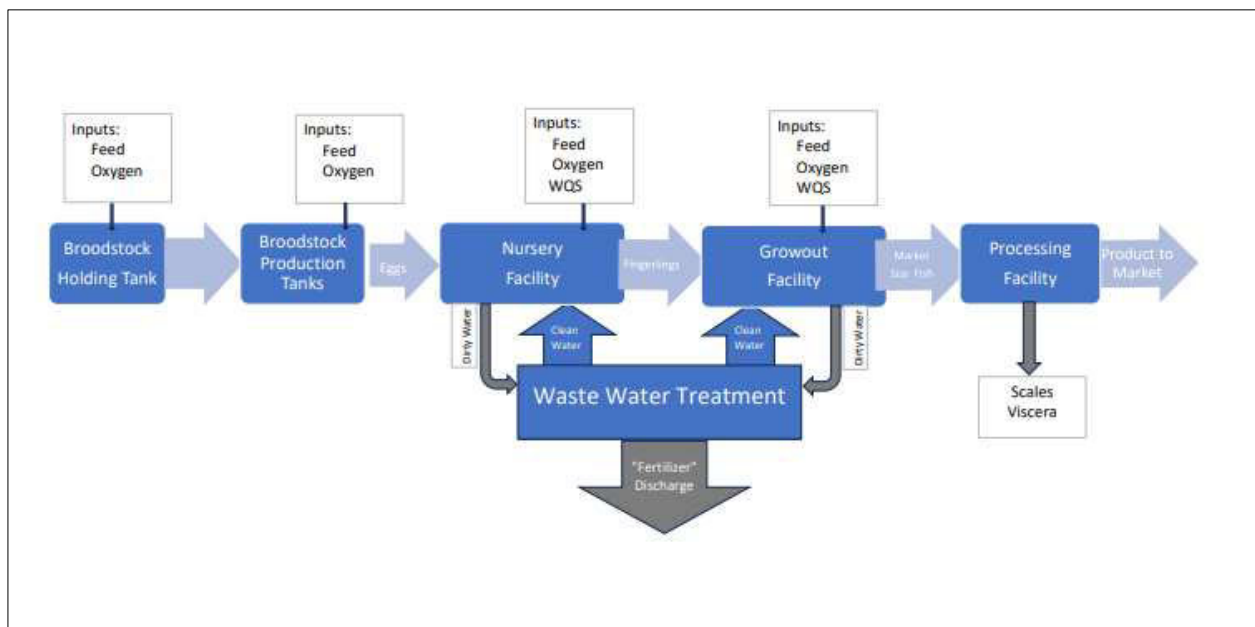
This chapter is a brief presentation of the project activities to be undertaken for the project.

The project activities will be implemented in three phases, namely, the planning and design, construction and operations and maintenance phases. These phases and the required resources and services are presented under the following subsections.

### 2.1. Planning and Design

This is the phase during which all design parameters required for the project implementation are drafted and finalized in preparation for the construction phase. It is also during this phase that cost analysis of the different aspects project (including the ESIA study) are done. These aspects include but not limited to technical, administration and finances as well as finalization of land use agreements (ownership or leasehold) with custodians.

The construction contractor will also be appointed towards the end of this phase to commence with the construction works once all aspects are considered and finalized. The site layout or proposed process flow of the project is shown in Figure 3 below.



**Figure 3: The process flow for the aquaculture facility near Henties Bay (source: Blue Ridge Aquaculture Africa, 2024)**

## 2.2. Site Preparation and Construction Phase

Once the ECC is issued and obtained from MEFT, the Proponent will prepare the site for construction and the actual commencement of construction works onsite. The construction activities will include earthworks; excavation, concrete civil works as well as structure and infrastructure erection and installation, respectively using manual labour as far as possible. A contractor will be appointed to carry out the site construction.

The appointed contractor will have and make arrangements for the logistics of their own workforce (including accommodation) but not to be accommodated onsite. It is anticipated that the construction works force will be accommodated in Henties Bay and commute to site. Blue Ridge Aquaculture Africa and their appointed contractor will be required to adhere to the health, safety and environment requirements for construction and operation (as well as maintenance) to be presented in the Draft ESMP for the project.

The construction works is anticipated to take between 3 to 6 months and will be limited to normal working hours, i.e., 08h00 and 17h00 (from 08am to 5pm).

For security purposes, the site will be fenced off to restrict access to authorized personnel only, prevent vandalism and theft as well as wildlife invasion onsite since the site near the boundaries of the Dorob National Park.

## 2.3. Operations and Maintenance Phase

This is the phase during which the aquaculture facility and its associated infrastructures will be operational and maintenance conducted by the Blue Ridge Aquaculture Africa maintenance team, as and when necessary.

The proposed project (aquacultural) activities and processes as provided by Blue Ridge (2024) are as follows:

### 2.3.1. Broodstock

The project operational activities will commence with the selection of its broodstock and harvesting of the eggs produced via the breeding process.

Blue Ridge began its genetics / broodstock program in 1997 and the program is currently in its 20th generation. Their unique, non-GMO (non-genetically modified organism) strain of hybrid Tilapia allows the Blue Ridge to achieve performance results well above industry standards. The Proponent

Blue Ridge uses traditional husbandry methods with modern genetic modelling systems. Figure 4 below displays typical broodstock species used in the Blue Ridge aquaculture Africa farms.



**Figure 4: The Blue Ridge broodstock (source: Blue Ridge Aquaculture Africa, 2024)**

### **2.3.2. Hatchery**

In March 2021, the Blue Ridge opened its new hatchery and nursery with advanced RAS technology. Blue Ridge employees collect eggs from its broodstock every 7 days and transfer those eggs to hatching jars (Figure 5) where they take a day or two to hatch. The hatched fish are then transported to a larger tub before growing large enough to enter the nursery.



**Figure 5: The Blue Ridge hatchery (source: Blue Ridge Aquaculture Africa, 2024)**

As the fish mature, they progress through several tanks within the nursery facility and subsequently the grow-out tanks in the production facility.

### **2.3.3. Nursery**

The nursery ensures the Company has an abundant amount of high-quality fingerlings to stock the grow-out tanks. Other RAS companies buy their eggs or fingerlings, and face the risk of disease or sub-adequate fingerlings.

The new facility allows for grading fish according to size / maturity without manual sorting processes. State-of-the-art water filtration and water re-use technologies have been implemented in the nursery

to promote more sustainable, efficient operations. The typical utilized nursery for aquaculture is shown in Figure 6 below.



**Figure 6: The Blue Ridge nursery (source: Blue Ridge Aquaculture Africa, 2024)**

#### **2.3.4. Grow-out Tanks**

Blue Ridge currently has 42 rectangular grow-out tanks in its Martinsville (Virginia) facility that produce 5 million pounds of Tilapia per year.

The Proponent has several automated processes that promote the growth of the fish over the 23 weeks spent in the facility. Fish are harvested directly from the grow-out tanks (Figure 7) via automated sorting machines to ensure that the fish are large enough for sale.



**Figure 7: The grow-out tanks (source: Blue Ridge Aquaculture Africa, 2024)**

#### **2.3.5. Feed Mill and Distribution**

The two crucial parts of the Blue Ridge operations are its integrated feed mill, which ensures a high-quality supply of feed (Figure 8), and distribution platform, which delivers the live fish to major metropolitan markets. However, from initial engagements between the Proponent and Namibia's Ministry of Fisheries and Marine Resources (MFMR), the delivery of live fish is not allowed for the project (at least for now and could maybe re-considered in future).

Blue Ridge opened its own feed mill in 2017 to supply the Company's internal feed demand (current and future) while also ensuring food safety and feed quality. The feed mill incorporates innovations in the areas of facility design, system integration, product traceability, and local ingredient supply.

The facility allows the Company to develop diets that best meet the nutritional requirements of their fish while also having the ability to test and develop new feeds.



**Figure 8: Blue Ridge Feed Mill (source: Blue Ridge Aquaculture Africa, 2024)**

In the first phase of the project operations, the fish feed will be imported feed from the USA and later in Phase 2, the project will need about 30 tons of feed (soya) a day. This will mean that the project will have to look into expanding the footprints of fish feed locally, i.e., to other regions such as the Kavango and Zambezi Regions for plantations that can produce the feed. Thus, promoting economic growth in these regions too and not just in Henties Bay (Erongo Region).

In terms of distribution in the USA, there is a wholly-owned subsidiary of Blue Ridge Aquaculture (Rolling River Live Haul), the transportation company dedicated to the distribution of Blue Ridge's product in Virginia - Figure 9.



**Figure 9: The distribution of Tilapia (source: Blue Ridge Aquaculture Africa, 2024)**

This allows for Blue Ridge to deliver an uninterrupted supply of live Tilapia daily to live fish distributors in major metropolitan markets on the East Coast of the U.S. and Canada. Rolling River Live Haul makes

it possible for Blue Ridge to have total control of its supply chain and biosecurity of its Tilapia in the USA.

It is therefore, anticipated that the Proponent will establish the same supply chain for its products in Namibia or establish partnerships with local supply chain businesses to promote economic growth.

## **2.4. Required Resources and Services**

The following services and infrastructure as provided below will be required for the project activities:

### **2.4.1. Human Resources**

During the construction and operation of the Project, about one hundred and forty-six (146) people will be employed, i.e., fifty (50) during construction and ninety-six (96) during the operational and maintenance phase (Phase 1) and about 200 people expected to be employed during Phase 2.

### **2.4.2. Construction Workers Accommodation**

During the construction of the proposed project, workers will be accommodated in Henties Bay upon arranging with the existing accommodation facilities or setting a camp upon obtaining consent from the Henties Bay Town Council.

### **2.4.3. Administration and Control buildings**

There will be site offices for the operations and maintenance workforce.

### **2.4.4. Water supply: Construction and Operational Phase**

Water for construction will be supplied by a desalination plant to be set up near for the project and as back up, the Proponent will have a water supply connection from Henties Bay Town (upon arrangements with the Municipal Council). Where the Municipality cannot supply, the Proponent will approach NamWater to supply the backup line directly to the site from construction throughout to the operational phase.

About 150,000 litres of water per month will be required for the construction. During the consultation meeting in Swakopmund with a NamWater representative, they indicated that the amount of water that will be needed as back up is not significant to raise concerns for NamWater.

Approximately 400,000 litres of water will be used per day during the operational and maintenance phase. This includes water for drinking, ablution facilities and other general uses onsite. The water will be supplied from a desalination as indicated under section 2.4.4 above.

### **2.4.5. Site Accessibility (roads)**



The site is easily accessible from the C34 (Swakopmund-Henties Bay-Uis) road. Therefore, the project vehicles will access the site from the C34 turn off. However, the Proponent will need to create an access road from the C34 to site. A permit for the access from the public road (C34) will be required from the Roads Authority of Namibia (to be obtained prior to project implementation).

#### **2.4.6. Power Supply**

During construction, power will be supplied by generators, whereas during the operational phase, the project will mainly rely on solar energy (about 10MW), and if need be, consideration will also be made to connect to the nearest power grid by the Erongo Regional Electricity Distributor (ErongoRED). An application to connect the site will be made by the Proponent to reach an agreement with the nearest ErongoRED offices in Swakopmund and or Head Office in Walvis Bay Region.

#### **2.4.7. Fuel Supply (Machinery and Equipment)**

It is anticipated that there will fuel use onsite during construction works to refuel project machinery and vehicles.

#### **2.4.8. Waste Management**

Considerable amounts of solid waste will be generated in the construction phase of the project, particularly from packaging materials associated with importation of the project materials for infrastructure and structure set ups. Responsible treatment and disposal and optimum recycling is necessary to minimise environmental problems arising from the waste. The waste hierarchy encourages waste prevention and reduction, followed by re-use, recycling and reclamation, and finally waste treatment and waste disposal, as depicted in Figure 10.



**Figure 10: The waste hierarchy, as explained by DEFRA, UK (2011)**

The different waste onsite will be handled as follows:

- Sewage: Portable toilets (minimum 2) will be provided onsite during construction and emptied according to manufacturers' instructions. For the operational phase, there will be enough flushing toilets for the project staff and visitors.
- General solid and domestic waste (office, packaging and construction): Solid waste containers will be made available onsite for different waste storage during construction and operational phases. The waste will be disposed of at the nearest approved solid waste management facility in the Erongo Region (Henties Bay or Swakopmund, depending on the capability and agreements with the authorities).
- Hazardous waste: All vehicles, machinery and fuel consuming equipment onsite will be provided with drip trays to capture potential fuel spills and waste oils.

The waste fuel/oils used during the construction phase will be carefully stored in standardized containers for disposal at the nearest approved hazardous waste management facility in the country (with the approved sites of that nature being in Walvis Bay and Windhoek only).

#### **2.4.9. Health and Safety**

Adequate and appropriate Personal Protective Equipment (PPE) will be provided to all construction personnel while on and working onsite. At minimum, two fully-equipped first aid kits will be readily available onsite and two to three personnel trained on administering first aid. There will be safety and health inductions for all site workers prior to working on site. Method statements will be communicated to all relevant workers through activity plans which will include provision of ongoing:

- Training and review of relevant procedures with site staff throughout the contract, including through the use of toolbox talks,
- Monitoring of the effectiveness of mitigation and procedures and update as required,
- Monitoring, review and update of environmental control measures in method statements,

#### **2.4.10. Site Security**

During construction, the site will be delineated by post and wire fencing to prevent access. If deemed necessary, security measures may include locking site areas, and onsite 24hour security personnel. An up-to-standard boundary wall will be erected around the project site for the operational phase. High-level security measures will also be implemented during the operational phases. These will include installation of CCTV cameras, access cards to site areas, special clearances to certain site buildings or areas and 24hour security guard services.



**2.4.11. Potential Accidental Fire Outbreaks**

A minimum of four well-serviced fire extinguishers will be readily available onsite during construction and each building structure will be equipped with a fire extinguisher for the operational phase.

The alternatives considered during the assessment are discussed further in Section 3.

### 3. PROJECT ALTERNATIVES CONSIDERED

Alternatives are defined as: “different means of meeting the general purpose and requirements of the activity” (Environmental Management Act (2007) of Namibia and its regulations (2012)). This chapter will highlight the different ways in which the project can be undertaken and identify the alternative that will be the most practical but least damaging to the environment.

#### 3.1. No-Go Alternative

The “No-Go” alternative is the option of not proceeding with the activity, which typically implies a continuation of the status quo. This would mean that the proposed aquaculture project will not commence. Should the proposed project be discontinued, none of the potential impacts (positive and negative) identified would occur. Therefore, the proposed site will remain unchanged and would not be improved. This will also mean that there will be change in the economic status of the Henties Bay Town.

In considering the proposed project, the ‘no-go’ option cannot be the preferred alternative.

#### 3.2. Design alternatives

The project infrastructure and structures are being designed to consider the environmental and social aspects of the area. The designs will also consider the economic and technology aspects appropriate for the project site area.

#### 3.3. Project Location

The Proponent first considered a site away from Henties Bay (about 5km northeast of the current site). However, it was realized that the site is far from services like the main road, electricity grid, Town itself and even the NamWater supply line. These services are essential for the implementation of the project and setting up the project so far would hinder its implementation or come up costly. Furthermore, the site is flat which is good for establishing structures because there will be no need to spend more money in levelling the ground if it was uneven. Therefore, the proposed site is more feasible.

#### 3.4. Resources alternatives

In terms of the resources that may be required for the project, their alternatives are presented in Table 2 below.

**Table 2: Alternatives considered in terms of services infrastructure**

<b>Services</b>	<b>Proposed source</b>	<b>Alternative source</b>
<b>Water</b>	<ul style="list-style-type: none"> <li>-Water to be sourced from the NamWater supply line</li> <li>-Water to be obtained from a desalination to supply the project</li> </ul>	-Given the challenge with water supply in the area from aquifers, the primary water supply to the project will be from a desalination plant. NamWater will only supply water as backup (not primary supply).
<b>Power</b>	<ul style="list-style-type: none"> <li>-Electric drives and generators</li> <li>-Solar and power from ErongorRED grid</li> </ul>	-During the construction phase, generators will be used, and for the operational phase, the project will be supplied with 10MW power from solar.
<b>Worker's accommodation</b>	<ul style="list-style-type: none"> <li>-Campsite at the project site</li> <li>-Accommodation in Henties Bay</li> </ul>	<p>-Workers will be accommodated in Henties Bay (locals to be commuting from their homes by buses). Thus, no need for onsite accommodation (campsite).</p> <p>-Accommodation for out-of-town workers (highly skilled workers who are not available in Town) will be in existing accommodation facilities.</p>
<b>Waste Management</b>		
<b>Sewage</b>	<ul style="list-style-type: none"> <li>-Portable toilets – these are easily transportable and have no direct impact on the environment or ecology (if waste is properly disposed of). They are easy to dismantle and move after completion of construction works.</li> <li>-Flushing toilets – these are convenient for long-term use at a project.</li> </ul>	-During construction, portable toilets with septic tanks will be provided onsite while for operational phase, flushing toilets connected to a sewer system will be install onsite for workers, and visitors.
<b>Domestic waste</b>	-Onsite waste bins, regularly emptied at the Town's dumping site.	-Waste will be collected by the Municipality as often as needed (using the existing municipal waste collection schedules. alternatively, a

Services	Proposed source	Alternative source
		separate waste collection agreement will be reached between the Proponent and Municipality of Henties Bay.
<b>Hazardous waste (chemicals)</b>	-Waste generated is to be transported to and disposed of at an appropriate facility in the nearest town equipped for the disposal of hazardous waste, i.e. Walvis Bay.	-None.

### 3.5. Conclusions on the Considered Alternatives

The alternatives considered for the project are summarized as follow:

- **No-go vs. continuation of the proposed project:** The no-go alternative is not considered to be the preferred option. Should the proposed project be discontinued, none of the potential impacts (positive and negative) identified would occur. Therefore, the economic status of the Town and site would not be improved and changed, respectively.
- **Project design:** project infrastructure and structures are designed to consider the environmental, social, technology and economic aspects of the area.
- **Locality:** The proposed site is more feasible as it is close to services like the main road, electricity grid, Town itself and even the NamWater supply line. Furthermore, the site is flat which is good for establishing structures because there will be no need to level the ground.
- **Resources:**
  - **Water-**Given the challenge with water supply in the area from aquifers, the primary water supply to the project will be from a desalination plant. NamWater will only supply water as backup (not primary supply).
  - **Energy-**During the construction phase, generators will be used, and for the operational phase, the project will be supplied with 10MW power from solar.
  - **Workers accommodation:** to be accommodated in Henties Bay (locals to be commuting from their homes by buses). Accommodation for out-of-town workers (highly skilled workers) will be accommodated in existing accommodation facilities.

- Waste - During construction, portable toilets with septic tanks will be provided onsite while for operational phase, flushing toilets connected to a sewer system will be install onsite for workers, and visitors. Solid domestic waste will be collected by the Municipality as often as needed (using the existing municipal waste collection schedules. alternatively, a separate waste collection agreement will be reached between the Proponent and Municipality of Henties Bay.).

The above-presented project activities and the alternatives are governed by certain legislations that will need to be complied with as required. These legal requirements, their description and relevance to the proposed project/development are presented under Chapter 4.

## 4. APPLICABLE POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

### 4.1. Introduction

In terms of aquaculture governance in Namibia, Iitembu *et al.*, (2022), stated that Namibian aquaculture sector is still very small, but it has the potential to act as a vehicle for both food security and economic growth for the country. The governance structure in place regulates matters such as public health, environmental protection, animal health and disease. The aquaculture license includes the classical bundles of property rights such as transferability, renewability, specified duration and cancellation based only on failure to perform. However, aquaculture land ownership/leasing is not sufficiently regulated to encourage long-term investment into aquaculture. Freshwater aquaculture has the potential to contribute to food security, but the absence of differentiation between community-based and commercial farming creates regulatory burdens which cannot be easily be met by prospective small-scale fish farmers (Iitembu *et al.*, 2022).

With that said, a review of Namibian legislation, policies and guidelines applicable and relevant to the proposed project and its associated activities is given in this chapter. This review serves to inform the Proponent (Blue Ridge Aquaculture Africa), Interested and Affected Parties (I&APs) and the decision-makers at the DEAF of the requirements and expectations, as laid out in terms of these instruments, to be fulfilled when undertaking the proposed project and its associated activities. The following legal framework has been reviewed:

- The Constitution of the Republic of Namibia (1990)
- Environmental Assessment Policy of Namibia 1994
- Environmental Management Act No. 7 of 2007 and its Environmental Impact Assessment (EIA) Regulations Government Notice 57/2007 (Government Gazette 3812)
- Marine Resources Act No. 27 of 2000
- Inland Fisheries Resources Act No. 1 of 2003
- Urban and Regional Planning Act No. 5 of 2018
- Water Resources Management Act No. 11 of 2013
- Namibia Water Corporation (NamWater) Act 12 of 1997
- The Regional Councils Act No. 22 of 1992
- Local Authorities Act No. 23 of 1992

- National Policy on Climate Change for Namibia (2011)
- National Climate Change Strategy & Action Plan 2013 - 2020
- Roads Authority Act No 17 of 1999
- Atmospheric Pollution Prevention Ordinance No. 11 of 1976
- Electricity Act No. 7 of 2004
- National Solid Waste Management Strategy
- Soil Conservation Act No. 76 of 1969
- Nature Conservation Ordinance (1996)
- Labour Act 11 of 2007 and Health and Safety Regulations Government Notice 156/1997 (Government Gazette 1617)
- Public Health Act No. 36 of 1919
- Public and Environmental Health Act No. 1 of 2015
- National Heritage Act No. 27 of 2004
- The National Monuments Act No. 28 of 1969.

These above-listed legislations and policies and their inclusion in the proposed project assessment are further presented in Table 3 below.

**Table 3: Policies, legal and administrative regulations governing the proposed project activities**

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
The Constitution of the Republic of Namibia (1990)	<p>The articles 91(c) and 95 (i) commits the state to actively promote and sustain environmental welfare of the nation by formulating and institutionalising policies to accomplish the Sustainable objectives which include:</p> <ul style="list-style-type: none"> <li>• Guarding against overutilization of biological natural resources,</li> <li>• Limiting over-exploitation of non-renewable resources,</li> <li>• Ensuring ecosystem functionality,</li> <li>• Maintain biological diversity.</li> </ul>	The Proponent should ensure compliance with the conditions set in the Constitution pertaining to protection and conservation of natural resources and ecosystems.
Environmental Assessment Policy of Namibia 1994	The Environmental Assessment Policy of Namibia states Schedule 1: Screening list of policies/ plans/ programmes/ projects subject to environment must be accompanied by environmental assessments. "The proposed project activities" are on that list.	This EIA outlines the environmental consequences of this project and considers this definition of Environment.
	The policy provides a definition to the term "Environment" broadly interpreted to include biophysical, social, economic, cultural, historical and political components and provides reference to the inclusion of alternatives in all projects, policies, programmes and plans.	This EIA outlines the environmental consequences of this project and considers this definition of Environment.



LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
<p>Environmental Management Act No. 07 of 2007</p> <p>EIA Regulations GN 57/2007 (GG 3812)</p>	<p>Requires that activities with significant environmental impact are subject to an environmental assessment process (Section 27).</p> <p>Requires for adequate public participation during the environmental assessment process stakeholders to give their opinions about a project (Section 2(b-c)).</p> <p>According to Section 5(4) a person may not discard waste as defined in Section 5(1)(b) in any way other than at a disposal site declared by the</p> <p>Section 3 (2) (b) states that “community involvement in natural resources management and the sharing of benefits arising from the use of the resources, must be promoted and facilitated” is key.</p> <p>Section 3 (2) (e) states that “assessments must be undertaken for activities which may have a significant effect on the environment or the use of natural resources”.</p> <p>Details requirements for public consultation within a given environmental assessment process (GN No 30 S21).</p>	<p>The EMA and its regulations should inform and guide this EA process.</p> <p>An ECC should be obtained before the project is implemented.</p>

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
	Details the requirements for what should be included in an Environmental Scoping Report (GN No 30 S8) and an EIA report (GN No 30 S15).	
Urban and Regional Planning Act No. 5 of 2018	To provide for a legal framework for spatial planning in Namibia; to provide for principles and standards of spatial planning; to establish the urban and regional planning board; to decentralise certain matters relating to spatial planning; to provide for the preparation, approval and review of the national spatial development framework, regional structure plans and urban structure plans; to provide for the preparation, approval, review and amendment of zoning schemes; to provide for the establishment of townships; to provide for the alteration of boundaries of approved townships, to provide for the disestablishment of approved townships; to provide for the change of name of approved townships; to provide for the subdivision and consolidation of land; to provide for the alteration, suspension and deletion of land related conditions.	Through the Municipality, the Proponent should adhere to the structure plans of the Town and apply for land and approval for the zoning corresponding to the project nature.

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
Marine Resources Act 27 of 2000	To provide for the conservation of the marine ecosystem and the responsible utilization, conservation, protection and promotion of marine resources on a sustainable basis; for that purpose to provide for the exercise of control over marine resources; and to provide for matters connected therewith.	The Proponent is required to comply with the regulations and conditions set by the Ministry of Fisheries and Marine Resources pertaining to operating aquaculture projects.
Inland Fisheries Resources Act No. 1 of 2003	The Act provides for the conservation and protection of aquatic ecosystems and the sustainable development of inland fisheries resources; to provide for the control and regulation of inland fishing; and to provide for related matters	The Proponent should comply with the Act's Part VI: Conservation and Protection Measures, Chapter 19. Introduction, import or export of fish and ensure that all permits and associated licenses for the project are obtained from the MFMR.
The Regional Councils Act No. 22 of 1992  Local Authorities Act No. 23 of 1992	This Act sets out the conditions under which Regional Councils must be elected and administer each delineated region. From a land use and project planning point of view, their duties include, as described in section 28 "to undertake the planning of the development of the region for which it has been established with a view to physical, social and economic characteristics, urbanisation patterns, natural resources, economic development potential, infrastructure, land utilisation pattern and sensitivity of the natural environment."	The Erongo Regional Councils are regional stakeholders / IAPs and were consulted during the Environmental & Social Impact Assessment (ESIA) process.  The Henties Bay Municipality is the affected local authorities and were consulted during the ESIA process

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
Electricity Act 4 of 2007	To establish the Electricity Control Board and provide for its powers and functions; to provide for the requirements and conditions for obtaining licences for the provision of electricity; to provide for the powers and obligations of licensees.	The Proponent will be obtaining electricity from solar. Therefore, it is important for the Proponent to ensure that the solar farm supplying them with electricity is environmentally certified and licensed by the Electricity Control Board of Namibia.
Roads Authority Act No 17 of 1999	The Act establishes a Roads Authority to manage the national road network of Namibia.	Mitigation measures should be provided for, if the roads and traffic impact cannot be avoided.  The Proponent is required to apply for an access permit from the C34 to site. The permit is to be applied from Roads Authority.
The Water Resources Management Act No. 11 of 2013 and 2023 Water Regulations	Equitable improvement of water and sanitation services should be achieved by the combined efforts of the government and the beneficiaries, based on community involvement and participation, the acceptance of a mutual responsibility and by outsourcing services where necessary and appropriate, under the control and supervision of government.	Proponent will have a water supply connection from Henties Bay Town (upon arrangements with the Municipal Council). However, if the Municipality cannot supply, the Proponent will approach NamWater to supply the backup line directly to the site from construction throughout to the operational phase. Therefore, consent or supply agreement should be applied for.

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
Namibia Water Corporation (NamWater) Act 12 of 1997	The Act regulate its powers, duties and functions; to provide for a more efficient use and control of water resources.	The Proponent should make necessary arrangements to apply for water meter connection from NamWater for their backup supply, if the Municipality cannot directly supply the project.
National Policy on Climate Change for Namibia (2011)	<p>The National Policy on Climate Change supports constitutional obligations of the Government of the Republic of Namibia, namely for “the state to promote the welfare of its people and protection of Namibia’s environment for both present and future generation.”</p> <p>The goal of the National Policy on Climate Change is to contribute to the attainment of sustainable development in line with Namibia’s Vision 2030 through strengthening of national capacities to reduce climate change risk and build resilience for any climate change shocks.</p>	<p>Through the implementation of the project that addresses food security and economic growth, the project contributes towards sustainable development. The project implementation is aimed at addressing climate change mitigation and adaptation. Therefore, implementation should be climate sensitive.</p> <p>By relying on solar energy for the project, the Proponent is promoting green energy in the fight against climate change.</p>
National Climate Change Strategy & Action Plan 2013 - 2020	<p>The Strategy outlines Namibia’s response to climate change. The strategy aims to address and plan for action against climate change, both through mitigation and adaptation actions. In its adaptation strategy, the Strategy recognises the role of a sustainable water resource base.</p>	The project implementation should adopt measures that strengthen sustainable energy and water use of the country. The implementation should be very careful on not to cause harm to ensure sustainable use of the available water resources and energy but improve these management through various conservation technics.

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
Atmospheric Pollution Prevention Ordinance 11 of 1976:	The law act to provide for the prevention of the pollution of the atmosphere, and for matters incidental thereto. The law regulates and prohibit pollution from industries particularly smoke and dust from various activities.	The development should consider the provisions outlined in the act. The proponent should apply for an Air Emissions permit from the Ministry of Health and Social Services (if needed).
National Solid Waste Management Strategy	The Strategy ensures that the future directions, regulations, funding and action plans to improve solid waste management are properly co-ordinated and consistent with national policy, and to facilitate co-operation between stakeholders  The Strategy listed priorities for the strategy to address for effective solid waste management.	The project can potentially generate significant amount of solid waste (stockpiles, soil remains, domestic and rubbles) that might need proper management by contractors to avoid pollution. Waste management plans should be generated and implemented prior the commencement of civil works and during road operation.
	Waste disposal is the main problem with the current solid waste management in Namibia. The top priority is to reduce risks to the environment and public health from current waste disposal sites and illegal dumping in many areas of Namibia.	Contractors for the construction and eventually operations workers should reduce the risk of solid waste to the environment and surroundings of the project area.

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
Pollution Control and Waste Management Bill	<p>The bill aims to “prevent and regulate the discharge of pollutants to the air, water and land” Of particular reference to the Project is:</p> <p>Section 21 “(1) Subject to sub-section (4) and section 22, no person shall cause or permit the discharge of pollutants or waste into any water or watercourse.”</p> <p>Section 55 “(1) No person may produce, collect, transport, sort, recover, treat, store, dispose of or otherwise manage waste in a manner that results in or creates a significant risk of harm to human health or the environment.”</p>	<p>The Proponent, their workers and appointed contractors should continue with the good waste management work (directly or indirectly) to ensure that the waste does not cause environmental threat and degradation.</p> <p>No permit or license required.</p>
Soil Conservation Act 76 of 1969	<p>The Act established to consolidate and amend the law relating to the combating and prevention of soil erosion, the conservation, improvement and manner of use of the soil and vegetation and the protection of the water sources in the Republic of Namibia.</p>	<p>The proposed activity should ensure that soil erosion and soil pollution is avoided during construction and operation.</p>
Nature Conservation Ordinance (1996)	<p>This ordinance relates to the conservation of nature; the establishment of game, parks and nature reserves; the control of problem animals; and highlights matters incidental thereto.</p>	<p>Although the project activities will be limited to the site boundaries, the site is neighbouring the Dorob National Park whereby wildlife can roam around and on the site. Therefore, there is a potential of encountering animals around the site However, there is need for proper designing</p>

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
		and planning of the drainage and water network of the project to make sure that the infrastructure will not interfere with facilities listed in the Nature Conservation Ordinance.
Labour Act 11 of 2007.	Empowers the minister responsible for labour to publish regulations pertaining to health and safety of labourers (S135). Details requirements regarding minimum wage and working conditions (S39-47).	The construction and operation activities will invite significant amount of laborious work. Therefore, there is need to make sure that the workers participate are protected and that they are from the local's especially unskilled labour.
Health and Safety Regulations GN 156/1997 (GG 1617)	Details various requirements regarding health and safety of labourers to be involved in the project construction, and subsequent operations and maintenance.	Contractors involved in the project construction and maintenance should complying with this Act and its regulations
Public Health Act 36 of 1919	Section 119 states that "no person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health."	The Proponent should ensure that relevant regulations set out under this Act are adhered to.



LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
Public and Environmental Health Act 1 of 2015.	To provide a framework for a structured uniform public and environmental health system in Namibia; and to provide for incidental matters.	
National Heritage Act 27 of 2004	<p>Section 48(1) states that “A person may apply to the (Heritage) Council for a permit to carry out works or activities in relation to a protected place or protected object”</p> <p>Protects and conserves cultural heritage and cultural resources with special emphasis on places and sources of National heritage including graves, artefacts and any objects older than 50 years.</p>	The project constructions are localized, however, if heritage resources (e.g. human remains, artefacts, etc.) are discovered during constructions, it would require the Proponent to have a permit from the National Heritage Council of Namibia for removal and or relocation.
The National Monuments Act (No. 28 of 1969)	To provide for the repair, maintenance and general care of certain burial grounds, graves, the establishment of gardens of remembrance in respect of certain persons, the erection of memorial for certain persons and the preservation of certain immovable or movable property as national monuments.	
Hazardous Substance Ordinance, No. 14 of 1974	The ordinance provides for the control of toxic substances. It covers manufacture, sale, use, disposal and dumping as well as import and export. Although the environmental aspects are not explicitly stated, the ordinance provides for the importing, storage, and handling.	The Proponent should handle and manage the use of hazardous substances onsite so that they do not harm or compromise the site environment.

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
Petroleum Products and Energy Act (No. 13 of 1990) Regulations (2001)	Regulation 3(2)(b) states that “No person shall possess [sic] or store any fuel except under authority of a licence or a certificate, excluding a person who possesses or stores such fuel in a quantity of 600 litres or less in any container kept at a place outside a local authority area”	If intends to store/keep 600 litre or more of fuel onsite, a consumer installation certificate should be applied for from the Ministry of Mines and Energy (MME)’s Petroleum Affairs Directorate for the storage and handling of bulk fuel onsite.

Given the fact that the proposed project will be funded by international investors and the financing require the project to comply with certain requirements, particularly the International Finance Corporation (IFC) Performance Standards (PSs). Therefore, it is crucial to analyse the ESIA Study process against these IFC’s PSs and these are listed in Table 4.

**Table 4: The IFC Performance Standards (PSs) analysis against the ESIA Study for the project**

IFC PS	RELEVANT PROVISIONS OF THE IFC PS	IMPLICATIONS FOR THE PROJECT / ACTIONS TAKEN
PS1	Assessment and Management of Environmental and Social Risks and Impacts:	The ESIA has been undertaken in accordance with this, whereby the project has been advertised in the national media outlets, consultation meetings held and comments noted down for incorporation into the Assessment Report and Environmental & Social Management Plan together with identified potential adverse/negative and positive environmental and social impacts stemming from the project.

IFC PS	RELEVANT PROVISIONS OF THE IFC PS	IMPLICATIONS FOR THE PROJECT / ACTIONS TAKEN
PS2	Labour and Working Conditions	The ESIA Study assessed the potential impacts of the project activities on the health and safety project crew in accordance with the Labour Act (No. 6 of 1992) and fair labour working conditions, including compensations, i.e., no compromising of the labour and working welfare of workers as required in the ESMP.
PS3	Resource Efficient and Pollution Prevention and Management	The ESIA Study assessed the usage of resources such as water, soils and power resources required for the project. The appropriate measures to manage and mitigate the impacts associated with the project activities have been provided under the ESMP for implementation.
PS4	Community Health and Safety	The potential impacts of the project activities on the workers as well as communities' health and safety in accordance with the Labour Act (No. 6 of 1992) have been assessed and mitigation measures provided accordingly in the EMP, i.e., ensuring that the project activities do not compromise the safety and welfare of workers and communities.
PS5	Land Acquisition, Restrictions on Land Use, and Involuntary Resettlement	The proposed site falls within a Townland. The consent for land use has been issued and granted to Blue Ridge Aquaculture Africa. The structures and human settlements in far Town. Therefore, no relocation or resettlement will be done.

IFC PS	RELEVANT PROVISIONS OF THE IFC PS	IMPLICATIONS FOR THE PROJECT / ACTIONS TAKEN
PS6	Biodiversity Conservation and Sustainable Management of Living Natural Resource	The ESIA Study undertook a baseline assessment of the fauna and flora onsite. The relevant management and mitigation measures have been provided thereto in the ESMP.
PS7	Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	The project site fall within Townland. There is no presence of indigenous (San and Ovahimba) people on and around the site.
PS8	Cultural Heritage	There are no surface archaeological and heritage cultural resources on and around the site. Regardless, mitigation measures will be provided in the ESMP for subsurface works during excavation for construction.

The other international statues such as policies, standards and conventions that may govern the project activities are provided under Table 5.

**Table 5: International treaties and conventions governing the proposed activities of the project**

STATUTE	PROVISION/SUMMARY	IMPLICATIONS FOR THE PROJECT / REQUIREMENTS
The United Nations Convention to Combat Desertification (UNCCD) 1992	Addresses land degradation in arid regions with the purpose to contribute to the conservation and sustainable use of biodiversity and the mitigation of climate change.  The convention objective is to forge a global partnership to reverse and prevent desertification/land degradation and to mitigate the effects of drought in affected areas to support poverty reduction and environmental sustainability United Nation Convention	The project activities should not be undertaken such that they contribute to desertification.
Convention on Biological Diversity 1992	Regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation and sustainable use.  Promote the protection of ecosystems, natural habitats, and the maintenance of viable populations of species in natural surroundings	The removal of vegetation cover and destruction of natural habitats should be avoided and where not possible minimised
Stockholm Declaration on the Human Environment, Stockholm (1972)	It 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.	Protection of natural resources and prevention of any form of pollution.

STATUE	PROVISION/SUMMARY	IMPLICATIONS FOR THE PROJECT / REQUIREMENTS
Equator Principles	A financial industry benchmark for determining, assessing, and managing environmental and social risk in projects (August 2013). The Equator Principles have been developed in conjunction with the International Finance Corporation (IFC), to establish an International Standard with which companies must comply with to apply for approved funding by Equator Principles Financial Institutions (EPFIs). The Principles apply to all new project financings globally across all sectors.	These principles are an attempt to: ‘...encourage the development of socially responsible projects, which subscribe to appropriately responsible environmental management practices with a minimum negative impact on project-affected ecosystems and community-based upliftment and empowering interactions.’

The baseline biophysical and social environment under which the proposed project will be undertaken is presented under the next chapter.

## 5. ENVIRONMENTAL AND SOCIAL BASELINE

### 5.1. Introduction

The proposed project will be undertaken in a specific biophysical and social environment. The baseline conditions of these environmental features are described in the following subchapters. The baseline conditions are described for the subject area, which is the area/region in which the project will be established and operated.

### 5.2. Socio-economic profile

#### 5.2.1. Population

The project site is in the Erongo Region which according to the 2011 Population and Housing Census (pending 2023 Census results) has a population 150,809 which comprises 70,986 females and 79,823 males. The Henties Bay Town had a population of 4,720 (Namibia Statistics Agency (NSA), 2014). Henties Bay Town falls under the Arandis Constituency which has a population of 10,093 (4,852 females and 5,241 males). The area of the Constituency is 13,519km<sup>2</sup> and the population density is 0.7 persons per kilometre square.

According to NSA (2014), the labour force (i.e., 15+ years) was 79% in 2011, with 70% being employed and 30% unemployed. The Arandis Constituency had an employed and unemployed rates of 72% and 28%, respectively. The main sources of household income in the Region were wages and salaries (73%), cash remittance (5%), business (non-farming) accounting for 9%, pension 8%, and farming at 3%. The main source of income in the Arandis Constituency is 1% farming, 72% from wages and salaries, 3% cash remittance, 6% business (non-farming) and 10% from pension.

In terms of employment by industry in the Erongo Region, manufacturing is the main industry (13.8%) followed by mining and quarrying (11.7%), then and agriculture, forestry and fishing (11.5%). Remediation activities, information and communication, as well as real estate make up about less than 1% of the work force. Administration, education, human health and social work activities were the domain of women, while men predominantly worked in mining, construction and transport services (NSA, 2014).

#### 5.2.2. Education

According to the NSA (2014), in terms of literacy rate of people aged 15 years and above, the Region is 97%. About 83% of persons in the Erongo Region aged 15 years and above had already left school,

9% were still at school and 6% never attended school (NSA, 2014). About 44% of persons aged 15 years and above completed primary education before leaving.

The statistics of education attainment of the employed population in the Region are shown in Figure 11 below.

Educational Attainment	Population employed			Percent		
	Total	Female	Male	Total	Female	Male
Total	58 865	22 283	36 582	100.0	100.0	100.0
No Formal education	3 480	806	2 674	5.9	3.6	7.3
Incomplete primary education	8 451	2 327	6 124	14.4	10.4	16.7
Primary education	22 397	8 840	13 557	38.0	39.7	37.1
Secondary education	18 606	7 916	10 690	31.6	35.5	29.2
Tertiary education	5 171	2 184	2 987	8.8	9.8	8.2
Others	20	6	14	0.0	0.0	0.0
Don't Know	740	204	536	1.3	0.9	1.5

**Figure 11: Educational attainment of employed population aged 15 years and above by sex (NSA, 2014)**

### 5.2.3. Economic activities

The main economic activities in the Erongo Region are tourism, mining and farming (inland), and further to the coastal side, fishing. These are listed below:

- **Agriculture (farming):** From the 2000 statistics, the Region accommodated more than 110,000 goats, nearly 36,000 heard of cattle, and about 50,000 sheep. Cattle from commercial and communal farmers can be marketed to the national abattoir and processing facility, Meatco (Erongo Regional Council, 2021).
- **Tourism:** The Erongo Region offers some of the most spectacular and popular tourist destinations as well as a variety eco-, wildlife, cultural and adventure tourism opportunities. In other words, tourism activities practiced in the Region is centered on eco-tourism, game drive and trophy hunting.
- **Mining:** The mining activities are undertaken near mining towns of Arandis and settlements such as Uis, Omatjete where commonalities such as nuclear fuels (Uranium), Dimension Stone (marble and granite), Base & Rare Metals (Copper), Precious Metals (Gold) and Industrial Minerals, etc. are mined.

### 5.2.4. Land Use

The project site located within the Town boundaries, in an area being rezoned for industrial purposes (activities).



### 5.3. Infrastructure Development

The services and infrastructure in proximity of the site are as follows.

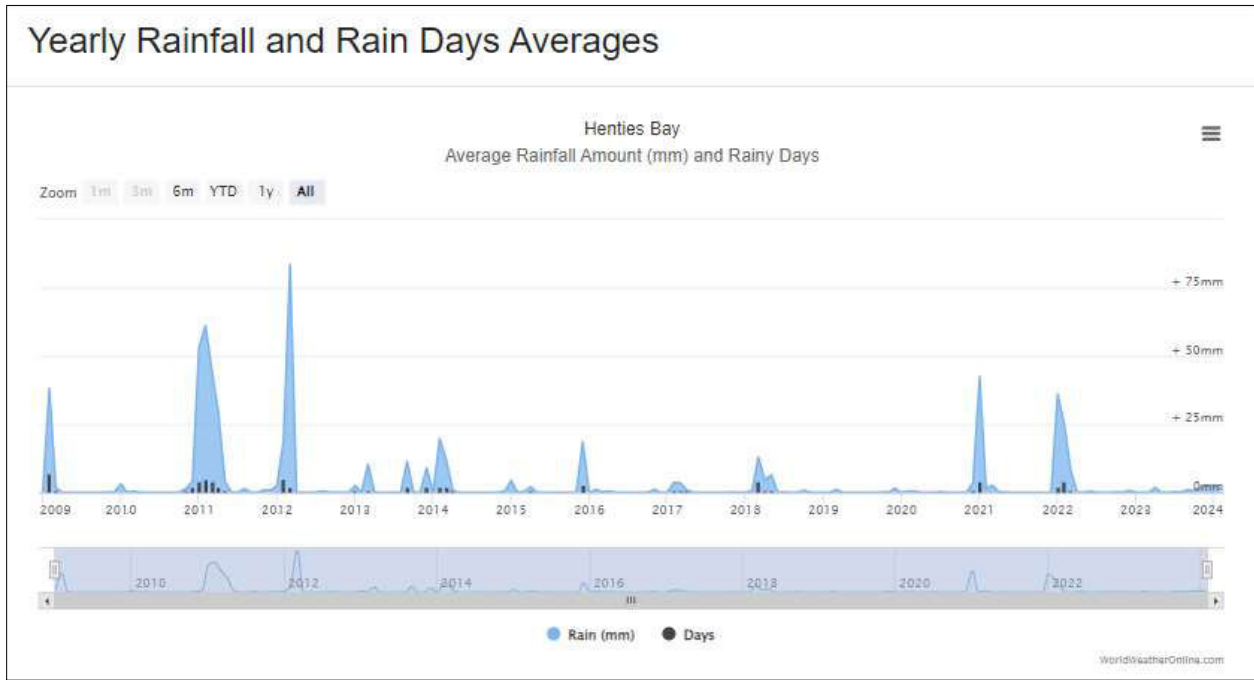
- Power Supply: Electricity in the project area is supplied by ErongoRED.
- Water Supply: Water in the Henties Bay is provided by NamWater from the Omaruru Delta (OMDEL) aquifers (groundwater), which is then pumped to several reservoirs that provide water to towns in the Region such as Walvis Bay, Swakopmund, Henties Bay, Arandis and the mining industry.
- Road Network: the project site is next to the C34 (Swakopmund-Henties Bay-Uis) road. Therefore, the project vehicles will access the site from the C34 turn.
- Telecommunications: The Region and local areas are well connected to the telecommunication services and facilities supplied by MTC Namibia and Telecom and these services are constantly being improved and extended. In addition to cellular services by the two services providers, there are also landlines (telephone lines) available in these areas and provide communication conveniences for the locals and travellers alike. There are telecommunication lines near the project towards the Town

### 5.4. Climate & Topography

#### 5.4.1. Climatic Conditions

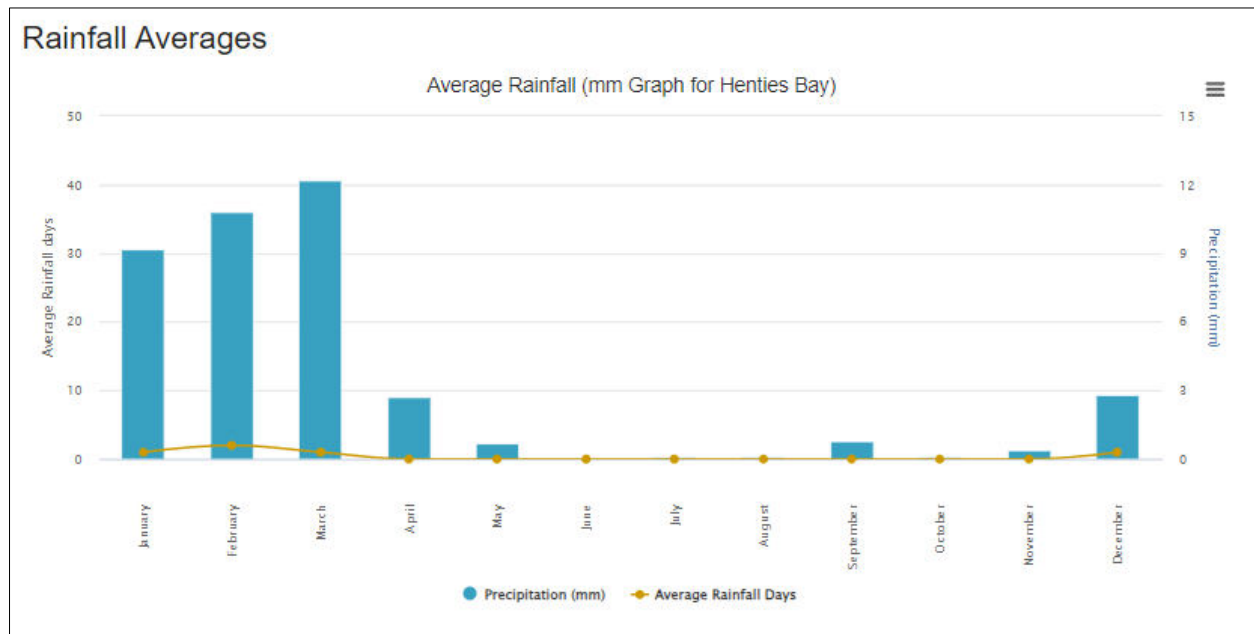
According to Mendelsohn et al. (2002), the Henties Bay area has an average annual rainfall ranging between 50 and 100mm and the annual evaporation ranging between 2,100 and 2,380mm which characterized by the arid conditions of the area. Weather average information for the area has been sourced from World Weather Online (2024) for the full period of fourteen (14) years (2009 to 2023) and these are shown in the figures below (for both rainfall and temperature).

Figure 12 indicates that the highest rainfall was 83mm recorded in March 2012 followed by 60mm recorded in February 2011.



**Figure 12: The yearly rainfall and rain days chart for Henties Bay (World Weather Online, 2024)**

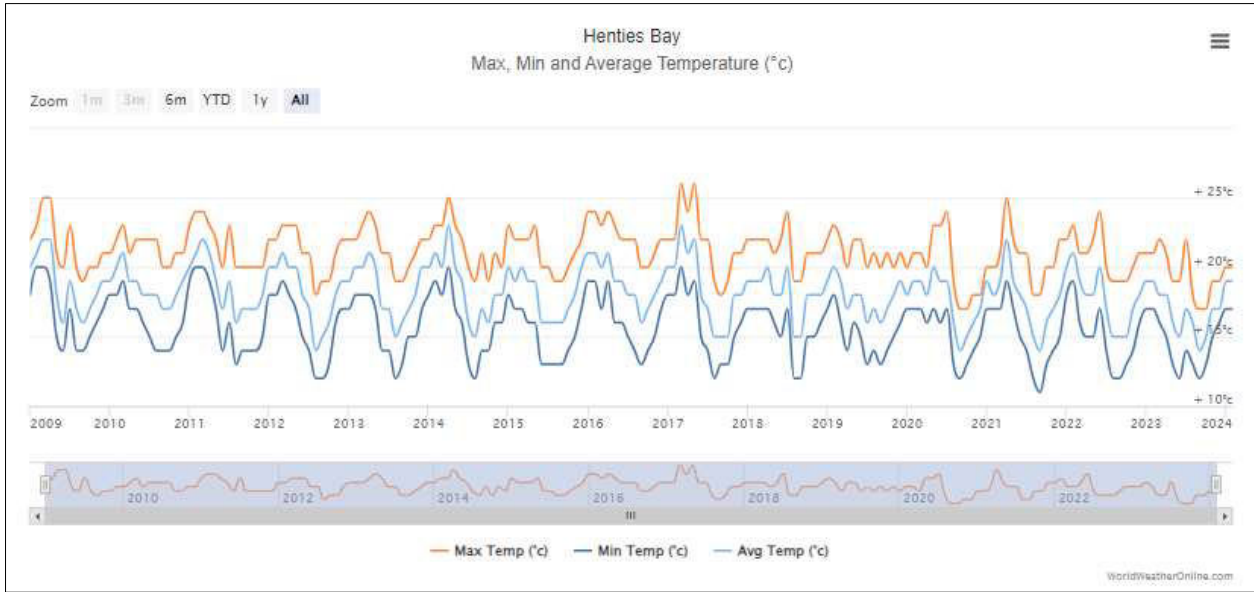
The monthly average rainfall shown in Figure 13 indicates that March has the highest average rainfall of 12mm (with an average rainfall days of 1) followed by February with 10mm (with 2 days of an average rainfall) and January with 9mm (and with the same average rainfall days as March).



**Figure 13: The rainfall average chart for Henties Bay (World Weather Online, 2024)**

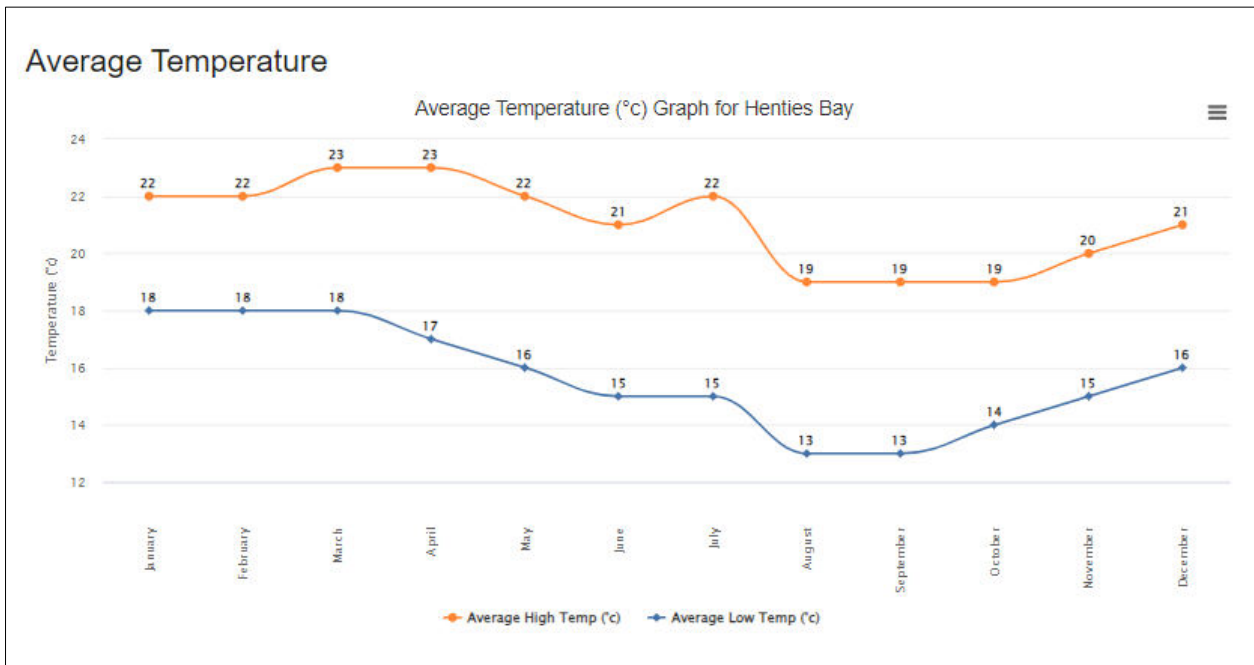
In terms of temperatures, the Henties Bay area has minimum temperatures ranging between 8 and 12°C, maximum temperatures in the ranges of 22 and 28°C while the annual temperatures range between 16 and 22°C (Mendelsohn et al., 2002). Based on the World Weather Online (2024), over

the last 14 years, the minimum and maximum temperatures were recorded at 11°C (in September 2021) and 26°C (in March and May 2017), respectively as shown in Figure 14.



**Figure 14: The yearly maximum, minimum and average temperatures for Henties Bay (World Weather Online, 2024)**

The monthly average minimum and maximum temperatures are shown in Figure 15 and indicate that the monthly average minimum and maximum are recorded in August/September at 11°C and 23°C in March/April, respectively.



**Figure 15: The monthly average temperatures for Henties Bay (World Weather Online, 2024)**

**5.4.2. Landscape and Topography**

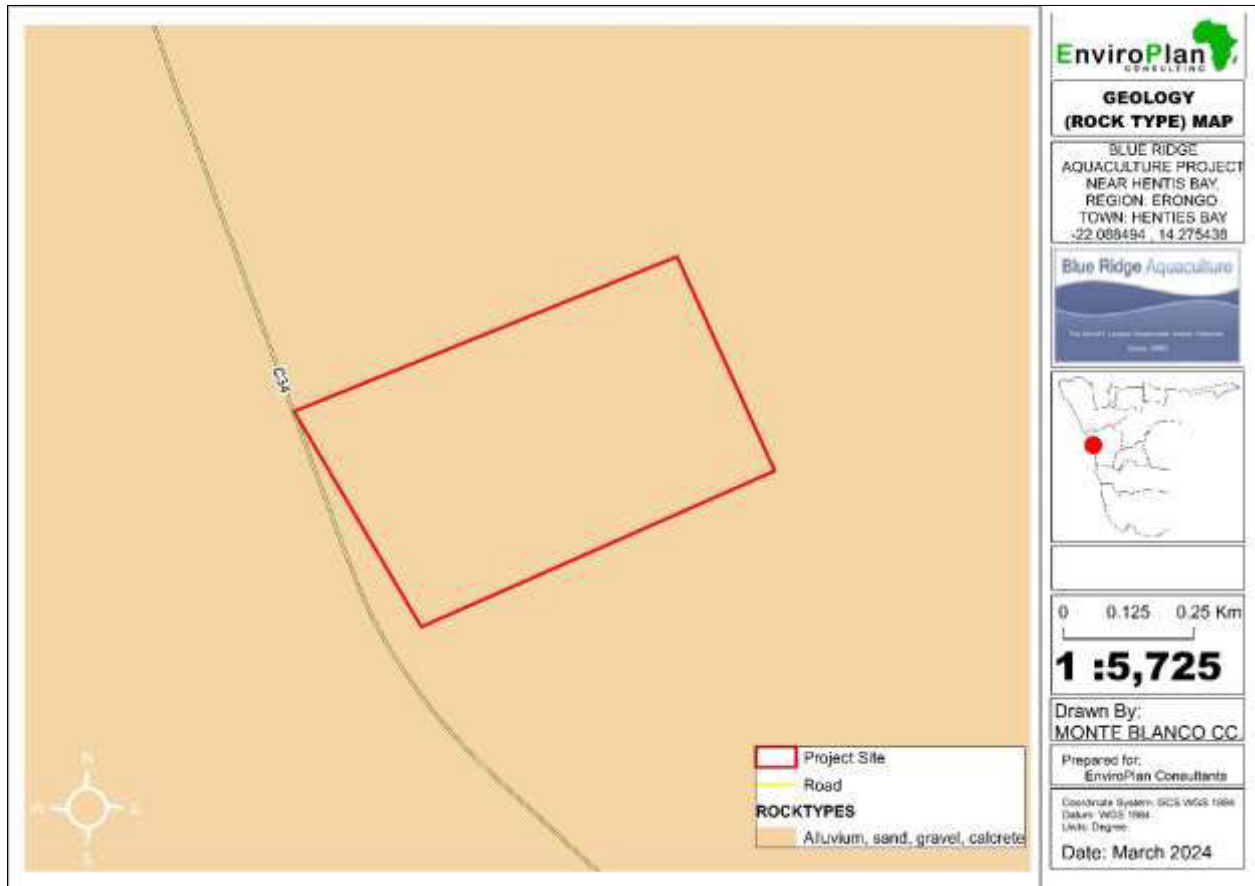
The landscape of the entire project area is characterized by the Coastal Plain as shown in Figure 16. This landscape stretches back from the coast, flat and low-lying piece of land next to the ocean. Coastal plains are separated from the rest of the interior by nearby landforms, such as mountains (National Geographic, 2023). The project site and surrounding areas are relatively with elevations ranging between 0 and 250 meters above sea level as shown on the topography map below (Figure 16).



**Figure 16: The landscape and elevation around the project site**

**5.4.3. Geology and Soils**

Henties Bay is located on the extensive Pleistocene alluvial deposits (fan delta) of the Omaruru River. These cohesive sediments, comprising sands, silts and gravels, form a sea-facing cliff, up to 20 m high, that is partly obscured by an aeolian sand drape which has slopes of up to 30° (Bully and Ward, 1988). The geology of the site is characterized by the sediments of the Namib Desert comprising alluvium, sand, gravel and calcrete as shown in Figure 17.



**Figure 17: The geological conditions of the project route**

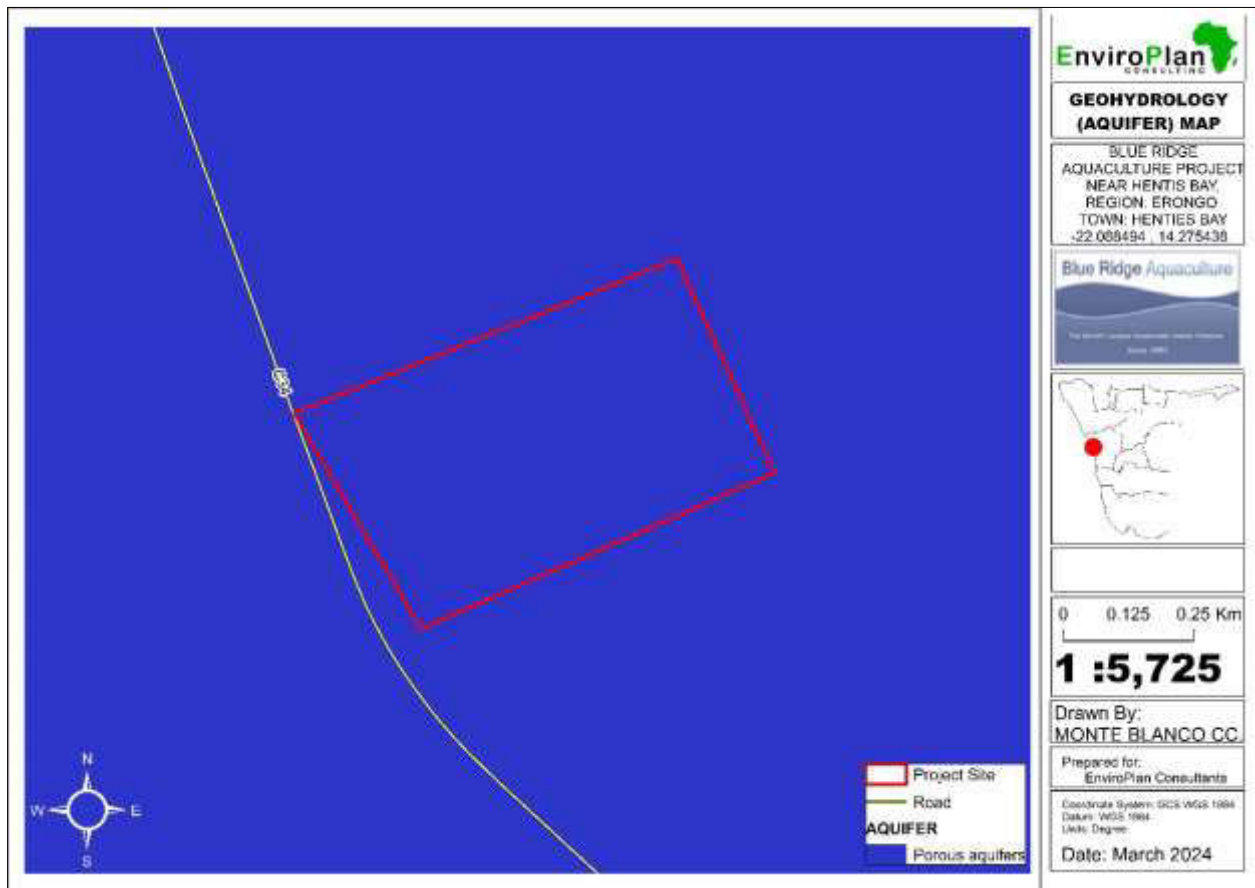
The dominant soils on and around the project site are petric gypsisols as shown on the soil map in Figure 18. Petric soils are these with a solid layer at a shallow depth that remains hard even when wet (an “indurated’ layer). According to Mendelsohn et al. (2002), gypsisols are characterized by the accumulation of calcium sulphate that are restricted to the very dry areas of the central Namib. The calcium sulphate is dissolved out of the rock and soil, and then carried by percolating water beneath the surface, where it remains in a variety of forms such as powder, pebbles, stone or gypsum crystals. These soils are known to have a very levels of fertility, thus, only hardest of plants would grow in these soils.



Figure 18: The soils overlying the project area and immediate surroundings

### 5.5. Hydrogeology (Groundwater) and Hydrology (Surface water)

The project site, near Henties Bay Town falls under the Coastal Central Namib Area Groundwater Basin. The potential of bedrock aquifers in this Basin is very limited. This is partly due to the low rainfall and lack of recharge, and generally unfavourable aquifer properties of Damara Sequence rocks (Christelis and Struckmeier, 2011). According to the geohydrology map in Figure 19, the project site is characterized by porous aquifers which could be explained by the presence of unconsolidated Namib sediments (alluvium, sands, and gravel). Owing to limited groundwater potential in the project area, there are no boreholes onsite.



**Figure 19: The groundwater map of the project site**

There is not much water on the surface in Namibia due to the little rain that falls, especially on the coastal area of the country either evaporates, seeps into the ground or is rapidly drained by ephemeral rivers that dominate natural surface water systems inside the country. Water is only held for longer periods are perennial rivers on Namibia’s borders with other neighbouring countries. These rivers that can hold surface water are extremely varied, ranging from great rivers to a host of smaller rivers and channels that flow at varying frequencies (Mendelsohn, Jarvis and Robertson, 2002).

The nearest surface water body within proximity of the project site is the sea, bordering the site to the west about 2km away. To the north (in an easterly-westerly trend) is the present Omaruru River, and according to Bully and Ward (1988), this is a major ephemeral watercourse that follows in a south-westerly course, partly incised into the alluvial sediments for the last 8km to the Atlantic Ocean from Henties Bay. A distributary (or possibly a former main course) runs to the south of the main channel and divides Henties Bay into northern (North Dune) and southern (South Dune) sections.

A Hydrogeological Impact Assessment Report prepared for this ESIA is attached as Appendix C.



## 5.6. Ecological Environment

The project area and route falls under the Nama Karoo and Namib Desert biomes (Mendelsohn, Jarvis and Robertson, 2002). An Ecological assessment detailing the faunal and floral species of the project site area is provided in Appendix D. However, a summary of the ecology is provided under the subsections below.

### 5.6.1. Fauna

Henties Bay, situated in Namibia's Erongo Region along the Atlantic coast, is home to a variety of mammals and reptiles that have adapted to the harsh and arid desert environment characteristic of the area. While wildlife sightings can be more sporadic in this coastal desert region compared to other habitats, several species are known to inhabit the surrounding landscape.

One of the iconic mammals found in the Erongo Region is the gemsbok (oryx), a striking antelope species known for its long, straight horns and distinctive black and white facial markings. Gemsbok are well-adapted to desert conditions and can often be spotted foraging for vegetation in the sparse scrublands near Henties Bay. Another notable antelope species in the area is the springbok, known for its impressive jumping ability and swift movements across the desert terrain. Along the coastline near Henties Bay, visitors can observe colonies of Cape fur seals, particularly at locations like Cape Cross. These seals gather in large numbers and provide a fascinating glimpse into the marine mammal life of the region.

### 5.6.2. Flora

Some plant species found in the vicinity of Henties Bay include various succulents, such as the resilient desert-adapted varieties of vygies (mesembs) and euphorbias. These plants have evolved to store water in their fleshy leaves or stems, allowing them to thrive in the arid conditions. Additionally, scattered shrubs like the Namibian grape (*Trianthema hereroensis*) and drought-resistant grasses may be found in more sheltered areas. The coastal environment near Henties Bay also supports some salt-tolerant vegetation, including species like the beach evening primrose (*Oenothera glazioviana*) and the coastal sage (*Salvia africana-lutea*), which contribute to stabilizing the sandy coastal soils. Overall, the vegetation of Henties Bay and the surrounding Erongo Region reflects the resilience and adaptability of plant life in extreme desert conditions. Despite the arid climate, these unique plants play essential roles in the ecosystem and contribute to the area's



rugged natural beauty. The project area is characterized by the Namib grassland vegetation type as shown on the map in Figure 20.



Figure 20: The vegetation structure map of the project area

The major (dominant) vegetation type occurring on the project site is shown in Figure 21 below.



Figure 21: A Sandy terrain with small sand hills and vegetation growing

### 5.7. Aquaculture in Namibia

The aquaculture sector of Namibia consists of a marine and freshwater sub-sector. The relatively new marine subsector is mainly focused on the production of molluscan shellfish, and nine farms along the coast with nodes at Walvis Bay-Swakopmund, Luderitz and Oranjemund are operational.

Two species of oysters, *Crassostrea gigas* and *Ostrea edulis*, are cultivated in open water on long-lines and in shallow inshore flow through systems in baskets (FAO, 2015).

### **5.7.1. Inland Aquaculture in Namibia**

According to the Ministry of Fisheries and Marine Resources (2024), inland freshwater fisheries are important in less arid areas such as the Zambezi and Kavango regions in the northeast and the Omusati, Kunene and Oshana regions in the northwest. Commercial freshwater aquaculture of Tilapia (*Oreochromis andersonii*) and catfish (*Clarias gariepinus*) is currently undertaken at all aquaculture establishments throughout the country.

About 50% of the rural population live in the northern regions and derive food, income and informal employment from inland fish resources. Inland aquaculture includes on-land facilities and utilizes ponds, tanks, and enclosures that are dependent upon the culturists for maintenance of water quality, food supply, and waste removal (Ministry of Fisheries and Marines Resources, 2024).

Furthermore, according to the FAO (2015), on the Tilapia species, *Oreochromis andersoni* and catfish, *Clarias gariepinus*, these currently dominate the freshwater aquaculture initiatives in Namibia, although exotic species such as *Oreochromis niloticus* and *Oreochromis mossambicus* are farmed for commercial purposes at Hardap in the Karas Region. The spreading of exotic species is prohibited in Namibia and is addressed in the Master Plan for Aquaculture. The MFMR launched the National Aquaculture Master Plan (2013-2023), which provides a roadmap for a sustainable and profitable development of the marine and freshwater aquaculture sectors for the benefit of the Namibian people. The Plan was guided by the FAO Code of Conduct, lessons learned from the region and past national initiative (FAO, 2015).

## **5.8. Archaeological and Heritage Sites**

There were no distinct archaeological and heritage sites encountered during the project site visit by the Environmental Consultants. There is a cemetery for the Town but it is located close to the actual Town of Henties Bay than the project site. Apart from that, there is little scientific value due to the erosional landscape and resultant lack of artefact context.

The stakeholders and public consultation play a crucial role in an ESIA and eventual implementation of the project. Therefore, the consultation process and means are presented under Chapter 6.

## 6. PUBLIC CONSULTATION AND ENGAGEMENTS

### 6.1. Overview

The Public Participation Process (PPP) is an integral part of the Environmental and Social Impact Assessment process by providing a platform for all Interested and Affected Parties (I&APs) to obtain information about the proposed project, to review project documentation, to provide input and voice any concerns regarding the project. The process has been done as set out in Section 21 of Regulation No. 30 of the EMA. The details thereof are documented under this chapter.

As part of the PPP, newspaper adverts, public notices and consultation meetings were published and held, respectively. During the meetings stakeholders and public were afforded the opportunity to comment, ask questions and raise any concerns regarding the project implementation. All comments were recorded and considered in the Scoping Report and Environmental Management Plan that will be submitted to the MEFT for review.

The public consultation process assists the Environmental Assessment Practitioner (EAP) in identifying all potential impacts and the extent to which further investigations are required. Public consultation can also aid in the process of identifying possible mitigation measures.

In addition, conditions for environmental compliance monitoring have also been derived from the public meeting and stakeholders' recommendations.

### 6.2. Approach

#### 6.2.1. Stakeholders or Interested and Affected Parties (I&APs)

An I&AP is defined under the Environmental Management Act (2007) as:

- “Any person, group of persons or organization interested in or affected by an activity, and
- (b) Any organ of state that may have jurisdiction over any aspect of the activity”.

EnviroPlan identified specific I&APs, who were considered interested in and/or affected by the proposed activities through the following means:

- Information for the applicable local authorities was obtained from the existing stakeholder database,

- Notification letters and/or emails were sent to those possibly interested and affected by the proposed project, and
- Notices were placed in the local newspapers requesting any potentially affected or interested members of the public to register as I&APs.

A summary of the I&APs identified is presented in Table 6 and attached hereto as Appendix E1.

**Table 6: Summary of Identified stakeholders (I&APs)**

List of I&APs	Description
	Ministry of Environment, Forestry and Tourism and representatives (Directorate: Wildlife & National Parks)
	Ministry of Agriculture, Water and Land Reform (MAWLR)
	Ministry of Fisheries and Marines Resources (MFMR)
	Ministry of Works and Transport
	Ministry of Health and Social Services
	National Heritage Council of Namibia
	Ministry of Urban and Rural Development
	NamWater
	Roads Authority of Namibia
	Erongo Regional Council
	Arandis Constituency
	Henties Bay Municipality
	Hangana Artisanal Fishing Association
	Religious Groups (Roman Catholic Church, Henties Bay)
	Community representatives and Local community members
Namibian Environment and Wildlife Society	

### 6.2.2. Communication with I&APs

Regulation 21 of the EIA Regulations details steps to be taken during a given public consultation process and these have been used in guiding this process. Communication with I&APs regarding the proposed development was facilitated through the following means and in this order:

Meetings were held with the relevant authorities and members of the public as follows and as summarized in Table 7.

**Table 7: Consultative engagement conducted**

Date and Time	Activity	Venue/Place
Thursday, 04 April 2024: 09h30	Stakeholder Consultative Meeting	Atlantic Villa Guesthouse Conference Room, Plover Street in Swakopmund
Thursday, 04 April 2024: 14h00	Public Consultative Meeting	Roman Catholic Church Hall in Henties Bay

- A Background Information Document (BID) containing descriptive information about the proposed activities was compiled and sent out to all identified and registered I&APs,
- Site notices were compiled in English and fixed at conspicuous locations in Henties Bay and Swakopmund. The notices contained information on the project, participation details and meeting invitations.

Public consultation was carried out according to the Environmental Management Act's EIA Regulations. After the initial notification, the I&APs were given three weeks to submit their comments on the project until the 30<sup>th</sup> of April 2024. The comment period will remain open until the final scoping report is submitted to MEFT.

### 6.3. Printed Media

#### 6.3.1. Background Information Document

A Background Information Document (BID) was drafted at the onset of the ESIA process to act as a useful information handout about the project. In addition, the BID provided details on the public consultation process with contact details for further information. This document was advertised for availability through various means of newspaper articles, public meeting and electronic mail; see Appendix E of this document.

#### 6.3.2. Building a Stakeholder Database

A stakeholder database for the project collected through a variety of means. During the advertisement of the project (through public notices in local newspapers and site-notices) the list was augmented as Interested & Affected Parties (I&AP) registered and contact information of stakeholders updated, please refer to Appendix E1.

#### 6.3.3. Newspaper Advertisements & Articles

Newspaper notices about the proposed project and related EA processes was circulated in two newspapers for two weeks. The newspapers in which the adverts were placed are *Namib Times*

dated 22 and 28 March 2024 and *New Era* dated 25 March and 02 April 2024. The newspaper advert briefly explained the activity and its locality and inviting members of the public to register as I&APs (under Appendix E). The details of the newspapers used for the project advertisement are presented in Table 8 below.

**Table 8: The stakeholders and public consultation methods undertaken during the ESIA**

<b>Newspaper</b>	<b>Area of Distribution</b>	<b>Language</b>	<b>Placement Date</b>
The <i>New Era</i> (Refer to Appendix E2)	Country Wide	English	25 March & 02 April 2024
<i>Namib Times</i> (Refer to Appendix E2)	Country Wide	English	22 & 28 March 2024
Site notice (Appendix E3)	Henties Bay (OK Market in Omdel Location, U-Save/Shoprite and at the Municipality)	English	24 March 2024
	Swakopmund (Municipality and Erongo Regional Council)	English	27 March 2024
Stakeholders Meeting - Meeting minutes attached in Appendix E4	Atlantic Villa Guesthouse, Swakopmund	English	04 April 2024
Public Meeting - Meeting minutes attached in Appendix E4	Roman Catholic Church Hall, Henties Bay	English, with occasional translations in Oshiwambo and Afrikaans	04 April 2024

The public notices as placed at the strategic locations mentioned above are shown from Figure 22 to Figure 24.





Figure 22: Public Consultation Notification Posters at some U-Save and Municipality in Henties Bay



Figure 23: Public Consultation Notification Posters at OK Market in Henties Bay



Figure 24: Public Notification Posters at the Municipality and Erongo regional Council in Swakopmund

#### 6.3.4. Stakeholder Meetings & Key Conversations

Consultation meetings (stakeholders and public) were conducted in Swakopmund and Henties Bay on 04 April 2024 - Figure 25 and Figure 26. Pertinent issues relating to the projects from both meetings were discussed, recorded and included in the meeting minutes attached hereto as part of Appendix E4.

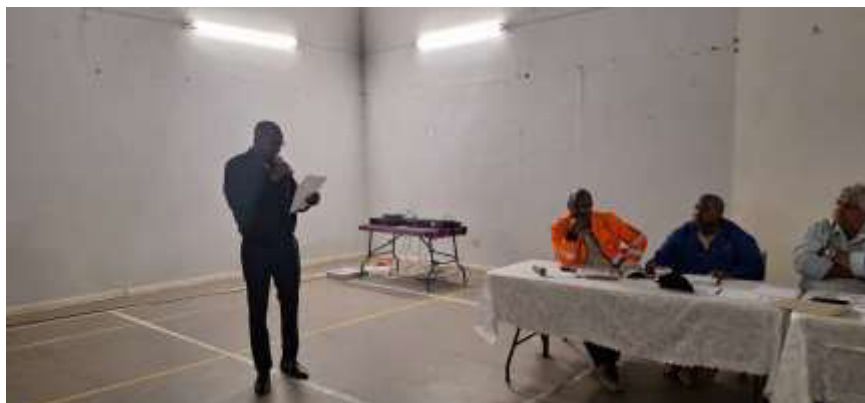


**Figure 25: Stakeholders Meeting Proceedings in Swakopmund on 04 April 2024**



**Figure 26: Public Meeting Proceedings in Henties Bay on 04 April 2024**

Another community meeting was held by the Municipality in Henties Bay on the 30<sup>th</sup> of April 2024 to consult the community on the plan to avail the land to Blue Ridge Aquaculture Africa for the proposed project. Some photos taken during the meeting proceedings are shown in Figure 27 below.







**Figure 27: Community-Henties Bay Municipality Meeting Proceedings on 29 April 2024**

**6.3.5. Comments and review period**

Various stakeholders have registered and provided comments from the onset of the public consultation process and the initial information sharing through the BID, newspaper and site notices. The public commenting period from the first newspaper advert spanned for 30 Man days and the Scoping Report and ESMP was made available to the public and stakeholders for comment and review.

Attendance registers, comments and proof of stakeholder’s engagement are attached under Appendix E of this ESSR. Some comments received after the public consultation meeting (on the 08<sup>th</sup> of April 2024) have been incorporated into this ESSR and presented as received under Appendix E5.

**6.4. Key issues raised in the Consultation Process: Meetings and Written Comments**

The main concerns or comments made in the three meetings and comments shared after the first two meetings with the EnviroPlan Consultants are provided in Table 9 below.

**Table 9: Key issues raised during consultation process and possible solutions (also refer to the ESMP)**

Key issue	Possible solutions
The supply of water and electricity to such a big project with already scarce services (especially water) in the Region	The project will be supplied with water from desalination. NamWater connection will be a backup water supply and not the primary. For electricity, the project will use generators during construction and for operations, a 10MW solar connection will be utilized. Therefore, the impact on local water resources and electricity is minimal, thus, not significant.

Key issue	Possible solutions
Potential pollution of water owing to the mismanagement of fish medication substances during operations	The substances will be properly handled and contained onsite until such a time that they can be safely transported offsite for treatment at designate facility. The mitigation measures provided in the Hydrogeology report will be implemented.
Waste generation from excess feed and fecal materials as well as handling might be a problem (soil and water pollution).	Same as the preceding solution.
Project proponents hiring outsiders at the expense of local people who are also unemployed.	The Proponent took note of this and agreed that the Proponent will need to liaise with the Office of the Constituency Councillor, Municipality and local youth associations for announcing the employment opportunities. This way, the issue of people migrating to Henties Bay for jobs will be minimized.
The issue of more people migrating to Henties Bay due to the presence of such a large-scale facility. Increased crimes and pressure on the available services (water, electricity and possible land for housing).	Although it is difficult to control who comes to a town for opportunities, this can be mitigated by implementing the solution under the preceding point.
The specific species of Tilapia to be farmed with and how the Proponent will ensure that the species will be contained and not invade the local water sources.	The Tilapia to be farmed with is <i>Oreochromis niloticus</i> . There will be high security at the facility and that minimal access in the breeding ponds will be allowed. No live fish will be sold. This is also not allowed by the Ministry of Fisheries and Marine Resources during their initial engagement meetings with Blue Ridge Aquaculture Africa.
The depletion of Omdel aquifer may be depleted by huge project water demand of 400m <sup>3</sup> per day).	The project will be supplied from a desalination plant and not depending on the existing water supply for the Town (from NamWater). The NamWater representation for the area indicated that, the amount of water required by Blue Ridge Aquaculture Africa is not significant, thus, the impact is not significant, given that NamWater supply would only serve as a backup.

Key issue	Possible solutions
Electricity and backup may create problems.	The project will not rely on ErongoRED for power supply but supplied by a 10MW solar. Therefore, the pressure on the existing electricity grid will not be there for the project operations. For construction, diesel powered generators will be utilized

## 6.5. Continued Consultation Methods

The I&APs were informed to continue submitting their comments in forms of a clearly handwritten letter, email, and or mobile short messages addressed to EnviroPlan. Written communication is encouraged for proper record of issues raised and tracking compared to telephone calls.

## 6.6. Stakeholder Engagement Plan (SEP)

The SEP is a living document that will need to be developed and updated as and when necessary, and monitored by Blue Ridge Aquaculture Africa throughout the project life cycle.

### 6.6.1. Aim of a Stakeholder Engagement Plan

The document will be aimed at ensuring that a consistent, comprehensive and coordinated approach is taken to stakeholder engagement and project disclosure throughout the project phases. The documented also serves as a demonstration and commitment tool for the Proponent, showing to local and international stakeholders the company's engagement approach and implementation. Blue Ridge African will be committed to be fully compliant with the Namibian EIA Regulations and the IFC Standards pertaining to stakeholder engagement and involvement in the project.

Furthermore, the SEP aims to ensure that stakeholder engagement is conducted on the basis of timely, relevant, and accessible information. In this way, the SEP will be used to ensure that stakeholders are given sufficient opportunity to raise their opinions and concerns, and that these concerns influence project decisions.

To summarize, the SEP is aimed at:

- Providing the approach to stakeholder engagement, showing how this will be integrated into the rest of the ESIA process and throughout the project,
- Identifying main categories of stakeholders and how they will be engaged during project implementation, and
- Identifying ways to document engagement undertaken throughout the project.

### 6.6.2. Objectives of the Stakeholder Engagement

The objectives of stakeholder engagement during the ESIA process as well as throughout the project include the following (after WSP et al., 2017):

- **Ensuring Understanding:** An open, inclusive and transparent process of engagement, communication will be undertaken by the Proponent to ensure that stakeholders are well informed about the proposed project. Information will be disclosed as early and as comprehensively as possible.
- **Involving Stakeholders in the Assessment:** Stakeholders will be included in the scoping of issues during the ESIA consultation period, and the assessment of impacts, and management/mitigation measures defined in the ESMP. Stakeholders can greatly contribute to the ESIA process by providing local knowledge and information for the social baseline and informing the social impact assessment. This is also to ensure that grievances from affected communities and or other stakeholders are responded to and managed appropriately.
- **Building Relationships:** Through supporting open dialogue, engagement will help to establish and maintain a productive relationship between Blue Ridge Aquaculture Africa and stakeholders. This will not only help the Proponent with the ESIA but also build trust and strengthen future relationships between them and stakeholders.
- **Managing Expectations:** It is important to ensure that the proposed project does not create, or allow, unrealistic expectations to develop amongst stakeholders about potential project benefits. The engagement process will serve as a mechanism for understanding and managing stakeholder and community expectations, by disseminating accurate information in an easily understandable manner.
- **Ensuring Compliance:** The process is designed to ensure compliance with both local regulatory requirements and international best practice with regards to stakeholder engagement and involvement in the project.

### **6.6.3. Grievance Redressal Mechanism (GRM)**

A process will be established for stakeholders and members of the public to communicate any concerns or complaints about the project during its implementation, i.e., from the construction throughout the operational and maintenance phase. This grievance mechanism will be implemented throughout the project cycle, providing a channel of communication from the public to the managers of the project, so that problems with the project can be resolved.

### **6.6.4. Objectives of the Grievance Mechanism**

The objectives of the grievance mechanism will be to:

- Clarify the nature of the grievance,
- Provide stakeholders with a platform to submit their grievances and or comments pertaining to the Project activities,
- Record the grievances received as well as comments in a grievance log,
- Review and investigate the grievances from a stakeholder and or public,
- Provide responses (solution to the grievances) to the stakeholder and ensure that they are satisfied with the mitigating action or solution (response) provided, and

- Communicate the responses to the stakeholders and provide satisfactory feedback or action to their grievances.

#### **6.6.5. Proposed Grievance Procedures**

The grievances associated with the Project will be handled by Proponent through the Project Manager, Contractor (Engineering, Procurement and Construction), and subsequent Operations & Maintenance Manager. These will include the following steps and timelines:

- A grievance registration book will be available on-site,
- A grievance form for the stakeholder to complete (personal details and grievance details). One copy will be submitted to the appropriate project phase Manager onsite and another copy to the Proponent's Project Manager,
- Open discussion of the issue or problem by the Project Manager and onsite respective phase Manager, to find solutions to the problem(s),
- Communication of the resolution to the concerned stakeholder(s), and
- If the stakeholder is not satisfied with the proposed resolution, it can be appealed.

Stakeholders will also be encouraged to submit anonymous grievances, if not comfortable providing their identity. The grievance registration form will be attached to the ESMP.

The Grievance Mechanism stipulates the need for the following:

- Training – those who are responsible for addressing grievances, must have detailed knowledge on how the project's grievance mechanism work and who to speak with on each category of issues.
- Record Keeping – all aspects of the grievance management process must be comprehensively documented and accurate records should be maintained.
- Reporting – Blue Ridge Aquaculture Africa will compile information relating to engagement activities as appropriate for the monthly social and environmental reports

### **6.7. Feedback from the I&APs on the Draft ESIA Scoping Report**

The draft ESIA Scoping Report and ESMP were circulated to the registered I&APs for review and comments from 22 May 2024 to 31 May 2024 - Appendix E6. No further comments were received.

### **6.8. Conclusion**

EnviroPlan concludes that the public participation was extensive and transparent enough to ensure any comments or issues regarding the proposed project were addressed and to suggest possible mitigation measures.

## 7. ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACTS

### 7.1. Overview

The proposed activities have impacts on certain biophysical and social features. The identified impacts were assessed in terms of probability (likelihood of occurring), scale/extent (spatial scale), magnitude (severity) and duration (temporal scale) as presented in Table 10, Table 11, Table 12 and Table 13. To enable a scientific approach to the determination of the environmental significance, a numerical value is linked to each rating scale. This methodology ensures uniformity and that potential impacts can be addressed in a standard manner so that a wide range of impacts are comparable.

### 7.2. Key Potential Impacts Identified

The proposed development is associated with potential impacts, positive and negative (adverse).

#### 7.2.1. Positive Impacts

- Employment creation to both skilled, semi-skilled and unskilled (casual labour),
- In phase 2, the project will expand its footprints of fish feed to other regions such as the Kavango and Zambezi Regions for plantations that can produce the feed. Thus, promoting economic growth in these regions too and not just in Henties Bay (Erongo Region),
- Environmental preservation through the use of less freshwater, land resources and fewer greenhouse gas emissions required to produce good through aquaculture compared to traditional agriculture,
- A domestic supply of healthy, sustainable protein. <sup>3</sup> Aquaculture has the potential to significantly address nutritional challenges, especially in developing countries with persistent micronutrient deficiencies, considerable nutritional reliance on aquatic foods (including wild capture and aquaculture), declining marine catches due to overfishing, climate change, and reduced local nutrient supply due to rising exports,
- Blue Ridge beneficial impact to the environment through the:
  - 91% reduction of food miles relative to imported, for instance, Tilapia

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<sup>3</sup> Shepon, A., Gephart, J. A., Golden, C. D., Henriksson, P. J. G, Jones, R. C., Koehn, J. Z & Eshel, G. (2021). Exploring sustainable aquaculture development using a nutrition-sensitive approach. *Global Environmental Change: Science Direct*. Available online <https://www.sciencedirect.com/science/article/abs/pii/S0959378021000649#preview-section-abstract>

- 95% water reuse facility
- 365 days of indoor growing (eliminating weather and seasonal constraints)
- 20 times reduction of land area usage relative to traditional aquaculture, and
- Contribution to the national economic development through payment of taxes (revenues).

### **7.2.2. Negative (Adverse) Impacts**

The preliminary adverse or negative impacts identified for the proposed project are as follows:

- Physical soil disturbance resulting in compaction and erosion as well as pollution during construction,
- Impacts on local fauna and flora owing to project implementation. This include habitat alteration (modification) and fragmentation and loss,
- Visual impact (aesthetic value): contrasting surroundings due to erection of project structures and installation of infrastructures,
- Impacts on surface and groundwater resources (quality owing to pollution from accidental spillages of fuels and oils during construction) as well as potential pollution from mishandling and mismanagement of fish medication substances during operations,
- Air quality impact owing to dust generation and emissions from vehicles and machinery around the site,
- Waste generation (littering),
- Potential social conflicts owing to land use change,
- Cultural, heritage and archaeological impacts during site preparation for construction,
- Vehicular traffic safety during the construction phase,
- Aquaculture can both contribute to and be affected by climate change. Some aquaculture practices, such as Tilapia farming in coastal areas can be vulnerable to sea level rise and extreme weather events. Extreme weather events can create conditions conducive to disease outbreaks among Tilapia,
- Invasion of fish species in natural local water due to their mishandling at the facility (project site) and or transportation of live fish from the facility to consumers or customers (markets) or fish escaping from the fish tanks (ponds) onsite into the environment,
- Occupational and community health and safety risks/hazards during the construction and operational phases, and

- Cumulative impacts of the project operation (Environmental Compliance Monitoring and reporting to be done).

### 7.3. Methodology for Impact Assessment

It is assumed that an assessment of the significance of a potential impact is a good indicator of the risk associated with such an impact. The following process will be applied to each potential impact:

- Provision of a brief explanation of the impact,
- Assessment of the pre- and post-mitigation significance of the impact, and
- Description of recommended mitigation measures.

The recommended mitigation measures prescribed for each of the potential impacts contribute towards the attainment of environmentally sustainable operational conditions of the project for various features of the biophysical and social environment.

The following criteria were applied in this impact assessment:

#### 7.3.1. Extent (spatial scale)

Extent is an indication of the physical and spatial scale of the impact. Table 10 shows rating of impact in terms of the extent of spatial scale.

**Table 10: Extent or spatial impact rating**

Low (1)	Low/Medium (2)	Medium (3)	Medium/High (4)	High (5)
Impact is localised within the site boundary: Site only	Impact is beyond the site boundary: Local	Impacts felt within adjacent biophysical and social environments: Regional	Impact widespread far beyond site boundary: Regional	Impact extend National or over international boundaries

#### 7.3.2. Duration

Duration refers to the timeframe over which the impact is expected to occur, measured in relation to the lifetime of the project. Table 11 shows the rating of impact in terms of duration.

**Table 11: Duration of Impact**



Low (1)	Low/Medium (2)	Medium (3)	Medium/High (4)	High (5)
Immediate mitigating measures, immediate progress	Impact is quickly reversible, short term impacts (0-5 years)	Reversible over time; medium term (5-15 years)	Impact is long- term	Long term; beyond closure; permanent; irreplaceable or irretrievable commitment of resources

### 7.3.3. Intensity, magnitude / severity

Intensity refers to the degree or magnitude to which the impact alters the functioning of an element of the environment. The magnitude of alteration can either be positive or negative. These were also taken into consideration during the assessment of severity. Table 12 shows the rating of impact in terms of intensity, magnitude or severity.

**Table 12: Intensity, magnitude and severity of impact**

Type of Criteria	Negative				
	H-(10)	M/H (8)	M-(6)	M/L (4)	L-(2)
Qualitative	Very high deterioration, high quantity of deaths, injury of illness / total loss of habitat, total alteration of ecological processes, extinction of rare species	Substantial deterioration, death, illness or injury, loss of habitat / diversity or resource, severe alteration or disturbance of important processes	Moderate deterioration, discomfort, partial loss of habitat / biodiversity or resource, moderate alteration	Low deterioration, slight noticeable alteration in habitat and biodiversity. Little loss in species numbers	Minor deterioration, nuisance or irritation, minor change in species / habitat / diversity or resource, no or very little quality deterioration.

### 7.3.4. Probability of occurrence

Probability describes the likelihood of the impacts occurring. This determination is based on previous experience with similar projects and/or professional judgment. See Table 13 for impact rating in terms of probability of occurrence.

**Table 13: Probability of occurrence impact rating**

Low (1)	Low/Medium (2)	Medium (3)	Medium/High (4)	High (5)
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Improbable; low likelihood; seldom. No known risk or vulnerability to natural or induced hazards.	Likely to occur from time to time. Low risk or vulnerability to natural or induced hazards	Possible, distinct possibility, frequent. Low to medium risk or vulnerability to natural or induced hazards.	Probable if mitigating measures are not implemented. Medium risk of vulnerability to natural or induced hazards.	Definite (regardless of preventative measures), highly likely, continuous. High risk or vulnerability to natural or induced hazards.
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### 7.3.5. Significance

Impact significance is determined through a synthesis of the above impact characteristics. The significance of the impact “without mitigation” is the main determinant of the nature and degree of mitigation required. As stated in the introduction to this chapter, for this assessment, the significance of the impact pre-and post-mitigation actions was measured.

Once the above factors (Table 10, Table 11, Table 12 and Table 13) have been ranked for each potential impact, the impact significance of each is assessed using the following formula:

$$SP = (\text{magnitude} + \text{duration} + \text{scale}) \times \text{probability}$$

The maximum value per potential impact is 100 significance points (SP). Potential impacts were rated as high, moderate or low significance, based on the following significance rating scale - Table 14.

**Table 14: Significance rating scale**

<i>SIGNIFICANCE</i>	<i>ENVIRONMENTAL SIGNIFICANCE POINTS</i>	<i>COLOUR CODE</i>
High (positive)	>60	H
Medium (positive)	30 to 60	M
Low (positive)	<30	L
Neutral	0	N
Low (negative)	>-30	L
Medium (negative)	-30 to -60	M
High (negative)	>-60	H

For an impact with a significance rating of high (negative), mitigation measures are recommended to reduce the impact to a low or medium significance rating, provided that the impact with a medium significance rating can be sufficiently controlled with the recommended mitigation

measures. To maintain a low or medium significance rating, monitoring is recommended for a period to enable the confirmation of the significance of the impact as low or medium and under control.

The impact assessment of the proposed activities on the biophysical and social environment is given below.

## 7.4. Assessment of Negative Impacts from Project Construction and Operations

The potential impacts from the proposed project activities are described, and assessed under this subheading under respective features. The management and mitigation measures are in a form of management action plans are provided in the Draft ESMP.

### 7.4.1. Biodiversity: Fauna and Flora and Habitat Degradation

#### A. Fauna

Construction activities may involve clearing natural habitats such as coastal dunes or wetlands, leading to habitat loss and fragmentation, disruption of ecosystem functions, owing to habitat alteration (modification).

The introducing of non-native species for aquaculture can lead to genetic pollution and competition with native species, disrupting local ecosystems and causing biodiversity loss. Escapes from aquaculture facilities and or the transportation of live fish from the facility to consumers can also introduce diseases to wild populations. The Fish species may invade into local water sources.

In terms of local fauna, the potential impact will be on the movement of heavy vehicles that may lead to road kills of wildlife in the area. Another impact would be the illegal hunting of wildlife by the project related personnel during construction, given that the site is bordering the Dorob National Park which unfenced to restrict animal movements. Therefore, without any mitigation measures, the impact significance will be of medium rating. The impact is assessed under Table 15.

**Table 15: Assessment of the project impacts on fauna and invasive of species into local water**

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre- mitigation	M - 3	M - 3	M - 6	M/H - 4	M – 48
Post- mitigation	L - 1	L- 1	L- 2	L - 1	L - 4

#### B. Flora

The project site has little to no vegetation cover in some areas, i.e., scarcely distributed vegetation. Some of this little vegetation falls within the site footprint, thus, may need to be removed if found to be necessary. This may lead to habitat destruction for some fauna such as reptiles and birds. As such, care will need to be taken during the removal of vegetation for site preparation to ensure minimal disturbance onsite and immediate site area.

Aquaculture infrastructure such as ponds, cages, and nets can also physically alter coastal and marine habitats.

As indicated under the floral baseline section and Ecological report, the floral biodiversity and endemism of the area is low, therefore, the impact will be minimal. However, without any implementation of mitigation measures, the impact is assessed to be of “medium” significance and after mitigation the impact is assessed to have a “low” significance as presented in Table 16.

**Table 16: Assessment of the impacts on Vegetation**

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre- mitigation	L/M - 3	L/M - 5	M - 6	M – 3	M - 42
Post- mitigation	L - 1	L- 1	L- 2	L - 1	L-4

#### **7.4.2. Resources Use**

Although aquaculture projects often requires large amounts of resources such as water, energy, and feed, the proposed project near Henties Bay will utilize water from desalination and energy from solar. Therefore, no pressure on existing water and energy sources. However, the statement may be true for the feed because about 30 tonnes of feed will be required. The plan is to expand the projects footprints of benefit to other regions such as Kavango and Zambezi for the production and supply of fish feed (plantation of soya for soya oil) to the project. The production of feed, in particular, can have significant environmental impacts, including overfishing of wild fish stocks for fishmeal and fish oil.

#### **7.4.3. Land Use (Aesthetic Value)**

The presence of construction vehicles and equipment near the C34 for longer periods would introduce new and additional elements in short-range views resulting in visual nuisance.

<sup>4</sup>When assessing an aesthetic value of an area, there are three described factors that are considered, and defined the aesthetic character and quality. These are as follows:

- **Vividness**: The visual power or memorability of landscape components as they combine in striking or distinctive visual patterns.
- **Intactness**: The visual integrity of the natural and human-built landscape and its freedom from encroaching elements. This factor can be present in well-kept urban and rural landscapes, as well as in natural settings.
- **Unity**: The visual coherence and compositional harmony of the landscape considered as a whole. It frequently attests to the careful design of individual components in the landscape.

Viewer sensitivity is also considered when determining the impacts of a visual change; however, the proposed project would be established at the selected site near the road, and also within 5km of the expanding Henties Bay Town towards the project site. Therefore, viewer sensitivity is expected to be minimal. The impact significance is considered low and therefore, not significant. Regardless, the impact is assessed in Table 17.

**Table 17: Assessment of the impacts on aesthetic values**

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre- mitigation	M - 3	M - 3	M - 6	M/H - 4	M – 48
Post- mitigation	L - 1	L- 1	L- 2	L - 1	L-4

#### **7.4.4. Climate Change**

Aquaculture can both contribute to and be affected by climate change. Some aquaculture practices, such as Tilapia farming in coastal areas can be vulnerable to sea level rise and extreme weather events. Extreme weather events can create conditions conducive to disease outbreaks among Tilapia populations. Tilapia farms located in low-lying coastal regions may face inundation as sea levels rise, leading to flooding of ponds and infrastructure. Additionally, aquaculture operations emit greenhouse gases, primarily through the production and use of feed, energy consumption, and waste decomposition.

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<sup>4</sup> Olinda Last Mile Underserved Broadband Project: Aesthetics.  
<https://ia.cpuc.ca.gov/environment/info/ene/olinda/documents/5.1%20Aesthetics.pdf>

Pre-implementation of mitigation measures, the impact is rated as of medium significance. However, upon mitigation (post-mitigation), the significance will change from medium to low rating. The impact is assessed below (Table 18).

**Table 18: Assessment of impacts of climate change on the project and project on climate**

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre- mitigation	M - 3	M - 3	M - 6	M/H - 4	M - 48
Post- mitigation	L - 1	L - 1	M/L - 4	M/L -2	L - 12

#### 7.4.5. Soils and Water Resources Pollution

Improper handling, storage and disposal of fish feed, faecal, chemicals, hydrocarbon products, hazardous materials onsite may lead to soil, surface and groundwater contamination, in case of significant (large volumes of) spills and leakages. The impact would be a concern if significant volumes of fuels or wastewater spills onsite during rainy season, given the fact that the site is near the Omaruru River. Thus, in case of such an incident, the surface water resources would be impacted through run-off into River, particularly during the flash floods rainy seasons.

The intensification is associated with health-related issues of the stocked species due to the stress of the animals and opportunistic pathogens and microscopic organisms such as bacteria, virus, fungi and parasite. According to Dinesh et al., (2023), fish diseases pose severe economic losses and are considered as the major bottleneck for aquaculture production and development. Different species of *Streptococcus* bacteria are known to infect both marine as well as freshwater cultured fishes including the Tilapia culture (Dinesh et al., 2023). Therefore, during operations, there is a risk of pollution from mishandling and mismanagement of fish medication substances onsite. If not properly managed, these pollutants can degrade water quality, leading to eutrophication, oxygen depletion, and harmful algal blooms.

Aquaculture operations can generate organic waste and nutrient runoff that can lead to water pollution and eutrophication, especially if care is not taken to prevent this from happening in the Omaruru River, which is closest to the site.

Without any mitigation measures implemented, the impact can be rated as of a “medium” significance. After the implementation of the mitigations, the impact will be significantly reduced to “low” rating. The assessment of this impact is presented in Table 19.

**Table 19: Assessment of the impacts on soil and water resources**

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
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Pre- mitigation	M: -3	M: -3	M / L: -4	M / H: 4	M: -40
Post- mitigation	L - 1	L / M - 2	L - 2	L / M -2	L - 10

#### 7.4.6. *Water Resources Abstraction and Use*

The abstraction of more water than it can be replenished from low groundwater potential areas would negatively affect communities that depend on the same low potential groundwater resource (aquifer). However, the project will not rely on groundwater resources as it will be supplied from a desalination plant. Therefore, the impact is not significant, thus, rated as low. Regardless, mitigation measures have been provided. The assessment is presented in Table 20 below.

**Table 20: Assessment of the impacts on water resource use and availability**

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre- mitigation	L/M - 1	L/M - 4	M - 6	M - 1	M - 11
Post- mitigation	L - 1	L - 1	L - 2	L - 1	L - 4

#### 7.4.7. *Archaeology, Cultural and Heritage Resources*

The proposed construction activities would have a potential impact on archaeological and heritage resources would be through the inadvertent unearthing of buried objects especially during trenching for site preparation. There are no known or observed surface heritage sites or objects onsite. However, the absence of such resources on the surface onsite does not mean that such sites cannot be encountered during excavation works. Therefore, the necessary measures will be implemented through the Heritage Council's Chance Finds Procedure. Without any mitigation measures implemented, the impact can be rated as of a "medium" significance. After the implementation of the mitigations, the impact will be significantly reduced to "low" rating. The assessment of this impact is presented in Table 21.

**Table 21: Assessment of the impacts on archaeological and heritage resources**

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre- mitigation	L/M - 1	L/M - 4	M - 6	M - 1	M - 11
Post- mitigation	L - 1	L - 1	L - 2	L - 1	L - 4

#### 7.4.8. *Air Quality (Dust Generation and Emissions)*

During preparation of the site for the proposed project, the presence of machinery such as excavators preparing the site may lead to the generation of dust which could impact the surrounding air quality. This may pose a negative health impact on the people and vegetation around the site. Without any mitigation measures implemented, the impact can be rated as of a "medium"

significance. After the implementation of the mitigations, the impact will be significantly reduced to “low” rating. The assessment of this impact is presented in Table 22.

**Table 22: Assessment of the impacts of dust generation**

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre- mitigation	L/M - 3	L/M - 5	M - 6	M – 3	M - 27
Post- mitigation	L - 1	L- 1	L- 2	L - 1	L - 4

#### **7.4.9. Occupational & Community Health and Safety**

Project personnel (workers) may be exposed to health and safety risks associated with the construction works. These are in terms of accidental injury, owing to either minor (i.e., superficial physical injury) or major (i.e., involving heavy machinery or vehicles) accidents. The lack of protective equipment and or know-how to properly use these protective equipment may lead to safety and health risks for the workers. Moreover, workers may be potentially exposed to the following risks while onsite:

- Heat (extreme high temperatures leading to dehydration),
- Unfenced or unmarked trenching and excavations while moving around the site
- Welding light and fumes,
- Structural failures,
- working at heights,
- Exposure to live electrical infrastructure onsite, and
- Potential fires and/or explosions resulting from ignition of flammable materials or gases.

Another potential impact of the project activities is the health and safety of the wildlife and people. If the project heavy vehicles, equipment and hazardous materials are not stored and secured properly, these can cause harm or injury to people and animals within the surrounding and project site area. The open (unsecured) and unrehabilitated trenches may pose a risk to wild animals during and after the project completion, if not backfilled.

The presence of hydrocarbons during construction onsite may result in accidental fire outbreaks. This could pose a safety risk to the project personnel (workers) as well as properties onsite. Added to this, the dust associated with construction works may compromise air quality of the area resulting in health risks. Furthermore, given the high unemployment in the country, the presence of construction workers in the area may lead to prostitution (sex workers are hired from the locals by



the construction team). This may result in associated social pathologies and health risks (contracting sexual transmitted viruses and diseases).

Without the implementation of any measures, the impact significance can be rated as medium. However, with adequate mitigation measures, the impact rating will be reduced to low. This impact is assessed in Table 23 below and mitigation measures provided.

**Table 23: Assessment of impacts on workers and community health and safety**

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre- mitigation	M - 3	M - 3	M - 6	M/H - 4	M - 48
Post- mitigation	L - 1	L - 1	L - 2	L - 1	L - 4

#### **7.4.10. Noise Generation**

Construction activities and the presence of construction vehicles may lead to the generation of noise which could impact the locals negatively, if not properly handled. The construction activities will be limited to the site which is far from most Town and places of residence. During operations, the actual operations are quiet and the only noise that would emanate from site is from vehicles moving to and from site. Therefore, the impact will be minimal. Without any mitigation measures implemented, the impact can be rated as of a “medium” significance. After the implementation of the mitigations, the impact will be significantly reduced to “low” rating. The assessment of this impact is presented Table 24.

**Table 24: Assessment of the impacts of noise generation**

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre- mitigation	L/M - 2	L/M - 2	M - 6	M - 3	M - 27
Post- mitigation	L - 1	L - 1	L - 2	L - 1	L-4

#### **7.4.11. Vehicular Traffic Safety**

The C34 is the main transportation route for all vehicular movement in the area connecting Henties Bay to Swakopmund and Uis. There are also nearby district roads such as D1918 and D2301 that connects Henties Bay to nearby settlements. The addition of construction vehicles during the construction phase will increase traffic flow in the area due to the delivery of supplies such as water, waste removal, procurement of construction materials, goods, services, and equipment as well as project workers from/and to Town. The project activities will mean an increased movement of heavy trucks and equipment on the C34 and local access roads which would exert more pressure on these roads, and potential accidents due to slow moving vehicles such as heavy trucks on the roads. Pre-mitigation, the impact can be rated medium and with the implementation of mitigation measures, the significance will be low as assessed in Table 25 below.

**Table 25: Assessment of the impact of project activities on vehicular traffic**

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre- mitigation	M - 3	M/H - 4	L/M - 4	M/H - 4	M - 44
Post- mitigation	L - 1	L - 1	M/L - 4	M/L - 2	L - 12

#### **7.4.12. Social Nuisance: Project establishment and Immigration of workers to the Town**

The establishment of aquaculture projects in areas can have social impacts on local communities, including changes in land use, displacement of traditional livelihoods, and conflicts over resource access and tenure. Furthermore, the presence of some out-of-area workers may lead to social annoyance to the local community. The increase number of people in Henties Bay may result in conflicts and pressure exerted on the municipal services as well as increase in crime rate. The influx of people in the Town may lead to congestion, overcrowding, and inadequate access to essential social services. The rapid population increase in Henties Bay could exacerbate housing shortages, leading to increased competition for housing, rising rents, and housing affordability challenges which may negatively impact low-income residents. The influx of people in search for work opportunities may cause social disruption, which can disrupt social dynamics within communities, leading to tensions, conflicts, and social cohesion challenges. There is also concern over cultural erosion (cultural heritage and traditional practices) within communities as newcomers may bring different cultural norms and values. This can lead to the loss of identity and cultural homogenization. In addition, the unauthorized entry to private properties by project related workers may cause tensions and crashes between the affected property owners and the Proponent.

Pre-implementation of mitigation measures, the impact is rated as of medium significance. However, upon mitigation (post-mitigation), the significance will change from medium to low rating. The impact is assessed below (Table 26).

**Table 26: Assessment of impacts on private and communal properties**

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre- mitigation	M - 3	M - 3	M - 6	M/H - 4	M - 48
Post- mitigation	L - 1	L - 1	M/L - 4	M/L - 2	L - 12

#### **7.4.13. Environmental Degradation: Waste Generation**

During construction different types of waste may be generated on-site. This may include general waste as well as hazardous waste and hydrocarbons which may cause degradation of the environment if not correctly managed and contained. Furthermore, the presence of the workforce and machinery may enhance environmental destruction within the subject site. Construction activities usually generate waste, which leads to environmental pollution. This waste would range

from solid waste, wastewater (sewage), packaging and hazardous waste. If not correctly managed and contained, these may cause degradation of the soil and water environments.

The solid waste such as papers and plastic bags may be blown into the surrounding environment and may choke wildlife roaming in the area when ingested. The waste may also pose a negative visual impact on the surrounding environment. Without any mitigation measures implemented, the impact can be rated as of a “medium” significance. After the implementation of the mitigations, the impact will be significantly reduced to “low” rating. Refer to Table 27 for impact assessment.

**Table 27: Assessment of impacts on environmental degradation**

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre- mitigation	L/M - 1	L/M - 3	M - 4	M - 4	M - 32
Post- mitigation	L - 1	L - 1	L - 2	L - 1	L-4

## 7.5. Cumulative Impacts from the Project

According to the International Finance Corporation (2013), cumulative impacts are defined as “those that result from the successive, incremental, and/or combined effects of an action, project, or activity (collectively referred to in this document as “developments”) when added to other existing, planned, and/or reasonably anticipated future ones”. Like other developments, some of the cumulative impacts to which the proposed project and associated activities potentially contribute are the following. These impacts can be adequately addressed as their respective counterparts addressed under section 7.4 above in the ESMP:

- **Habitat Degradation:** The cumulative expansion of aquaculture can lead to habitat degradation, particularly in coastal and freshwater ecosystems. Clearing of natural habitats to make way for aquaculture ponds or cages can result in loss of biodiversity, alteration of hydrology, and disruption of ecosystem functions.
- **Water Pollution:** The discharge of waste products such as uneaten feed, faeces, hydrocarbons, fish medicines, and chemicals from multiple aquaculture operations can degrade water quality in rivers such as Omaruru River and coastal areas. This pollution can lead to eutrophication, oxygen depletion, and harmful algal blooms, affecting aquatic ecosystems and human health.
- **Competition for Resources:** The cumulative demand for resources such as land, and feed by the expansion of the aquaculture operations can lead to competition with other users,

including agriculture, industry, and urban development. This competition can exacerbate conflicts over resource allocation and access.

- Genetic Pollution: The introduction of non-native species and escapees from aquaculture facilities can lead to genetic pollution of wild populations, threatening native biodiversity and genetic diversity. This can occur through interbreeding with wild populations, outcompeting native species, thus, spreading diseases and parasites.
- Spreading of diseases: The concentration of aquaculture operations in an area can increase the risk of disease outbreaks among cultured species. Disease pathogens can spread more easily in densely populated aquaculture facilities, leading to increased mortality and economic losses. Disease outbreaks in one aquaculture operation can potentially spread to neighbouring facilities, hence, amplifying the impact.
- Social and Economic Impacts: The cumulative expansion of aquaculture can have social and economic impacts on local communities. These may include changes in land use and land tenure, displacement of traditional livelihoods, and shifts in power dynamics and social structures. Additionally, the concentration of aquaculture operations in certain areas can lead to uneven distribution of benefits and exacerbate social inequalities.
- Climate Change Interactions: Aquaculture operations can both contribute to and be affected by climate change. The cumulative emissions of greenhouse gases from multiple aquaculture operations, as well as land use changes associated with aquaculture expansion, can contribute to climate change. Conversely, climate change impacts such as sea level rise, temperature increases, and extreme weather events can also affect aquaculture operations, exacerbating existing vulnerabilities

## 8. RECOMMENDATIONS AND CONCLUSION

The Environmental Scoping Study (ESIA) for the proposed aquaculture and associated activities near Henties Bay Town was carried out in accordance with the EMA and its 2012 EIA Regulations and checked against IFC Standards. The objective of the ESIA study was to identify key potential impacts, primarily the negative impacts. These were identified, described, assessed, and appropriate management and mitigation measures were made thereof for implementation by the Proponent and their contractors, as deemed necessary.

The public and stakeholders were consulted as required by Section 21 to 24 of the EIA Regulations. This exercise was done by placing notifications in the two newspapers, i.e., *New Era* and *Namib Times* as indicated herein. Consultation meetings were scheduled, and an invitations pasted both in the newspapers and frequented places in Swakopmund and Henties Bay for public attention. The meetings were held with the available stakeholders and community members in Swakopmund and Henties Bay, respectively on 04 April 2024.

Comments and issues were raised in the consultation meetings and noted down. These has been addressed and incorporated into this Report. For significant environmental and social issues, mitigation measures have been provided thereof to avoid and/or minimize their significance on these components.

Impact Assessment: Most potential negative impacts assessed have a medium rating significance. The effective implementation of the recommended management and mitigation measures accompanied by monitoring will particularly see a reduction in the significance of adverse impacts that cannot be avoided completely (from medium rating to low).

The ESIA Study has been complemented by two specialist studies:

- Hydrogeological impact assessment – to assess the impact of the project activities on the water resources (in terms of pollution since abstraction related to the project is insignificant).
- Ecological impact assessment – to assess the impact of the project activities on the faunal and floral species around the site.

EnviroPlan are confident that the potential negative impacts associated with the proposed aquaculture project and associated activities can be managed and mitigated by the effective implementation of the recommended management and mitigation measures and with more effort and commitment put on monitoring their implementation during construction.

The Proponent is encouraged to ensure that:

- All the management and mitigation measures provided herein are effectively and progressively implemented.
- All permits or approvals for the project such as land use consents, resources (water supply) utilisation permits, and associated documentations required to undertake specific site activities are obtained and renewed as stipulated by the issuing authorities should be obtained prior to project implementation on the ground. Adherence to the permits and consents and relevant specific legal requirements is required.
- All disturbed site areas are rehabilitated, as far as practicable. This includes the levelling of stockpiled topsoil, backfilling of construction trenches and holes.

To maintain the desirable rating and that the potential impacts are under control, the implementation of management and mitigation measures should be monitored by their Environmental Control Officer (ECO) on a bi-annual basis. The Monitoring the implementation will also be done to ensure that all potential impacts that might arise during implementation are properly identified in time and addressed immediately.

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# APPENDICES



**APPENDIX C: HYDROGEOLOGICAL IMPACT  
ASSESSMENT REPORT**

# **HYDROGEOLOGICAL IMPACT ASSESSMENT FOR THE PROPOSED AQUACULTURE PROJECT AND ASSOCIATED ACTIVITIES NEAR HENTIES BAY TOWN IN THE ERONGO REGION, NAMIBIA**

**Document Version: Final**

**Date: 20 April 2024**

**Prepared by: Fredrika N. Shagama**

**Prepared for: EnviroPlan Consulting CC  
P O Box 81042 Olympia, Windhoek**




**April 2024**

**DOCUMENT INFORMATION**

Title: Hydrogeological Impact Assessment for the Proposed Aquaculture Project and associated Activities near Henties Bay Town in the Erongo Region, Namibia

**Prepared by:**

<b>Author:</b>	Ms. Fredrika N. Shagama: Independent Water Consultant (Hydrogeologist)
<b>Qualifications:</b>	PhD. Student: Civil Engineering (Geotechnics & Hydrogeology), VSB - Technical University of Ostrava, Czech Republic  MSc. Geological Engineering ( <i>cum laude</i> ) with primary focus in Hydrogeology, VSB - Technical University of Ostrava, Czech Republic  BSc. Geological Engineering, VSB - Technical University of Ostrava, Czech Republic
<b>Professional Affiliations:</b>	International Association of Hydrogeologists (IAH) - Full (online) Member, Membership No.139790  Namibian Hydrogeological Association (NHA) – Member  Environmental Assessment Professionals of Namibia (EAPAN) - Ordinary Member Practitioner (Membership No. 183)
<b>Signature:</b>	
<b>Date:</b>	20 April 2024

**STATEMENT OF INDEPENDENCE**

*The Author of this Report does not have, to her knowledge, any information or relationship with staff from Blue Ridge Aquaculture Africa (Pty) Ltd or Ministry of Environment, Forestry & Tourism (MEFT)'s Department of Environmental Affairs & Forestry (DEAF) that may reasonably have potential of influencing the outcome of this Water Resources Impact Assessment, the (main) Environmental & Social Impact Assessment (ESIA) process and the subsequent Environmental Clearance Certificate.*

## EXECUTIVE SUMMARY

Blue Ridge Aquaculture Africa (Pty) Ltd hereinafter to as Blue Ridge proposes to construct and operate an aquaculture project (farm) near Henties Bay Town in the Erongo Region (the Project). The project is located near the turn off of C34 road (Swakopmund-Henties Bay-Uis) about 5km north of Henties Bay Town, although it falls within the undeveloped extended boundaries of the Town.

The propose project will entail the farming of Broodstock by means of Recirculating Aquaculture Systems (RAS) which is a technological approach to aquaculture where the entire process is brought indoors into a highly controlled environment. RAS technologies have been in use globally for over 40 years. The RAS systems entails the following components (Blue Ridge Aquaculture, 2024):

The proposed activity (aquaculture and associated activities) is however one of the listed activities in the Environmental Management Act (EMA) No. 7 of 2007 and its 2012 Environmental Impact Assessment (EIA) Regulations that may not be undertaken without an Environmental Clearance Certificate (ECC) issued by the Environmental Commissioner. Consequently, the Blue Ridge Aquaculture appointed EnviroPlan Consulting CC (a team of independent environmental assessment practitioners) to undertake the required Environmental & Social Impact Assessment (ESIA) process and apply for the required ECC.

To ensure that all the significant environmental components are considered and as part of the ESIA study, under EnviroPlan, Ms. Fredrika Shagama (a Hydrogeologist) was tasked to undertake a Hydrogeological Assessment, i.e., to investigate the potential impact of the proposed project activities on water resources, particularly groundwater.

This Report has therefore been compiled to assess the potential impact of the project on groundwater and or surface water resources. The assessment also provided some measures that can be implemented to mitigate the potential negative impacts of pollution associated with the proposed project activities

## RECOMMENDATIONS AND CONCLUSIONS

The aim of this Report was to identify and assess the potential impact of the project on groundwater and or surface water resources. The following recommendations are made:

### **Groundwater Pollution**

Ground surface pollution is anticipated from the project and related activities. Potential pollutants such as hazardous products (fuel/oils and grease), fish medication that may be used on machinery and equipment during construction and operations which may lead to potential leakages and spills that can washed into water systems, especially groundwater during flash flood periods.

The infiltration of pollution would be magnified by the nature of the site geology (porous aquifers) that provide ready and quick pathways of pollution into groundwater systems. However, the effective implementation of the recommended pollution management and mitigation action measures will greatly aid in minimizing and ultimately preventing groundwater pollution. Given the low rainfall in the area, the impact of project activities on water resources from the site is also minimal.

### **Groundwater Abstraction (Use)**

The direct impact on local groundwater resources in terms of quantity (abstraction) is minimal for the project works as the project activities will be supplied with water from desalination. As a backup, water from the existing supply line will be considered from Henties Bay Municipality, and if Municipality cannot supply, a metered connection from NamWater supply scheme will be installed onsite. Project water will be used for concrete works and laying foundations for the project structures and subsequent operations as well as for ablution facilities, drinking (domestic use). Therefore, the impact on groundwater resources through direct abstraction is none. This water is still anticipated to be supplied by the. Therefore, there will be no impact on groundwater resources owing to direct abstraction.

Based on the analyzed information from baseline literature consulted, knowledge of the area (from site visit), available information on groundwater and planned project activities as well as considering the possible factors, it can be concluded that in terms of pollution, the potential impact of the project on groundwater resources is considered moderate to slightly high (in the absence of mitigation measures). However, this rating could be progressively reduced to low rating by ensuring effective implementation of management and mitigation measures provided in this Report. The implementation of measures should be monitored as part of the overall bi-annual environmental compliance and auditing.

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# 1 INTRODUCTION

## 1.1 Brief Project Background and Location

Blue Ridge Aquaculture Africa (Pty) Ltd hereinafter to as Blue Ridge Aquaculture proposes to construct and operate an aquaculture project (farm) near Henties Bay Town in the Erongo Region (the Project). The project is located near the turn off of C34 road (Swakopmund-Henties Bay-Uis) about 5km north of Henties Bay Town, although it falls within the undeveloped extended boundaries of the Town. The locality map is shown in Figure 1-11.

The propose project will entail the farming of Broodstock by means of Recirculating Aquaculture Systems (RAS) which is a technological approach to aquaculture where the entire process is brought indoors into a highly controlled environment. RAS technologies have been in use globally for over 40 years. The RAS systems entails the following components (Blue Ridge Aquaculture, 2024):

- Grow-out tank – large culture tanks with a constant flow of clean water where fish are raised
- Solids removal – the excess to feed and fecal material from fish are removed via mechanical filtration. This process is vital for fish welfare and the stability of other water purification processes.
- Biofiltration - Beneficial bacteria consume ammonia, which, converted into nitrogen, is released harmlessly into the atmosphere.
- Oxygenation / Dissolved gas control - First, carbon dioxide is removed then pure oxygen is injected into the returning water. The reoxygenated water is returned to the grow-out tank.
- Wastewater recovery - As a secondary filtration system, wastewater from the drum filter is filtered by biological processes and ultra-filtration membranes. Once filtered, the “permeate” effluent is re-used within the grow-out tanks.

The RAS offers reduced impacts to the environment with no water pollution or disease transfer relative to open system aquaculture production methods when best practices are implemented which includes the following:

- Ideal growing conditions,
- Feed optimization,
- Low environmental impact,
- Location flexibility,
- Production monitoring, and
- Low food miles and no seasonality.





Figure 1-1: Location of the proposed Blue Ridge Aquaculture project in Erongo Region

This Report was compiled to assess the potential impacts of the proposed project and associated activities on water resources (both groundwater and surface water), particularly in terms of pollution. The Report also provided some measures on mitigating the potential negative impacts of pollution associated with the proposed project.

The scope of work and methodology for this assessment is provided under chapter 2 below.

## 2 SCOPE OF WORKS AND METHODOLOGY

### 2.1 Scope of Works

The scope of work for this study is limited to the water resource impact assessment with a cursory look at the project impacts on groundwater in terms of quality (pollution). The scope of works for this study is presented below:

- Baseline assessment study of existing site information as provided by Blue Ridge Aquaculture, site visit information and general literature on the area in relation to the proposed project site.
- A review of legislation that governs water resources management and protection in Namibia,
- A description of the physical conditions; climatic, geological, soil, hydrogeological, and hydrological conditions of the project site.
- Identification of the potential impacts from the proposed project activities on water resources; and
- Water resources impact assessment and recommendations on management.

### 2.2 Limitations of the Study

The following assumptions apply to this assessment:

- This report has been compiled based on literature review that was complemented by site visit information collected for this assessment. The project specific information in this Report has been used as provided by Blue Ridge Aquaculture.
- The Author assumes that all the project information and data provided by Blue Ridge Aquaculture and site information is correct and accurate, and that all necessary information has been disclosed.
- It is also assumed that the relevant information obtained from different literature consulted is accurate; and
- This Report has been compiled on an assumption that there will be no significant changes to the proposed activity or the affected water environment between the time of compiling this Report and implementation of the proposed project activities that could substantially influence findings of contained herein. It is also assumed that there will be no significant changes to the project activities that could substantially influence the mitigation measures given and recommendations made for the management and protection of water resources.

### 2.3 General Methodology Employed

For this study, the following tasks were undertaken:

- Desktop study - reviewing of literature and legislation relevant to the study (baseline assessment). This review entails reports containing information on the area geology, soil, climate, and hydrology. Other existing reports of similar or related studies conducted in the area were also reviewed.
- The information was complemented by the site walkover on the 04<sup>th</sup> of April 2024.
- Data analyses and reporting. This entails the consolidation of all the information obtained from Blue Ridge Aquaculture, site obtained data and applicable literature. This includes physical settings/conditions of the area, relevant maps, water resources, impact assessment, and recommendations on water resources management and protection. The recommendations will be incorporated into the project's Draft Environmental & Social Management Plan (ESMP).

The following chapter is the presentation of the institutional (local), national and international legal requirements that are applicable and relevant to this assessment and water resources

### **3 LEGAL FRAMEWORK FOR WATER RESOURCES MANAGEMENT AND PROTECTION: NATIONAL WATER LEGISLATIONS**

The proposed project will require some volumes of water for the construction phase as well as potentially affect water quality (pollution) but especially during the construction phase. It is therefore necessary to consider the legislations and legal requirements governing the water management and protection.

The main legal framework presented herein is that of Namibia for the relevant project component under the scope of this document. The chapter also presents a summary of the relevant international legislations and agreements to protect the water resources, where required.

The Namibian legislations that govern the use, management and protection of water resources and related activities are as follows:

- Water Act No. 54 of 1956: To consolidate and amend the laws relating to the control, conservation and use of water for domestic, agricultural, urban and industrial purposes; to make provision for the control, in certain respects, of the use of sea water for certain purposes; for the control of certain activities on or in water in certain areas; for the control of activities which may alter the natural occurrence of certain types of atmospheric precipitation; for the control, in certain respects, of the establishment or the extension of townships in certain areas; and for incidental matters.

- Water Resources Management Act No. 11 of 2013 and its June 2023 Regulations relating to appeals to Water Tribunal: Water Resources Management Act, 2013. The objectives of this Act are to ensure that the water resources of Namibia are managed, developed, used, conserved, and protected in a manner consistent with, or conducive to, the fundamental principles set out in relevant Sections.
- Environmental Management Act No. 7 of 2007 and its 2012 Environmental Impact Assessment (EIA) Regulations: The Act aims at promoting sustainable management of the environment and use of natural resources. The Environmental Management Act (EMA) is broad; it regulates land use development through environmental clearance certification and/or Environmental Impact Assessments. The Act provides for the clearance certification for **“the abstraction of ground or surface water for industrial or commercial purposes (Regulation 8.1)”**.
- **Soil Conservation Act No.76 of 1969**: The Act makes provision for the prevention and control of soil erosion and the protection, improvement and conservation of soil, vegetation and water supply sources and resources, through directives declared by the Minister.

The following chapter is the summary of the main data sources in terms of baseline databases and maps that played a vital role in compiling this Report.

The next chapter is the description of the relevant baseline physical settings (environment) of the project areas as this is crucial in any assessment.

## 4 DESCRIPTION OF THE RECEIVING (BASELINE) ENVIRONMENT

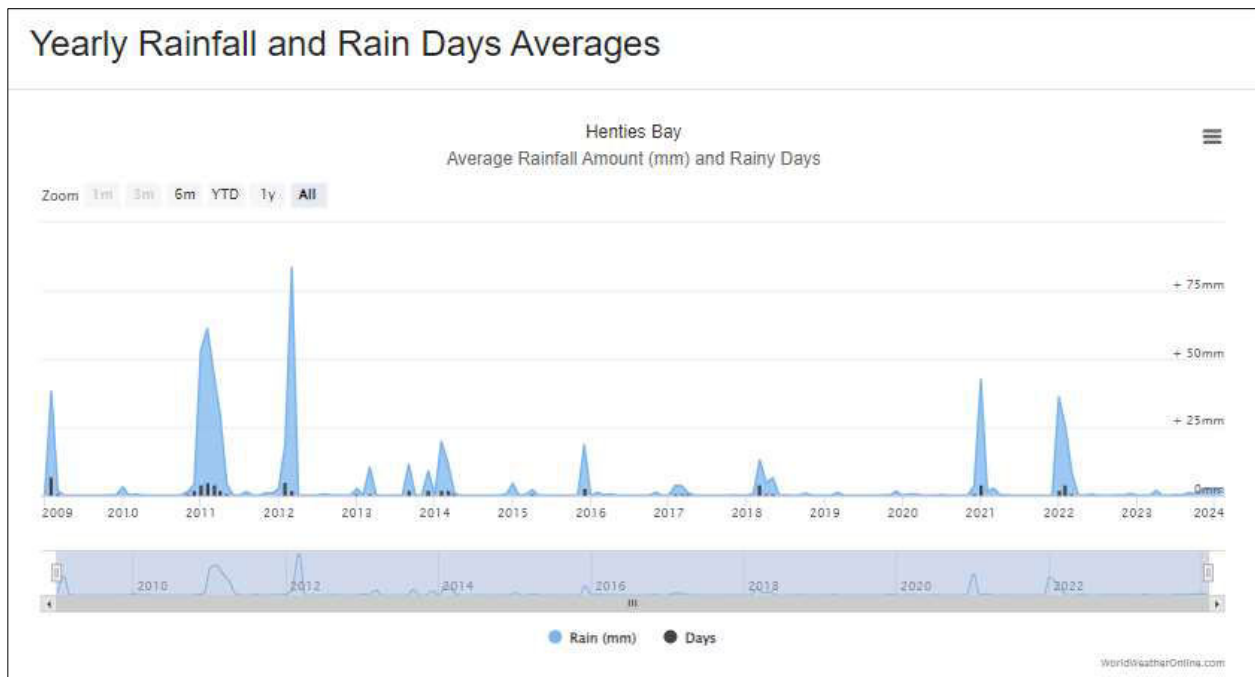
It is vital to understand the baseline (pre-project site conditions) information of a project area as this will help in undertaking a concise assessment and make informed conclusions on the proposed impact of the project activities on a physical environmental feature such as water resources. The baseline conditions for the project site area that are relevant to this assessment are briefly described below.

## 4.1 Climate and Topography

### 4.1.1 Climatic Conditions

According to Mendelsohn *et al.* (2002), the Henties Bay area has an average annual rainfall ranging between 50 and 100mm and the annual evaporation ranging between 2,100 and 2,380mm which characterized by the arid conditions of the area. Weather average information for the area has been sourced from World Weather Online (2024) for the full period of fourteen (14) years (2009 to 2023) and these are shown in the figures below (for both rainfall and temperature).

Figure 4-1 indicates that the highest rainfall was 83mm recorded in March 2012 followed by 60mm recorded in February 2011.



**Figure 4-1: The yearly rainfall and rain days chart for Henties Bay (World Weather Online, 2024)**

The monthly average rainfall shown in Figure 4-2 indicates that March has the highest average rainfall of 12mm (with an average rainfall days of 1) followed by February with 10mm (with 2 days of an average rainfall) and January with 9mm (and with the same average rainfall days as March).

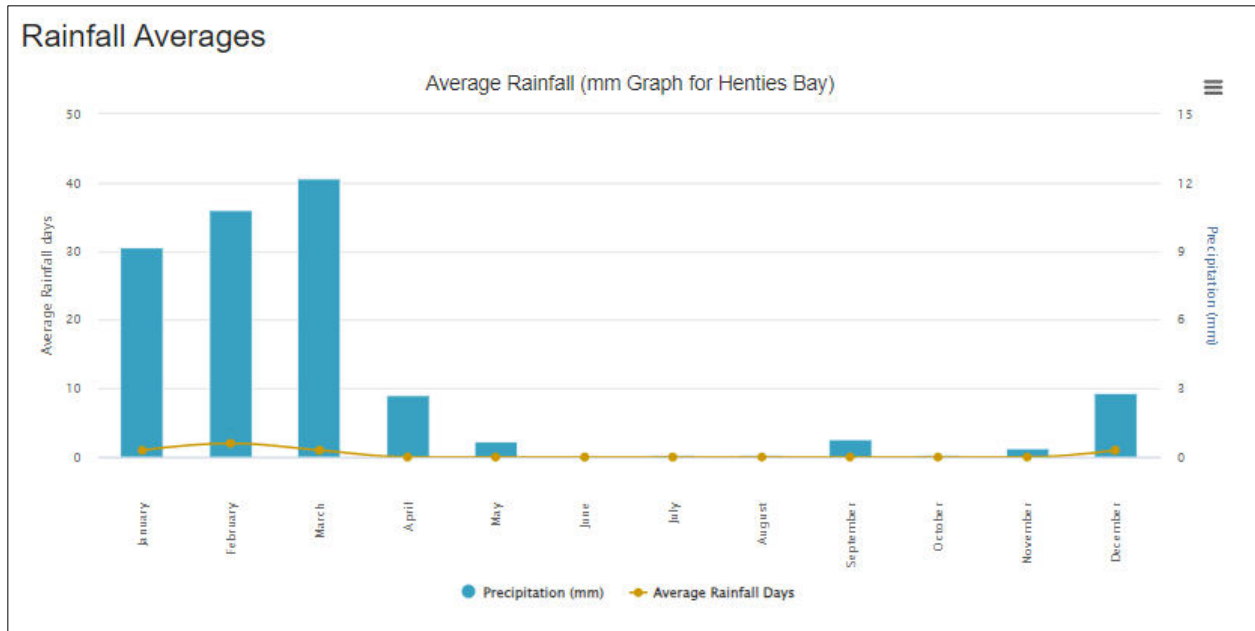


Figure 4-2: The rainfall average chart for Henties Bay (World Weather Online, 2024)

In terms of temperatures, the Henties Bay area has minimum temperatures ranging between 8 and 12°C, maximum temperatures in the ranges of 22 and 28°C while the annual temperatures range between 16 and 22°C (Mendelsohn *et al.*, 2002). Based on the World Weather Online (2024), over the last 14 years, the minimum and maximum temperatures were recorded at 11°C (in September 2021) and 26°C (in March and May 2017), respectively as shown in Figure 4-3.

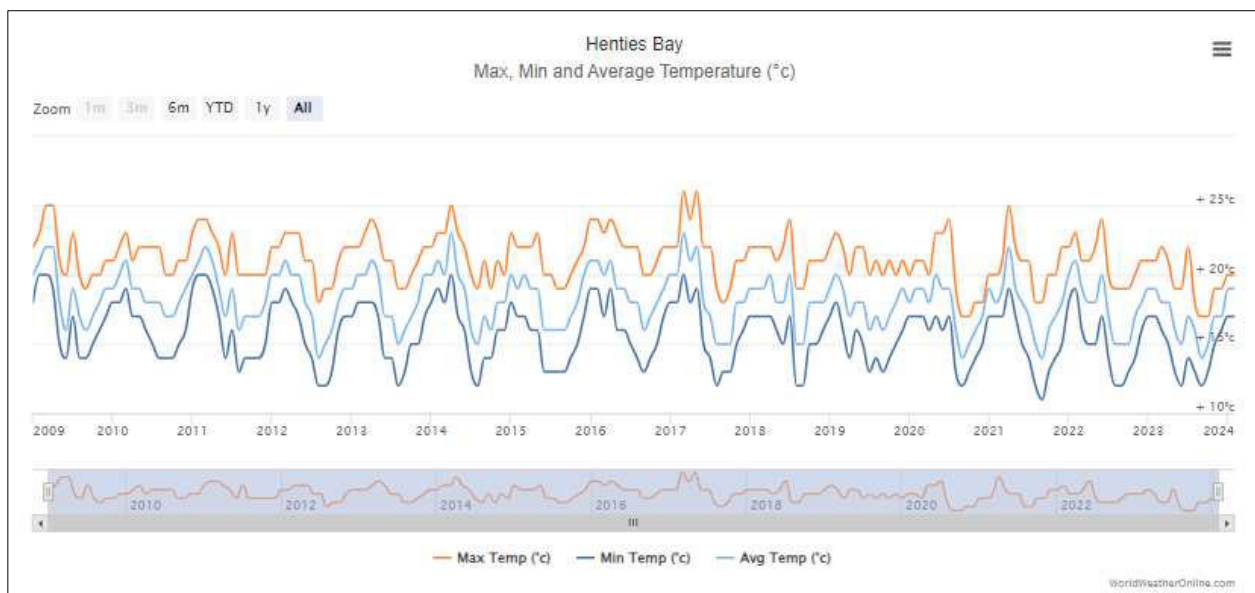


Figure 4-3: The yearly maximum, minimum and average temperatures for Henties Bay (World Weather Online, 2024)

The monthly average minimum and maximum temperatures are shown in Figure 4-4 and indicate that the monthly average minimum and maximum are recorded in August/September at 11°C and 23°C in March/April, respectively.

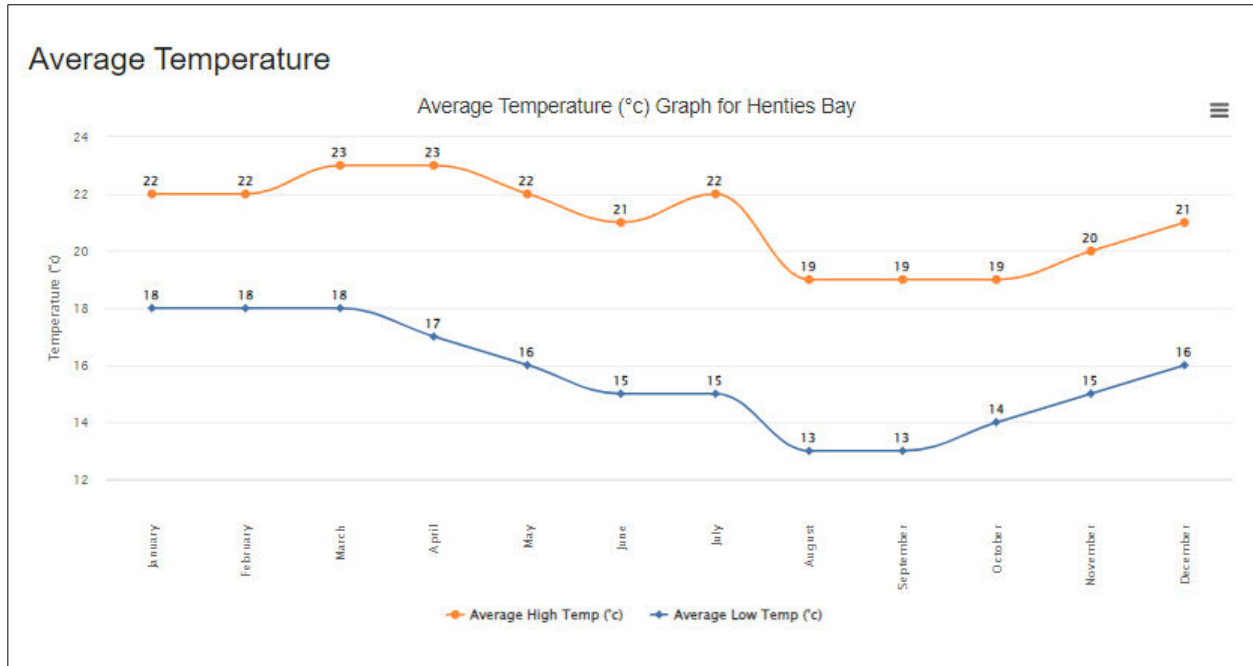


Figure 4-4: The monthly average temperatures for Henties Bay (World Weather Online, 2024)

**4.1.2 Landscape and Topography**

The landscape of the entire project area is characterized by the Coastal Plain as shown in Figure 4-5. This landscape stretches back from the coast, flat and low-lying piece of land next to the ocean. Coastal plains are separated from the rest of the interior by nearby landforms, such as mountains (National Geographic, 2023).

The project site and surrounding areas are relatively with elevations ranging between 0 and 250 meters above sea level as shown on the topography map below (Figure 4-5).



Figure 4-5: The landscape and elevation around the project site

## 4.2 Local Geology

Henties Bay is located on the extensive Pleistocene alluvial deposits (fan delta) of the Omaruru River. These cohesive sediments, comprising sands, silts and gravels, form a sea-facing cliff, up to 20 m high, that is partly obscured by an aeolian sand drape which has slopes of up to 30° (Bully and Ward, 1988).

The geology of the site is characterized by the sediments of the Namib Desert comprising alluvium, sand, gravel and calcrete as shown in Figure 4-6.



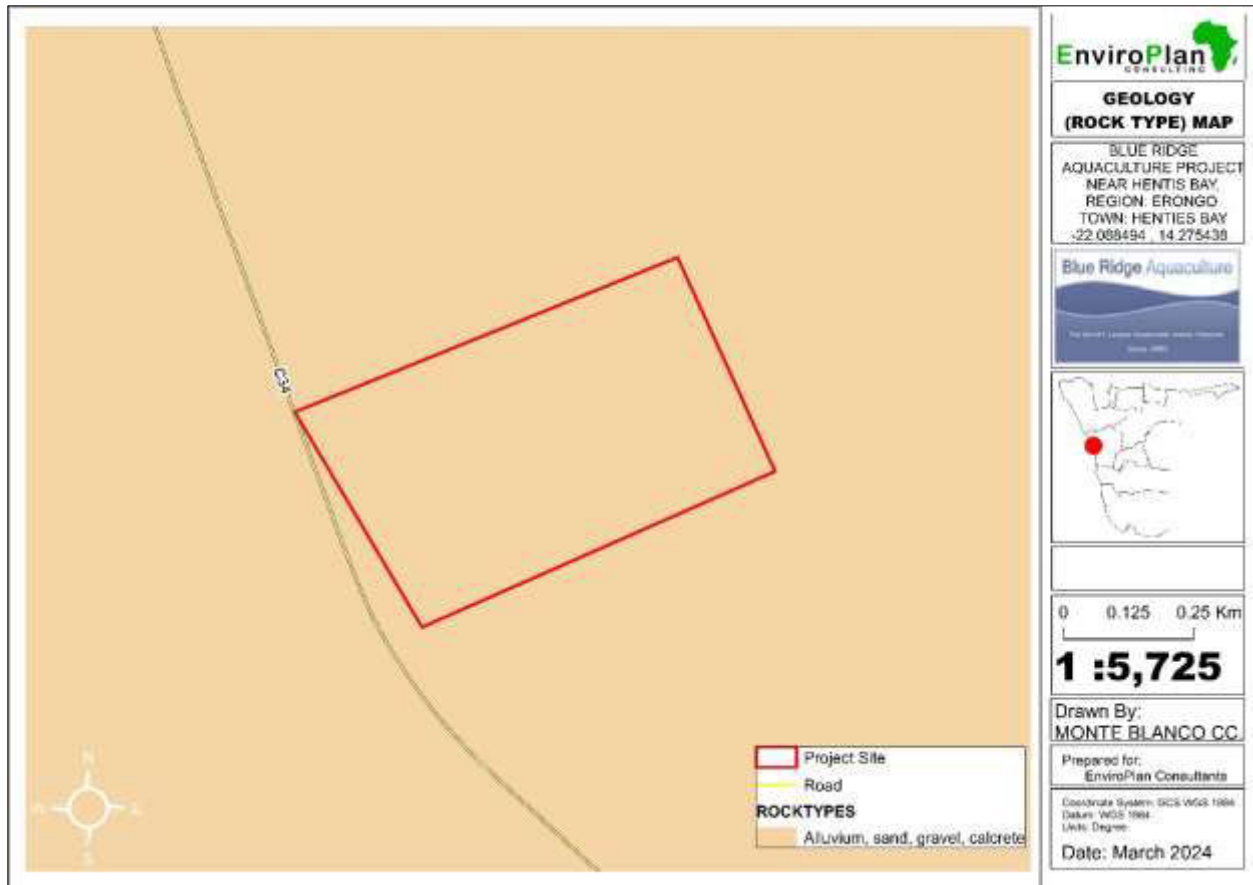


Figure 4-6: The geology map of the project site

### 4.3 Soils

The dominant soils on and around the project site are petric gypsisols as shown on the soil map in Figure 4-7. Petric soils are these with a solid layer at a shallow depth that remains hard even when wet (an "indurated" layer). According to Mendelsohn et al. (2002), gypsisols are characterized by the accumulation of calcium sulphate that are restricted to the very dry areas of the central Namib. The calcium sulphate is dissolved out of the rock and soil, and then carried by percolating water beneath the surface, where it remains in a variety of forms such as powder, pebbles, stone or gypsum crystals. These soils are known to have a very levels of fertility, thus, only hardest of plants would grow in these soils.



Figure 4-7: The soils on and around the project area

#### 4.4 Hydrogeology and Hydrology

The project site, near Henties Bay Town falls under the Coastal Central Namib Area Groundwater Basin. The potential of bedrock aquifers in this Basin is very limited. This is partly due to the low rainfall and lack of recharge, and generally unfavourable aquifer properties of Damara Sequence rocks (Christelis and Struckmeier, 2011). According to the geohydrology map in Figure 4-8 below, the project site is characterized by porous aquifers which could be explained by the presence of unconsolidated Namib sediments (alluvium, sands, and gravel).

Owing to limited groundwater potential in the project area, there are no boreholes on and within proximity of the site.

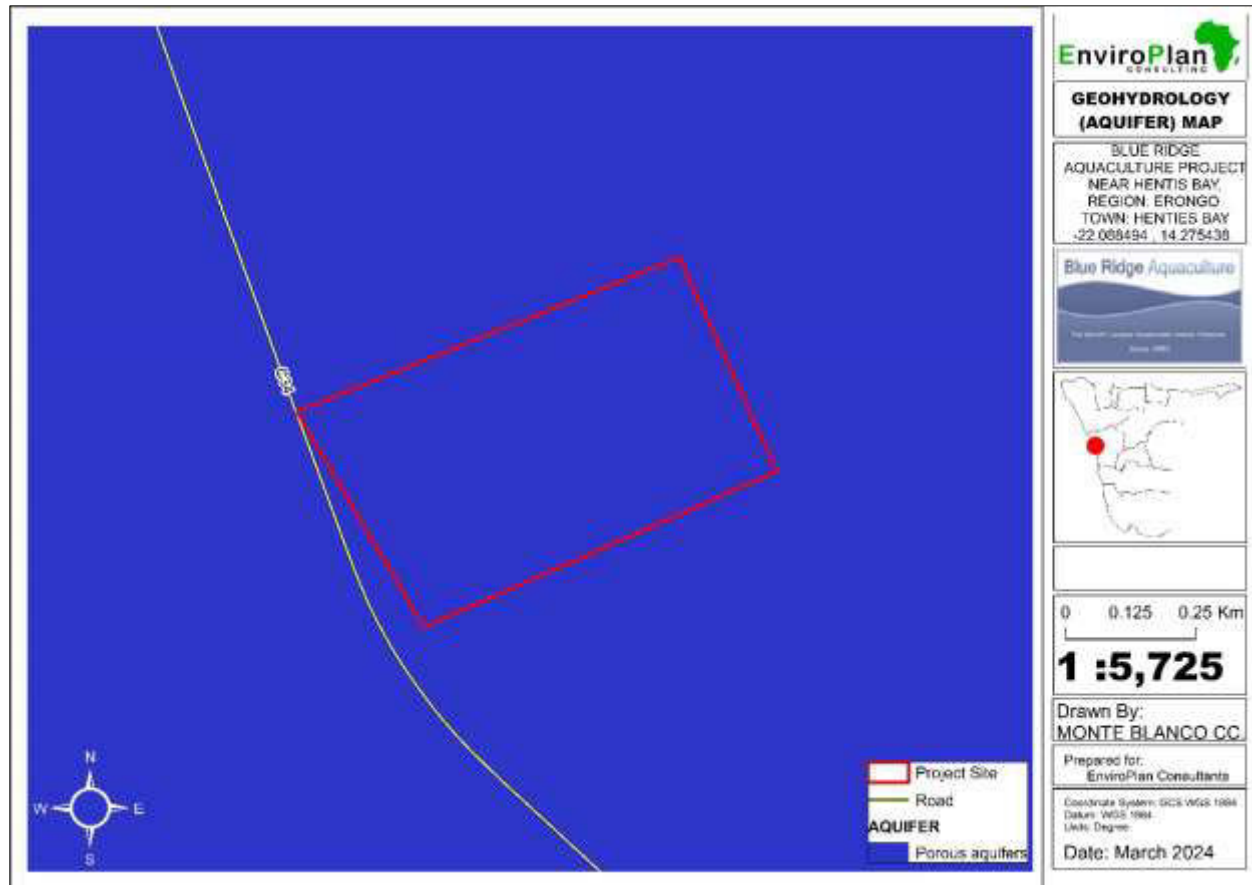


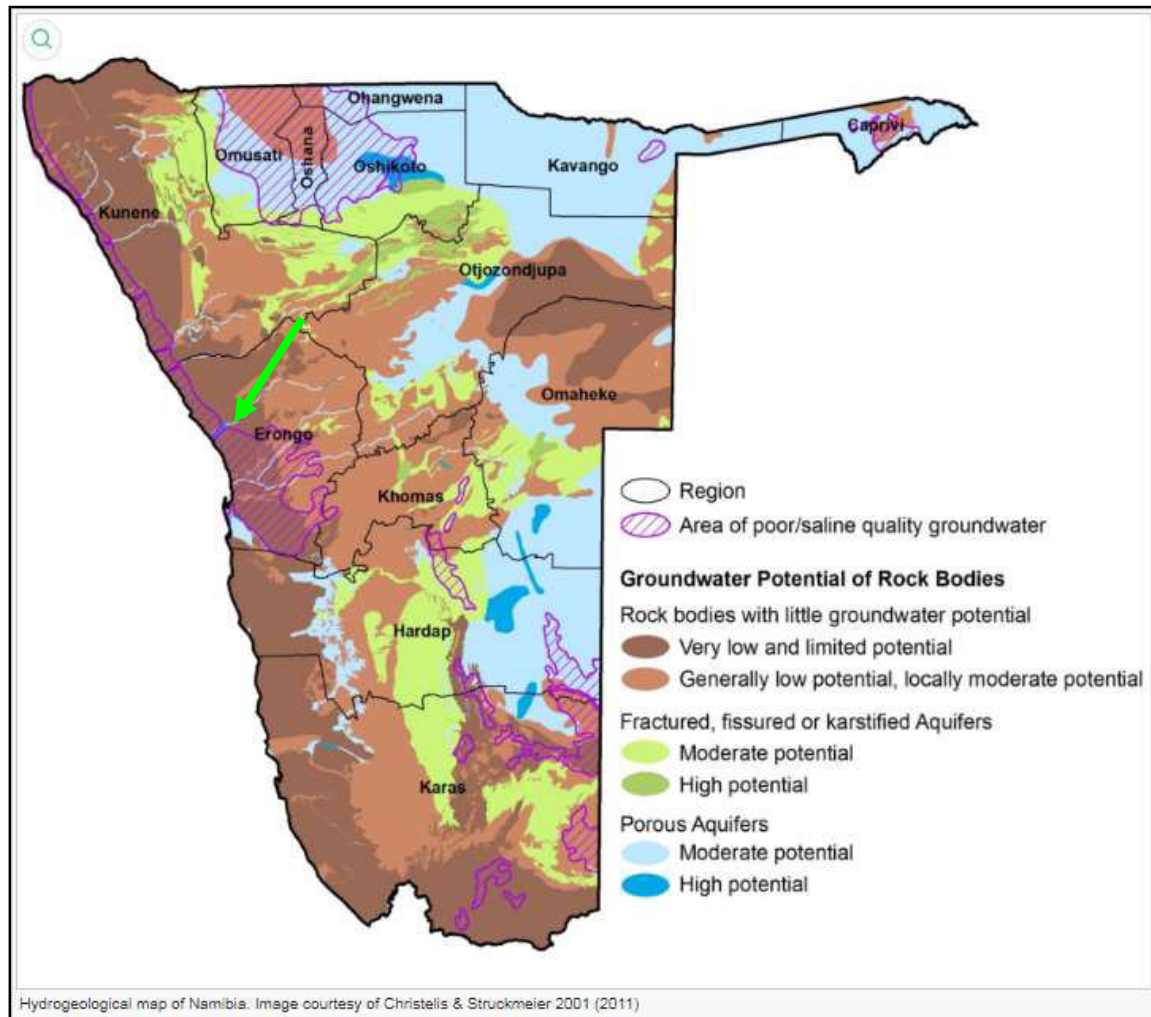
Figure 4-8: The Geohydrology (groundwater) map of the project site area

There is not much water on the surface in Namibia due to the little rain that falls, especially on the coastal area of the country either evaporates, seeps into the ground or is rapidly drained by ephemeral rivers that dominate natural surface water systems inside the country. Water is only held for longer periods are perennial rivers on Namibia's borders with other neighbouring countries. These rivers that can hold surface water are extremely varied, ranging from great rivers to a host of smaller rivers and channels that flow at varying frequencies (Mendelsohn et al., 2002).

The nearest surface water body within proximity of the project site is the sea, bordering the site to the west about 2km away. To the north (in an easterly-westerly trend) is the present Omaruru River, and according to Bully and Ward (1988), this is a major ephemeral watercourse that follows in a south-westerly course, partly incised into the alluvial sediments for the last 8km to the Atlantic Ocean from Henties Bay. A distributary (or possibly a former main course) runs to the south of the main channel and divides Henties Bay into northern (North Dune) and southern (South Dune) sections.

#### 4.4.1 Groundwater Potential

The groundwater potential of rock bodies in Namibia, including the project area is shown on the national groundwater map in Figure 4-9. The project site are is characterized by porous aquifers with a moderate potential of groundwater as slightly shown below as well as on the site groundwater map above (Figure 4-8).



**Figure 4-9: Hydrogeological map of Namibia with groundwater potential of rock bodies with the approximate location of the project site in the Erongo Region at the coastal area of Namibia (green arrow) (source: Christelis and Struckmeier, 2011)**

#### **4.4.2 Groundwater Usage**

According to Lohe et al. (2021), the towns of Walvis Bay, Swakopmund and Henties Bay were wholly reliant on local water sources near the mouths of the Kuiseb, Swakop and Omaruru rivers. Water supplies for Walvis Bay and Henties Bay were originally drawn from surface water springs. Swakopmund was supplied from wells situated in the Swakop River near to the old railway bridge. These were the early days of water supply at the coast that eventually lead to the discovery of the Kuiseb River - and Omaruru River Delta (known as the Omdel Scheme) aquifers and the development of the present-day bulk water supply system. The Swakop River did not develop as a bulk water resource due to the predominantly brackish groundwater quality. For an extended period, groundwater pumped from the Omdel and Kuiseb aquifers was the primary water resource for the entire central coastal region, until the first Wlotzkabaken desalination plant was built.

The water supply schemes were built to abstract and distribute groundwater from these aquifers have been developed in phases and now comprises of an elaborate system of boreholes, powerlines, reservoirs, pumping schemes and pipelines. These schemes are managed by NamWater which supplies bulk water to the municipalities, mines and other customers (Lohe et al., 2021).

#### **4.4.3 Vulnerability of Site Groundwater Resources to Pollution**

Poor planning for some extensive developmental activities such as agricultural, mining, waste management and other industrial activities may result in water resources (surface water and groundwater) pollution which becomes a concern. Given the nature and duration of the proposed project activities, groundwater vulnerability to pollution could be anticipated, especially if the wastewater or effluent from the project construction activities are not properly disposed of at appropriate waste management facilities. This would also occur if construction works were to be undertaken during rainy seasons (months of the year, between January and March) where the waste could be easily carried away through runoff of 10-year flash floods in the desert areas into nearby rivers and eventual recharging groundwater with polluted water.

According to the Groundwater Resources Vulnerability Map of Namibia, the vulnerability of groundwater to pollution in the project area as shown on the national map in Figure 4-10 and local (site) groundwater vulnerability map in Figure 4-11 is high.

The vulnerability of groundwater to pollution in the area could be explained by the porous nature of the sediments overlying the project site that if significant pollution volumes are spilled on the ground surface and over a prolonged period, the groundwater resources would be compromised.

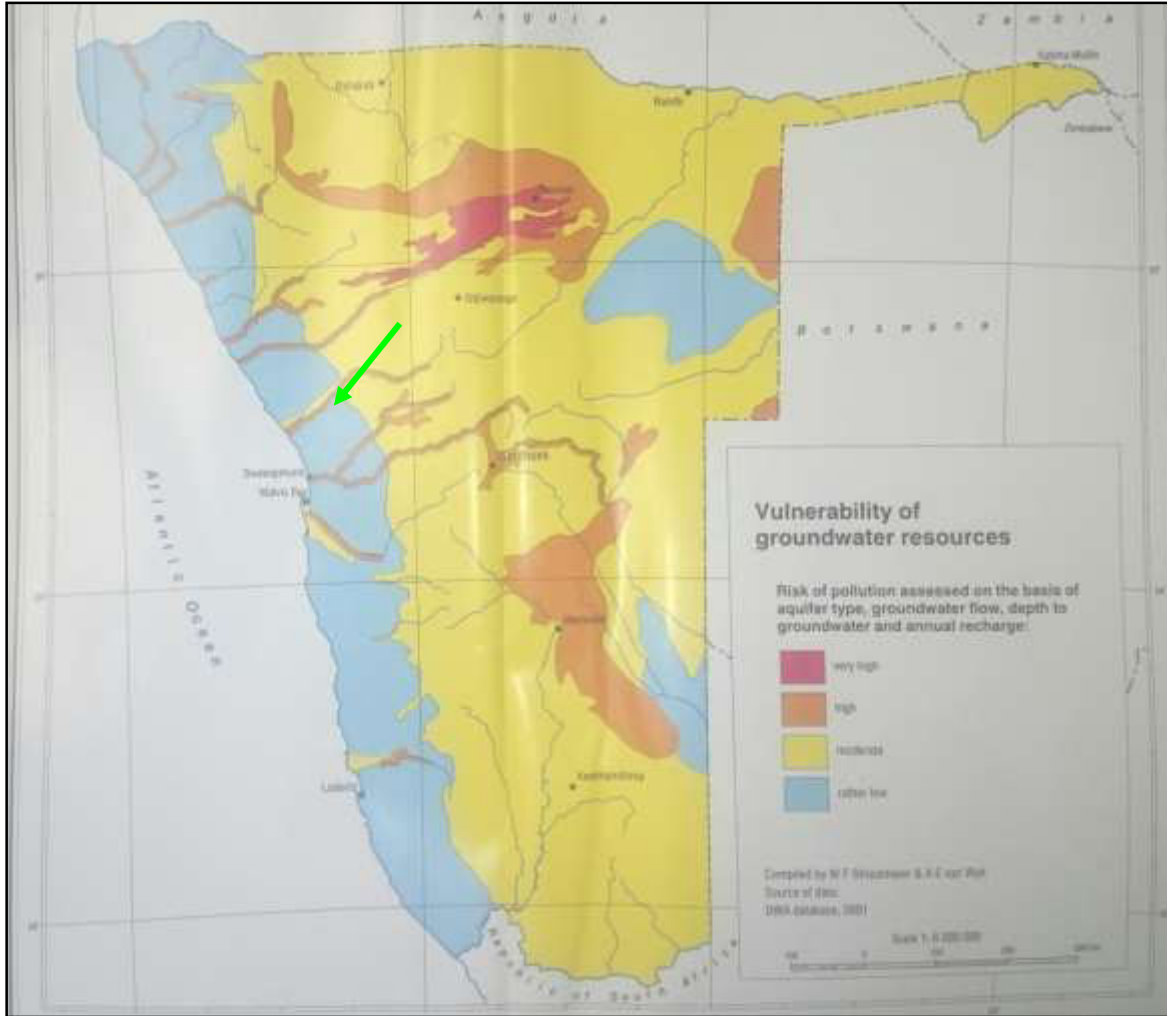


Figure 4-10: Vulnerability of groundwater resources to Pollution (Van Wyk *et.al*, 2001) - approximate project site area shown by the green arrow



Figure 4-11: Vulnerability of groundwater resources to Pollution of the project site area

#### 4.4.4 Surface Water Vulnerability to Pollution

With regards to surface water, potential pollution is likely if construction works are undertaken during rain seasons or months (January and March) and flash flood years when there would be a high risk of accidental spills of hydrocarbons (oils or fuels) and effluent (wastewater) from the site. The last two notable flash floods were in 2011/2012 and 2021/2022 and anticipated next flood in 2021/2032). If construction is to be carried out dry season (dry months of the year), then the risk of surface water pollution will be negligible to none, because accidental wet waste spills would be easy to control and manage compared to rainy seasons/ flash floods periods with surface runoff.

Furthermore, the project area also receives very little rainfall during normal rainy seasons (less than 100mm annually), which would influence the amount of pollution that would otherwise enter the water system with surface runoff and recharge water systems with pollutants after heavy or high rainfalls.



## 5 IMPACT DESCRIPTION AND ASSESSMENT

### 5.1 Potential Impacts (Risks) Identified and Sources of Pollution

The potential impact on water resources stemming from the proposed project and associated activities would be pollution from the following:

- Poor handling of wastewater (effluent) and hydrocarbons during construction, and
- Mishandling, poor storage as well as management and disposal of hazardous substances / waste such as oil, grease and other hydrocarbons related substances during construction and possibly during the operational and maintenance phase.

These potential pollutants handled on the ground surface would be transported into nearby surface water bodies such as the ephemeral river during flash floods periods. The polluted water would eventually infiltrate into the ground and pollute local groundwater systems (aquifers).

### 5.2 Impact Assessment Methodology and Criteria

The Environmental Assessment process primarily ensures that potential impacts that may occur from a certain project activity are identified and addressed with environmentally cautious approaches and legal compliance. The impact assessment method used for this project is in accordance with the EMA No. 7 of 2007 and its 2012 EIA Regulations.

The identified impacts above were assessed in terms of scale/extent (spatial scale), duration (temporal scale), magnitude (severity) and probability (likelihood of occurring) as presented in Table 5-1.

To enable a scientific approach to the determination of the environmental significance, a numerical value is linked to each rating scale. This methodology ensures uniformity and that potential impacts can be addressed in a standard manner so that a wide range of impacts are comparable. It is assumed that an assessment of the significance of a potential impact is a good indicator of the risk associated with such an impact. The following process will be applied to each potential impact:

- Provision of a brief explanation of the impact,
- Assessment of the pre-mitigation significance of the impact,
- Description of recommended mitigation measures, and
- Assessment of the post-mitigation significance of the impact.



The recommended mitigation measures prescribed for each of the potential impacts contribute towards the attainment of environmentally sustainable operational conditions of the project for various features of the biophysical and social environment.

**Table 5-1: The criteria used to assess the impacts (based on extent, duration, intensity and probability)**

<b>The Criteria used to assess the potential negative impacts</b>				
<b>Extent or (spatial scale)</b> - extent is an indication of the physical and spatial scale of the impact.				
<b>Low (L) - 1</b>	<b>Low/Medium (L/M) - 2</b>	<b>Medium (M) - 3</b>	<b>Medium/High (M/H) - 4</b>	<b>High (H) - 5</b>
Impact is localised within the site boundary: Site only	Impact is beyond the site boundary: Local	Impacts felt within adjacent biophysical and social environments: Regional	Impact widespread far beyond site boundary: Regional	Impact extend National or over international boundaries
<b>Duration</b> - Duration refers to the timeframe over which the impact is expected to occur, measured in relation to the lifetime of the project				
<b>L - 1</b>	<b>L/M - 2</b>	<b>M - 3</b>	<b>M/H - 4</b>	<b>H - 5</b>
Immediate mitigating measures, immediate progress	Impact is quickly reversible, short-term impacts (0-5 years)	Reversible over time; medium term (5-15 years)	Impact is long-term	Long term; beyond closure; permanent; irreplaceable or irretrievable commitment of resources
<b>Intensity, Magnitude / severity</b> - Intensity refers to the degree or magnitude to which the impact alters the functioning of an element of the environment. This a qualitative type of criteria				
<b>L - 2</b>	<b>L/M - 4</b>	<b>M - 6</b>	<b>M/H - 8</b>	<b>H - 10</b>
Minor deterioration, nuisance or irritation, minor change in species / habitat / diversity or resource, no or very little quality deterioration.	Low deterioration, slight noticeable alteration in habitat and biodiversity. Little loss in species numbers	Moderate deterioration, discomfort, partial loss of habitat / biodiversity or resource, moderate alteration	Substantial deterioration, death, illness or injury, loss of habitat / diversity or resource, severe alteration or disturbance of important processes	Very high deterioration, high quantity of deaths, injury of illness / total loss of habitat, total alteration of ecological processes, extinction of rare species
<b>Probability of occurrence</b> - Probability describes the likelihood of the impacts occurring. This determination is based on previous experience with similar projects and/or based on professional judgment				

The Criteria used to assess the potential negative impacts				
L - 1	L/M - 2	M - 3	M/H - 4	H - 5
Improbable; low likelihood; seldom. No known risk or vulnerability to natural or induced hazards.	Likely to occur from time to time. Low risk or vulnerability to natural or induced hazards	Possible, distinct possibility, frequent. Low to medium risk or vulnerability to natural or induced hazards.	Probable if mitigating measures are not implemented. Medium risk of vulnerability to natural or induced hazards.	Definite (regardless of preventative measures), highly likely, continuous. High risk or vulnerability to natural or induced hazards.

### 5.3 Impact significance

This significance is determined through a synthesis of the above impact characteristics. The significance of the impact “without mitigation” is the main determinant of the nature and degree of mitigation required.

Once the above factors (Table 5-1) have been ranked for each potential impact, the impact significance of each is assessed using the following formula:

$$\text{Significance Points (SP)} = (\text{magnitude} + \text{duration} + \text{scale}) \times \text{probability}$$

The maximum value per potential impact is 100 SPs. Potential impacts were rated as high, moderate, or low significance, based on the following significance rating scale (Table 5-2).

**Table 5-2: The rating scale for Impact significance (the negative impact rating scale is marked purple)**

Significance	Environmental Significance Points	Colour Code
High (positive)	>60	H
Medium (positive)	30 to 60	M
Low (positive)	<30	L
Neutral	0	N
Low (negative)	>-30	L
Medium (negative)	-30 to -60	M
High (negative)	>-60	H

### 5.3.1 The Source-Pathway-Receptor (S-P-R) Linkage for Impact Assessment

Generally, an environmental risk (impact) occurs when there is a hazard (e.g., process, activity, or substance) that can result in a harmful impact on the surrounding environment. The part of the environment which is, or could be, affected is known as a receptor. Receptors include humans, flora and fauna, the built environment and water resources.

According to SRK (2006), the presence of a hazard alone does not constitute a risk; a risk is only present if there is a means by which the hazard can impact on sensitive receptor(s). The connection between the hazard and receptor is known as a pathway, and all three elements together constitute a source-pathway-receptor (S-P-R) linkage. The three elements namely the:

1. Source: a substance capable of causing pollution or harm,
2. Receptor: the affected feature, and
3. Pathway: a route by which contaminants can reach the receptor.

Environmental risk assessment is the process whereby S-P-R linkages are identified and evaluated. If any of the three elements are absent, then there is no complete linkage and thus no unacceptable risk. The magnitude of a risk is a function of the consequences of risk and the likelihood that such risk will occur.

Using the S-P-R linkage description (and impact assessment criteria (Table 5-1 and Table 5-2) above, the pollution impact / risk for the duration of the project and its associated activities onsite is assessed below.

## 5.4 Groundwater Impact Assessment: Pollution

### 5.4.1 Source of Pollution

Generally, for construction works, potential sources of point pollution will be mainly:

- Storage and handling of hydrocarbons (fuels) for generators, and
- Wastewater and grease,

With regards to the project site activities, the anticipated key potential source of pollution to water resources would be mainly the handling of wastewater, fuels and oils onsite for construction works.

These accidental spills or leaks of these potential pollutants onsite could infiltrate into the ground and pollute soils or further infiltrate into the ground and pollute aquifers. However, the pollution significance would also depend on the volumes of spilled or leaked fuels (major spills and leaks would mean significant pollution).

### 5.4.2 Pathway of Pollution

Polluted water would travel from the potential sources to downstream water users (receptors). Pollution can be transported to nearby receptors via the unconsolidated alluvium overlaying the project area via intense surface run-offs from flash floods. These unconsolidated alluvium and sands onsite would act as ready

pathways for polluted water (pollution) to spread fast and to a larger area. However, the extent of the pollution will also depend on the amount of pollutant (hydrocarbon or wastewater) infiltrating from the ground surface into the aquifers or run off to nearby surface water. Surface run off in the project area is unlikely, except for flash flood years. Therefore, without proper planning on the handling and management of hazardous substances and wastewater on the ground (onsite), pollution of groundwater would be high.

### 5.4.3 Receptor(s) of Pollution

The downstream sources such as the Omaruru River and sea as well as the adjacent low-lying areas to the west and northwest side of the site (as direction of flow is anticipated to be towards the west/north-westerly) would be considered potential receptors to pollution from the project site.

### 5.4.4 Pollution Impact Assessment

The management and mitigation measures have been recommended and should be effectively implemented and monitored to mitigate and properly manage the potential risks on water resources. Without any measures implemented, the significance of the impact is rated medium.

Upon implementing the recommended measures, the significance will be reduced to low and eventually negligible. The impact assessment (before and after the implementation of mitigation measures) is provided under Table 5-3, and the recommended measures for implementation are provided under Chapter 6.

**Table 5-3: The assessment of project impact on groundwater quality (owing to pollution) and mitigation measures to reduce the pollution impact significance from medium to low**

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Before mitigation measures	M: -3	M: -3	M / L: -4	M / H: 4	M: -40
Please refer to the measures under Chapter 6.					
After the effective implementation of mitigation measures	L - 1	L / M - 2	L - 2	L / M -2	L - 10

Although the assessment was mainly focused on the pollution impact, it is crucial to consider the potential impact of the project on water resources over-exploitation (over-abstraction) and use. It is anticipated that the construction works will be supplied with water from the existing supplies in or near Henties Bay. Regardless, the protection and conservation of water resources will be required as possible and necessary. Therefore, to manage and conserve the water resources, the following measures (under the next chapter) should be effectively implemented throughout the project implementation (construction and operational phase).

## 6 GROUNDWATER MANAGEMENT AND MITIGATION MEASURES

The following management plans are recommended, and they should be effectively implemented and monitored by the project Proponent Contractor to manage the potential impacts efficiently and effectively on water resources.

### 6.1 Pollution Management Plans

It is important to note that the potential pollution from the project does not constitute the absence of current and future anthropogenic contribution to groundwater pollution in the project area. Therefore, to avoid and or minimize the potential impact of pollution stemming from the project activities, the following measures are recommended for implementation:

- Site specific stormwater management and discharge systems should be properly designed and installed / implemented to prevent potentially contaminated run-off into water bodies during flash flood periods, thus, causing pollution of such sources and groundwater resources.
- Due to flash floods in this part of Namibia, thus, high flow of the Omaruru River that side, consider carrying out construction activities with high use of hydrocarbons during the dry months of the year (i.e., from April to December) to reduce the risk of run-offs carrying waste from site into surface water (river), and eventually into groundwater systems.
- Areas where hydrocarbons will be utilized, the surface should be covered with a plastic impermeable plastic liner to prevent the spillage on the soils and eventual infiltration into the ground.
- Intensive wastewater generation activities for construction should be undertaken during dry season (dry months of the year, i.e., between January and March), to reduce the risk of pollutants being washed into nearest surface water bodies from accidental hazardous waste spills. This would be easy to control and manage compared to rainy season (particularly flash floods) with major uncontrolled surface runoff from site works during construction.
- Project machines and equipment should be equipped with drip trays to contain possible oil spills when operated during construction works.
- All hydrocarbon substances (fuels, grease, oil and other lubricants) associated with the project activities should be contained in designated containers on site and later disposed of at nearby approved waste sites in accordance with hazardous waste discharge standards (the nearest to site being Walvis Bay).

- In cases of accidental fuel or oil spills on the soils from site vehicles, machinery and equipment, the polluted soil should be removed immediately and put in a designate waste container for later disposal as per the preceding bullet point. The removed polluted soil should either be completely disposed of or cleaned and returned to where it was taken from on site or can be replaced with clean soil.
- Spill clean-up kit must be available on site as per the relevant Material Safety Data Sheets (MSDS).
- Any spillage of more than 200 litre must be reported as per the Petroleum Products License and cleaned as soon it happens to prevent it from reaching groundwater systems.
- The washing of equipment contaminated hydrocarbons, as well as the washing and servicing of project vehicles should take place offsite, i.e., at a dedicated area (impervious surface), where contaminants cannot contaminate soil or water resources. In other words, the washing and servicing of equipment and vehicles should be done at designated places for such in Towns.
- Spill control preventive measures should be in place on site to management soil contamination, thus, preventing and or minimizing the contamination from spreading into nearby water bodies and eventually infiltrating into groundwater systems.

## 6.2 Water Abstraction & Use Management Plans

The project will require about 150,000 litres of water per month for the construction. For operations, approximately 400,000 litres of water will be used per day. This includes water for drinking, ablution facilities and other general uses onsite. It should be noted that the project will be supplied by a desalination plant to be set up near for the project and as back up, the Proponent will have a water supply connection from Henties Bay Town (upon arrangements with the Municipal Council). Where the Municipality cannot supply, the Proponent will approach NamWater to supply the backup line directly to the site from construction throughout to the operational phase. Regardless, it is still important to manage this resource as any other. Thus, the following management action plans are recommended:

- Water should be used sparingly through water recycling and re-use for some of the upgrading activities where possible. This is done to minimize the amount of water supplied from the Henties Bay Municipality or the separate metered connection from NamWater Scheme.
- Regardless of the amount of water required for the project during construction and operations, the Proponent should raise awareness to the construction Contractor and personnel alike on the importance of water conservation and saving measures and become accountable.

The recommendations and conclusions made for the overall assessment are as presented under the following chapter.

## 7 RECOMMENDATIONS AND CONCLUSIONS

This Report was prepared to assess the potential impact of the project on groundwater and or surface water resources. The following recommendations and conclusions are made and reached, respectively:

### 7.1 Groundwater Pollution

Ground surface pollution is anticipated from the project and related activities. Potential pollutants such as hazardous products (fuel/oils and grease) that may be used on machinery and equipment during construction which may lead to potential leakages and spills that can be washed into water systems, especially groundwater during flash flood periods. The infiltration of pollution would be magnified by the nature of the site geology (porous aquifers) that provide ready and quick pathways of pollution into groundwater systems. However, the effective implementation of the recommended pollution management and mitigation action measures will greatly aid in minimizing and ultimately preventing groundwater pollution. Given the low rainfall in the area, the impact of project activities on water resources from the site is also minimal.

### 7.2 Groundwater Abstraction (Use)

The direct impact on local groundwater resources in terms of quantity (abstraction) is minimal for the project works as the project activities will be supplied with water from the existing water supply systems near the site. This water will be used for concrete works and laying foundations for the project structures. Therefore, the impact on groundwater resources through direct abstraction is none. During the operational phase, the water demand will slightly increase to cater for ablution facilities, drinking and some project operations. This water is still anticipated to be supplied by the Henties Bay Municipality or from the existing water supply line (a separate metered connection from NamWater Scheme). Therefore, there will be no impact on groundwater resources owing to direct abstraction.

Based on the analyzed information from baseline literature consulted, knowledge of the area, available information on groundwater and planned project activities as well as considering the possible factors, it can be concluded that in terms of pollution, the potential impact of the project on groundwater resources is considered moderate to slightly high (in the absence of mitigation measures). However, this rating could be progressively reduced to low rating by ensuring effective implementation of management and mitigation measures provided in this Report. The implementation of measures should be monitored as part of the overall bi-annual environmental compliance and auditing.

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**APPENDIX D: ECOLOGICAL ASSESSMENT REPORT**

**ECOLOGICAL STUDY ASSESSMENT (FAUNA AND FLORA STUDY) FOR THE PROPOSED  
AQUACULTURE PROJECT AND ASSOCIATED ACTIVITIES NEAR HENTIES BAY TOWN IN THE  
ERONGO REGION, NAMIBIA**

**DRAFTED BY: ADIEL.T. MUDZANAPABWE**


**PROPONENT: BLUE RIDGE AQUACULTURE AFRICA (PTY) LTD**



## DOCUMENT INFORMATION

Title: Ecological Study for The Proposed Aquaculture Project and Associated Activities Near Henties Bay Town in The Erongo Region, Namibia: A Part of the Environmental & Social Impact Assessment Study

### Prepared by:

<b>Author:</b>	Mr Adiel.T. Mudzanapabwe: Ecologist & Environmental Consultant
<b>Qualifications:</b>	BSc. Natural Resource Management, Major in Forestry & Ecological Restoration.  Masters in Natural Resource Management, (Candidate)
<b>Signature:</b>	
<b>Date:</b>	03 May 2024

## EXECUTIVE SUMMARY

Blue Ridge Aquaculture Africa (Pty) Ltd hereinafter to as Blue Ridge or the Proponent proposes to construct and operate an aquaculture project (farm) near Henties Bay Town in the Erongo Region (the Project). The project is located near the turn off of C34 road (Swakopmund-Henties Bay-Uis) about 5km north of Henties Bay Town, although it falls within the undeveloped extended boundaries of the Town.

The proposed activity (aquaculture activities) is however one of the listed activities in the Environmental Management Act (EMA) No. 7 of 2007 and its 2012 Environmental Impact Assessment (EIA) Regulations that may not be undertaken without an Environmental Clearance Certificate (ECC) issued by the Environmental Commissioner. Consequently, the Blue Ridge Aquaculture (PTY) Ltd has appointed EnviroPlan Consulting CC to undertake the required Environmental & Social Impact Assessment (ESIA) process and apply for the required ECC.

To ensure that all the significant environmental components are considered and as part of the ESIA study EnviroPlan appointed Mr. Adiel.T. Mudzanapabwe (Ecologist/Environmental Consultant) to undertake an Ecological Study to investigate the potential sustainable preservation of the ecology in the immediate vicinity of the proposed aquaculture facility/activities.

This Report was therefore compiled to assess the possibility of any disturbances that may impact the immediate ecosystem for aquaculture activities. The assessment also provided some measures on mitigating the potential negative impacts of abstraction and pollution associated with the proposed aquaculture activities.

## **RECOMMENDATIONS AND CONCLUSIONS**

The general aim of the ecological study for aquaculture activities is to comprehensively assess and understand the potential environmental impacts and ecological consequences associated with the proposed aquaculture development. This entails evaluating the biodiversity, habitat fragmentation, and ecosystem services in the project area, identifying sensitive ecological zones, and determining strategies to mitigate adverse effects on local flora and fauna. The study seeks to inform sustainable aquaculture structural design and construction practices that minimize ecological disturbance, promote habitat connectivity, and preserve the overall ecological integrity of the landscape, thereby fostering a balanced approach between infrastructural development and environmental conservation. The following recommendations are made:

- The Proponent may go ahead with the project and we recommend that the Proponent to try and avoid the removal of large ecologically important plants and make efforts to incorporate these plants in the building design if it is cost effective.
- In the event where protected plants are to be removed, a permit should be applied for the removal which can be obtained at Ministry of Environment, Forestry & Tourism.
- The area is within the Dorob National Park, so caution needs to be taken into consideration during construction where minimal impact may affect the parks resources.
- The Proponent should make sure that there is minimal interference in natural habitat of the animals.
- Poaching by employees and workforce should be condemned with the utmost seriousness during the construction phases.
- Strict monitoring must be implemented to avoid high human footprint left behind after construction.

In conclusion, the ecological study conducted for the aquaculture construction project has provided

valuable insights into the potential environmental impacts and ecological considerations associated with the proposed development. Through comprehensive assessment and analysis, key findings have highlighted areas of ecological sensitivity, identified potential risks to biodiversity and habitat integrity, and outlined mitigation measures to minimize adverse effects. It is evident that sustainable aquaculture design and construction practices, coupled with effective environmental management strategies, are crucial for mitigating the project's ecological footprint and ensuring the preservation of the surrounding environment. Moving forward, the integration of these findings into the planning and implementation stages of the aquaculture construction project will be essential to foster a harmonious balance between infrastructural development and ecological conservation, thereby safeguarding the long-term sustainability of the landscape and its ecosystems.

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## **1. Introduction and Background**

Blue Ridge Aquaculture Africa (Pty) Ltd hereinafter to as Blue Ridge or the Proponent proposes to construct and operate an aquaculture project (farm) near Henties Bay Town in the Erongo Region (the Project). The project is located near the turn off of C34 road (Swakopmund-Henties Bay-Uis) about 5km north of Henties Bay Town, although it falls within the undeveloped extended boundaries of the Town.

It is important to note that aquaculture construction and its associated activities, such as materials abstraction are listed activities that cannot be undertaken without an Environmental Clearance Certificate (ECC) in accordance with the Namibia's Environmental Assessment Policy, Environmental Management Act (EMA) No. 7 of 2007 and its 2012 Environmental Impact Assessment (EIA) Regulations. In this respect, the aquaculture facility construction and associated activities require a specific Environmental and Social Impact Assessment (ESIA) Study prior to implementation.

Subsequently, Blue Ridge Aquaculture Africa (Pty) Ltd appointed EnviroPlan Consulting cc to conduct an independent ESIA for the proposed aquaculture project to ascertain potential environmental and social impacts (both positive and negative) and establish how to improve or mitigate these impacts.

The ESIA study will be undertaken based on biophysical and socio-economic baseline investigations relating to the proposed project and all identified impacts will be addressed in an Environmental and Social Management Plan (ESMP) that meets the requisites of the EMA and its EIA Regulations.

To understand the flora and fauna of a region, it is important to first understand its biome details, which consists of the following:

1. Climate – rainfall patterns, temperature, wind patterns etc.
2. Terrain

The above influence the flora and fauna occurrence in an area. For the RSWSP Phase 1, a background of the climate is outlined below.

## **2. Terms of Reference, Scope of Works and Methodology**

### **i. Project Terms of Reference**

This document has been prepared as guided by the Terms of Reference (TOR) provided by EnviroPlan Consulting and Consulting Engineers, their requirement for the ecological component as part the main Environmental & Social Impact Assessment (ESIA). The ecological impact assessment covered in this report primarily deals with the potential impacts of the proposed aquaculture construction activities on the ecosystem (Fauna and Flora) resources on site route and immediate environment.

## **ii. Scope of Works**

The scope of work for this study is limited to the ecological (fauna and flora) impact assessment with a cursory look at the project impacts on fauna and flora in the immediate ecosystem. The scope of works for this study is presented below:

- Baseline assessment study of existing site information as provided by onsite inspection and survey, site visit information and general literature on the broader area in relation to the proposed project site (route).
- A review of legislation that governs fauna and flora resources management and protection in Namibia,
- A description of the physical conditions; climatic, terrain and social activities conditions of the project site route.
- Identification of the potential impacts from the proposed project activities on the ecosystems; and
- Ecological impact assessment and recommendations on management.

## **iii. Limitations of the Study**

The following assumptions apply to this assessment:

- This report has been compiled based on literature review that was complemented by site visit information collected for this assessment. The project specific information in this Report has been used as provided by the Consulting Engineer and EnviroPlan.
- The Author assumes that all the project information and data provided by the design engineers and environmental assessment practitioner and site information is correct and accurate, and that all necessary information has been disclosed.



- It is also assumed that the relevant information obtained from different literature consulted is accurate; and
- This Report has been compiled on an assumption that there will be no significant changes to the proposed activity or the affected water environment between the time of compiling this Report and implementation of the proposed project activities that could substantially influence findings of contained herein. It is also assumed that there will be no significant changes to the project activities that could substantially influence the mitigation measures given and recommendations made for the management and protection of water resources.

#### iv. **Methodology**

The ecological study was done on the 4th of April 2024, where a survey was done inspecting and recording all present ecological resources and social activities that are taking place around the project site. Small brief interviews were done for further information that might have been missed out.

Observation of terrain type was recorded as well and the dominant vegetation. Wildlife observation was done as well to see how their habitats may be impacted by the project as the area is located near Dorob National Park.



*Figure 1. Terrain of project site.*

### **3. Legal Framework for Ecological (Fauna & Flora) Resources Management and Protection: National Biodiversity Legislations**

In Namibia, the legal framework for fauna and flora management and protection is primarily governed by the Nature Conservation Ordinance of 1975, which has been amended and updated over time to align with international conservation standards and best practices. Under this ordinance, the Ministry of Environment, Forestry, and Tourism is entrusted with the responsibility of conserving and managing Namibia's rich biodiversity.

Additionally, Namibia is a signatory to various international agreements and conventions such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which further

reinforces its commitment to wildlife and habitat conservation. The legal framework encompasses regulations for the establishment and management of protected areas, permits for hunting and harvesting of wildlife, measures to combat poaching and illegal trade, as well as initiatives for community-based natural resource management. Through this comprehensive legal framework, Namibia aims to ensure the sustainable utilization and conservation of its fauna and flora for the benefit of present and future generations.

The following are few key Namibian legislations governing the use, management, and protection of fauna and flora resources and related activities:

- Nature Conservation Ordinance of 1975 (Act 4 of 1975) - This legislation forms the cornerstone of Namibia's conservation efforts, outlining measures for the protection, management, and sustainable use of wildlife and habitats.
- Forest Act, 2001 (Act 12 of 2001) - This law regulates the management, utilization, and conservation of forests and forest resources in Namibia, including measures to prevent deforestation and promote sustainable forestry practices.
- Agricultural (Commercial) Land Reform Act, 1995 (Act 6 of 1995) - This act addresses land reform and tenure, including provisions related to the sustainable management of agricultural land and natural resources, which indirectly impact fauna and flora.
- Environmental Management Act, 2007 (Act 7 of 2007) - This legislation provides a framework for the sustainable management of the environment, including provisions for the protection of biodiversity, ecosystems, and natural resources.
- National Biodiversity Strategy and Action Plan (NBSAP) - While not a law itself, the NBSAP outlines Namibia's strategy for the conservation and sustainable use of biodiversity, guiding policy and decision-making related to fauna and flora management.

## **4. Climate**

### **i. Regional**

Regionally, Namibia lies within the Southern Hemisphere's anticyclone belt with winds generated from high-pressure systems over the cold Atlantic Ocean generally blowing from a southerly direction. The

influence of these winds creates a relatively low-pressure system over the continent due to the convectonal uplift of the air being warmed over the land. This results in a pressure gradient that draws the cold southern coastal winds towards the interior of the country (Department of Water Affairs, 2001). However, the spread of moist air only reaches the coastal, northern and central parts of the country. The limited and variable spread of moist air results in coastal fog and relatively high regular precipitation in the northern and central parts of the country with variable and less rainfall around the area. Cycles with unpredictable patterns and with prolonged droughts are the norm (Namibia Meteorological Service, 2019).

## **ii. Rainfall**

Henties Bay, situated in Namibia's Erongo Region along the Atlantic coast, experiences an exceedingly dry climate characterized by minimal rainfall. With an average annual precipitation of just 15-20 millimeters (0.6-0.8 inches), this coastal town reflects the stark aridity typical of the Namib Desert environment. The prevailing cold Benguela Current, which flows along the adjacent coastline, plays a significant role in shaping Henties Bay's climate by cooling the air and limiting its moisture content. Consequently, the region receives most of its scant rainfall during the winter months from June to September, although these amounts remain minimal and sporadic.

The landscape of Henties Bay and the surrounding Erongo Region reflects the impact of this arid climate, featuring expansive desert vistas and sparse vegetation adapted to survive with very little water. Despite the scarcity of rainfall, Henties Bay attracts visitors with its rugged coastal beauty, including vast sand dunes and the striking contrast between the desert terrain and the ocean's edge. This unique environment, shaped by its limited rainfall and coastal influences, offers a tranquil and captivating experience for those seeking to explore Namibia's coastal desert landscapes.

## **iii. Temperature**

Henties Bay, situated in Namibia's Erongo Region along the Atlantic coast, benefits from a moderate coastal desert climate characterized by mild temperatures year-round. During the summer months (November to April), daytime temperatures typically range from 20°C to 25°C (68°F to 77°F), with occasional warmer days influenced by ocean breezes. This coastal cooling effect keeps temperatures comfortable, making Henties Bay a pleasant destination even in the peak of summer.

In winter (May to September), temperatures in Henties Bay are cooler but still mild, with daytime highs

averaging between 15°C to 20°C (59°F to 68°F). Nighttime temperatures can drop to around 10°C (50°F) or slightly lower. Despite the cooler weather, winter in Henties Bay is characterized by clear skies and sunny days, offering an inviting atmosphere for outdoor activities and exploration of the coastal landscapes. Overall, Henties Bay's climate, shaped by its coastal location and the influence of the Benguela Current, provides residents and visitors with a temperate environment conducive to year-round enjoyment of its natural beauty.

#### **iv. Wind Patterns**

Henties Bay, situated along Namibia's Atlantic coast in the Erongo Region, experiences notable wind patterns that define its climate throughout the year. During the summer months (November to April), the town encounters strong southwesterly winds blowing onshore from the ocean. These winds, influenced by temperature differentials between land and sea, bring cool air and create a breezy coastal atmosphere. The southwesterlies are particularly favored by wind and kite surfers seeking optimal conditions for their sports.

In winter (May to September), Henties Bay experiences dry offshore winds known as berg winds, which blow from the east and southeast. These winds are warmer and drier, originating from the inland areas of Namibia. While less intense than the summer southwesterlies, the berg winds contribute to warmer daytime temperatures and reduced coastal humidity during the winter season. Overall, the wind patterns in Henties Bay play a significant role in shaping the local climate, affecting temperature, humidity, and outdoor activities year-round.

## **5. Terrain and Vegetation**

### **i. Terrain**

Henties Bay, located in Namibia's Erongo Region along the Atlantic coast, is characterized by a diverse and captivating terrain that showcases the unique beauty of the Namib Desert meeting the ocean.

The terrain around Henties Bay is predominantly coastal desert, featuring expansive sand dunes, gravel plains, and sparse vegetation adapted to arid conditions. The towering sand dunes, some reaching heights of over 100 meters (328 feet), are a striking feature of the landscape, particularly towards the south of the town where the famous Skeleton Coast begins. These dunes provide dramatic vistas and opportunities for activities like dune boarding and photography.

In addition to the dunes, Henties Bay is bordered by rocky outcrops and hills that offer panoramic views of the coastline and surrounding desert. The terrain transitions from sandy stretches to gravel plains as one moves inland, with scattered desert-adapted plants such as the distinctive *Welwitschia mirabilis* adding to the area's rugged charm. The proximity of the Atlantic Ocean further enhances the terrain, with rocky shores and tidal pools creating a dynamic coastal environment. This varied and visually captivating terrain makes Henties Bay a haven for nature enthusiasts, photographers, and adventurers seeking to explore the unique landscapes of the Namibian coast.



*Figure 2. Sandy terrain with small sand hills and vegetation growing.*

## **ii. Vegetation**

One of the most notable plants in this region is the *Welwitschia mirabilis*, a unique and ancient plant species endemic to the Namib Desert. The *Welwitschia* is known for its distinctive appearance, with only two long, strap-like leaves that grow continuously throughout its lifespan, which can span hundreds of years. This plant is well-adapted to survive on very little water and plays a crucial role in the ecosystem.

Other plant species found in the vicinity of Henties Bay include various succulents, such as the resilient desert-adapted varieties of vygies (mesemb) and euphorbias. These plants have evolved to store water in their fleshy leaves or stems, allowing them to thrive in the arid conditions. Additionally, scattered shrubs like the Namibian grape (*Trianthema hereroensis*) and drought-resistant grasses may be found in more sheltered areas.

The coastal environment near Henties Bay also supports some salt-tolerant vegetation, including species like the beach evening primrose (*Oenothera glazioviana*) and the coastal sage (*Salvia africana-lutea*), which contribute to stabilizing the sandy coastal soils.



Overall, the vegetation of Henties Bay and the surrounding Erongo Region reflects the resilience and adaptability of plant life in extreme desert conditions. Despite the arid climate, these unique plants play essential roles in the ecosystem and contribute to the area's rugged natural beauty.



Figure 3. Vegetation structure Map of project site

### iii. Plants Identified on the project site

Table 1. List of plants identified on project site

Scientific Name	Common Name	Endemism	Legal Status	Photo Description
<i>Arthroa leubnitziae</i>	Pencil Bush	Namibian Endemic	Not evaluated	
<i>Salsola tuberculata</i>	Salt Bush	Endemic	Not evaluated	

#### **iv. Importance of Protected Tree/Plants identifies**

Namibia, a country known for its diverse landscapes and unique flora, takes conservation seriously to protect its natural heritage. Among the few plant species found in the project area which are protected under the Forest amendment Act no 13 of 2005.

Protected plants in Henties Bay and the broader Erongo Region of Namibia play a crucial role in preserving biodiversity, supporting local ecosystems, and maintaining the unique desert environment. The designation of certain plant species as protected helps ensure their survival and contributes to the overall conservation efforts in the region.

One of the key protected plants in this area is the *Welwitschia mirabilis*, a remarkable and ancient species endemic to the Namib Desert. The *Welwitschia* is considered a living fossil and is protected due to its slow growth rate and vulnerability to habitat disturbances. Conservation efforts aimed at preserving *Welwitschia* populations contribute to safeguarding this iconic plant for future generations and maintaining its ecological significance within the desert ecosystem.

Additionally, other indigenous plant species that are protected in the Erongo Region contribute to habitat stability, erosion control, and the provision of food and shelter for local wildlife. By conserving these plants, authorities and conservation organizations help sustain the delicate balance of desert ecosystems and mitigate the impact of human activities on natural habitats.

Furthermore, protecting certain plant species in Henties Bay and surrounding areas contributes to ecotourism initiatives, as visitors are drawn to the region's unique flora and landscapes. Preserving these plants ensures that future generations can continue to appreciate and benefit from the diverse natural heritage of Namibia's coastal desert environment.

In summary, the importance of protecting plants in Henties Bay and the Erongo Region lies in safeguarding biodiversity, supporting ecosystem functions, and promoting sustainable development practices. By conserving these plants, stakeholders contribute to the overall health and resilience of Namibia's desert landscapes while fostering a deeper appreciation for the value of nature conservation.

## **6. Fauna**



## **i. Mammals and Reptiles**

Henties Bay, situated in Namibia's Erongo Region along the Atlantic coast, is home to a variety of mammals and reptiles that have adapted to the harsh and arid desert environment characteristic of the area. While wildlife sightings can be more sporadic in this coastal desert region compared to other habitats, several species are known to inhabit the surrounding landscape.

One of the iconic mammals found in the Erongo Region is the gemsbok (oryx), a striking antelope species known for its long, straight horns and distinctive black and white facial markings. Gemsbok are well-adapted to desert conditions and can often be spotted foraging for vegetation in the sparse scrublands near Henties Bay. Another notable antelope species in the area is the springbok, known for its impressive jumping ability and swift movements across the desert terrain. Along the coastline near Henties Bay, visitors can observe colonies of Cape fur seals, particularly at locations like Cape Cross. These seals gather in large numbers and provide a fascinating glimpse into the marine mammal life of the region.

In terms of reptiles, the Erongo Region boasts a diverse array of species adapted to desert living. Various lizards, including Namibian rock agamas and sand-diving lizards, are commonly found basking on rocks or sand dunes. The region is also home to several snake species, such as the spotted sand snake and Cape cobra, which play important roles in the local ecosystem as predators. One of the most intriguing reptiles in the area is the Namibian chameleon (*Chamaeleo namaquensis*), known for its ability to change color to blend into its surroundings and its specialized adaptations for desert life.

While wildlife encounters around Henties Bay require patience and a keen eye due to the sparse vegetation and rugged terrain, the presence of these mammals and reptiles highlights the resilience and adaptability of wildlife in Namibia's coastal desert ecosystems. Protecting these species and their habitats is crucial for maintaining biodiversity and ensuring the conservation of this unique desert environment.

### **Conservation Efforts**

Conservation efforts for mammals and reptiles around Henties Bay and the Erongo Region of Namibia focus on protecting and preserving the unique wildlife adapted to the desert environment. Organizations like the Ministry of Environment, Forestry, and Tourism in Namibia collaborate with local communities and conservation groups to implement strategies aimed at safeguarding key species such as gemsbok, springbok, Cape fur seals, and various reptiles including Namibian chameleons and endemic lizard species. Conservation initiatives include habitat restoration, anti-poaching patrols, wildlife monitoring, and public education to raise awareness about the importance of preserving these species and their fragile desert

ecosystems. By promoting sustainable land management practices and responsible tourism, these efforts contribute to the long-term survival and well-being of the diverse mammal and reptile populations in the Henties Bay area and throughout the Erongo Region.

## ii. Avian

Henties Bay and the surrounding Erongo Region in Namibia are home to a diverse array of bird species adapted to the coastal desert environment. One of the iconic avian species found in this area is the Benguela long-billed lark (*Certhilauda benguelensis*), known for its distinctive long bill and sandy-colored plumage. This lark is well-adapted to the desert conditions and can be observed foraging for seeds and insects amidst the sparse vegetation.

Another notable bird species in the region is the tractrac chat (*Emarginata tractrac*), a small and agile bird that inhabits the coastal dunes and gravel plains. Its cryptic coloration allows it to blend seamlessly into its surroundings, making it a fascinating subject for birdwatchers.

Here is a list of key bird species found around Henties Bay and the broader Erongo Region in Namibia:

1. Benguela long-billed lark (*Certhilauda benguelensis*)
2. Tractrac chat (*Emarginata tractrac*)
3. Gray's lark (*Ammomanes grayi*)
4. Damara tern (*Sterna balaenarum*)
5. Chestnut-banded plover (*Charadrius pallidus*)
6. African black oystercatcher (*Haematopus moquini*)
7. Hartlaub's gull (*Chroicocephalus hartlaubii*)
8. Rüppell's korhaan (*Eupodotis rueppellii*)
9. Dusky sunbird (*Cinnyris fuscus*)
10. Rosy-faced lovebird (*Agapornis roseicollis*)

These bird species are adapted to the arid coastal desert environment of Namibia and can be observed in various habitats around Henties Bay, including dunes, gravel plains, and coastal areas. Some of these species are endemic to the region or have specialized adaptations for survival in the desert climate. Birdwatching enthusiasts visiting Henties Bay have the opportunity to observe and appreciate these unique avian residents amidst the stunning landscapes of the Namibian coast.

### **Conservation and Challenges:**

Conservation efforts for avian species around Henties Bay and the Erongo Region are focused on preserving critical habitats and addressing threats such as habitat loss, climate change, and disturbance from human activities. Organizations like the Namibia Nature Foundation and local conservation groups work to establish protected areas, conduct bird surveys, and promote responsible tourism practices that minimize disturbance to bird populations. Education and outreach programs also play a vital role in raising awareness about the importance of bird conservation and the role of birds in maintaining healthy ecosystems.

By supporting these conservation efforts, stakeholders aim to ensure the continued survival and well-being of the diverse avian species that enrich the coastal desert environment around Henties Bay, contributing to the overall biodiversity and ecological health of Namibia's unique landscapes.

## **7. Potential Ecological Impacts and Mitigation Methods:**

The construction of an aquaculture facility in Henties Bay, Namibia, has the potential to create various ecological impacts that must be carefully assessed and mitigated to ensure sustainable development and minimal harm to the environment. Here are some potential impacts and corresponding mitigation methods:

### Habitat Alteration:

- Impact: Construction activities may involve clearing natural habitats such as coastal dunes or wetlands, leading to habitat loss and fragmentation.
- Mitigation: Conduct thorough environmental impact assessments (EIAs) to identify sensitive habitats and ecosystems. Implement measures such as habitat restoration and compensation by creating new habitat areas or preserving nearby undeveloped lands.

### Water Use and Quality:

- Impact: Aquaculture facilities require substantial amounts of water, which can affect local water sources and quality.
- Mitigation: Optimize water use efficiency through water recycling and reuse systems. Implement sustainable water sourcing practices, such as using brackish water or treated effluent, to minimize impacts on freshwater resources. Employ effective wastewater treatment technologies to ensure that discharged water meets regulatory standards.

#### Waste and Pollution:

- Impact: Aquaculture operations generate organic waste and nutrient runoff that can lead to water pollution and eutrophication.
- Mitigation: Implement best management practices for waste management, such as installing sedimentation ponds, using biological filters, and adopting nutrient management strategies. Regular monitoring of water quality parameters can help detect and address potential pollution issues promptly.

#### Introduction of Non-Native Species:

- Impact: Introducing non-native fish species for aquaculture can pose risks of genetic pollution and potential escape into natural water bodies.
- Mitigation: Prioritize the use of native species for aquaculture to minimize the risk of introducing invasive species. Implement strict biosecurity measures, such as secure containment systems and regular inspections, to prevent escapes and mitigate impacts on local biodiversity.

#### Coastal Dynamics and Erosion:

- Impact: Aquaculture facilities situated along the coast can influence sediment transport and shoreline stability, potentially leading to erosion.
- Mitigation: Incorporate coastal engineering measures, such as setback distances, vegetative buffers, and erosion control structures (e.g., breakwaters or revetments), to minimize coastal impacts. Conduct regular monitoring of coastal processes to assess any changes and adapt mitigation measures accordingly.

#### Community Engagement and Education:

- Mitigation: Engage with local communities, stakeholders, and regulatory authorities throughout the planning and construction process. Raise awareness about the potential ecological impacts of aquaculture and promote sustainable practices through education and outreach initiatives.

By implementing these mitigation methods and adhering to strict environmental regulations, the ecological impacts of constructing an aquaculture facility in Henties Bay can be effectively minimized, ensuring the long-term sustainability of both the aquaculture operation and the surrounding natural environment.

## 8. Recommendations

Based on the assessment of potential ecological impacts associated with the construction of an aquaculture facility in Henties Bay, Namibia, it is recommended to proceed with the project while implementing robust mitigation measures to minimize environmental harm. The following recommendations should be considered:

- **Comprehensive Environmental Impact Assessment (EIA):** Conduct a detailed EIA prior to construction to identify potential impacts on habitats, water resources, and biodiversity. Engage with environmental experts, local stakeholders, and regulatory agencies to ensure thorough assessment and mitigation planning.
- **Habitat Protection and Restoration:** Implement measures to protect and restore critical habitats affected by construction activities. This may include habitat mapping, establishment of buffer zones, and implementation of habitat restoration projects in impacted areas.
- **Water Management Practices:** Adopt sustainable water management practices to optimize water use efficiency and minimize impacts on freshwater resources. Implement water recycling systems and consider alternative water sources such as brackish water or treated effluent.
- **Waste and Pollution Control:** Develop and implement effective waste management strategies to minimize nutrient runoff and water pollution from aquaculture operations. Utilize sedimentation ponds, biological filters, and nutrient management techniques to treat wastewater before discharge.
- **Biosecurity Measures:** Prioritize the use of native fish species to minimize the risk of introducing non-native species into local waterways. Implement strict biosecurity protocols to prevent escapes and mitigate potential impacts on indigenous biodiversity.
- **Coastal Protection and Monitoring:** Incorporate coastal engineering measures, such as setback distances and erosion control structures, to minimize coastal erosion and maintain shoreline stability. Conduct regular monitoring of coastal dynamics to assess any changes and adjust mitigation measures accordingly.

## 9. Conclusion

In conclusion, the construction of an aquaculture facility in Henties Bay, Namibia, has the potential to support economic development and food security while contributing to local livelihoods. However, it is

essential to proceed with caution and implement robust mitigation measures to minimize ecological impacts on the surrounding environment.

By prioritizing environmental sustainability and adhering to best practices in aquaculture management, it is possible to achieve a balance between economic benefits and ecological conservation. Engaging with local communities, stakeholders, and regulatory authorities throughout the project lifecycle is key to ensuring transparent decision-making and effective implementation of mitigation measures.

Ultimately, the success of the aquaculture facility in Henties Bay will depend on its ability to operate in harmony with the natural environment, preserve biodiversity, and safeguard ecosystem health for present and future generations. Through careful planning, responsible management, and continuous monitoring, the project can contribute positively to the local economy while demonstrating environmental stewardship and commitment to sustainable development.

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