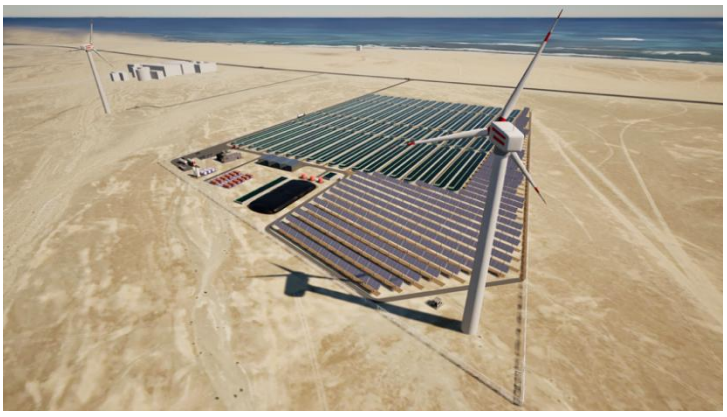
SKORPIO ALTERNATIVE FUELS NAMIBIA (PTY) LTD

SEAWEED AQUACULTURE PILOT PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) REPORT
FOR THE PROPOSED CONSTRUCTION AND OPERATION OF TWO (2) 4MW
WIND TURBINES FOR ELECTRICITY GENERATION

WLOTZKASBAKEN SETTLEMENT, ERONGO REGION, NAMIBIA

AUGUST 2025



DOCUMENT CONTROL	
REPORT TITLE	ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) REPORT FOR THE PROPOSED CONSTRUCTION AND OPERATION OF TWO (2) 4MW WIND TURBINES FOR ELECTRICITY GENERATION
I.N.K PROJECT NO	YP2401
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SPECIALIST INPUT	• NAHAS ENKONO – BIODIVERSITY SPECIALIST
DATE OF REPORT COMPILATION	JULY 2025
CURRENT REVISION	FINAL

ENVIRONMENTAL CONSULTANT'S EXPERTISE

I.N.K Enviro Consultants cc is the independent firm of environmental consultants that has been appointed by SKORPIo Alternative Fuels Namibia (Pty) Ltd to conduct and manage the ESIA process.

Immanuel N. Katali, an Environmental Assessment Practitioner, possesses a Bachelor of Arts (Honours) in Geography, Environmental Studies, and Sociology, and is currently pursuing a Master of Philosophy in Sustainable and Environmental Health Studies at Africa Research University (ARU). With a decade of relevant experience in conducting and overseeing Environmental and Social Impact Assessments (ESIAs) as well as Environmental Compliance and Monitoring Audits in Namibia, Immanuel is recognized as a certified Environmental Assessment Practitioner by the Environmental Assessment Professionals Association of Namibia (EAPAN).

DECLARATION OF INDEPENDENCE AND DISCLAIMER

I.N.K Enviro Consultants cc herewith declare that this report represents an independent assessment of the proposed Construction and Operation of Two (2) 4MW Wind Turbines, on the request of SKORPIo Alternative Fuels Namibia (Pty) Ltd. The Environmental Consultant has prepared this report based on an agreed scope of work and acts in all professional manner as an Independent Environmental Consultant to SKORPIo Alternative Fuels Namibia (Pty) Ltd and exercises all reasonable skill and care in the provision of its environmental professional services and in a manner consistent with the level of expertise exercised by members of the environmental profession.

The information, statements and commentary contained in this report have been prepared by I.N.K Enviro Consultants cc from information provided by SKORPIo Alternative Fuels Namibia (Pty) Ltd, relevant Specialist Studies, Site Visits and the Public Participation Process. I.N.K Enviro Consultants cc does not express an opinion as to the accuracy or completeness of the information provided, the assumptions made by the party that provided the information, or any conclusions reached. I.N.K Enviro Consultants cc has based this report on information received or obtained, on the basis that such information is accurate and, where it is represented to I.N.K Enviro Consultants cc as such, complete. I.N.K Enviro Consultants cc is not responsible and will not be held liable to any other person or organization for any loss or damage suffered by any other person or organization arising from matters dealt with or conclusions expressed in this report. This report is the sole property of SKORPIo Alternative Fuels Namibia (Pty) Ltd and must not be altered or added to without the prior consent of SKORPIo Alternative Fuels Namibia (Pty) Ltd.

EXECUTIVE SUMMARY

Project Background

SKORPIo ALTERNATIVE FUELS NAMIBIA (PTY) LTD (hereinafter referred to as SKORPIoN) seeks to obtain an Environmental Clearance Certificates (ECCs) for their proposed Construction and Operation of Two (2) 4MWp Wind Turbines.

The objective is to install two (2) 4MW wind turbines, each covering a footprint of approximately 0.4-hectares (ha), situated along the Namibian coastline in Wlozkasbaken Settlement between Swakopmund and Henties Bay, in proximity to the existing Erongo Desalination Plant and NamPower substation and conveniently near the Walvis Bay Port. Although the settlement is situated within the boundaries of the Dorob National Park, the Wlotzkasbaken townlands are expressly excluded from the park's jurisdiction.

Wind is the preferred energy source to produce green hydrogen, biofuels and e-fuels, as it, in contrast to solar power, does not require substantial land allocation. The strategy entails the installation of two 4MW units. The project is projected to consume a maximum of 1300 kW; however, most of this consumption will stem from processes operating continuously, 24/7. To ensure a reliable power supply, a 10 MWh battery will be installed on-site.

The overall Seaweed Aquaculture Pilot Project is a continuation of the prior assessment undertaken in 2024 for the Proposed Deployment of WaveRoller devices designed to harness electricity and the Installation of Underground Cable from the sea to the proposed site. Consequently, the Seaweed Aquaculture Project along with its ancillary infrastructure—including the Bulk Water Supply Pipelines, Land-Based Seaweed Aquaculture Ponds, a 2 MWp Solar Photovoltaic Plant, two (2) Four (4) MWp Wind Turbines, and a Green Hydrogen, Biofuels and E-Fuels Production Facility—constitutes the second phase of the Pilot Project.

The objectives of the proposed project include the following:

- Sustainable cultivation and harvesting of seaweed.
- Local Employment.
- Significant investment in the project area.
- Training and research opportunities.

- Demonstration of seaweed aquaculture farming applications.

Project Need and Desirability

The proposed wind turbines represent a pivotal element of the ancillary infrastructure for the Seaweed Aquaculture Farm Pilot Project. The primary aim of this initiative is to produce 4MWp of electricity as required to produce green hydrogen and biofuels. Wind energy is the primary sources of electricity for green hydrogen, biofuels and e-fuels production due to their abundant and renewable nature. Consequently, the construction and installation of the wind turbines is essential for the successful realization of the Seaweed Aquaculture Pilot Project. In the absence of this implementation, the project's objectives and goals will remain unfulfilled, thereby jeopardizing the overall feasibility of the Project.

Public Participation Process

The public participation process for the proposed project is conducted to ensure that all persons and/or organizations that may be affected by, or interested in the proposed project, were informed of the project and could register their views and concerns. By consulting with relevant authorities and I&APs, the range of environmental issues to be considered in this Report has been given specific context and focus.

Included below is a summary of the I&APs consulted, the process that was followed and the issues that were identified.

General Assumptions and Limitations

The key assumptions and limitations of this ESIA Report are detailed below.

- It is assumed that the information provided by SKORPIoN, relating to the project activities is accurate and that the project will be implemented and operated as described.
- The predictions of the impacts of the wind turbines, on the terrestrial environment need to be validated by regular field observations and subsequent monitoring.
- The results of specialist study formed the basis for the assessment of impact significance. The specialist investigations are conducted by independent specialists considered to be experts in their fields. It was assumed that the information from these sources is relevant and accurate.

- Considering the dynamic nature of the marine environment and its susceptibility to the influence of climate change e.g. sea level rise, increases in frequency of wave storms, are not evidently considered in this study.
- Area is frequented by the Orano Desalination Plant activities, recreational fishers and off-road driving, as such the area is not entirely pristine.

Assessment Approach and Methodology

The site visit and beach survey collected sediment for grain size analysis, as well as sediment samples for invertebrates. Counts of avifauna and marine flora were also taken into consideration. This approach is deemed adequate for placing into context the potential impacts associated with the establishment of the proposed pipeline installation for this pilot project.

An assessment of the potential positive and negative impacts associated with the installation and operations phase of the pipeline is provided below. As an outcome, specialist input was requested for some of the environmental issues and has been included in this assessment.

Each observed species and habitat type were assessed and ranked according to ecological sensitivity criteria, including endemism, conservation status, reproductive vulnerability, and habitat specialization. Particular attention was given to marine species, endemic reptiles, lichens, and nesting birds.

Other potential environmental impacts resulting from the proposed project activities and facilities (also identified during the ESIA) were assessed by I.N.K and are also presented below.

Impacts are considered in a cumulative manner where possible such that the impacts of the proposed Project are seen in the context of the baseline conditions described in Section 6.

- Both the criteria used to assess the impacts and the Method of determining the frequency/severity of the impacts is outlined.

This Method complies with the EIA Regulations: EMA, 2007 (Government Gazette No. 4878) EIA regulations. Both mitigated and unmitigated scenarios are considered for each impact in the ESIA results.

Conclusions and Recommendations

Exclusion/No-go zones are proposed where channel courses are found within the Project site to prevent irreversible degradation.

The Drainage Pattern and Exclusion Zone Map for the overall project site has been developed as a critical planning and environmental management tool for the proposed Seaweed Aquaculture Project.

The flora, fauna, and avifauna in the Wlotzkasbaken Coastal Zone are ecologically sensitive and highly endemic. Impacts from aquaculture infrastructure must be mitigated through strict environmental safeguards, including habitat buffers and exclusion zones, timing of activities to avoid sensitive seasons, and continuous monitoring. The findings in Seely and Pallett (2008) affirm the critical need to prioritize biodiversity protection in this arid coastal region.

The potential inland impacts may arise from the land clearing and preparation which could disturb the sensitive fauna and flora.

However, the mitigation measures that have been identified and recommended by I.N.K will promote the positive impacts of the project, as well as reduce the negative impacts to acceptable levels. An ESMP was further developed which identifies potential impacts of the project during the construction and operation phases. The ESMP is a legally binding document to which SKORPIoN must adhere to.

Despite these impacts, I.N.K concludes that the Proponent should be allowed to undertake the proposed Project, provided the potential impacts in the ESMP are implemented.

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LIST OF ACRONYMS, ABBREVIATIONS AND UNITS

Acronyms / Abbreviations / Units	Definition
BCLME	Benguela Current Large Marine Ecosystem
BID	Background Information Document
CO_2	Carbon Dioxide
DAE	Department of Agricultural Engineering
DEA	Directorate of Environmental Affairs
EAP	Environmental Assessment Practitioner
ECC	Environmental Clearance Certificate
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EMA	Environmental Management Act
ESF	Environmental and Social Framework
ESMP	Environmental and Social Management Plan
ESS	Environmental and Social Safeguard
GW	GigaWatt
ha	Hectares
IPF	Investment Project Financing
IRR	Issues and Response Report
IMO	International Maritime Organization
I&APs	Interested and Affected Party
Km	Kilometer
kW	kiloWatt
M	Meter
MAWLR	Ministry of Agriculture, Water and Land Reform
MD	Ministry of Defense
MEFT	Ministry of Environment, Forestry and Tourism
mm	Millimeter
MME	Ministry of Mines and Energy
MWh	MegaWatt hour
MWT	Ministry of Works and Transport
NACOMA	Namibian Coast Conservation and Management
NAMPOWER	Namibia Power Corporation

Acronyms / Abbreviations / Units	Definition
NDP	National Development Plan
PPAH	Pollution Prevention and Abatement Handbook
PPP	Public Participation Process
SEA	Strategic Environmental Assessment

1 INTRODUCTION

1.1 Purpose of the Report

Interested and/or Affected Parties (I&APs) relating to the proposed Pilot Project are invited to comment on this ESIA Report. The final report, including comments received from I&APs, will be submitted to the Ministry of Environment, Forestry and Tourism (MEFT): Department of Environmental Affairs (DEA), who will make the final decision on the application for an environmental clearance.

Five (5) separate ECC Applications will be submitted to MEFT; DEA, in accordance with the proposed Project activities outlined below:

1. Two Bulk Water Supply Pipelines.
2. Land-Based Seaweed Aquaculture Ponds.
3. 2 MWp Solar PV Plant.
4. 2x Four (4) MWp Wind Turbines.
5. Green Hydrogen and Biofuels Production Facility.

This ESIA Report exclusively addresses the 2x Four (4) MWp Wind Turbines. Distinct ESIA Reports have been compiled to assess the Bulk Water Supply Pipelines, 2 MWp Solar Photovoltaic Plant, and Green Hydrogen and Biofuels Production Facility.

Prior to the commencement of the project, an environmental clearance is required based on an approved Environmental and Social Impact Assessment (ESIA) and Environmental and Social Management Plan (ESMP). This report describes the ESIA process being followed and provides an overview of the affected environment. It includes an assessment of the environmental impacts that the proposed activities are likely to have and sets out the consultants' recommendations. The proposed management and mitigation measures related to the proposed activities are documented in an ESMP.

1.2 Project Background

SKORPIo ALTERNATIVE FUELS NAMIBIA (PTY) LTD (hereinafter referred to as SKORPIoN) seeks to obtain an Environmental Clearance Certificates (ECCs) for their proposed Construction and Operation of Two (2) 4MWp Wind Turbines.

The objective is to install two (2) 4MW wind turbines, each covering a footprint of approximately 0.4-hectares (ha), situated along the Namibian coastline in Wlozkasbaken Settlement between Swakopmund and Henties Bay, in proximity to the existing Erongo Desalination Plant and NamPower substation and conveniently near the Walvis Bay Port. Although the settlement is situated within the boundaries of the Dorob National Park, the Wlotzkasbaken townlands are expressly excluded from the park's jurisdiction.

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The objectives of the proposed project include the following:

- Sustainable cultivation and harvesting of seaweed.
- Local Employment.
- Significant investment in the project area.
- Training and research opportunities.

- Demonstration of seaweed aquaculture farming applications.

SKORPIoN is an innovative sub-commercial pilot initiative aimed at transforming the production of biofuels. This pioneering endeavor is a collaboration between SKORPIo Alternative Fuels Namibia (Pty) Ltd and SeaH4 (Pty) Ltd.

I.N.K Enviro Consultants cc (hereinafter referred to as I.N.K), an independent firm of environmental consultants, has been appointed to undertake the Environmental and Social Impact Assessment process for this project. For more details on the ESIA process that was followed, please refer to Section 1.

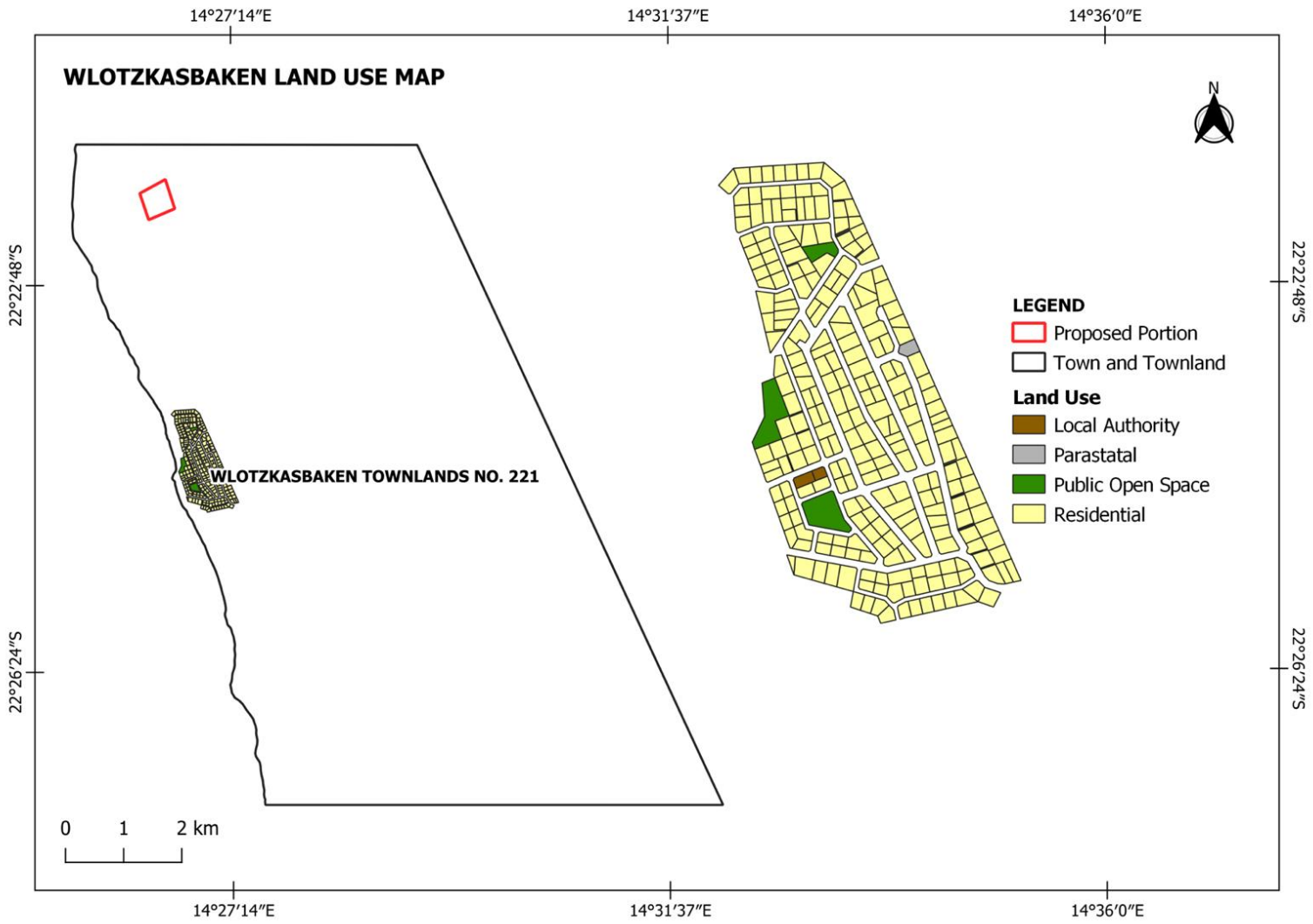


Figure 1: Site Locality Map

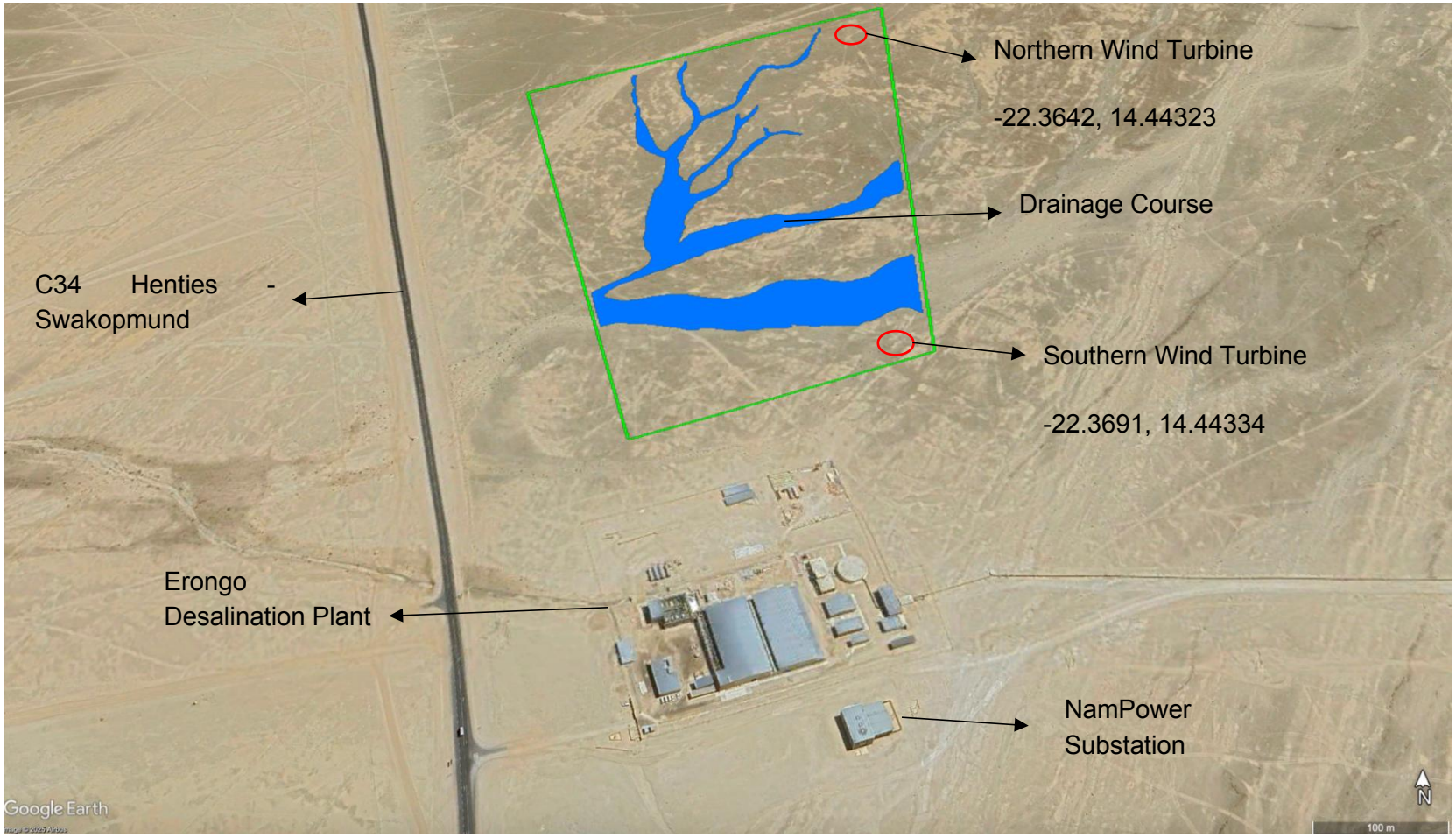


Figure 2: Proposed Solar PV Plant Location

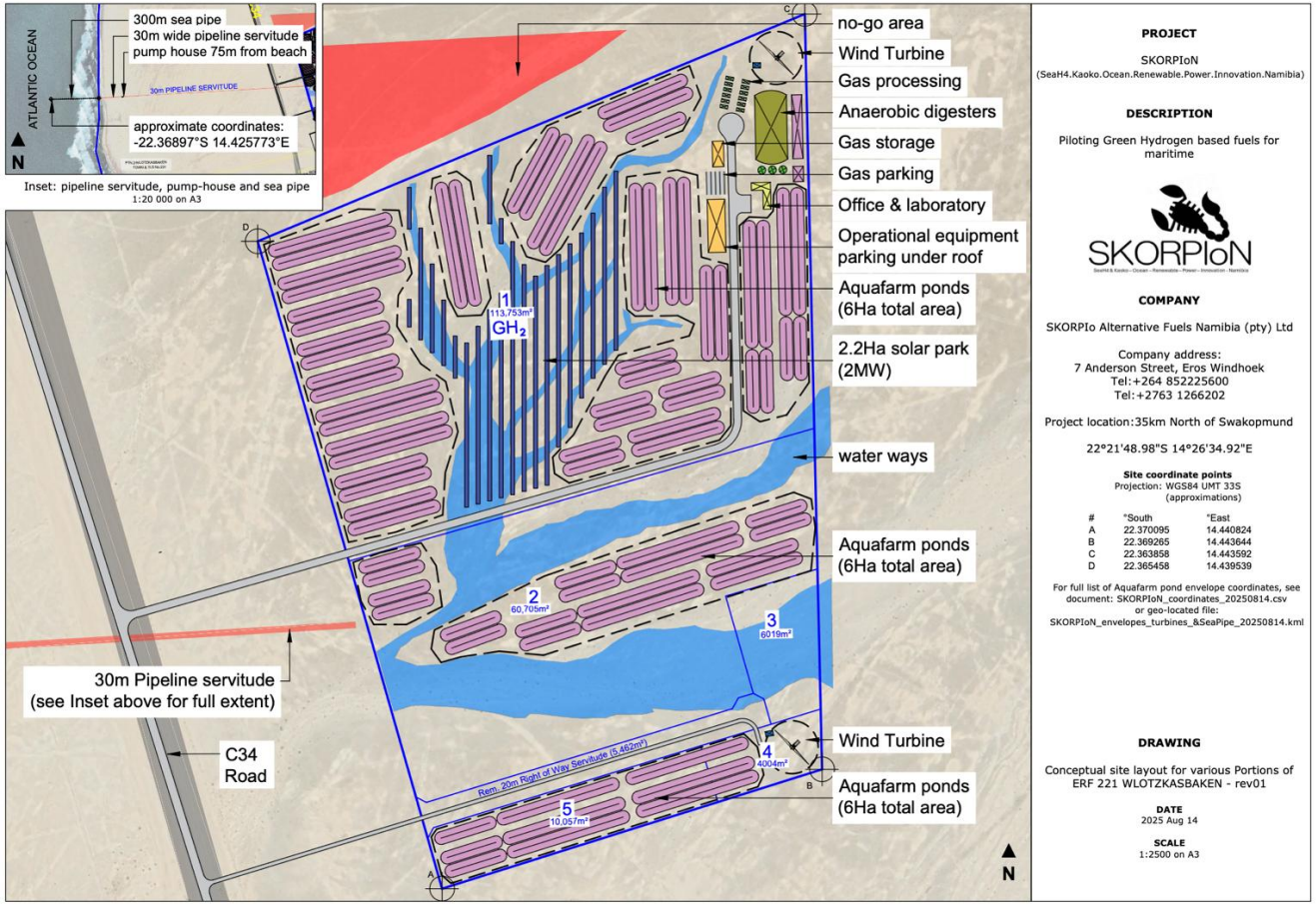


Figure 3: Proposed Seaweed Aquaculture Pilot Project Site Layout

1.3 Project Need and Desirability

The proposed wind turbines represent a pivotal element of the ancillary infrastructure for the Seaweed Aquaculture Farm Pilot Project. The primary aim of this initiative is to produce 4MWp of electricity as required to produce green hydrogen and biofuels. Wind energy is the primary sources of electricity for green hydrogen, biofuels and e-fuels production due to their abundant and renewable nature. Consequently, the construction and installation of the wind turbines is essential for the successful realization of the Seaweed Aquaculture Pilot Project. In the absence of this implementation, the project's objectives and goals will remain unfulfilled, thereby jeopardizing the overall feasibility of the Project.

1.3.1 The Seaweed Aquaculture Project's Contribution to Namibia's Green Energy Efforts

The Government of Namibia is focusing efforts on achieving large-scale, low-cost renewable energy development and designing models for sustainably maximizing fiscal revenue and local development in renewable energy investment and green hydrogen production. Namibia's world-class solar and wind resources give it a long-term competitive advantage in producing green hydrogen (Namibia Green Hydrogen Council, 2022).

Therefore, Namibia is aiming to become a green hydrogen superpower in the coming decade by positioning itself as a leader in the emerging markets and an international exporter of green hydrogen. The production of green hydrogen will be an important source of foreign investment, foreign currency and be important for the country's energy security and transition.

In addition, Namibia is investing significant resources in expanding its port in Walvis Bay to safeguard sea routes and establish itself as a maritime powerhouse in the region and stay abreast of climate change related rules, regulations and initiatives. This endeavor aims to leverage the increasing demands in shipping, rising cargo volumes, the oil and gas industries, commercial activities, recreational uses, and more. The development of the Walvis Bay port is part of Namibia's broader ambition to evolve into a pivotal logistics center for southern Africa. The proposed project will therefore aim to maximize on the port expansion by supplying vessels with biofuels and e-fuels.

Considering the above, the proposed project holds significant potential in enhancing Namibia's logistics capabilities by establishing crucial supply of biofuels in the logistics sector, and elevating Walvis Bay's stature as a regional logistics hub.

1.4 Introduction to the Environmental and Social Impact Assessment Process

Environmental and Social Impact Assessments are regulated by the Ministry of Environment, Forestry and Tourism (MEFT) in terms of the Environmental Management Act, 7 of 2007. This Act was gazetted on 27 December 2007 (Government Gazette No. 3966) and enacted on 6 January 2012. The Environmental and Social Impact Assessment Regulations: Environmental Management Act, 2007 (Government Gazette No. 4878) were promulgated on 6 January 2012.

1.4.1 ESIA Process

The ESIA process that has been followed is summarized in the table below:

Table 1: ESIA Process

ESIA OBJECTIVES	CORRESPONDING ACTIVITIES
Project initiation, Screening Phase	
◆ Understanding of the environmental and social baseline relating to the proposed Project. ◆ Notify the decision-making authority of the proposed Project. ◆ Initiate the Environmental and Social Impact Assessment process. ◆ Site visits and identify environmental issues. ◆ Identify key stakeholders and early identification of other I&APs.	◆ Project Inception and initiation meetings to discuss the Project and ESIA process requirements. ◆ Liaise with the Specialists. ◆ Draft ESIA Schedule. ◆ Initiate baseline studies. ◆ Submit Application for authorisations and a Background Information Document (BID) to the authorities. ◆ Register the Project and Applications for environmental clearances with MEFT (DEA) on its online portal. ◆ Early identification of environmental aspects and potential impacts associated with the proposed Project.
Assessment Phase	

ESIA OBJECTIVES	CORRESPONDING ACTIVITIES
◆ Notify other regulatory authorities and I&APs of the proposed Project (via newspaper advertisements, BID, emails, site notices and telephone calls). ◆ Conduct Key Stakeholder and Public meetings. ◆ Carry out specialist investigations and establish baseline environmental conditions. ◆ Determine the terms of reference for additional assessment work. ◆ Compile Scoping Report and Issues and Response Report (IRR) ◆ Distribute the Scoping Report for review and comment by relevant authorities and I&APs. ◆ Assessment of potential issues, consider comments received and compile the ESIA final report.	◆ Develop Public Participatory Process (PPP) Programme. ◆ Develop I&AP database. ◆ Prepare BID and distribute to I&APs. ◆ Notify government authorities and IAPs of the Project and ESIA process (telephone calls, e-mails, BID newspaper advertisements and site notices). ◆ IAP registration and comments. ◆ Meetings with authorities and IAPs. ◆ Investigations by appointed specialists. ◆ Compilation of Scoping Report and ESMPs. ◆ Distribute Scoping Report and ESMP to all I&APs for review and comments. ◆ Assess potential issues, obtain comments and update the Scoping Report and ESMP.

Within this framework, the required components of the ESIA report are discussed in more detail as part of the ESIA Methodology in Section 8.

ESIAs are influenced by national legislation and a range of guidelines. The legislation applicable to this project and the ESIA process is discussed further in Section 3 below.

2 SCOPING METHODOLOGY

2.1 Information Collection

An assessment focusing on both the potential marine and terrestrial disturbances and displacements, while assessing the potential effects on marine and terrestrial fauna and flora as a consequence of the ancillary infrastructure for the Pilot Project, was previously undertaken as part of the phase 1 (Deployment of the WaveRoller Devices and Installation of Underground Cables from the sea to the proposed Aquaculture site) Project in 2024. Therefore, marine data for the ancillary infrastructure conducted in 2024 has been updated for this project.

From desktop study methodology and literature review, the description will be based on a review of existing information and data from local and international scientific literature and information sourced from the internet sources and complemented by a biodiversity assessment, beach and site survey.

Therefore, I.N.K used various information sources to identify and assess the issues associated with the proposed project as per the following:

- Site visit by I.N.K.
- Consultation with SKORPIoN Project Technical Team.
- Where applicable, consultation with local conservation experts and review of research by BirdLife Namibia, Gobabeb Research Centre, and NACOMA provided regional ecological insights and validated species presence and habitat importance.
- Consultation with MEFT via online application system.
- Similar ESIA report in the vicinity of Wlotzkasbaken - Desalination Plant and Water Carriage System to Secure Water Supply to the Central Coast, Windhoek And En-Route Users (SLR, 2021).
- Consultation with I&APs.
- Observations were used to document ecological features, including breeding zones, and fauna and flora.
- Atlas of Namibia.

- Google Earth.
- Internet sources.

2.2 Scoping

The main purpose of scoping is to indicate which environmental aspects relating to the proposed project might have an impact on the environment, to assess them and provide management and mitigation measures to avoid or minimize these impacts.

Table 2 outlines the Scoping requirements as set out in Section 8 of the Environmental and Social Impact Assessment Regulations that were promulgated in January 2012 in terms of the Environmental Management Act, 7 of 2007.

Table 2: Scoping Requirements Stipulated in the ESIA Regulations.

Requirements for a Scoping Report in terms of the February 2012 regulations	Reference in report
(a) the curriculum vitae of the EAP who prepared the report.	Appendix A
(b) a description of the proposed activity.	Section 4
(c) a description of the site on which the activity is to be undertaken and the location of the activity on the site.	Section 4
(d) a description of the environment that may be affected by the proposed activity and the way the geographical, physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed listed activity.	Sections 6
(e) an identification of laws and guidelines that have been considered in the preparation of the Scoping Report.	Section 3
(f) details of the public consultation process conducted in terms of regulation 7(1) in connection with the application, including - (i) the steps that were taken to notify potentially interested and affected parties of the proposed application. (ii) proof that notice boards, advertisements and notices notifying potentially interested and affected parties of the proposed application have been displayed, placed or given. (iii) a list of all persons, organisations and organs of state that were	Sections 2.3, 2.4, 2.5 and Appendix B

registered in terms of regulation 22 as interested and affected parties in relation to the application. (iv) a summary of the issues raised by interested and affected parties, the date of receipt of and the response of the EAP to those issues.	
(g) a description of the need and desirability of the proposed listed activity and any identified alternatives to the proposed activity that are feasible and reasonable, including the advantages and disadvantages that the proposed activity or alternatives have on the environment and on the community that may be affected by the activity;	Sections 1.3 and 5
(h) a description and assessment of the significance of any significant effects, including cumulative effects, that may occur because of the undertaking of the activity or identified alternatives or as a result of any construction, erection or decommissioning associated with the undertaking of the proposed listed activity;	Sections 7 and 8
(i) terms of reference for the detailed assessment; and	Section 7 & 8
(j) a management plan, which includes - (i) information on any proposed management, mitigation, protection or remedial measures to be undertaken to address the effects on the environment that have been identified including objectives in respect of the rehabilitation of the environment and closure. (ii) as far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of the activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development. (iii) a description of the manner in which the applicant intends to modify, remedy, control or stop any action, activity or process that causes pollution or environmental degradation and remedy the cause of pollution or degradation and migration of pollutants.	Separate document

2.3 Public Participation Process

The public participation process for the proposed project is conducted to ensure that all persons and/or organizations that may be affected by, or interested in the proposed project, were informed of the project and could register their views and concerns. By consulting with relevant authorities and I&APs, the range of environmental issues to be considered in this Report has been given specific context and focus.

Included below is a summary of the I&APs consulted, the process that was followed and the issues that were identified.

2.3.1 Identification of Stakeholder Groups

A stakeholder for the proposed Project is defined as a person, group or organization that has direct or indirect stake in a Project because it can affect or be affected by the Project or its Proponents' actions, objectives and policies. Stakeholders vary in terms of degree of interest, influence and control they have over the Project or the proponent.

During the environmental and social impact assessment consultations process, various activities as part of the development of the public consultation program were conducted to determine the relevant stakeholders. From the field-consultations, key stakeholder groups were identified and categorized them as Primary and Secondary stakeholders, based on the nature and extent of impact of project and influence of stakeholders on the project.

2.4 The Proposed Project I&APs

The table below provides a broad list of persons, group of persons or organizations that were informed about the project and were requested to register as I&APs should they be interested and/or affected.

Table 3: SKORPIoN's Project Stakeholders

IAP Grouping	Organisation
Government Ministries	◆ Ministry of Environment, Forestry and Tourism (MEFT) ◆ Ministry of Agriculture, Fisheries, Water and Land Reform (MFMR) ◆ Ministry of Works and Transport ◆ Ministry of Industries, Mines and Energy
Local Authorities	◆ Erongo Regional Council ◆ Arandis Constituency Office ◆ Wlotzkasbaken Settlement Office ◆ Swakopmund Municipality

IAP Grouping	Organisation
Parastatal	◆ ErongoRed ◆ Namwater ◆ Namport ◆ Nampoer ◆ Namcor ◆ Environment Investment Fund ◆ Electricity Control Board
Nearest Communities	◆ Residents in Wlotzkasbaken ◆ Wlotzkasbaken Homeowners Association
Other	◆ Erongo Desalination Plant ◆ UNAM Henties Bay Campus ◆ Nantional Commission on Research Science and Technology (NCRST) ◆ Confederation of Namibia Fishing Associations ◆ Kelp Blue Namibia ◆ SASSCAL ◆ Namibia Green Hydrogen Researh Institute ◆ Debmarine Namibia ◆ Monjasa ◆ Namibia Energy Institute ◆ Platonic Academy Namibia ◆ Benguela Current Convention ◆ Namibia Training Authority ◆ NIMT ◆ Namibia Nature Foundation ◆ UNDP ◆ Namibia Investment Promotion Development Board ◆ Ocean Conservation Namibia (OCN)
Media	Newspaper adverts placed on 9 and 16 June 2025, in the following newspapers: ◆ Die Republikein ◆ The Allgemeine Zeitung ◆ The Namibian Sun.
Other interested and affected	Any other people with an interest in the proposed project or who may be affected

IAP Grouping	Organisation
parties	by the proposed project.

2.5 Steps in the Consultation Process

Table 4 sets out the steps that were followed as part of the consultation process:

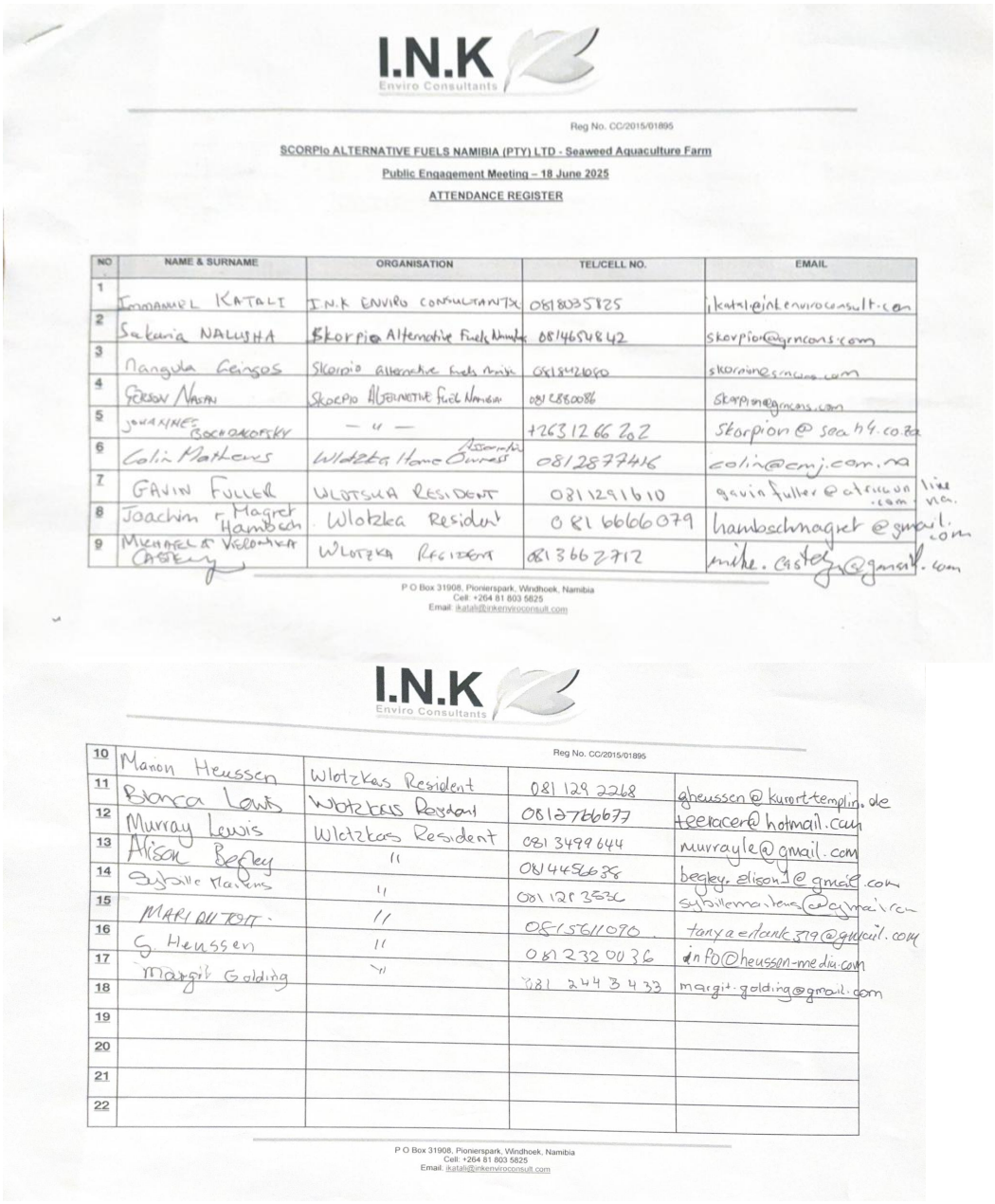
Table 4: Consultation Process with I&APs and Authorities

TASK	DESCRIPTION
Notification - Regulatory Authorities and IAPs	
Notification to MEFT	I.N.K submitted the Application Form (online system) as a form of project registration and notification to MEFT.
I&AP identification	A stakeholder database was developed for the proposed project and ESIA process. Additional I&APs will be updated during the ESIA process as required.
Distribution of background information document (BID), flyers and stakeholders meeting invitation letters	BIDs were made available to all I&APs on the project's stakeholder database. Copies of the BID were available on request to I.N.K. Stakeholder meeting invitation were given out to the residents of Wlotzkasbaken. The purpose of the BID was to inform I&APs and authorities about the proposed project, the ESIA process, possible environmental impacts and means of providing input into the ESIA process. Attached to the BID was a registration and response form, which provided I&APs with an opportunity to submit their names, contact details and comments on the project.
Newspaper Advertisements	Block advertisements were placed as follows: ◆ Die Republikein (9 and 16 June 2025) ◆ The Namibian Sun (9 and 16 June 2025) ◆ Allgemeine Zeitung (9 and 16 June 2025) Please refer to Figure 3.
Scoping Meetings	Several consultations were made with I&APs. This included meetings and telephonic

TASK	DESCRIPTION
Notification - Regulatory Authorities and IAPs	
	discussions. A public meeting (Figure 4) was held with I&APs as follows: ◆ Date - Wednesday, 18 June 2025 ◆ Venue - The Wlotzkasbaken Settlement Office The due date to register as an I&AP and submit comments was 7 July 2025. Please refer to Figure 5 for the attendance register.
I&AP Review	The report is distributed for a 7-day comment period.
Comments and Responses	Minutes and Issues and Response of the meetings were recorded.
MEFT review of ESIA Report and ESMP	A copy of the final ESIA Report, including authority and I&AP review comments, will be submitted to MEFT via the online application system, on completion of the public review process.

Figure 4: Newspaper Advert - 9 and 16 June

Figure 5: Public Consultation Meeting – 18 June 2025



I.N.K Enviro Consultants

Reg No. CC/2015/01895

SCORPIo ALTERNATIVE FUELS NAMIBIA (PTY) LTD - Seaweed Aquaculture Farm

Public Engagement Meeting – 18 June 2025

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Figure 6: Attendance Register

2.6 General Assumptions and Limitations

The key assumptions and limitations of this ESIA Report are detailed below.

- It is assumed that the information provided by SKORPIoN, relating to the project activities is accurate and that the project will be implemented and operated as described.
- The predictions of the impacts of the wind turbines, on the terrestrial environment need to be validated by regular field observations and subsequent monitoring.
- The results of specialist study formed the basis for the assessment of impact significance. The specialist investigations are conducted by independent specialists considered to be experts in their fields. It was assumed that the information from these sources is relevant and accurate.
- Considering the dynamic nature of the marine environment and its susceptibility to the influence of climate change e.g. sea level rise, increases in frequency of wave storms, are not evidently considered in this study.
- Area is frequented by the Orano Desalination Plant activities, recreational fishers and off-road driving, as such the area is not entirely pristine.

3 IDENTIFICATION OF APPLICABLE ENVIRONMENTAL AND SOCIAL GUIDELINES

3.1 Introduction

The Republic of Namibia has five tiers of law and several policies relevant to environmental assessment and protection, which include:

- The Constitution.
- Statutory law.
- Common law.
- Customary law.
- International law.

As the main source of legislation, the Constitution of the Republic of Namibia (1990) makes provision for the creation and enforcement of applicable legislation. In this context and in accordance with its constitution, Namibia has passed numerous laws intended to protect the natural environment and mitigate against adverse environmental impacts.

The management and regulation of the activities in the Namibian ocean fall within the jurisdiction of the Ministry of Fisheries and Marine resources. The environmental regulations are guided and implemented by the DEA within the MEFT.

In the context of the proposed project activities, there are several laws and policies currently applicable.

The Marine resources Act 27 of 2000 provides for the conservation of the marine ecosystem, the responsible utilization, conservation, protection, promotion of marine resources in a sustainable manner and for the control of marine resources for these purposes. The Minister of Fisheries is empowered to make regulations under section 61 on a broad number of topics including “regulating or prohibiting the discharge in the sea or discarding on the seashore and

land of specified substances or materials, or substances or materials not complying with specified requirements or having specified properties"

The EIA Policy (1995) is enforced through the Environmental Management Act, 7 of 2007 and the EIA Regulations of 6 January 2012 (EIA Regulations). In terms of this legal framework certain identified activities may not commence without an environmental clearance issued by MEFT.

3.2 Applicable Authorities

3.2.1 Ministry of Environment, Forestry and Tourism

The mission of the Ministry of Environment, Forestry and Tourism is to promote biodiversity conservation in the Namibian environment through the sustainable utilization of natural resources and tourism development for the maximum social and economic benefit of its citizens. MEFT develops, administers and enforces environmental legislation and policy.

The MEFT's Department of Environmental Affairs ("DEA") is mandated to give effect to Article 95L of the Constitution by promoting environmental sustainability. The Environmental Commissioner serves as head of the DEA. The DEA is responsible for, inter alia, the administration of the EIA process undertaken in terms of the Environmental Management Act, 2007 and the EIA Regulations 2012. The DEA will be responsible for issuing a decision on the application for an ECC, based on the recommendations from MAFWLR. If approved, the DEA will issue an Environmental Clearance Certificate.

3.2.2 Ministry of Agriculture, Fisheries, Water and Land Reform (MAFWLR)

This Ministry is responsible for the management and development of fisheries and aquaculture in Namibia. The Ministry is comprised of four directorates; two of which include the Directorate of Resource Management and Directorate of Operations and Surveillance. The Directorate of Resource Management is responsible for scientific research and providing advice on the state of commercially important marine fish stocks and recommending catch quotas. It is also

responsible for managing and regulating species fish size limits, dates of closed fishing seasons, declaring areas closed to fishing and determining fishing gear use.

The Directorate of Operations and Surveillance is responsible for monitoring, controlling and surveillance of fishing-related activities both at sea and onshore.

The MAFWLR is a key stakeholder in the project and the ESIA process due to the proposed installation of the water supply pipelines on Namibian waters. The construction of the ponds have the potential to have both negative and positive impact on the marine ecology and the fishing industry.

3.2.3 Ministry of Industries, Mines and Energy

The Ministry of Mines and Energy was constitutionally established to take custody of the diverse geological, mineral and energy resources, and to ensure their contribution to the country's socioeconomic development. To formulate policies and legislations that effectively regulate activities in mining and energy sectors; generate knowledge and information on resources and provide services to stimulate investment for sustainable economic development and benefit to all Namibians.

3.3 The Integrated Coastal Management Bill

Once enacted, the Integrated Coastal Management Bill (2014) aims to establish a system of integrated coastal management in Namibia in order to promote the conservation of the coastal environment, maintaining the natural attributes of the coastal landscapes and seascapes, and ensuring the sustainable development and use of the natural resources within the coastal zone that is also socially, economically and ecologically justifiable.

3.4 Coastal Strategic Environmental Assessments

Two Namibian coastal Strategic Environmental Assessments (SEAs) were undertaken between 2006 and 2008, i.e. one for the northern regions of Kunene and Erongo and another for the southern regions of Karas and Hardap. These draw on international experience and were

undertaken at a time of mounting production sector pressures within Namibia. Being an initiative of the Namibian Government through MEFT, the two SEAs seek to inform political and technical decision makers at local, regional and national levels.

The 2008 “SEA for the coastal areas of the Erongo and Kunene Regions” compiled by the Namibian Coast Conservation & Management Project (NACOMA) is aimed at ensuring informed decisions on issues related to biodiversity conservation, land use planning and socio-economic development planning in the Kunene and Erongo coastal regions.

3.5 Relevant Namibian Gudelines and Policies

Namibia’s policies provide the framework to the applicable legislation. Whilst policies do not often carry the same legal recognition as official statutes, policies are used in providing support to legal interpretation or guidance for civil servants and other stakeholders in the implementation of government objectives.

3.5.1 The Namibia Vision 2030

The principles that underpin Vision 2030, a policy framework for Namibia’s long-term national development, comprise the following:

- Good governance
- Partnership
- Capacity enhancement
- Comparative advantage
- Sustainable development
- Economic growth
- National sovereignty and human integrity
- Environment
- Peace and security

Vision 2030 states that natural environments are disappearing quickly. Consequently, the solitude, silence and natural beauty that many areas in Namibia provide are becoming sought after commodities and must be regarded as valuable natural assets. Vision 2030 emphasises the importance of promoting healthy living which includes that most Namibians are provided with safe drinking water. The importance of developing wealth, livelihood, and the economy is also emphasized by Vision 2030. This includes infrastructure provision like transport, communication, water, and electricity.

3.6 Other Relevant Local Policies and Legislation

Below (Table 5) is a list of other applicable local policies and legislation for the proposed project.

Table 5: List of local policies and legislation

Local Legislation, and adopted Policies, Protocols and Agreements	Summary	Environmental principles
Pollution Control and Waste Management Bill	This Act promote sustainable development; to provide for the establishment of a body corporate to be known as the Pollution Control and Waste Management Agency; to prevent and regulate the discharge of pollutants to the air, water and land; to make provision for the establishment of an appropriate framework for integrated pollution prevention and control; to regulate noise, dust and odor pollution; to establish a 'system of waste planning and management; and to enable Namibia to comply with its obligations under international law in this regard.	The environmental principle specific to this Bill is pollution control.
Namibia Ports Authority Act 2 of 1994	To provide for the establishment of the Namibia Ports Authority to	To manage and exercise control over the

	undertake the management control of ports and lighthouse in Namibia and the provision of facilities and services related thereto.	operation of ports and lighthouse and other navigational aids in Namibia and its territorial waters.
Aquaculture Act 18 of 2002	This Act regulate and control aquaculture activities; to provide for the sustainable development of aquaculture resources; and to provide for related matters.	Environmental principles of this act are to promote sustainable aquaculture, management, protection and conservation of marine and onshore aquatic ecosystems.
Urban and Regional Planning Act no. 5 of 2018	This Act consolidate the laws relating to urban and regional planning; to provide for a legal framework for spatial planning in Namibia; to provide for principles and standards of spatial planning.	Environmental principles specific to this act are harmonization and streamlining of spatial planning in order to avoid land use conflicts, delays in decision making and to minimize negative environmental impacts.
Atmospheric Pollution Prevention Ordinance 11 of 1976	To provide for the prevention of the pollution of the atmosphere	To prevent atmospheric pollution and minimize environmental impacts associated with it.
Public and Environmental Health Act 1 of 2015	To provide a framework for a structured uniform public and environmental health system in Namibia.	Principles of this act includes protecting individuals and communities from public health risks, encourage community participation to create a healthy environment; and provide for early detection of diseases and public health risks.
National Climate Change Policy	This policy identifies technology development and transfer to be a key issue for which strategies and action plans should be developed.	Promote and encourage new and clean technologies to be developed to reduce greenhouse gas

		emissions.
Convention on Biological Diversity (CBD)	Namibia ratified the Convention on Biological Diversity in 1992. As a party to the CBD, the Namibian government is obliged to develop a national strategy for the conservation of biodiversity.	Environmental principles of this are to establish a system of protected areas and integrate biodiversity considerations into development planning.
Convention to Combat Desertification (UNCCD)	Namibia ratified the UN Convention to Combat Desertification in 1995. This convention addresses the socio-economic and biophysical drivers of land degradation and desertification.	Objectives are to adopt integrated strategies that improve land productivity, rehabilitate degraded areas, and ensure sustainable management of land and water resources, with a focus on improving community livelihoods.

3.7 Relevant International Standards

3.7.1 The EIB's Statement of Environmental and Social Principles and Standards (EIB, 2009)

The European Investment Bank (EIB) adopted an Environmental Statement in 1996 to underline its commitment to protecting and improving the natural and built environment according to EU policy (EIB, 209). The statement focuses on, a) the principles on which the EIB approach to environmental and social issues are based and b) the environmental and social performance standards that ensure compliance with Bank requirements. The principles and standards are derived from EU policy and law and supplemented by other examples of international good practice. The EIB requires that all the projects it is financing are acceptable in environmental and social terms by applying appropriate safeguards to all its operations.

3.7.2 The EIB's Environmental and Social Handbook (EIB, 2013)

The EIB Environmental and Social Handbook provides an operational translation of the policies and principles contained in the 2009 EIB Statement of Environmental and Social Principles and Standards (see above). Principles include the Environmental and Social Impact Assessment process of identifying predicting, evaluating a project's positive and negative environmental and social impact on the biophysical and human environment as well as identifying ways of avoiding, minimizing, mitigating and compensating, including offsetting in the case of the environment and remedying in the case of social impacts, by applying the mitigation hierarchy. This process includes consultation with direct and indirect stakeholders and the elaboration of an environmental and social management plan detailing the implementation of the mitigation measures.

3.7.3 World Bank Environmental and Social Framework

The W orld Bank's Environmental and Social Framework (ESF) enables the World Bank and Borrowers to better manage environmental and social risks of projects and to improve development outcomes. The ESF offers broad and systematic coverage of environmental and social risks. It makes important advances in areas such as transparency, non-discrimination, public participation, and accountability - including expanded roles for grievance mechanisms. It brings the World Bank's environmental and social protections into closer harmony with those of other development institutions.

The ESF consists of:

- The World Bank's Vision for Sustainable Development.
- The World Bank's Environmental and Social Policy for Investment Project Financing (IPF) which sets out the requirements that apply to the Bank.
- The 10 Environmental and Social Standards (ESS), which set out the requirements that apply to Borrowers.
- Bank Directive: Environmental and Social Directive for Investment Project Financing

- Bank Directive on Addressing Risks and Impacts on Disadvantaged or Vulnerable Individuals or Groups.

3.7.4 World Bank's Pollution Prevention and Abatement Handbook (PPAH)

The Pollution Prevention and Abatement Handbook (PPAH) promotes the concepts of sustainable development by focusing attention on the benefits, both environmental and economic, of pollution prevention, including cleaner production and good management techniques. In many cases, the guidelines provide numerical targets for reducing pollution, as well as maximum emissions levels that are normally achievable through a combination of cleaner production and end-of-pipe treatment. The guidelines are designed to protect human health, reduce mass loading to the environment, draw on commercially proven technologies, be cost effective, follow current regulatory trends and promote good industrial practices, which offer greater productivity and increased energy efficiency.

3.7.5 Applicable International Finance Corporation (IFC) Performance Standards

IFC's Environmental and Social Performance Standards define IFC clients' responsibilities for managing their environmental and social risks. The Performance Standards provide guidance on how to identify sustainability risks and impacts and are designed to help avoid, mitigate, and manage them as a way of doing business in a more sustainable way.

The following are the performance standards that are applicable to the construction and operation of the project and are used as the basis of investigation for the ESMP:

Table 6: Applicable Performance Standards

IFC Performance Standard	Description	Applicable	Not Applicable
1. Environmental and Social Management System	An environmental and social management system (ESMS) helps companies integrate plans and standards into their core operations—so they can anticipate environmental and social risks posed by	☑	☐

IFC Performance Standard	Description	Applicable	Not Applicable
	their business activities and avoid, minimize, and compensate for such impacts as necessary. A good management system provides for consultation with stakeholders and a means for complaints from workers and local communities to be addressed.		
2. Labour and Working Conditions	It asks that companies treat their workers fairly, provide safe and healthy working conditions, avoid the use of child or forced labor, and identify risks in their primary supply chain.	☑	☐
3. Pollution Prevention and Control	It guides companies to integrate practices and technologies that promote energy efficiency, use resources—including energy and water—sustainably, and reduce greenhouse gas emissions.	☑	☐
4. Occupational Health and Safety, Public Health and Security	It helps companies adopt responsible practices to reduce such risks including through emergency preparedness and response, security force management, and design safety measures.	☑	☐
5. Land Acquisition and Involuntary Resettlement	It advises companies to avoid involuntary resettlement wherever possible and to minimize its impact on those displaced through mitigation measures such as fair compensation and improvements to and living conditions. Active community engagement throughout the process is essential.	☐	☑
6. Biodiversity and Ecosystems	It recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and managing living natural resources adequately are fundamental to sustainable development.	☑	☐
7. Rights and Interests of Indigenous People	It seeks to ensure that business activities minimize negative impacts, foster respect for human rights, dignity and culture of indigenous populations, and promote development benefits in culturally appropriate ways. Informed consultation and participation with IPs	☑	☐

IFC Performance Standard	Description	Applicable	Not Applicable
	throughout the project process is a core requirement and may include Free, Prior and Informed Consent under certain circumstances.		
8. Cultural Heritage	Cultural heritage encompasses properties and sites of archaeological, historical, cultural, artistic, and religious significance. It also refers to unique environmental features and cultural knowledge, as well as intangible forms of culture embodying traditional lifestyles that should be preserved for current and future generations. PS8 aims to guide companies in protecting cultural heritage from adverse impacts of project activities and supporting its preservation. It also promotes the equitable sharing of benefits from the use of cultural heritage.	☑	☐

3.8 International Conventions and Agreements

Below (Table 7) is a list of applicable international conventions and agreements for the proposed project.

Table 7: International conventions and agreements

Legislation	Summary	Environmental principles
Stockholm Convention on Persistent Organic Pollution (2001)	Is a global treaty to protect human health and the environment from chemicals that remain intact in the environment for longer periods.	To protect human health and the environment from persistent organic pollutants; especially those used in marine paints.
Vienna Convention for the protection of ozone layer (1985)	This Convention is aimed to promote cooperation among nations by exchanging information on the effects of	To take control actions to protect the ozone layer.

	human activities on the ozone layer.	
Montreal protocol (1997)	Is a global agreement to protect the earth's ozone layer by phasing out the chemicals that depletes it.	Control substances and chemicals production that are depleting the ozone layer.
UN Framework on climate change (1992)	This framework was introduced to stabilize greenhouse gas concentrations at a level that would prevent dangerous anthropogenic interference with the climate system.	Countries should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects.
Kyoto protocol (1997)	It is also designed to assist countries in adapting to the adverse of climate change. It facilitates the development and deployment of technologies that can help increase resilience to the impacts of climate change.	Reduce GHG emission at least by 18%.
Basel Convention (1992)	To protect human health and the environment against the adverse effects of hazardous wastes.	Reduction of hazardous waste generation and the promotion of environmentally sound management of hazardous wastes
Conventions on Wetland of International Importance (1971)	Conserving wetlands (swamps, marshes, lakes, mudflats, peat bogs and other bodies of water whether natural or artificial, permanent or temporary).	This convention establishes a management framework aimed at conserving the wetland and ensuring its wise use. The Walvis Bay is recognized under this convention.
Paris Agreement (2015)	Is a legally binding international treaty on climate change.	To limit global warming to preferably 1.5 degrees Celsius, compared to pre-industrial levels.

Internal Convention on Biological Diversity	Among others, this Convention aims at conservation of biological diversity and promote sustainable development of biological components.	Conservation of biological diversity, sustainable use and equitable sharing of utilization of biodiversity, ecosystem assessment and monitoring and mitigation of adverse environmental impacts.

3.8.1 Applicable Listed Activities

The EIA Regulations promulgated in terms of the Environmental Management Act, identify certain activities which could have a substantially detrimental effect on the environment. These listed activities require environmental clearance from MEFT prior to commencing. The following listed activities (Table 8) identified in the regulations apply to the proposed project:

Table 8: Listed activities triggered by the proposed Project.

Listed activity
1) The construction of facilities for – a) The generation of electricity

4 Project Description

4.1 Wind Turbine Components

The wind panels will be arranged in a fixed-tilt configuration. The turbines are made up of the following components.

- Blades.
- Lower Tower.
- Upper Tower.
- Nacelle.
- Concrete Foundation.

Figure 3: Typical Wind Turbine (DotPower, 2025)

4.2 Lower Tower

The figures below show an example of the lower tower installation by cranes.

Figure 4: Installation of Lower Tower (DotPower, 2025)

4.3 Upper Tower

The figures below show an example of the upper tower installation by cranes.

Figure 5: Installation of Upper Tower (DotPower, 2025)

4.4 Foundation and Support Structures

Install foundations and support structures for the wind turbines, ensuring stability and durability. However, the foundation still needs to be decided between gravity foundation or piling (figures 6 and 7).

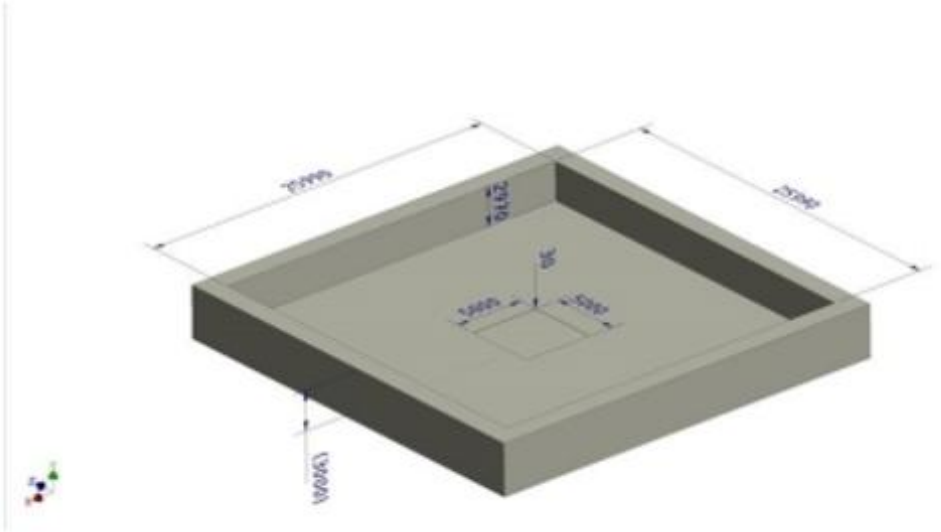


Figure 6: Concrete Gravity Foundation

Figure 7: Piling Foundation

4.5 Energy Storage and Connection

A lithium-ion battery system with a capacity of 10 MWh will be used for peak shaving and energy arbitrage and connected to the green hydrogen and biofuels facility. Electrical cables will be connected to this system from the wind turbines via the power management system.

4.6 Wind Panel Installations

Carefully install the wind turbines according to the approved design and specifications, ensuring proper orientation and spacing.

4.7 Electrical Infrastructure

Install inverters, substations, and transmission.

4.8 Construction Phase

4.8.1 Construction

The construction working areas include the following:

- mobile stores for storing the construction materials.
- temporary lay-down areas.
- mobile waste collection and storage areas.
- temporary parking area for cars and equipment.
- toilet facilities (preferably mobile toilets) that will be serviced regularly.

Construction activities will take place during the establishment and preparation of the sites. Therefore, it is expected that construction will involve the following activities:

- Appoint contractors, laborers, etc.
- Clearing and grubbing and other earth moving activities.
- Stockpiling topsoil and sub-soil.
- Foundation excavations.
- Setting up contractor's laydown areas.
- General building/construction activities including, amongst others: mixing of concrete; operation of construction vehicles and machinery; civil, mechanical and electrical works; painting; grinding; welding; etc.
- Disposal or treatment of potentially contaminated soil
- Water utilisation
- Operation and movement of construction vehicles and machinery
- Refueling of equipment
    - Hydrocarbon wastes
- Using of cranes
- Handling, storage and disposal of non-hazardous waste
    - Domestic waste
    - Other construction waste
- Transportation of fuel in small quantities
- Handling and storage of hazardous material
    - Fuel
    - Lubricants

4.8.2 Site preparations for infrastructure

Site preparation includes the demarcation of the 1-ha footprint of the wind turbines and the laydown area to be located ±15 m for each of the proposed project component and infrastructure site, for the storage and partial assembly of the project material or equipment to be constructed.

4.8.3 Access Roads

The installation traffic will use the C34 Swakopmund - Henties Bay public road, and existing off-roads currently used by fishermen and Orano. Vehicles used for the installation phase will include trucks for moving materials and 4x4 vehicles for workers. The existing road infrastructure will be used into the installation area. However, additional access roads for all construction and service vehicles will be established, if needed.

4.8.4 Refueling of Construction Vehicles

The construction vehicles and machinery such as the graders and tipper trucks will be refueled in Henties Bay or Walvis Bay. No refueling of vehicles will be taking place on site.

4.8.5 Topsoil Removal

Topsoil will be excavated to install foundations.

4.8.6 Employment and housing

The construction will be carried out by contractors. Contractors for the construction phase will be engaged on a short term, temporary basis. The construction workforce/contractors will commute to the designated sites each day and will be accommodated in Swakopmund and Henties Bay. No accommodation or any permanent structures will be constructed on site. Approximately 10 workers will be required for the erection of the wind turbines.

4.8.7 Power Supply for Construction Activities

Mobile generators will supply power for the construction phase.

4.8.8 Sanitation during construction

Mobile toilets with will be used. The septic tanks will be emptied on a regular basis and the effluent disposed of at a licensed facility off-site.

4.8.9 Waste Management during Installation

Waste is anticipated to be generated on site during construction. The pilot project will make use of waste skips during the construction phase. These skips should be emptied on a regular basis.

Waste will be transported off site and disposed of at the nearest landfill site in Henties Bay or Swakopmund. No waste will be disposed of or burnt on site.

All hazardous waste, i.e., chemical containers, hydrocarbon contaminated materials, used hydrocarbons etc., will be separated from the general waste and removed from site and disposed of at a licensed hazardous waste disposal site in Walvis Bay.

4.8.10 Timeline

Construction commencement is subject to regulatory approval, i.e. approval of the ESIA and issuing of an ECC by MEFT.

The construction phase for the wind turbines would take approximately 4 months to complete before commissioning and subsequent operations can commence.

4.8.11 Rehabilitation of temporary construction sites and laydown area

The removal of all temporary construction equipment will be undertaken at the end of construction activities. This will be done as per Environmental and Social Management Plan recommendations.

4.9 Operational phase

The main activities will include routine inspections and maintenance as required.

4.9.1 Maintenance

A dedicated team of technicians will be responsible for the regular maintenance and operation of the wind turbines. Regular inspections, cleaning, and repairs will be conducted to ensure optimal performance.

4.9.2 Employment

Overall, the seaweed aquaculture farm (all components of SKORPIoN) will create employment opportunities as follows:

- 4x Water Quality monitoring (Dayshift only)
- 8x Harvest Team (Dayshift only)

- 1x Maintenance (Dayshift only)
- 1x Operator Biogas (24 / 7)
- 4x Labourer Biogas (Dayshift only)
- 1x Operator Gas Upgrading (24/7)
- 1x labourer Gas Upgrading (dayshift only)
- 1x Operator PTX (24/7)
- 1x Labour PTX (night) / 2x Labour PTX (day)
- 1x gate control (24 / 7)
- 1x perimeter control (24 / 7)
- 1x canteen (24/7)
- 1x maintenance (dayshift only)
- 2x cleaning (night shifts only)

4.9.3 Housing and Accommodation

The workforce will be commuting daily from their regular residence. No permanent accommodation or dwellings will be established on site.

4.9.4 Operational Traffic

Other than the need for routine inspections and maintenance which will use the existing service tracks and additional access roads created during construction.

4.9.5 Power Supply for operation activities

The renewable energy harnessed from oceanic waves, solar panels, and wind turbines will suffice to generate the power required on site. These three modalities will complement one another, further backed up by a 10 MWh BESS (Battery Energy Storage System), particularly during periods of intermittent and short power supply. This does not only underscore the potential of sustainable energy but also seeks to enhance the resilience and efficiency of energy production coastal environments and for the Project. By integrating diverse renewable sources, the Project aspires to mitigate the challenges posed by energy fluctuations, ensuring a more reliable and consistent power supply.

4.9.6 Waste Management

Domestic waste will be generated on site during operations. Waste will be transported off site and disposed of at the nearest landfill site. No waste will be disposed of or burnt on site.

All hazardous waste, i.e., chemical containers, hydrocarbon contaminated materials, used hydrocarbons etc., will be removed from site and disposed of at a licensed hazardous waste disposal in Walvis Bay.

4.9.7 Security

Security at the aquafarm will be limited to perimeter fencing and CCTV, as well as 24/7 access/gate and perimeter control.

4.9.8 Decommissioning

At the end of the seaweed aquaculture farm operations, the site including all linear infrastructure will be decommissioned and suitably rehabilitated. Where possible, rehabilitation will be undertaken progressively during operation as areas become available. This approach will allow the operational team to determine the best and most effective method of rehabilitation for the various areas disturbed by Project activities.

5 PROJECT ALTERNATIVES

5.1 Alternative Site Selection

The Seaweed Aquaculture site is selected due to the following factors:

- Proximity to the existing Orano/Erongo Desalination Plant, which is a key component in the project, for the supply of fresh water for green hydrogen production.
- Proximity to the existing substation, whereby surplus electricity generated from wave, wind and solar can be fed into the grid to supply electricity to nearby communities.
- Proximity to the Walvis Bay Port, where the biofuels are proposed to be transported to supply vessels with these biofuels, therefore making it financially viable to transport the fuels to the port.
- The site is situated on a significantly low elevation (20 m above sea level), which would make it suitable, viable and efficient to pump water from the sea to the aquaculture ponds, as also evident from the Erongo Desalination Water Pumping activities.
- The Seaweed (Ulva) is widely found in the area. Though SKORPIoN will not be harvesting wild ulva, this species that is already present means that in case of accidental escape of the farmed seaweed, no impact to existing biome occurs, no alien or invasive species and no change of genepool.
- This section is free of dunes (compared to the stretch between Swakopmund and Walvis Bay, which otherwise would require SKORPIoN to transverse them with the pipelines or threaten to bury the project as they move.

5.2 Alternative source of power for the production facility

The Seaweed Aquaculture Pilot Project aims to harness electricity from renewable energy sources, specifically wave, wind, and solar power. These three modalities will complement one another, further backed up by a 10 MWh BESS particularly during periods of intermittent and short supply. This does not only underscore the potential of sustainable energy but also seeks to enhance the resilience and efficiency of energy production coastal environments and for the Project. By integrating diverse renewable sources, the project aspires to mitigate the challenges posed by energy fluctuations, ensuring a more reliable and consistent power supply.

5.3 The “no project” option

The proposed wind turbines represent a pivotal element of the ancillary infrastructure for the Seaweed Aquaculture Farm Pilot Project. The primary aim of this initiative is to produce 4MWp of electricity as required to produce green hydrogen, biofuels and e-fuels.

SKORPIoN aims to harness the power of nature and technology to create a sustainable future by farming algae along the desert shores to provide the primary feedstock for biogas production. This biogas is then transformed into carbon-neutral liquefied biomethane (LBM) and biogenic CO2. This state-of-the-art process will yield approximately 800 kilograms of e-methanol daily, supplying the shipping sector with a green alternative to conventional marine fuels. The pilot plant aims to produce 1.5 tonnes of biogenic CO2 and 200 kg of green hydrogen per day, showcasing the feasibility of commercial-scale e-fuel production.

Consequently, the installation of the proposed wind turbines is essential for the successful realization of the Seaweed Aquaculture Pilot Project. In the absence of this implementation, the project's objectives and goals will remain unfulfilled, thereby jeopardizing the overall feasibility of the Project.

Therefore, proceeding with the Project, will contribute to the feasibility of the overall seaweed aquaculture farm and create a significant positive economic impact such as employment and procurement of goods and services.

The challenge facing the Project Proponent is its contribution towards achieving these goals while at the same time preventing and/or mitigating potential negative social and environmental impacts. The proponent will have to ensure that the identified mitigation measures and commitments to address the potential impacts, will appropriately be implemented and adhered to.

6 DESCRIPTION OF THE CURRENT/BASELINE ENVIRONMENT

6.1.1 Climate

The meteorological conditions along the Namibian coast are controlled by the ever-present South Atlantic anticyclone, the northward-flowing Benguela Current (with associated upwelling) and the divergence of the south-east trade winds along the coast. Climatic conditions in the region vary from cool, foggy, windy and hyper-arid conditions along the coast to dry and hot weather towards onshore from which is separated by the Great Escarpment.

6.1.2 Temperature, Rainfall and Fog

Namibia is a hot country with temperatures along the coast being relatively constant but fluctuating daily and seasonally in the interior. The coastal area around Swakopmund receives less than 50 mm of rainfall per annum, but approximately a third of the year are characterised as fog days. Fog is the most distinctive climatic feature Namibia's coast, with 100-125 days of fog per year in the vicinity of Wlotzkasbaken. Fog usually forms when moist maritime air moves over cold upwelled water adjacent to the coast and is the predominant source of precipitation for the coastal areas.

Many plants and animals rely on the fog in these areas as water source and is an important driver of the establishment and growth of lichens. Average rainfall increases and fog days decrease towards the east. Heavy rainfall in the interior of the country rarely reaches the sea, except as occasional floods in the Omaruru, Swakop and Kuiseb rivers. Evaporation rates in Namibia are generally high, however lower rates of evaporation are experienced at the coast due to cooler and more humid coastal conditions.

6.1.3 Surface Wind

The presence of the subtropical South Atlantic Anticylcone off Namibia's coast drives the wind pattern, generating strong to gale force south-westerly winds along the coast in all seasons but most frequently during mid-summer and spring. These strong winds cause upwelling in the ocean, bringing nutrient rich water to the surface and consequently resulting in the high biological productivity characteristic of Namibian coastal waters. Additionally, the coastal

southwesterly wind is responsible for transporting sand to the Namib Sand Sea. Occasional hot, dry and powerful easterly winds ("Berg Winds") during winter cause large quantities of dust and sand to be blown offshore, affecting sediment input into the coastal marine environment. The abrasive effect of the sand and dust transported by Berg winds is an important consideration in the design of power lines and other infrastructures. Wind in the interior blows mainly from north, north-east and easterly directions, and carries moist air into Namibia. Wind in the interior blows mainly from north, north-east and easterly directions, and carries moist air into Namibia.

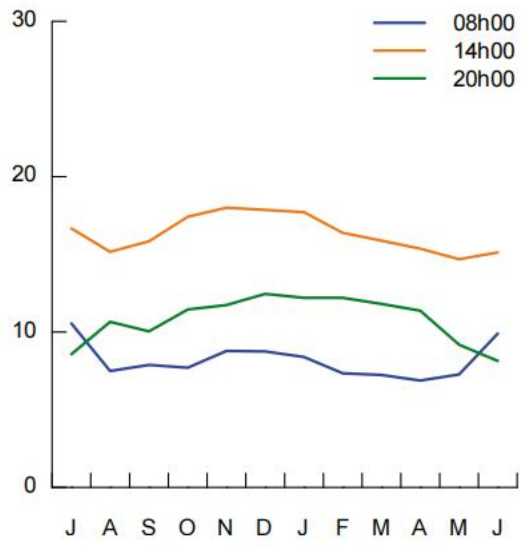


Figure 8: Mean Wind Speeds in Wlotzkasbaken

6.1.4 Topography and Drainage

The landscape is classified as being in a flat western coastal plain composed of mobile dunes and gravel sandy plains, an area of dissection and erosional cutback. The site is not located within a river catchment and surface runoff would be in a westerly direction towards the Atlantic Ocean. Thelocal landscape, and the site and its immediate surroundings, is generally flat with poorly developed drainage systems (Geo-Pollution, 2023). Figure 6 below indicated the drainage courses within the site boundaries.

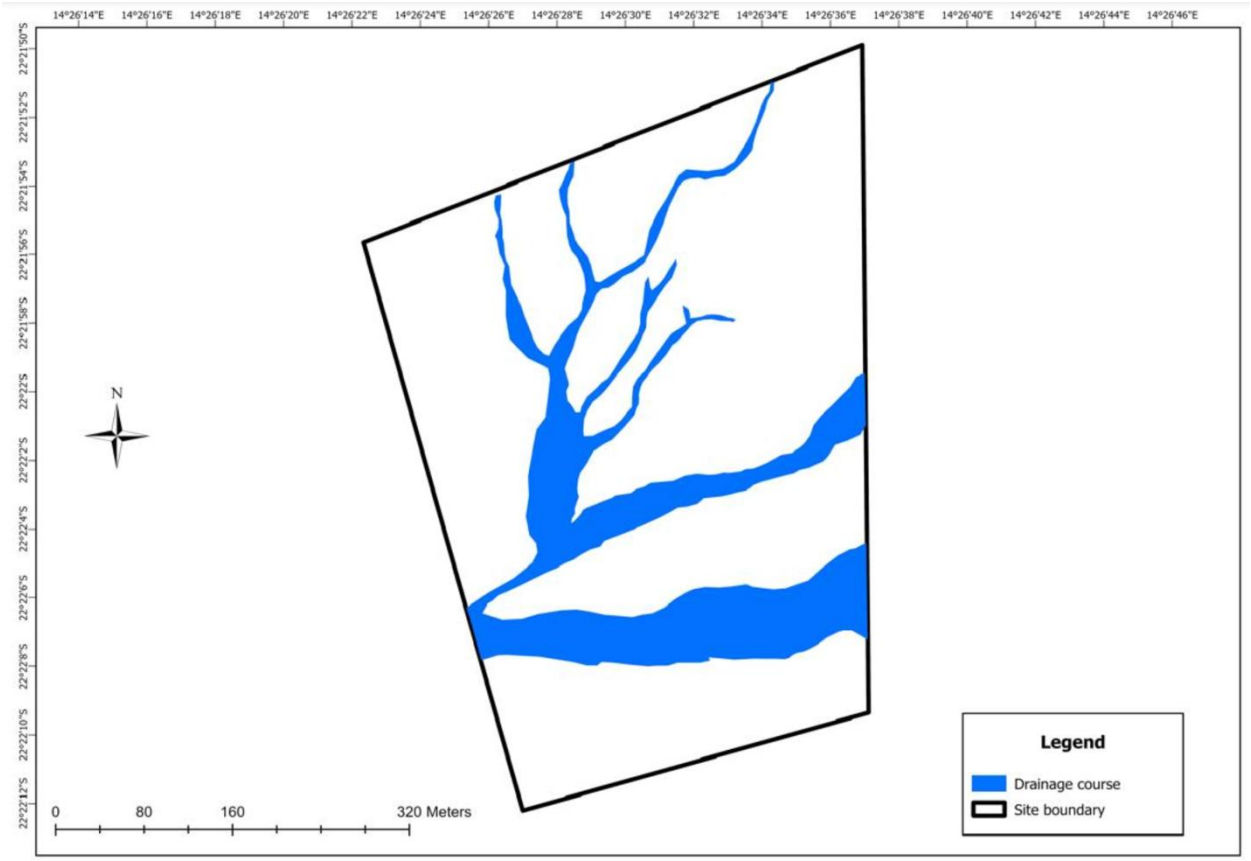


Figure 9: Thematic map indicating the drainage courses within the 20 ha Project site boundaries

6.1.5 Geology and Hydrogeology

Schists and dolomites, with patches of granite and complex rock types, predominantly underlie the proposed project area. The eastern part around Windhoek is characterised by schistsThe dominant soil types of the proposed project area are petric Gypsisols, pertic Calsisols, eutric Regosols, and lithic and eutric Leptosols, with interspersed rocky outcrops. The desert areas of the proposed project area are sparsely covered with lichen and vegetation.

Local geological features in the area are defined by the presence of marble, schist, conglomerate, quartzite, and dolerite sills and dykes originating from the Namibian Age – Damara Sequence. The superficial geology of the site consists of a layer of shallow, coarse brown sand. The flow of groundwater mainly transpires through primary porosity in the topsoil

and along fractures, faults, and other geological structures that exist within the underlying hard rock formations (Geo-Pollution, 2023).

6.1.6 Soils

The two main soil units on the site, are Solonchaks and Leptosols. Approximately one third of the profiles are Solonchaks, which are predominantly found in the plain habitat and characterised by a salic horizon. However, these soils are shallow and partly with a high gypsum content, as expressed by the qualifier 'Gypsic'. Profiles with shallower bedrock and lower gypsum content are classified as Leptosols. In some places, especially on the calcite marble, only very shallow soils or substrate layers cover the bedrock. Texture ranges from sand to silty sand and sandy silt. Clay contents are very low (Biota, 2010).

Pattern analogies in the soil and vegetation distribution are not very prominent but evident and are analogous to topographic features. Higher plants are concentrated along the drainage courses that (i) receive more water by run-on effects and (ii) have lower salt contents by run-off salt export. Although the annual rainfall is very low, a few events within decades might suffice to transport at least the highly soluble salts into deeper topographical positions or even out of the system (Biota, 2010).

6.1.7 Surface Water

Although the surface water features in the study area are not of particular significance for aquatic ecology, dry rivers and drainage lines act as resource sinks that attract and provide habitat for plants and animals. Dry rivers and drainage lines channel water during rains, often characterised by flash floods, and play a critical role in the landscape in terms of transporting water and nutrients downstream. Drainage lines and other surface water features are thus of significance for terrestrial biodiversity and ecology. In Namibia, where surface water is very sparse, groundwater is a critical resource. Little or no groundwater exists between the coast and ~ 15°15'E, hallower groundwater areas are often associated with surface water features (ephemeral rivers and dry rivers).

6.1.8 Biodiversity

The proposed wind turbines are located within the sensitive ecosystem zone, which raises critical biodiversity considerations. This area is globally recognized for its ecological uniqueness, harboring numerous endemic species and specialized life forms that rely on fog, sparse vegetation, and temperature regulation. The study area is ecologically diverse, hosting rocky intertidal zones, estuarine systems, and coastal wetlands. These ecosystems provide critical habitats for various flora and fauna and a breeding area for avian species. The proximity to the Skeleton Coast and Namib Desert adds to the ecological importance of the site. The proposed site for the project, in the settlement of Wlotzkasbaken, falls in the Erongo coastal zone region (NACOMA, 2007). The Erongo coastal zone is approximately 300 km long, and features Namibia's only coastal urbanised sub-region, incorporating the municipalities of Walvis Bay, Swakopmund and Henties Bay, and the declared settlement area of Wlotzkasbaken.

Within the locality of Wlotzkasbaken, the extensive lichen fields and the bird species are of ecological importance.

6.1.9 Flora

6.1.9.1 Lichen Fields

The Namib Desert lichen fields near Wlotzkasbaken are ecologically significant and a unique coastal habitat characterised by high biodiversity and endemism. These fog-dependent systems host lichens such as *Teloschistes capensis* and *Ramalina spp*., which stabilise soils and support nutrient cycling. As noted by Seely and Pallett (2008), these habitats are fragile and recover slowly from disturbance. These lichen mats support distinct arthropod assemblages, including beetles, spiders, and insects. They are extremely fragile and highly sensitive to dust, trampling, and physical disturbance, with recovery taking decades. The lichen field is densely distributed towards, on the outside of the northern ERF perimeter.

This area is one of the richest in lichen diversity due to extremely favourable climatic conditions characterised by high air humidity, dew and fog precipitation. Several of the recorded taxa are endemic to the Namib Desert, and one species, *Phloeopeccania pulvinulina,* was recorded for the first time in Africa (Schultz et al. 2009).

Crustose lichens have the highest cover just outside the study area, while foliose and fruticose lichens are also common. Vehicle tracks have caused disturbances, but crustose lichens like *Lecidella crystallina, Buellia sipmanii, and Caloplaca volkii* are recolonizing these areas.

These vegetation types are foundational to the coastal Namib ecosystem. Lichens initiate soil formation and create habitats for micro-fauna. Hummock plants act as fog traps and shelter a variety of species, including arthropods, small mammals, and ground-nesting birds (Burke, 2001; Henschel & Seely, 2000).

The high-density lichens extend northwards from the northwestern boundary of the site while the the specific study area consist of low-density lichens. There is a global biodiversity and climate change monitoring station in the Wlotzkasbaken lichen fields, approximately 6.5 km North-Northeast of the proposed site.

6.1.9.2 The Coastal Hummock Species

The coastal hummock belt refers to a narrow stretch of area from the high-water mark, directly inland from the littoral zone. The inland site hosts the primary vegetation species which are very distinct and dominated by *Arthraerua leubnitziae, and Zygophyllum stapffi*i (Figure 10 and 11). Other Hummock species in the general area include, *Zygophyllum clavatum, and Brownanthus kuntzei.*

Hummocks are critical landforms that enhance desert biodiversity by retaining soil moisture, moderating temperatures, and reducing wind erosion.

The ecological significance of the hummocks is profound, serving as a buffer zone that protects inland habitats from saltwater intrusion and erosion. These ecosystems are not only pivotal for local wildlife, providing essential habitat for numerous bird and small mammal species, but they also play a critical role in nutrient cycling. The unique soil composition here, often characterized by salinity and specific organic matter, supports the growth of halophytes and other specialized plant species.

In addition to *Arthraerua leubnitziae and Zygophyllum stapffii*, other notable flora includes *Cambiscanthus bracteatus* and *Limonium spp*., both of which contribute to the biodiversity of the

region. The pollinators visiting these plants further enhance the ecosystem diversity, establishing intricate relationships between species. Conservation efforts in the Wlotzkasbaken area aim to maintain these vital habitats, as they face threats from climate change, invasive species, and human activities such as off-road driving. The preservation of such ecological communities is essential not only for maintaining local biodiversity.

Figure 10: *Arthraerua leubnitziae (Pencil Bush)* observed on site

Figure 11: *Zygophyllum stapffii (Dollar Bush)* observed on site

Figure 12: Vegetation distribution of *Arthraerua leubnitziae and Zygophyllum stapffii* along drainage channels through the site

6.1.10 Fauna

Desert-adapted fauna, including Tenebrionid beetles, gerbils, and geckos, inhabit the lichen fields and dune systems. These organisms perform essential ecological roles such as detritus decomposition and seed dispersal. According to Seely and Pallett (2008), these species are finely tuned to the microclimatic conditions created by lichen coverage.

Desert-adapted fauna that can be found in the study area are as follows:

- True Bugs:
    - *Nysius ericae* (Lygaeidae): A widespread seed bug that breeds mostly on Asteraceae.
    - *Reduvius nigricephalus* (Reduviidae): Found in multiple desert observatories.
- Butterflies and Moths:

- *Azanus jesous jesous and Vanessa cardui*: Considered an autochthonous species of the area.
- *Ectochela nigrilineata* (Noctuidae): Considered an autochthonous species of the area.
- *Pecticossus gaerdesi* (Cossidae): Larvae bore into roots and stems of *Zygophyllum stapffii*, a desert plant.
- *Eilema s.l.* (Arctiidae): Larvae feed on lichens, which are abundant in the Namib Desert.

- Large and Small Mammals:
  - Occasional sightings of brown hyenas, jackals and springboks: Adapted to arid environments and rely on the dune systems for habitat
- Reptiles
  - Reptiles such as skinks and geckos

Dominant invertebrates include tenebrionid beetles such as *Onymacris unguicularis*, which harvest fog using specialized dorsal structures (Henschel et al., 2020). These beetles are integral to nutrient cycling and are highly susceptible to habitat alteration, especially from vehicle tracks and sediment disruption.

Reptilian diversity includes over 80 species, with endemics such as *Pachydactylus rangei* (Namib web-footed gecko) displaying adaptations like burrowing and nocturnality to escape extreme daytime temperatures (Herrmann & Branch, 2013).

Larger mammals such as springboks and brown hyenas coexist with smaller rodents and herbivores, relying on seasonal vegetation and natural water catchments (Kinahan, 2005).

6.1.11 Avifauna

The site is also home to a variety of Avian species, reported to be about 270 bird species. These include resident birds such as Kelp Gulls *(Larus dominicanus*), cormorants, and terns, as well as migratory birds like Lesser Flamingos (*Phoeniconaias minor)*, Curlew Sandpipers *(Calidris ferruginea),* Damara Terns, Ludwig's Bustards, Rüppell's Korhaans, African Black Oystercatchers, and Gray's Larks. The site is part of a major migratory route and is crucial for

roosting and feeding. The area is a favorable breeding ground based on the characteristics as outlined below:

Sparsely Vegetated Gravel Plains: The flat, open gravel plains and sand flats around Wlotzkasbaken are ideal for ground-nesting birds such as the Damara Tern *(Sternula balaenarum).* These areas offer high visibility to detect predators and have minimal vegetation, making them preferred nesting substrates.

Proximity to Marine Food Resources: Birds breeding in this zone have immediate access to nutrient-rich coastal waters that support abundant fish and crustaceans. This proximity improves foraging efficiency during the critical breeding season, thereby increasing chick survival rates.

Low Human Density and Disturbance: Historically, Wlotzkasbaken area has had limited development, resulting in minimal disturbance to breeding birds. The low level of infrastructure and traffic ensures birds are less likely to abandon nests due to stress or habitat degradation.

Evolutionary Adaptation and Habitat Suitability: Several bird species in this region, such as the Damara Tern and Dune Lark, have evolved reproductive strategies that align with the seasonal fog cycles and specific substrate characteristics of the area. The habitat is not only suitable but essential for their survival.

Conservation Significance: Due to its ecological uniqueness and the presence of near-endemic species, this coastal zone is classified as an Important Bird Area (IBA) by BirdLife International. The site supports globally significant breeding populations and requires high conservation priority.

Breeding birds are susceptible to disturbance especially when the construction activity takes place during the critical time in the breeding cycle, when the eggs are not hatched or when there are newly hatched chicks, this could lead to abandonment of nest or premature fledging.

However, the most prevalent avian species inhabiting the region include the Damara Tern *(Sternula balaenarum)*, notable for its ground-nesting behavior, the *Ammomanes grayi* (Gray's Lark), a species distinctly adapted to arid desert environments, and the *Cercomela tractrac* (Tractrac Chat), which thrives under desert conditions. These birds exemplify remarkable

adaptations essential for survival in their harsh surroundings. The Damara Tern, with its unique nesting habits, demonstrates resilience against the challenges posed by terrestrial predators. Meanwhile, the Gray's Lark showcases its exceptional camouflage and foraging strategies, enabling it to find sustenance amidst the sparse vegetation of the desert. The Tractrac Chat, with its melodious calls and agile movements, adds a vibrant note to the arid landscape, illustrating the intricate balance of life that persists even in such inhospitable environments.

These species exhibit a range of remarkable adaptations that enable them to thrive in the extreme aridity of the Namib Desert, including feeding on lichens, utilizing moisture from fog, and flourishing amidst sparse vegetation. The flora and fauna within this environment are critical for a delicate balance to sustain the biodiversity characteristic of the Namib Desert. Vegetation such as drought-resistant shrubs and hardy grasses not only provides crucial nesting sites but also serves as a vital food source for both resident and migratory birds.

Birds such as the *Phoenicurus mertensii* (Redstart) may also be spotted, taking advantage of seasonal blooms that attract insects. Furthermore, the presence of water bodies, albeit seasonal, contributes significantly to the biodiversity, drawing migratory birds like the Numidia meleagris (Guinea Fowl) during wetter months. The unique climatic conditions of Wlotzkasbaken shape not only the avifauna but also the behaviors and survival strategies of its resident species. The diurnal patterns of the *Ammomanes grayi* exhibit fascinating adaptations; these birds often forage during the cooler morning hours to avoid the intense midday heat. Similarly, the *Cercomela tractrac* has developed a remarkable ability to utilize its environment, often hunting insects by darting in and out of the sparse vegetation that defines the region's landscape.

In addition, the ecological balance here is delicately maintained by predatory species such as the *Milvus migrans* (Black Kite), which soar overhead, keenly observing the activities below. Their presence acts as a natural regulator and influences the foraging habits of smaller birds. The seasonal migrations bring a temporary influx of variation, introducing transient species that interact with the established residents, leading to dynamic changes in feeding behaviors and nesting strategies. This intricate web of life within Wlotzkasbaken highlights the resilience of desert ecosystems.

6.1.12 Noise

The only source of noise in the vicinity of the wind turbines is the natural sounds from wind, ocean, the vehicles and the day-to-day operational activities of the Erongo Desalination Plant. Wlotzkasbaken Settlement is the immediate community located approximately 4 km from the proposed activities. The sensitivity of noise receptors usually increases at night when conditions are still, and ambient noise levels are at their lowest.

6.1.13 Air Quality

The only source of dust in the area is from 4x4 off-road vehicles and by sand picked up by wind.

6.1.14 Heritage Resources

No archaeological sites were noted within the perimeter of the sites during I.N.K's visit or identified by the locals.

6.1.15 Visual and Sense of Place

The nearest settlement is Wlotzkasbaken, located approximately midway between Henties Bay and Swakopmund along the C34 road. Established in the 1930s as a leisure angling destination, the settlement remains devoid of electrification, with water being transported via road and stored in private water towers that define the skyline. The absence of walls or fences is notable; instead, boundaries are delineated by rocks. In the year 2000, the Erongo Regional Council augmented the total number of erven to 248, offering existing leaseholders the opportunity to purchase the parcels of land they had previously rented and developed. Adjacent to the settlement, a mere 75 meters south of the proposed project site, lies the current Erongo Desalination Plant, constructed to furnish the Areva Trekoppie mine with water.

The surrounding landscape is characterized by its captivating natural beauty, where the arid terrain meets the coastline. Despite its remote setting, Wlotzkasbaken has gradually attracted those in search of solitude.

Figure 13 indicates the ground view of the proposed site from the Wlotzkasbaken residential establishments. The Wlotzkasbaken Settlement is approximately 4 km from the site. The proposed site is located north of the Erongo Desalination Plant, which will partially obscure the

view to the site. The figure below indicates a low visibility of the site due to its significant distance. Other visual features include the ocean to the west, Erongo Desalination Plant Pipelines and vehicles frequently traveling on the C34. However, the area is dominated by the pristine natural environment.

Figure 13: Ground view of the site from the Wlotzkasbaken residential area

As development progresses in the region, there is potential for evolution in infrastructure, which might enhance the quality of life for residents while preserving the settlement's intrinsic character. The balance between modernization and the preservation of Wlotzkasbaken's calm environment is a point of collective consideration, ensuring that future growth aligns with the community's values and aspirations.

7 IDENTIFICATION OF ENVIRONMENTAL ASPECTS AND POTENTIAL IMPACTS

The scoping phase which included a consultation process with key stakeholders that included government authorities and I&APs allowed the opportunity to raise the issues associated with the project development.

The relevance of the potential impacts ("screening") is also presented in the tables below to determine aspects to be assessed in further detail (Section 8 of this report).

Table 9: Environmental Aspects and Potential Impacts

ASPECT	APPLICABLE PHASE	POTENTIAL ENVIRONMENTAL IMPACT	RELEVANCE (SCREENING) OF POTENTIAL IMPACT	Significance and Impact Rating
Waste Management (Accidental hydrocarbon spills from vehicles, heavy machinery generators and equipment)	Construction and Operational	◆ Potential impact on surface and marine water quality ◆ Water quality degradation ◆ Potential impact on marine and terrestrial fauna and flora ◆ Potential soil impacts ◆ Loss of habitat ◆ Loss of biodiversity	Potential hydrocarbon runoff during the construction phase may result in the contamination of both groundwater and surface water. Hydrocarbon spillages from the construction phase are expected from the heavy machinery, generators, while during operations, spillages are expected from the frequent and constant running of mechanical and electric equipment and machinery such as motors and pumps. Potential hydrocarbon spillages during the operations may result in the contamination of both groundwater and surface and marine water, and disruptions in habitats and the decline of marine and terrestrial fauna and flora. Therefore, considering the sensitive nature of potential hydrocarbon spillages, the potential impacts have been assessed further in section 8.	**Medium (M)**
Land clearing and preparation		Alteration of drainage courses that may potentially affect natural drainage patterns and fauna and flora habitats ◆ Habitat alteration	The hummock species *(Arthraerua leubnitziae, and Zygophyllum stapffii)* are found along and associated with the drainage channels within the aquafarm site boundaries and could potentially be disturbed from alterations of the drainage courses. The drainage channels support globally significant breeding populations and require high conservation priority. Therefore, exclusion zones of the drainage courses should be taken into consideration.	**High (H)**

		◆ Habitat fragmentation and displacement ◆ Physical damage and root disturbance ◆ Displacement of reptiles and small mammals due to habitat disturbance, increased predation risk in fragmented environments. ◆ Interference with natural drainage courses.	In addition, the installation activities could potentially be disturbing the breeding birds associated with vegetation along drainage courses, such as *Kelp Gulls (Larus dominicanus), Lesser Flamingos (Phoeniconaias mino, Damara Tern (Sternula balaenarum), Ammomanes grayi (Gray's Lark), Curlew Sandpipers (Calidris ferruginea), Cercomela tractrac (Tractrac Chat), Phoenicurus mertensii (Redstart), Ludwig's Bustards, Rüppell's Korhaans, African Black Oystercatchers and Ammomanes grayi. Reptiles* such as Geckos may be adversely affected by artificial lighting and construction-induced vibrations. Therefore, considering the sensitive nature and severity of altering natural drainage courses and cumulative impacts on the terrestrial ecosystem, the potential impacts have been assessed further in section 8.	
		Potential Impacts on the lichen fields	The assessment found that the proposed 20 ha site comprises of high densely distributed lichen field towards the northern boundary. To prevent damage to these fields, SKORPIoN redesigned its infrastructure layout to ensure that the high-density lichen fields are avoided by the project activities. With the new design, these fields are located just outside the site boundaries to the north. Therefore, lichen species that are densely distributed are taken into consideration by not having them included within the site boundaries as part of the project layout and design. However, low density lichen distribution is still found within the site. Though the construction phase is not poised to impact the significant and recognized high-density lichen distribution north of the site, impacts on the low distribution of lichens within the site will still likely take place, with a high significance rating. Considering the sensitive nature of the lichen fields, the potential impacts on these ecologies have been further evaluated in Section 8.	**High (H)**
		Potential impacts on archaeology sites	There's no evidence of archaeological remains in the area. Therefore, no impacts are expected for this issue. No further assessment is required. However, should there be any archaeological/heritage discoveries on site during the construction and operations, the related management and mitigation measures stipulated in the ESMP should be followed.	**Low (L)**
		Noise Impacts on the	The only source of noise in the area is the natural sounds	**Low (L)**

		closest sensitive receptors in Wlotzkasbaken Settlement.	from wind, ocean, the vehicles and the day-to-day operational activities of the Erongo Desalination Plant. Wlotzkasbaken Settlement is the immediate community located approximately 4 km from the proposed activities. Mechanical noise is created by the gearing and generator and is audible from 100m. The dominant blade noise is a low thumping rhythm, approximately 75 beats per minute (created by 3 blades at rotating at 25 rpm). Residential reports from within 1km of Wind Parks complain of stress and anxiety created by the noise. Given that the proposed turbines are 4km from the nearest settlement, the impact on humans is not an issue. The primary noise comes from the blade, created by the compression of air and the impact of the compressed air against the wind tower. The combined noise for a single wind turbine (typical) has been measured at 99.8dB and is audible under still (low wind) conditions at 1km, though distances of 1.5km have been reported. Considering that two wind turbines will be installed, there will be a cumulation in noise levels, However, considering the strong influences from ocean waves that are approximately 400-700 meters from the settlement and the distance of 4 km away from the site, there are no high noise levels anticipated to cause noise impacts on the community. The relevant management, monitoring and mitigation measures are outlined in the ESMP.	
		Air Quality Impacts	The only source of dust in the area is from 4x4 off-road vehicles. The construction of the turbines will have vehicles and trucks delivering material and equipment to laydown areas at the turbine sites and potentially generating dust. However, this potential impact is deemed minimal due to a low number of vehicles expected during this phase. The relevant management and mitigation measures are outlined in the ESMP.	**Low (L)**
Visual conditions	Operational	Changes in visual conditions.	Turbines are tall structures that can be seen from several kilometres away and impose a change on the landscape of the area where they are installed. However, visual impacts depend on several factors such as distance, size, visibility, landscape and geography, and the presence of potential sensitive visual receptors. However, visual impacts from turbines are typically low from a distance between 4-5 km away. The proposed site would partially be visually obscured by	**Low (L)**

			the existing Erongo Desalination Plant infrastructure when viewed from the direction of the residential establishments, situated approximately 4 kilometers south of the site. Therefore, visual impacts created from the development of the Project are not considered an issue of concern due to the following: Potential sensitive receptors are in Wlotzkasbaken Settlement - 4km from the Project. The rotating blades will have a low visibility from the Wlotzkasbaken Settlement. There is an existing development, that will partially obscure the wind structures and the overall site infrastructure. Therefore, the anticipated visual impacts of the wind turbines, on the Wlotzkasbaken residents are expected to be minimal. The visual management and mitigation measures are stipulated in the ESMP, and no further assessment was conducted.	
Rotating Wind Turbines	Operational	Bird Collision	The site is part of a major migratory route and is crucial for roosting and feeding. Wind turbine caused mortality may vary across space in response to local abundances of resident species, migratory routes, and habitat characteristics influencing the density of vulnerable species. These include resident birds such as Kelp Gulls (Larus dominicanus), cormorants, and terns, as well as migratory birds like Lesser Flamingos (Phoeniconaias minor), Curlew Sandpipers (Calidris ferruginea), Damara Terns, Ludwig's Bustards, Rüppell's Korhaans, African Black Oystercatchers, and Gray's Larks. Therefore, considering the significance and severity of the potential impact, the potential avifauna impacts are assessed further in section 8.	**High (H)**
Employment and resource management	Construction and Operations	Positive socio-economic impacts ◆ Employment Opportunities ◆ Skills and knowledge transfer ◆ Training and research	The construction will be carried out by contractors. Contractors for the construction phase will be engaged on a short term, temporary basis. Approximately 15 workers will be required for the construction. The overall project will generate operational employment of approximately 28 permanent jobs. Therefore, the proposed activities have the potential to	**High+(H+)**

		opportunities ◆ Significant investment in local area.	create a significant positive socio-economic contribution. The relevant management and mitigation measures are stipulated in the ESMP.	

8 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

8.1 Assessment Approach and Methodology

The site visit and beach survey collected sediment for grain size analysis, as well as sediment samples for invertebrates. Counts of avifauna and marine flora were also taken into consideration. This approach is deemed adequate for placing into context the potential impacts associated with the establishment of the proposed wind turbines for this pilot project.

An assessment of the potential positive and negative impacts associated with the installation and operations phase of the wind turbines is provided below. As an outcome, specialist input was requested for some of the environmental issues and has been included in this assessment.

Each observed species and habitat type were assessed and ranked according to ecological sensitivity criteria, including endemism, conservation status, reproductive vulnerability, and habitat specialization. Particular attention was given to marine species, endemic reptiles, lichens, and nesting birds.

Other potential environmental impacts resulting from the proposed project activities and facilities (also identified during the ESIA) were assessed by I.N.K and are also presented below.

Impacts are considered in a cumulative manner where possible such that the impacts of the proposed Project are seen in the context of the baseline conditions described in Section 6.

- Both the criteria used to assess the impacts and the Method of determining the frequency/severity of the impacts is outlined in Table 10.

This Method complies with the EIA Regulations: EMA, 2007 (Government Gazette No. 4878) EIA regulations. Both mitigated and unmitigated scenarios are considered for each impact in the ESIA results.

The matrix is explained as follows:

Duration

- The length of time a risk is present or active.
- While not a separate axis on a standard matrix, it can influence the ratings of probability and severity.

Probability/Likelihood

- The chance of a risk or hazard actually happening.

Severity/Consequence

- The magnitude of the consequences if the risk occurs.
- It considers potential harm to people, property, or operations.

The overall risk level is determined by combining the likelihood and severity ratings, often by multiplying their numerical values.

The result: The final risk rating (e.g., Low, Medium, High) is a single score that indicates the overall significance of the risk, often visually represented on the matrix with a color-coded area.

Table 10: Frequency/Severity Rating

Likelihood/ Frequency	Definition	Probability	Rating	Consequence/ Severity				
				Insignificant	**Minor**	**Moderate**	**Major**	**Critical**
				Very minor or no impact.	Minor impact that can be contained	Impact may have moderate effects	Serious impact/effect	Permanent Impact/effect
				1	**2**	**3**	**4**	**5**
Very high	Almost certain Extremely likely	>90%	**5**	Low	**Medium**	High	Extreme	Extreme
				5	10	15	20	25
High	Very likely Will probably occur	60-90%	**4**	Low	**Medium**	**Medium**	High	Extreme
				4	**8**	12	16	20
Medium	Likely to happen	40-59%	**3**	**Low**	**Low**	**Medium**	**Medium**	High
				3	**6**	**9**	12	15
Low	Possible but unlikely	10-39%	**2**	**Low**	**Low**	**Low**	Medium	**Medium**
				2	**4**	**6**	8	**10**
Very low	Conceivable but extremely unlikely	<10%	**1**	**Low**	**Low**	**Low**	**Low**	**Low**
				1	**2**	**3**	**2**	**2**

8.2 Issue: Bird Mortality due to Wind Turbine Collision

Applicable Phase: Operational

Wind turbines can adversely impact birds through collision mortality, as they collide with turbine blades or get drawn into the wind vortex. Many raptors, which play vital ecological functions, are particularly vulnerable to collisions with turbines because of their large size, reduced manoeuvrability and foraging behavior. Such mortality may have serious population-level impacts particularly for endangered species. Declines in breeding populations of raptor and other birds are typically observed post wind turbine construction, due to wind turbine collisions. The birds that are common in the area and could be at risk include resident birds such as Kelp Gulls *(Larus dominicanus),* cormorants, and terns, as well as migratory birds like Lesser Flamingos *(Phoeniconaias minor*), Curlew Sandpipers *(Calidris ferruginea)*, Damara Terns, Ludwig's Bustards, Rüppell's Korhaans, African Black Oystercatchers, and Gray's Larks.

There are several factors that must be addressed prior full development of the wind turbines such as:

Targeting bird species and different flight patterns: Ideally, functional mitigation measures should be tailored to as many bird species as possible. However, this is a challenging problem as birds present different behavior and morphology. Thus, it is important to understand which/how many species can benefit from a collision avoidance control scheme, and to verify how the control should adapt to different flight patterns. This should be done through a monitoring programme during operations.

Detecting and tracking birds approaching the rotor: To implement an active avoidance strategy, approaching birds should be detected and their path tracked by using the Automatic Detection Systems, which employ radar or optical (including thermal) cameras to detect and analyze bird trajectories. However, this cannot be done for singular birds, but in the event of expectable migrations. This is due to the large turbines and stopping them takes time and starting them off again requires energy.

Shutting down the rotating turbines: Certain species (especially small birds) fly in patterns that cannot be predicted a few seconds in advance. In this case, to prevent collisions, the turbine might need to be shut down as soon as the bird is detected. This can be done during a specific nesting / migration time, but not bird for bird - and if shut down times for migrations are too long (weeks per year) the overall commercial viability of the project is at stake

Given the above, the cumulative unmitigated severity is **Extreme (25)** but may be reduced to **Medium (10)** with the successful implementation of the mitigation measures outlined below.

Table 11: Potential Impact on Lichens during inland installation

				Severity	
Likelihood	**Definition**	**Probability**	**Rating**	**Unmitigated**	**Mitigated**
Very High	Almost certain and extremely likely	>90%	5	Extreme (25)	Medium (10)

Relevant Monitoring, Management and Mitigation Measures

- An on-going bird monitoring programme should be carried out during operations.
- The rotational motion of turbines causes an effect known as motion smear (or motion blur) that can make the blades appear transparent to birds. Painting a single blade in black has been proposed as a suitable measure to reduce motion smear and risk of collisions.
- Implement bird flight diverters and visual deterrence measures such as the use of reflective markings to increase visibility of the turbines and reroute flight paths of birds. The use of sensory cues, such as auditory, visual and acoustic deterrents, activated to scare or frighten birds and prevent them from coming closer to the wind turbines.
- SKORPIoN should slow or stop the rotating of the turbines during high risk (migratory) periods, thereby reducing collision risks.

8.3 Issue: Noise Impacts to Wlotzkasbaken Residents

Applicable Phase: Operational

The only source of noise in the area is the natural sounds from wind, ocean, the vehicles and the day-to-day operational activities of the Erongo Desalination Plant. Wlotzkasbaken Settlement is the immediate community located approximately 4 km from the proposed activities.

Mechanical noise is created by the gearing and generator and is audible from 100m. The dominant blade noise is a low thumping rhythm, approximately 75 beats per minute (created by 3 blades at rotating at 25 rpm). Residential reports from within 1km of Wind Parks complain of stress and anxiety created by the noise. Given that the proposed turbines are 4km from the nearest settlement, the impact on humans is not an issue. The primary noise comes from the blade, created by the compression of air and the impact of the compressed air against the wind tower. The combined noise for a single wind turbine (typical) has been measured at 99.8dB and is audible under still (low wind) conditions at 1km, though distances of 1.5km have been reported. Considering that two wind turbines will be installed, these numbers will most likely double, for noise to be audible up to 3 km. However, the strong influences from ocean waves that are approximately 400-700 meters from the settlement and the distance of 4 km away from the site, there are no high noise levels anticipated to cause major noise impacts on the community.

Given the above, the cumulative unmitigated severity is **Medium (12)** but may be reduced to **Medium (8)** with the successful implementation of the mitigation measures outlined below.

Table 12: Noise Impacts on the residents

				Severity	
Likelihood	**Definition**	**Probability**	**Rating**	**unmitigated**	**Mitigated**
High	Very likely, will probably occur	60-90%	4	Medium (12)	Medium (8)

Relevant Monitoring, Management and Mitigation Measures

- An on-going noise monitoring programme should be carried out during operations and allow for community feedback.
- SKORPIoN must consider The use of sound-absorbing materials and structures, particularly in the nacelle where mechanical noise is generated, to reduce sound emissions.

- The turbine's rotational speed (curtailing) must be lowered during low wind conditions to reduce noise output

8.4 Issue: Visual Impacts

Visual impacts associated with wind energy projects typically concern the turbines themselves (e.g. colour, height, and number of turbines) and impacts relating to their interaction with the character of the surrounding landscape and the visual receptor which might be present.

Given the unique landscape of the Wlotzkasbaken area, it was deemed necessary to include visual impact in this study. The first step was to identify relevant viewpoints. This resulted in a viewpoint from the Wlotzkasbaken settlement which is 4 km from the site. The visually sensitive terrain is therefore defined as: The visual sensitive landscape consisting of the area northwest of Wlotzkasbaken, where the Pilot Project is proposed to be developed. The visual landscape towards the aquaculture farm will determine the sensitivity of the receptor. However, in line with the turbine development, seen from Wlotzkasbaken residential, the desalination plant is visible, already interrupting the prestine views.

The visual landscape varies little for all the identified viewpoints and is described as, the visual landscape consisting of pristine desert features consisting of gravel plains with limited features and low-rise rocky outcrops with only rock features. Visible vegetation is negligent. The following criteria were used to analyse how significant the view of the typical structure will be from the viewpoint:

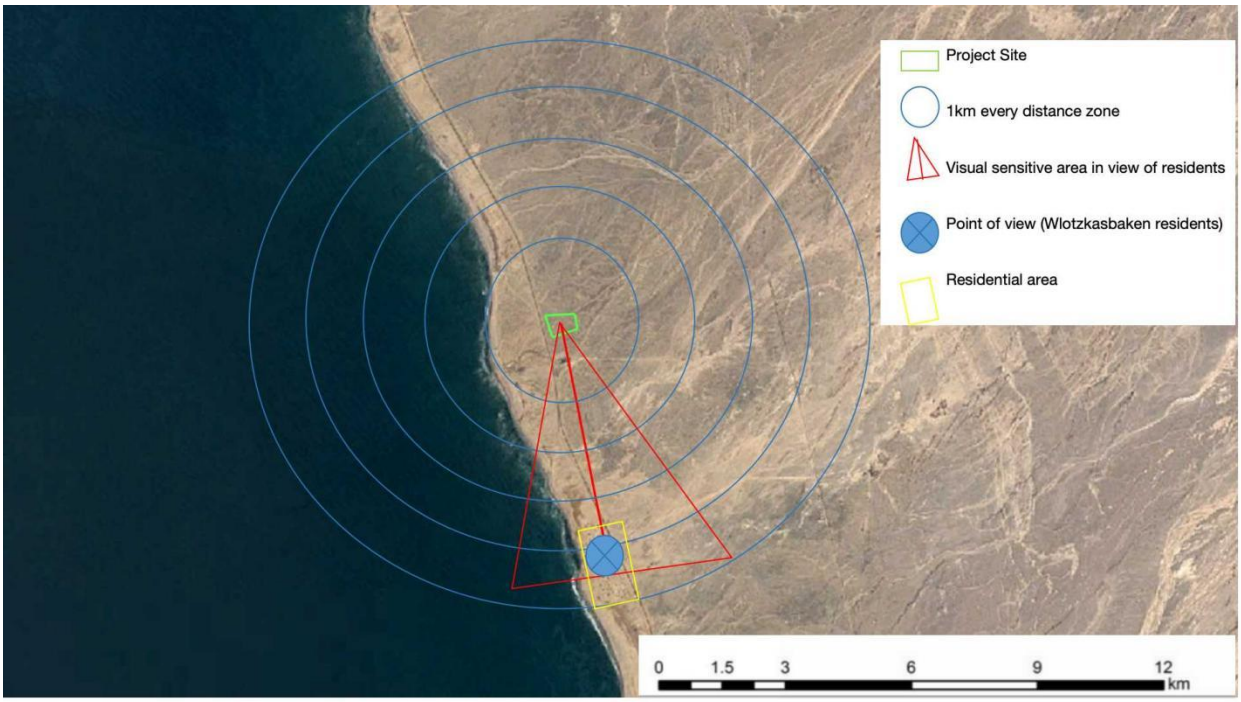
- Distance to relative size.
- Distance of visibility.
- Scale contrast.
- Spatial dominance.

Distance to relative size: The results of relative size in the case of the project area that most views will only see the wind turbine as between 0.11cm to 0.48cm high. The wind turbine is therefore of a low relative size. The relative size of the wind turbines becomes low as the distance from the turbines increases.

The distance of visibility criterion: The visibility criterion can change significantly with the change of weather conditions. This means that it is difficult to predict the visibility of the wind turbine structure from the viewpoint. A general guideline will be that structures will become less visible after having a perceived width of less than 1mm and invisible after having a width of less than 0.1mm. Therefore, the wind turbine will become invisible at 5km.

Scale of contrast: The scale of contrast is determined by the scale relation of the wind turbine to other structures in the landscape. There are other existing structures such as the Erongo Desalination Plant, in the visual landscape from the Wlotzkasbaken settlement to the site, therefore the scale will be less significant if the wind turbine is visible or of medium relative size.

Spatial dominance: The spatial dominance considers the occupation of space in a visual landscape. The wind turbine only has a significant occupation of space, individually if the structure is visible or of medium relative size. The spread of the wind turbines over the visual landscape is anything from 2km to 4km wide. Considering that there are and will be other infrastructure surrounding the wind turbines, the spatial dominance ratio is therefore between 25% to 50%. This can be considered low.



Given the above, the cumulative unmitigated severity is **medium (9)** but may be reduced to **Low (6)** with the successful implementation of the mitigation measures outlined in the ESMP.

Table 13: Visual impacts on residents

				Severity	
Likelihood	**Definition**	**Probability**	**Rating**	**Unmitigated**	**Mitigated**
Medium	Likely to happen	40-59%	3	Medium (9)	Low (6)

Relevant Monitoring, Management and Mitigation Measures

- Continuously monitor visual impacts and adjust mitigation strategies as needed to ensure their effectiveness
- Engage with communities early in the planning process to understand their visual concerns and incorporate their feedback into mitigation strategies.
- Use colors that blend with the background environment. Liaise with Namibian Civil Aviation Authority (NCAA).
- Install safety features as required by aviation authority, such as lighting.

8.5 Issue: Direct destruction and disturbance of Lichen Fields

Applicable Phase: Construction

The possible effects on the lichen fields that are densely distributed towards the northern boundary of the site, relate mainly to dust and physical damage and destruction as a result of the construction phase (land clearing and preparation activities for the construction of the wind turbines). The construction activities involving workforce, vehicle and heavy machinery movement may generate dust, cause trampling, or result in runoff that degrades lichen communities which are highly vulnerable and sensitive.

Construction activities can create habitat for flora species to establish e.g. disturbed soil is favourable for the establishment of weeds and invader species. Additionally, such disturbances can alter nutrient availability in the soil, thereby impacting the types of vegetation that thrive in the area. Over time, these changes can lead to shifts in the type of vegetation found in the project area, as established species may outcompete native flora for resources.

It is essential to monitor and manage these areas to promote biodiversity, as invasive species can disrupt local habitats.

8.5.1 No-go/Exclusion Zone of densely concentrated Lichen fields

The assessment has identified and mapped regions where lichen populations are densely concentrated as no-go/exclusion zones, within which no developmental activities should be undertaken in these ecologically sensitive areas. Furthermore, the preservation of these delicate ecosystems is important, as any disturbance could irrevocably disrupt the balance that sustains both lichen growth and the broader environmental context. SKORPIoN is urged to recognize the significance of these protected zones and to implement strategies that prioritize conservation efforts over development in order to safeguard biodiversity and ecological integrity. Engaging in responsible land management practices will not only benefit these areas but will also enhance the overall resilience of the surrounding habitat.

Protecting areas with dense lichen distributions is not merely an ecological imperative, but a moral one, as it reflects the respect for the environment and commitment to a sustainable future. By adapting ecological principles into development, land-use planning and project design, SKORPIoN can ensure that their actions resonate with the ethical practice of environmental protection. Therefore, SKORPIoN has rearranged its design, to avoid the densely populated areas but will include the less densely distributed lichen within their ERF, into security fencing, meaning enhanced protection of those fields, avoiding 4x4 driving in these areas and no access to poachers, i.e. these areas will be better protected than outside of the ERF.

Given the above, the cumulative unmitigated severity is **Extreme (25)** but may be reduced to **Medium (10)** with the successful implementation of the mitigation measures outlined in the ESMP.

Table 14: Potential Impact on Lichens during inland installation

				Severity	
Likelihood	**Definition**	**Probability**	**Rating**	**Unmitigated**	**Mitigated**
Very High	Almost certain and extremely	>90%	5	Extreme (25)	Medium (10)

	likely				

Relevant Monitoring, Management and Mitigation Measures

- Areas where Lichens are densely distributed should be avoided.
- No development will occur on established ecological no-go areas and exclusion zones for densely distributed lichen fields and the drainage systems where vegetation is densely distributed. Refer to exclusion zone maps for Lichen fields and drainage channel.
- Management will implement a zero-tolerance policy concerning the killing or collecting of any plants. This applies to people directly employed by SKORPIoN as well as any contractors working on their behalf. Develop a policy that limits independent movements of all workers into the veld. Strictly prevent poaching, harvesting or possession of any such wildlife resources without an appropriate permit.
- Keep destruction of Lichens and Hummock species to a minimum. Strictly control vehicle and machinery movement in the area where lichens and individual plants occur.
- Map lichen-dominated areas in more detail, use to guide planning of infrastructure positions.
- Backfill excavated areas continuously.
- Do not clear areas that are not within the infrastructure footprint
- Maintain track discipline – i.e. slow speeds (e.g. 40km/h) and no off-road driving throughout the area.
- Ongoing awareness to contractors and SKORPIoN Employees (i.e. Regular toolbox talks) should be promoted about the value of biodiversity and the negative impacts of disturbance, especially to lichens and hummocks, as well as the negative impacts of illegal collecting of plants.
- Monitor the clearing of vegetation prior to installation to ensure that the requirements stipulated in the EMP are adhered to.
- Monitor management adherence to waste management requirement frequently.
- Monitor quantities of waste material production and dust.

8.6 Issue: Alteration of drainage courses due to the construction of the wind turbines may affect fauna and flora habitats.

Applicable Phase: Construction

The assessment findings indicate that the two drainage systems on site have an important role in the general area of Wlotzkasbaken. The drainage channels are adorned with vegetation that provides habitat for avian species, including Kelp Gulls *(Larus dominicanus*), Lesser Flamingos (*Phoeniconaias mino,* Damara Tern *(Sternula balaenarum)*, Ammomanes grayi (Gray's Lark), Curlew Sandpipers *(Calidris ferruginea), Cercomela tractrac* (Tractrac Chat), *Phoenicurus mertensii* (Redstart), Ludwig's Bustards, Rüppell's Korhaans, African Black Oystercatchers and *Ammomanes grayi*.

Drainage channels not only serve as crucial nesting sites but also foster a rich biodiversity, attracting a myriad of bird species and supporting their reproductive endeavors. The interplay of flora within these channels creates a dynamic ecosystem, where the intricate relationships between different species flourishes. Collectively, these species highlight the rich biodiversity of the region and serve as a testament to the extraordinary processes in desert ecosystems. Due to its ecological uniqueness and the presence of near-endemic species, this coastal zone is classified as an Important Bird Area (IBA) by BirdLife International. The site supports globally significant breeding populations and requires high conservation priority.

Understanding natural drainage patterns helps prevent the destruction of infrastructure from being placed in flood-prone or erosion-sensitive zones. Surface water movement, even in arid environments like the Namib, can become hazardous during episodic rainfall events, leading to:

- Damage to infrastructure.
- Soil erosion and sediment displacement.
- Risk to worker safety.

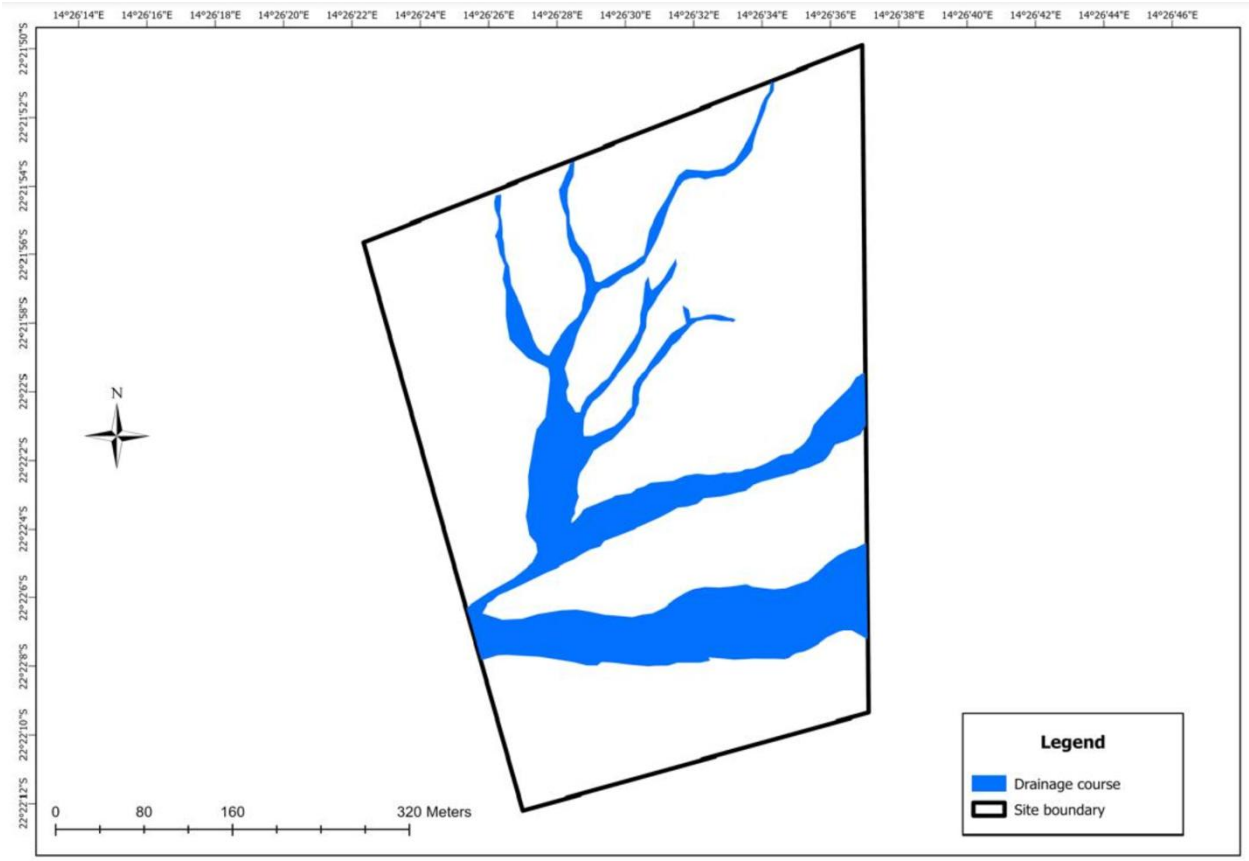
Hummock plants are found along the drainage courses and act as fog traps and shelter a variety of species, including arthropods, small mammals, and ground-nesting birds (Burke, 2001; Henschel & Seely, 2000). The potential development impacts associated with the construction of the wind turbines within the site boundaries can alter surface hydrology, leading to the

flattening or degrading of hummock structures. The assessment noted that in the proposed development, severe degradation of this belt is noted due to anthropogenic activities and stretches along drainage channels. However, patches of pristine habitat remain. A similar trend is noted along the rest of the Namibian coast (which hosts this habitat), as recreational activities and related access roads fragment the habitat, isolating endemic hummock invertebrates, thereby reducing their ranges, interrupting gene flow and diminishing their ability to adapt and survive into the future. Therefore, SKORPIoN has rearranged its design, to avoid the waterways and the associated natural ecology along these channel courses. SKORPIoN will include security fencing within their ERF, meaning enhanced protection of those ecologies, avoiding 4x4 driving in these areas and no access to poachers, i.e. these areas will be better protected than outside of the ERF. Construction may only occur under heightened care not to disturb flora or fauna and the natural flow of water.

8.6.1 No-go/Exclusion Zone of main drainage courses

Due to its ecological uniqueness and the presence of near-endemic bird species, this coastal zone is classified as an Important Bird Area (IBA) by BirdLife International. The drainage channels support globally significant breeding populations and require high conservation priority. Conservation efforts in Wlotzkasbaken are paramount, given the increasing pressures from anthropogenic activities and environmental changes. Safeguarding this habitat is essential for the continued survival of biodiversity species. It is imperative that SKORPIoN recognize the significance of such ecosystems and work collaboratively to implement strategies that mitigate disruption.

Furthermore, the presence of such fauna and flora enhances the ecological integrity of the region, contributing to the overall health of the environment. The vitality of these drainage systems underscores their importance in sustaining wildlife populations and preserving the natural heritage of the area.



Given the above, the cumulative unmitigated severity is **Extreme (25)** but may be reduced to **Medium (10)** with the successful implementation of the mitigation measures outlined in the ESMP.

Table 15: Potential Impact on Alteration of main drainage courses

				Severity	
Likelihood	**Definition**	**Probability**	**Rating**	**Unmitigated**	**Mitigated**
Very High	Almost certain and extremely likely	>90%	5	Extreme (25)	Medium (10)

Relevant Management and Mitigation Measures

- Areas where the drainage courses are mapped as no-go/exclusion zones should be avoided and clear of wind turbine developmental activities with a buffer zone of 30 meters.

- High-impact construction may only occur outside migratory period.
- During roosting period, the 200–500 m buffer zone needs to be maintained around nesting and roosting sites. Infrastructure placement should ensure connectivity between important bird habitats.

8.7 Issue: Socio-Economic Benefits

Applicable Phase: Construction and Operational

This project has the potential to create significant socio-economic benefits through employment creation and economic contributions. The construction phase has benefits linked to the procurement of goods and services, while approximately 28 permanent jobs will be created for the operational phase of the project.

Additionally, the project offers the region an opportunity to develop sustainably through its collaborative links with the local authorities, in fast tracing development in the region, to enhance improved public service delivery and social welfare in the region.

Given the above, the cumulative unmitigated severity is **positive high** but may be increased to **extreme** with the successful implementation of the mitigation measures outlined in the ESMP.

Table 16: Assessment - Socio-Economic Benefits

				Severity	
Likelihood	**Definition**	**Probability**	**Rating**	**Unmitigated**	**Mitigated**
Very High	Almost certain Extremely likely	>90%	5	Positive High (15)	Positive Extreme (25)

Relevant Management and Mitigation Measures

- Local people be preferentially selected to encourage social growth and development in the settlement, region and Namibia as a country.
- Management is urged to begin local selection and provide technical training as soon as possible to enable local people to compete for the lower skilled jobs and upskill themselves in anticipation of the proposed project.

8.8 Issue: Negative Impacts on the Socio-economic Environment

Although the project may benefit the socio-economic environment, the project may also draw people to the Wlotzkasbaken settlement (in-migration), which may place pressure on existing services and opportunities and may create pressure on services, such as housing, health, and sanitation. The influx of people may also result in an increase in negative social behaviours including an increase in the crime rate.

Given the above, the cumulative unmitigated severity is **high** but may be reduced to **low** with the successful implementation of the mitigation measures outlined in the ESMP.

Table 17: Assessment - Negative Impacts on the Socio-Economic Environment

				Severity	
Likelihood	**Definition**	**Probability**	**Rating**	**Unmitigated**	**Mitigated**
Very High	Almost certain Extremely likely	>90%	5	High (15)	Low (5)

Relevant Management and Mitigation Measures

- Local people be preferentially selected to encourage social growth and development in the region and Namibia as a country.
- Management should work closely with the Erongo Regional Council and the Wlotzkasbaken Homeowners Association to manage in-migration, and the effects thereof.
- Management is urged to begin local selection and provide technical training as soon as possible to enable local people to compete for the lower skilled jobs and allow potential candidates to upskill themselves.

9 CONCLUSIONS AND RECOMMENDATIONS

Exclusion/No-go zones are proposed where channel courses are found within the Project site to prevent irreversible degradation (Figure 14).

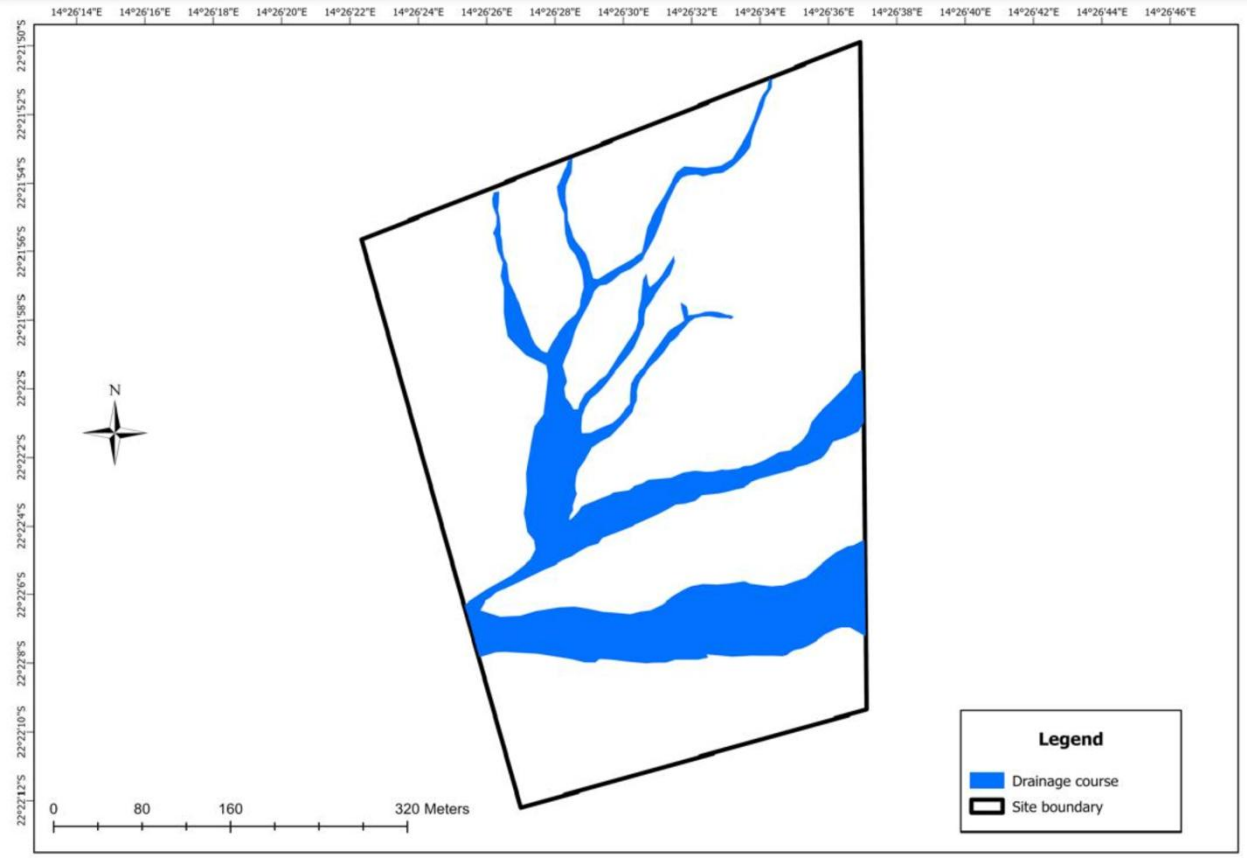


Figure 14: No-go zones within the Project site

The Drainage Pattern and Exclusion Zone Map for the overall project site has been developed as a critical planning and environmental management tool for the proposed Seaweed Aquaculture Project.

The flora, fauna, and avifauna in the Wlotzkasbaken Coastal Zone are ecologically sensitive and highly endemic. Impacts from aquaculture infrastructure must be mitigated through strict environmental safeguards, including habitat buffers and exclusion zones, timing of activities to

avoid sensitive seasons, and continuous monitoring. The findings in Seely and Pallett (2008) affirm the critical need to prioritize biodiversity protection in this arid coastal region.

The potential inland impacts may arise from the land clearing and preparation which could disturb the sensitive fauna and flora.

However, the mitigation measures that have been identified and recommended by I.N.K will promote the positive impacts of the project, as well as reduce the negative impacts to acceptable levels. An ESMP was further developed which identifies potential impacts of the project during the construction and operation phases. The ESMP is a legally binding document to which SKORPIoN must adhere to.

Despite these impacts, I.N.K concludes that the Proponent should be allowed to undertake the proposed Project, provided the potential impacts in the ESMP are implemented.

References

Abaunza P, Gordo L, Karlou-Riga C, Murta A, Eltink ATGW, GarcíaSantamaría MT, Zimmermann C, Hammer C, Lucio P, IversenSA, Molloy J, Gallo E. 2003. Growth and reproduction of horsemackerel, Trachurus trachurus (Carangidae). Reviews in Fish Biology and Fisheries 13: 27–61

Assorov, V. V., and Berenbeim, D. Y. 1983. Spawning grounds and cycles of Cape hakes in the southeast Atlantic. Collection of Scientific Papers of the International Commission for Southeast Atlantic Fisheries, 10 (i): 27–30.

Awad, A.A., Haag, F., Anil, A. C., & Abdulla, A. (2014). Guidance on Port Biological Baseline Surveys (PBBS).

Bakun A., 1995. “Climate variability and regime shift in the eastern boundary upwelling current,” In O’Toole, M. J. (ed), 1995, The Benguela current and comparable eastern boundary upwelling systems. GTZ, Germany. p14.

Benedetti, F., Gasparini, S. and Ayata S. D. 2015. “Short term communication: identifying copepod functional groups from species functional traits”. Journal of Plankton Research 38 (1): 159-166.

Bianchi, G., Carpenter, K. E., Roux, J.-P., Molloy, F. J., Boyer, D. and Boyer, H. J. (Eds) 1999. Food and Agricultural Organisation (FAO). FAO species identification guide for fishery purposes. A field guide to the living marine resources of Namibia. The living marine resources of the Western Central Pacific. Food and Agricultural Organisation of the United Nations. Rome, Italy.

Boyd, A. J., and R. A. Cruickshank (1983). An environmental basin model for West Coast pelagic fish distribution. S. Afr. J. Sci. 79(4): 150–151.

Boyer, D. C, Boyer, H. J, and Fossen I, Kreiner A. (2001) Changes in abundance of the northern Benguela sardine stock during the decade 1990–2000, with comments on the relative importance of fishing and the environment, South African Journal of Marine Science, 23:1, 67-84, DOI: 10.2989/025776101784528854

Boyer, D. C. and Hampton, I. 2001. An overview of the living marine resources of Namibia. In: Payne, A. I. L., Pillar, S., C. and Crawford, R. J. M. (eds), A decade of Namibian fisheries science. South African Journal of Marine Science. 23, 5–35.

Branch, G. M., Griffiths, C. L., Branch, M. L. & Beckley, M. L. (2016). Two oceans: a guide to the marine life of southern Africa (4th ed.). Cape Town: Struik Nature.

Britz PJ (2006). A Review of Aquaculture Policy and Institutional Capacity in the BCLME Region with Recommended Regional Policy Options. Report BCLME project LMR/MC/03/01. Development of Responsible Aquaculture Policy for the BCLME Region.

Bromley C, McGonigle C, Ashton EC, Roberts D (2016). Bad moves: Pros and cons of moving oysters – a case study of global translocations of Ostrea edulis Linnaeus, 1758 (Mollusca

Burmeister, L.-M. 2001. Depth-stratified density estimates and distribution of the Cape hake Merluccius capensis and M. paradoxus off Namibia, deduced from survey data, 1990–1999. South African Journal of Marine Science, 23: 347–356

Chiripanhura B, Teweldemedhin M (2016). An analysis of the fishing industry in Namibia: the structure, performance, challenges, and prospects for growth and diversification. www.agrodep.org/sites/default/files/AGRODEPWP0021

Collette, B. B., and C. E. Nauen. 1983. FAO species catalogue, vol. 2, Scombrids of the world. FAO. Fisheries synopsis 125 (2): 137 p.

Copping A. 2018. The state of knowledge for environmental effects: Driving consenting/permitting for the marine renewable energy industry. Report by Pacific Northwest National Laboratory (PNNL), 25.

Crawford, R. J. M., Dyer, B. M., Cordes, I., Williams, A. J. 1999. Seasonal pattern of breeding, population trend and conservation status of bank cormorants Phalacrocorax neglectus off South western Africa. Biol Conserv. 87, 49–58.

Critchley KW, Rotmann G and Molloy FJ (1991). The Namibian seaweed industry: Present and potential. Bioresource Technology. 38: 137-143.

Du Preez D. 1996. Conservation priorities and management recommendations for the Erongo Region Coastal Zone, Namibia (Master's thesis, University of Cape Town).

GRN, (2021). The Harambee Prosperity Plan II 2021 -2025. Government of the Republic of Namibia. Office of the President. Windhoek.

MFMR. 2018. MSP in Namibia. Current Status Report Knowledge Baseline for Namibia's Central Marine Plan.

O'Toole M. 1996. Namibia's Marine Environment

Pfiz M, Loris K, Erb E, Wirth V, Küppers M. 2010. Changing patterns of lichen growth form distributions within the lichen fields of the Central Namib. Biodiversity in southern Africa, 2, 33-37.

Tjipute M, Thorarensen H, Jenson P. 2011. Feasibility study for mass production of the silver kob, Argyrosomus inodorus, in Namibia.

Gordoa A, Macpherson E. 1990. Food selection by a sit-and-wait predator, the monkfish, Lophius upsicephalus, off Namibia (South West Africa). Environmental Biology of Fishes. 27: 71–76.

Gordoa, A., and Duarte, C. M. 1991. Size-dependent spatial distribution of hake (Merluccius capensis and Merluccius paradoxus) in Namibian waters. Canadian Journal of Fisheries and Aquatic Sciences, 48: 2095–2099.

Gordoa, A., Masó, M., and Voges, E. 2000. Monthly variability in the catchability of Namibian hake and its relationship with environmental seasonality. Fisheries Research, 48: 185–195.

Hamukuaya, H., O'Toole, M. J. and Woodhead, P. M J. 1998 "Observations of severe hypoxia and offshore displacement of cape hakes over the Namibian shelf in 1994" S. Afr. J. Mari. Sci. 19. p.57-59.

Iitembu JA (2005). Analysis of Marine Aquaculture Developments in Namibia: Environmental, Economic and Legislative considerations. Master of Science in International Fisheries Management Norwegian College of Fishery Science, University of Tromsø, N-9037, Tromsø, Norway.

Kirchner, C. (1998). Population dynamics and stock assessment of the exploited silver kob (Argyrosomus inodorus) in Namibian waters. Ph.D. thesis, University of Port Elizabeth: 240 pp.

Mann, K. H. and Lazier, J. R .N. 1996. Dynamics of Marine Ecosystems: Biological-Physical Interaction in the Oceans. Blackwell Science, Inc.: Cambridge, UK. pp 150-175; 282-316.

Matthews, J. P. (1964). The pilchard of South West Africa (Sardinops ocellata). Sexual development, condition factor and reproduction 1957–1960. Investl Rep. mar. Res. Lab. S.W. Afr. 10: 96 pp.

Mecenero, S., Roux, J.-P., Underhill, L. G., and Bester, M. N. (2006). Diet of Cape fur seals Arctocephalus pusillus pusillus at three maonshore breeding colonies in Namibia. 1. Spatial variation. African Journal of Marine Science, 28 (1): 57–71.

Ministry of Fisheries & Marine Resources. (2019). Coastal Biodiversity Survey, Survey 1. Swakopmund, Namibia.

NPC, (2004). Vision 2030. National Planning Commission of Namibia. Government of the Republic of Namibia. Office of the President. Windhoek.

Potts, W. M., Sauer, W HH, Henriques, R., Sequesseque, S., Santos, C. V. and Shaw, P. W. (2010) 'The biology, life history and management needs of a large sciaenid fish, Argyrosomus coronus, in Angola', African Journal of Marine Science, 32: 2, 247 — 258To link to this Article: DOI: 10.2989/1814232X.2010.501567URL: http://dx.doi.org/10.2989/1814232X.2010.

Reiss, H.; Kroncke, I. Seasonal variability of benthic indices: An approach to test the applicability of different indices for ecosystem quality assessment. Mar. Pollut. Bull. 2005, 50, 1490–1499.

Renaud, P.E., Webb, T.J., Bjørgesæter, A., Karakassis, I., Kedra, M., Kendall, M.A., Labrune, C., Lampadariou, N., Somerfield, P.J., Wlodarska-Kowalczuk, M., Vanden Bergh, E., Claus, S., Aleffi, I.F., Amouroux, J.M., Bryne, K.H., Cochrane, S.J., Dahle, S., Degraer, S., Denisenko, S.G., Deprez, T., Dounas, C., Fleischer, D., Gil, J., Grémare, A., Janas, U., Mackie, A.S.Y., Palerud, R., Rumohr, H., Sardá, R., Speybroeck, J., Taboada, S., Van Hoey, G., Weslawski, J.M., Whomersley, P., Zettler, M.L. (2009) Continental-scale patterns in benthic invertebrate diversity: insights from the MacroBen database. Marine Ecology Progress Series (382) 239-252.

Rosenberg R. 2001. Marine benthic faunal successional stages and related sedimentary activity. Scientia Marina 65: 107–119.

Roux, J.-P., and Shannon, L. J. 2004. Ecosystem approach to fisheries management in the northern Benguela: the Namibian experience. African Journal of Marine Science, 26: 79–93.

Shannon, V. and O'Toole, M. J. 1999, (eds) “Integrated overview of the oceanography and environmental variability of the Benguela current region” BCLME report. Online: www.bclme.org/factfig/asp#chemistry accessed 24 April 2004

Tjipute M. Feasibility study for mass production of the silver kob, Argyrosomus inodorus, in Namibia. Reykjavík: United Nations University – Fisheries Training Programme; 2011

Van der Lingen, CD, Hutchings L, Pitcher GC, Lamont T (2016). Climate change, dinoflagellate blooms 1045 and sardine in the southern Benguela current large marine ecosystem. Environmental Development 17: 230–243. https://doi.org/10.1016/j.envdev.2015.09.004

Van der Westhuizen, A. 2001. A decade of exploitation and management of the Namibian hake stocks. South African Journal of Marine Science. 7615, 307–315.

Walmsley, S., Leslie, R. and Sauer, W. 2005. The biology and distribution of the monkfish Lophius vomerinus off South Africa. African Journal of Marine Science. 27, 157–168.