Environmental, Social and Impact Assessment (ESIA) for Offshore Drilling Activities in Namibia in PEL 82

Final Scoping Report for Authority Decision

PREPARED FOR

Chevron Namibia Exploration Limited II

IN COLLABORATION WITH

DATE
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Final Scoping Report for Authority Decision

0775081

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ACRONYMS AND ABBREVIATIONS

Acronym	Description
BOP	Blowout Preventer
CBD	Convention on Biological Diversity
CBO	Community Based Organisation
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CNEL	Chevron Namibia Exploration Limited II
DEA	Department of Environmental Affairs
DP	Dynamic Positioning
EAP	Environmental Assessment Practitioner
ECC	Environmental Clearance Certificate
EFA	Environment Focus Area
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
ESMP	Environmental and Social Management Plan
ERM	Environmental Resource Management
ESIA	Environmental and Social Impact Assessment
FSR	Final Scoping Report
GHG	Greenhouse Gas
GN	Government Notice
GM	Grievance Mechanism
HSE	Health, Safety and Environment
IFC	International Finance Corporation
IUCN	International Union for Conservation of Nature
MARPOL	International Convention for the Prevention of Pollution from Ships
MEFT	Ministry of Environment, Forestry and Tourism
MGO	Marine Gas Oil
MIME	Ministry of Industries, Mines and Energy
MODU	Mobile Offshore Drilling Unit
MSCF	Million Standard Cubic Feet
MWT	Ministry of Works and Transport
NADF	Non-Aqueous Drilling Fluid
NAMCOR	National Petroleum Corporation of Namibia
NDP	Namibian Dolphin Project

Acronym	Description
NGO	Non Governmental Organisation
OEMS	Operational Excellence Management System
OIC	Oil Industry Contractor
OSCP	Oil Spill Contingency Plan
PAM	Passive Acoustic Monitoring
PEL	Petroleum Exploration License
PPE	Personal Protective Equipment
PS	Performance Standard
ROV	Remote Operated Vehicle
SACW	South Atlantic Central Water
SEP	Stakeholder Engagement Plan
TAC	Total Allowable Catch
TSPM	Total Suspended Particulate Matter
UNFCCC	United Nations Framework Convention on Climate Change
VSP	Vertical Seismic Profiling
WBM	Water-Based Mud

1. INTRODUCTION

This chapter provides the background and context of the proposed project, and describes the purpose and structure of this report as well as details the proponent and Environmental and Social Impact Assessment (ESIA) team.

1.1 PROJECT BACKGROUND AND CONTEXT

Chevron Namibia Exploration Limited II (CNEL) proposes to initiate an offshore exploration program within Petroleum Exploration License (PEL) 82 encompassing blocks 2112B and 2212A situated in the Walvis Basin, Namibia (Figure 1-1) (i.e. proposed project). CNEL holds the Exploration Licence for both blocks which spans over an area of approximately 11,400 km².

PEL 82 is located offshore, approximately 257 km north west of Walvis Bay, with water depths ranging from 200 m to 2,500 m. The plan is to initially conduct a one-well campaign in the Gemsbok prospect location (coordinates: LAT: 21° 44’ 48.15” S, LONG: 12° 27’ 13.74” E; with water depths ranging from 1,000 – 1,500 m). Additional follow-up drilling could potentially include up to nine additional wells (total of 5 exploration and 5 appraisal wells) in blocks 2112B and 2212A. Well testing may be conducted in the future; however, it will not be conducted for this initial well.

The drilling of the first well is planned between Quarter 4 of 2026 and Quarter 1 of 2027. The potential for additional wells to be drilled will be dependent on the results of the first exploration well and will not occur immediately after the drilling of the initial well (i.e. in 2027 and beyond).

To date, the following exploration activities have taken place in PEL 82:

- Initial seismic surveys: Over 3,500 km² of 2D seismic data and 9,500 km² of 3D seismic data were acquired in 2013;
- Previous drilling: Two wells, Murombe-1 and Wingat-1, were drilled by Galp Energia in 2013; and
- 3D marine seismic survey programme in 2019.

CNEL has appointed Environmental Resource Management Southern Africa (ERM) as the independent Environmental Assessment Practitioner (EAP) to undertake a Scoping and Environmental Impact Assessment (EIA) process for the proposed exploration activities in compliance with the EIA Regulations of 2012 promulgated under the Environmental Management Act, No. 7 of 2007 and international environmental standards and guidelines and (hereafter collectively referred to as “Environmental and Social Impact Assessment” or “ESIA” process).

FIGURE 1-1 LOCALITY MAP

Point	Latitude	Longitude
A	21° 30' 00" S	12° 00' 00" E
B	21° 30' 00" S	13° 00' 00" E
C	22° 00' 00" S	13° 00' 00" E
F	22° 00' 00" S	12° 00' 00" E
E	22° 30' 00" S	12° 00' 00" E
D	22° 30' 00" S	13° 00' 00" E

Source: Chevron, 2025

1.2 PURPOSE OF THE SCOPING REPORT

The purpose of this Final Scoping Report (FSR) is to provide information to regulators, the public and other stakeholders to aid the decision-making process. The main objectives of the FSR are therefore:

- To define the scope of the project and the potential interactions of project activities with the natural and social environment that should be defined and assessed during the ESIA process;
- To assess applicable national and international legislation, standards and guidelines, so as to allow for the various stages of the proposed project to take into consideration the requirement of Namibian legislation, CNEL's Health, Safety and Environment (HSE) policies and standards and internationally accepted environmental guidelines;
- To provide a description of the proposed project activities and the existing physical, biological, socio-economic and human environment that these activities may interact with;
- To screen and identify the potential environmental and social impacts resulting from the project activities that will be assessed in the ESIA phase; and
- To provide the means by which the mitigation measures will be implemented and residual impacts managed, through the provision of an Environmental and Social Management Plan (ESMP).

Chapter 5 of the Final Scoping Report presents a summary of stakeholder comments received during the public consultation meeting and the subsequent review period. It also outlines the revisions made from the Draft Scoping Report to the Final Scoping Report.

1.3 DETAILS OF PROJECT PROPONENT

The proponent of PEL 82 in Namibia is CNEL, an affiliate of Chevron Corporation. CNEL holds an 80% working interest and operates the license, which covers blocks 2112B and 2212A in the Walvis Basin, offshore Namibia. The remaining interests are held by the National Petroleum Corporation of Namibia (NAMCOR) and Custos Energy (Pty) Ltd., each with a 10% carried interest.

1.4 DETAILS OF ESIA TEAM

The project team and specialists appointed as part of the ESIA process are presented in Table 1-1. The CV for the EAP is attached as Appendix A.

TABLE 1-1 ESIA PROJECT TEAM AND SPECIALISTS

Name	Organisation	Position
ESIA Project Team		
Stephanie Gopaul	ERM	Partner In Charge
Vicky Louw	ERM	ESIA Lead
Joane Foucher	ERM	Project Manager
Anathi Manyakanyaka	ERM	Project Coordinator and ESIA compiler
Specialist Team		
Dr. Victoria Griffiths	ERM	Social Performance Specialist
Rachel Gray	ERM	Stakeholder Engagement Support
George Chatzigiannidis	ERM	Noise Specialist
Michael Fichera	ERM	Discharge Modelling Specialist
Novania Reddy	ERM	Climate Change and GHG Specialist
Maitshoko Tumane	ERM	Air Quality Specialist
Heidri Bindemann-Nel	Urban Dynamics (UD)	Local Environmental Expert and Socio-Economic Study lead
Ernst Arthur Simon	UD	Local Stakeholder Engagement Specialist and Facilitator and Socio-Economic Study support
Tresia Amwaalwa	UD	Stakeholder Engagement Support
Collin Shapaka	UD	Stakeholder Engagement Support
Andrea Pulfrich	Pisces	Marine Biodiversity Specialist
Sarah Wilkinson	CapMarine	Fisheries Specialist

1.5 STRUCTURE OF THIS REPORT

The structure of this Scoping Report follows the requirements of Namibian legislation; Environmental Management Act (2007) and the Environmental Impact Assessment Regulations (2012) issued by Ministry of Environment and Tourism. The contents are summarised in Table 1-2.

TABLE 1-2 SUMMARY OF SCOPING REPORT TABLE OF CONTENT

Section	Content
Non-Technical Summary	Provides a non-technical summary of the FSR.
Chapter 1	**Introduction** This chapter provides the background and context of the proposed project, describes the purpose and structure of this report as well as details the proponent and ESIA team.
Chapter 2	**Legal and Policy Framework and Project Standards** This chapter outlines the key legal, policy and regulatory framework governing CNEL's exploration activities.
Chapter 3	**Preliminary Project Description** This chapter provides a technical description of the proposed exploration and appraisal activities and describes the proposed project scope and activities to be undertaken by CNEL
Chapter 4	**Description of the Receiving Environment** This chapter outlines the characteristics of the physical, biological, socio-economic and cultural environments within the licence area and the surrounding region.
Chapter 5	**Stakeholder Engagement** This chapter provides a summary of the engagement to be undertaken during the scoping and ESIA phases of the project.
Chapter 6	**Identification of Key Environmental and Social Issues and Screening of Key Impacts** This chapter provides a high-level screening of the interaction between the proposed activities and the receiving environment.
Chapter 7	**Terms of Reference (ToR) for the ESIA Report** This chapter presents the terms of reference ESIA report
Chapter 8	**Environmental and Social Management Plan (ESMP)** This chapter provides a framework for the draft ESMP that will be developed in the ESIA phase.
Chapter 9	**Conclusion** This chapter provides a conclusion of the scoping report, summarising the outcomes of the scoping process.
Chapter 10	**References** This chapter provides a list of the references used in compiling this report.
Appendixes	Appendix A: Detailed Curriculum Vitae of EAP Appendix B: Newspaper advertisement and notification letter Appendix C: Presentation for the public consultation meeting Appendix D: Meeting minutes, attendance register and photographs Appendix E: Interested and affected party email correspondence

1.6 OPPORTUNITY TO COMMENT DURING DRAFT SCOPING PHASE

The Draft Scoping Report was available for public comment from 26 May – 19 June 2025 and I&APs were invited to comment on any aspect of the report, project activities and ESIA process.

Copies of the full report Draft Scoping Report and Non-technical Summary were available at the public locations listed in Table 1-3 and on the project website: cnel-esia (https://www.erm.com/public-information-sites/cnel-esia/).

TABLE 1-3 PUBLIC LOCATIONS WHERE THE DRAFT SCOPING REPORT AND NON-TECHNICAL SUMMARY WERE AVAILABLE

Location	Draft Scoping Report and Non-technical Summary
Walvis Bay	26 May – 19 June 2025
Town Council Office	26 May – 19 June 2025

Comments could also be submitted using any of the contact details below or by scanning the QR code. For comments to be considered in the FSR, they had to reach the ESIA team by no later than 19 June 2025.

Contact Person: Heidri Nel

Postal Address: PO Box 20837, Windhoek

Phone /SMS/WhatsApp: +264 81 124 5188 or +264 81 651 7336

Email: cnel.pel82esia@udanam.com

I&APs were also invited to attend the public meeting which was held during the Draft Scoping Report comment and review period. The public meeting took place on 12 June 2025 at 17:30 at the Walvis Bay Town Hall.

2. LEGAL AND POLICY FRAMEWORK AND PROJECT STANDARDS

This chapter outlines the key legal, policy and regulatory framework governing CNEL's intended exploration activities. It focuses on the relevant national and regional legislation, the regulatory requirements for environmental assessments, international environmental standards and guidelines, and CNEL's internal project standards.

2.1 ADMINISTRATIVE FRAMEWORK

The overarching legislation of the Republic of Namibia is the Constitution that establishes the separation of powers into three main organs of the State: Executive, Legislature and Judiciary. Under this scheme the government defines and executes the general administrative policies of the country while the National Assembly has the power to pass laws with the assent of the President. Within this Government scheme, the responsibilities in terms of oil and gas activities and environmental issues are distributed among different institutions.

The Ministry of Industries, Mines and Energy (MIME) is the competent authority with regards to activities associated with offshore oil and gas exploration. Environmental related issues are the responsibility of the Ministry of Environment, Forestry and Tourism (MEFT) as the regulatory authority, while the Ministry of Fisheries and Marine Resources (MFMR) and the Ministry of Works and Transport (MWT) deal with sensitive issues that could also be impacted by project activities such as fisheries and marine transport.

2.1.1 MINISTRY OF INDUSTRIES, MINES AND ENERGY

The MIME is responsible for promoting and regulating the development and use of Namibia's mining and hydrocarbon resources through suitable legislative and institutional frameworks. The Ministry is organized into seven main directorates:

- Directorate of Mines;
- Directorate of Geological Survey;
- Directorate of Energy;
- Directorate of Energy Funds;
- Directorate of Petroleum;
- Directorate of Diamond; and
- Directorate of Administration and Services

The Directorate of Petroleum Affairs oversees ensuring an adequate supply of petroleum products to the country and minimizing the potential negative impacts of petroleum resource exploitation on the environment. The Petroleum Exploration and Production division is responsible for all exploration-related activities, including regulating and promoting these activities, coordinating HSE aspects, and issuing licenses for petroleum exploration and production.

2.1.2 MINISTRY OF ENVIRONMENT, FORESTRY AND TOURISM

The MEFT is responsible of the protection and management of Namibia's natural environment. It develops, administers and enforces environmental legislation and policy through three main departments:

- Department of Environmental Affairs (DEA);
- Department of Natural Resources Management; and
- Department of Tourism, Planning and Administration.

The DEA is responsible for the administration of the environmental impact assessment process undertaken in terms of the Environmental Management Act (Act No. 7 of 2007) and its Regulations. The DEA has other environmental responsibilities such as compliance and enforcement duties, pollution control, waste management, and overall coordination of environmental issues with the Namibian Government. The DEA will be requested to submit comments on the ESIA report to the MIME to inform the final decision on the project.

2.1.3 MINISTRY OF FISHERIES AND MARINE RESOURCES

The MFMR is responsible for the management and development of fisheries and aquaculture in Namibia. It is organized into four main directorates:

- Directorate of Resource Management;
- Directorate of Operations;
- Directorate of Policy Planning and Economics; and
- Directorate of Aquaculture and Inland

The Directorate of Resource Management provides advice on the state of commercially important marine fish stocks, recommends catch quotas, establishes fish size limits, dates of closed fishing seasons, types of gear allowed, and declares areas closed to fishing.
The Directorate of Operations regulates fishing activity within the Namibian Exclusive Economic Zone (EEZ), monitors, controls, and surveils fishing-related activities both at sea and onshore, and enforces legislation governing the fisheries sector

2.1.4 MINISTRY OF WORKS AND TRANSPORT

The MWT oversees maritime affairs through its Department of Transport. It ensures the safety of life and property at sea, prevents marine pollution from ships, and promotes Namibia's maritime interests by drafting, reviewing, and implementing national maritime legislation.
The Namibian Port Authority (Namport), a public entity associated with the Ministry, manages the ports of Walvis Bay and Lüderitz and is responsible for protecting the environment within harbour areas under the National Ports Authority Act.

2.2 REGULATORY FRAMEWORK

The legal and regulatory framework for CNEL's exploration operations in Namibia is governed by several national and regional laws aimed at ensuring the protection of the environment, public health and safety, while promoting sustainable development.

2.2.1 REGULATORY FRAMEWORK GOVERNING ESIA PROCESS

2.2.1.1 ENVIRONMENTAL MANAGEMENT ACT (NO. 7 OF 2007)

This Act establishes the framework for environmental protection in Namibia and mandates that an Environmental Clearance Certificate (ECC) be obtained for any project that may significantly impact the environment. It stipulates the requirements for conducting an EIA process and ensures that the principles of sustainable development and precautionary measures are integrated into the project planning process.

Regulatory Requirements for Environmental Assessment

Namibia's EIAs are governed by the Environmental Management Act, 2007 (Act No. 7 of 2007) hereafter referred to as the EMA and its supporting Environmental Impact Assessment Regulations (Government Notice No. 30 of 2012). The EMA provides the legislative framework for ensuring that listed activities with potential environmental or social impacts are assessed, mitigated, and managed in a responsible and transparent manner before being authorized.

The list of activities requiring an EIA is set out in Government Notice (GN) No. 29 of 2012, and includes activities related to mining, infrastructure development, waste management, energy generation, industrial processes, water abstraction, and land use change, among others. Where an activity is deemed to be listed, an application for environmental clearance must be submitted in accordance with the procedural requirements laid out in Regulation 6 of the 2012 EIA Regulations. The application must be accompanied by relevant documents including a Scoping Report, a Plan of Study for the EIA, and if applicable, a full EIA report and Environmental Management Plan (EMP).

The EIA process follows a staged approach. The initial screening phase determines whether a listed activity is triggered. Where applicable, the scoping phase, governed by Regulation 8, identifies key issues of concern and informs the scope of the subsequent impact assessment. During the EIA phase, a detailed assessment of potential biophysical and socio-economic impacts is undertaken. This includes identifying, evaluating, and proposing mitigation measures for all significant impacts, as required under Regulation 15. The final outputs of the EIA phase include an EIA report and a corresponding EMP, which must be submitted for review and decision-making.

The EIA report must include a description of the proposed activity and its alternatives (Regulation 15(b)), the affected environment (Regulation 15(c)), an assessment of the anticipated environmental and social impacts (Regulation 15(d)), and measures for impact mitigation and monitoring (Regulation 15(e–f)). The EMP, as stipulated under Regulation 8(j) and Regulation 15(g), should outline practical actions for impact avoidance, mitigation, rehabilitation, and compliance monitoring throughout the life cycle of the project—from construction through to decommissioning.

Public participation must be conducted in line with the principles set out in Section 3(2) of the EMA and detailed in Regulations 21–24 of the EIA Regulations. Affected communities and stakeholders must be provided with opportunities to review project information, raise concerns, and influence the assessment process. This includes publishing notices in at least two newspapers for two consecutive weeks (Regulation 21(2)(a)), installing on-site notices (Regulation 21(2)(b)), and hosting public meetings or consultations with Interested and Affected Parties (I&APs), as appropriate. All engagement activities and outcomes must be documented and included in the final EIA submission.

The decision to issue or refuse an ECC rests with the Environmental Commissioner, as outlined in Section 37 of the EMA. Upon receipt of the final EIA report and EMP, and following a review of the process and documentation, the Commissioner may issue the ECC with or without conditions or may request further information or reject the application. An ECC, once issued, is valid for three years unless otherwise specified and may be renewed or amended in accordance with Section 39 of the EMA and Regulations 25 and 26.

2.2.2 REGULATORY FRAMEWORK GOVERNING OIL AND GAS EXPLORATION

2.2.2.1 PETROLEUM (EXPLORATION AND PRODUCTION) ACT (NO. 2 OF 1991) AMENDED BY THE PETROLEUM LAWS AMENDMENT ACT, 1998

This Act regulates the exploration and production of petroleum resources in Namibia. It outlines the requirements for obtaining Petroleum Exploration Licenses (PEL) and provides guidelines for the conduct of exploration activities, including compliance with environmental protection standards.

2.2.2.2 PETROLEUM TAXATION ACT (NO. 3 OF 1991)

The Petroleum Taxation Act regulates the levying and collection of a petroleum income tax on income derived from petroleum exploration, development, and production operations. It ensures that the government can collect taxes from these activities to benefit the country's economy.

2.2.2.3 PETROLEUM (EXPLORATION AND PRODUCTION) ACT REGULATIONS, 1991

The Petroleum (Exploration and Production) Act Regulations, 1991, promulgated under Section 76A of the Petroleum (Exploration and Production) Act, 1991, sets out the obligations of the operator, some of which are listed below:

- Implement necessary precautions to safeguard the environment and natural resources;
- Allocate funds and take measures to ensure the health, safety, and welfare of employees, as well as the protection of other individuals, property, the environment, and natural resources from petroleum-related hazards;
- Conduct ESIA studies as stipulated in the Model Petroleum Agreement between the Minister and the operator;
- Register the installation and obtain a certificate of fitness;
- Report the installation's location to the Petroleum Commissioner and ensure its publication in a "Notice to Mariners";
- Ensure the installation is marked in accordance with the International Regulations for Preventing Collisions at Sea, as incorporated into the Merchant Shipping Act, 1951;
- Equip the installation with necessary equipment to record environmental data for controlling petroleum activities;
- Properly transport, handle, and store hazardous substances;
- Develop and regularly update an Emergency Preparedness Plan;
- Establish a safety/exclusion zone, communicate it to the Petroleum Commissioner, and ensure its publication in the "Notice to Mariners"; and
- Immediately notify the Petroleum Commissioner of any emergencies.

2.2.3 OTHER REGULATORY FRAMEWORK RELEVANT TO THE PROPOSED PROJECT

2.2.3.1 MARINE RESOURCES ACT (NO. 27 OF 2000)

This Act is relevant for ensuring the sustainable management and protection of marine resources. It covers the regulation of fishing, marine pollution, and the protection of the coastal and offshore ecosystems.

2.2.3.2 NATURE CONSERVATION ORDINANCE (NO. 4 OF 1975) NATURE CONSERVATION AMENDMENT ACT (ACT 5 OF 1996)

This legislation governs the conservation of Namibia's natural resources, including the protection of biodiversity and wildlife. It is particularly relevant for ensuring that exploration and drilling activities do not adversely affect protected species or areas of conservation importance.

2.2.3.3 NAMIBIAN WATER ACT (NO. 54 OF 1956)

This Act is relevant for managing water resources, and this includes coastal or marine environments. The Act aims to safeguard water supplies from pollution and ensure their beneficial use.

2.2.3.4 THE NATIONAL HERITAGE ACT (NO. 27 OF 2004)

This Act provides for the protection of cultural heritage and monuments, which may be relevant for the assessment of impacts on cultural or historical sites within the project area.

2.2.3.5 ATMOSPHERIC POLLUTION PREVENTION ORDINANCE (ORDINANCE 11 OF 1976)

The ordinance aims to prevent and control atmospheric pollution. It empowers appointed officers to enforce regulations, controls the emission of noxious gases, smoke, and dust, and sets standards for vehicle emissions.

2.2.3.6 LABOUR ACT (ACT 11 OF 2007) AND ASSOCIATED REGULATIONS

The law establishes measures to ensure the safety, hygiene and health of workers in their workplace, defining their rights and the basic conditions for their work.

2.2.3.7 INTERNATIONAL CONVENTION FOR THE PREVENTION OF POLLUTION FROM SHIPS ACT (ACT 2 OF 1986)

This Act enforces the requirements of International Convention for the Prevention of Pollution from Ships (MARPOL) convention into Namibian legislation (refer to Table 2-1 for more information on MARPOL).

2.2.3.8 CONTROLLED WILDLIFE PRODUCTS AND TRADE ACT, 2008

This Act enforces the requirements of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) into Namibian legislation (refer to Table 2.1 for more information on CITES).

2.3 INTERNATIONAL ENVIRONMENTAL STANDARDS AND GUIDELINES

In addition to complying with Namibian laws and regulations, CNEL must adhere to international environmental standards and guidelines to align its exploration and drilling activities with global best practices for environmental and social sustainability. This includes compliance with ratified international conventions and treaties that govern biodiversity protection, pollution prevention, climate change mitigation, and the sustainable management of natural resources.

TABLE 2-1 SUMMARY OF INTERNATIONAL CONVENTIONS RELEVANT TO THE PROJECT

Convention/Standard	Description	Status in Namibia
Air and Atmosphere		
United Nations Framework Convention on Climate Change (UNFCCC, 1992)	Aims to stabilize greenhouse gas concentrations to prevent harmful human-induced interference with the climate system.	Ratified on May 16, 1995, entered into force on August 14, 1995
Kyoto Protocol (1997)	Sets legally binding emission reduction targets for developed countries.	Acceded on September 4, 2003, entered into force on February 16, 2005
Paris Agreement (2015)	Seeks to limit global warming to well below 2°C, aiming for 1.5°C, through nationally determined contributions.	Signed on April 22, 2016, ratified on September 21, 2016, entered into force on November 4, 2016
Vienna Convention (1985)	Aims to protect human health and the environment against adverse effects resulting from modifications of the ozone layer.	Acceded on September 20, 1993
Montreal Protocol (1987)	Designed to phase out the production and consumption of ozone-depleting substances.	Acceded on September 20, 1993
Chemicals and Waste		
Basel Convention (1989)	Aims to reduce the movement of hazardous waste between nations and prevent transfer of hazardous waste from developed to less developed countries.	Ratified on December 8, 1994, entered into force on March 8, 1995
Stockholm Convention (2001)	Protects human health and the environment from chemicals that remain intact in the environment for long periods.	Ratified on June 24, 2005
Flora, Fauna, and Protected Areas		
African Convention (1968, revised 2003)	Enhances environmental protection, fosters conservation and sustainable use of natural resources, and harmonizes policies.	Signed on 9th December 2003, ratified the revised convention on October 15, 2020
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES; 1973)	Regulates international trade in specimens of wild animals and plants to ensure that such trade does not threaten their survival.	Acceded on December 18, 1990

Convention/Standard	Description	Status in Namibia
Ramsar Convention (1971)	Provides the framework for the conservation and sustainable use of wetlands and their resources.	Acceded on December 23, 1995
MoU on Conservation Measures of Marine Turtles of the Atlantic Coast of Africa (1999)	Focuses on conservation measures for marine turtles.	Signed on 21st February 2006
Convention on Biological Diversity (1992)	Provides for the conservation of biological diversity, sustainable use of its components, and fair sharing of benefits.	Signed on 12th June 1992, ratified on 16th May 1995
International Commission for the Conservation of Atlantic Tunas (ICCAT, 1996)	Provides for the conservation of tuna and tuna-like species in the Atlantic Ocean and adjacent seas.	Ratified since 10th November 1999
United Nations Convention to Combat Desertification (UNCCD, 1994)	Combat desertification and mitigate the effects of drought.	Signed in October 1994, ratified on 16th May 1997
Cartagena Protocol on Biosafety (2000)	Safe handling, transport, and use of living modified organisms.	Signed in May 2000, ratified on 10th February 2005
Marine Pollution		
MARPOL (1973/1978)	Minimizes pollution of the oceans and seas caused by ships. It is divided into the following Annexes: • Annex I: Prevention of pollution by oil and oily water; • Annex II: Control of pollution by noxious liquid substances in bulk; • Annex III: Prevention of pollution by harmful substances carried by sea in packaged form; • Annex IV: Pollution by sewage from ships; • Annex V: Pollution by garbage from ships; and • Annex VI: Prevention of air pollution from ships.	Acceded on August 17, 2001
International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC, 1990)	Establishes measures for dealing with marine oil pollution incidents nationally and in cooperation with other countries.	Acceded on August 17, 2001
International Convention on Civil Liability for Oil Pollution Damage (CLC, 1969) and its protocol	Liability for oil pollution damage.	Enacted in the International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties Act 64 of 1987

Convention/Standard	Description	Status in Namibia
Maritime Safety and Resources		
International Convention for the Safety of Life at Sea (SOLAS, 1974)	Sets minimum safety standards in the construction, equipment, and operation of merchant ships.	Acceded on August 17, 2001
Convention on the International Regulations for Preventing Collisions at Sea (COLREGs, 1972)	Provides rules to prevent collisions at sea.	Acceded on August 17, 2001
International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW, 1978)	Standards of training, certification, and watchkeeping for seafarers.	Enacted in the Merchant Shipping Act 57 of 1951: Schedule 5
Load Lines Convention (1966, protocol 1988)	Establishes load line standards for ships.	Enacted in the Merchant Shipping Act 57 of 1951: Schedule 4
United Nations Convention on the Law of the Sea (UNCLOS, 1982)	Establishes a legal framework for all marine and maritime activities.	Ratified on April 18, 1994
International Maritime Organization (IMO) Convention (1948)	Establishes the International Maritime Organization which is a specialist United Nations agency dealing with maritime issues, including development of all the marine pollution control conventions.	Accepted on 27th October 1994
Abidjan Convention (1984)	Protection and development of the marine and coastal environment of the West, Central, and Southern African region.	Member state, in process of ratification
Archaeology and Cultural Heritage		
World Heritage Convention (1972)	Protection of world cultural and natural heritage.	Accepted on 6th April 2000
United Nations Educational, Scientific and Cultural Organization (UNESCO) Convention on the Protection of the Underwater Cultural Heritage (2001).	This convention aims to safeguard all remnants of human activity that possess cultural, historical, or archaeological significance and have been submerged for over a century. It encompasses the protection of shipwrecks, submerged cities, prehistoric artifacts, looted treasures, sacrificial and burial sites, as well as ancient ports scattered across the ocean floors.	Ratified on 9th March 2011
Fishing		
Compliance Agreement (1993)	Promotes compliance with international conservation and management measures by fishing vessels on the high seas.	Accessed on 7th August 1998

Convention/Standard	Description	Status in Namibia
Fishery Resources Convention (2001)	Conservation and management of fishery resources in the South-East Atlantic Ocean.	Signed in April 2001, ratified on 26th February 2002

2.4 CHEVRON'S PROJECT STANDARDS

2.4.1 OPERATIONAL EXCELLENCE MANAGEMENT SYSTEM

Chevron strives to protect the environment through responsible design, development, operations and retirement of assets. By considering potential environmental risks, Chevron aims to enhance their environmental performance around the world. They identify and manage safeguards designed to prevent or mitigate potential environmental impacts. The Operational Excellence Management System (OEMS) environment focus area promotes systematic consideration of business risks and environmental performance alongside stakeholder expectations.

Their environment strategy supports them taking steps to steward water, biodiversity, waste, air emissions and asset retirement.

The environment focus area strategy provides a comprehensive vision for protecting the environment while delivering affordable and reliable energy. It clarifies environmental expectations, such as:

- Preventing and mitigating accidental releases;
- Reducing air emissions, including greenhouse gases (GHGs);
- Conserving and protecting water and biodiversity;
- Managing waste and wastewater;
- Conserving energy; and
- Retiring idle assets and reclaiming sites with residual environmental impacts.

FIGURE 2-1 ENVIRONMENTAL MANAGEMENT FRAMEWORK

Source: Chevron, 2025

2.4.2 WATER MANAGEMENT

Chevron continues to enhance its water management practices, emphasizing the importance of responsible water use as part of The Chevron Way values and environmental policies. The

company aims to protect this vital resource through risk-based management systems, processes, and standards, including:

- Risk-Based Approach: Applying a risk-based strategy to understand, prioritize, and manage water risks throughout the lifecycle of assets.
- High-Water Stress Areas: In regions with water scarcity, implementing water management practices such as efficient and responsible water use, reuse, recycling, and conservation. This includes using lower-quality water instead of fresh water and recycling and reusing wastewater and produced water.
- Containment Systems: Utilizing engineered containment systems to manage produced water and chemicals reliably, preventing potential environmental releases and protecting natural groundwater resources.
- Well Construction Practices: Adopting industry best practices for well construction, well integrity assurance, and stimulation design to ensure wellbore fluids are contained within intended formation targets and to prevent unexpected subsurface fluid communication.
- Performance Metrics: Establishing metrics to measure the effectiveness of water management practices, enabling regular and meaningful performance reporting to stakeholders.
- Stakeholder Engagement: Applying the Stakeholder Engagement and Issues Management process to identify and manage social risks and potential impacts on the community, including access to water resources where applicable.

2.4.3 WASTE MANAGEMENT

Chevron manages all types of solid waste, irrespective of hazardous classification. At operated facilities, the company employs the waste management hierarchy to prioritize reducing, reusing, recycling, or recovering materials that might otherwise be disposed of. Chevron is committed to implementing business practices that enhance waste management activities and minimize potential environmental, health, and safety impacts.

FIGURE 2-2 WASTE MANAGEMENT HIERARCHY OVERVIEW

Source: Adapted from USEPA, 2025

2.4.4 BIODIVERSITY

Chevron acknowledges the importance of protecting and conserving regional biodiversity and has a long-standing history of collaborating with communities, industry groups, regulators, and conservation organizations to identify and safeguard biodiversity in areas where it operates. Due to the variation in biodiversity and the complexities of operations, Chevron's Environment Risk Management Process (ERMP), under the Operational Excellence Management System, is designed to implement a risk-based approach to identify, assess, and manage potential environmental risks throughout the lifecycle of assets, including those related to biodiversity.

When considering operations in protected or ecologically sensitive areas, Chevron evaluates the area's characteristics, the type and proximity of the proposed operation, the ability to meet or exceed regulatory requirements, and the capability to avoid or manage potential impacts through protective operating practices. Chevron has a successful track record of working in sensitive environments and employs a mitigation hierarchy to manage potential impacts. This hierarchy includes avoidance, reduction, restoration, and offsets to minimize development impacts and control any negative effects on the environment and surrounding communities.

FIGURE 2-3 OVERVIEW OF CHEVRON'S MITIGATION HIERARCHY

Source: Chevron, 2022

2.4.5 CLIMATE CHANGE

Chevron has a long-standing history of producing oil, natural gas, and other products that contribute to human progress. The company continues this legacy while also evolving the energy future. Chevron aims to expand its traditional oil and gas business, reduce the carbon intensity of its operations, and grow new lower-carbon businesses in renewable fuels, carbon capture and offsets, hydrogen, and other emerging technologies.

2.4.5.1 ACHIEVING NET ZERO AT LEAST COST TO SOCIETY

Chevron believes climate policy should be designed in a manner that enables the realization of a lower carbon future at the least cost to society. Chevron supports the Paris Agreement's global approach to governments addressing climate change. They continue to take actions to help lower the carbon intensity of operations while continuing to meet the demand for energy. We believe policy should drive the most efficient and cost-effective abatement economywide, along with natural and technological emissions removals. They believe policies should enable lower carbon solutions and products by allowing all solutions to compete without penalizing one sector to build another. aspires to achieve net zero upstream emissions (Scope 1 and 2) by 2050. This goal depends on advancements in commercially viable technology, supportive government policies, successful negotiations for Carbon Capture, Utilization and Storage (CCUS) and nature-based projects, the availability of cost-effective, verifiable offsets in the global market, and the necessary permits from governing authorities.

Economically Efficient GHG Abatement

Chevron prioritizes efforts to reduce emissions at the lowest cost per tonne, regardless of the sector. Marginal Abatement Cost Curves (MACCs) help identify and prioritize the most promising GHG abatement opportunities across operations, focusing on achieving the greatest volume of GHG reductions at the least cost to society.

2.4.5.2 LOWER CARBON INTENSITY OF OPERATIONS

Chevron targets an upstream oil and natural gas intensity of 24 kg CO_2e/boe. Actions to reduce carbon intensity include high-grading the portfolio, improving operations, and using the MACC process to drive emissions reductions at existing facilities. For new facilities, Chevron identifies opportunities to adjust standards and pilot new technologies for lower-emission facility design.

2.4.5.3 GHG REDUCTION APPROACHES

Chevron assesses reduction opportunities in energy management, methane management (venting, fugitives, and flaring reductions), CCUS, and offsets. Emissions can be offset with natural or technological removals, supported by policies on carbon pricing, well-designed carbon-related reporting, and support for technologies like CCUS and offsets.

2.4.5.4 WELL CONTROL SYSTEMS TEAM

Chevron leads the industry in offshore and onshore well control equipment reliability and standards. Since 2018, Chevron's well control equipment reliability has surpassed all major oil operators in the Gulf of Mexico. The team focuses on improving onshore equipment reliability and operations through external and internal efforts.

2.4.5.5 WELLS DECISION SUPPORT CENTER (DSC)

The Wells DSC integrates technology, processes, and people to eliminate serious well control incidents and improve operational efficiency. The DSC supports real-time operations with a cross-functional team of experts, providing analytical support and ensuring sound engineering practices. The DSC operates 24/7, supporting drilling operations across various regions.

2.4.5.6 CHEVRON WELLSAFE

Developed in 2012, the WellSafe Process is a proprietary well control assurance program for well control on wells capable of sustained natural flow of potentially harmful fluids. The program provides independent verification and validation of compliance with technical standards governing well design and construction, overseen by a WellSafe Technical Authority.

3. PRELIMINARY PROJECT DESCRIPTION

This chapter provides a technical description of the proposed exploration and appraisal activities and describes the proposed project scope and activities to be undertaken by CNEL.

3.1 DESCRIPTION OF THE PREVIOUS ACTIVITIES IN PEL 82

PEL 82 in the Walvis Basin, offshore Namibia, has seen various activities and ESIAs over the past 10 to 15 years. The block has been the focus of several exploration efforts, including seismic surveys and drilling activities:

- Seismic Surveys: Over 3,500 km of 2D seismic data and approximately 9,500 km² of 3D seismic data have been acquired, covering about 70% of the total licensing area.
- Drilling Activities: Significant drilling activities have taken place in the PEL, including the Wingat-1 and Murombe-1 wells drilled by HRT (now PetroRio) in 2013. The Wingat-1 well successfully recovered 38-41 degree API oil to the surface, while the Murombe-1 well intersected a world-class mature oil-prone source rock in the Aptian sequence.
- Galp EIA (2017) conducted for a 3D marine seismic survey programme proposed by Galp through its Namibian subsidiary Windhoek PEL 23 B.V. The survey area lies 100 km west of the Namibian coast and 190 km northwest of Walvis Bay.

3.2 PROJECT NEED AND DESIRABILITY

The proposed project is necessary for advancing Namibia's understanding of its offshore petroleum systems. Despite the commencement of offshore seismic survey operations in Namibia as early as 1968, significant gaps remain in the comprehensive geological knowledge of deep-water offshore Namibia. This project aims to address some of these gaps by providing additional data on subsurface geological conditions, including offshore bathymetry, depositional history, and potential petroleum-bearing structures.

The need for this project is underscored by the following factors:

- Expansion of Geological Data Coverage: The exploration drilling will significantly enhance the overall geological data coverage for Namibia, contributing to a more detailed and accurate understanding of the subsurface conditions.
- Improved Interpretation and Confidence: The data obtained will improve the interpretation contrast and confidence in identifying potential subsurface structures, thereby supporting more informed decision-making in future exploration activities.
- Increased Interest and Competitiveness: The results could potentially attract multinational oil and gas companies, increasing competitiveness in local bid rounds for exploration blocks offered by NAMCOR (Pty) Ltd and other entities. This increased interest may lead to additional investments and economic benefits for Namibia.

The desirability of the project is further supported by its potential to stimulate economic growth and development. The proposed exploration drilling could potentially lead to further exploration or production in the future (based on several factors, business decisions and future permitting and approvals), contribute to economic growth, bringing increased investments and associated benefits both locally and nationally.

Moreover, the project aligns with Namibia's strategic goals of developing its natural resources while supporting the development of other sectors such as offshore wind energy, sustainable industrial hydrogen sites, and mineral resources.

The project alternatives are detailed in Section 3.9 including consideration of the No-Go alternative. The No-Go alternative represents the option not to proceed with exploration drilling, maintaining the status quo, which implies that the project area remains in its current condition. This means foregoing the opportunity for potential future oil and gas development and the associated, potential economic and social benefits.

In conclusion, the proposed exploration drilling project is both necessary and desirable for advancing Namibia's geological knowledge, attracting investment, and supporting economic growth and resource development. The ESIA process will conduct these activities responsibly, with due consideration for environmental and social impacts, in accordance with Namibian regulations.

3.3 PROJECT LOCATION

CNEL plans to initiate an offshore exploration program within PEL 82 encompassing blocks 2112B and 2212A, situated in the Walvis Basin, Namibia. The license area spans approximately 11,400 km², located between 80 km and 300 km offshore, with water depths ranging from 200 m to 2,500 m. Initially, the plan is to conduct a one well campaign in the Gemsbok prospect location (refer to Figure 1-1), coordinates: LAT: 21° 44’ 48.15” S, LONG: 12° 27’ 13.74” E; with water depths ranging from 1,000 – 1,500 m. Additional follow-up drilling could potentially include up to nine additional wells (total of 5 exploration and 5 appraisal wells).

3.4 MAIN PROJECT COMPONENTS

This section describes the main project components, these include the following:

- Drilling unit;
- Shore base;
- Personnel; and
- Infrastructure and services.

A summary of the project activities is provided in Table 3-1.

TABLE 3-1 SUMMARY OF MAIN PROJECT COMPONENTS

Purpose	To confirm and test the presence and quality of hydrocarbon resources
Number of exploration and appraisal wells	• Up to 5 exploration wells • Up to 5 appraisal wells
Size of Area of Interest for proposed exploration drilling	Blocks 2112B and 2212A spanning approximately 11,400 km² located between 80 km and 300 km offshore
Well depth (below seafloor)	Variable depth of 1,500 to 4,000. A notional well depth of 4 000 m is assumed for the ESIA.
Water depth range	Water depth range of license block: 300 m to 2,200 m

Duration	• Mobilisation phase: up to 15 days
	• Drilling phase:
	  ◦ Exploration well: 2-3 months
	  ◦ Appraisal well: 3-4 months
	• Well abandonment: up to 7 days
	• Demobilisation phase: up to 7 days

Commencement of drilling and anticipated timing	Commencement is not confirmed, but anticipated to be between Quarter 4 2026 and Quarter 1 2027 to drill first well.
Proposed drilling fluids (muds)	Water-based Muds (WBM) will be used during the riserless drilling stage and Non-Aqueous Drilling Fluid (NADF) during the risered drilling stage (closed loop system).
Drilling and support vessels	• Drillship or semi-submersible drill rig. • Three to four support vessels. These vessels will be on standby at the drilling site, as well as moving equipment and materials between the drilling unit and the onshore base.
Operational safety zone	Minimum 500 m around drilling unit
Flaring	If hydrocarbons are discovered, one Drill Stem Test (DST) may be performed per well.
Logistics base	Walvis Bay
Logistics base components	Office facilities, warehouse, laydown area, mud plant.
Support facilities	Crew accommodation in Walvis Bay area, helicopter out of Walvis Bay area and fixed wing out of Windhoek.
Staff requirements:	• Specialised drilling staff supplied with hire of drilling unit. • Additional specialised international and local staff at logistics base.
Staff changes	Rotation of staff every four weeks with transfer by helicopter to shore

3.4.1 DRILLING UNIT

Various types of drilling vessels are used worldwide in offshore drilling operations, with the type of unit typically dependent on water depths in which it needs to operate and marine operating conditions experienced at the well site. The proposed drilling unit is a drillship or semi-submersible drill rig using Dynamic Positioning System (DPS). The DPS allows for minimal subsea disturbance due to its ability to operate without moorings. A significant benefit to using a drillship is the ease of mobility as it is a self-propelled vessel with the flexibility to move from location to location without the need of transport vessels. An example of drillship is presented in Figure 3-1.

FIGURE 3-1 EXAMPLE OF A DRILLSHIP

Source: Shutterstock, 2022

The use of a semi-submersible drilling unit may also be considered based on the availability of vessels. This type of drilling unit consists of a rig mounted on a floating structure supported by pontoons. When positioned at the well site, the pontoons are partially filled with seawater (ballasted) to submerge them to a specific depth below the sea surface, where wave motion is reduced. This submersion provides stability to the drilling vessel, thereby enhancing the efficiency of drilling operations.

FIGURE 3-2 EXAMPLE OF SEMI-SUBMERSIBLE DRILLING UNIT

Source: Huisman, 2025

3.4.1.1 SUPPORT VESSELS

The drilling unit will be serviced by up to four support vessels (refer to Figure 3-3). These vessels are expected to operate two to three rotations per week. They will be on standby at the drilling site as well as facilitate the transportation of equipment and materials between the drilling unit and the onshore base. The support vessels can also be utilized for medical evacuations or crew transfers if necessary and provide assistance in firefighting, oil containment and recovery, rescue operations in case of emergencies, and supply any additional equipment that may be needed.

FIGURE 3-3 EXAMPLE OF SUPPORT VESSEL

Source: Wärtsilä, 2025

3.4.1.2 HELICOPTERS

Helicopters similar to the one in Figure 3-4 are the preferred method for transporting personnel to and from the drilling unit. It is estimated that there could be up to four trips per week between the drilling unit and the helicopter support base in the Walvis Bay area (primary) or Windhoek (secondary). If required, helicopters can also be used for medical evacuations from the drilling unit to shore, both during the day and at night.

FIGURE 3-4 EXAMPLE OF A HELICOPTER

Source: MHM Publishing Inc, 2025

3.4.1.3 EXCLUSION ZONE

During the drilling operations, there will be a temporary. 500 m exclusion/safety one around the drillship, which will be enforced by a standby vessel. The exclusion zone would be described in a Notice to Mariners as a navigational warning.

The purpose of the exclusion zone is to prevent a vessel collision with the drillship during operations. Under the Marine Traffic Act, 1981 (No. 2 of 1981), as amended by the Namibia Ports Authority Act No. 2 of 1994, an “exploration platform” or “exploration vessel” used in prospecting for or mining of any substance falls under the definition of an “offshore installation” and as such it is protected by a 500 m exclusion zone.

According to the Convention on the International Regulations for Preventing Collisions at Sea (COLREGS, 1972, Part B, Section II, Rule 18), a drillship involved in underwater operations is classified as a "vessel restricted in its ability to manoeuvre." This classification mandates that power-driven and sailing vessels must yield to such a vessel. Additionally, fishing vessels are required to avoid interfering with the well drilling operations as much as possible.

3.4.2 SHORE BASE

An onshore logistics base will be located in Walvis Bay. The shore base within the port authority boundaries and control will provide for the storage of various materials and equipment, including pipes, sub sea equipment, drilling fluid, cement, chemicals, marine fuels, and water. It will also house a mud plant for mixing drilling fluids, which will be transported to and from the drilling vessel by sea. Additionally, the shore base will serve as office space equipped with communication systems, first response emergency facilities, and will provide accommodation (refer to section 3.4.3) as well as waste management services, vessel refuelling, and customs clearance services.

This base will include a yard area and a warehouse to store drilling materials such as hardware (tubular, wellhead), bulk materials (barite, bentonite, cement), and other minor equipment. A third-party service provider—yet to be selected—will be responsible for supplying additional resources, including a mud plant, essential materials, equipment, and logistical support. Supply vessels providing fuel, food supplies, water, and other necessities to the drillship will also utilize the shore base.

Supply vessels are expected to occupy the quay for approximately 12 hours per trip, depending on the volume of materials to be loaded or unloaded and the time required for customs and sailing clearance. The shore base will feature a mooring area, a temporary office, and bunkering services for vessels.

The existing service infrastructure at the port is sufficient to provide the necessary onshore support for the project, and no additional permanent onshore infrastructure is anticipated to be required.

3.4.3 PERSONNEL

The shore base will be situated in Walvis Bay. In addition to the support services it will provide, it will also be used for offices (with communication and emergency procedures / facilities).

Shore-based staff will be accommodated in Walvis Bay area. This could be hotels, apartments or house rental. In addition, accommodation during crew changes may be required in Windhoek based on incoming or departure flight times. The only CNEL personnel stationed in

Walvis Bay would be the logistics base personnel. Other CNEL representatives will be based in the Windhoek office.

The number of personnel on the drilling unit will depend on the specific unit obtained for the proposed activities. Most of the staff will be expatriates due to the short-term nature of the work and the specialized technical skills required. Drilling units typically come with a core team of technical specialists on board.

The number of personnel on supply vessels will vary based on the vessel size and the activities they support. All workers will receive health and safety training and be provided with Personal Protective Equipment (PPE) appropriate for their tasks.

3.4.3.1 CREW TRANSFERS

Transportation of personnel to and from the drillship would most likely be provided by helicopter operations from Walvis Bay area. Crews would generally work in 12 hour shifts in 4 week cycles. Crew changes would be staggered, and in combination with ad hoc personnel requirements. Thus helicopter operations to and from the drillship may occur up to 4 days per week between the helicopter support base and the drilling unit to shore.

3.4.4 INFRASTRUCTURE SUPPORT AND SERVICES

3.4.4.1 FRESHWATER

The project will require freshwater and some limited industrial water for making the water-based drilling muds required to drill the well. This industrial water will be transported from shore.

The potable water for the personnel on board the drilling unit will be produced by the Mobile Offshore Drilling Unit (MODU), or bottled water will be made available.

3.4.4.2 FUEL

Estimates for the fuel (Marine Gas Oil (MGO)) use per day by the drillship and support vessels during transit, standby and drilling operations are provided in the Table 3-2 below.

TABLE 3-2 PROJECTED FUEL USAGE FOR DRILLING A SINGLE WELL

Discharge Source	Units of measurement	Duration	Consumption of marine fuel (t)	Jet-A-1 fuel consumption (t)
1 x Drilling unit	m^3/day	70 days	2,800	-
4 x Support vessels	m^3/day	210 days	2,800	-
Helicopter	m^3/per flight	4 per week	-	102
Total			5,600	102

3.5 PROJECT ACTIVITIES

Project activities associated with drilling include the following phases:

- Mobilisation of the supply vessels, operation of the shore-based facilities for handling support services needed by the drillship;

- Drilling of a well;
- Well execution (side track, logging, completion) options;
- Optional well testing;
- Well abandonment; and
- Demobilisation of the drillship, vessel and local logistics base.

All activities will be conducted in conformity with recognised industry international best practice.

3.5.1 MOBILISATION PHASE

The mobilisation phase will involve issuing necessary notifications, setting up the onshore base, hiring local service providers, sourcing and transporting equipment and materials from different ports and airports, arranging accommodation, and moving the drilling unit and support vessels to the drilling site.

3.5.1.1 VESSEL MOBILISATION AND SITE PREPARATION

The drilling unit and supply vessels may either sail directly to the well site from outside Namibian waters or from a Namibian port, depending on the selected drilling unit and its last location. The drillship will be equipped with navigation equipment for accurate station keeping above the well location (dynamic positioning – using thrusters). Both the drilling unit and support and supply vessels will need to undergo customs clearance.

Once in position, the drillship will carry out its pre-drilling activities comprising seabed survey; Remote Operated Vehicle (ROV) dive; positioning; beacon placement and dynamic positioning (DP) trials. These activities will be followed up with safety checks, drills, communication tests and drilling of the pilot hole.

Drilling materials, including casings, mud components, cement, and other equipment, will be transported into the country either on the drilling unit itself or via a container vessel directly to the onshore logistics base. From there, supply vessels will transfer these materials to the drilling unit.

3.5.2 DRILLING PHASE

Drilling is essentially undertaken in two stages, namely the riserless and risered drilling stages.

3.5.2.1 DRILLING PROCESS

Riserless (Initial) Drilling Stage

The first, 36 inch (”), and second 26” sections of the proposed well will be drilled riserless. During this section drilling mud returns are not flowed back to the drilling unit. The drilling of a well generally involves drilling a large diameter hole first and running a large diameter conductor casing which serves as structural pipe to support the load of the well control equipment and subsequent casing strings.

Closed-Loop Drilling Stage

Closed-loop drilling occurs for all sections below the 26” casing. For deepwater well construction, after the riserless drilling stage, a drilling riser (ie a hollow tube known as the ’marine riser‘) is run between the drilling unit and the seabed so that weighted drilling fluid can

be pumped through the drill pipe and out through the drill bit. It circulates all the way around up through the marine riser back to the drilling unit. Drilling fluid helps prevent the well from caving in and clears the rock bits or "cuttings" that are constantly being chipped away as the drill bit drills deeper into the ground to prevent them from building up on the bottom of the well.

3.5.2.2 WELL DRILLING

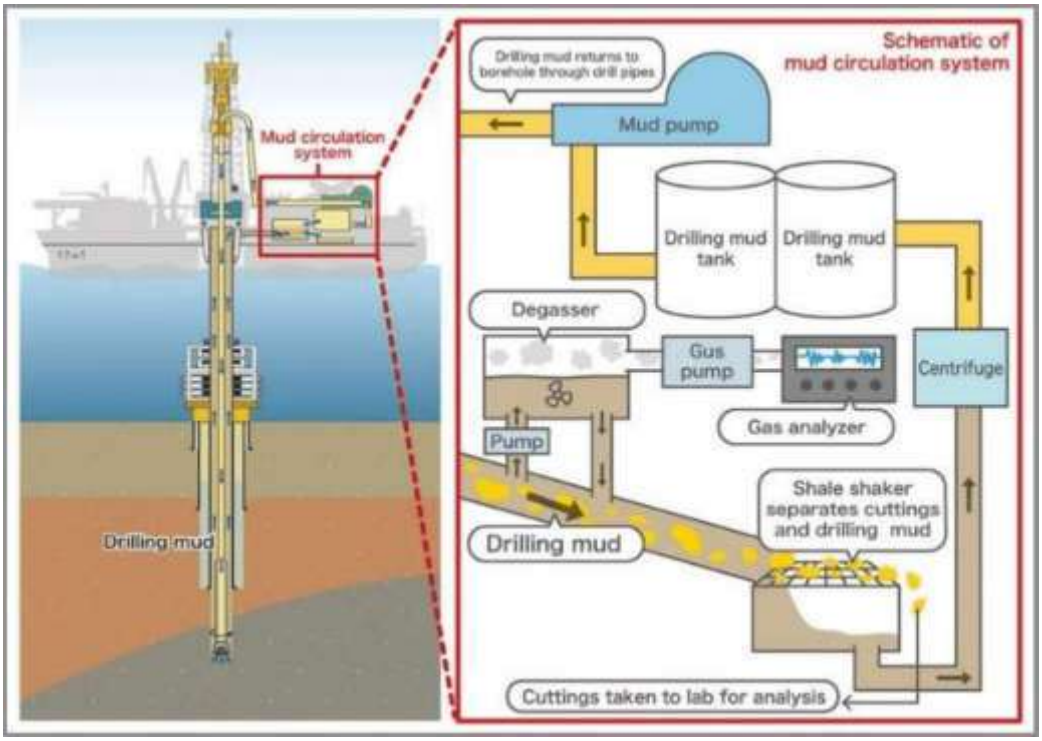
The well is planning to be drilled to a total depth range of 1,500 to 4,000 m. The schematic of a drilling mud circulation system is illustrated in Figure 3-5.

Once in position at the designated well location, drilling will commence. The well is drilled using a bit that chips off pieces of rock. The drill bit is connected to the surface by segments of hollow pipe, which together are called the drill string. The first and second drilling stage (riserless stage) is made by lowering the drill string from the drill deck to the seafloor and drilling into the seabed. All cuttings are set down directly onto the seafloor. Following these first two stages, a marine riser pipe connects the drilling floor of the drilling unit to the wellhead on the seafloor in order to collect drilling mud. Drilling is undertaken by lowering the drill string through the closed loop riser to the seafloor and rotating the drill string, causing the drill bit to crush the rock. Cuttings are removed from the bottom of the hole thanks to a drilling fluid called clays, polymers, weighting agents and/or other materials suspended in a fluid medium. Drilling is stopped at regular intervals to allow new sections of pipe to be added to the drill string or to replace the drill bit.

As the well is drilled, metal casing is placed inside the well to line it and stabilize the hole to prevent it from caving in. The casing also isolates aquifers and hydrocarbon-bearing zones through which the well passes, thus preventing liquids or gases from entering the well prematurely. After each casing string is installed, it is cemented in place. The casing string also provides a firm point for the attachment of the BOP stack, which is where it will be located. The conductor casing serves as a support during drilling operations, to flowback returns during drilling and cementing of the surface casing, and to prevent collapse of the loose soil near the surface. The lengths and diameters of each casing section of the well are established prior to drilling. The exact details are determined by the geological conditions through which the well is drilled and will be driven by the final desired hole diameter to drill the reservoir section.

The well will be drilled initially with water-based mud for the riserless sections and then Non-Aqueous Drilling Fluid (NADF) for the subsequent sections. Following installation of the wellhead, blowout preventor (BOP), and marine riser, forming a closed, circulating system between the well and drilling unit. The spent NADF will be recycled onboard the drilling unit through a dedicated mechanism where the NADF cuttings will be separated from NADF. Spent NADF will be collected in a fully enclosed skip and shipped to shore for disposal in an environmentally responsible manner, at a licensed waste management facility. NADF cuttings will be treated on the drilling unit to reduce oil content to <6.9% Oil On Cutting (OOC) and discharge the treated cuttings overboard.

FIGURE 3-5 DRILLING SCHEMATIC



Source: Apostolidou, Christina, 2019

3.5.2.3 DRILLING FLUIDS AND MATERIAL

Drilling Mud

Seawater with high viscous pills, sweeps, and water-based muds (WBM) are used for drilling the tophole sections of the well, which are drilled riserless (that is without the marine riser installed) while NADF are used for the subsequent sections (with riser installed on top of wellhead and BOP).

Mud Management

Unused WBMs will be disposed of at sea after their use. During NADF drilling, drilling muds are circulated in a closed loop system which recycles the drilling muds and removes the drill cuttings. The returns from downhole (muds and cuttings) are routed to the shakers, which will physically separate the drill cuttings from the drilling muds that are then recycled.

Cuttings

During the riserless drilling stage (tophole section drilling) WBM and associated drill cuttings are discharged directly on the seabed in immediate proximity of the well. Cuttings with associated NADF are returned to the drilling unit and processed onboard as stated above (i.e. treated on the drilling unit to reduce oil content to <6.9% OOC and discharged overboard).

Cement

During drilling, the required cement volume will be pumped into the annular space between the casing and the borehole wall. The tophole sections however are cemented to seabed. An excess of cement, necessary to guarantee sufficient presence of cement through the overall

annulus, will emerge out of the top of the well. In doing this, the conductor pipe and surface casing are cemented all the way to the seafloor.

After the riser has been installed, for the next phases cement jobs, the excess cement will be returned via the riser to the drilling vessel and treated using the solids control system. Unused cement slurry that has already been mixed is discharged overboard to avoid plugging the lines and tanks.

3.5.3 WELL LOGGING AND TESTING

Wireline logging is currently planned only in the success case. Data from Logging While Drilling (LWD) will be gathered during the drilling sections.

Well logging will be standard electric wireline logging. Logging instruments are attached to the bottom of a 'wireline' and lowered to the bottom of the well. The wireline containing a pre-determined array of monitoring instruments is then slowly brought back up, the devices reading different data as they pass each formation and recording it on graphs, which can be interpreted by the geologist, geophysicist, and drilling engineer. The evaluation programme will include sidewall rotary coring; the cores will be recovered to the surface. There are no emissions to the environment associated with standard wireline logging operations. Recovery of fluid samples to surface using a Modular Formation Dynamics Tester (MDT), a type of wireline tester which allows samples of reservoir hydrocarbon to be brought to the surface in small, contained volumes.

Vertical Seismic Profiling (VSP) may also be undertaken for the well in the event hydrocarbons are discovered.

Well testing is conducted to assess the economic viability of a discovery before decommissioning. Typically, one test is performed per appraisal well if a resource is found, with up to two tests possible. Each test and associated flaring (it is unlikely that flaring will be undertaken), can last up to seven days, including five days of build-up and two days of flowing and flaring. During testing, any water from the reservoir is separated from oily components and treated onboard to minimize hydrocarbons. The treated water is then either discharged overboard or sent to an onshore facility for further treatment and disposal.

3.5.4 WELL PLUGGING AND ABANDONMENT

Once drilling is completed, and after well logging activities have been undertaken, the exploration well will be plugged and abandoned; irrespective of whether any hydrocarbons have been discovered in the reservoir sections.

Abandonment involves inserting cement plugs across all reservoir sections that were identified and an abandonment cap on top of the well following standard procedures. The well will be abandoned in accordance with the Chevron global technical standards and will meet or exceed any local required regulations. A minimum of three permanent barriers will be placed in the well between any reservoir sands and the seabed.

3.5.5 DEMOBILISATION

With the exception of the wellhead and potential cuttings depositions, there will be no further physical evidence of drilling on the seafloor. A final clearance survey check will be undertaken using an ROV. On completion of drilling activities, the drilling unit and support vessel will go off

hire and will either leave the area or be contracted to other oil and gas exploration operators to continue similar operations.

Wireless monitoring gauges, operating at frequencies between 12.75 and 21.25 kHz, may be installed on wells that CNEL plans to revisit for future appraisal or production activities. These gauges will be positioned on the wellhead and remain there. However, monitoring gauges will not be installed on exploration wells designated for abandonment.

3.6 PROJECT SCHEDULE

The first drilling campaign is anticipated to start between Quarter 4 2026 and Quarter 1 2027. The preliminary project schedule is provided in Table 3-3 below.

TABLE 3-3 PRELIMENARY PROJECT SCHEDULE

Project Phase / Activity	Anticipated Timeframe
Mobilisation phase	Up to 15 days
Exploration drilling	Up to three months
Appraisal well	Up to four months
Well abandonment:	Up to 7 days
Demobilisation phase	Up to 7 days

3.7 PLANNED EMISSIONS AND DISCHARGES AND WASTE MANAGEMENT

This section presents the main sources of emissions to air, discharges to sea and waste that would result from the planned drilling activities and associated operations.

All vessels would have equipment, systems and protocols in place for prevention of pollution by oil, sewage and garbage in accordance with MARPOL 73/78.

Waste disposal sites and waste management facilities would be identified, verified and approved prior to commencement of project activities.

3.7.1 AIR EMISSIONS

The principal sources of emissions to air from the proposed project activities would be from exhaust emissions from power generation on the vessels.

While unlikely, if well testing is conducted on the appraisal well, then emissions would be generated from hydrocarbon flaring for the limited duration of the well test. Estimated emissions to air from flaring during well testing will be quantified during the ESIA process and presented in the ESIA report.

Dynamically positioned vessels have relatively high fuel consumption and consequently high levels of corresponding air emissions. MGO would be used as fuel for all vessels resulting primarily in emissions of carbon dioxide (CO_2), sulphur oxides (SO_x), nitrogen oxides (NO_x) and carbon monoxide (CO). Relative to these pollutants, smaller quantities of non-methane volatile organic compounds (VOCs), methane (CH_4) and particulate matter (PM10/PM2.5) will also be released. These emissions are released during the normal operation of a marine vessel and have the potential to result in a short-term localised increase in pollutant concentrations. They also contribute to regional and global atmospheric emissions.

Helicopter emissions levels would depend on actual fuel consumption and hence would vary with flying time, payload, weather, speed etc. Estimated emissions to air from vessels and helicopter fuel use are presented in Table 3-2 above for drilling of a single well.

3.7.2 DISCHARGES TO SEA

3.7.2.1 DRILL CUTTINGS AND MUD DISPOSAL

During the drilling of the well, drill cuttings are produced as the rock is broken down in small rock particles by the drill bit advancing through the subsurface. The amount of drill cuttings that will be discharged during the drilling are described in Table 3-4.

TABLE 3-4 DRILL CUTTING DISCHARGES FOR A SINGLE WELL

Section and Bore Diameter (inches)	**OH Length (m)**	**Discharge Depth (m) from Surface (MSL)**	**Cuttings**	**Mud**		
			Volume / Mass Discharged (m^3 / MT)	Type of drilling fluid	Mass Discharged Mud (MT)	Mass Discharged Adhered Oil (MT)
Section 1 Drill 36”	62	Seafloor	58 / 165.49	WBM	468.43	N/A
Section 2 Drill 26”	938	Seafloor	463 / 1321.11	WBM	9962.98	N/A
Section 3 Drill 17.5”	2041	Surface	307 / 876	NADF	203	101.5
Section 4 Drill 12.25”	1417	Surface	104 / 296.75	NADF	75	37.5
TOTAL			932 / 2659.33		10709.41	

The top-hole sections of the well are drilled riserless (that is without the marine riser installed) using sea water with high viscous pills, sweeps, and WBM while NADF systems are used for subsequent sections (with riser installed on top of wellhead and BOP).

During the riserless drilling stage (top-hole section drilling) fluid and cuttings are discharged directly on the seabed in immediate proximity of the well. Following installation of the riser (at the end of tophole sections) excess seawater stored in tanks is discharged.

During drilling using NADF, drilling muds and associated drill cuttings are circulated in a closed loop system which recycles the drilling muds and removes the drill cuttings. The returns from downhole (muds and cuttings) are routed to the shakers, which will physically separate the drill cuttings from the drilling muds.

Unused WBMs will be discharged to sea after their use, whereas NADF that cannot be further cleaned and recycled will be returned to shore. NADF retained on cuttings will returned to the drilling unit and processed onboard as stated above.

3.7.2.2 CEMENT

During drilling, cement and its additives are generally not released. However, in the initial cementing process, surface casing, surplus cement can flow out of the well's top and onto the seafloor to fully cement the conductor pipe to the seafloor. This process may involve pumping up to 150-200% of the necessary cement volume into the annulus (the space between the casing and the borehole wall). In the worst-case scenario, around 100 cubic meters of cement might be discharged onto the seafloor.

3.7.2.3 PRODUCED WATER

The volume of hydrocarbons (to be burned) and possible associated produced water from the reservoir which could be generated during well testing cannot be reliably predicted due to variations in gas composition, flow rates and water content. Burners are manufactured to ensure emissions are kept to a minimum. The estimated volume of hydrocarbons to be burned cannot be with much accuracy because the actual test requirements can only be established after the penetration of a hydrocarbon-bearing reservoir. However, an estimated 20 million standard cubic feet (MSCF) of gas per day and 20,400 barrels of oil could be flared per test.

If produced water is generated during well testing, it will be separated from the hydrocarbons and discharged to the sea.

3.7.2.4 LIQUID DISCHARGES

Table 3-5 shows types and disposal methods of liquid waste anticipated to be generated during the proposed project activities. The disposal methods shall comply with Namibian regulations and MARPOL requirements.

TABLE 3-5 TYPES OF LIQUID WASTE AND THEIR DISPOSAL METHODS

Type	Proposed disposal method
Wastewater	Wastewater will include brine (which is produced in the reverse osmosis process to produce freshwater on the drillship). Typically in well drilling operations, the production of freshwater is approximately 40 m^3 per day, leading to an estimated salt output of about 35 grams for every litre of water generated (equating to roughly 1,400 kg of salt/brine daily). The wastewater will be treated onboard via a dedicated and approved system prior to discharge in accordance with the requirements the International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78.
Bilge water	Bilge water will be collected and piped into a bilge holding tank on board the project vessels in accordance with MARPOL 1973/78 Annex 1. The fluid will be monitored and any oily water would be processed through a suitable separation and treatment system. Detergents used for washing exposed marine deck spaces will be managed as bilge water. The toxicity of detergents varies greatly depending on their composition. Water-based or biodegradable detergents are preferred for use due to their low toxicity. In certain cases of specific area cleaning, e.g., marine deck with no contamination of pollutants, using no toxic detergent, direct overboard discharge may be considered.
Galley waste	The disposal of galley waste into the sea is permitted under MARPOL 73/78 Annex V, only when the vessel is located more than three nautical miles (approximately 5.5 km) from land and the food waste has been ground or comminuted to particle sizes smaller than 25 millimeters (mm).

Type	Proposed disposal method
Ballast water	Ballast water is crucial for maintaining safe operating conditions on a ship. It helps reduce hull stress, provides stability, enhances propulsion and manoeuvrability, and compensates for weight changes due to fuel and water consumption. However, discharging ballast water can introduce foreign marine species, such as bacteria and larvae, into new environments, posing ecological risks. This is particularly relevant when moving a drilling unit to Namibia. To mitigate these risks, the 2004 International Convention for the Control and Management of Ships' Ballast Water and Sediments mandates that all ships must have a Ballast Water Management Plan. Ships using ballast water exchange must do so at least 200 nautical miles (approximately 370 km) from the nearest land in waters at least 200 meters deep when arriving from a different marine region. If this is not feasible, the exchange should occur as far from the nearest land as possible, with a minimum distance of 50 nautical miles (about 93 km) and preferably in waters at least 200 meters deep. Project vessels are required to adhere to these regulations.
Sewage and grey wate	Sewage discharge from the project vessels and the drilling unit will meet the requirements of MARPOL 73/78 Annex IV. The drilling unit and all project vessels will have a valid International Sewage Pollution Prevention (ISPP) Certificate. The sewage discharged from vessels will be disinfected, comminuted and any effluent will not produce visible floating solids in, nor cause discoloration of the surrounding water. The treatment system will provide primary settling, chlorination, and de-chlorination. The treated effluent will then be discharged into the sea.

3.7.3 LAND DISPOSAL

A number of other types of wastes generated during the drilling activities would not be discharged at sea but would be transported to shore for disposal. These wastes would be recycled or re-used if possible or disposed at an appropriate licensed municipal landfill facility or at an alternative approved site. The services of a licenced waste contractor will be used to collect all operational waste for treatment, disposal or recycling.

Typical waste types generated by a drillship that are disposed of onshore include:

- Garbage (eg paper, plastic, wood and glass) including wastes from accommodation and workshops etc;
- Scrap metal and other material;
- Drums and containers containing residues (eg lubricating oil) that may have environmental effects;
- Used oil, including lubricating and gear oil; solvents; hydro-carbon based detergents, possible drilling fluids and machine oil;
- Chemicals and hazardous wastes (eg radioactive materials, neon tubes and batteries);
- Medical waste from treatment of personal onboard the vessel;
- Filters and filter media from machinery;
- Drilling fluid, including WBM, NADF, brine from drilling and completion activities.

Additionally, Naturally Occurring Radioactive Materials (NORM) can be found in formation sands and liquids, presenting as scale on equipment or solids in production separators. Although NORMs are not expected from the project, any generated NORMs will be collected and handled according to Chevron procedures and guidelines.

3.7.4 NOISE EMISSIONS

Underwater noise is generated from various sources during maritime operations. These include vessel propellers, positioning thrusters, drag on the riser, supply vessels, and drilling activities. The sound levels vary significantly depending on the operational mode of each vessel. The VSP survey, in particular, produces short-term noise. The primary sources of noise are categorized as follows (values given below are representative values for a drilling program (OSPAR Commission, 2009)):

- Drilling Noise: Drilling units typically emit underwater noise ranging from 10 Hz to 100 kHz, with major frequency components below 100 Hz and average source levels up to 190 dB re 1 µPa at 1 m (rms), especially when bow thrusters are used.
- Propeller and Positioning Thrusters: The propellers and thrusters noise is mainly due to cavitation around the blades during high-speed transit or when thrusters operate under load to maintain vessel position. This broadband noise, with some low tonal peaks, can be heard over many kilometers. Supply and support vessels also contribute to overall propeller noise.
- Machinery Noise: Low-frequency machinery noise becomes dominant when vessels are stationary or moving slowly. This noise originates from large machinery like power generation units, compressors, and fluid pumps. Sound transmission occurs through structural paths (machine to hull to water) and airborne paths (machine to air to hull to water). Machinery noise is typically tonal. An ROV will sweep the drilling site for debris, but this is not expected to be a significant noise source.
- Well Logging Noise: VSP surveys generate high-resolution geological images using a small dual airgun array with a total volume of 1,000 cubic inches of compressed nitrogen at about 2,000 psi. This produces significantly less energy than conventional seismic surveys. Airguns discharge approximately five times at 20-second intervals, repeated for different well sections, totalling around 250 shots. The VSP operations take less than nine hours per well to complete, depending on the depth and profiling stations, during which short-term noise from airguns will be generated at intervals.
- Well Testing Noise: Flaring during well testing produces airborne noise above sea level.
- Equipment in Water: Noise from equipment like the drill string is relatively low compared to drilling noise and dynamic positioning systems.
- Helicopter Noise: Helicopters contribute to noise affecting marine fauna both underwater and airborne.

The extent of project-related noise above background levels varies based on the vessels used, the number of supply vessels operating, weather conditions, and proximity to other vessel traffic. An Underwater Noise Modelling Study will assess underwater noise transmission loss from the well site and compare results with threshold values for marine fauna to determine impact zones.

3.7.5 LIGHT EMISSIONS

For safe operations and navigation during nighttime, the drilling unit and supply vessels will use operational lighting. Efforts will be made to shield these lights to reduce their spill into the surrounding sea where possible.

3.7.6 HEAT EMISSIONS

Heat emissions are produced during well testing due to the combustion of hydrocarbons at the burner head during flaring.

3.8 UNPLANNED EMISSIONS AND DISCHARGES

This section presents the main sources of emissions that would result from unlikely unplanned/ accidental events during the drilling activities and associated operations.

3.8.1 HYDROCARBONS AND CHEMICAL SPILLS (ONSHORE AND OFFSHORE)

Two of the main types of accidental events that could occur while drilling wells that could result in a discharge of hydrocarbons or chemicals to the marine environment are:

- Loss of well containment; and
- Single-event/batch spills.

Loss of well containment is a continuous release, which could last for a measurable period of time, while a single-event spill is an instantaneous or limited duration occurrence. CNEL is committed to minimising the release of hydrocarbons and hazardous chemical discharge into the marine and onshore environments and avoiding unplanned spills.

In case of accidental events, CNEL will minimise any adverse effects to the environment and plans to accomplish this goal by:

- Incorporating oil and chemical spill prevention into the well design and drilling plans.
- Confirming that the necessary contingency planning has taken place to respond effectively in the event of an incident.

CNEL will develop and implement an Oil and Chemical Spill Response Plan (OSRP) in the event of an accidental release of oil or chemicals offshore. In addition, precautions will be taken to manage all chemicals and petroleum products stored and transferred onshore and offshore are done so in a manner to minimise the potential for a spill and environmental damage in the event of an accidental release.

Additionally, CNEL , is a member of Oil Spill Response Limited (OSRL) which provides advanced capping stacks to shut-in uncontrolled subsea wells in the event of a blow-out. The primary capping stack, a 10K unit, is housed at OSRL's Saldanha Bay Base in South Africa and is available for global mobilisation. Additional stacks are located in Brazil, Norway, and Singapore.

In the event of a blow-out, the capping stack is deployed in the event that the Blowout Preventer (BOP) fails. It weighs around 100 tonnes and requires careful logistical planning for transport and deployment. Before its arrival, a Remotely Operated Vehicle (ROV) inspects the seabed, removes debris, and prepares the wellhead. The stack can either cap the well or redirect the flow to surface vessels.

3.9 PROJECT ALTERNATIVES

A summary of the project alternatives considered during the project design are summarised in Table 3-6. A more detailed assessment of project alternatives considered will be provided in the ESIA report.

TABLE 3-6 SUMMARY OF ALTERNATIVES CONSIDERED IN THE SCOPING PHASE

Aspect	Description / Alternative	Consideration in ESIA
Site / location alternatives	Drill site locations	Two locations have been provisionally identified within PEL 82. Well locations within PEL 82 will be further identified based on further analysis of seismic data, geological targets, seafloor obstacles, and results from previous well tests. Drill site locations for the Drilling Discharges and Oil Spill Modelling will be chosen based on various criteria (including metocean dataset, water depths, and proximity to coast and sensitive areas) to model and assess worst-case scenarios for predicted cuttings dispersion and potential oil spill events.
Aviation base location	Aviation base locations: Lüderitz and Walvis Bay	The ESIA report will evaluate both alternatives.
Timing / Scheduling Alternatives	Timing of exploration and appraisal drilling	No upfront restrictions or alternative timelines are provided. Drilling may potentially impact marine fauna, such as whales, dolphins, and turtles, which have seasonal occurrences in the project area. The ESIA report will consider the implications of drilling in different seasons. The results of the modelling studies (drilling discharge and underwater noise) will be used to assess impacts on marine fauna and commercial fisheries and the possible need for mitigation, e.g., restricting certain activities to specific seasons.
No-Go alternative	No-Go alternative	The No-Go alternative represents the option not to proceed with exploration drilling, maintaining the status quo, which implies that the project area remains in its current condition. This means foregoing the opportunity for potential future oil and gas development and the associated economic and social benefits. The ESIA report will consider the implications of the No-Go alternative.
Design and Technology Alternatives	Number of wells	The proposal is to drill one exploration well. Additional follow-up drilling could potentially include up to nine additional wells (total of 5 exploration and 5 appraisal wells) in blocks 2112B and 2212A. The ESIA report will assess the potential impacts associated with drilling five exploration and five appraisal wells in any location within the Block.
Drilling unit	Given the oceanographic conditions and depth of the Block, a drillship or semi-submersible vessel are being considered for the proposed well drilling activities.	The ESIA report will assess the potential impacts of either a drillship or semi-submersible vessel. There are no additional impacts or differences in impact significance relating to the choice of drilling unit (semi-submersible or drillship).
Drilling method	Two drilling methods can be employed on a drilling unit, namely rotary or downhole motor drilling.	The ESIA report will assess the potential impacts related with either drilling method and will not distinguish between the two options. The environmental consequences of both methods are similar and do not make a material difference to the findings of the ESIA report.

Aspect	Description / Alternative	Consideration in ESIA
Drilling fluid	Two types of drilling fluid could be used during drilling: WBM or NADF. CNEL proposes using WBMs during the riserless drilling stage and NADF during the risered drilling stage, if WBMs are not able to provide the necessary characteristics.	The ESIA report will assess the potential impacts related to both drilling fluids.
Drill cuttings disposal methods	Options for drill cuttings disposal include discharge to sea; onshore disposal; and re-injection.	Drilling discharges will be disposed at sea, in line with most countries (including Namibia and South Africa) for early exploration development phases. The rationale for this is based on the low density of drilling operations in the vast offshore area and the high-energy marine environment. Drill cuttings modelling will be undertaken to confirm the extent of plume dispersion and will be used to assess impacts on marine habitats and species. Should potentially significant impacts be identified, alternative disposal methods may need to be considered.
Helicopter flight paths	Helicopter flights between the aviation base and the drilling unit may impact seabirds or seals on coastal rocky shores or islands during specific breeding seasons.	The ESIA report will assess the risk of helicopter flights on seabirds or seals to confirm whether helicopter flight paths need to be rerouted to avoid certain sensitive areas. It will also consider additional mitigation such as minimum flight heights when flying over seal or bird islands or Marine Protected Areas (MPAs).
Well abandonment	Wellheads can either be left in place or removed from the seafloor, as is standard practice for deep-water wells. Given the water depth over most of the proposed drill area, the preferred option would be to leave the wellheads on the seafloor.	The ESIA will assess the potential impacts and risks related to removing wellheads versus leaving them in place.

4. DESCRIPTION OF THE RECEIVING ENVIRONMENT

This chapter outlines the characteristics of the physical, biological, socio-economic, and cultural environments within the licence area and the surrounding region.

4.1 PROJECT AREA

The project Area of Influence (AoI) encompasses the PEL 82, where the project activities will take place, the onshore base, and the routes used by vessels and helicopters traveling from the onshore base to PEL 82. This area is where both direct and indirect impacts of the project are anticipated. This includes both the immediate vicinity of the project activities and any regions that might be affected by secondary or unplanned events. The direct area of influence will be established based on the results of underwater noise and drill cuttings discharge modelling, as well as marine ecology and fisheries assessments. The indirect Area of Influence will be established based on oil spill modelling results. This area includes coastal and nearshore regions that could be affected in the unlikely event of a well blow-out.

4.2 PHYSICAL ENVIRONMENTAL

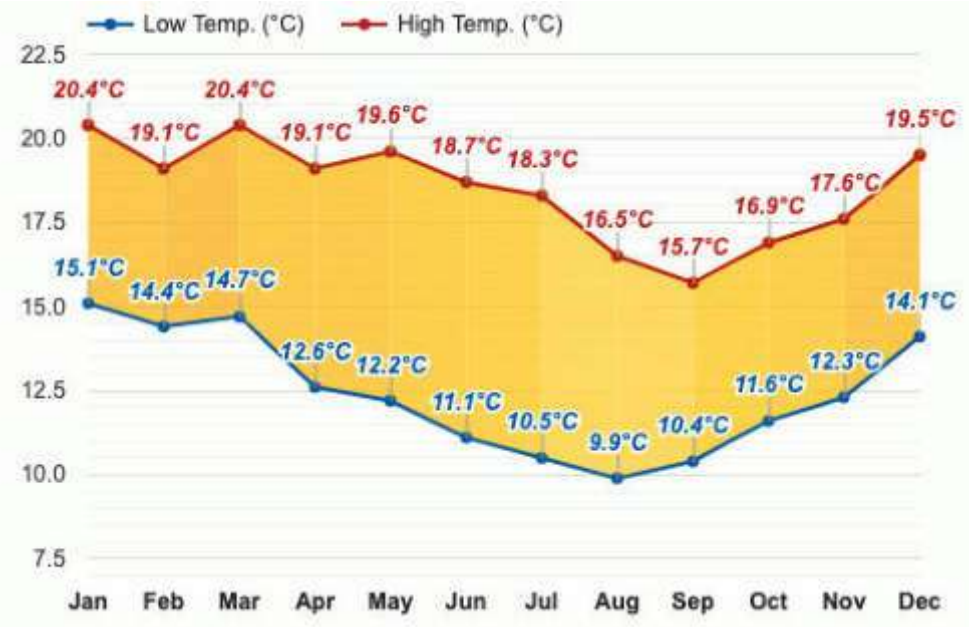
4.2.1 CLIMATE

The climate of the Namibian coastline is classified as hyper-arid with typically low, unpredictable winter rains and strong predominantly southerly or south-westerly winds. Further out to sea, a south-easterly component is more prominent. Winds reach a peak in the late afternoon and subside between midnight and sunrise.

4.2.1.1 TEMPERATURE

The average annual temperature in Walvis Bay is approximately 17.1°C. Monthly average temperatures range from a minimum of 14.7°C (in September to a maximum of 19.1°C in March. The temperature variation throughout the year is relatively small, contributing to stable atmospheric conditions.

FIGURE 4-1 MINIMUM AND MAXIMUM TEMPATURES IN WALVIS BAY



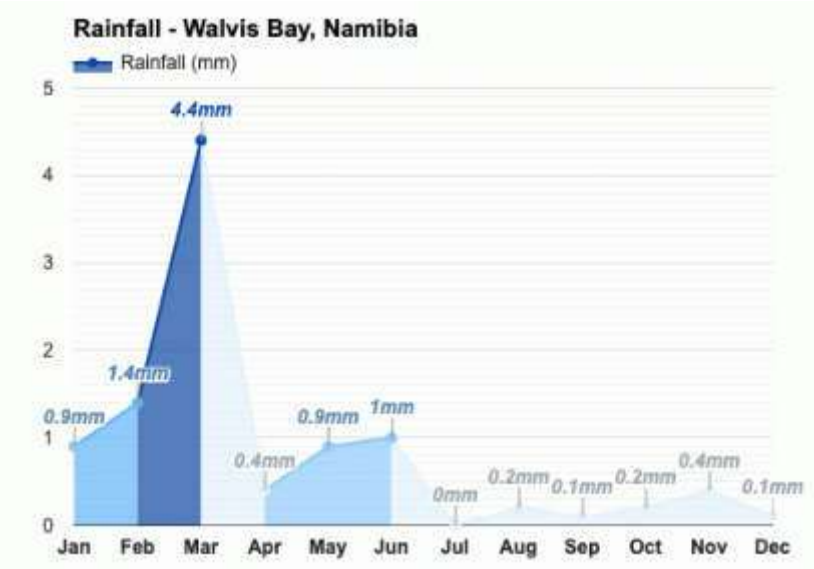
Note: Data was collected from 1991 to 2021

Source: Weather Atlas, 2025

4.2.1.2 RAINFALL

Rainfall in Walvis Bay is extremely low, with an annual precipitation of about 33 mm. The wettest month is January, with an average rainfall of six mm, while May is the driest month with only one mm of rain. The city experiences virtually no rainfall from May to September (Weather Atlas, 2025).

FIGURE 4-2 RAINFALL CLIMATOLOGY IN WALVIS BAY



Note: Data was collected from 1991 to 2021

Source: Weather Atlas, 2025

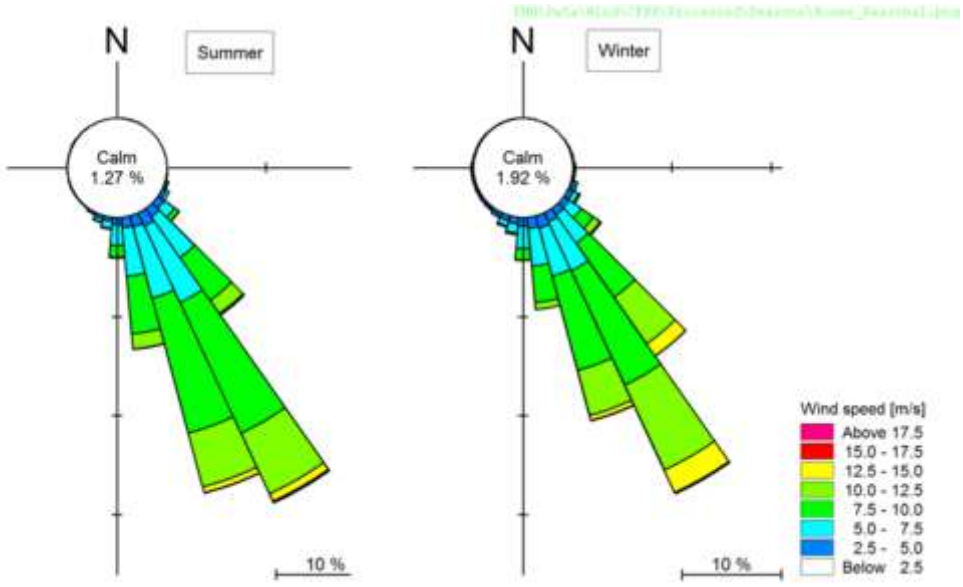
4.2.1.3 WIND PATTERNS

Winds are one of the main physical drivers of the near shore Benguela region, both on an oceanic scale, generating the heavy and consistent south-westerly swells that impact this coast, and locally, contributing to the northward-flowing longshore currents, and being the prime mover of sediments in the terrestrial environment. Consequently, physical processes are characterised by the average seasonal wind patterns, and substantial episodic changes in these wind patterns have strong effects on the entire Benguela region.

The prevailing winds in the Benguela region are controlled by the South Atlantic subtropical anticyclone, the eastward moving mid-latitude cyclones south of southern Africa, and the seasonal atmospheric pressure field over the subcontinent. The south Atlantic anticyclone is a perennial feature that forms part of a discontinuous belt of high-pressure systems that encircle the subtropical southern hemisphere. This undergoes seasonal variations, being strongest in the austral summer, when it also attains its southernmost extension, lying south west and south of the subcontinent. In winter, the south Atlantic anticyclone weakens and migrates north-westwards.

The PEL 82 licence area is located in an area of strong south-easterly winds, which blow approximately parallel to the coastline. There is minimal seasonality in the wind pattern, with a slightly more easterly direction in winter. Seasonal wind roses for the Climate Forecast System Reanalysis (CFSR) wind hindcast data at 10°E, 22°S in the vicinity of PEL 82 are illustrated in Figure 4-3 (PRDW 2019).

FIGURE 4-3 SEASONAL WIND ROSES AT 10°E, 22°S IN THE VICINITY OF PEL 82



Source: PRDW, 2019

During autumn and winter, catabatic, or easterly 'berg' winds can also occur. These powerful offshore winds can exceed 50 km/h, producing sandstorms that considerably reduce visibility at sea and on land. Although they occur intermittently for about a week

at a time, they have a strong effect on the coastal temperatures, which often exceed 30°C during ‘berg’ wind periods (Shannon and O’Toole 1998). The winds also play a significant role in sediment input into the coastal marine environment with transport of the sediments up to 150 km offshore (Figure 4-4).

FIGURE 4-4 AEROSOL PLUMES OF SAND AND DUST BEING BLOWN OUT TO SEA DURING A NORTHEAST 'BERG' WIND EVENT ALONG THE CENTRAL NAMIBIAN COAST

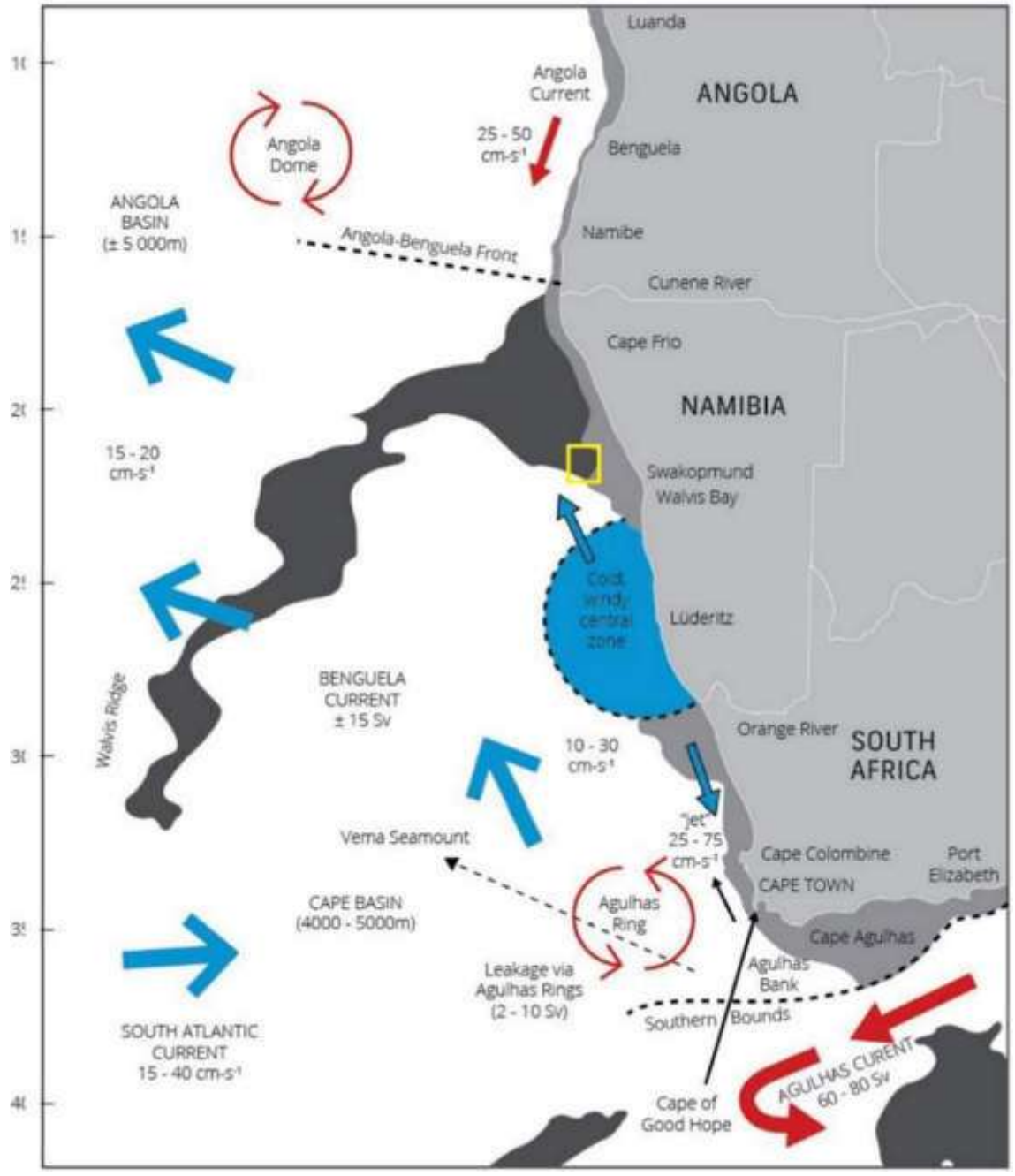
Source: www.intute.ac.uk, 2025

4.2.2 OCEANOGRAPHIC CONDITIONS

4.2.2.1 LARGE-SCALE CIRCULATION AND COASTAL CURRENTS

The Namibian coastline is strongly influenced by the Benguela Current. Current velocities in continental shelf areas generally range between 10–30 cm/s (Boyd and Oberholster 1994). In the south the Benguela current has a width of 200 km, widening rapidly northwards to 750 km. The flows are predominantly wind-forced, barotropic and fluctuate between poleward and equatorward flow (Shillington et al. 1990; Nelson and Hutchings 1983). Fluctuation periods of these flows are 3 - 10 days, although the long-term mean current residual is in an approximate northwest (alongshore) direction. Near bottom shelf flow is mainly poleward (Nelson 1989) with low velocities of typically 5 cm/s.

FIGURE 4-5 PEL 82 (YELLOW POLYGON) IN RELATION TO MAJOR FEATURES OF THE PREDOMINANT CIRCULATION PATTERNS AND VOLUME FLOWS IN THE BENGUELA SYSTEM



Source: Shannon and Nelson 1996

The Angola Dome lies to the north of the licence area and is characterised by cyclonic circulation, with periodic intrusion of tropical waters into the northern Benguela from the north and northwest. Off the coast of Angola, the most prominent circulation feature is the southward flowing Angola current, which turns westwards between 16°S and 17°S just north of the Angola-Benguela Front. The Angola-Benguela Front is a permanent

feature at the surface and to a depth of at least 200 m between latitudes 14°S and 17°S. The front is maintained by a combination of factors including coastal orientation, wind stress, bathymetry and opposing flows of the Angola and Benguela Currents. To what extent the Angola Current contributes to the Benguela system at the surface and subsurface off northern Namibia is uncertain. At greater depths (400 m), however, the poleward flow of the Angola Current is more continuous. The episodic southward movement of this front during late summer introduces warm tropical water southwards and eastwards along the Namibian coast. Known as Beguela Niños, these events occur on average every ten years (Shannon and O'Toole 1998).

4.2.2.2 WAVES AND TIDES

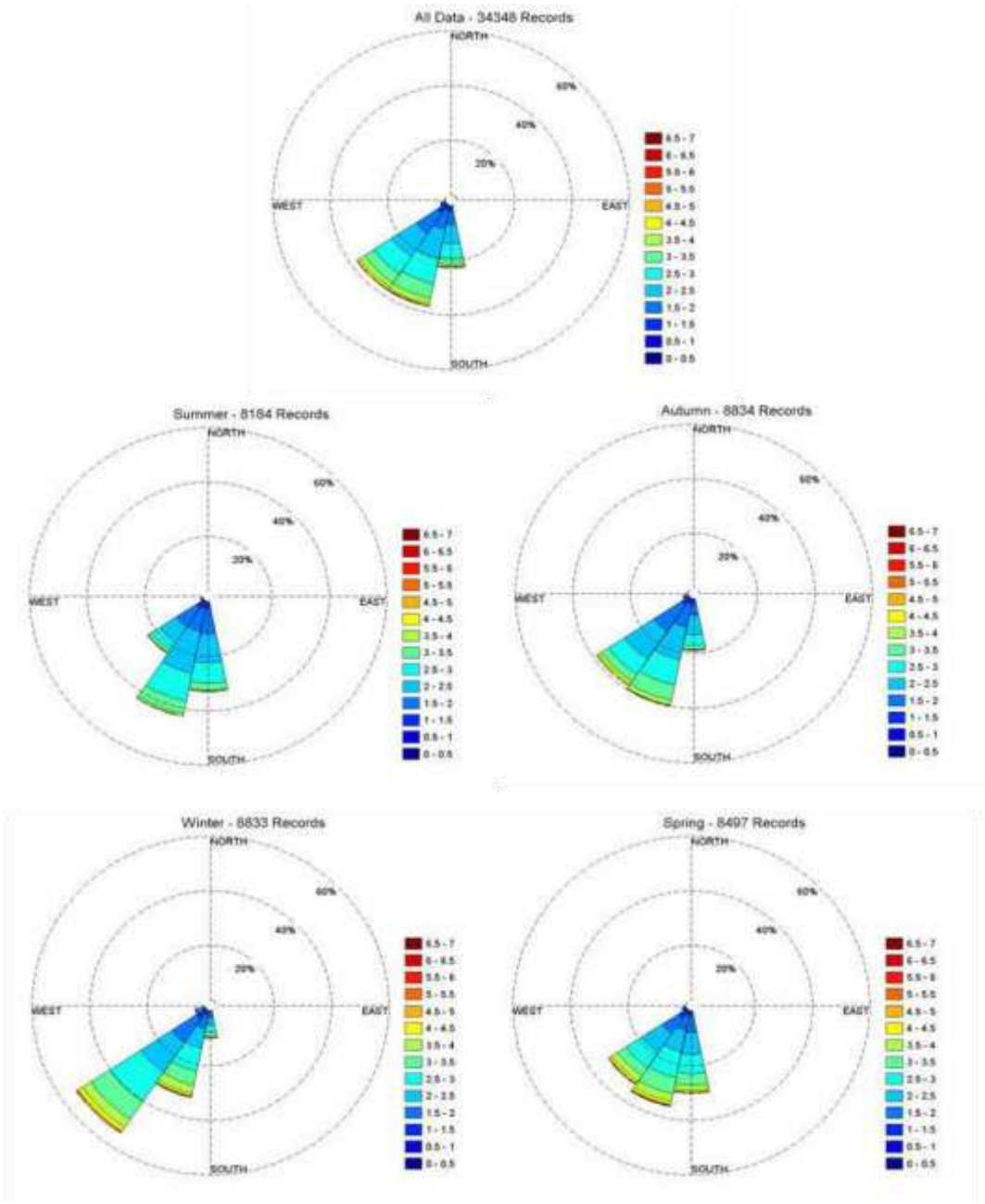
The Namibian Coast is classified as exposed, experiencing strong wave action rating between 13-17 on the 20-point exposure scale (McLachlan 1980). The coastline is influenced by major swells generated in the roaring forties, as well as significant sea waves generated locally by the persistent southerly winds.

Typical seasonal swell-height rose-plots, compiled from Voluntary Observing Ship (VOS) data off Walvis Bay are shown in Figure 4-6. The wave regime along the southern African west coast shows only moderate seasonal variation in direction, with virtually all swells throughout the year coming from the SW - S direction. In winter there is a slight increase in swell from the SW direction. The median significant wave height is 2.4 m with a dominant peak energy period of ~12 seconds. Longer period swells (11 to 15 seconds), generated by mid-latitude cyclones occur about 25-30 times a year. These originate from the S-SW sectors, with the largest waves recorded along the southern African West Coast attaining 4-7 m. With wind speeds capable of reaching 100 km/h during heavy winter south-westerly storms, winter swell heights can exceed 10 m. Generally, wave heights decrease with water depth and distance longshore.

In comparison, spring and summer swells tend to be smaller on average, typically around 2 m, not reaching the maximum swell heights of winter. There is also a more pronounced southerly swell component in summer. These southerly swells tend to be wind-induced, with shorter wave periods (~8 seconds), and are generally steeper than swell waves (Council for Scientific and Industrial Research (CSIR), 1996). These wind-induced southerly waves are relatively local and, although less powerful, tend to work together with the strong southerly winds of summer to cause the northward-flowing nearshore surface currents, and result in substantial nearshore sediment mobilisation, and northwards transport, by the combined action of currents, wind and waves.

In common with the rest of the southern African coast, tides are semi-diurnal, with a total range of some 1.5 m at spring tide, but only 0.6 m during neap tide periods.

FIGURE 4-6 SEASONAL OFFSHORE WAVE CONDITIONS FOR A DATA POINT LOCATED AT 23° S, 13.75°E



Source: CSIR 2009

4.2.2.3 WATER MASSES

South Atlantic Central Water (SACW) constitutes the majority of the seawater within the study area, found either in its unaltered state in deeper zones or mixed with previously upwelled water of the same origin on the continental shelf (Nelson and Hutchings 1983). Salinity levels fluctuate between 34.5‰ and 35.5‰ (Shannon 1985).

Data collected over a decade at Swakopmund (1988 – 1998) revealed that seawater temperatures range from 10°C to 23°C, with an average of 14.9°C. Well-defined thermal

fronts are present, marking the seaward limit of the upwelled water. Upwelling filaments are typical of these offshore thermal fronts, appearing as surface currents of cold water, generally 50 km wide and extending beyond the typical offshore reach of the upwelling cell. These fronts usually last from a few days to several weeks, with the filamentous mixing area reaching up to 625 km offshore.

The continental shelf waters of the Benguela system are noted for their low oxygen levels, particularly near the seabed. SACW itself exhibits reduced oxygen levels (~80% saturation), but even lower oxygen concentrations (<40% saturation) are common (Bailey et al. 1985; Chapman and Shannon 1985). Nutrient levels in the upwelled waters of the Benguela system reach 20 µm nitrate-nitrogen, 1.5 µM phosphate, and 15-20 µM silicate, indicating nutrient enrichment (Chapman and Shannon 1985). This enrichment is facilitated by nutrient regeneration from biogenic materials in the sediments (Bailey et al. 1985). The modification of these peak concentrations is influenced by phytoplankton uptake, which varies based on phytoplankton biomass and production rates. Consequently, the range of nutrient concentrations can be extensive, but generally, levels are high. Given that PEL 82 is situated well offshore from the upwelling cells, low nutrient concentrations are anticipated.

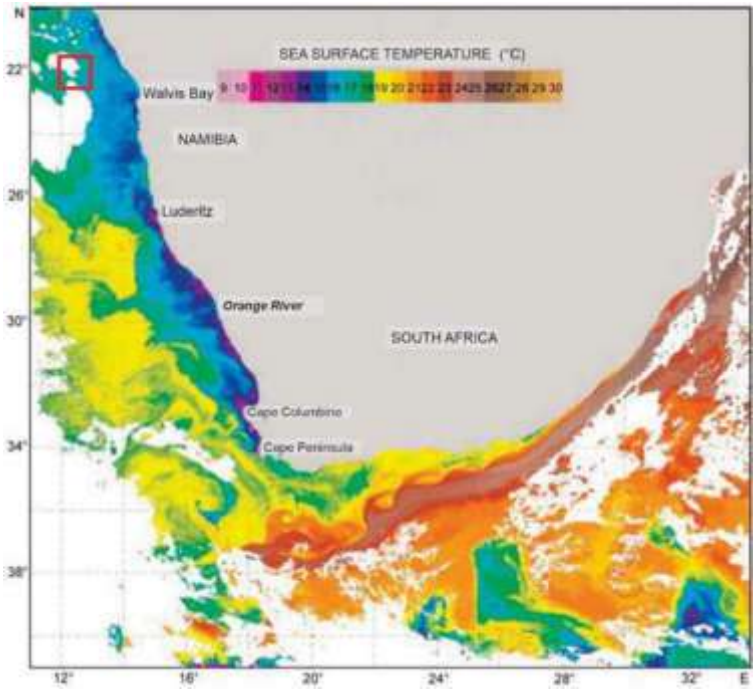
4.2.2.4 UPWELLING AND PLANKTON PRODUCTION

The major feature of the Benguela Current Coastal is upwelling and the consequent high nutrient supply to surface waters leads to high biological production and large fish stocks. The prevailing longshore, equatorward winds move nearshore surface water northwards and offshore. To balance the displaced water, cold, deeper water wells up inshore supporting substantial seasonal primary phytoplankton production. Although the rate and intensity of upwelling fluctuates with seasonal variations in wind patterns, the most intense upwelling tends to occur where the shelf is narrowest and the wind strongest. Consequently, it is a semi-permanent feature at Lüderitz and upwelling can occur there throughout the year and areas to the north due to perennial southerly winds (Figure 4-7; Shannon 1985). The Lüderitz upwelling cell is the most intense upwelling cell in the system (Figure 4-7)with the seaward extent reaching nearly 300 km, and the upwelling water is derived from 300-400 m depth (Longhurst 2006). A detailed analysis of water mass characteristics revealed a discontinuity in the central and intermediate water layers along the shelf north and south of Lüderitz (Duncombe Rae 2005). The Lüderitz / Orange River region thus forms a major environmental barrier between the northern and southern Benguela sub-systems (Ekau & Verheye 2005). Off northern and central Namibia, several secondary upwelling cells occur. Upwelling in these cells is perennial, with a late winter maximum (Shannon 1985).

FIGURE 4-7 UPWELLING CENTRES AND LOW OXYGEN AREAS IN RELATION TO PEL 82

Source: Shannon 1985

FIGURE 4-8 SEA SURFACE TEMPERATURE AND COASTAL UPWELLING EVENTS FOR 15 MAY 2003 IN RELATION TO PEL 82 (RED POLYGON)



Source: Weeks et al. 2006

The cold, upwelled water is rich in inorganic nutrients, the major contributors being various forms of nitrates, phosphates and silicates (Chapman and Shannon 1985). The seasonal primary production, in turn, serves as the basis for a rich food chain up through zooplankton, pelagic baitfish (anchovy, pilchard, round-herring and others), to predatory fish (hake and snoek), mammals (primarily seals and dolphins) and seabirds (jackass penguins, cormorants, pelicans, terns and others). High phytoplankton productivity in the upper layers again depletes the nutrients in these surface waters. This results in a wind-related cycle of plankton production, mortality, sinking of plankton detritus and eventual nutrient re-enrichment occurring below the thermocline as the phytoplankton decays.

4.2.3 BATHYMETRY AND SEDIMENTS

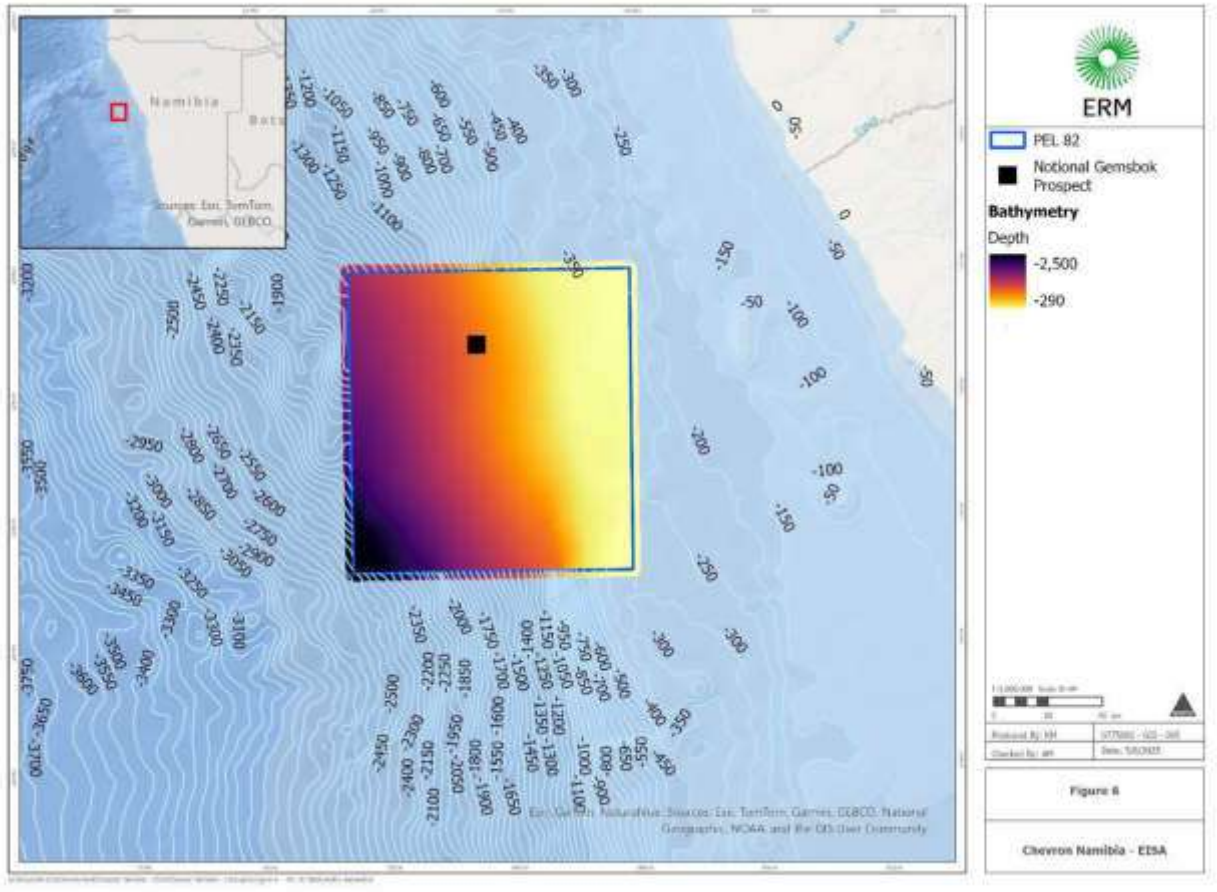
4.2.3.1 BATHYMETRY

The continental shelf off Namibia is variable in width. The shelf off of the Orange River is wide (230 km) and characterised by well-defined shelf breaks, a shallow outer shelf and the aerofoil-shaped submarine Recent River Delta on the inner shelf. It narrows to the north reaching its narrowest point (90 km) off Chameis Bay, before widening again to 130 km off Lüderitz (Rogers 1977). Off of Walvis Bay there is a double shelf break, with the inner and outer breaks beginning at depths of around 140 m and 400 m, respectively (Shannon and O'Toole 1998).

Off Terrace Bay the shelf gives rise to the Walvis Ridge, an underwater plateau extending obliquely (NE-SW) south-westwards far into the south Atlantic from the northern Namibian shelf (18°S) to the Tristan da Cunha island group at the Mid-Atlantic Ridge (38°S). Beyond the Walvis Ridge, the shelf narrows again towards Cape Frio (refer to Figure 4-9). The Walvis Ridge is a chain of seamounts and guyots that individually and collectively constitute an ecologically and biologically significant deep-sea feature. It also includes steep canyons, embayments formed by massive submarine slides, trough-like structures, a graben, abyssal plains, and a fossilized cold-water coral reef mound community (GEOMAR 2014).

The salient topographic features of the shelf include the relatively steep descent to about 100 m, the gentle decline to about 180 m, and the undulating depths to about 200 m. The most prominent topographic feature in the study area is the Walvis Ridge, which extends from the African coast at around 18°S more than 3,000 km south-westwards to Tristan da Cunha, the Gough Islands and the Mid-Atlantic Ridge. This plateau effectively splits the abyssal plain of the Southeast Atlantic into the Angola Basin to the north and the Cape Basin to the south. The variable topography of the shelf is of significance for near shore circulation and for fisheries (Shannon and O'Toole 1998).

FIGURE 4-9 BATHYMETRY OF THE PROJECT AREA

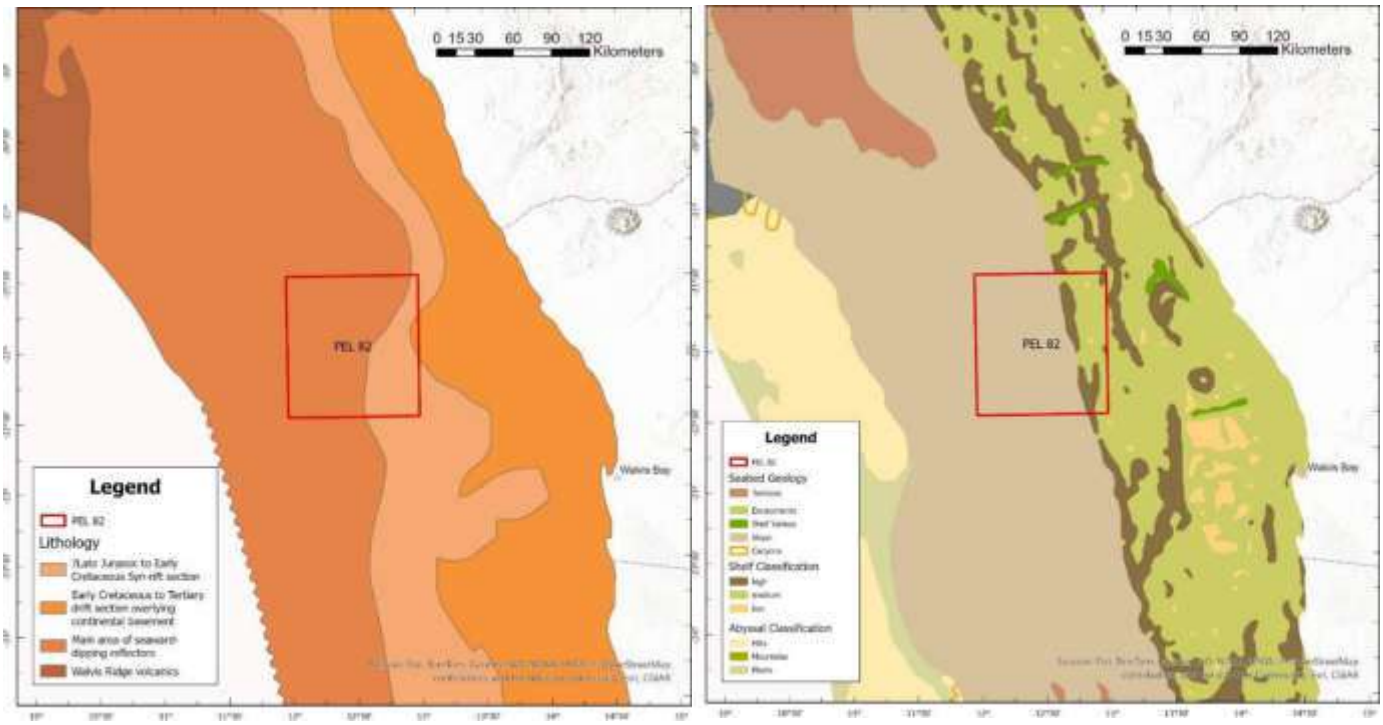


Source: CNEL, 2025

4.2.3.2 COASTAL AND INNER-SHELF GEOLOGY AND SEABED GEOMORPHOLOGY

As part of the recent Marine Spatial Planning (MSP) process in Namibia, the marine geology of the Namibian continental shelf and geomorphic seafloor features within the EEZ were mapped (refer to Figure 4-10).

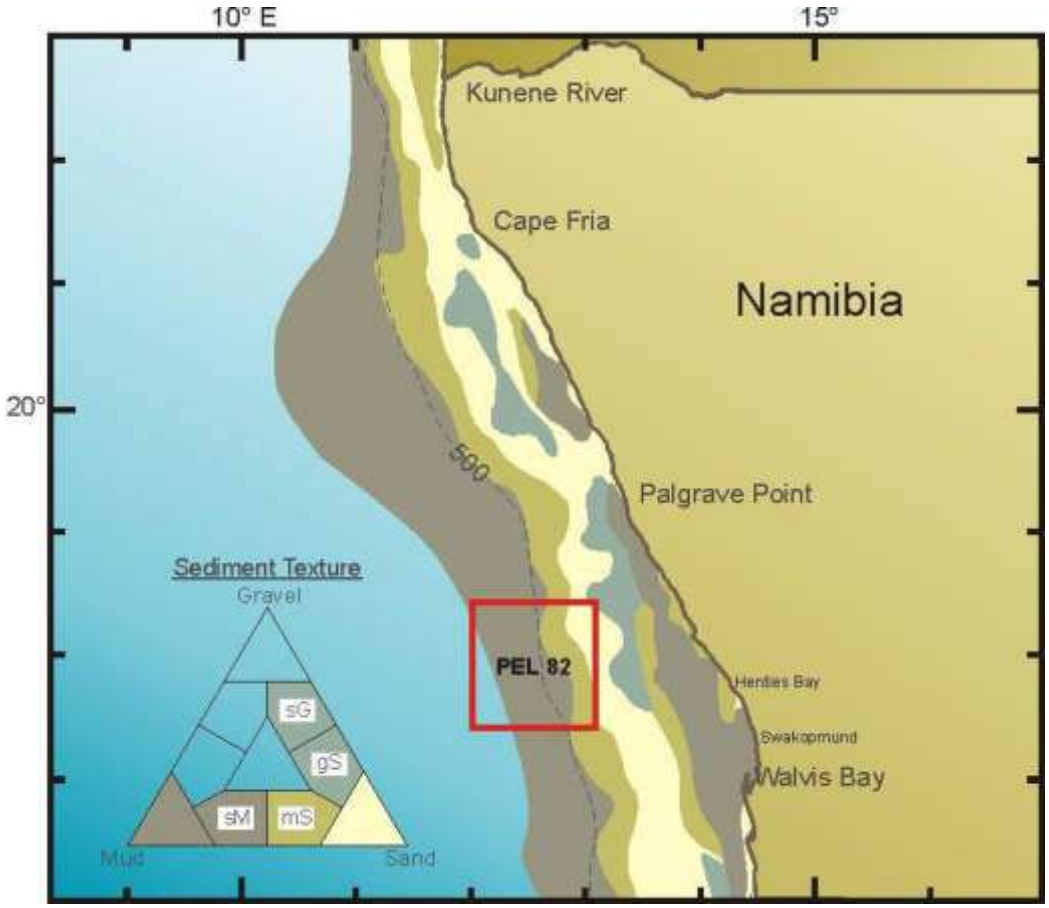
FIGURE 4-10 MARINE GEOLOGY OF THE SOUTHERN NAMIBIAN CONTINENTAL SHELF (LEFT) AND SEABED GEOMORPHIC FEATURES (RIGHT) IN RELATION TO PEL 82



Source: Adapted from MFMR 2021

Figure 4-11 illustrates the distribution of seabed surface sediment types of the central and northern Namibian coast. The inner shelf is underlain by Precambrian bedrock (also referred to as Pre-Mesozoic basement), whilst the middle and outer shelf areas are composed of Cretaceous and Tertiary sediments (Dingle 1973; Birch et al. 1976; Rogers 1977; Rogers and Bremner 1991). As a result of erosion on the continental shelf, the unconsolidated sediment cover is generally thin, often less than 1 m. Sediments are finer seawards, changing from sand on the inner and outer shelves to muddy sand and sandy mud in deeper water. However, this general pattern has been modified considerably by biological deposition (large areas of shelf sediments contain high levels of calcium carbonate) and localised river input. Off central Namibia, the muddy sand in the near shore area off Henties Bay gives way to a tongue of organic-rich sandy mud, which extends from south of Sandwich Harbour to ~ 20°40’S northwards to Pelgrave Point (Figure 4-12)These biogenic muds are the main determinants of the formation of low-oxygen waters and sulphur eruptions off central Namibia. Further offshore this gives way to muddy sands, sands and gravels before changing again into mud-dominated seabed beyond the 500-m contour. The continental slope, seaward of the shelf break, has a smooth seafloor, underlain by calcareous ooze.

FIGURE 4-11 PEL 82 IN RELATION TO THE SEDIMENT DISTRIBUTION ON THE CONTINENTAL SHELF OFF CENTRAL AND NORTHERN NAMIBIA



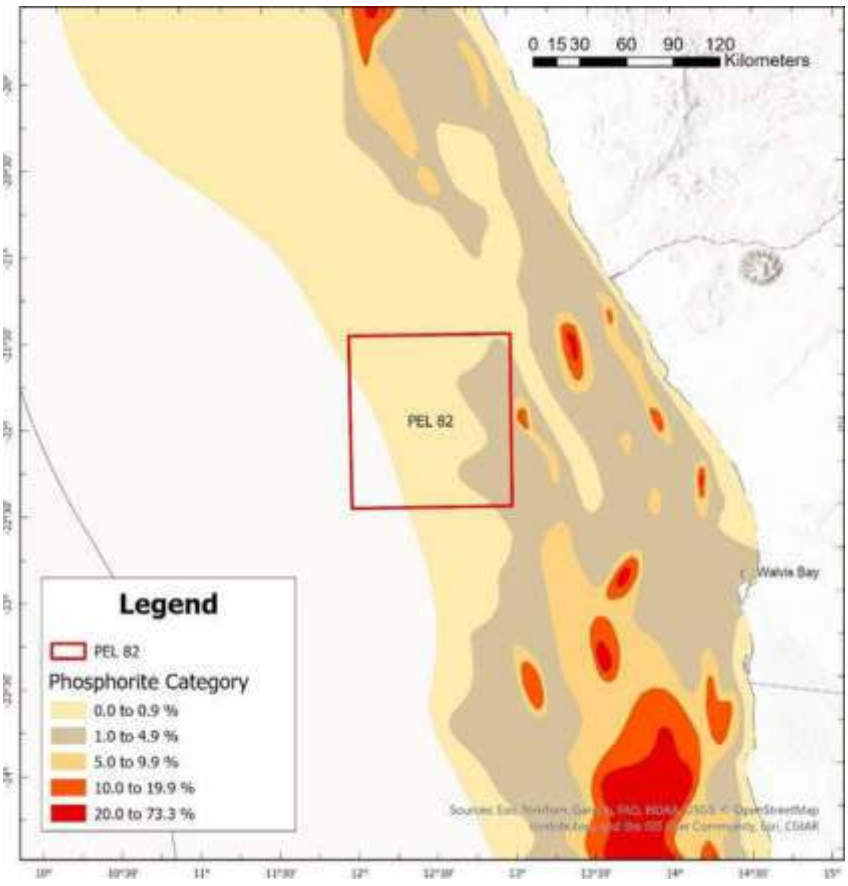
Source: Rogers, 1977

4.2.3.3 SEDIMENTARY PHOSPHATES

Phosphorite, or phosphate-rich rock, is defined as sedimentary rock typically containing between 5%-20% phosphate. In the marine environment, it occurs either as a nodular hard ground capping of a few metres thick or as layers of consolidated or unconsolidated sediments on continental shelves and in the upper part of continental slopes (Morant 2013). Such deposits provide a record of paleoceanographic changes in upwelling systems linked to climate. Being one of the most productive upwelling systems in the world, the Benguela Upwelling System is associated with major phosphorite deposits (of various type and grade) exposed over an area of 24 700 km² on the Namibian shelf (Compton & Bergh 2016).

PEL 82 overlaps primarily with low percentage occurrence of the known phosphate deposits (Figure 4-12).

FIGURE 4-12 PEL 82 IN RELATION TO THE KNOWN LOCATION OF PHOSPHATE DEPOSITS ON THE SOUTHERN NAMIBIAN CONTINENTAL SHELF



Source: MFMR, 2021

4.2.3.4 TURBIDITY

Turbidity is a measure of the degree to which the water loses its transparency due to the presence of suspended particulate matter. Total Suspended Particulate Matter (TSPM) can be divided into Particulate Organic Matter (POM) and Particulate Inorganic Matter (PIM), the ratios between them varying considerably. The POM usually consists of detritus, bacteria, phytoplankton and zooplankton, and serves as a source of food for filter-feeders. Seasonal microphyte production associated with upwelling events will play an important role in determining the concentrations of POM in coastal waters. PIM, on the other hand, is primarily of geological origin consisting of fine sands, silts and clays. Off the southern African West Coast, the PIM loading in nearshore waters is strongly related to natural riverine inputs. 'Berg' wind events can potentially contribute the same order of magnitude of sediment input as the annual estimated input of sediment by the Orange River (Shannon and Anderson 1982; Zoutendyk 1992, 1995; Shannon and O'Toole 1998; Lane and Carter 1999).

Concentrations of suspended particulate matter in shallow coastal waters can vary both spatially and temporally, typically ranging from a few mg/l to several tens of mg/l (Bricelj and Malouf 1984; Berg and Newell 1986; Fegley et al. 1992). Field measurements of

TSPM and PIM concentrations in the Benguela current system have indicated that outside of major flood events, background concentrations of coastal and continental shelf suspended sediments are generally <12 mg/l, showing significant long-shore variation (Zoutendyk 1995). Considerably higher concentrations of PIM have, however, been reported from southern African West Coast waters under stronger wave conditions associated with high tides and storms, or under flood conditions.

The major source of turbidity in the swell-influenced nearshore areas off the West Coast is the redistribution of fine inner shelf sediments by long-period Southern Ocean swells. The current velocities typical of the Benguela (10-30 cm/s) are capable of resuspending and transporting considerable quantities of sediment equatorwards. Under relatively calm wind conditions, however, much of the suspended fraction (silt and clay) that remains in suspension for longer periods becomes entrained in the slow poleward undercurrent (Shillington et al. 1990; Rogers and Bremner 1991).

Superimposed on the suspended fine fraction, is the northward littoral drift of coarser bedload sediments, parallel to the coastline. This northward, nearshore transport is generated by the predominantly south-westerly swell and wind-induced waves. Longshore sediment transport varies considerably in the shore-perpendicular dimension, being substantially higher in the surf-zone than at depth, due to high turbulence and convective flows associated with breaking waves, which suspend and mobilise sediment (Smith and Mocke 2002).

On the inner and middle continental shelf, the ambient currents are insufficient to transport coarse sediments, and resuspension and shoreward movement of these by wave-induced currents occur primarily under storm conditions (see also Drake et al. 1985; Ward 1985).

The powerful easterly ‘berg’ winds occurring along the Namibian coastline in autumn and winter also play a significant role in sediment input into the coastal marine environment (refer to Figure 4-4), potentially contributing the same order of magnitude of sediment input as the annual estimated input of sediment by the Orange River (Zoutendyk 1992; Shannon & O’Toole 1998; Lane & Carter 1999). For example, for a single ‘berg’-wind event it was estimated that 50 million tons of dust were blown into the sea by extensive sandstorms along much of the coast from Cape Frio, Namibia in the north to Kleinzee, South Africa in the south (Shannon & Anderson 1982) with transport of the sediments up to 150 km offshore.

4.2.4 ORGANIC INPUTS

The Benguela upwelling region is an area of particularly high natural productivity, with extremely high seasonal production of phytoplankton and zooplankton. These plankton blooms in turn serve as the basis for a rich food chain up through pelagic baitfish (anchovy, pilchard, round-herring and others), to predatory fish (snoek), mammals (primarily seals and dolphins) and seabirds (jackass penguins, cormorants, pelicans, terns and others). All of these species are subject to natural mortality, and a proportion

of the annual production of all these trophic levels, particularly the plankton communities, die naturally and sink to the seabed.

Balanced multispecies ecosystem models have estimated that during the 1990s the Benguela region supported biomasses of 76.9 tons/km² of phytoplankton and 31.5 tons/km² of zooplankton alone (Shannon et al. 2003). Approximately 36% of the phytoplankton and 5% of the zooplankton are estimated to be lost to the seabed annually. This natural annual input of millions of tons of organic material onto the seabed off the southern African West Coast has a substantial effect on the ecosystems of the Benguela region. It provides most of the food requirements of the particulate and filter-feeding benthic communities that inhabit the sandy-muds of this area, and results in the high organic content of the muds in the region. As most of the organic detritus is not directly consumed, it enters the seabed decomposition cycle, resulting in subsequent depletion of oxygen in deeper waters.

An associated phenomenon ubiquitous to the Benguela system are red tides (dinoflagellate and/or ciliate blooms) (see Shannon and Pillar 1985; Pitcher 1998). Also referred to as Harmful Algal Blooms (HABs), these red tides can reach very large proportions. Toxic dinoflagellate species can cause extensive mortalities of fish and shellfish through direct poisoning, while degradation of organic-rich material derived from both toxic and non-toxic blooms results in oxygen depletion of subsurface water.

4.2.4.1 LOW OXYGEN EVENTS

The continental shelf waters of the Benguela system are characterised by low oxygen concentrations with <40% saturation occurring frequently (e.g. Visser 1969; Bailey et al. 1985). The low oxygen concentrations are attributed to nutrient remineralisation in the bottom waters of the system (Chapman and Shannon 1985). The absolute rate of this is dependent upon the net organic material build-up in the sediments, with the carbon rich mud deposits playing an important role. As the mud on the shelf is distributed in discrete patches (refer Figure 4-11) there are corresponding preferential areas for the formation of oxygen-poor water (refer to Figure 4-12). The two main areas of low-oxygen water formation in the central Benguela region are in the Orange River Bight and off Walvis Bay (Chapman and Shannon 1985; Bailey 1991; Shannon and O'Toole 1998; Bailey 1999; Fossing et al. 2000). The spatial distribution of oxygen-poor water in each of the areas is subject to short- and medium-term variability in the volume of hypoxic water that develops. De Decker (1970) showed that off Lambert's Bay in South Africa, the occurrence of low oxygen water is seasonal, with highest development in summer/autumn. Bailey and Chapman (1991), on the other hand, demonstrated that in the St Helena Bay area in South Africa, daily variability exists as a result of downward flux of oxygen through thermoclines and short-term variations in upwelling intensity. Subsequent upwelling processes can move this low-oxygen water up onto the inner shelf, and into nearshore waters, often with devastating effects on marine communities.

Oxygen deficient water can affect the marine biota at two levels. It can have sub-lethal effects, such as reduced growth and feeding, and increased intermoult period in the rock-lobster population (Beyers et al. 1994). The oxygen-depleted subsurface waters

characteristic of the central and southern Namibian shelf are an important factor determining the distribution of rock lobster in the area. During the summer months of upwelling, lobsters show a seasonal inshore migration (Pollock & Shannon 1987), and during periods of low oxygen become concentrated in shallower, better-oxygenated nearshore waters.

On a larger scale, periodic low oxygen events in the nearshore region can have catastrophic effects on the marine communities. Low-oxygen events associated with massive algal blooms can lead to large-scale stranding of rock lobsters, and mass mortalities of other marine biota and fish (Newman & Pollock 1974; Matthews & Pitcher 1996; Pitcher 1998; Cockroft et al. 2000). In March 2008, a series of red tide or algal blooms dominated by the (non-toxic) dinoflagellate Ceratium furca occurred along the central Namibian coast (MFMR 2008). These bloom formations ended in disaster for many coastal marine species and resulted in what was possibly the largest rock lobster walkout in recent memory. Other fish mortalities included rock suckers, rock fish, sole, eels, shy sharks, and invertebrates such as octopuses and red bait, which were trapped in the low oxygen area below the surf zone (Louw 2008). The main cause for these mortalities and walkouts is oxygen starvation that results from the decomposition of huge amounts of organic matter. The blooms develop over a period of unusually calm wind conditions when sea surface temperatures where high. These anoxic conditions were further exacerbated by the release of hydrogen sulphide - which is highly toxic to most marine organisms. Algal blooms usually occur during summer-autumn (February to April) but can also develop in winter during the 'bergwind periods', when similar warm windless conditions occur for extended periods.

4.2.4.2 SULPHUR ERUPTIONS

Closely associated with seafloor hypoxia, particularly off central Namibia, is the generation of toxic hydrogen sulphide and methane within the organically-rich, anoxic muds following decay of expansive algal blooms. Under conditions of severe oxygen depletion, hydrogen sulphide (H2S) gas is formed by anaerobic bacteria in anoxic seabed muds (Brüchert et al. 2003). This is periodically released from the muds as 'sulphur eruptions', causing upwelling of anoxic water and formation of surface slicks of sulphur discoloured water (Emeis et al. 2004), and even the temporary formation of floating mud islands (Waldron 1901). Such eruptions are accompanied by a characteristic pungent smell along the coast and the sea takes on a lime green colour (Figure 4-13). These eruptions strip dissolved oxygen from the surrounding water column, resulting in mass mortalities of marine life. Such complex chemical and biological processes are often associated with the occurrence of harmful algal blooms, causing large-scale mortalities to fish and crustaceans.

FIGURE 4-13 SATELLITE IMAGE SHOWING DISCOLOURED WATER OFFSHORE THE CENTRAL NAMIBIAN COAST RESULTING FROM A NEARSHORE SULPHUR ERUPTION.

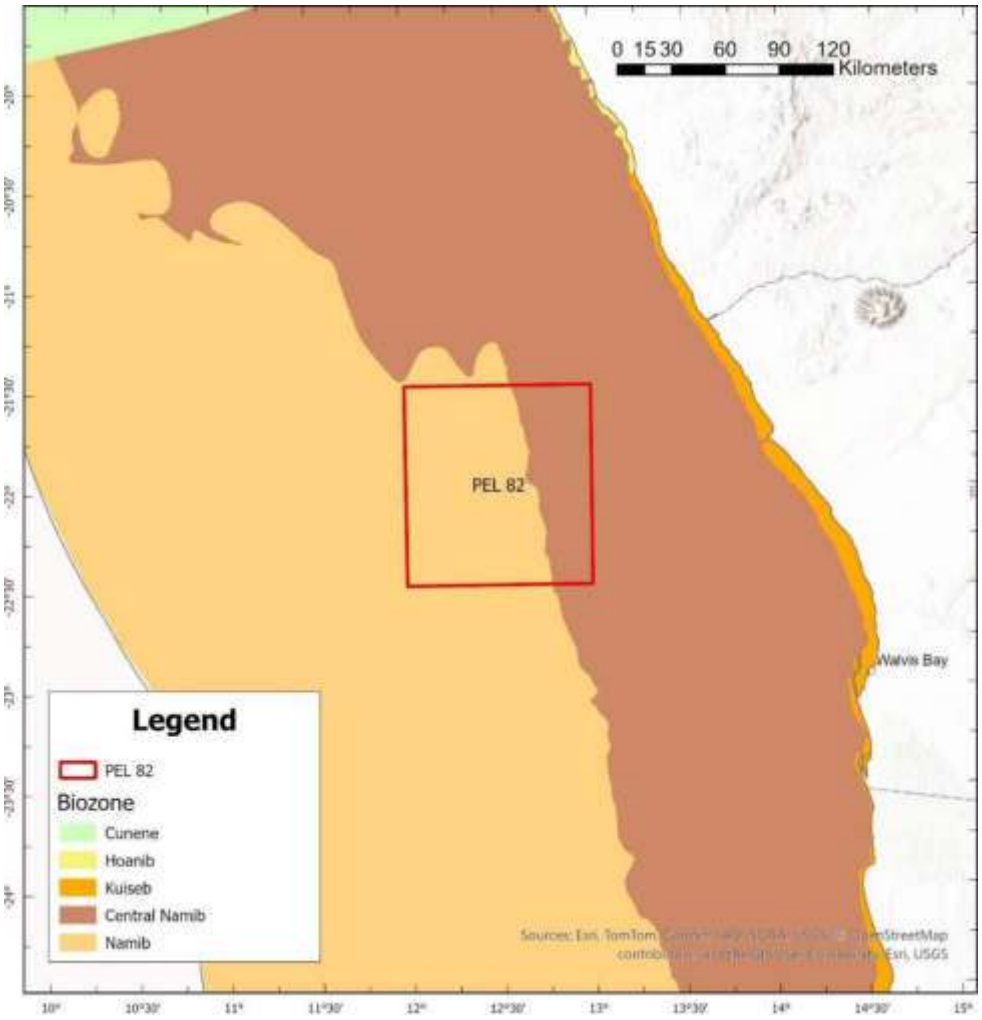
Source: www.intute.ac.uk, 2025

4.3 BIOLOGICAL ENVIRONMENT

Biogeographically, the central Namibian coastline falls into the warm-temperate Namib Province, which extends northwards from Lüderitz into southern Angola (Emanuel et al. 1992). PEL 82 is located in the offshore Central Namib and Namib Biozones (De Cauwer 2007), which extend beyond the shelf break onto the continental slope and into abyssal depths (Figure 4-14). The coastal, wind-induced upwelling characterising the Namibian coastline, is the principle physical process which shapes the marine ecology of the central Benguela region. The Benguela system is characterised by the presence of cold surface water, high biological productivity, and highly variable physical, chemical and biological conditions (Barnard 1998). During periods of less intense winds off the northern Nambian coast (Benguela Niños), upwelling weakens and the warmer, more saline waters of the Angola Current intrude southwards along the coast introducing organisms normally associated with the subtropical conditions typical off Angola (Barnard 1998). As these events are typically temporary, the species of tropical west African origin associated with them will not be discussed here.

Communities within marine habitats are largely ubiquitous throughout the southern African West Coast region, being particular only to substrate type or depth zone. These biological communities consist of many hundreds of species, often displaying considerable temporal and spatial variability (even at small scales). PEL 82 is located beyond the 200 m depth contour, the closest points to shore being ~80 km off the coast near the Ugab River mouth. The near- and offshore marine ecosystems comprise a limited range of habitats, namely unconsolidated seabed sediments and the water column. The biological communities 'typical' of these habitats are described briefly below, focusing both on dominant, commercially important and conspicuous species, as well as potentially threatened or sensitive species, which may be affected by the exploration well-drilling.

FIGURE 4-14 PEL 82 IN RELATION TO THE NAMIBIAN BIOZONES



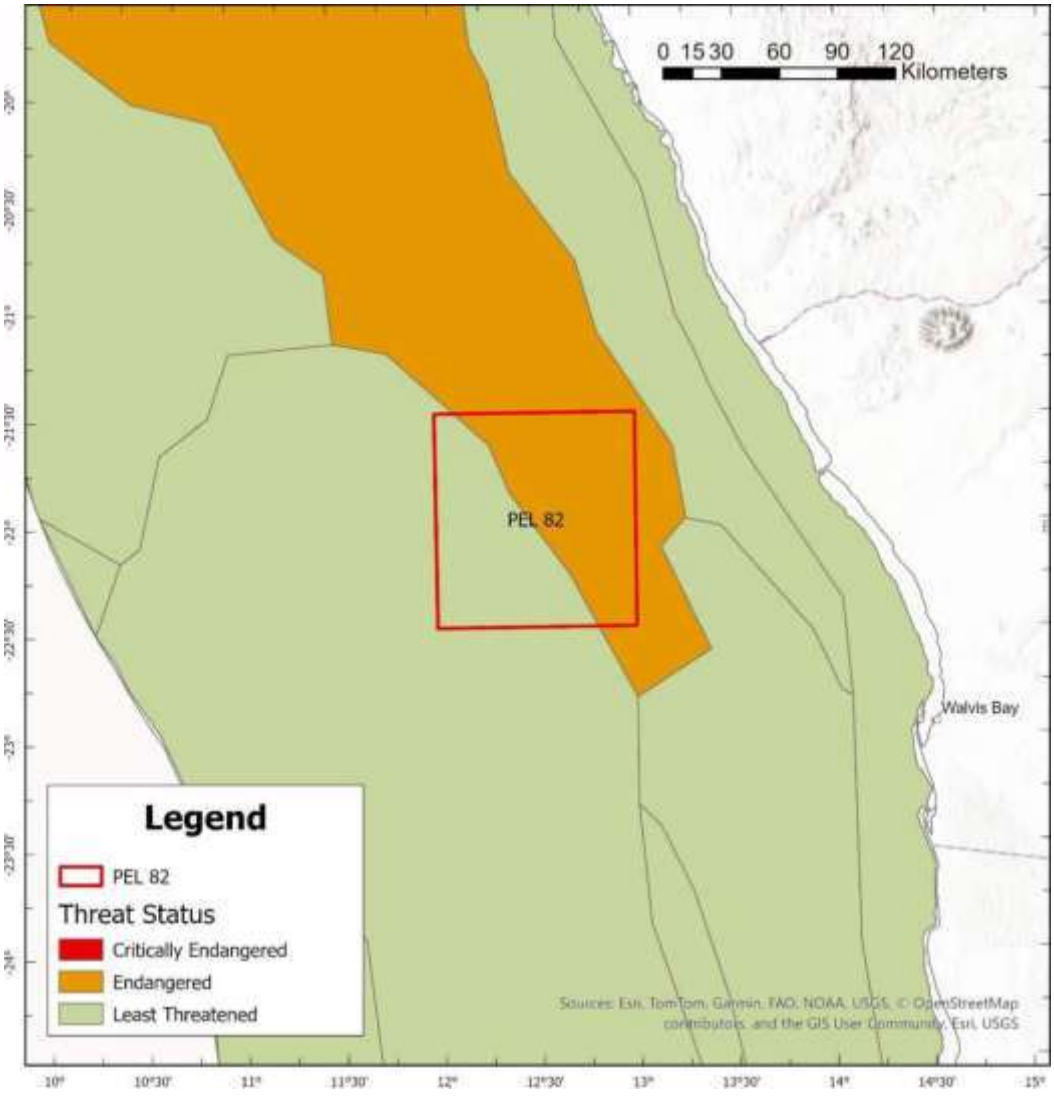
Source: De Cauwer 2007; MFMR 2021

4.3.1 PELAGIC COMMUNITIES

The pelagic communities are typically divided into plankton, pelagic invertebrates and fish, and their main predators, marine mammals (seals, dolphins and whales), seabirds and turtles.

Pelagic habitat types within the broader project area have been defined as 'Least Threatened, 'Endangered' or 'Critically Endangered' depending on their level of protection (Sink et al. 2012; Holness et al. 2014) (Figure 4-15). The north-eastern half of PEL 82 falls within a pelagic habitat considered 'Endangered', with the remainder rated as 'Least Threatened'.

FIGURE 4-15 PEL 82 IN RELATION TO ECOSYSTEM THREAT STATUS FOR OFFSHORE PELAGIC HABITAT TYPES ON THE CENTRAL NAMIBIAN COAST



Source: Holness et al. 2014

4.3.1.1 PLANKTON

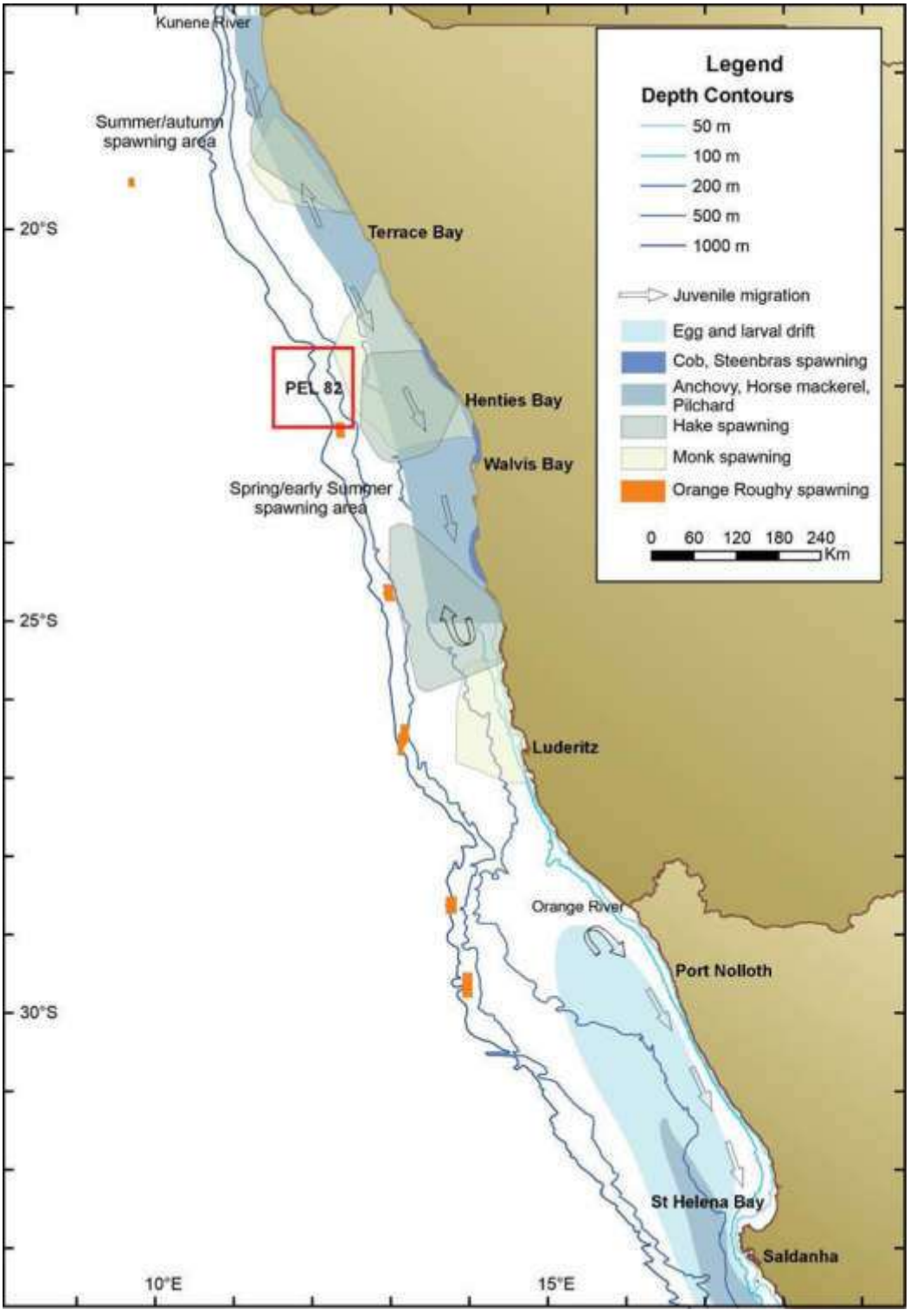
Plankton is particularly abundant in the shelf waters off Namibia, being associated with the upwelling characteristic of the area. Plankton range from single-celled bacteria to jellyfish of 2-m diameter, and include bacterio-plankton, phytoplankton, zooplankton, and ichthyoplankton.

Off the Namibian coastline, phytoplankton are the principle primary producers with mean annual productivity being comparatively high at 2 g C/m2/day (Barnard 1998). The phytoplankton is dominated by diatoms, which are adapted to the turbulent sea conditions. Diatom blooms occur after upwelling events, whereas dinoflagellates are more common in blooms that occur during quiescent periods, since they can grow rapidly at low nutrient concentrations. In the surf zone, diatoms and dinoflagellates are nearly equally important members of the phytoplankton, and some silicoflagellates are also present.

Namibian zooplankton reaches maximum abundance in a belt parallel to the coastline and offshore of the maximum phytoplankton abundance. Samples collected over a full seasonal cycle (February to December) along a 10 to 90-nautical-miles transect offshore Walvis Bay showed that the mesozooplankton (<2 mm body width) community included egg, larval, juvenile and adult stages of copepods, cladocerans, euphausiids, decapods, chaetognaths, hydromedusae and salps, as well as protozoans and meroplankton larvae (Maartens 2003; Hansen et al. 2005). Copepods are the most dominant group making up 70–85% of the zooplankton. Seasonal patterns in copepod abundance, with low numbers during autumn (March–June) and increasing considerably during winter/early summer (July–December), appear to be linked to the period of strongest coastal upwelling in the northern Benguela (May–December), allowing a time lag of about 3–8 weeks, which is required for copepods to respond and build up large populations (Hansen et al. 2005). This suggests close coupling between hydrography, phytoplankton and zooplankton. Timonin et al. (1992) described three phases of the upwelling cycle (quiescent, active and relaxed upwelling) in the northern Benguela, each one characterised by specific patterns of zooplankton abundance, taxonomic composition and inshore-offshore distribution. It seems that zooplankton biomass closely follows the changes in upwelling intensity and phytoplankton standing crop. Consistently higher biomass of zooplankton occurs offshore to the west and northwest of Walvis Bay (Barnard 1998).

Ichthyoplankton constitutes the eggs and larvae of fish. As the preferred spawning grounds of numerous commercially exploited fish species are located off central and northern Namibia (Figure 4-16), their eggs and larvae form an important contribution to the ichthyoplankton in the region. Phytoplankton, zooplankton and ichthyoplankton abundances in the project area will be seasonally high, with diversity increasing in the in the vicinity of the confluence between the Angola and Benguela currents and west of the oceanic front and shelf-break.

FIGURE 4-16 PEL 82 IN RELATION TO MAJOR SPAWNING AREAS IN THE CENTRAL AND NORTHERN BENGUELA REGION

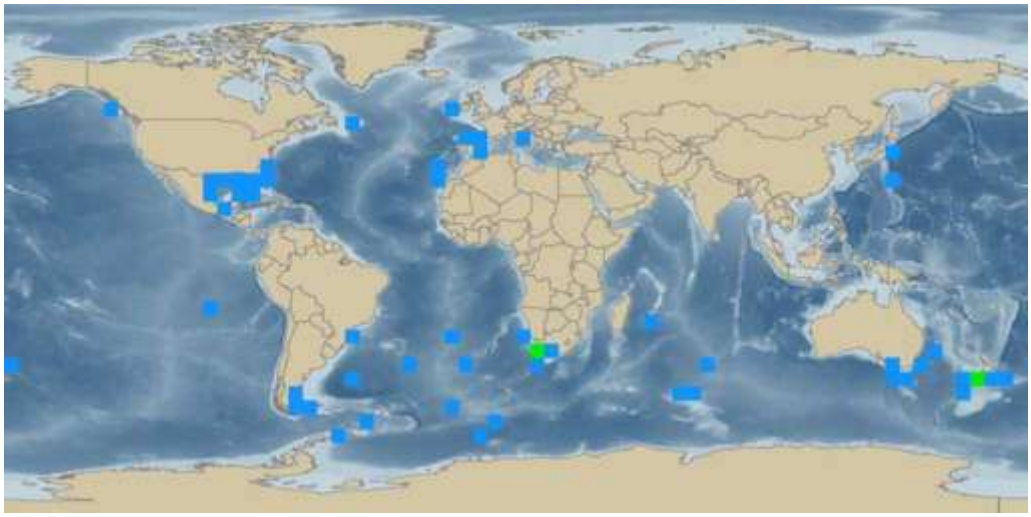


Source: Cruikshank 1990; Hampton 1992; Holness et al. 2014

4.3.1.2 PELAGIC INVERTEBRATES

Pelagic invertebrates that may be encountered in the project area are the giant squid Architeuthis sp. The giant squid is a deep dwelling species usually found near continental and island slopes all around the world's oceans (Figure 4-17) and could thus potentially occur in the pelagic habitats of the project area, although the likelihood of encounter is extremely low. Growing to in excess of 10 m in length, they are the principal prey of the sperm whale, and are also taken by beaked whaled, pilot whales, elephant seals and sleeper sharks. Nothing is known of their vertical distribution, but data from trawled specimens and sperm whale diving behaviour suggest they may span a depth range of 300 – 1,000 m. They lack gas-filled swim bladders and maintain neutral buoyancy through an ammonium chloride solution occurring throughout their bodies.

FIGURE 4-17 DISTRIBUTION OF THE GIANT SQUID.



Note: Blue squares <5 records, green squares 5-10 records
Source: Ocean Biodiversity Information System, 2025

4.3.2 FISH

The surf zone and outer turbulent zone habitats of sandy beaches are considered to be important nursery habitats for marine fishes (Modde 1980; Lasiak 1981; Clark et al. 1994). However, the composition and abundance of the individual assemblages seems to be heavily dependent on wave exposure (Blaber & Blaber 1980; Potter et al. 1990; Clark 1997a, b). Surf zone fish communities off the coast of central Namibia have been studied at Langstrand (McLachlan 1986; Romer 1988), between Mile 9 and Wlotzkasbaken (Pulfrich 2015) and south of Langstrand to the Walvis Bay Naval Base (Laird et al. 2018). Species from the surf zone off Langstrand beach and further south included galjoen (Dichistius capensis), West Coast steenbras (Lithognathus aureti), flathead mullet (Mugil cephalus), southern mullet (Chelon richardsonii) and Cape silverside (Atherina breviceps) (McLachlan 1986; Romer 1988; Laird et al. 2018). The size composition of the catches confirmed that most of these species utilize the surf zone in the area as a nursery. North of Mile 9 the surf zone fish catches were more diverse with silver kob (Argyrosomus

inodorus), Blacktail (Diplodus capensis), elf (Pomatomus saltatrix), bluntnose guitarfish (Rhinobatos blochii) and maned blennie (Scartella emarginata) also being reported (Pulfrich 2015). Off Cape Cross only two species were recorded, these being sandsharks (Rhinobatos annulatus) and West Coast steenbras. Many of these species are important in the catches of recreational and/commercial net fisheries and linefisheries in Namibia (Kirchner et al. 2000; Holtzhausen et al 2001, Stage & Kirchner 2005).

The inshore waters of the central and northern Namibian coastline are also home to a number of bony fish and cartilagenous fish, many of which are popular angling species. Other than those mentioned above, these include the dusky kob Argyrosomus coronus, white steenbras Lithognathus lithognathus, west coast steenbras Lithognathus aureti, copper shark Carcharhinus brachyurus, the spotted gulley shark Triakis megalopterus and the smoothhound Mustelus mustelus (Kirchner et al. 2000; Zeybrandt and Barnes 2001). Warm water species that occur further north include garrick Lichia amia, shad Pomatomus saltatrix and spotted grunter Pomadasys jubelini (Barnard 1998).

A number of the nearshore teleost and chondrichthyan species are considered Endangered', 'Near Threatened' or 'Vulnerable' (Table 4-1).

TABLE 4-1 KEY LINEFISH SPECIES LIKELY TO OCCUR OFF CENTRAL NAMIBIA.

Common Name	Species	IUCN Conservation Status
Teleosts		
Silver kob	Argyrosomus inodorus	Vulnerable
Elf	Pomatomus saltatrix	Vulnerable
West Coast steenbras	Lithognathus aureti	Near threatened
West coast dusky kob	Argyrosomus coronus	Data deficient
Chondrichthyans		
Bronze whaler	Carcharhinus brachyurus	Vulnerable
Six gill shark	Hexanchus griseus	Near threatened
Spotted gullyshark	Triakis megalopterus	Least Concern
Smooth houndshark	Mustelus mustelus	Endangered
Broadnose seven-gill cow shark	Heptranchias perlo	Near threatened

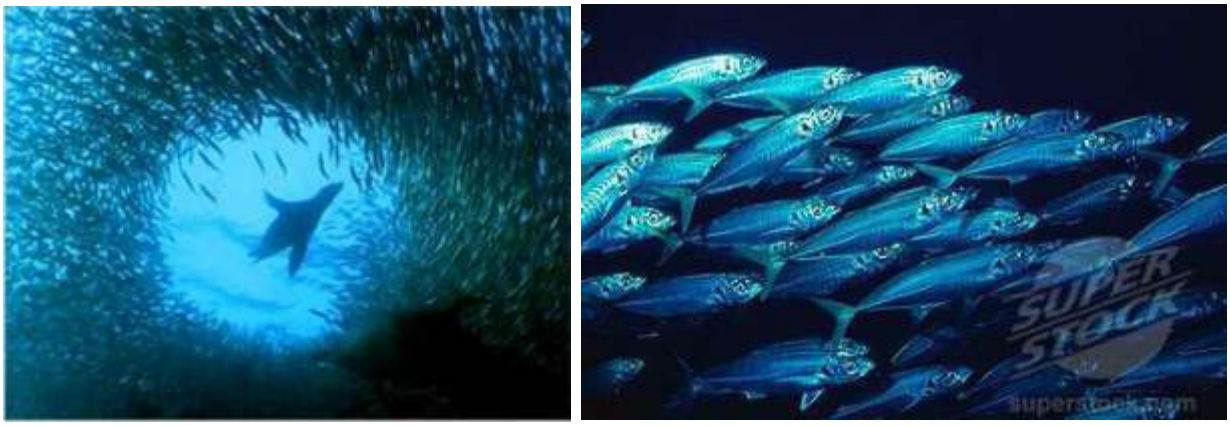
Source: FishBase, 2025

Small pelagic species include the sardine/pilchard (Sadinops ocellatus) (Figure 4-16, left), anchovy (Engraulis capensis), chub mackerel (Scomber japonicus), horse mackerel (Trachurus capensis) (Figure 4-18, right) and round herring (Etrumeus whiteheadi). These species typically occur in mixed shoals of various sizes (Crawford et al. 1987), and generally occur within the 200 m contour, although they may often be found very close inshore, just beyond the surf zone. They spawn downstream of major upwelling centres in spring and summer, and their eggs and larvae are subsequently carried up the coast in

northward flowing waters. Historically, two seasonal spawning peaks for pilchard occurred; the first from October to December in an inshore area between Walvis Bay and Palgrave Point and the second from February to March near the 200 m isobath between Palgrave Point and Cape Frio. However, since the collapse of the pilchard stock, spawning in the south has decreased (Crawford et al. 1987). Recruitment success relies on the interaction of oceanographic events and is thus subject to spatial and temporal variability. Consequently, the abundance of adults and juveniles of these small pelagic fish is highly variable both within and between species. The Namibian pelagic stock is currently considered to be in a critical condition due to a combination of over-fishing and unfavourable environmental conditions as a result of Benguela Niños.

Since the collapse of the pelagic fisheries, jellyfish biomass has increased and the structure of the Benguelan fish community has shifted, making the bearded goby (Sufflogobius bibarbatus) the new predominant prey species. Gobies have a high tolerance for low oxygen and high H2S levels, which enables them to feed on benthic fauna within hypoxic waters during the day, and then move to oxygen-richer pelagic waters at night, when predation pressure is lower, to feed on live jellyfish (Utne-Palm et al. 2010; van der Bank et al. 2011).

FIGURE 4-18 CAPE FUR SEAL PREYING ON A SHOAL OF PILCHARDS (LEFT). SCHOOL OF HORSE MACKEREL (RIGHT) (PHOTOS).



Source: Under water video, 2025; Superstock, 2025

Two species that migrate along the southern African West Coast following the shoals of anchovy and pilchards are snoek *Thyrsites atun* and chub mackerel *Scomber japonicas*. Both these species have been rated as 'Least concern' on the South African national assessment (Sink et al. 2019). While the appearance of chub mackerel along the West coast is highly seasonal, adult snoek are found throughout their distribution range and longshore movement are random and without a seasonal basis (Griffiths 2002). Initially postulated to be a single stock that undergoes a seasonal longshore migration from southern Angola through Namibia to the South African West Coast (Crawford & De Villiers 1985; Crawford et al. 1987), Benguela snoek are now recognised as two separate sub-

populations separated by the Lüderitz upwelling cell (Griffiths 2003). Snoek are voracious predators occurring throughout the water column, feeding on both demersal and pelagic invertebrates and fish. The abundance and seasonal migrations of chub mackerel are thought to be related to the availability of their shoaling prey species (Payne and Crawford 1989).

The fish most likely to be encountered on the shelf, beyond the shelf break and in the offshore waters of PEL 82 are the large migratory pelagic species, including various tunas, billfish and sharks, many of which are considered threatened by the International Union for the Conservation of Nature (IUCN), primarily due to overfishing (Table 4-2). Tuna and swordfish are targeted by high seas fishing fleets and illegal overfishing has severely damaged the stocks of many of these species. Similarly, pelagic sharks, are either caught as bycatch in the pelagic tuna longline fisheries, or are specifically targeted for their fins, where the fins are removed and the remainder of the body discarded.

Species occurring off Namibia include the albacore/longfin tuna Thunnus alalunga (Figure 4-19, right), yellowfin T. albacares, bigeye T. obesus, and skipjack Katsuwonus pelamis tunas, as well as the Atlantic blue marlin Makaira nigricans (Figure 4-19, left), the white marlin Tetrapturus albidus and the broadbill swordfish Xiphias gladius (Payne and Crawford 1989). Large pelagic species migrate throughout the southern oceans, between surface and deep waters (>300 m) and have a highly seasonal abundance in the Benguela. The distributions of these species are dependent on food availability in the mixed boundary layer between the Benguela and warm central Atlantic waters. Concentrations of large pelagic species are also known to occur associated with underwater feature such as canyons and seamounts as well as meteorologically induced oceanic fronts (Penney et al. 1992).

TABLE 4-2 KEY LARGE MIGRATORY PELAGIC FISH LIKELY TO OCCUR IN THE OFFSHORE REGIONS OF THE WEST COAST.

Common Name	Species	IUCN Conservation Status
Tunas		
Southern Bluefin Tuna	Thunnus maccoyii	Endangered
Bigeye Tuna	Thunnus obesus	Vulnerable
Longfin Tuna/Albacore	Thunnus alalunga	Least concern
Yellowfin Tuna	Thunnus albacares	Least concern
Frigate Tuna	Auxis thazard	Least concern
Eastern Little Tuna	Euthynnus affinis	Least concern
Skipjack Tuna	Katsuwonus pelamis	Least concern
Billfish		
Black Marlin	Istiompax indica	Data deficient
Blue Marlin	Makaira nigricans	Vulnerable

Common Name	Species	IUCN Conservation Status
Striped Marlin	Kajikia audax	Least Concern
Sailfish	Istiophorus platypterus	Vulnerable
Swordfish	Xiphias gladius	Near Threatened
Pelagic Sharks		
Oceanic Whitetip Shark	Carcharhinus longimanus	Critically Endangered
Dusky Shark	Carcharhinus obscurus	Endangered
Great White Shark	Carcharodon carcharias	Vulnerable
Shortfin Mako	Isurus oxyrinchus	Endangered
Longfin Mako	Isurus paucus	Endangered
Whale Shark	Rhincodon typus	Endangered
Blue Shark	Prionace glauca	Near Threatened

Until recently Southern Bluefin Tuna was globally assessed as 'Critically Endangered' by the IUCN. Although globally the stock remains at a low state, it is not considered overfished as there have been improvements since previous stock assessments. Consequently, the list of species changing IUCN Red List Status for 2025 now list Southern Bluefin Tuna is globally 'Endangered'.
Source: FishBase, 2025; IUCN, 2025

FIGURE 4-19 LARGE MIGRATORY PELAGIC FISH SUCH AS BLUE MARLIN (LEFT) AND LONGFIN TUNA (RIGHT) OCCUR IN OFFSHORE WATERS

Source: samathatours and osfimages, 2025

A number of species of pelagic sharks are also known to occur off the southern African West Coast, including blue Prionace glauca, short-fin mako Isurus oxyrinchus and oceanic whitetip sharks Carcharhinus longimanus. Occurring throughout the world in warm temperate waters, these species are usually found further offshore. Great whites Carcharodon carcharias and whale sharks Rhincodon typus may also be encountered in coastal and offshore areas, although the latter occurs more frequently along the South and East coasts. The recapture of a juvenile blue shark off Uruguay, which had been tagged off the Cape of Good Hope, supports the hypothesis of a single blue shark stock in

the South Atlantic (Hazin 2000; Montealegre-Quijano & Vooren 2010) and Indian Oceans (da Silva et al. 2010). Using the Benguela drift in a north-westerly direction, it is likely that juveniles from the parturition off the south-western Cape would migrate through the project area en route to South America (da Silva et al. 2010).

The shortfin mako inhabits offshore temperate and tropical seas worldwide. It can be found from the surface to depths of 500 m, and as one of the few endothermic sharks is seldom found in waters <16 °C (Compagno 2001; Loefer et al. 2005). As the fastest species of shark, shortfin makos have been recorded to reach speeds of 40 km/h with burst of up to 74 km/h, and can jump to a height of 9 m. Most makos caught by longliners off South Africa are immature, with reports of juveniles and sub-adults sharks occurring near the edge of the Agulhas Bank and off the South Coast between June and November (Groeneveld et al. 2014), whereas larger and reproductively mature sharks were more common in the inshore environment along the East Coast (Foulis 2013).

While Southern Bluefin Tuna may transit Namibian waters, there is limited data on its specific status in the region. Regional conservation efforts, such as those led by the Benguela Current Commission, aim to address broader marine resource sustainability, which may indirectly benefit the species.

Whale sharks are regarded as a broad ranging species typically occurring in offshore epipelagic areas with sea surface temperatures of 18–32°C (Eckert & Stewart 2001). Adult whale sharks reach an average size of 9.7 m and 9 tonnes, making them the largest non-cetacean animal in the world. They are slow-moving filter-feeders and therefore particularly vulnerable to ship strikes (Rowat 2007). Although primarily solitary animals, seasonal feeding aggregations occur at several coastal sites all over the world, those closest to the project area being off Sodwana Bay in KwaZulu Natal (KZN) (Cliff et al. 2007). Satellite tagging has revealed that individuals may travel distances of tens of 1 000s of kms (Eckert & Stewart 2001; Rowat & Gore 2007; Brunnschweiler et al. 2009). On the southern African West Coast their summer and winter distributions are centred around the Orange River mouth and further south between Cape Columbine and Cape Point (Harris et al. 2022). The likelihood of an encounter in the offshore waters of PEL 82 is relatively low.

Of the species listed above, the Oceanic Whitetip is listed as ‘Critically Endangered’, blue shark is listed as ‘Near threatened’, and the short-fin and long-fin mako, Dusky and whale shark as ‘Endangered’ on the International Union for Conservation of Nature (IUCN). The whale shark and shortfin mako are listed in Appendix II (species in which trade must be controlled in order to avoid utilization incompatible with their survival) of CITES (Convention on International Trade in Endangered Species) and Appendix I and/or II of the Bonn Convention for the Conservation of Migratory Species (CMS). The whale shark is also listed as ‘vulnerable’ in the South African List of Marine Threatened or Protected Species (TOPS) as part of South Africa’s National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA).

4.3.3 TURTLES

Five of the eight species of turtle worldwide occur off Namibia (Bianchi et al. 1999). The Leatherback (Dermochelys coriacea) turtle (Figure 4-20, left) is occasionally encountered in the offshore waters off Namibia. Observations of Green (Chelonia mydas), Loggerhead (Caretta caretta) (Figure 4-20, right), Hawksbill (Eretmochelys imbricata) and Olive Ridley (Lepidochelys olivacea) turtles in the area are rare. Loggerhead turtles have been reported by marine mammal observers (MMOs) during seismic operations in PEL 82. The leatherback turtle may also be encountered, although abundance in the study area is expected to be low.

FIGURE 4-20 LEATHERBACK (LEFT) AND LOGGERHEAD TURTLES (RIGHT) OCCUR ALONG THE COAST OF CENTRAL NAMIBIA

Source: Ketos Ecology, 2009

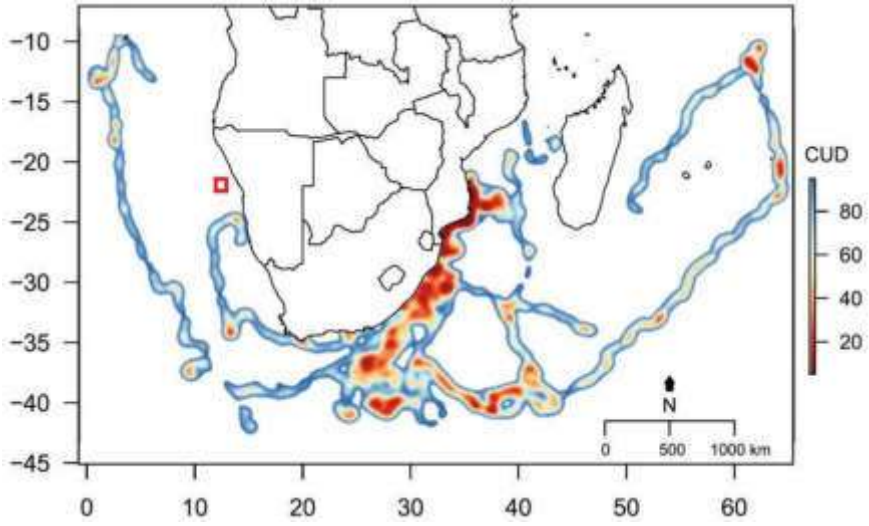
The Benguela ecosystem is increasingly being recognized as a potentially important feeding area for leatherback turtles from several globally significant nesting populations in the south Atlantic (Gabon, Brazil) and south-east Indian Ocean (South Africa) (Lambardi et al. 2008, Elwen & Leeney 2011). Leatherback turtles from the east South Africa population have been satellite tracked swimming around the west coast of South Africa and remaining in the warmer waters west of the Benguela ecosystem (Lambardi et al. 2008, Elwen & Leeney 2011; SASTN 2011[1]).

Leatherback turtles inhabit deeper waters and are considered a pelagic species, travelling the ocean currents in search of their prey. While hunting they may dive to over 600 m and remain submerged for up to 54 minutes (Hays et al. 2004). Their abundance in the study area is unknown but expected to be low. Although they tend to avoid nearshore areas, they may be encountered in Walvis Bay and off Swakopmund between October and April when prevailing north wind conditions result in elevated seawater temperatures (Figure 4-21).

1 SASTN Meeting – Second meeting of the South Atlantic Sea Turtle Network, Swakopmund, Namibia, 24-30 July 2011.

After completion of the nesting season (October to January) both Leatherbacks and Loggerheads undertake long-distance migrations to foraging areas. Loggerhead turtles are coastal specialists keeping inshore, hunting around reefs, bays and rocky estuaries along the African South and East Coast, where they feed on a variety of benthic fauna including crabs, shrimp, sponges, and fish. In the open sea their diet includes jellyfish, flying fish, and squid (www.oceansafrica.com/turtles.htm). Satellite tagging of loggerheads suggests that they seldom occur west of Cape Agulhas (Harris et al. 2018; Robinson et al. 2019). A green turtle and loggerhead turtle recently released on the Cape Peninsula by the Two Oceans Aquarium has, however stayed in the West Coast waters, spending time in St Helena Bay and travelling up the Namaqualand coast before heading northwards into Namibian waters to north of Walvis Bay, suggesting that occurrence in West Coast waters does arise.

FIGURE 4-21 PEL 82 (RED POLYGON) IN RELATION TO THE MIGRATION CORRIDORS OF LEATHERBACK TURTLES IN THE SOUTH-WESTERN INDIAN OCEAN



Relative use (CUD, cumulative utilization distribution) of corridors is shown through intensity of shading: light, low use; dark, high use
Source: Harris et al. 2018.

Loggerheads and leatherbacks nest along the sandy beaches of the northeast coast of KwaZulu Natal, as well as southern Mozambique during summer months. Loggerhead and leatherback females come ashore to nest from October to March, with peak nesting for both species occurring in December – January (Le Gouvello et al. 2020). Hatchlings emerge from their nests from mid-January to mid-March. Those hatchlings that successfully escape predation en route to the sea, enter the surf and are carried ~10 km offshore by coastal rip currents or swim actively offshore for 24-48 hours (frenzy period) to reach the Agulhas Current (Hughes 1974). Although they can actively swim to influence their dispersal trajectories (Scott et al. 2014; Putman & Mansfield 2015), hatchlings are not powerful swimmers and will primarily drift south-westwards in the current. The Agulhas Current migration corridor will therefore be very active with

migrating sea turtles between January and April (Harris et al. 2018), some of which may be distributed along the West Coast through mass transport of Agulhas Current water into the southeast Atlantic by warm core rings. Despite their extensive distributions and feeding ranges, the numbers of adult and neonate turtles encountered in PEL 82 may therefore be seasonally high.

Turtles marked with titanium flipper tags have revealed that South African loggerheads and leatherbacks have a remigration interval of 2 – 3 years, migrating to foraging grounds throughout the Southwestern Indian Ocean (SWIO) as well as in the eastern Atlantic Ocean. They follow different post-nesting migration routes (Hughes et al. 1998; Luschi et al. 2006). Loggerheads use one of 3 migration corridors between their nesting and foraging grounds of which the coast-associated Mozambique Corridor is the most commonly used (>80% of the population). Leatherbacks largely follow the same corridors as the loggerheads, with most riding the Agulhas Current southward to forage in high seas regions of the Agulhas Plateau (Hughes et al. 1998; Luschi et al. 2003b; Luschi et al. 2006), at which point they either swim east following the Agulhas Retroflection (Agulhas-Retroflection Corridor) as far north as the Mascarene Plateau or enter the Benguela Current to migrate into the southeastern Atlantic, as far north as central Angola (Agulhas-Benguela Corridor) (Figure 4-21) (Lambardi et al. 2008; de Wet 2013; Harris et al. 2018).

Ocean circulation models and numerical dispersal simulations have recently provided insights into the cryptic 'lost years' of neonate turtles (Hamann et al. 2011; Putman et al. 2012; Putman & Naro-Maciel 2013; Le Gouvello et al. 2020; Putman et al. 2020; DuBois et al. 2021; Le Gouvello et al. 2024). After ~10 years, juvenile loggerheads return to coastal areas to feed on crustaceans, fish and molluscs and subsequently remain in these neritic habitats (Hughes 1974). In contrast, leatherbacks remain in pelagic waters feeding primarily on jellyfish until they become sexually mature and return to coastal regions to breed. While hunting they may dive to over 600 m and remain submerged for up to 54 minutes (Hays et al. 2004).

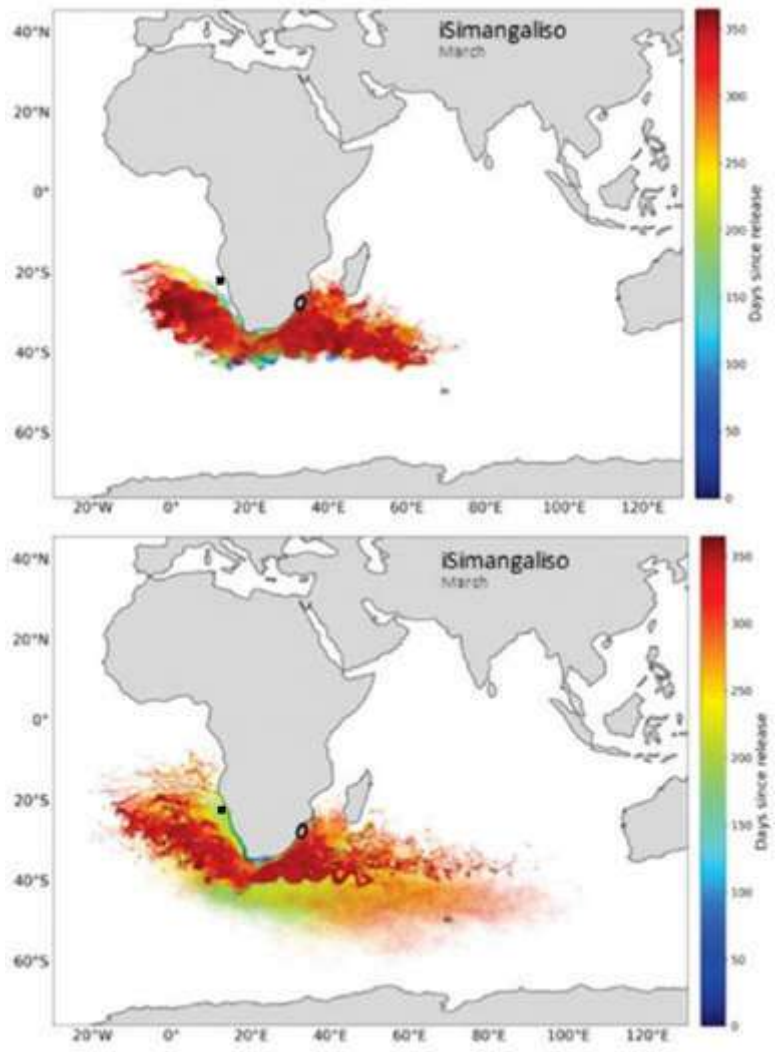
Leatherback Turtles are listed as 'Vulnerable' worldwide by the IUCN and are in the highest categories in terms of need for conservation in CITES (Convention on International Trade in Endangered Species), and CMS (Convention on Migratory Species).

Loggerhead and Olive Ridley turtles are globally listed as 'Vulnerable' whereas Hawksbill are globally listed as 'Critically Endangered', and Green turtles as 'Endangered'. The most recent conservation status, which assessed the species on a scale of Regional Management Units (RMU)[2], is provided in Table 4-3. From this it is evident that leatherback and loggerhead turtles, the two species most likely to be encountered in the licence area, are rated as 'Critically Endangered' and 'Near Threatened', respectively in the Southwest Indian RMU. Although not a signatory of CMS, Namibia has endorsed and signed a CMS International Memorandum of Understanding specific to the conservation of

2 RMUs organise marine turtles that might be on independent evolutionary trajectories within regional entities into units of protection above the level of nesting populations, but below the level of species.

marine turtles. Namibia is thus committed to conserve these species at an international level.

FIGURE 4-22 DISPERSAL MAPS SHOWING TRAJECTORIES OF 5,000 PARTICLES RELEASED FROM THE RESPECTIVE NESTING SITES (WHITE CIRCLES) IN MARCH 2018 FOR LOGGERHEADS (TOP) AND LEATHERBACKS (BOTTOM)



Colours (blue to red) indicate the number of days since release. PEL 82 is depicted as a small black square.
Source: Le Gouvelle et al. 2020

TABLE 4-3 GLOBAL AND REGIONAL CONSERVATION STATUS OF THE TURTLES OCCURRING OFF THE SOUTHERN AFRICAN COASTLINE SHOWING VARIATION DEPENDING ON THE LISTING USED.

Listing	IUCN Red List	Population (RMU)	Sub-Regional / National (RSA)	NEMBA TOPS (2007)	Hughes & Nel (2014)
Leatherback	V (2013)	CR	E	E	CR

Listing	IUCN Red List	Population (RMU)	Sub-Regional / National (RSA)	NEMBA TOPS (2007)	Hughes & Nel (2014)
Loggerhead	CR (2013)	E	NT	NT	NT
Green	CR	V	CR (2008)	CR (2008)	E
Hawksbill	E	NT	NT	NT	DD
Olive Ridley	V (2017)	CR	V (2008)	V (2008)	*

NT – Near Threatened V – Vulnerable E – Endangered CR – Critically Endangered
DD – Data Deficient * Not yet assessed

4.3.4 MARINE MAMMALS

Marine mammals occurring off the central Benguela ecosystem include cetaceans (whales and dolphins) and seals. The cetacean fauna of central Namibia comprises 33 species of whales and dolphins known (historic sightings or strandings) or likely (habitat projections based on known species parameters) to occur here (Table 4-4), and their known seasonality (Table 4-5). Apart from the resident species such as the endemic Heaviside's dolphin, bottlenose and dusky dolphins, Namibia's waters also host species that migrate between Antarctic feeding grounds and warmer low latitude breeding grounds, as well as species with a circum-global distribution. The Namibian shelf and deeper waters have been poorly studied with most available information in deeper waters (>200 m) arising from historic whaling records, although data from marine mammal observers and passive acoustic monitoring is improving knowledge in recent years. Current information on the distribution, population sizes and trends of most cetacean species occurring in Namibian waters is lacking. Information on smaller cetaceans in deeper waters (>100 m) is particularly poor and the precautionary principal must be used when considering possible encounters with cetaceans in this area.

Although the location of PEL 82 can be considered to be truly within the Benguela Ecosystem, the warmer waters that occur more than ~100 km offshore provide an entirely different habitat, that despite the relatively high latitude may host some species associated with the more tropical and temperate parts of the Atlantic such as rough toothed dolphins, striped dolphins, Pan-tropical spotted dolphins and short finned pilot whales.

The distribution of cetaceans in Namibian waters can largely be split into those associated with the continental shelf and those that occur in deep, oceanic water. Importantly, species from both environments may be found in the shelf edge area (200-1,000 m) making this the most species-rich area for cetaceans. Cetacean density on the continental shelf is usually higher than in pelagic waters as species associated with the pelagic environment tend to be wide ranging across 1,000s of kilometers. The most common species within the broader project area (in terms of likely encounter rate not total population sizes) are likely to be the humpback whale and pilot whale.

Cetaceans comprise two basic taxonomic groups, the mysticetes (filter feeding whales with baleen) and the odontocetes (predatory whales and dolphins with teeth). The term 'whale' is used to describe cetaceans larger than approximately 4 m in length, in both these groups and is taxonomically meaningless (e.g. the killer whale and pilot whale are members of the Odontocetes and the family Delphinidae and are thus dolphins, not whales). Due to large differences in their size, sociality, communication abilities, ranging behaviour and principally, acoustic behaviour, these two groups are considered separately.

From MMO sightings (Figure 4-23) it is evident that many species do occur as far offshore as PEL 82, particularly sei, sperm, fin, pilot and humpback whales.

The South African red list of cetacean fauna was updated in 2016 and global reviews are underway. As the Namibian list has not been updated recently the South African red list ratings are used as the most up to date. Of the 33 species listed, one is 'critically endangered', two are 'endangered' and one is considered 'vulnerable'. Altogether 11 species are listed as 'data deficient', underlining how little is known about cetaceans, their distributions and population trends in Namibian waters. A review of the distribution and seasonality of the key cetacean species likely to be found within the broader project area is provided below, based on information provided by the Sea Search - Namibian Dolphin Project (NDP), which has been conducting research in Namibian waters since 2008. The NDP holds the most up-to-date data of cetacean occurrence and distribution since whaling times, with the records including a total database of over 7,000 records with more than 1,000 sightings made by MMOs on seismic or mining vessels and fisheries observers operating in shelf or pelagic waters.

4.3.4.1 MYSTICETE (BALEEN) WHALES

Most mysticetes whales belong to the Balaenidae family, including blue, fin, sei, Antarctic minke, dwarf minke, humpback, and Bryde's whales in the study area (Table 4-4). These species primarily inhabit pelagic waters, migrating between high-latitude feeding grounds and lower-latitude breeding grounds, resulting in either unimodal or bimodal seasonal patterns in Namibian waters. Migration patterns vary, influencing occurrence based on geographic features.

Sei whales, with limited data from Namibian waters, historically migrated through the region, likely showing bimodal peaks in abundance. There is no current information on the abundance or distribution of this species in the region, but a recent sighting of a mother and calf in March 2012 (NDP unpublished data) and a stranding in Walvis Bay in July 2013 (NDP unpublished data) confirms their contemporary and probably year round occurrence on the Namibian continental shelf and beyond. Encounters in the project area are likely to occur.

Bryde's whales consist of two distinct populations: an offshore population that migrates between equatorial west Africa and western South Africa, peaking in abundance from January to March, and a non-migratory inshore population. Sightings of Bryde's whales

were made in the vicinity of PEL 82 (Figure 4-23). Encounters in the project area are thus likely to occur.

TABLE 4-4 CETACEANS OCCURRENCE OFF THE SOUTHERN NAMIBIAN COAST

Common Name	Species	Hearing Frequency	Shelf (<200 m)	Offshore (>200 m)	Seasonality	RSA Regional Assessment	IUCN Global Assessment
Delphinids							
Dusky dolphin	Lagenorhynchus obscurus	HF	Yes (0-800 m)	No	Year round	Least Concern	Least Concern
Heaviside's dolphin	Cephalorhynchus heavisidii	VHF	Yes (0-200 m)	No	Year round	Least Concern	Near Threatened
Common bottlenose dolphin	Tursiops truncatus	HF	Yes	Yes	Year round	Least Concern	Least Concern
Common dolphin	Delphinus delphis	HF	Yes	Yes	Year round	Least Concern	Least Concern
Southern right whale dolphin	Lissodelphis peronii	HF	Yes	Yes	Year round	Least Concern	Least Concern
Striped dolphin	Stenella coeruleoalba	HF	No	Yes	Year round	Least Concern	Least Concern
Pantropical spotted dolphin	Stenella attenuata	HF	Edge	Yes	Year round	Least Concern	Least Concern
Long-finned pilot whale	Globicephala melas	HF	Edge	Yes	Year round	Least Concern	Least Concern
Short-finned pilot whale	Globicephala macrorhynchus	HF	Edge	Yes	Year round	Least Concern	Least Concern
Rough-toothed dolphin	Steno bredanensis	HF	No	Yes	Year round	Not Assessed	Least Concern
Killer whale	Orcinus orca	HF	Occasional	Yes	Year round	Least Concern	Data deficient
False killer whale	Pseudorca crassidens	HF	Occasional	Yes	Year round	Least Concern	Near Threatened
Pygmy killer whale	Feresa attenuata	HF	No	Yes	Year round	Least Concern	Least Concern

Common Name	Species	Hearing Frequency	Shelf (<200 m)	Offshore (>200 m)	Seasonality	RSA Regional Assessment	IUCN Global Assessment
Risso's dolphin	Grampus griseus	HF	Yes (edge)	Yes	Year round	Data Deficient	Least Concern
Sperm whales							
Pygmy sperm whale	Kogia breviceps	VHF	Edge	Yes	Year round	Data Deficient	Least Concern
Dwarf sperm whale	Kogia sima	VHF	Edge	Yes	Year round	Data Deficient	Least Concern
Sperm whale	Physeter macrocephalus	HF	Edge	Yes	Year round	Vulnerable	Vulnerable
Beaked whales							
Cuvier's	Ziphius cavirostris	HF	No	Yes	Year round	Data Deficient	Least Concern
Arnoux's	Berardius arnuxii	HF	No	Yes	Year round	Data Deficient	Least Concern
Southern bottlenose	Hyperoodon planifrons	HF	No	Yes	Year round	Least Concern	Least Concern
Layard's	Mesoplodon layardii	HF	No	Yes	Year round	Data Deficient	Least Concern
True's	Mesoplodon mirus	HF	No	Yes	Year round	Data Deficient	Least Concern
Gray's	Mesoplodon grayi	HF	No	Yes	Year round	Data Deficient	Least Concern
Blainville's	Mesoplodon densirostris	HF	No	Yes	Year round	Data Deficient	Least Concern
Baleen whales							
Antarctic Minke	Balaenoptera bonaerensis	LF	Yes	Yes	>Winter	Least Concern	Near Threatened
Dwarf minke	B. acutorostrata	LF	Yes	Yes	Year round	Least Concern	Least Concern
Fin whale	B. physalus	LF	Yes	Yes	MJJ & ON	Endangered	Vulnerable

Common Name	Species	Hearing Frequency	Shelf (<200 m)	Offshore (>200 m)	Seasonality	RSA Regional Assessment	IUCN Global Assessment
Blue whale (Antarctic)	B. musculus intermedia	LF	No	Yes	Winter peak	Critically Endangered	Critically Endangered
Sei whale	B. borealis	LF	Yes	Yes	MJ & ASO	Endangered	Endangered
Bryde's (inshore)	B. edeni (subspp)	LF	Yes	Edge	Year round	Vulnerable	Least Concern
Bryde's (offshore)	B. edeni	LF	Edge	Yes	Summer (JFM)	Data Deficient	Least Concern
Pygmy right	Caperea marginata	LF	Yes	?	Year round	Least Concern	Least Concern
Humpback sp.	Megaptera novaeangliae	LF	Yes	Yes	Year round, SONDJF	Least Concern	Least Concern
Humpback B2 population	Megaptera novaeangliae	LF	Yes	Yes	Spring/Summer peak ONDJF	Vulnerable	Not Assessed
Southern Right	Eubalaena australis	LF	Yes	No	Year round, ONDJFMA	Least Concern	Least Concern

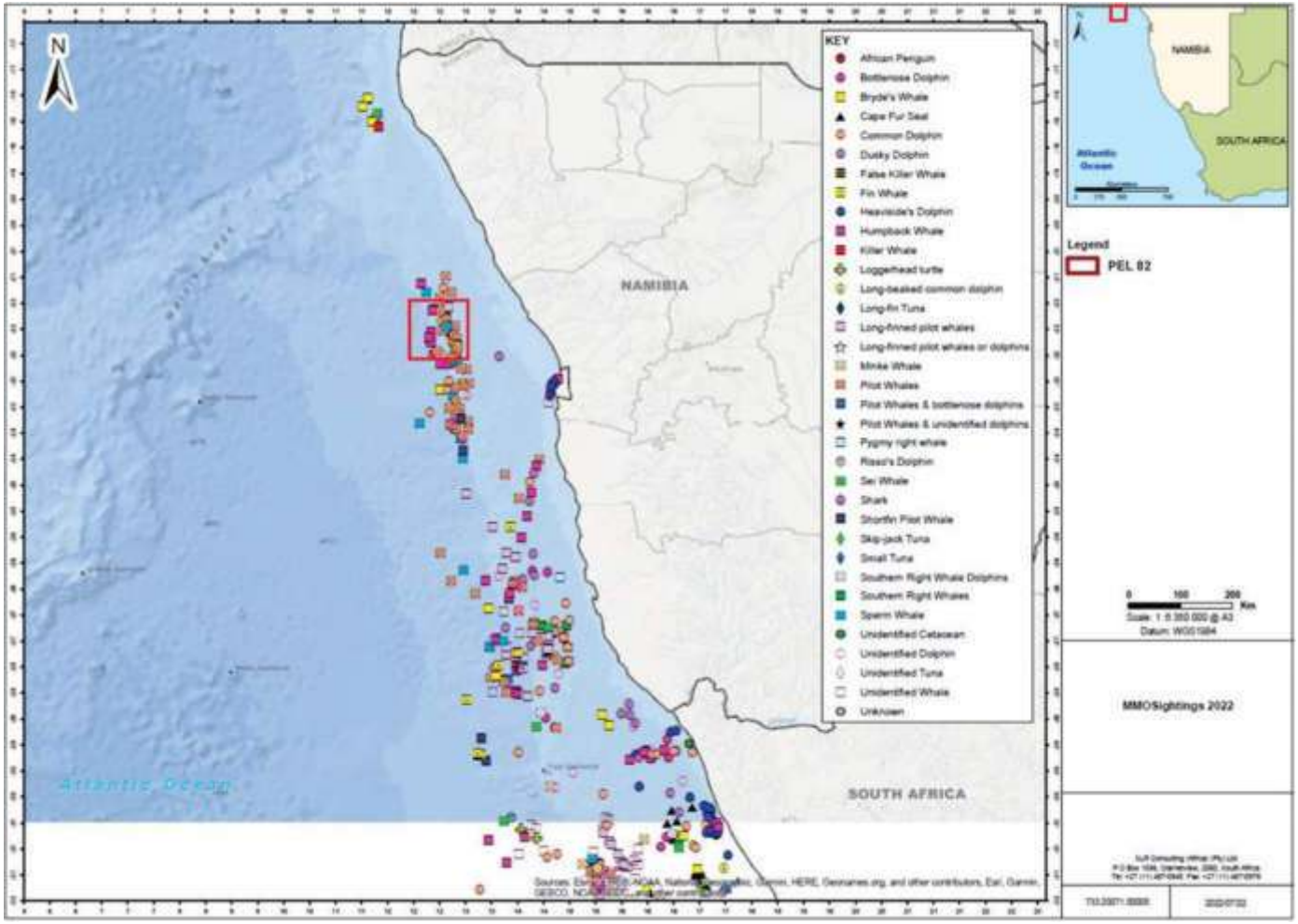
Marine animals do not hear equally well at all frequencies within their functional hearing range. Based on the hearing range and sensitivities, Southall et al. (2019) have categorised noise sensitive marine mammal species into six underwater hearing groups: low-frequency (LF), high-frequency (HF) and very high-frequency (VHF) cetaceans, Sirenians (SI), Phocid carnivores in water (PCW) and other marine carnivores in water (OCW).
Source: Findlay et al. (1992); Best (2007); Weir (2011); Dr J-P Roux, (MFMR pers comm); unpublished records held by the Namibian Dolphin Project, which includes sightings from fisheries observers and Marine Mammal Observers (MMOs) working on seismic surveys in the area (de Rock et al. 2019); Child et al. 2016; IUCN, 2025

TABLE 4-5 SEASONALITY OF BALEEN WHALES IN THE BROADER PROJECT AREA

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Bryde's Inshore	L	L	L	L	L	L	L	L	L	L	L	L
Bryde's Offshore	H	H	H	L	L	L	L	L	L	L	L	L
Sei	L	L	L	L	H	H	L	H	H	H	L	L
Fin	M	M	M	H	H	H	M	H	H	H	M	M
Blue	L	L	L	L	L	H	H	H	L	M	L	L
Minke	M	M	M	H	H	H	M	H	H	H	M	M
Humpback	M	M	L	L	L	H	H	M	M	L	M	H
Southern Right	H	M	L	L	L	H	H	H	M	M	H	H
Pygmy right	H	H	H	M	L	L	L	L	L	L	M	M

Data from multiple sources, predominantly commercial catches (Best 2007 and other sources) and data from stranding events (NDP unpubl data). Values of high (H), Medium (M) and Low (L) are relative within each row (species) and not comparable between species.

FIGURE 4-23 PEL 82 IN RELATION TO THE DISTRIBUTION AND MOVEMENT OF CETACEANS SIGHTED BY MMOS WITHIN THE NAMIBIAN EEZ, COLLATED BETWEEN 2001 AND 2022.



Source: SLR MMO DATABASE, 2022

Fin whales were historically caught off South Africa and Namibia, with catch data indicating northward migration for breeding (May-June) before returning to Antarctic feeding grounds (August-October). The breeding ground location remains unknown. Some juveniles may feed year-round in deeper waters. Four strandings occurred between Walvis Bay and the Kunene River in the last decade. Groups of 5-8 whales were observed near Lüderitz in April, May 2014, and January 2015, indicating their presence in Namibian waters and potential feeding in upwelling areas. Most sightings and strandings happen in late summer (April-May), aligning with whaling data. Encounters in the project area are likely. Sightings of fin whales were made in the vicinity of PEL 82 (Figure 4-23). Encounters in the project area are thus likely to occur.

Antarctic blue whales were historically caught in high numbers during commercial whaling activities, with a single peak in catch rates during July in Walvis Bay, Namibia and Namibe, Angola suggesting that in the eastern South Atlantic these latitudes are close to the northern migration limit for the species (Best 2007). Evidence of blue whale presence off Namibia is rapidly increasing. Recent acoustic detections of blue whales in the Antarctic peak between December and January (Tomisch et al. 2016) and in northern Namibia between May and July (Thomisch 2017) supporting observed timing from whaling records. Several recent (2014-2015) sightings of blue whales have occurred during seismic surveys off the southern part of Namibia in water >1,000 m deep confirming their current existence in the area and occurrence in Autumn months. Encounters in the project area may occur.

wo minke whale species exist in the Southern Hemisphere: the Antarctic minke whale and the dwarf minke whale, both found in the Benguela. Antarctic minke whales migrate from the Southern Ocean to tropical/temperate waters for breeding, with some juveniles remaining year-round. They are regularly sighted in Lüderitz Bay during summer and have been confirmed in Namibia. Passive acoustic monitoring indicates their presence from June to August and November to December. Dwarf minke whales, with a more temperate range, do not go further south than 60-65°S and are often found closer to shore, occasionally within 2 km of South Africa. Both species are generally solitary, with low densities in the area, but encounters may occur. Both species are generally solitary, and densities are likely to be low in the licence area, but encounters may occur.

The pygmy right whale is the smallest of the baleen whales reaching only 6 m total length as an adult (Best 2007). The species is typically associated with cool temperate waters between 30°S and 55°S and records in Namibia there are the northern most for the species with no confirmed records north of Walvis Bay (Leeney et al. 2013).

The most abundant baleen whales in the Benguela are southern right whales and humpback whales (Figure 4-24). In the last decade, both species have been increasingly observed to remain on the west coast of South Africa well after the 'traditional' South African whale season (June - November) into spring and summer (October - February) where they have been observed feeding in upwelling zones, especially off Saldanha and St Helena Bays (Barendse et al. 2011; Mate et al. 2011). Increasing numbers of summer records of both species, suggest that animals may also be feeding in upwelling areas off Namibia, especially the southern half of the country near the Lüderitz upwelling cell (NDP unpubl. data) and will therefore occur in or pass through the project area.

The southern African population of southern right whales historically extended from southern Mozambique (Maputo Bay) to southern Angola (Baie dos Tigres) and is considered to be a

single population within this range (Roux et al. 2015). The most recent abundance estimate for this population is available for 2017 which estimated the population at ~6 100 individuals including all age and sex classes, and still growing at ~6.5% per annum (Brandaõ et al. 2017). When the population numbers crashed, the range contracted down to just the south coast of South Africa, but as the population recovers, it is repopulating its historic grounds including Namibia (Roux et al. 2001, 2015; de Rock et al. 2019) and Mozambique (Banks et al. 2011).

FIGURE 4-24 THE SOUTHERN RIGHT WHALE EUBALAENA AUSTRALIS (LEFT) AND THE HUMPBACK WHALE MEGAPTERA NOVAEANGLIAE (RIGHT)

The whales migrate along the coastal and shelf waters of southern Africa, including Namibia.

Source: Namibian Dolphin Project, 2025

Southern right whales are seen regularly in Namibian coastal waters (<3 km from shore), especially in the southern half of the Namibian coastline (Roux et al. 2001, 2011). Right whales have been recorded in Namibian waters in all months of the year (J-P Roux pers comm) but with numbers peaking in winter (June - August). A secondary peak in summer (November - January) also occurs, probably associated with animals feeding off the west coast of South Africa performing exploratory trips into southern Namibia (NDP unpubl. data). Notably, all available records have been very close to shore with only a few out to 100 m depth, so they are unlikely to be encountered in PEL 82.

Most humpback whales in the Benguela migrate to breeding grounds off tropical West Africa, particularly between Angola and the Gulf of Guinea. Data from Namibia indicates a larger northward migration than southward, with whales striking the coast north of St Helena Bay, leading to increased density toward Angola but no defined migration corridor. During southward migration, some whales follow the Walvis Ridge to feeding grounds, while others take a coastal route, especially mother-calf pairs. There is no clear corridor, as whales are dispersed across shelf and deeper waters. Regular sightings in Namibia suggest summer feeding occurs there, with the West African breeding population estimated at over 9,000 in 2005, likely increasing by 5% annually since then. Humpback whales are thus likely to be the most frequently encountered baleen whale in PEL 82, ranging from the coast out beyond the shelf, with year-round presence but numbers peaking in June – July (northern migration) and a smaller peak with the southern breeding migration around September – October but with regular encounters until February associated with subsequent feeding in the Benguela ecosystem.

FIGURE 4-25 PEL 82 (RED POLYGON) IN RELATION TO 'BLUE CORRIDORS' OR 'WHALE SUPERHIGHWAYS' FIGURE HOWING TRACKS OF HUMPBACK WHALES (ORANGE) AND SOUTHERN RIGHT WHALES (GREEN) BETWEEN SOUTHERN AFRICA AND THE SOUTHERN OCEAN FEEDING GROUNDS

Source: Johnson et al. 2022

4.3.4.2 ODONTOCETE (TOOTHED) WHALES

The Odontoceti are a varied group of animals including the dolphins, porpoises, beaked whales and sperm whales. Species occurring within the broader project area display a diversity of features, for example their ranging patterns vary from extremely coastal and highly site specific to oceanic and wide ranging. Those in the region can range in size from 1.6 m long (Heaviside's dolphin) to 17 m (bull sperm whale).

Sperm whale data in southern Africa is mainly from pre-1985 commercial whaling (Best 2007). They are the largest toothed whales, with a complex social structure. Typically found in waters deeper than 1,000 m, they occasionally inhabit shallower areas (500-200 m). Globally abundant (Whitehead 2002), no local population estimates exist. Seasonal patterns show larger males are more common in winter, while females peak in autumn (Best 2007). They are frequently sighted during offshore seismic surveys between Angola and the Gulf of Guinea, mainly in depths over 780 m, with sightings peaking from April to June (Weir 2011). Recent sightings near Tripp Sea Mount, Namibia, have been recorded (NDP Unpublished data, De Rock

et al. 2019). Their deep feeding habits make visual detection difficult, but acoustic monitoring can detect their echolocation clicks. Sperm whales in the project area are likely to be encountered in deeper waters (>500 m), predominantly in the winter months (April - October).

There are almost no data available on the abundance, distribution, or seasonality of the smaller odontocetes (including the beaked whales and dolphins) known to occur in oceanic waters (greater than 200 m) off the Namibian continental shelf (refer to Table 4-4). Beaked whales are all considered to be true deep-water species, usually recorded in waters in excess of 1,000 – 2,000 m (see various species accounts in Best 2007) and thus may be encountered in the project area.

Beaked whales seem to be particularly susceptible to man-made sounds and several strandings and deaths at sea, often en masse, have been recorded in association with naval mid-frequency sonar (Cox et al. 2006; MacLeod & D'Amico 2006) and a seismic survey for hydrocarbons also running a multi-beam echo-sounder and sub bottom profiler (Cox et al. 2006). Although the exact reason that beaked whales seem particularly vulnerable to man-made noise is not yet fully understood, the existing evidence clearly shows that animals change their dive behaviour in response to acoustic disturbance (Tyack et al. 2011), and all possible precautions should be taken to avoid causing any harm. Sightings of beaked whales in the project area are expected to be very low.

Killer whales have a circum-global distribution being found in all oceans from the equator to the ice edge (Best 2007). Killer whales occur year round in low densities off western South Africa (Best et al. 2010), Namibia (Elwen & Leeney 2011) and in the Eastern Tropical Atlantic (Weir et al. 2010). Killer whales are found in all depths from the coast to deep open ocean environments and may thus be encountered in the licence area at low levels.

False killer whales are recognized as a single species globally, although clear differences in morphological and genetic characteristics between different study sites show that there is substantial difference between populations and a revision of the species taxonomy may be needed (Best 2007). The species has a tropical to temperate distribution and most sightings off southern Africa have occurred in water deeper than 1000 m but with a few close to shore as well (Findlay et al. 1992; NDP Unpubl. data). False killer whales usually occur in groups ranging in size from 1-100 animals (mean 20.2) (Best 2007) and are thus likely to be fairly easily seen in most weather conditions. However, the strong bonds and matrilineal social structure of this species makes it vulnerable to mass stranding (8 instances of 4 or more animals stranding together have occurred in the western Cape, South Africa, all between St Helena Bay and Cape Agulhas (Kirkman et al. 2010)), which may aggrandize the consequences of any injury or disturbance by seismic airguns or associated activities. There is no information on population numbers of conservation status and no evidence of seasonality in the region (Best 2007).

Long- and short-finned pilot whales (Globicephala melas and G.macrorhynchus) display a preference for temperate waters and are usually associated with the continental shelf or deep water adjacent to it (Mate et al. 2005; Findlay et al. 1992; Weir 2011; Seakamela et al. 2022). They are regularly seen associated with the shelf edge by MMOs, fisheries observers and researchers operating in Namibian waters (NDP unpubl. data; De Rock et al. 2019). The distinction between long-finned and short finned (G. macrorhynchus) pilot whales is difficult to make at sea. hort finned pilot whales are regarded as a more tropical species (Best 2007),

and most sightings within the Benguela Ecosystem are thought to be long-finned pilot whales, however, due to the low latitude and offshore nature of the project, it is likely that either could be encountered. There are many confirmed sighting of pilot whales along the shelf edge of South Africa and Namibia including within the project area since 2010 (de Rock et al. 2019). Observed group sizes range from 8-100 individuals (Seakamela et al. 2022). Pilot whales are commonly sighting by MMOs and detected by PAM during seismic surveys.

Dusky dolphins (Lagenorhynchus obscurus) (Figure 4-26, left) are likely to be the most frequently encountered small cetacean in water less than 500 m deep. This species is resident year round throughout the Benguela ecosystem in waters from the coast to at least 500 m deep (Findlay et al. 1992). Although no information is available on the size of the population, they are regularly encountered in near shore waters off South Africa and Lüderitz, although encounters near-shore are rare along the central Namibian coast (Walvis Bay area), with most records coming from beyond 5 nautical miles from the coast (Elwen et al. 2010a; NDP unpubl. data). In a recent survey of the Namibian Islands Marine Protected Area (between latitudes of 24°29′ S and 27°57′ S and depths of 30-200 m) dusky dolphin were the most commonly detected cetacean species with group sizes ranging from 1 to 70 individuals (NDP unpubl. data), although group sizes up to 800 have been reported in southern African waters (Findlay et al. 1992). However, due to the offshore location of PEL 82, encounters within the project area are unlikely.

Heaviside's dolphins (Figure 4-26, right) are relatively abundant in both the southern and northern Benguela ecosystem within the region of 10,000 animals estimated to live in the 400 km of coast between Cape Town and Lamberts Bay (Elwen et al. 2009a) and several hundred animals living in the areas around Walvis Bay and Lüderitz. Heaviside's dolphins are resident year-round. This species occupies waters from the coast to at least 200 m depth (Elwen et al. 2006; Best 2007), and may show a diurnal onshore-offshore movement pattern feeding offshore at night, although this varies throughout the range (Elwen et al. 2009b). This species occupies waters from the coast to at least 200 m depth (Elwen et al. 2006; Best 2007; Elwen et al. 2010), suggesting they are unlikely to be encountered in the project area.

FIGURE 4-26 THE DUSKY DOLPHIN LAGENORHYNCHUS OBSCURUS (LEFT) AND ENDEMIC HEAVISIDE'S DOLPHIN CEPHALORHYNCHUS HEAVISIDII (RIGHT).

Source: Namibian Dolphin Project, 2025

The common dolphin (*Delphinus delphis*) is found offshore in Namibian waters, with two forms present in southern Africa: long-beaked and short-beaked, though they are classified as a

single species. The long-beaked form typically inhabits the continental shelf of South Africa and is rarely seen north of St Helena Bay or in depths over 500 m, though recent sightings extend to 1,000 m. Evidence from strandings and MMO reports confirms their presence in the region. Group sizes average 267 in southern Africa and 37 in Namibia, with sightings occurring in warmer, deeper waters. There is no seasonal pattern noted. The short-beaked form is less understood and is difficult to distinguish from the long-beaked form at sea, with larger group sizes, likely found deeper than 2,000 m.

Common bottlenose dolphins (*Tursiops truncatus*) are widely distributed in tropical and temperate waters throughout the world, but frequently occur in small (10s to low 100s) isolated coastal populations. Within Nambian waters two populations of bottlenose dolphins occur. A small population inhabits the very near shore coastal waters (mostly <15 m deep) of the central Namibian coastline from approximately Lüderitz in the south to at least Cape Cross in the north, and is considered a conservation concern. The population is thought to number less than 100 individuals (Elwen et al. 2011), but its nearshore habitat makes it unlikely to be impacted by the proposed exploration-drilling activities. An offshore 'form' of common bottlenose dolphins occurs around the coast of southern Africa including Namibia and Angola (Best 2007) with sightings restricted to the continental shelf edge and deeper. Offshore bottlenose dolphins frequently form mixed species groups, often with pilot whales or Risso's dolphins.

The cold waters of the Benguela provide a northwards extension of the normally sub Antarctic habitat of Southern right whale dolphins (Lissodelphis peronii) (Best 2007). Most records in the region originate in a relatively restricted region between 26°S and 30°S roughly between Lüderitz and Tripp Seamount in water 100-2,000 m deep (Rose & Payne 1991; Best 2007; NDP Unpublished data). There has been a recent live stranding of two individuals in Lüderitz Bay in December 2013. They are often seen in mixed species groups with other dolphins such as dusky dolphins. It is possible that the Namibian sightings represent a regionally unique and resident population (Findlay et al. 1992) and as such caution is needed to minimize negative effects of hydrocarbon exploration. Encounters in the project area are likely to be low.

Several other species of toothed whales that might occur in the deeper waters of licence area at low levels include the pygmy killer whale, Risso’s, and Striped dolphins, and Cuvier’s and Layard’s beaked whales. Nothing is known about the population size or density of these species in the project area but it is likely that encounters would be rare (Findlay et al. 1992; Best 2007).

Beaked whales, rarely targeted commercially and difficult to study due to their pelagic nature, are among the most extreme divers, reaching depths over 2 km and lasting over an hour. However, they are particularly vulnerable to anthropogenic noise, with several species stranding or dying in response to man-made sounds, especially naval sonar. While the exact cause of this vulnerability is unclear, evidence indicates susceptibility to noise, necessitating precautions to prevent harm. Beaked whales typically occur in small groups, complicating visual detection, but passive acoustic monitoring (PAM) can enhance detection during foraging dives.

Current data on cetaceans in the project area is scarce, relying on past studies and habitat knowledge. Available information focuses on humpback and southern right whales, primarily found on the continental shelf. These species feed around Cape Columbine from September to

February, unlike winter breeding on the South Coast. Whaling data suggests fin whales peak in May-July and October-November, sei whales in May-June and August-October, and Bryde's whales offshore in January-March. Overall, whale numbers are likely highest from October to February.

Of the migratory cetaceans, the Blue whale is considered 'Critically Endangered', and Sei and Fin whales are listed as 'Endangered' in the IUCN Red Data book. All whales and dolphins are given protection under the Namibian Law. The regulations under the Namibian Marine Resources Act, 2000 (No. 27 of 2000) states that no whales or dolphins may be harassed, killed or fished. Although not legislated in Namibia, no vessel or aircraft should approach closer than 500 m to any whale and a vessel or aircraft should move to a minimum distance of 500 m from any whales if a whale surfaces closer than 500 m from a vessel or aircraft.

4.3.4.3 SEALS

The Cape fur seal (*Arctocephalus pusillus pusillus*) (Figure 4-27) is the only species of seal resident along the west coast of Africa, occurring at numerous breeding and non-breeding sites on the mainland and on nearshore islands and reefs (refer to Figure 4-37). Vagrant records from four other species of seal more usually associated with the sub Antarctic environment have also been recorded: southern elephant seal (*Mirounga leoninas*), sub Antarctic fur seal (Arctocephalus tropicalis), crabeater (*Lobodon carcinophagus*) and leopard seals (*Hydrurga leptonyx*) (David 1989).

FIGURE 4-27 COLONY OF CAPE FUR SEALS (ARCTOCEPHALUS PUSILLUS PUSILLUS)

Source: Photo by J. Kemper, 2014

The southern colonies (Spencer Bay to Baker's Bay) historically contributed ~62% to the overall seal population in Namibia. With the distributional shift of the seal population northwards in response to environmental change and altered prey distributions, the southern colonies currently comprise just less than a third of the total Namibian seal population (J-P Roux pers comm.). Population estimates fluctuate widely between years in terms of pup production, particularly since the mid-1990s (MFMR unpubl. Data; Kirkman et al. 2007). The colony closest to PEL 82 is at Cape Cross approximately 100 km inshore of the licence area where about 51,000 pups are born annually (MFMR unpubl. Data). The colony supports an

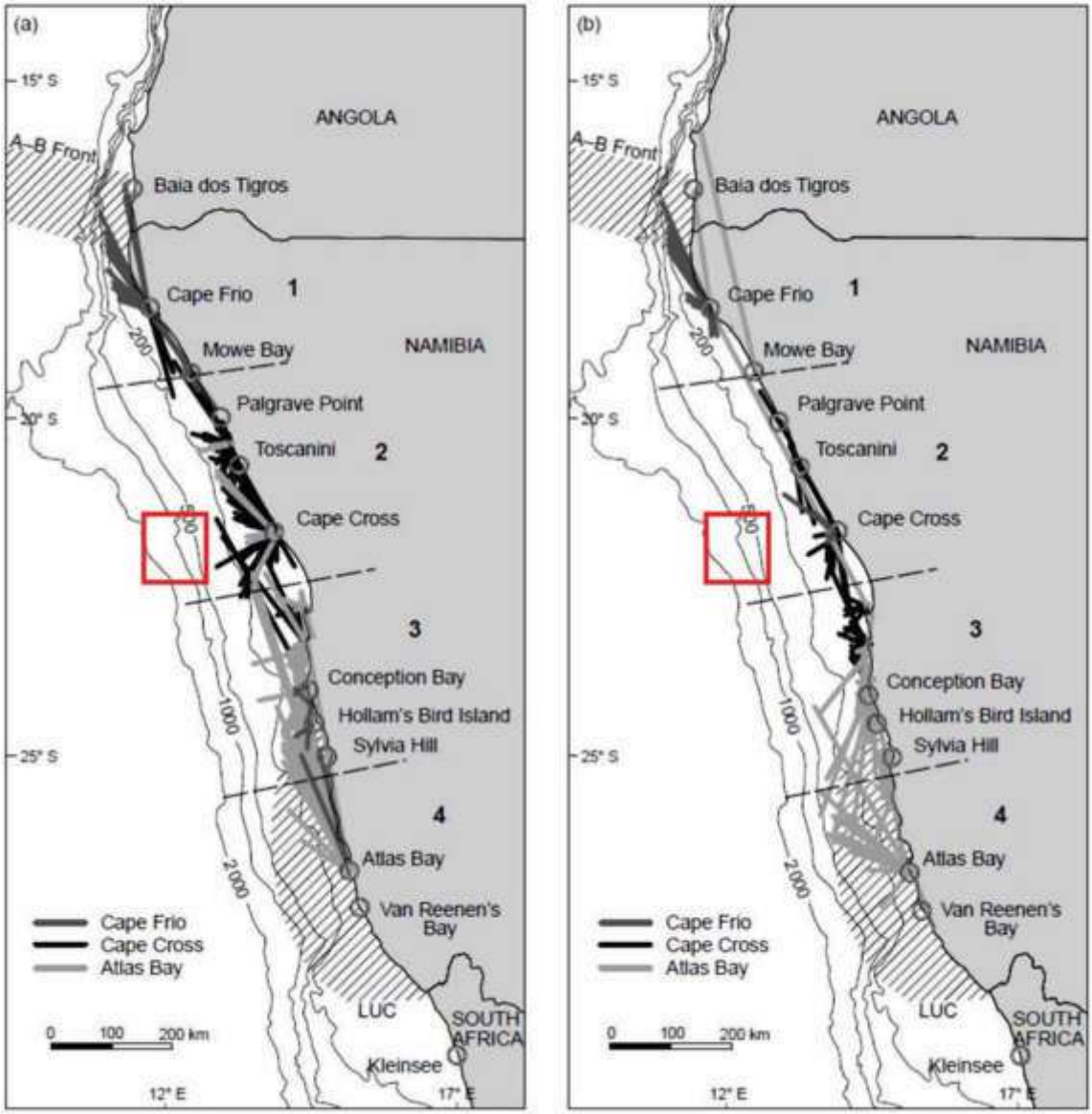
estimated 157,000 adults (Hampton 2003), with unpublished data from Marine and Coastal Management (MCM, South Africa) suggesting a number of 187,000 (Mecenero et al. 2006). A further colony of ~9,600 individuals exists on Hollamsbird Island south of Sandwich Harbour, approximately 285 km south-east of PEL 82. There are also seal colonies at Cape Frio and Möwe Bay, which are located approximately 360 km and 240 km north of PEL 82, respectively. The colony at Pelican Point in Walvis Bay is primarily a haul-out site. The mainland seal colonies present a focal point of carnivore and scavenger activity in the area, as jackals and hyena are drawn to this important food source.

The Cape fur seal population in the Benguela is regularly monitored by the South African and Namibian governments (e.g. Kirkman et al. 2012). Surveys of the full species range are periodically undertaken providing data on seal pup production (which can be translated to adult population size), thereby allowing for the generation of data on the population dynamics of this species. The population is considered to be healthy and stable in size although there has been a northward shift in the distribution of the breeding population (Kirkman et al. 2007; Skern-Mauritzen et al. 2009; Kirkman et al. 2012).

Seals are highly mobile animals with a general foraging area covering the continental shelf up to 120 nautical miles (~220 km) offshore (Shaughnessy 1979), with bulls ranging further out to sea than females. The foraging area of tracked seals from Namibian colonies and the South African West Coast colonies was provided in Skern-Mauritzen et al. (2009) (Figure 4-28). PEL 82 lies well offshore of the foraging ranges from these colonies. The timing of the annual breeding cycle is very regular occurring between November and January. Breeding success is highly dependent on the local abundance of food, territorial bulls and lactating females being most vulnerable to local fluctuations as they feed in the vicinity of the colonies prior to and after the pupping season (Oosthuizen 1991).

There is a controlled annual quota, determined by government policy, for the harvesting of Cape fur seals on the Namibian coastline. The Total Allowable Catch (TAC) for 2020 and 2021 stands at 60,000 pups and 8 000 bulls, distributed among seven licence holders at Cape Cross and a further three in Lüderitz. The annual quotas are seldom filled with concessionaires typically only harvesting 50% of the bulls and 30% of the pups. The seals are exploited mainly for their pelts (pups), blubber and genitalia (bulls). The pups are clubbed and the adults shot. These harvesting practices have raised concern among environmental and animal welfare organisations (Molloy & Reinikainen 2003).

FIGURE 4-28 PEL 82 (RED POLYGON) IN RELATION TO FORAGING TRIPS OF (A) FEMALES AND (B) MALES OF CAPE FUR SEALS AT THE CAPE FRIO, CAPE CROSS AND ATLAS BAY COLONIES.



Note: Trips are depicted as straight lines between the start location and the location where the seals spent most time during a trip.
Source: Skern-Mauritzen et al. 2009

4.3.5 DEMERSAL COMMUNITIES

4.3.5.1 BENTHIC INVERTEBRATE MACROFAUNA

The seabed communities in the PEL 82 area lie within the Namib sub-photic and continental slope biozones, which extend from a 30 m depth to the shelf edge, and beyond to the lower deepsea slope, respectively. The benthic and coastal habitats of Namibia were mapped as part of the Benguela Current Commission's Spatial Biodiversity Assessment (BCC-SBA) (Holness et al. 2014) (Figure 4-29). The benthic habitats were subsequently assigned an ecosystem threat status based on their level of protection (Table 4-6). Submarine canyons were also mapped as biodiversity features, although descriptions of their geographical situations were not

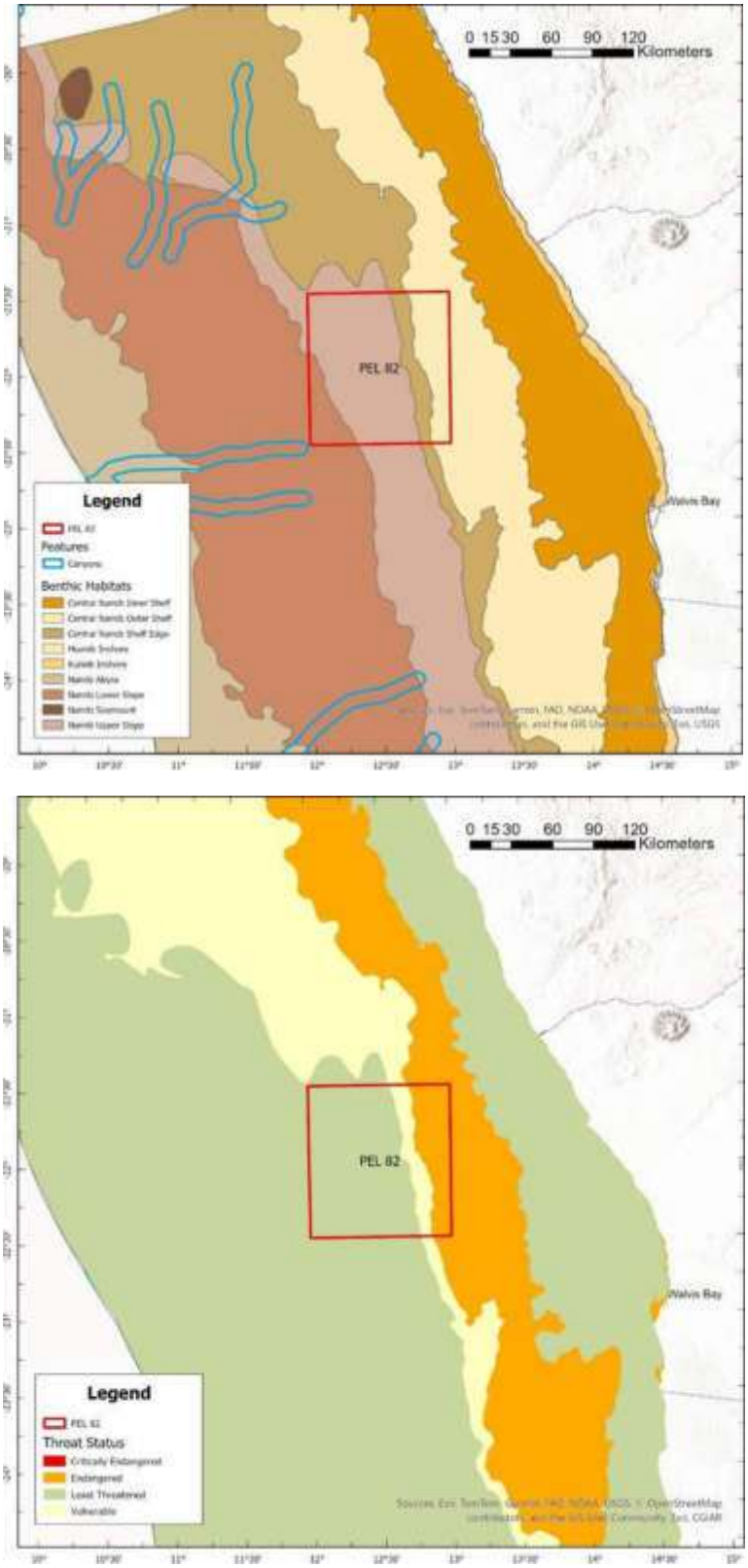
sufficiently accurate to include them in the benthic habitat map[3] (Figure 4-29). PEL 82 mostly overlaps with benthic habitat considered of 'Least Concern', however, those along the 500 m depth contour in the eastern portion of PEL 82 have been assigned a threat status of 'Vulnerable', with those further inshore to the 100 m depth contour considered 'Endangered' by the Benguela Current Commission (BCC) Spatial Biodiversity Assessment (Holness et al. 2014) (Figure 4-29).

The benthic biota of unconsolidated marine sediments constitute invertebrates that live on (epifauna) or burrow within (infauna) the sediments, and are generally divided into macrofauna (animals >1 mm) and meiofauna (<1 mm). Numerous studies have been conducted on southern African West Coast continental shelf benthos, mostly focused on mining, pollution or demersal trawling impacts (Christie and Moldan 1977; Moldan 1978; Jackson and McGibbon 1991; Environmental Evaluation Unit 1996; Parkins and Field 1997; 1998; Pulfrich and Penney 1999; Goosen et al. 2000; Savage et al. 2001; Steffani and Pulfrich 2004a, 2004b; 2007; Steffani 2007a; 2007b; Atkinson 2009; Steffani 2009a, 2009b, 2009c, 2010a, 2010b, 2010c; Atkinson et al. 2011; Steffani 2012a, 2012b, 2014; Karenyi 2014; Steffani et al. 2015; Biccard & Clark 2016; Biccard et al. 2016; Duna et al. 2016; Karenyi et al. 2016; Biccard et al. 2017, 2018; Gihwala et al. 2018; Biccard et al.2019; Giwhala et al. 2019). The description below is drawn from the various baseline and monitoring surveys conducted by diamond mining companies (Bickerton and Carter 1995; Steffani and Pulfrich 2007; Steffani 2007a; 2007b). These studies, however, concentrated on the continental shelf and nearshore regions, and consequently the benthic fauna of the outer shelf and continental slope (beyond ~450 m depth) are very poorly known. This is primarily due to limited opportunities for sampling as well as the lack of access to Remote Operated Vehicles (ROVs) for visual sampling of hard substrata. To date very few areas of the continental slope off the southern African West Coast have been biologically surveyed.

Polychaetes, crustaceans and molluscs make up the largest proportion of individuals, biomass and species on the west coast. The distribution of species within these communities are inherently patchy reflecting the high natural spatial and temporal variability associated with macro-infauna of unconsolidated sediments (e.g. Kenny et al. 1998; Kendall and Widdicombe 1999; van Dalfsen et al. 2000; Zajac et al. 2000; Parry et al. 2003), with evidence of mass mortalities and substantial recruitments recorded on the South African West Coast (Steffani and Pulfrich 2004a). Generally species richness increases from the inner shelf across the mid shelf and is influenced by sediment type (Karenyi unpublished data). The highest total abundance and species diversity was measured in sandy sediments of the mid-shelf. Biomass is highest in the inshore (± 50 g/m2 wet weight) and decreases across the mid-shelf averaging around 30 g/m2 wet weight. The midshelf mudbelt, however, is a particularly rich benthic habitat where biomass can attain 60 g/m2 dry weight (Christie 1974; see also Steffani 2007b). The comparatively high benthic biomass in this mudbelt region represents an important food source to carnivores such as the mantis shrimp, cephalopods and demersal fish species (Lane and Carter 1999). In deeper water beyond this rich zone biomass declines to 4.9 g/m2 at 200 m depth and then is consistently low (<3 g/m2) on the outer shelf (Christie 1974).

3 Marine canyons identified by the international Deep Ocean project mapped them as lines. The lines were buffered by 5 km to include both the canyon and its associated adjacent ecosystems.

FIGURE 4-29 PEL 82 IN RELATION TO THE NAMIBIAN BENTHIC HABITATS (TOP) AND THEIR ECOSYSTEM THREAT STATUS (BOTTOM).



Source: Holness et al. 2014

TABLE 4-6 ECOSYSTEM THREAT STATUS FOR MARINE HABITAT TYPES ON THE NAMIBIAN COAST.

Habitat Type	Threat Status	Area (km²)
Namib Abyss	Least Threatened	800.93
Namib Lower Slope	Least Threatened	1,380.13
Namib Upper Slope	Least Threatened	590.66
Namaqua Shelf Edge	Endangered	44.40
Namaqua Outer Shelf	Least Threatened	175.29
Namaqua Inner Shelf	Least Threatened	69.48
Namaqua Inshore	Vulnerable	4.45
Namib Seamount	Least Threatened	26.83
Lüderitz Shelf Edge	Critically Endangered	87.55
Lüderitz Outer Shelf	Vulnerable	184.70
Lüderitz Inner Shelf	Least Threatened	62.91
Lüderitz Islands	Least Threatened	13.32
Central Namib Shelf Edge	Vulnerable	327.46
Central Namib Outer Shelf	Endangered	409.40
Central Namib Inner Shelf	Least Threatened	382.44
Kuiseb Inshore	Least Threatened	29.11
Hoanib Inshore	Least Threatened	7.85
Cunene Abyss	Least Threatened	2,488.57
Cunene Lower Slope	Least Threatened	308.96
Cunene Upper Slope	Least Threatened	113.21
Cunene Shelf Edge	Vulnerable	116.62
Cunene Outer Shelf	Endangered	54.61
Cunene Inner Shelf	Least Threatened	43.75
Cunene Inshore	Least Threatened	10.18

Note: The habitats potentially affected by the proposed well drilling are shaded. The threat status is based on regional assessment
Source: Holness et al. 2014

Whilst many empirical studies related community structure to sediment composition (e.g. Christie 1974; Warwick et al. 1991; Yates et al. 1993; Desprez 2000; van Dalfsen et al. 2000), other studies have illustrated the high natural variability of soft-bottom communities, both in space and time, on scales of hundreds of metres to metres (e.g. Kenny et al. 1998; Kendall and Widdicombe 1999; van Dalfsen et al. 2000; Zajac et al. 2000; Parry et al. 2003), with evidence of mass mortalities and substantial recruitments (Steffani and Pulfrich 2004a). It is likely that the distribution of marine communities in the mixed deposits of the coastal zone is controlled by complex interactions between physical and biological factors at the sediment–water interface, rather than by the granulometric properties of the sediments alone (Snelgrove

and Butman 1994; Seiderer and Newell 1999). For example, off central Namibia it is likely that periodic intrusion of low oxygen water masses is a major cause of this variability (Monteiro and van der Plas 2006; Pulfrich et al. 2006). Although there is a poor understanding of the responses of local continental shelf macrofauna to low oxygen conditions, it is safe to assume that in areas of frequent oxygen deficiency the communities will be characterised by species able to survive chronic low oxygen conditions, or colonising and fast-growing species able to rapidly recruit into areas that have suffered complete oxygen depletion. Local hydrodynamic conditions, and patchy settlement of larvae, will also contribute to small-scale variability of benthic community structure.

It is evident that an array of environmental factors and their complex interplay is ultimately responsible for the structure of benthic communities. Yet the relative importance of each of these factors is difficult to determine as these factors interact and combine to define a distinct habitat in which the animals occur. However, it is clear that water depth and sediment composition are two of the major components of the physical environment determining the macrofauna community structure off the west coast of southern Africa (Steffani and Pulfrich 2004a, 2004b, 2007; Steffani 2007a, 2007b, 2009a, 2009b, 2009c, 2010). However, in the deepwater shelf areas off central and Northern Namibia, the occurrence of Oxygen Minimum Zones (OMZs), the periodic intrusion of low oxygen water masses and diffusive hydrogen sulphide flux have been found to play a major role in determining variability in community structure (Monteiro and van der Plas 2006; Zettler et al. 2009, 2013; Eisenbarth and Zettler 2016; Amorim and Zettler 2023).

Specialised benthic assemblages (protozoans and metazoans) can thrive in OMZs (Levin 2003) and many organisms have adapted to low oxygen conditions by developing highly efficient ways to extract oxygen from depleted water. Within OMZs, benthic foraminiferans, meiofauna and macrofauna typically exhibit high dominance and relatively low species richness. In the OMZ core, where oxygen concentration is lowest, macrofauna and megafauna (>10 cm) often have depressed densities and low diversity, despite being able to form dense aggregations at OMZ edges (Levin 2003; Levin et al. 2009). Taxa most tolerant of severe oxygen depletion (~0.2 ml/l) include calcareous foraminiferans, nematodes, and polychaetes, with agglutinated protozoans, harpacticoid copepods, and calcified invertebrates typically being less tolerant. Small-bodied animals, with greater surface area for O_2 adsorption, are thought to be more prevalent than large-bodied taxa under conditions of permanent hypoxia as they are better able to cover their metabolic demands and often able to metabolise anaerobically (Levin 2003). Meiofauna may thus increase in dominance in relation to macro- and megafauna. This was not the case, however, within the lower OMZs of the Oman (Levin et al. 2000) and Pakistan margins (Levin et al. 2009), where the abundant food supply in the lower or edge OMZs is thought to be responsible for promoting larger macrofaunal body size.

There is a poor understanding of the responses of local continental shelf macrofauna to low oxygen conditions, as very little is known about the benthic fauna specific to the Namibian OMZ. It is safe to assume that in areas of frequent oxygen deficiency the communities will be characterised by species able to survive chronic low oxygen conditions, or colonising and fast-growing species able to rapidly recruit into areas that have suffered complete oxygen depletion. Local hydrodynamic conditions, and patchy settlement of larvae, will also contribute to small-scale variability of benthic community structure.

Data collected from between 150 m and 300 m depth offshore of the area between Meob Bay and Conception Bay showed that overall species richness of benthic macrofauna assemblages was relatively low and strongly dominated by polychaetes, particularly the spionid polychaete Paraprionospio pinnata. This species is dominant in oxygen-constrained environments worldwide. Crustaceans were poorly represented, both in terms of abundance and biomass (Steffani 2011). The phyla distribution is generally in common with other OMZs around the world.

In contrast, Amorim and Zettler (2023), who studied the distribution of macrofaunal assemblages between 17°S and 25°S latitudes and between 25 m and 1523 m water depth off northern Namibia, reported that the Namibian benthic macrofauna, in general, shows high total biomasses and high representativeness of molluscs compared to OMZs worldwide. Deep communities tended to show high diversity but low biomass. A further study that sampled stations between 30 m to 2,513 m depth at 20°S found 5 different communities along the depth gradient with three shelf communities, one continental margin community and one deep-sea community. Species richness was highest along the continental margin between 400 and 1,300 m water depth. Polychaetes and molluscs contributed most to the biomass on the shelf (Eisenbarth and Zettler 2016). These authors concluded that macrozoobenthic diversity off northern Namibia is strongly affected by temporary oxygen deficiency.

Also associated with soft-bottom substrates are demersal communities that comprise epifauna and bottom-dwelling invertebrate and vertebrate species, many of which are dependent on the invertebrate benthic macrofauna as a food source. An invertebrate demersal species of commercial importance in Namibia is the deepsea red crab Chaceon maritae, which occurs at depths of 300-1,000 m along the entire west coast of Africa from West Sahara to central Namibia. In Namibia, densities are highest between the Kunene and latitude 18°S. Larger animals tend to occur more frequently between latitudes 20° - 23°S, where densities are lower. The species is slow-growing taking up to 25-30 years to reach maximum size. Females occur at depths of 350-500 m, whereas males become more dominant in deeper water (Le Roux 1998). Spawning occurs throughout the year.

4.3.5.2 DEEP-WATER CORAL COMMUNITIES

There has been increasing interest in deep-water corals in recent years because of their likely sensitivity to disturbance and their long generation times. These benthic filter-feeders generally occur at depths exceeding 150 m. Some species form reefs while others are smaller and remain solitary. Corals add structural complexity to otherwise uniform seabed habitats thereby creating areas of high biological diversity (Breeze et al. 1997; MacIssac et al. 2001). Deep water corals establish themselves below the thermocline where there is a continuous and regular supply of concentrated particulate organic matter, caused by the flow of a relatively strong current over special topographical formations which cause eddies to form. Nutrient seepage from the substratum might also promote a location for settlement (Hovland et al. 2002). Substantial shelf areas in the productive Benguela region should thus potentially be capable of supporting rich, cold water, benthic, filter-feeding communities. Such communities would also be expected with topographic features such as the Walvis Ridge (and its associated seamounts) to the north and west of PEL 82 (Figure 4-30). The high habitat heterogeneity of the ridge supports moderately diverse biological communities, including benthic macrofauna such as brachiopods, sponges, octocorals, deep-water hexacorals, gastropods, bivalves, polychaetes, bryozoans, cirriped crustaceans, basket stars, ascidians, isopods and amphipods

(GEOMAR 2014), which are assumed to extent along the full extent of the ridge. The Ridge as a whole remains largely unexplored. Productivity along Walvis Ridge increases from SW to NE, with sediment organic carbon and the abundance and diversity of phytoplankton communities increasing towards the Namibian shelf. This is thought to reflect patterns of nutrient transport and upwelling in the north-flowing Benguela Current that are more intense closer to the African continent (GEOMAR 2014).

FIGURE 4-30 TOP: GORGONIANS RECORDED ON DEEP-WATER REEFS (100-120 M) OFF THE SOUTHERN AFRICAN WEST COAST. BOTTOM: VME INDICATOR SPECIES RECORDED FROM THE WALVIS RIDGE

Source: De Beers Marine and Ramil & Gil 2015

4.3.5.3 DEMERSAL FISH SPECIES

Up to 110 fish species inhabit the demersal communities on the southern African West Coast continental shelf (Roel 1987). Fish communities change with depth, notably between 300 m and 400 m (Roel 1987; Atkinson 2009). Key commercial species include shallow-water hake (*Merluccius capensis*), deep-water hake (*Merluccius paradoxus*), monkfish (*Lophius vomerinus*), and kingklip (*Genypterus capensis*), alongside various bycatch species and cephalopods (Compagno et al. 1991). Seasonal variations affect species distribution, with some like pelagic goby (*Sufflogobius bibarbatus*) and West Coast sole (*Austroglossus microlepis*) present only in summer. Atkinson (2009) noted two long-term community shifts in the 1990s and 2000s, linked to environmental changes and shifts in small pelagic fish and rock lobster populations (Howard et al. 2007; Coetzee et al. 2008).

4.3.5.4 SEAMOUNT COMMUNITIES

Seamounts, including banks and knolls, interact with surrounding water currents, leading to upwelling of cool, nutrient-rich water that enhances productivity. This enrichment supports diverse bottom-associated communities and high demersal fish populations. The complex

current regimes foster detritivore-based food webs, attracting scavengers and predators. Seamounts are crucial habitats for commercial fish stocks like orange roughy and Patagonian toothfish, serving as feeding, spawning, and nursery grounds. They also act as focal points for various pelagic species, including turtles and tunas, that migrate for food or gather seasonally.

Seamounts support diverse benthic communities due to enhanced currents and rocky substrata, fostering suspension feeders like deep-water corals and various invertebrates (Rogers 1994). These habitats include mobile fauna such as echinoderms and crustaceans, with some cnidarians forming reefs that enhance habitat complexity. Coral frameworks provide refuge for numerous invertebrates and fish, creating biologically rich hotspots. Seamount fauna is often unique and endemic, with high vulnerability to anthropogenic disturbances, leading to slow recovery or permanent damage (FAO 2008).

Not all seamount habitats are Vulnerable Marine Ecosystems; some lack fragile animal communities and high endemism. Video evidence from 100-120 m depth off Namibia indicates vulnerable communities like gorgonians and sponges on the continental shelf. Similar findings on the Walvis Ridge include Lophelia and bamboo corals. Ramil & Gil (2015) noted VME indicators in all surveyed seamounts, with variations in structure and development, showing coral rubble and living coral frameworks along the slopes.

4.3.6 SEABIRDS

The Namibian coastline sustains large populations of breeding and foraging seabird and shorebird species, which require suitable foraging and breeding habitats for their survival. In total, 11 species of seabirds are known to breed along the Namibian coast (Table 4-7). Most seabirds breeding in Namibia are restricted to areas where they are safe from land predators, although some species are able to breed on the mainland coast in inaccessible places. In general most breed on the islands off the southern Namibian coast, or on the man-made guano platforms in Walvis Bay, Swakopmund and Cape Cross, approximately 280 km to the southeast and 120 km to the east of PEL 82, respectively. The southern Namibian islands and guano platforms therefore provide a vital breeding habitat to most species of seabirds that breed in Namibia. However, the number of successfully breeding birds at the particular breeding sites varies with food abundance (J. Kemper, MFMR Lüderitz, pers. comm.). With the exception of Kelp Gull and White-breasted Cormorants all the breeding species are listed Red Data species in Namibia.

Most of the seabird species breeding in Namibia feed relatively close inshore (10-30 km), although exceptions occur (Ludynia et al. 2012), particularly when birds are forced to alter their dispersal patterns in response to environmental change (Sherley et al. 2017). Cape Gannets (Figure 4-31, left), however, are known to forage up to 140 km offshore (Dundee 2006; Ludynia 2007) (Figure 4-32) and African Penguins (Figure 4-31, right) have also been recorded as far as 60 km offshore (Ludynia et al. 2012). The closest Cape Gannet and African penguin colonies to PEL 82 are at Mercury and Ichaboe Islands some 345 km and 460 km to the southeast, with smaller penguin colonies reported at Hollamsbird Island, at the caves at Sylvia Hills and Oyster Cliffs and on Neglectus Islet. As the project area is ~80 km offshore at its closest point and north of the northern-most islands, encounters with these species during exploration drilling operations in PEL 82 is likely to be rare.

TABLE 4-7 NAMIBIAN BREEDING SEABIRD SPECIES WITH THEIR NAMIBIAN AND IUCN CLASSIFICATION .

Species	Namibian	Global IUCN
*African Penguin Spheniscus demersus	Endangered	Endangered
*Bank Cormorant Phalacrocorax neglectus	Endangered	Endangered
*Cape Cormorant Phalacrocorax capensis	Endangered	Endangered
*Cape Gannet Morus capensis	Critically Endangered	Endangered
*Crowned Cormorant Microcarbo coronatus	Near Threatened	Near Threatened
*African Black Oystercatcher Haematopus moquini	Near Threatened	Near Threatened
White-breasted cormorant Phalacrocorax lucidus	Least Concern	Least Concern
Kelp Gull Larus dominicanus	Least Concern	Least Concern
*Hartlaub's Gull Chroicocephalus hartlaubii	Vulnerable	Least Concern
Caspian Tern Hydroprogne caspia	Vulnerable	Least Concern
*Greater Crested (Swift) Tern Thallaseus bergii bergii	Least Concern	Least Concern
*Damara Tern Sternula balaenarum	Near Threatened	Vulnerable
Note the IUCN scheme Endangered is a more extinction-prone class than Vulnerable, and differences between Namibia and global classifications are the result of local population size, and the extent and duration of declines locally.		

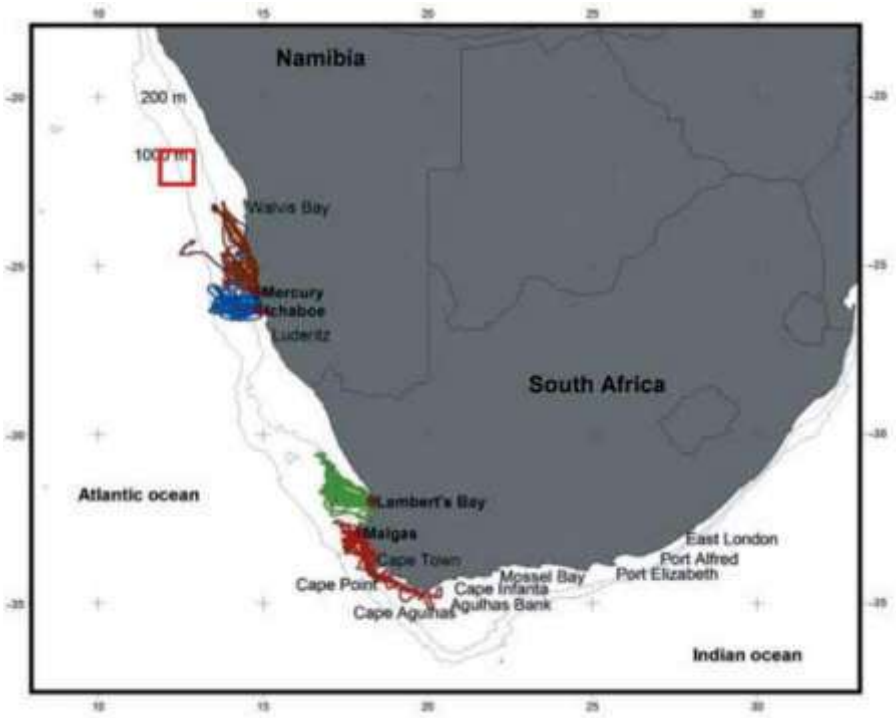
Source: Kemper et al. 2007; Simmons et al. 2015

FIGURE 4-31 CAPE GANNETS MORUS CAPENSIS (LEFT) AND AFRICAN PENGUINS SPHENISCUS DEMERSUS (RIGHT)

Breed primarily on the offshore islands.

Source: NACOMA, 2025

FIGURE 4-32 PEL 82 (RED POLYGON) IN RELATION TO GPS TRACKS RECORDED FOR 93 CAPE GANNETS FORAGING OFF FOUR BREEDING COLONIES IN SOUTH AFRICA AND NAMIBIA



Source: Grémillet et al. 2008

Other Red-listed species found foraging, or roosting along the coastline of southern and central Namibia are listed in Table 4-8. Among the other species present off Namibia's coast there are at least nine species of albatrosses, petrels or giant-petrels recorded (Boyer & Boyer 2015, Benthic Solutions Ltd 2019). However, none of these species breed in Namibia, and the numbers foraging in Namibian waters are poorly known, although some tracking data are available (Figure 4-33). Forty-nine species of pelagic seabirds have been recorded in the region, of which 14 are resident. Highest pelagic seabird densities occur offshore of the shelf-break in winter. Pelagic seabirds potentially encountered in PEL 82 are provided in Table 4-8.

In central Namibia, the 30 km long shoreline between Walvis Bay and Swakopmund has the highest linear count of birds in southern Africa at ~450 birds/km with totals exceeding 13,000 shorebirds of 31 species, most of which are Palearctic migrants (Simmons et al. 1999; Molloy and Reinikainen 2003). Individual 10 km sections, peak even higher at 770 birds/km. Birds reported from the 30 km stretch of coast between Walvis Bay and Swakopmund include African Black Oystercatcher, Kelp Gull, Cape cormorant, Turnstone (*Arenaria interpres*), Curlew Sandpiper (*Calidris ferruginea*), Grey plover (*Pluvialis squatarola*), Swift Tern, Damara tern and Common Tern (*Sterna hirundo*) (Simmons et al. 1999).

TABLE 4-8 OTHER RED-LISTED BIRD SPECIES THAT OCCUR IN NAMIBIA, WITH THEIR NAMIBIAN AND IUCN CLASSIFICATION

Species	Namibian	Global IUCN
Tristan Albatross Diomedea dabbenena	Critically Endangered	Critically Endangered
Atlantic Yellow-nosed Albatross Thalassarche chlororhynchos	Endangered	Endangered
Black-browed Albatross Thalassarche melanophrys	Endangered	Least Concern
Wandering Albatross Diomedea exulans	Vulnerable	Vulnerable
Shy Albatross Thalassarche cauta	Near Threatened	Near Threatened
White-capped Albatross Thalassarche sneadi	Near Threatened	Near Threatened
Spectacled Petrel Procellaria conspicillata	Vulnerable	Vulnerable
Northern Giant-Petrel Macronectes halli	Near Threatened	Least Concern
Southern Giant-Petrel Macronectes giganteus	Not listed	Least Concern
Cape (Pintado) Petrel Daption capense	Not listed	Least Concern
Kerguelen Petrel Aphrodroma brevirostris	Not listed	Least Concern
Great-winged Petrel Pterodroma macroptera	Not listed	Least Concern
Soft-plumaged Petrel Pterodroma mollis	Not listed	Least Concern
White-chinned Petrel Procellaria aequinoctialis	Vulnerable	Vulnerable
Leach’s Storm-Petrel Oceanodroma leucorhoa	Not listed	Vulnerable
Wilson’s Storm-Petrel Oceanites oceanicus	Not listed	Least Concern
European Storm-Petrel Hydrobates pelagicus	Not listed	Least Concern
Sabine’s Gull Xema sabini	Not listed	Least Concern
Arctic Tern Sterna paradisaea	Not listed	Least Concern
Red Phalarope Phalaropus fulicarius	Not listed	Least Concern
Brown (Sub-Antarctic) Skua Catharacta antarctica	Not listed	Least Concern
Pomarine Jaeger (Skua) Stercorarius pomarinus	Not listed	Least Concern
Antarctic Prion Pachyptila desolata	Not listed	Least Concern
Long-Tailed Jaeger (Skua) Stercorarius longicaudus	Not listed	Least Concern

Species	Namibian	Global IUCN
Sooty Shearwater Ardenna grisea	Near Threatened	Near Threatened
Cory's Shearwater Calonectris borealis	Not listed	Least Concern
Scopoli's Shearwater Calonectris diomedea	Not listed	Least Concern
Manx Shearwater Puffinus puffinus	Not listed	Least Concern
Great Shearwater Ardenna gravis	Not listed	Least Concern

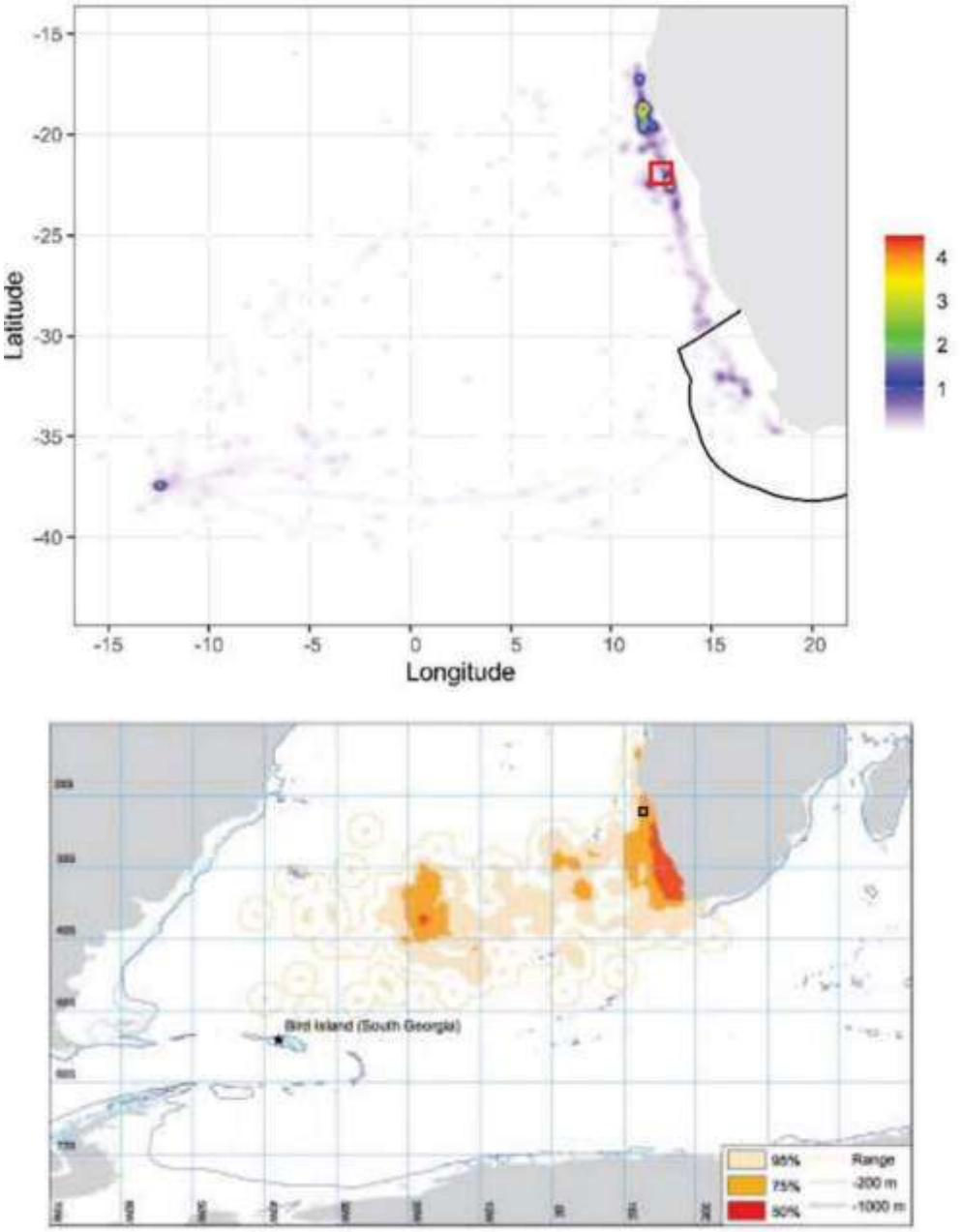
Notes:
In the IUCN scheme 'Endangered' is a more extinction-prone class than 'Vulnerable', and differences between Namibia and global classifications are the result of local population size and importance, and the extent and duration of declines locally / globally.

Source: Kemper et al. 2007; Simmons et al. 2015; IUCN 2025

The coastline between Walvis Bay and Cape Cross also boasts three man-made guano platforms: "Bird Rock" north of Walvis Bay is 200 m offshore, whereas those north of Swakopmund and at Cape Cross have been erected in salt pans. The platforms are unique in the world and produce about 2,500 tons of guano per season. About 99% of the birds occurring on the platforms are Cape Cormorants, although White-breasted Cormorants, Crowned Cormorants and Great White Pelicans also breed on the platforms

The Kunene River mouth and its estuary at the border with Angola also serves as an extremely important wetland for coastal birds, particularly the near threatened Damara Tern, which has been recorded in high numbers (2,000 – 5,000) within and to the south of the mouth.

FIGURE 4-33 PEL 82 (RED AND BLACK POLYGONS) IN RELATION TO THE UTILIZATION DISTRIBUTION OF INCUBATING ATLANTIC YELLOW-NOSED ALBATROSSES FROM GOUGH ISLAND (TOP), SOUTHERN OCEAN, AND BLACK-BROWED ALBATROSS FROM BIRD ISLAND, SOUTH GEORGIA (BOTTOM)



Source: Birdlife Africa 2004, 2022

4.4 OTHER USES OF THE PROPOSED LICENCE AREA

4.4.1 BENEFICIAL USES

The licence area is located well offshore at depths beyond 200 m. Other users of the area include the commercial fishing industry (see Specialist Report on Fisheries), and oil and gas licence holders. In Namibia various restrictions apply to areas permittable to commercial fisheries. No trawling or long-lining is permitted inshore of the 200 m depth contour, and south of 25°S no freezer trawlers or hake trawlers are permitted inshore of the 350 m depth contour.

Marine mining (diamonds and marine phosphates) concessions and Exclusive Prospecting Licences (EPLs) are located inshore of PEL 82 (Figure 4-34). Current activities in the EPLs are minimal to non-existent, the only active operations being diamond mining south of Lüderitz. Recreational use of the coastline and inshore areas is negligible and restricted primarily to the area around Henties Bay, Swakopmund, Walvis Bay and Lüderitz, all of which lie well inshore and to the southeast of PEL 82. Recreational activities offshore of the Namib-Naukluft and the Skeleton Coast National Park are similarly limited.

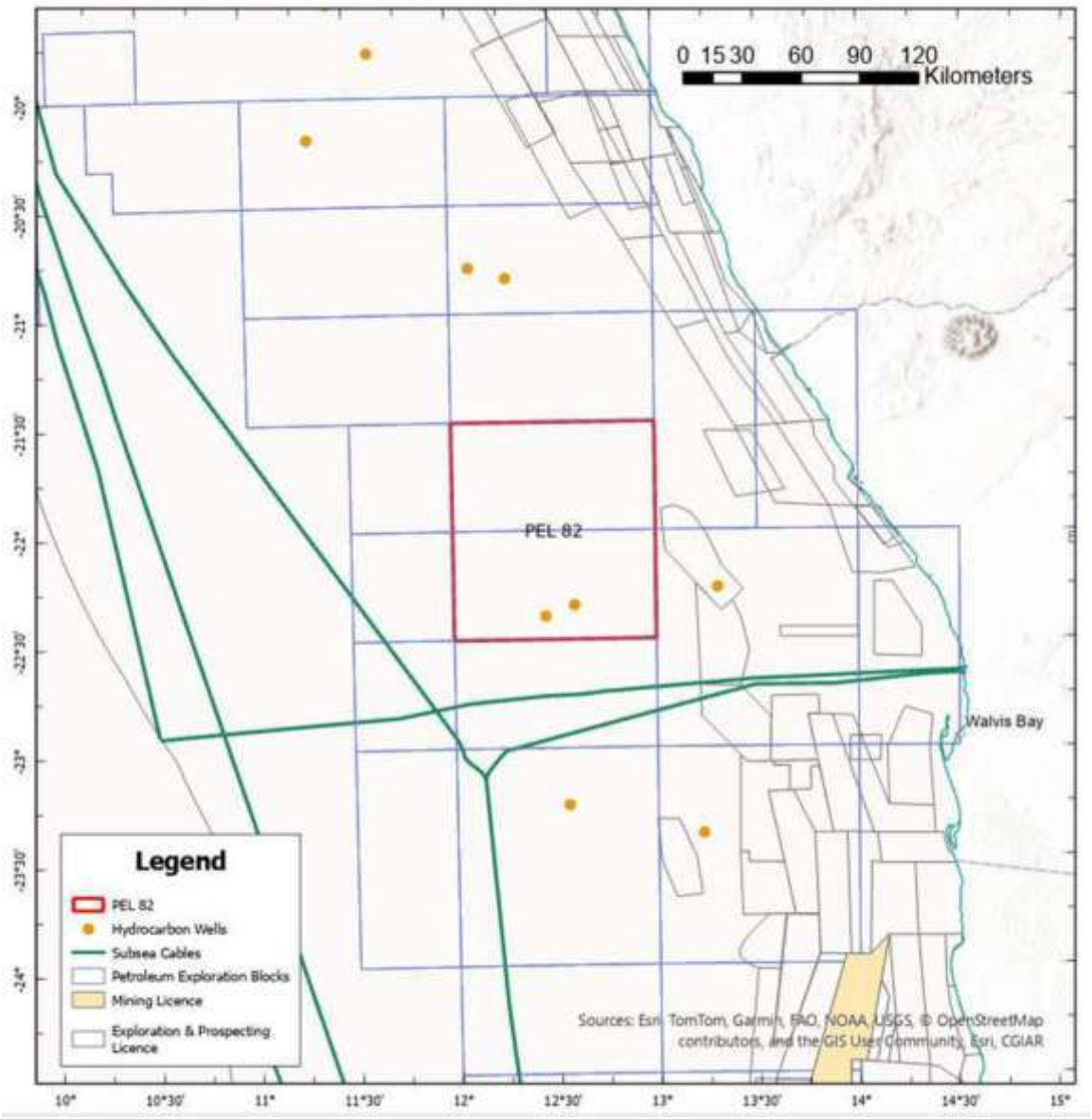
The main shipping lanes around southern Africa lie seawards of PEL 82, however, the licence area lies within the main trawling lanes and traffic routes into and out of Walvis Bay. Both coastal shipping and fishing craft may therefore be encountered in the licence area, particularly the eastern portion of PEL 82 (Figure 4-35).

Various subsea telecommunications cable traverse across the Namibian EEZ, of which two come ashore at Swakopmund. These cables, however all lie south and offshore of PEL 82.

Other current and proposed industrial uses of the marine environment include the intake of cooling water for power plants, intake of feed-water for desalination plants, and seawater intakes for fish processing, or mariculture operations. There is also limited guano harvesting on the guano platforms and salt production in Walvis Bay, Swakopmund and at Cape Cross. These activities are all located well inshore of PEL 82 and should in no way be affected by offshore well-drilling activities.

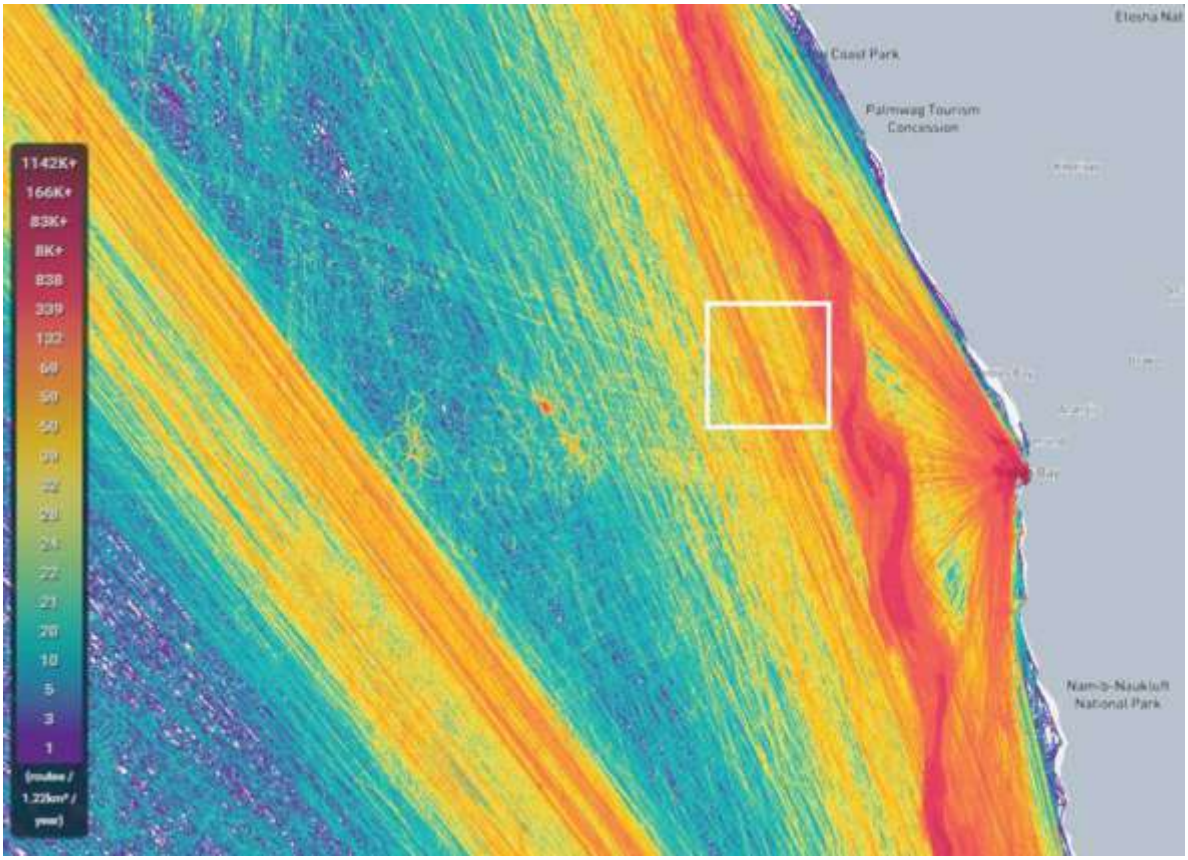
Mariculture activities are being conducted at an increasing scale in Walvis Bay, and at present there are over 20 companies engaged in cultivation of Pacific oyster (Crassostrea gigas) and European flat oyster (Ostrea edulis) in the bay. Oyster cultivation is also conducted in the feed-water ponds of the Walvis Bay and Swakopmund salt works. These various mariculture activities should likewise not be affected in any way by offshore exploration well-drilling.

FIGURE 4-34 MARINE DIAMOND MINING CONCESSIONS AND OTHER USERS OF THE MARINE ENVIRONMENT IN THE PROJECT AREA.



Source: Chamber of Mines, 2024

FIGURE 4-35 PEL 82 (WHITE POLYGON) IN RELATION TO OFFSHORE VESSEL TRAFFIC



Source: Marine Traffic, 2025

4.4.2 CONSERVATION AREAS AND MARINE PROTECTED AREAS

4.4.2.1 NATIONAL PARKS

Inshore of PEL 82, the coastline of Namibia is part of a continuum of protected areas that stretch along the entire Namibian coastline, a distance of about 1,570 km, from Southern Angola into Namaqualand in South Africa. Recently proclaimed as the Namib-Skeleton Coast National Park it incorporates four terrestrial Management Areas, namely the Skeleton Coast National Park, the Dorob National Park, the Namib-Naukluft National Park and the Tsau//Khaeb-Sperrgebiet National Park (refer to Figure 4-38). The Namib-Skeleton Coast National Park is the 8th largest protected area in the world, the 6th largest terrestrial protected area globally and the largest park in Africa, covering an area of 107,540 km.

Of the three designated coastal Ramsar sites in Namibia, the Walvis Bay wetlands and Sandwich Harbour fall within the broader project area and are described briefly below.

The Walvis Bay Wetland is one of the most important coastal wetlands in Southern Africa. As the largest single area of shallow sheltered water along the Namibian coastline, it encompasses the lagoon and mudflats exposed at low tide, and sandbars serving as roosting and feeding sites for resident and migratory birds, Paaltjies beach on the Pelican Point peninsula, the Walvis Bay saltworks, and sand dunes and gravel fields extending to the boundary of the Namib-Naukluft Park (Barnard 1998; www.nacoma.org.na). The estimated total area for these wetlands is 35 - 40 km². It was proclaimed a Ramsar site in 1995.

Sandwich Harbour, located 55 km south of Walvis Bay, is one of southern Africa's richest and most unique coastal wetlands. Situated within the Namib-Naukluft Park, the area consists of two distinct parts. Firstly, a northern saltmarsh and adjoining intertidal sand flat area (5 km x 300 m), which supports emergent freshwater vegetation (37 species) and 4,000 – 5,500 wetlands birds. The more extensive (40 km²) southern area of unvegetated tidal mudflats and raised shingle bars supports up to 175,000 birds, mainly waders, terns, pelicans and flamingos. Although the area is not directly associated with a river, water from an inland aquifer seeps into the northern portion of Sandwich Harbour, filling the lagoon and sustaining freshwater vegetation at the base of the dunes. Also 36 species of fish and eight Namibian Red Data bird species can be found at Sandwich Harbour.

The Namib-Naukluft National Park has an area of 49,800 km² and encompasses part of the Namib Desert, the Naukluft mountain range, Sandwich Harbour and Sossusvlei, which is a main visitor attraction in Namibia.

4.4.2.2 MARINE SANCTUARIES

Sanctuaries are considered a type of management area within Namibia's multi-purpose National Park and MPA network in which access and/or resource use is prohibited.

The Lüderitz Bay and Ichaboe Island Rock-Lobster Sanctuaries were proclaimed by South Africa in 1939 and 1951, respectively (Matthews & Smit 1979), and subsequently maintained as reserves by MFMR after Namibian independence. There is no restriction on other activities within these reserves. These sanctuaries are well to the south of PEL 82.

4.4.2.3 MARINE PROTECTED AREAS

The first (and to date only) Namibian MPA was launched on 2 July 2009 under the Namibian Marine Resources Act (No. 29 of 1992 and No. 27 of 2000), with the purpose of protecting sensitive ecosystems and breeding and foraging areas for seabirds and marine mammals, as well as protecting important spawning and nursery grounds for fish and other marine resources (such as rock lobster). The MPA comprises a coastal strip extending from Hollamsbird Island (24°38´S) in the north, to Chamais Bay (27°57´S) in the south, spanning approximately three degrees of latitude and an average width of 30 km, including 16 specified offshore islands, islets and rocks (Currie et al. 2009). The Namibian Islands' Marine Protected Area (NIMPA) spans an area of 9,555 km², and includes a rock-lobster sanctuary constituting 478 km2 between Chameis Bay and Prince of Wales Bay. The offshore islands, whose combined surface area amounts to only 2.35 km² have been given priority conservation and highest protection status (Currie et al. 2009). The area has been zoned into four degrees of incremental protection. These are detailed in Currie et al. (2009).

The NIMPA lies ~260 km southeast of PEL 82.

4.4.2.4 SENSITIVE AREAS

Despite the current lack of knowledge of the community structure and endemicity of southern African macro-infauna off the edge of the continental shelf, the spatial marine biodiversity assessment (Holness et al. 2014), rated the Namib upper and lower slope unconsolidated habitat types that characterise depths beyond 1.000 m, as being of 'Least concern' (Figure 4-29), reflecting the great extent of these habitats in the Namibian Exclusive Economic Zone (EEZ). However, those ecosystem types occurring along the shelf edge in the Central Namib

biozone are considered 'Vulnerable, with those on the outer shelf rated as 'Endangered'. PEL 82 spans all three of these habitats.

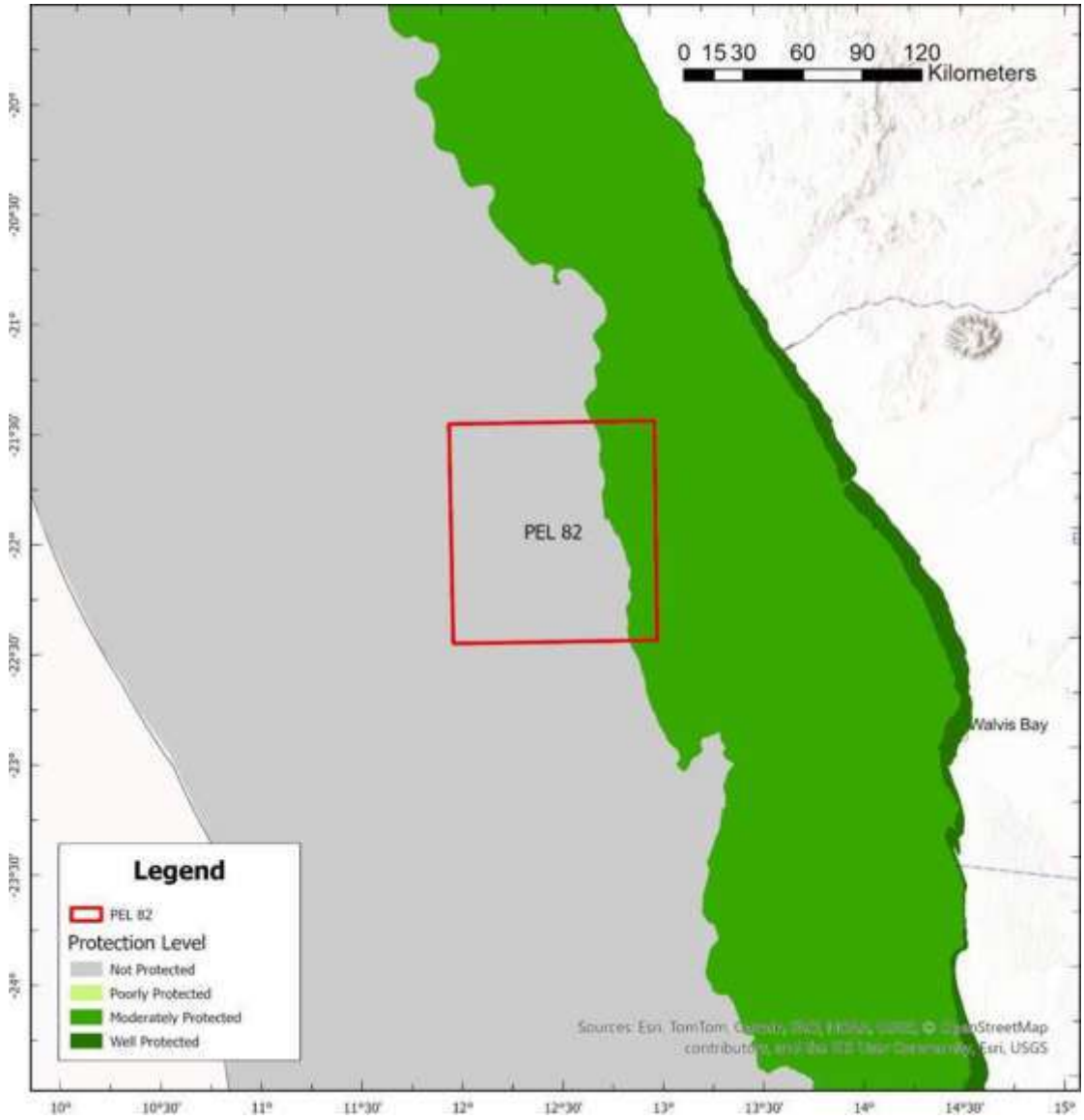
Despite the development of the offshore EBSAs a number of 'Vulnerable' ecosystem types in the broader project area are currently considered 'not well protected' or 'moderately protected' and further effort is needed to improve protection of these threatened ecosystem types (Holness et al. 2014) (Figure 4-36). Ideally, all highly threatened ('Critically Endangered' and 'Endangered') ecosystem types should be well protected. Currently, however, most of the upper and lower slope of the Namib biozone receives no protection at all, with the 'Endangered' Outer Shelf being 'moderately protected'. Most of PEL 82 lies within an area receiving no protection, with only the eastern portion being 'moderately protected'.

4.4.2.5 ECOLOGICALLY OR BIOLOGICALLY SIGNIFICANT AREAS

In the spatial marine biodiversity assessment undertaken for Namibia (Holness et al. 2014), a number of offshore and coastal area were identified as being of high priority for place-based conservation measures. To this end, Ecologically or Biologically Significant Areas (EBSA) spanning the coastline between Angola and South Africa were proposed and inscribed under the Convention of Biological Diversity (CBD). The principal objective of the EBSAs is identification of features of higher ecological value that may require enhanced conservation and management measures. No specific management actions have been formulated for the EBSAs at this stage and they carry no legal status. Any future decisions in relation to management of the areas and possible restrictions of human activities are within the mandate of the responsible authorities.

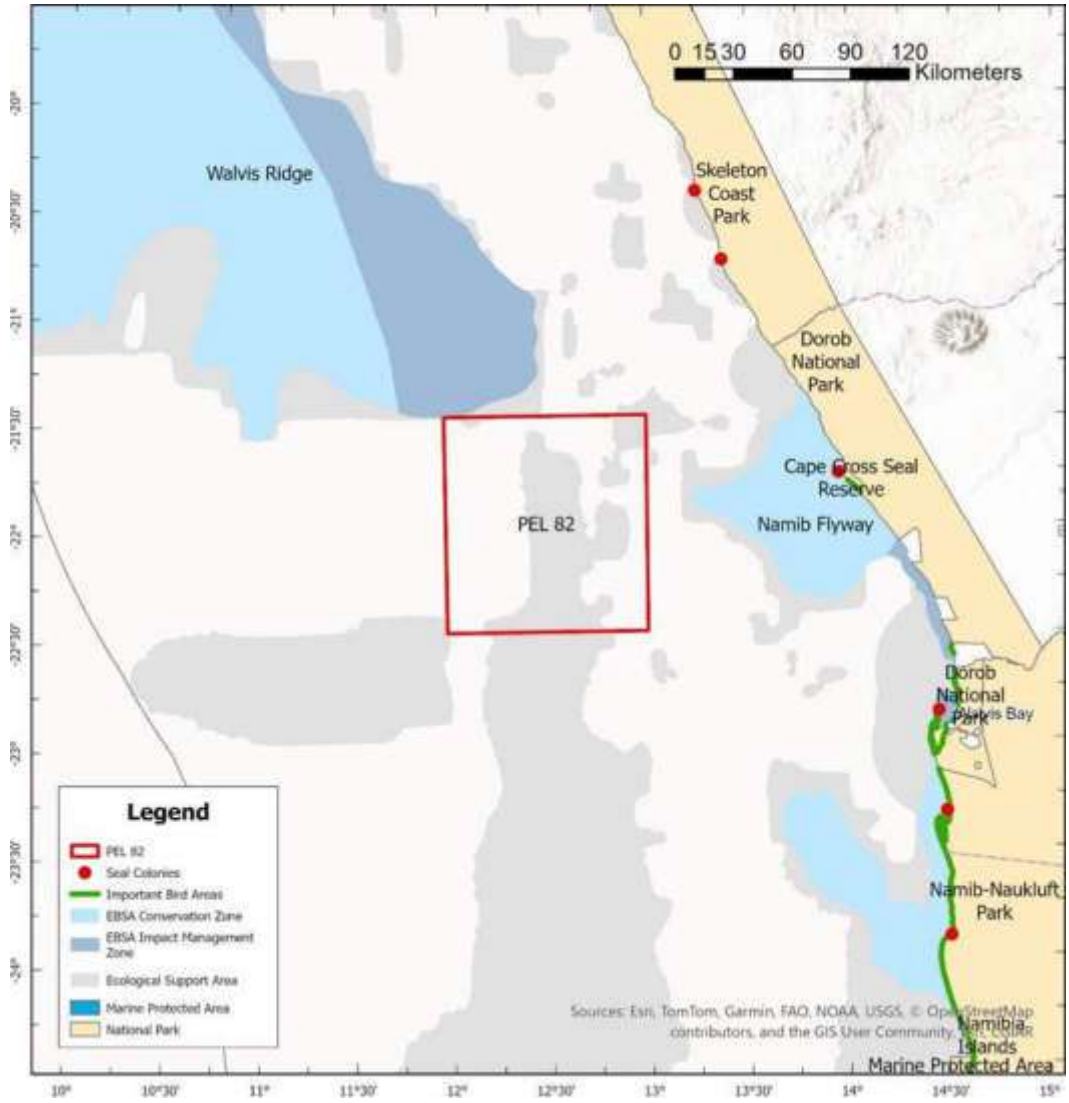
Of the eight identified EBSAs off Namibia, two fall solely within Namibian national jurisdiction (Namib Flyway and Namibian Islands), while one is shared with Angola (Namibe) and two are shared with South Africa (Orange Shelf Edge and Orange Cone) (Figure 4-37). The Benguela Upwelling System transboundary EBSA extends along the entire southern African West Coast from Cape Point to the Kunene River and includes a portion of the high seas beyond the Angolan EEZ.

FIGURE 4-36 PEL 82 IN RELATION TO THE PROTECTION LEVELS OF BENTHIC HABITAT TYPES



Source: Holness et al., 2014.

FIGURE 4-37 SEAL COLONIES, IBAS, MPAS & EBSAS IN THE PROJECT AREA



Source: Esri, 2025; FAO, 2025; NOAA 2025.

The Walvis Ridge Namibia EBSA lies contiguous to the Walvis Ridge EBSA in the high seas (Figure 4-37). Together, these two EBSAs span the full extent of the significant hotspot track (seamount chain formed by submarine volcanism) that comprises the aseismic Walvis Ridge and the Guyot Province. This unique feature forms a submarine ridge running north-east to south-west from the Namibian continental margin to Tristan da Cunha and Gough islands at the southern Mid-Atlantic Ridge. The Walvis Ridge Namibia EBSA encompasses the globally rare connection of a hotspot track to continental flood basalt in the Namibian EEZ. Given the high habitat heterogeneity associated with the complex benthic topography, it is likely that the area supports a relatively higher biological diversity, and is likely to be of special importance to vulnerable sessile macrofauna and demersal fish associated with seamounts. Productivity in the Namibian portion of Walvis Ridge is also particularly high because of upwelling resulting from the interaction between the geomorphology of the feature and the nutrient-rich, north-flowing Benguela Current.

The Namib Flyway is a highly productive area in the Benguela system that attracts large numbers of sea- and shorebirds, marine mammals, sea turtles and other fauna. PEL 82 lies offshore of this EBSA.

The Benguela Upwelling System is a transboundary EBSA and is globally unique as the only cold-water upwelling system to be bounded in the north and south by warm-water current systems, and is characterized by very high primary production (>1,000 mg C/m²/day). It includes important spawning and nursery areas for fish as well as foraging areas for threatened vertebrates, such as sea- and shorebirds, turtles, sharks, and marine mammals. Another key characteristic feature is the diatomaceous mud-belt in the Northern Benguela, which supports regionally unique low-oxygen benthic communities that depend on sulphide oxidising bacteria. PEL 82 falls within this EBSA.

4.4.2.6 BIODIVERSITY PRIORITY AREAS AND MARINE SPATIAL PLANNING

In addition to EBSAs, Ecological Support Areas (ESAs) have been identified. Although these areas do not meet the EBSA criteria they reflect secondary priority conservation areas with special attributes that support a healthy and functioning marine ecosystem (Figure 4-37). ESAs cover 37.4% of the total area of PEL 82.

Namibia recently embarked on a Marine Spatial Planning (MSP) process implemented as a development planning approach to organize the use of the country's marine territory in such way that comprehensive, integrated and complementary planning and management across sectors and for all ocean uses is enabled. MSP in Namibia is highly precautionary and forward-looking given the relatively low intensity of current uses, has a strong ecosystem-based perspective due to the fairly pristine environment, is driven by a social equity and distributive justice agenda, and features a strong collaborative process governance (Finke et al. 2020a, 2020b). Although at this stage MSP lacks legislation and has only weak links to broader ocean governance, the MSP process has resulted in a clear framework for the development of the first marine plan (MFMR 2019), as it was linked to a systematic conservation planning process from the outset.

The objectives and principles for MSP, as well as the steps each planning process is expected to follow, are set out in the National MSP Framework (MFMR 2019). The Framework provides high-level direction to ensure consistent and coherent plan development, implementation and review across Namibia's marine space and its three proposed planning areas: a northern, central and southern area. It also describes the background to MSP and its overarching objectives in Namibia and identifies relevant institutional structures, roles and responsibilities (MFMR 2022). The first MSP for Namibia is being developed for the central area, followed by the northern and the southern areas. Although all three areas have sites of high ecological sensitivity and importance, growing economic interests and increasingly overlapping human uses, particularly in the central and southern MSP areas call for improved management.

The Marine Spatial Plans in each of the three planning areas will translate the National Framework for MSP into integrated and strategic sustainable development plans that guide users, developers and regulators in their decision-making, setting out which activities should take place where, when and under what conditions. Any future licensing decisions would need to be in line with the provisions set out in the respective plans.

4.4.2.7 RAMSAR SITES AND IMPORTANT BIRD AREAS

The Walvis Bay wetland was proclaimed a Ramsar site in December 1995, supporting up to 250,000 birds at peak times during the summer season and about 80,000 to 100,000 birds during winter (Wearne & Underhill 2005). The wetland serves primarily as a dry-season and drought refuge for intra-African migrants and as a non-breeding area for Palaearctic migrants.

Sandwich Harbour, a natural tidal lagoon, is located 55 km south of Walvis Bay. The area hosts upwards of 70,000 birds, mostly seasonal migrants from the northern hemisphere (Kolberg 2015). It was proclaimed a Ramsar site in December 1995.

These coastal Ramsar sites all lie more than 100 km to the east and south of PEL 82.

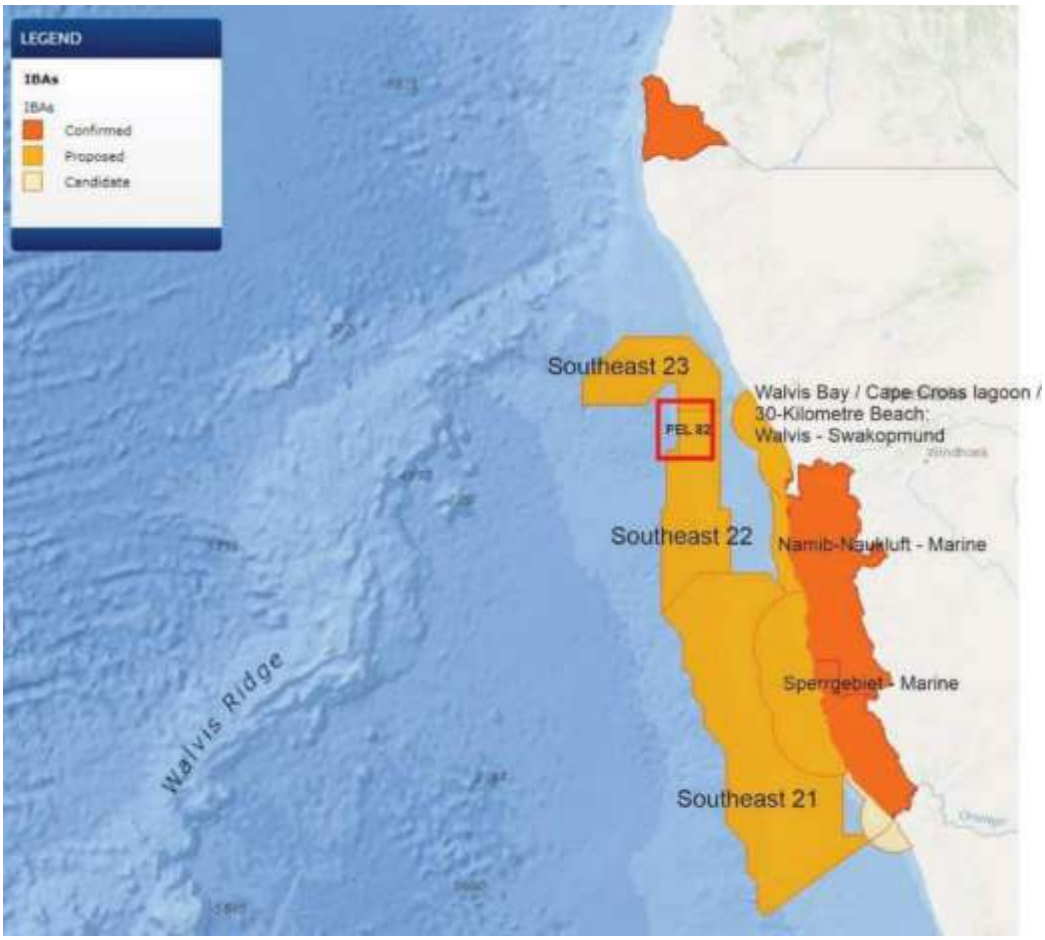
TABLE 4-9 LIST OF COASTAL RAMSAR SITES IN THE AREA OF INFLUENCE OF PEL 82.

Name	Size (ha)	Description
Walvis Bay Wetlands	10,550	Ramsar site no. 742. A tidal lagoon consisting of adjacent intertidal areas, Pelican Point, mudflats exposed at low tide, and sandbars serving as roosting sites. The site supports varying numbers of wetland birds (37,000 to 79,000 individuals); some species such as flamingos occur in large numbers. Eleven endangered bird species are regularly observed. Human activities include recreation and salt production. Residential development exists along the lagoon, and natural siltation may eventually lead to its infilling.
Sandwich Harbour	13,825	Ramsar site no. 743. Two distinct wetlands and associated mudflats. One is aquifer-fed and supports typical emergent vegetation, but is slowly disappearing due to natural causes. The second, under tidal influence, consists of mudflats and raised shingle bars. One of Namibia's most important coastal wetlands, supporting eight endangered species among the large numbers of wading birds. Several archaeological sites dating back 1,000 years exist within the site. The site is used for scientific research, with surrounding areas used for tourism, recreation, and angling.

Source: Ramsar, 2025

Various marine IBAs have also been proposed in Namibian territorial waters, with a candidate trans-boundary marine IBA suggested off the Orange River mouth (Figure 4-38). PEL 82 overlaps with the proposed Southeast 22 and Southeast 23 Marine IBAs to protect Atlantic Yellow-nosed Albatross and White-chinned Petrel.

FIGURE 4-38 PEL 82 IN RELATION TO COASTAL AND MARINE IBAS IN NAMIBIA



Source: BirdLife, 2025

4.5 SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT

The section provides the socio-economic and cultural context within which the project will be developed. This baseline focuses on the Erongo Region as this is the location of the town of Walvis Bay which is the largest settlement closest to PEL 82 and is the location of the port which will be used as the logistics and aviation base for project activities. Project support facilities such as worker accommodation will also be located in Walvis Bay area.

4.5.1 SOCIAL AREA OF INFLUENCE

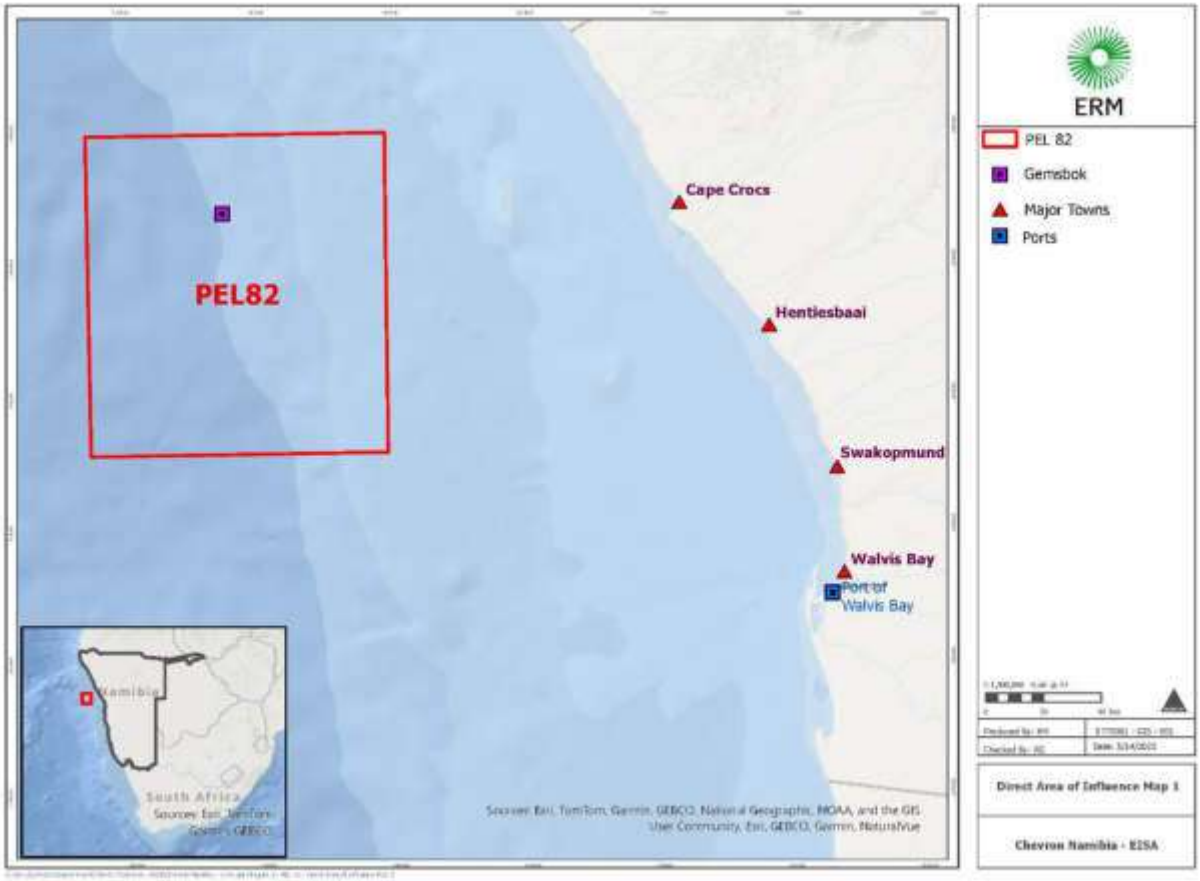
The Social AoI for the proposed project depicts the geographical extent of the potential direct and indirect socio-economic risks and impacts. An AoI can vary depending on the type of impact being considered and the attributes of the potentially affected receptors. The social footprint which has been considered in defining the AoIs for this socio-economic baseline encompasses:

- Onshore and offshore physical project footprints;
- Associated facilities whose viability and existence depend exclusively on the Project and without which the project would not be viable (when applicable);
- Areas potentially affected by impacts from unplanned but predictable events caused by the Project that may occur in the future or at a different location; and

- The project's primary labour-sending areas and areas where income generated from project employment is spent, i.e. the towns and communities that are likely to experience economic benefits following from construction of the Project.

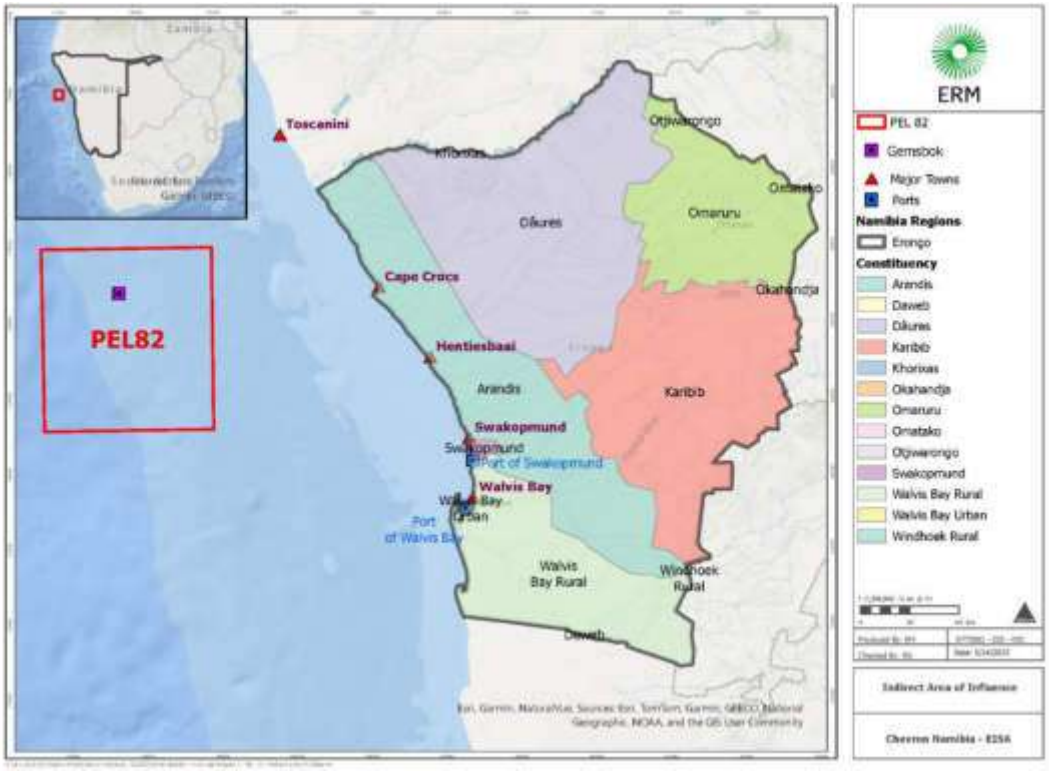
The direct Social AoI is characterised as the area subject to direct effects arising from the implementation of the project. These impacts may occur during mobilisation, drilling and demobilisation phases of the project. The direct Social AoI for the project will include the physical footprint of all project facilities and adjacent areas using a 5 km buffer for onshore project components, taking into account critical infrastructure such as the Port of Walvis Bay, schools, hospitals, and religious sites as well as sensitive receptors such as settlements. For offshore components the direct Social AoI will be inclusive of the PEL 82 License area and the exclusion zone. The Direct Social AoI is shown in Figure 4-39.

FIGURE 4-39 DIRECT SOCIAL AREA OF INFLUENCE



The indirect Social AoI is characterised as a more distant area, which may feel the effects of the project on the socio-economic environment. This includes key labour sending areas (e.g. Swakopmund) for the project and areas that will potentially benefit from economic development associated with the project. The indirect AoI therefore extends to the Urban Constituency of Walvis Bay and the Erongo Region. For the indirect AoI, the effects are perceived in a secondary manner, arising from the most diverse activities related to the project. It must be noted however, that significant socio-economic impacts may still occur in the indirect AoI. The Indirect Social AoI is shown in Figure 4-40.

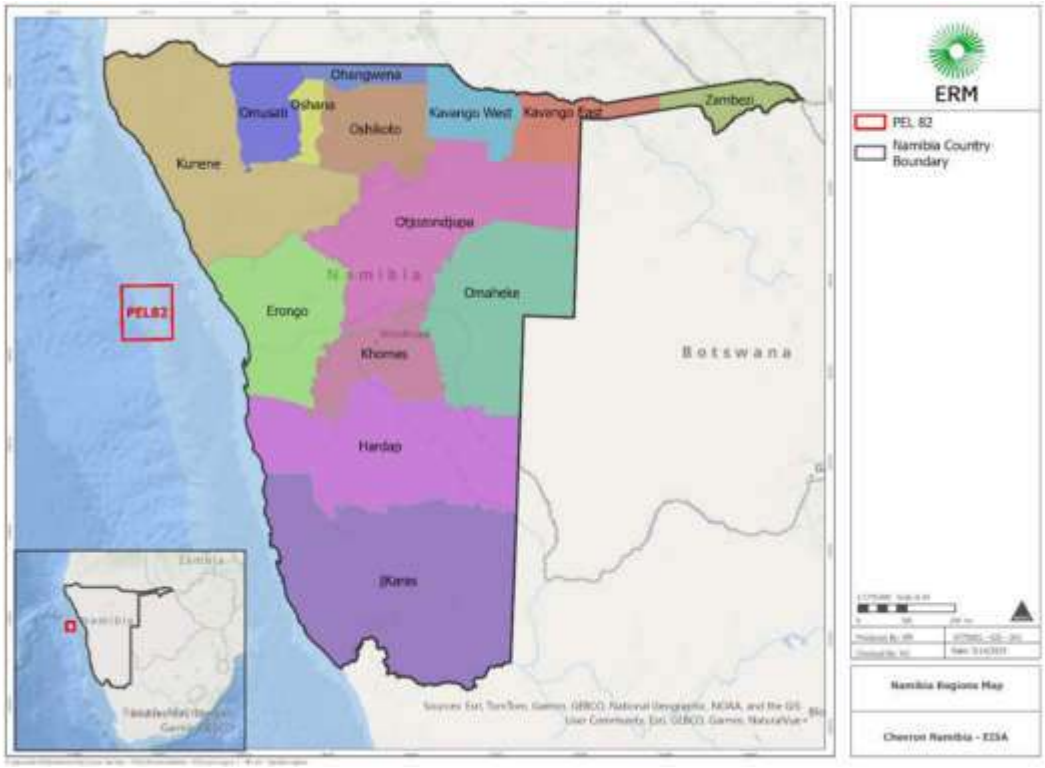
FIGURE 4-40 INDIRECT SOCIAL AREA OF INFLUENCE



4.5.2 GOVERNANCE AND ADMINISTRATION

Namibia is a democratic republic. In Namibia, the first level of local administration are regions. There are 14 regions in the country (refer to Figure 4-41) which are further subdivided into 121 constituencies for electoral purposes.

FIGURE 4-41 REGIONS OF NAMIBIA



Constituencies are headed by councillors that are elected by their constituents in a first-past-the-post system. Regional councillors are elected by the constituency councillors in their region. Regional councils are responsible for running each region with powers established under the Regional Councils Act of 1992.

Within the constituencies that encompass urban areas have local authorities that govern service delivery. Service delivery in rural constituencies is governed by the regional councils in which the constituency is located.

Each region has three local councillors represented in the National Council of Namibia. The National Council is the upper chamber of parliament and is responsible for reviewing bills and making recommendations on legislation with regional implications. Recommendations and reviews of the upper chamber are provided to the National Assembly (lower chamber) that is responsible for passing new laws. The National Assembly includes elected members and members appointed directly by the President (Inter-Parliamentary Union, 2018).

The onshore activities of the project are located in the Erongo Region and the Walvis Bay Urban Constituency. The capital of the Erongo Region in Swakopmund. Other key settlements in the region include Henties Bay and Omaruru.

TABLE 4-10 ERONGO REGION CONSTITUENCIES

Region	Constituency
Erongo	Arandis
	Dâures
	Karibib
	Omaruru
	Swakopmund
	Walvis Bay Rural
	Walvis Bay Urban*

*Indicates the constituency where onshore project activities will occur.

4.5.3 HISTORY OF OIL AND GAS EXPLORATION IN NAMIBIA AND THE ERONGO REGION

Oil exploration in Namibia began in the 1970s with the discovery by Texaco of the Kudu gas field in 1974 in the shallow waters of the coast of the ǁKharas Region, near the town of Oranjemund. This discovery was not developed for several decades and additional exploration by major international oil and gas companies was limited to sporadic exploration drilling that did not yield any promising results. BW Energy is the latest operator to attempt commercialisation of the Kudu gas field. This has focused on a gas-to-power development (Beckman, 2022).

In 2012, new deposits were observed following exploration by the Brazilian company HRT Oil and Gas in the Walvis Basin. However, these deposits were determined to be sub-commercial but encouraged further exploration from other oil and gas companies (Thom, 2023).

In 2022, it was announced by Shell and TotalEnergies that large deposits of oil and gas has been discovered at their exploration well sites in the Orange Basin that could potentially be

exploited. The discover of potentially commercial deposits led to a significant increase in exploration activity in Namibian waters by international companies. Further major oil deposit discoveries have been made by Galp Energia in 2024 in the Mopane field. Currently, Namibia has 230,000 square kilometres of licensed acreage where companies have been granted the right to exploration and potential extraction of oil and gas. It is expected that further significant exploration will take place (Milewski, 2025).

Exploration is at a relatively early stage and there is still a high level of uncertainty about how the oil and gas fields may be developed in terms of design concepts, timing and production levels, among others.

PEL 82 in the Walvis Basin, which includes the mopane field previously explored by Galp Energia, has now been acquired by Chevron who hold a majority participating interest and operatorship. Custos Energy and the National Petroleum Corporation of Namibia have also retained a minority interest in the block. PEL 90 has also been explored by Chevron. PEL 87 was expected to have exploration drilling in 2025 by Woodside. It is not clear at this stage if this exploration will take place (Terblanche, 2025).

It is unclear how much the oil and gas sector contributes to the Namibian economy currently as exploration is still at an early stage and large scale operations have not started. An Oil and Gas Industrial Baseline Survey conducted by Deloitte Namibia has estimated that the sector (based on a single potential project) may contribute an average of US$648 million to Gross Domestics Product (GDP) per year during production. During the construction phase, it is expected that the sector will contribute US$113 million per year. The primary drivers for GDP growth from the sector will be gross operating surplus and an increase in income for skilled labour. Key sectors expected to benefit from a growth in the oil and gas sector include transport, wholesale and retail trade, and private services (Mining and Energy, 2024).

4.5.4 DEMOGRAPHICS

A population and housing census was conducted in Namibia in 2023. This census recorded the population of Namibia at 3,002,401. This is an increase from 2,113,077 in 2011 (an increase of 42.1%). This is the largest percentage change in population size that has been observed in the country. Females account for 51.2% of the population while males account for 48.8%. There is a relatively even split between the urban and rural populations in the country. The census recorded and urban population of 1,512,685 and a rural population of 1,509,716. There are 756,339 households in Namibia. The average household size is 3.8 persons. Overall, 49% of households in Namibia are female-headed. Around 0.9% of households are child-headed (17 years or younger). This is a reduction from 1.1% in 2011. Child-headed households are more common in rural areas. Persons with disabilities are present in 11.9% of households in Namibia. In rural areas, 16.4% of households have persons with disabilities. Elderly people (aged 60 and above) headed 18.1% of households in the country. Significantly more households in rural areas are headed by elderly people (27.7%) than in urban areas (10.1%).

The Erongo Region has a population of 240,206, the majority of which is male (50.9%). The population of the Erongo Region has grown by 59.2% since 2011 and accounts for 7.9% of the total population of Namibia. Erongo is the 5th most populous region within Namibia.

There are 74,795 households in Erongo with an average household size of 3.1 persons (slightly smaller than the national average). Overall, 42.7% of households in Erongo are female-headed. Around 0.5% of households in Erongo are child-headed. Persons with disabilities are

present in 7% of households in the region. Elderly people (aged 60 and above) headed 10.9% of households in the region (similar to the national average for urban areas).

Walvis Bay is located on the coastline of the Erongo Region and is the second largest city in the country after Windhoek (when combining the Walvis Bay urban and rural constituencies). It is the largest coastal city. The urban constituency is home to Namibia's largest commercial port (The Port of Walvis Bay).

The Swakopmund Constituency has a population of 75,921. The population of Walvis Bay Urban is 51,618 and the rural constituency has a population of 51,497 (total population in the town of Walvis Bay was considered 102,704). The average household size in Walvis Bay Urban is 3.1, the same as the national average.

Namibia has a relatively young population which is also reflected within the Erongo Region. A significant proportion of the population is aged between 15-34 years while the population aged over 60 years is small. The Walvis Bay Urban Constituency has a slightly older population than the Namibian and Erongo averages. However, the population aged over 60 years in the urban constituency is smaller. The population in the rural parts of Walvis Bay is younger than in the urban constituency as shown in Table 4-11.

TABLE 4-11 PERCENTAGE AGE DISTRIBUTION 2023

Age Groups	Namibia	Erongo	Walvis Bay Urban	Walvis Bay Rural
0-4 years	13.7%	11%	9.7%	11.2%
5-14 years	23.3%	18.6%	17.2%	19.5%
15-34 years	34.1%	36.4%	36.7%	37.9%
35-59 years	22%	28.3%	31.8%	29%
60+ years	6.8%	5.8%	4.7%	2.4%

Source: Namibia Statistics Agency, 2024

The elderly population is Namibia is most likely to live in rural areas while the working age population (15-59 years) is most likely to live in urban areas where this age group constitutes 63.2% of the population compared to only 49.1% of the rural population.

The Erongo Region has a high percentage of youth aged 25-34 years old compared to national averages where the largest youth population is aged 15-24 years.

The age distribution of Namibia and the Erongo Region are typical of a population with a high fertility rate and a high mortality rate. When disaggregating by rural and urban areas, urban areas tend to have larger youth and working age population, associated with rural-urban migration often precipitated by improved employment and education opportunities in larger towns and cities.

The median age in Namibia is 22 with the median age in urban areas being 24 while rural areas have a median age of 19 years. The median age in the Erongo Region is higher than the national average at 27 years. This has increased from 24 years in 2011. This is indicative of a large working age population.

Namibia is a sparsely populated country with the highest population densities seen in the Onhangwnea and Oshana Regions. The Khomas Region, which includes the National Capital of

Windhoek, has a density of 13.48 people per square kilometre. The Erongo Region has a population density of 3.8 people per square kilometre. However, the population densities are significantly high in urban settlements with the Swakopmund Constituency having a density of 386.7 people per square kilometre and Walvis Bay Urban having a density of 2,730.8 people per square kilometre (Namibia Statistics Agency, 2024).

The population of Namibia is ethnically diverse. The Aakwanyama ethnic group accounts for the highest percentage of the population with 23.6%, followed by Aandonga (10.3%), OvaHerero (5.9%), and Damara (5.6%) (Namibia Statistics Agency, 2024). At the time of the 2011 census, Oshiwambo was spoken as the main language by 38.8% of households in the Erongo Region. This was followed by Afrikaans (20.4%), and Nama/Damara (18.8%) (Namibia Statistics Agency, 2014).

4.5.5 VULNERABLE GROUPS

Vulnerable people or groups are those who may be more adversely affected by project impacts than others by virtue of characteristics such as their gender, gender identity, sexual orientation, religion, ethnicity, Indigenous status, age (including children, youths and the elderly), physical or mental disability, literacy, political views, or social status. Vulnerable individuals and/or groups may include, but are not limited to, people living below the poverty line, the landless, single-headed households, natural resource dependent communities, migrant workers, refugees, internally displaced people, or other displaced persons who may not be protected through national legislation and/or public international law.

Vulnerable groups (Table 4-12) which may be present within the Social AoI include women, children, youth, the elderly, people with disabilities, people living on low incomes, artisanal fishers, ethnic minorities, and foreign nationals.

TABLE 4-12 POTENTIALLY VULNERABLE GROUPS IN THE SOCIAL AOI

Vulnerable Group	Description and Relationship to the Project
Women	Owing to the nature of traditional and domestic relations, women may be reliant on the male members of the family for financial support and participation in public decision-making. Women have fewer employment opportunities and are more likely to work in low-income, part-time or informal jobs. Women heads of household are more often vulnerable due to reduced access to financial resources and reduced voice in public decision-making.
Children	To access assets / resources, children are often reliant on older members of the household or community. When a child is not adequately represented by an adult, from a low-income family, or an ethnic minority, they may be vulnerable to exploitation within the community or workplace. Children may be more vulnerable to health impacts of environmental changes (e.g., air emissions) generated by the construction phase of the project. Child-headed households may also be present within the Social AoI. The households would be particularly vulnerable as they will lack access to resources and assets and are less likely to be able to benefit from the project (e.g. through employment).
Youth (18-24)	Youth may be vulnerable in terms of access to assets, education, or employment opportunities. Youth are present throughout the Social AoI. Impacts are likely to be limited to employment and expectations of economic benefits from the project.

Vulnerable Group	Description and Relationship to the Project
Elderly	The elderly may be vulnerable in terms of access to assets. Elderly people tend to live on low incomes (e.g. from pensions). Additionally, elderly people will have a baseline health status that may make them more vulnerable to health impacts from environmental changes generated by the project. By virtue of their age, elderly people may not be able to fully benefit from the project as positive impacts will be predominantly liked with employment.
People with Disabilities	People with disabilities can have various barriers that can obstruct their full and effective participation in society compared to other people. As such, people with disabilities may not be able to fully benefit from the project (e.g. employment) or may be vulnerable to exploitation within the community or workplace (including in the project supply chain). People with disabilities are present throughout the Social AoI.
People Living on Low Incomes	Low-income households have fewer resources on which to rely and are less likely to have savings and/or access to credit, which makes them vulnerable to shocks and change. Low-income households are present in the Social AoI and may be directly affected by the project's employment opportunities, including negatively due to unequal opportunity or positively if they can access employment.
Artisanal Fishers	Artisanal fishers are present within communities in the Erongo Region. Their livelihoods are centered on natural resources in coastal zones and rivers. They are particularly vulnerable to environmental changes. Artisanal fishers may be directly impacted by the project through changes in the marine environment as well as restrictions on access to certain fishing areas during mobilisation and exploration.
Ethnic Minorities	Some ethnic groups may have strong connections to traditional ways of life centered on natural resources. These groups may be resistant to the adaptations required as a result of the presence of a project. Ethnic Minorities also tend to be socially marginalised and lack adequate access to essential services such as healthcare and educations. This can exacerbate their vulnerability to changes caused by the project. The Topnaar (a clan of the Nama) are an Indigenous Peoples group present within the Erongo Region.
Foreign Nationals (with/without legal rights of residence)	Individuals from different countries may be less able to access social and economic resources and may also be at risk of xenophobic action. If the foreign nationals have no legal rights to reside in Namibia and/or are illegally occupying a plot / dwelling, they may be more vulnerable to exploitation in the community or workplace.

4.5.6 ECONOMY AND LIVELIHOODS

In 2023, the working age population (15 + years) in Namibia was 1,876,122 of which 867,247 were in the labour force (46.2%). Of the 1,008,875 individuals outside of the labour force, 33.3% have the potential to be in the labour force (i.e. are willing to become jobseekers). A further 66.1% do not want to join the labour force due to the fact that they are studying, have family responsibilities, are retired and have and injury/illness/disability. The majority of people who are outside the labour force cite family responsibility as the primary reason (44.8%), followed by studying (27.9%).

Within the labour force, 63.1% are currently employed while 36.9% are unemployed. The labour force is concentrated in urban areas (66.7%) and is dominated by men (53%). The largest segment of the labour force is in the 30-34 age group. Females have the largest share of the population outside the labour force (58.3%). Factors that contribute to the larger number of females outside of the labour force include societal expectations around gender

roles, domestic duties, and family responsibilities such as childcare. Women tend to be primary care givers within their households which limits their opportunities to enter the labour force (Oyadele and Amulungu, 2025). Additionally, 66.7% of the working age rural population are outside the labour force compared to 42.7% of the urban working age population.

The Erongo Region has 8.8% of the national working age population, 12.3% of the national labour force, and 5.8% of the national population outside of the labour force. Erongo has the second highest proportion of the labour force after the Khomas Region which is significant given that it is only the 5th most populous region. In Erongo, 35.6% of the working age population are outside of the labour force, this is the lowest share observed across all regions in Namibia. The Region has a labour force participation rate of 64.4% which is higher than the national average (46.2%) (Namibia Statistics Agency, 2024).

In 2011, in the Walvis Bay Urban Constituency, the labour force participation rate was 81%, the employment rate was 73% and the unemployment rate was 27%. A further 15% of those aged 15 and over were outside of the labour force. The Walvis Bay Rural Constituency had a labour force participation rate of 85%, and employment rate of 68%, and an unemployment rate of 32%. Of the population aged 15 and over in the Constituency, 11% were outside the labour force. Labour force participation was higher in Walvis Bay Urban and Rural than the regional average (79%). Additionally, the unemployment rate in Walvis Bay Urban was lower than the regional average (30%). Constituencies such as Daures had notably lower labour force participation (66%) in 2011 (Namibia Statistics Agency, 2014).

Employment in Namibia is mostly derived from the agriculture, forestry and fishing sectors as shown in Table 4-13. In the Erongo Region, key sectors include manufacturing, wholesale and retail trade, and agriculture, forestry, and fishing (Namibia Statistics Agency, 2022).

TABLE 4-13 EMPLOYMENT BY INDUSTRY SECTORS

Sector	% of Employment in Namibia (2023)	% of Employment in Erongo (2021)
Agriculture, forestry, and fishing	16.%	14%
Mining and quarrying	2.6%	1%
Manufacturing	9.8%	17%
Electricity, gas, steam, air conditioning supply	0.3%	0%
Water, sewerage, waste management, remediation	0.4%	0%
Construction	5.2%	3%
Wholesale and retail trade, repair of motor vehicles and motorcycles	10%	19%
Transport and storage	3.3%	5%
Accommodation and food	5.4%	9%
Information and communication	1.5%	0%
Financial and insurance	3.1%	1%
Real estate	0.2%	0%
Professions, scientific, and technical	2.9%	2%

Sector	% of Employment in Namibia (2023)	% of Employment in Erongo (2021)
Administrative and support services	9.3%	7%
Public administration and defense, compulsory social security	6.6%	6%
Education	7%	7%
Human health and social work	3.4%	3%
Arts, entertainment, and recreation	0.6%	1%
Other services	4.4%	2%
Subsistence production	7.9%	-
Extraterrestrial organisations	0.1%	0%

Source: Namibia Statistics Agency, 2024

The Erongo Region has a share of 16.7% of the total employment within the manufacturing sector. This is the largest share of all the regions in the country. Erongo has 12.1% of the share of employment in agriculture, forestry, and fishing, having the largest percentage of people employed in fishing at 5,285 from the total of 8,391 for the whole country.

Agriculture in the Erongo Region is dominated by livestock rearing (primarily sheep and goats), followed by crop farming (maize, sorghum, and wheat) and poultry. However, the agricultural sector within Walvis Bay is relatively small. At the time of the 2011 census, only 2.1% of households in Walvis Bay Urban and 5.2% in Walvis Bay Rural were engaged in livestock rearing (Namibia Statistics Agency, 2014). Given the urban and peri-urban nature of these two constituencies, the low engagement in agriculture is expected.

Of the employed persons in Namibia, 17.9% earn a gross monthly salary/wage of N$1,000 or less, 16.2% earn N$1,000 to N$2000, 11% earn N$2,001 to N$3000, and 10% earn N$3,001 to N$5000. Only 2.6% of those who are employed earn more than N$40,000 per month (Namibia Statistics Agency, 2024).

Most households in Namibia derive their livelihoods from wages or salaries (46.6%), followed by pensions (13.8%), subsistence or commercial farming (10.6%), business activities (9%), social grants (2.6%), and child support (2.4%). In rural areas, pensions (21.8%) and farming (22.2%) are more common sources of income for households with salaries and wages supporting 30.8% of household's livelihoods.

The unemployment rate in Namibia was 36.9% in 2023, an increase from 33.4% in 2018. Unemployment is marginally higher in rural areas (38%) compared to urban areas (36.4%). The unemployment rate in the Erongo Region is 32%, the fourth lowest rate seen nationally. Lower unemployment rates are seen in the ǁKharas Region (29.7%), Omaheke Region (30.3%), and Otjozondjupa Region (31.2%). The highest unemployment rate is observed in the Kavango West Region (52.8%). Nationally, unemployment is most pervasive amongst younger persons, especially the 15-19 year age group (57.7%). Females generally experience higher unemployment (39.6%) than men (34.6%). Individuals that are able to attain a tertiary education have the lowest level of unemployment (17.7%) compared to a 42.6% unemployment rate for individuals who have only completed a primary level education.

The informal economy in Namibia is significant. It has been reported that in 2023, informal economic activities contributed to around 24.7% of the country's gross domestic product (GDP). The informal sector is also one of the key sectors for employment. In countries with high population growth like Namibia, the informal economy is vital for absorbing the growing labour force. However, there are no safeguards within the informal economy to ensure decent work (working hours, income, skills development, etc.). Therefore, engagement with the informal economy is often linked with vulnerabilities and poverty.

The informal economy in Namibia includes subsistence agriculture, artisanal mining, trading (markets, street vendors, hawkers, rural retail stores, etc.), transport (unregistered taxis), and small loan and savings schemes. Informal employment accounts for 57.7% of total employment in Namibia. Informal employment is more common amongst females (Ministry of Industrialisation and Trade, 2024).

The informal sector within the Erongo Region is not considered a major component but does contribute to the local economy and employment creation. The informal economy is primarily centred on trade where individuals by good from wholesalers and suppliers within the formal sector and then resell the goods within informal markets. Overall, the informal sector in Namibia is estimated to contribute around 24% to national GDP. However quantitative data on the contributions of this sector are not accounted for in national statistics. People in this sector face numerous challenges due to a lack of labour rights, poor social protection, and lack of access to finance and credit (The Brief, 2025).

In 2023 Namibia had a Human Development Index (HDI) value of 0.665. This equated to a medium level of development. Namibia's HD score has been steadily improving since 1990 which has been linked to improving life expectancy and education access (United Nations Development Programme, 2025). However, this development has not been experienced equally across the country. When the HDI score is adjusted for inequality, it falls considerably. Inequality in Namibia are often tied to income, wealth distribution and the availability of opportunities differing significantly between men and women, urban and rural areas, and different groups in society. When people do not have the same opportunities as others, they limited in their ability to benefit from advancements in HDO dimensions. Further challenges are faced due to disparities in access to land and housing. Women tend to be particularly disadvantaged in respect to income, health, and security. The urban-rural divide is particularly apparent in the disparities in access to education (United Nations Namibia, 2020).

According to a report on the Multidimensional Poverty Index (MPI) from 2021, more than 43.3% of the population of Namibia live in multidimensional poverty. The MPI score for Namibia in 20221 was 0.191 with an intensity of poverty of 44%. This means that poor people in Namibia on average experience 44% of the weighted deprivations considered within the index. Poverty in rural areas is much higher than in urban areas of the country (59.3% and 25.3% respectively). Poverty is higher in female-headed households and larger households (Namibia Statistics Agency, 2021).

4.5.6.1 COMMERICIAL AND ARTISANAL FISHING

Namibia is the second largest exporter of fish and other seafood products in Africa. The industry contributes significantly to national food security, economic growth, job creation, and foreign earnings through exports. The commercial fishing industry is mostly focused on horse mackerel and cape hake. However, the commercial fishing industry is under strain as previous

overfishing has led to depleting fish reserves. The government has responded by reducing fishing quotas which has led to a decline in landings. There has been some offset as high demand and growing prices have compensated for smaller catches. Potential impacts to the fishing industry associated with the offshore oil and gas industry, such as seismic impacts, will need to be monitored as further exploration takes place and potential projects may move into operations.

In order to compensate for the pressures on traditional commercial fishing there are plans to grow the aquaculture sector for the offshore farming of oysters and abalone. However, this is in conflict with the offshore mining and oil and gas prospects in Namibian waters. There is also a growing interest in the cultivation of seaweed and kelp.

Commercial fishing in Namibia is done by foreign companies such as Oceana (South African) and NovaNam (Spanish), the state-owned National Fishing Corporation (Fishcor) as well as smaller local companies such as Tunacor and Etosha Fishing.

In recent years there have been a series of scandals where fishing companies have been paying bribes to government officials in order to secure more fishing quotas. Some species of fish are being caught at unsustainable levels by foreign vessels.

Artisanal fishing in Namibia includes small-scale and community-based fishing activities that use simple technology and traditional methods the catch marine resources. Fish and other seafood products caught by artisanal fishers are typically for local consumption and trading. In Namibia artisanal fishers mostly catch species such as snoek, kob, and linefish. According to the Food and Agriculture Organisation (FAO) small-scale and artisanal fisheries contribute positively to the lives of at least 40,000 Namibians through directly supporting livelihoods in fishing, processing and trading. This contributes positively to food security and poverty alleviation (The Namibian, 2022).

The Topnaar community in Erongo are known to be engaged in artisanal fishing. Communities such as the Topnaar do face challenges in artisanal fishing due to their marginalised status. These communities tend to have high rates of poverty and are sometimes exploited by middlemen and other merchants that unfairly control the trade of fish and other seafood products in local markets. Other challenges faced by artisanal fishers include rising costs for fishing equipment, overfishing, and variabilities in catch. This has made artisanal fishers particularly vulnerable as their livelihoods are uncertain. According to the Hanganeni Artisanal Fishing Association (HAFA) artisanal fishers can earn up to N$20,000 per month. Artisanal fishing associations such as HAFA provide support to members through providing spaces for them to sell fish. HAFA has also established a take-away food business in Henties Bay that prepares and sells fish dishes using fish caught by their members. The association has also bought boats and other fishing equipment and employs members as full-time crew to catch fish and work in processing facilities (Daniels, 2020). Women tend to play a vital role in handling and processing of the catch of artisanal fishers.

4.5.7 EDUCATION

In Namibia, 87.3% of the population aged 15 years and over is considered literate. There is no significant difference in the literacy rates of males and females. The 2023 census results show that literacy is highest in urban areas (93.8%) and significantly lower in rural areas (79.6%). Literacy is highest among the youth population aged 15-34 years. The Erongo Region has a literacy rate of 95.4% for individuals ages 15 years and over. The higher literacy rate may be

linked to the urban and peri-urban nature of parts of the Region where access to education will be improved compared to more rural and isolated regions.

School attendance in for the population aged 6 years and over in Namibia and Erongo is detailed in Table 4-14. School attendance in Erongo is better than in Namibia on average with 4% of the population in the region having never attended school compared to 9.7% nationally. Given that the population of Erongo is slightly older than the national average it is expected that a smaller proportion of the population are currently attending school and a larger proportion have left education compared to national averages.

TABLE 4-14 EDUCATION ATTENDANCE 2023

Education Level	% Attendance for Namibia	% Attendance for Erongo
Never attended	9.7%	4%
Pre-primary	2.1%	1.8%
Primary and secondary	31.2%	24.1%
Tertiary	5.3%	5.1%
Adult Education	0.3%	0.1%
Left education	50%	63.4%
Unknown	1.4%	1.5%

Source: Namibia Statistics Agency, 2024

Of the population aged 6 to 24 years, the enrolment rate in education is 76.5% in Namibia. School enrolment is slightly higher in urban areas (78.4%) than in rural areas (74.6%). The Erongo Region has a slightly lower enrolment rate than the national average at 74.2%. The Kunene Region has the lowest enrolment rate at 54.3%. School attendance in Namibia is mandatory for persons aged 6 to 17 years. There are generally good enrolment rates for children aged 6-14 years (peaking at 94.5% for 11 year olds). However, from 15 years of age, enrolment appears to drop significantly, with 82.2% of 17 year olds and 70.9% of 18 years olds still in school. Only 23.8% of 24 year olds are enrolled in education, highlighting the small number of individuals that are attaining a tertiary education.

The majority of the population aged 15 years and over in Namibia have completed primary school as their highest level of educational attainment as shown in Table 4-15. Only 11.8% of those aged 15 and over have completed a tertiary level education. Marginally more females have completed tertiary education (12.2%) than males (11.4%) (Namibia Statistics Agency, 2024).

TABLE 4-15 EDUCATION ATTAINMENT IN NAMIBIA

Education Level	Namibia
No formal education	1.2%
Incomplete primary education	15.1%
Primary education	44.7%
Secondary education	24.8%

Education Level	Namibia
Tertiary education	11.8%

Source: Namibia Statistics Agency, 2024

The educational attainment of the population aged 6 years and over within the Erongo Region and Walvis Bay is detailed in Table 4-16 below. Educational attainment does not vary significantly between Erongo and Walvis Aby. Both Walvis Bay Urban and Rural constituencies have a greater proportion of the population completing higher levels of education than the average for the region. Notably a tertiary education in most common in Walvis Bay Urban.

TABLE 4-16 EDUCATION ATTAINMENT IN THE ERONGO REGION

Education Level	Erongo	Walvis Bay Urban	Walvis Bay Rural
No formal education	1%	1%	1%
Primary education	27%	23%	26%
Secondary education	57%	59%	60%
Technical/vocational	3%	3%	3%
Tertiary education	9%	11%	9%

Source: Namibia Statistics Agency, 2024

The Namibian government has improved access to education through increasing the proportion of the national budget spent on this sector. Between 2012 to 2019 expenditure on the development of educational infrastructure rose substantially. Construction of new schools has improved access for children. In 2010 48.6% of children had access to their nearest primary school that was within one km of their homes. However, access to schools in rural areas is still a challenge with many children having to travel significant distances to reach their schools. Access to pre-primary education also remains limited in the country. The learner to teacher ratio in 2016 in Namibia was 1:25.5. This represented a slight increase from 2012 (1:25.1). The ratio ranges quite significantly between regions. For example, in 2016 the ratio in the Zambezi Region was 1:22.8 while in the Kavango East Region it was 1:31.7. It is estimated that at least 9% of schools in 2016 had a suboptimal learner to teacher ratio (UNICEF, 2017).

4.5.8 HEALTH

According to the World Health Organization (WHO), life expectancy at birth was 60.4 years in 2021 for Namibia. Life expectancy is higher for females (63.4 years) compared to males (57.3 years). The average life expectancy at birth for Namibia is lower than the average for Africa (63.6 years). Life expectancy in the country has been improving rising from 53 years in 2000. However, this improvement is occurring at a slower rate than the African region as a whole.

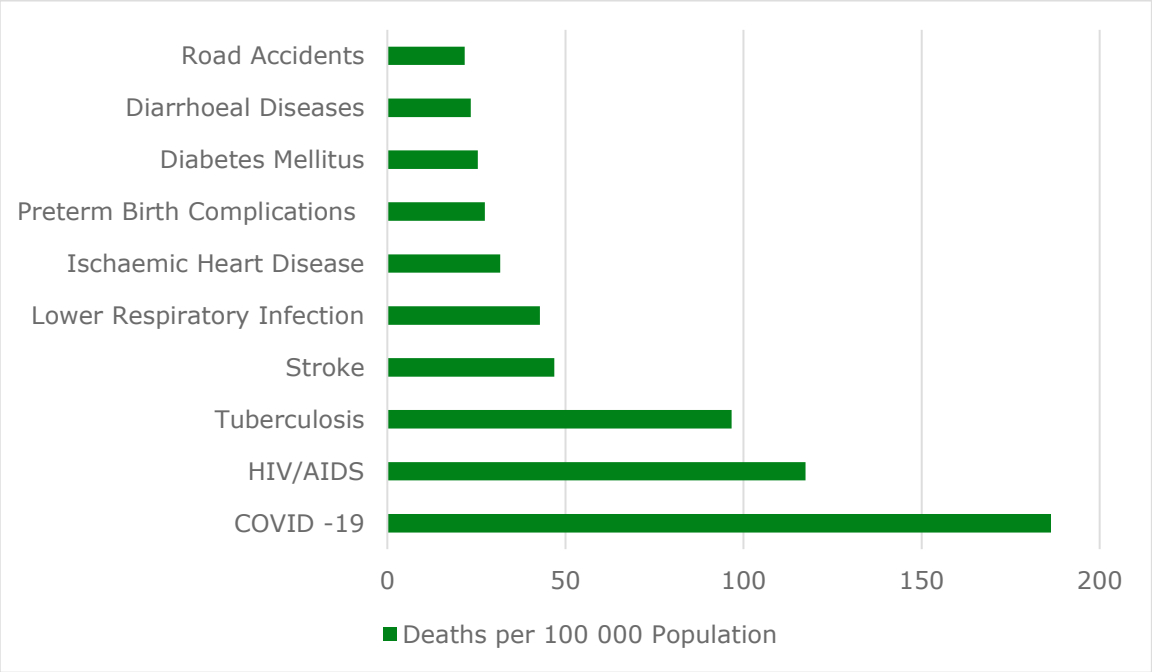
The leading cause of death in Namibia in 2021 was COVID-19 as shown in Figure 4-42. HIV/AIDS is also a significant health concern in Namibia. On average, there were 2.2 new HIV infections per 1,000 uninfected population in 2023. This new infection rate has been stable since 2022. However, the prevalence of HIV in Namibia is still ranked at the sixth highest in the world. A population with a high incidence of HIV also has additional health issues associated

with compromised immune systems. For instance, there were 468 tuberculosis infections per 100,000 population in 2023 across Namibia. This infection rate has worsened since 2022.

Malaria is also present in the country in certain regions, particularly in the north and north east regions such as Omaheke. In 2022, there were 8.29 malaria infections per 1,000 population at risk. This infection rate has improved since 2021. The under five mortality rate is 37.88 per 1,000 live births, improving since 2021 and is below the regional average for sub-Saharan Africa (71 per 1000 live births). The Erongo Region is considered malaria free.

Road traffic accidents had a mortality rate of 22 per 100,000 population in 2021. Maternal mortality was 215 per 100,000 live births in 2020. This has improved significantly since 2012 when there was a maternal mortality ratio of 362 (World Health Organization, 2024).

FIGURE 4-42 LEADING CAUSES OF DEATH NAMIBIA 2021



Source: Namibia Statistics Agency, 2024

The majority of Namibians make use of public health services (82%), with the remaining 18% accessing private healthcare through medical insurance schemes. Access to healthcare is considered good, with 76% of the population on average living within 10 km of a healthcare facility.

The Ministry of Health and Social Services is responsible for providing public health services. Healthcare is provided in a four tier system that includes primary healthcare sites (e.g. clinics), district hospitals, intermediate hospitals, and referral hospitals. Clinics generally are staffed by nurses and pharmacy technicians and assistance. Patients that require medical attention from doctors are referred to larger primary healthcare centres that are staffed by doctors, nurses and pharmacists. If a patient requires more specialist care, they are referred to district hospitals. Not all district hospitals have every specialist on staff; therefore, patients may be referred to intermediate hospitals if they require additional care. The most medically complex cases are all referred to the Windhoek General Hospital.

There are 844 private healthcare facilities in Namibia that employ 72% of all the doctors in the country and just under 50% of all the nurses.

In rural areas, on average, each primary healthcare facility serves a population of 5,780 people while each district hospital serves 58,825 people. This has resulted in overcrowding and long wait times. In response, many people travel significant distances to attend clinics and hospitals in areas far from their homes that are perceived to be less crowded and provide better services. The public health system in Namibia is facing challenges from a shortage of qualified professionals as well as high staff turnover. This is not helped by the fact that many medically trained people choose to work within the private health system where salaries are higher, and workloads tend to be more manageable (Christians, 2020).

The public healthcare system in the Erongo Region is facing similar challenges to those seen nationally. The demand for healthcare services in the region is growing as the population is aging. Staff shortages limit the provision of adequate services and specialist treatment. It was noted that clinics and health centres are particularly overcrowded in Walvis Bay and Swakopmund due to rural-urban migration. Physical infrastructure is not equipped to meet the demands of the growing population. Old and unreliable ambulances and other patient transport vehicles used by the healthcare services also limit the accessibility of rural and isolated populations to reach services (Uirab, 2024).

4.5.9 INFRASTRUCTURE AND SERVICES

4.5.9.1 ENERGY

The dominant source of energy used for cooking and lighting is mains electricity, reported by 46.9% of households in Namibia during the 2023 census. Lighting that uses a connection to the public electricity grid is more common in urban areas (69.2%) than rural areas (19.9%). In rural areas, it is more common for households to use battery lamps or torches for lighting (53%) or solar energy (17.8%). In the Erongo Region, 77.7% of households use grid electricity for lighting, followed by 10.9% that use battery lamps or torches.

Electricity from the national grid is not the most common source of energy used for cooking in Namibia. Wood/firewood is used by 50.1% of households as their primary source of energy for cooking. Grid electricity was used by 34.1% of households. In urban areas, households are more likely to cook using grid electricity (55%) compared to rural households (8.8%). Gas is used by 21.8% of urban households whereas 84.6% of rural households used wood/firewood for cooking.

In the Erongo Region, grid electricity is used by 72.9% of households for cooking. Followed by 13.3% that use wood/firewood, and 12.9% that use gas. Access to grid electricity is more common in urban or semi-urban areas of the region. At the time of the 2023 census, 99.1% of households in Walvis Bay Urban Constituency were connected to the electricity grid for lighting purposes. Access to a grid electricity connection is also common in households in Walvis Bay Rural (92.5%). In rural areas of the Erongo Region, a grid connection is much less common. For example, only 41% of households in the Daures Constituency had access to electricity from the grid for lighting, with many of these households' using solar power or battery powered lamps for lighting. Additionally, these rural households often used wood as an energy source for cooking (Namibia Statistics Agency, 2024). The primary electricity provider in Namibia is the Namibia Power Corporation (NamPower) which is a state owned utility company. NamPower

is responsible for electricity generation, transmission and distribution throughout the country. There are some Regional Electricity Distributors (RED) that play a role in local distribution from the NamPower grid (NamPower, n.d.). Erongo Red is a commercialised electricity company operational within the Erongo Region. The distributor was formed from a merger of the electricity distribution services that had previously been operational in towns, municipalities and constituencies (in particular Walvis Bay, Swakopmund, Henties Bay, Omaruru, Karibib, Usakos and Arandis). This merger was done in conjunction with the Erongo regional Council and NamPower. The company purchases electricity from NamPower and then distributes it locally to customers (Erongo RED, n.d.).

4.5.9.2 WATER AND SANITATION

Access to safe drinking water is a key indicator of development. Drinking water is considered safe if it is derived from piped water (inside or outside tap), public fountains, protected wells, bottled water, and protected boreholes (with tank covers). Around 91.4% of households in Namibia have access to safe drinking water. This proportion is higher in urban areas (98%) than rural areas (83.5%). The majority of households in the country get their drinking water from an inside tap connected to a public piped water supply (41.7%). Unprotected boreholes were used by 2.3% of households, rivers/dams/streams by 3%, canals by 0.4% and unprotected wells by 1.5%.

In the Erongo Region, 97.6% of households have access to safe drinking water. The majority of households have access to piped water in their homes (59.1%), piped water in outside taps (14.7%) or public fountains (14.2%). Unsafe drinking water sources are used by a small minority of households: unprotected borehole (1.1%), river/dam/stream (0.6%), unprotected well (0.1%). Overall, 73.7% of households in Walvis Bay Urban have access to piped water in their homes, while 14% have access to piped water from a tap/fountain outside of their homes. In Walvis Bay Rural, 65.9% of households have piped water in their homes and 23.4% of households make use of an outside tap.

Access to adequate sanitation is relatively poor in Namibia. The majority of households have no toilet facilities and partake in open defecation (40%). Only 33.8% of households have access to a private flushing toilet that is connected to a public sewerage system. Access to private toilets is more common in urban households (54.4%) while only 8.9% of rural households have access to this form of sanitation. Open defection is the most common form of sanitation used in rural households (63.8%). Access to adequate sanitation has been slowly improving in Namibia, with a reduction in the percentage of households having no toilet facilities from 48.6% in 2011 to 40% in 2023.

Households in the Erongo Region have better access to adequate sanitation compared to the national averages. Overall, 68.8% of households in the region have access to a private flushing toilet connected to a public sewerage network, with only 9.7% of households engaging in open defecation. This is a marginal improvement from 10.6% of households in 2011. In Walvis Bay Urban, 89.7% of households have a private flush toilet connected to a main sewer. Access in Walvis Bay Rural is similar (84.7%) (Namibia Statistics Agency, 2024). The primary water provider in Namibia is NamWater. This is a state owned utility company that supplies bulk water to urban municipalities and rural communities (NamWater, n.d.).

4.5.9.3 WASTE MANAGEMENT

Most households in Namibia dispose of their waste through regular collection (36.9%) or burning (24.2%) and dumping outside in a field/bush (23.1%). Regular waste collection is not common in rural areas (4.4%). However, in urban areas this is the dominant form of waste management (63.7%). For rural households, burning waste is the most common (41.8%).

In the Erongo Region, regular waste collections are used by 78.4% of households for the disposal of their waste. This is the highest rate of regular waste collections across all regions of Namibia. Only 8.1% of households in the region burn their waste, and 2.7% dump their waste outside, 8.1% burn their waste, and 4.1% deposit their waste in a rubbish pit. In Walvis Bay Urban, 98.2% of households have regular waste collections. Similarly, 94.8% of households in Walvis Bay Rural have regular waste collections. There are areas within the Erongo Region, such as Daures, where the majority of households burn their waste (Namibia Statistics Agency, 2024).

4.5.9.4 TELECOMMUNICATIONS

Access to telecommunications varies widely in Namibia with a clear urban rural divide. Most Namibians have access to mobile phones with 98% of the population aged over 15 having coverage. However, access to fixed line telephones, televisions, internet and broadband is still limited in some areas. In 2023 28.3% of the population ages 3 years and above in Namibia has access to the internet and 52.2% had their own mobile phone. In the Erongo Region 47.8% of the population aged 3 years and older had access to the internet in 2023 and 67.3% had their own mobile phone. Access to telecommunications in Erongo is improved compared to the national average. There have also been significant improvements since the previous census. For example, in 2011 only 15.5% of the population aged 3 years and over in Erongo had access to the internet (Namibia Statistics Agency, 2024). The largest telecommunications provider in the country is Mobile Telecommunications Company (MTC) Namibia. MTC also provides internet services. Other providers include Telecom Namibia and Paratus.

4.5.9.5 TRANSPORT INFRASTRUCTURE

Namibia has a relatively well established road network, however, the quality of roads is not always good. The majority of towns and settlements can be reached via the road network that consists of district, main, and trunk roads. The road network totals a distance of around 48,117 km. Of this 4,500 km are tarred roads. The remining roads tend to be gravel or dirt roads. Namibia has a series of tarred national highways that link key towns with neighbouring countries. For instance the Port of Wlavis Bay is connected visa the Trans-Caprivi Highway and the Trans-Kalahari Highway to Botswana, and the Democratic Republic of the Congo and then on to other countries such as Zambia, Zimbabwe and South Africa.

Namibia has 16 licensed airfields across the country, but main air travel is via the Hosea Kutako International Airport in Windhoek. The airport offers regional flights to major sub-Saharan cities such as Cape Town, Johannesburg, Gaborone, Luanda, and Harare. There are also a small number of long haul international flights (Namibia Investment Centre, 2025).

Ports

The port of Walvis Bay is the largest port in Namibia. A smaller secondary port is located in Lüderitz. Both ports are operated by the Namibian Ports Authority (NPA). Walvis Bay port has a deep-water harbour that has a depth of 12.8 m and can accommodate vessels up to 2,400

tonnes in 13 commercial berths. A new container terminal was completed in 2019 that has an additional quay with a depth of 16 m. Walvis Bay receives around 899 vessels per year and handle around 8 million tonnes of cargo. Cargo that travels through the port includes imports, exports and transhipments as well as bulk and break-bulk volumes of numerous commodities. The port also has a passenger berth for accommodating cruise and passenger vessels as well as ship repair facilities (Namport, 2025).

4.5.10 COMMUNITY COHESION, SAFETY AND SECURITY

In the Erongo Region the top five most prevalent crimes include housebreaking, robberies, assault, domestic violence, and drug offences. According to the Police Commander for Erongo, contributing factors to crime include poverty, unemployment, and alcohol and drug misuse. Drug related offences have been a point of concern for local law enforcement. Between January and July 2023, 151 people were arrested on drug offences. Between January and July 2024, a further 134 people were arrested for drug offences in Erongo (Andre, 2024). Overall crime rates have increased by 5% in the region between 2023 and 2024. Between January and July 2024, a total of 5,332 crimes were reported. This is an increase from 5,070 the previous year. An influx of jobseekers was also cited as contributing to the increase in crime (Namibian Broadcasting Corporation, 2024).

Gender-based violence (GBV), domestic violence, and rape are some of the most common offences reported in Namibia. The prevalence of GBV can be attributed to societal acceptance of certain types of violence against women and girls. There is a challenge that there is significant underreporting of GBV and related offences in rural areas. Despite comprehensive gender equality legislation and strong guidance from the state in regards to gender equity, patriarchal socio-cultural norms still prevail in many parts of the country leading to high rates of GBV. In the year ending September 2020 police in Namibia had recorded 6,000 GBV cases nationally with the highest rates observed in the Khomas Region (region with the largest population). These crimes include 896 rapes and 74 gender-based murders (United Kingdom Kome Office, 2021).

4.5.11 RECREATION AND TOURISM

Recreation and tourism within the Erongo Region are intrinsically linked to nature, including desert landscapes, mountains, the Dorob National Park, Kuiseb River, unique flora and fauna, Ramsar bird sites, coastal zones, dunes, game reserves, and communal conservancies. Eco-tourism and adventure sports activities are a key attraction for the region (Erongo Regional Council, 2015).

The Erongo Region is considered one of Namibia’s key tourism destinations with tourism contributing to foreign currency generation, infrastructure development, employment and livelihoods. The tourism industry in the region has shown signs of growth post-COVID. In the first quarter of 2024 the region recorded a 60% increase in room occupancy rates in tourist accommodation. During 2022 there were 381 new tourism business registered in Erongo. This included accommodations providers and tour operators.

Walvis Bay in particular has become a hub for cruise ship tourism due to the presence of the passenger berth and cruise terminal in the Port of Walvis Bay. By the ned of 2024, 65 cruise liners had already pre-booked arrivals at Walvis Bay for 2025 and 2026. Walvis Bay has also become a hub for marine tourism activities such as boat tours (Rengura, 2024).

4.5.12 CULTURAL HERITAGE

4.5.12.1 TANGIBLE CULTURAL HERITAGE

Namibia has a history of maritime trade and resource exploitation, as seen through the many shipwrecks that have been identified along its coast. Shipwrecks that have been within the territorial waters or contiguous zone of Namibia for 35 years or more are considered historic shipwrecks and are considered historic monuments (Government of Namibia, 2004).

The majority of shipwrecks are not recorded, so although there are no known shipwrecks within the licensing area this does not confirm the absence of maritime archaeology within the area.

4.5.12.2 INTANGIBLE CULTURAL HERITAGE

Traditional line fishing is common along the Namibian coast, although it does not operate within the licensing area.

Many of the cultures within Namibia have beliefs related to natural elements and features (2024-o4-15_SLR Harmattan ESIA_Proposed EIA CH sections.docx). However, there has been limited evidence of spiritual beliefs connected to the ocean and the coast, with the exception of the San group. The San were forcibly relocated inland from the coast by colonial and apartheid governments and can no longer practice rituals associated with the ocean. These rituals still exist within living memory but have been disconnected from their place of performance.

4.6 SUMMARY OF KEY SENSITIVITIES

4.6.1 PHYSICAL AND BIOLOGICAL KEY SENSITIVITIES

Due to the high diversity of habitats and marine biota along the coast of central Namibia (several of which are of conservation concern), significant biodiversity importance is attributed to many areas inshore of PEL 82. The sensitivity and significance of some of the ecological features on the shelf and shelf edge are summarised below:

- There is a double shelf break off Walvis Bay, with the outer break beginning at depths of ~400 m and therefore in the eastern portion of PEL 82.
- Sediments in the licence block are dominated by sandy muds with muddy sands and sand occurring in the eastern portion.
- PEL 82 overlaps with low percentage occurrence of the known phosphate deposits.
- The PEL 82 licence area is located in an area of strong south-easterly winds, with minimal seasonality in the wind pattern.
- Catabatic, or easterly ‘berg’ winds can transport substantial volumes of sediment up to 150 km offshore.
- The licence area lies offshore of a perennial upwelling cell centred around Walvis Bay.
- The nearshore region around Walvis Bay also experiences periodic, large-scale low oxygen events and sulphur eruptions, both of which can have catastrophic effects on marine communities of the inner shelf area.
- PEL 82 is located in the offshore Central Namib and Namib Biozones, which extend beyond the shelf break onto the continental slope and into abyssal depths.

- Pelagic communities in the licence area comprise plankton, pelagic invertebrates and fish, and their main predators, marine mammals (seals, dolphins and whales), seabirds and turtles, many of which are recognised as being sensitive to anthropogenic disturbance. The north-eastern half of PEL 82 falls within a pelagic habitat considered 'Endangered', with the remainder rated as 'Least Threatened'.
- There is overlap of the licence area with spawning grounds of monkfish and hake.
- The inshore waters of the central Namibian coastline are home to a number of bony fish and cartilagenous fish, many of which are popular angling species and/or are considered Endangered', 'Near Threatened' or 'Vulnerable'.
- The fish most likely to be encountered on the shelf, beyond the shelf break and in the offshore waters of PEL 82 are the large migratory pelagic species (tunas, billfish and sharks) many of which are considered threatened by the International Union for the Conservation of Nature (IUCN), primarily due to overfishing.
- Leatherback and Loggerhead turtles have been encountered in the offshore waters of the licence area; Leatherback Turtles are listed as 'Vulnerable' worldwide by the IUCN and Loggerhead turtles are globally listed as 'Vulnerable'.
- The cetacean fauna of central Namibia comprises up to 33 species of whales and dolphins. The species most likely to be encountered in the project area are the humpback whale, sperm whale and pilot whale.
- Humpback whale is likely to be the most frequently encountered baleen whale in PEL 82, ranging from the coast out beyond the shelf, with year-round presence but numbers peaking in June – July (northern migration) and a smaller peak with the southern breeding migration around September – October but with regular encounters until February associated with subsequent feeding in the Benguela ecosystem.
- Two populations of bottlenose dolphins occur within Nambian waters, of which the small population that inhabits the very near shore coastal waters between Lüderitz and Cape Cross, is considered a conservation concern.
- The Cape fur seal occurs at various coastal breeding sites inshore of PEL 82. The colony closest to the licence block is at Cape Cross. The seal population is considered to be healthy and stable in size although there has been a northward shift in the distribution of the breeding population. PEL 82 lies well offshore of the foraging ranges of seals from these colonies.
- The benthic fauna of the outer shelf and continental slope (beyond ~450 m depth) are very poorly known due to limited opportunities for sampling as well as the lack of access to Remote Operated Vehicles (ROVs).
- PEL 82 mostly overlaps with benthic habitat considered of 'Least Concern', however, those along the 500 m depth contour in the eastern portion of PEL 82 have been assigned a threat status of 'Vulnerable', with those further inshore to the 100 m depth contour considered 'Endangered'.
- As many as 110 species of bony and cartilaginous fish have been identified in the demersal communities on the continental shelf of the southern African West Coast, however, little is known of the demersal communities beyond the shelf break.
- 11 species of seabirds are known to breed along the Namibian coast of which the Cape Gannet is considered 'Critically Endangered' and the African Penguin, Bank Cormorant and

Cape Cormorant are considered 'Endangered' on the Namibian red-list. These species all forage close to shore and encounters with drilling operations in PEL 82 are highly unlikely.

- Other seabird species present off Namibia's coast comprise at least nine species of albatrosses, petrels or giant-petrels of which the Tristan Albatross is considered 'Critically Endangered' and the Atlantic yellow-nosed and Black-browed Albatross are considered 'Endangered' on the Namibian red-list. PEL 82 overlaps with the distribution of incubating Atlantic Yellow-Nosed Albatrosses from Gough Island and Black-browed Albatross from Bird Island (South Georgia). Encounters with these pelagic seabirds are thus possible.
- Other users of the offshore marine areas include the commercial fishing industry and oil and gas licence holders. As the licence area lies within the main trawling lanes and traffic routes into and out of Walvis Bay, both coastal shipping and fishing craft may be encountered.
- Various subsea telecommunications cable traverse across the Namibian EEZ, of which two come ashore at Swakopmund. These cables, however all lie south and outside of PEL 82.
- While PEL 82 does not overlap with the impact management or conservation zones of the adjacent EBSAs (Walvis Ridge and Namib Flyway), the licence block does overlap (37.4%) with ESAs.
- Six coastal IBAs lie inshore of the licence block; of which, two (Walvis Bay Wetland and Sandwich Harbour) are designated RAMSAR sites.
- PEL 82 overlaps with the proposed Southeast 22 and Southeast 23 Marine IBAs to protect Atlantic Yellow-nosed Albatross and White-chinned Petrel.

4.6.2 SOCIAL KEY SENSITIVITIES

Employment within the Erongo Region is dominated by the Agriculture, Manufacturing, and Retail Trade sectors. As a result, the local population may not be able to benefit extensively from employment generated by the project as they will not have the necessary expertise in the oil and gas or construction sectors and may not have the educational attainment necessary to secure skilled positions. The project may need to source a large proportion of labour from other regions within Namibia or from abroad to meet the workforce requirements for mobilisation and exploration.

Given the low population density in the Erongo Region, there may also be a limited pool of local contractors that will be capable of entering the supply chain of the project which may minimise local economic benefits of the project.

Rates of communicable diseased such as tuberculosis and HIV are high in Namibia. Any influx of labour will need to be carefully managed to mitigate the risks of increasing the burden of such diseases.

The Erongo Region and Namibia as a whole, are experiencing rapid population increases which is putting additional strain on local service provision. The project will need to carefully manage impact on local services including energy, water and sanitation, waste, etc.

Artisanal fishers are present within the Erongo Region, including communities from ethnic minority groups such as the Topnaar. Artisanal fishers are particularly vulnerable to changes and already face uncertain livelihoods due to exploitation, marginalization, rising operational costs, and the consequences of overfishing in the commercial sector. The project will need to

carefully manage any restrictions that may be placed on artisanal fishing activities as well as other impacts to fishing resources to ensure the livelihoods of artisanal fishers are maintained.

Previously unidentified marine archaeology is sensitive to direct impacts by the project that may partially or wholly remove them. The project will need to use side scan sonar and bathymetric data to identify possible marine archaeology in the licensing area. If any marine archaeology is identified, the project will need to carefully manage and mitigate the impacts upon the archaeology through an impact assessment.

5. STAKEHOLDER ENGAGEMENT

This section provides a summary of the engagement to be undertaken during the scoping and ESIA phases of the project. Regular, meaningful and culturally appropriate engagement and consultation will be central to the success of this project. In this regard, a Preliminary Stakeholder Engagement Plan (SEP) is provided in this Section to guide the engagement process throughout the scoping and ESIA phases. It also incorporates a preliminary grievance mechanism (GM), which will be used to address external stakeholder grievances pertaining to the project and its associated activities. This is a 'live' document and will be updated as the project progresses.

The preliminary stakeholder engagement process described herein has been designed to comply with relevant national legislative requirements, as well as to align with international good practice, and Chevron's internal policies and procedures. Overall, it demonstrates Chevron's commitment to good practice in stakeholder engagement.

5.1 OBJECTIVES OF STAKEHOLDER ENGAGEMENT

A stakeholder is defined as any individual or group potentially affected by a project, interested in a project or who can themselves affect the project. The main objectives of stakeholder consultation/ engagement are as follows:

- Identify all those affected by or who can affect in the project to ensure they are included in the engagement process.
- Understand the views of stakeholders and make sure that they adequately understand the positive and negative impacts of the proposed project.
- Inform stakeholders throughout the ESIA process including on local benefits and partner opportunities.
- Build relationships and trust through supporting open dialogue and engagement with stakeholders. Establish transparency in activities being undertaking and build trust with stakeholders.
- Engage with all stakeholders including vulnerable and marginalised groups by having an inclusive approach to consultation and participation. This may include the use of differential measures to maximise effective participation of vulnerable stakeholders.
- Manage expectations and concerns by providing a mechanism for stakeholders to engage with the project about their concerns and expectations and provide a mechanism for receiving, documenting and addressing comments received.

5.2 LEGAL FRAMEWORK

5.2.1 NATIONAL REGULATIONS

Stakeholder engagement related to the ESIA process in Namibia is primarily guided by the stipulations set out in the Environmental Management Act (EMA) 7 of 2007 and associated regulations such as the Environmental Impact Assessment Regulations. The EMA sets out requirements for public consultation based on the rights of the public to be informed as early as possible of any development project which may impact them, be included in decision making regarding project design, and be empowered to provide comment on potential development projects. Additionally, the Act specifies in Section 36 that a public hearing may be

carried out as part of the environmental impact assessment process prior to a final decision being made by the Environmental Commissioner regarding an application, if it is deemed necessary by the Commissioner (Environmental Management Act 7 of 2004).

Sections 21-24 of the EIA Regulations provides further details on the public consultation process required (Environmental Impact Assessment Regulations, 2012):

- A project must give notice of the public consultation process through the use of a site notices, written communication to neighbours and authorities as well as potentially interested and affected parties, and advertisements once per week for two consecutive weeks in at least two widely circulated newspapers;
- Public notices/ communication should include details of the application/ project to which the consultation is associated, the nature and location of the project, details of where further information on the application/ project can be obtained, how to communicate with the project;
- All interested and affected parties must be recorded on a register by the project. Interested and affected parties include all persons who have submitted written comments or attended meetings during the public consultation, all persons who have requested to be added to the register following public consultations, and all organs of state that have jurisdiction in respect to the planned activities of the project;
- All registered interested and affected parties are entitled to provide written comment on the application, including comments on scoping reports, EIA reports, and any amendments to such reports; and
- All comments received from registered interested and/or affected parties must be recorded by the project in the reports that are submitted as part of the application.

5.2.2 INTERNATIONAL STANDARDS

5.2.2.1 INTERNATIONAL FINANCE CORPORATION PERFORMANCE STANDARDS

The IFC PSs (IFC, 2012) are considered a benchmark for good practice for environmental and social (E&S) risk management in private sector developments. The IFC PSs include guidance on engaging affected communities through disclosure of information, consultation, and informed participation, in a manner proportional to the risks to and impacts of the project on the affected communities. The IFC PSs include specific guidance on conducting stakeholder engagement both during the planning phase and throughout the project lifecycle. The project will align with the general guidance of the IFC PSs.

5.2.2.2 EQUATOR PRINCIPLES IV

The Equator Principles (EPs) are intended to serve as a common baseline and risk management framework for financial institutions to identify, assess and manage environmental and social risks when financing projects. They are updated periodically to build upon implementation expertise and ongoing learning and to reflect changes in the evolving operating environment and emerging good practice. EP4 is the latest iteration of the EPs and came into effect in 2020.

The EPs emphasise that lenders involved with the project will seek to ensure that the project is developed in a manner that is socially responsible and reflects sound environmental

management practices. They further stipulate that host country legislation must be adhered to and provide requirements for stakeholder engagement and disclosure.

- Of the ten Equator Principles, two pertain to stakeholder engagement and grievance management (Principle 5 and Principle 6 respectively). *Principle 5 "Stakeholder Engagement": demonstrate effective Stakeholder Engagement, as an ongoing process in a structured and culturally appropriate manner, with Affected Communities, Workers or other Stakeholders. An Informed Consultation and Participation process will be conducted in the case of potentially significant adverse impacts on Affected Communities.* The Principle specifies that this process should be free from external manipulation, interference, coercion and intimidation. Furthermore, it specifies that the client will, commensurate with the project's risks and impacts, make the appropriate assessment documentation readily available to the local communities, and where relevant other stakeholders, in the local language and in a culturally appropriate manner. The client will also take account of, and document, the results of the stakeholder engagement process, including any actions agreed resulting from such process.
- *Principle 6 "Grievance Mechanism": establish as part of the ESMS (Environmental and Social Management System) an effective grievance mechanism, designed for use by Affected Communities and Workers to receive and facilitate resolution of concerns and grievances about the project's environmental and social performance.* The Principle states that the grievance mechanism is to be scaled to the risks and impacts of the project, and must seek to resolve concerns promptly, using an understandable and transparent consultative process that is culturally appropriate, readily accessible, at no cost, and without retribution to the party that originated the issue or concern. Grievance mechanisms should not impede access to judicial or administrative remedies and the client must inform potentially affected stakeholders about the grievance mechanisms during the course of the stakeholder engagement process.

5.2.3 COPORATE POLICIES AND PROCEDURES

The Chevron Operational Excellence Management System (2021) (Chevron Operational Excellence Management System, 2021) includes stakeholders as a focus area. This entails a focus on stakeholder engagement and issue management (grievance management) including within the activities of non-operated joint ventures and third party aviation and marine entities. According to the management system, Chevron engages "*stakeholders to foster trust, build relationships, and promote two-way dialogue to manage potential impacts and create business opportunities".* The company is committed to working with stakeholders in a socially responsible and ethical manner to ensure respect for human rights. Further commitments include:

- Building and maintaining relationships with all external stakeholders (including governments and communities);
- Identifying and assessing stakeholder issues; and
- Developing and implementing issue management plans, stakeholder engagement plans, and social impact management plans.

To guide approaches to stakeholder engagement at individual sites Chevron has established the Stakeholder Engagement and Issues Management Process. This process is a framework for

identifying, assessing, and managing social risks and impact that can be applied to individual projects. The process helps projects to understand and address the concerns of stakeholders with a goal of building trust and fostering positive relationships.

5.3 PRINCIPLES OF STAKEHOLDER ENGAGEMENT

The key principles guiding the project's approach to stakeholder engagement are as follows:

- Transparency: to be open and transparent with stakeholders;
- Accountability: to be willing to accept responsibility as a corporate citizen and to account for impacts associated with the project activities;
- Trust: to have a relationship with stakeholders that is based on mutual commitment to acting in good faith;
- Mutual Respect: to respect stakeholders' interests, opinions and aspirations;
- Collaboration: to work cooperatively with stakeholders to find solutions that meet common interests;
- Responsiveness: to coherently respond in good time to stakeholders;
- Proactiveness: to act in anticipation of the need for information or potential issues;
- Fairness: to engage with stakeholders such that they feel they are treated fairly, and their issues and concerns are afforded fair consideration;
- Accessibility: to be within reach of stakeholders so that they feel heard and to provide meaningful information as needed; and
- Inclusivity: to proactively anticipate, identify and include all stakeholders.

5.4 STAKEHOLDER IDENTIFICATION

The following categories of external stakeholders have been identified as being of interest for the project:

- National, Regional, and Local Authorities;
- Traditional Authorities;
- Affected Communities;
- Civil Society and Community Associations;
- Onshore Business;
- Commercial Marine Users; and
- Tourism Businesses.

Table 5-1 lists the preliminary stakeholders that have been identified for the project. This list will be further developed and refined as the project progresses through the ESIA phases.

These stakeholders have been identified through the working experience of the ESIA consultants (ERM and UD) as well as based on the review of available secondary data.

TABLE 5-1 PRELIMINARY EXTERNAL STAKEHOLDERS

Category	Stakeholder	Relationship to Project
Authorities	• MIME • MEFT • Ministry of Agriculture, Fisheries, Water and Land Reform (MAFWLR) • Ministry Works and Transport (MWT) • Namibia Ports Authority (NamPort) • Erongo Regional Council (ERC) • Municipality of Henties Bay • Municipality of Swakopmund • Municipality of Walvis Bay	• The MIME is responsible for promoting and regulating the development and use of Namibia's mining and hydrocarbon resources. The Ministry issues licenses for petroleum exploration and production. • The MEFT is responsible for issues relating to the environment including the EIA process and will comment on the EIA report. • The Ministry of Agriculture, Fisheries, Water and Land Reform deals with sensitive issues in the marine environment that could be impacted by project activities. • The Ministry of Works and Transport oversees maritime affairs through its Department of Transport. • The Nambian Ports Authority (Namport) a public entity associated with the Ministry of Works and Transport, manages the ports of Walvis Bay and Lüderitz and is responsible for protecting the environment within harbor areas under the National Ports Authority Act. • The Erongo Regional Council is responsible for decentralised governance and is mandated to plan and develop the region in a sustainable manner by establishing, managing and controlling settlement areas focusing on core services. Local Government may also have a role in issuing permits and processing applications associated with the project. They may also have a role in monitoring the implementation of project commitments included in an Environmental and Social Management Plan (ESMP). • Municipal Administrations (which govern cities) are responsible, in general, for: promoting the economic and social development of the Municipality, the quality of life of citizens, basic public services such as education, health, culture, sports, recreation and tourism, water and energy supply, basic sanitation and waste management, as well as the road network, the energy network and public lighting, building maintenance and wastewater management, civic and community education of citizens, social welfare services, parking, traffic and public transport.
Traditional Authorities	Topnaar Traditional Authority	Traditional authorities represent their communities' interests in local decision making.
Affected Communities	Walvis Bay communities close to onshore AoI	This category includes households and social support services (schools, healthcare facilities and places of worship) within the AoI that will potentially be impacted by or interested in the project. Positive benefits associated with employment may be experienced by some in this stakeholder category.
Civil Society, Non-Governmental Organisations (NGOs) and Community Associations	Community associations (including fishing and tourism) Civil society groups and NGO's (including conservation, workers, youth, justice, policing etc.)	Local community associations/ organisations and NGO's that engage in and are supportive of livelihood activities ensuring the needs of communities are being met. These groups can collaborate with the project to ensure socio-economic benefits are realised and livelihood compensations (where necessary) plans are effective. Furthermore, the groups can influence the project directly or through public opinion. There are a large number of active NGO's in the Erongo Region associated with environmental and biodiversity conservation.

Category	Stakeholder	Relationship to Project
Onshore Businesses and Business Associations	Businesses that are operational within the onshore AoI	Businesses may experience disruptions to their operations, especially during construction of the project due to changes in road conditions/ access, dust, noise etc. Some businesses may benefit in terms of service provisions.
Commercial Marine Users	Commercial fisheries, cargo, passenger transport, oil and gas logistics, and other marine users are in operation near the offshore AoI.	This includes any business engaged in commercial activities in the buffer zones of the offshore and nearshore components of the project who may have face temporary disruptions to commercial activities during project construction.
Tourism Businesses	Business within the AoI in tourism sector including tours and accommodation.	This includes any business engaged in commercial tourism activities near onshore and offshore components of the project that face temporary disruptions to commercial activities during project construction or benefit from providing services to the project/workforce (e.g. accommodation).
Media	Local newspapers, radio, television, social media.	Local media will be used for the communication of project-related information and has the potential to raise positive or negative awareness about the project. Newspapers will be used to advertise public meetings as part of the public participation process.

5.4.1 VULNERABLE GROUPS

Vulnerable people or groups are those who may be more adversely affected by project impacts by virtue of characteristics such as their gender, gender identity, religion, physical or mental disability, ethnicity, literacy and employment status. Vulnerable individuals and/or groups may include but are not limited to, people living below the poverty line, single-headed households, migrant workers and refugees.

To create an inclusive engagement process, it is important to identify individuals and groups who may find it more difficult to participate and those who may be directly and differentially or disproportionately affected by the project because of their disadvantaged or vulnerable status.

Table 5-2 below provides an overview of the groups that may be considered vulnerable in the project area and need to be particularly considered in the engagement plan in order to facilitate access and provide them with the opportunity to engage in informed discussion about the project.

TABLE 5-2 POTENTIALLY VULNERABLE GROUPS

Vulnerable Group	Description of the Group
Single parent households	Single parents may be less able to access stakeholder meetings due to caring responsibilities.
Elderly and retired individuals	Elderly individuals may find it difficult to access meetings about the project and have their voices heard.
Low-income households	These households might face more barriers to expressing any issues they may have with the project.
Physically and/or mentally disabled	Those who have physical and/or mental disabilities may find it difficult to access meetings / information about the project and have their voices heard.

5.5 STAKEHOLDER ANALYSIS

It is not practical, and not necessary, to engage with all stakeholder groups with the same level of intensity all the time. Analysing and prioritising stakeholders is important to determine appropriate engagement methods for different stakeholders. It also helps identify which stakeholders need to be prioritised during latter stages of the ESIA process. It is important to keep in mind that the project development situation is dynamic and that both stakeholders and their interests might change over time, in terms of level of relevance to the project and the need to actively engage at various stages. Stakeholder analysis should, therefore, be revisited throughout the project lifecycle.

For each stakeholder category identified in Section 5.4 above, the following needs to be considered:

1. Level of influence that they may exert over the project:

- High – Stakeholder is highly influential and has significant ability to stop or disrupt the project or cause extensive damage to its reputation.
- Medium – Stakeholder has a moderate influence and considerable capacity to stop or disrupt the project and cause damage to its reputation.

- Low – Stakeholder is considered to have limited influence and little capacity to stop or disrupt the project or cause damage to its reputation.

2. Level of interest that they may have in the project:

- High – Project is of high interest to stakeholder.
- Medium – Project is of moderate interest to the stakeholder.
- Low – Project is of little or negligible interest to the stakeholder.

3. Level of impact that they may experience as a result of the project:

- High – Stakeholder is considered to be highly sensitive to potential project impacts and may experience significant changes in their health, wellbeing and livelihoods as a result of the project.
- Medium – Stakeholder is considered to be moderately sensitive to potential project impacts and may experience some changes in their health, wellbeing and livelihoods as a result of the project.
- Low – Stakeholder is not considered to be sensitive to the potential project impacts and is unlikely to experience any changes in their health, wellbeing and livelihood as a result of the project.

Once the above criteria have been decided for each stakeholder category, the matrix below (Figure 5-1) can be used to determine the engagement approach to be adopted. Varying engagement approaches are necessary, depending on the level of importance and influence that each stakeholder has in regard to the project. Approaches to engagement are further described in Table 5-3. The analysis also needs to consider which stakeholder categories may find it more difficult to participate in consultation activities owing to their marginalised or vulnerable status (such as disabled or elderly people).

As the level of influence and importance in the project may change over time, there is a need to review and, where necessary, update this information on a regular basis.

FIGURE 5-1 STAKEHOLDER ANALYSIS MATRIX

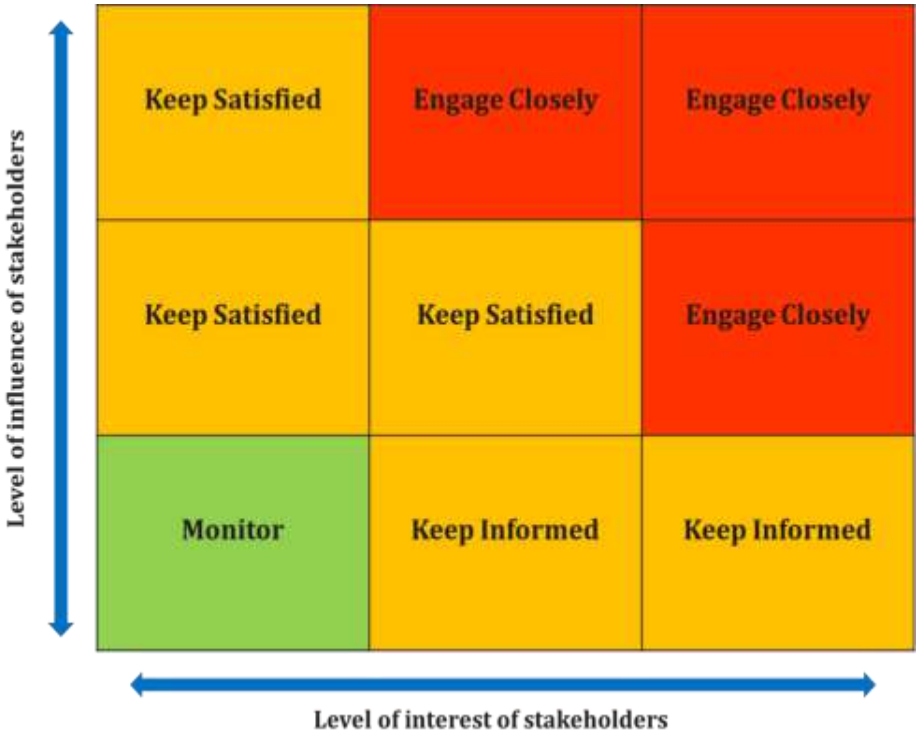


TABLE 5-3 ENGAGEMENT APPROACHES

Approach to Engagement	Frequency and Type of Engagement Activities
Engage closely	Stakeholders are directly engaged throughout the ESIA process. Communication is two-way and is likely to revolve around the conduct of direct, in-person or virtual meetings to discuss the project, facilitate dialogue and ensure that relevant information and feedback from stakeholders is considered in the ESIA process.
Keep satisfied	Stakeholders are engaged with indirectly throughout the ESIA process. Communication is predominantly one-way and revolves around the distribution of written information (e.g. information leaflets) via email, post or by hand. Stakeholders are encouraged to respond with written or verbal feedback and comments. Where appropriate, and at the stakeholder's request, there may be more direct contact.
Keep informed	Stakeholders are engaged with indirectly throughout the ESIA process. Communication is one-way and revolves around the distribution of written information (e.g. information leaflets) via email, post or by hand. Stakeholders are free to respond with written or verbal feedback or comments if they wish.
Monitor	There are no deliberate plans to engage with these stakeholders throughout the EISA process. However, their interest in and opinions of the project are monitored (e.g. through the receipt of correspondence and online, including social media, activities) to identify any change in perceptions and the potential need for engagement, as appropriate.

Using the approach and frequency of engagement activities set out in Table 5-4 together with the outcomes of the stakeholder analysis, recommended levels of engagement have been assigned to project stakeholder groups. This approach recognises that stakeholder engagement is multi-faceted, and that the approach to engagement is not uniform across stakeholders.

Priority should be given to stakeholders that are highly influential including those that are both supportive and unsupportive of the project.

TABLE 5-4 STAKEHOLDER ANALYSIS RESULTS

Stakeholder	Impact Level	Influence Level	Interest Level	Engagement Approach
Ministry of Industries, Mines and Energy	Medium	High	High	Engage Closely
Ministry of Environment, Forestry and Tourism	Medium	High	High	Engage Closely
Ministry of Agriculture, Fisheries, Water and Land Reform	Medium	High	High	Engage Closely
Ministry Works and Transport	Low	Medium	Medium	Keep Satisfied
Namibia Ports Authority	High	Medium	Medium	Keep Satisfied
Erongo Regional Council	Low	Medium	High	Engage Closely
Municipality of Henties Bay	Low	Low	High	Keep informed
Municipality of Swakopmund	Low	Low	High	Keep informed
Municipality of Walvis Bay	Medium	Medium	High	Engage Closely
Topnaar Traditional Authority	Low	Low	High	Keep Informed
Affected Communities	Medium	Low	High	Keep Informed
Civil Society and Community Associations	Low	Medium	Medium	Keep Satisfied
Onshore Businesses and Associations	Low	Low	Medium	Keep Informed
Commercial Marine Users	High	Medium	High	Engage Closely
Tourism Businesses	Low	Low	Medium	Keep Informed
Media	Low	Low	Low	Monitor

5.6 SCOPING PHASE STAKEHOLDER ENGAGEMENT

The scoping phase stakeholder engagement was aimed at facilitating disclosure of the latest project details, the Draft Scoping Report (including Non-Technical Summary) and obtaining information to identify the expectations of interested and potentially affected parties in relation to the project.

Stakeholder engagement during the Scoping Phase included a public meeting in Walvis Bay where onshore components of the project will be located . This meeting was attended by:

- Community members living in Walvis Bay;
- Representatives from NGOs and community based organisations (CBOs); and
- Representatives from local media.

Prior to the engagements, a Non-Technical Summary was prepared for distribution with invitations to the meeting. All stakeholders identified within the project stakeholder database were invited to attend the meeting and were supplied the Draft Scoping Report and Non-Technical Summary (via a website link). The meeting date, venue, and basic project information were published in advertisements in two newspapers that are widely circulated in the local area (Appendix B). These advertisements ran for two consecutive weeks prior to the meeting.

The public meeting was held in Walvis Bay to ensure easy access to the meeting within the areas where people live and work. A PowerPoint presentation was prepared for use in the meetings to facilitate information sharing and discussion regarding the project and the ESIA process (Appendix C). The meeting was led by UD and representative from ERM and CNEL were also present. The presentation given during the meeting covered an overview of CNEL and the Project, the potential environmental and social impacts associated with the project and the stakeholder engagement process. During the public meeting a question and answer session was held. Comments and suggestions raised by stakeholders were recorded and included in the meeting minutes and below. Evidence of the meeting includes signed registers and photographs (Appendix D).

Much of the issues raised during the public meeting centred on employment opportunities, local content development, and clarifications on project details. Responses were provided by CNEL and UD to queries raised by attendees. A summary of the issues raised, and responses given is provided in Table 5-5.

Post the public meeting, on comment was received via email relating to employment opportunities. This email is correspondence is attached as Appendix E.

On the 03 July 2025, the ESIA team and the proponent held a focus group meeting with the MFMR representative, Ms La-Toya Shivute. The meeting minutes are included in Appendix D.

TABLE 5-5 SUMMARY OF PUBLIC MEETING QUESTIONS AND ANSWERS

Issue	Response
Community Member: What are the procedures that the youth should follow in order to take part in this industry, and what job opportunities are available? This was not explained in your presentation.	CNEL: At this stage, we are still in the exploration phase, which unfortunately does not come with many direct employment opportunities yet. However, there are potential opportunities within support services. We encourage young people to find out what skills are required by local companies that might be contracted to support the project. For entrepreneurs and business owners, it's also a good idea to explore how to become a supplier or service provider to third-party contractors working with us. Information about available opportunities is often only displayed at the sub-contractors' notice boards in Walvis Bay. It's important for community members to actively visit these notice boards to check for updates and opportunities. Additionally, if you are looking to up skill, you should first research what skills are needed by the companies working on the project or within the wider industry, both locally and internationally. That way, you can focus your training efforts in areas that are in actual demand. Additionally, we work closely with Petrofund, which offers scholarships for students who want to study in fields related to the oil and gas industry. We also recommend attending events such as the Oil and Gas Youth Summit planned for 25 – 26 July, where more information will be shared about future opportunities and how to get involved. There is a cost to it but also opportunities to volunteer to gain access to the event.
Community Member: I want to know, where does local content actually start? We often feel left out once the project begins. Where are these opportunities advertised, and how can we access them?	CNEL: Opportunities for local participation are typically advertised directly by the sub-contractors or third-party contractors who work on the project. These are usually made available through notices posted at their offices or notice boards. It is therefore important for local businesses and interested individuals to actively monitor these spaces and engage with the sub-contractors directly to find out about available opportunities.
Community Member: How is local content defined? Does it include companies that are locally registered even if the owners are not Namibian? How exactly is it defined?	CNEL: Namibia has several official instruments guiding local content, including the Local Content Policy and the Petroleum and Energy Act. These documents provide the specifications on what qualifies as local content. For example, the local content policy defines a Namibian company as one that has at least 51% local ownership Chevron maintains a database of local companies that have formally expressed their interest in providing services, and third-party contractors are able to consider the companies listed on that database. Chevron also has an open-door policy, allowing any interested local company to approach us and present their profiles and capabilities
NGO: Regarding marine life, how will the drilling, machinery, and chemicals used in this project affect marine ecosystems and the communities living along the coast?	CNEL: Chevron will use a non- aqueous drilling fluid (NADF) system, also known as drilling muds, that is biodegradable and has lower toxicity and bioaccumulation potential. ERM is currently undertaking a full ESIA, which includes identifying sensitive marine areas, modelling potential impacts and recommending appropriate mitigation measures.

Issue	Response
	A mitigation example includes Chevron delaying the start of a previous seismic project in another block to be outside of the June to November whale migration season. t We will continue studying the potential impacts to ensure they are avoided where possible or reduced to the lowest practical level. While PEL 82 is located offshore approximately 257 km northwest of Walvis Bay, we recognise the importance of protecting marine ecosystems throughout the project area.
Media: PEL 82, was acquired by Chevron, does it mean they own the Walvis- basin area. Is Gemsbok prospect the license area?	CNEL: No, Chevron holds exploration rights over two specific blocks within PEL 82, specifically blocks 2112B and 2212A, which are part of the Walvis Basin. These blocks were previously part of the Galp portfolio and include a relatively small portion of the basin. 'Gemsbok prospect' refers to a specific prospect well within the license area; each well within the area has its own name.
Media: Based on the ESIA process diagram, you indicated we are currently in the scoping phase. Will a full Environmental and Social Impact Assessment (ESIA) be required, and is that why we are here now at the scoping phase (the second step)?	CNEL: Yes, a full ESIA is required. Urban Dynamics: We are busy with the scoping phase currently.
Media: We have an Oil Industry Contractor (OIC) list, and there are three local companies that provide offshore oil and marine services. Will Chevron use one of these existing providers, or will a new company be brought in to do this work?	CNEL: We are likely to use one of the existing local companies, but final decision has not yet been made at this stage. The actual work is some time away and new players may enter the market before then. It will be assessed closer to the time.
Community Member: We have noticed that when these new industries begin operations, they often don't engage directly with schools, where the future workforce is being prepared. These are new industries for our country, and we need to make sure that our children are given the right information and guidance early on, so that when they finish school, they can pursue courses and careers aligned with the demands of these industries. Please make an effort to engage with schools and provide them with clear information about	CNEL: Thank you for your contribution. Chevron is aware of the serious challenges faced by communities in Namibia, including the lack of access to water, food insecurity, and unemployment. This is why we are part of NAMPOA (Namibian Petroleum Operators Association), where petroleum industry players come together to work on addressing these social challenges in a coordinated way. We don't believe in just providing short-term solutions; we want to focus on building skills and creating meaningful, long-term opportunities for people. While we are still in the early exploration phase, which means job opportunities are currently limited, we know that there will be a need for various skills as the project develops. These may include general workers, engineers, support staff, and specialised skills like welding and potentially even underwater work. We acknowledge that preparation needs to start now, and your recommendation about engaging directly with schools to build awareness and interest in these opportunities is valuable. We will take

Issue	Response
potential job opportunities and the skills or technical expertise required by the industry.	this suggestion forward and ensure it is considered as we continue planning our community engagement and skills development initiatives.
Community Member: What qualification do you need to get involved in Oil industry?	CNEL: It's important to research the skills required by the various companies involved in the industry and seek employment through them. If you already have a qualification, you can attend specific courses to upskill yourself for offshore work. Community Member: emphasised the importance of up skilling for young people to access opportunities in this industry. She shared her personal example of how she has prepared herself for potential offshore or oil and gas related work by obtaining: A Welding qualification; Work experience in welding; Health and Safety certificates; Medical fitness examinations required for offshore work; A valid passport to be able to travel to South Africa for specialised offshore training courses; and An up-to-date CV detailing her qualifications, skills, and work experience. CNEL: We are one of the presenting sponsors of the Youth in Oil and Gas Summit here in Walvis Bay being held in July. We encourage you to find more information on their social media platforms.
Community Member: Where is Chevron's office in Walvis Bay so that we can visit and get first-hand information about available opportunities? Events like conferences on oil and gas—how can we attend those if we're unemployed and don't have the means to participate?	CNEL: We will discuss this with the organizers of the upcoming Youth Summit in July, to explore what opportunities can be made available for more youth to get involved — including as volunteers.
Community Member: I think it is better for Chevron to do their own short listing and not the third-party contractors.	CNEL: Noted

5.7 ESIA PHASE STAKEHOLDER ENGAGEMENT

Full details of the engagement process for the ESIA phase (and subsequent project phases) will be provided in the updated SEP. A complete list of stakeholders has been identified through engagements and a desktop review and are documented in a stakeholder database. They will be analysed based on their level of impact and interest in the project. Stakeholder identification and analysis is an on-going process through the ESIA phase and life of the project.

As part of the application to the Environmental Commissioner, public meetings will be held to inform the public about the project, the processes that will be followed during the application process and the results of the ESIA.

5.8 GRIEVANCE MECHANISM

Grievances are complaints or comments (or questions/suggestions) concerning the way in which a project is being implemented. A GM provides a formal and on-going avenue for stakeholders to engage with the project proponents and contractors, whilst the monitoring of grievances provides signals of any escalating conflicts or disputes.

Grievances can encompass minor concerns as well as serious or long-term issues. They might be felt and expressed by a variety of parties including individuals, groups, communities, entities, or other parties affected or interested in the social or environmental impacts of the project. It is essential to have a robust and credible mechanism to systematically handle and resolve any complaints that might arise in order that they do not escalate and present a risk to operations or the reputation of the company (nationally or internationally). If well-handled, an effective GM can help foster positive relationships and build trust with stakeholders.

An effective grievance management process should include the following components:

- **Simple and Culturally Appropriate Process:** Complaints should be submitted in a convenient manner. There should be several appropriate channels through which stakeholders can submit complaints free of charge, and without retribution to the party that is responsible for the issue or concern;
- **Simple Internal Procedure:** A simple and consistent procedure is required to record grievances, identify those responsible for addressing them and ensure that they are resolved;
- **Staff Arrangements:** Roles and responsibilities in the grievance management process to be defined and agreed upon;
- **Training:** The launch or modification of the grievance management process should include internal induction and/or training for operational staff;
- **A Set Timeframe:** The grievance process should set a timeframe within which complainants can expect acknowledgement of receipt of grievance and a response and/or resolution of grievance;
- **Sign Off**: Actions planned to resolve grievances that are considered to be of significant concern by the Grievance Officer should be signed-off by a member of the senior management, suitably qualified assess the effectiveness of the response;

- **System of Response:** A clear system of response is required to identify who should respond to the complainant and how. Response to the complainant should be provided in a timely and transparent manner;
- **Appeal process:** An appeal process with the involvement of third parties should be in place in case the complaint is not resolved to satisfaction of the party originating the grievance;
- **Disclosure:** The GM should be clearly and widely disclosed to stakeholders;
- Access to Legal Remedies: The mechanism should not impede access to judicial or administrative systems; and
- **Monitoring Effectiveness**: Mechanisms should be set in place for monitoring the effectiveness with which complaints are being recorded and resolved.

A GM enables any stakeholder to make a complaint or a suggestion about the way the project is being implemented. Grievances may take the form of specific complaints for damages/injury, concerns about routine project activities, or perceived incidents or impacts. The presence of workers in the area and the likely interaction with the local population requires that the GM provides a response to Gender Based Violence (GBV) related complaints. In this regard the GM can ensure capacity to handle these complaints and support potential victims.

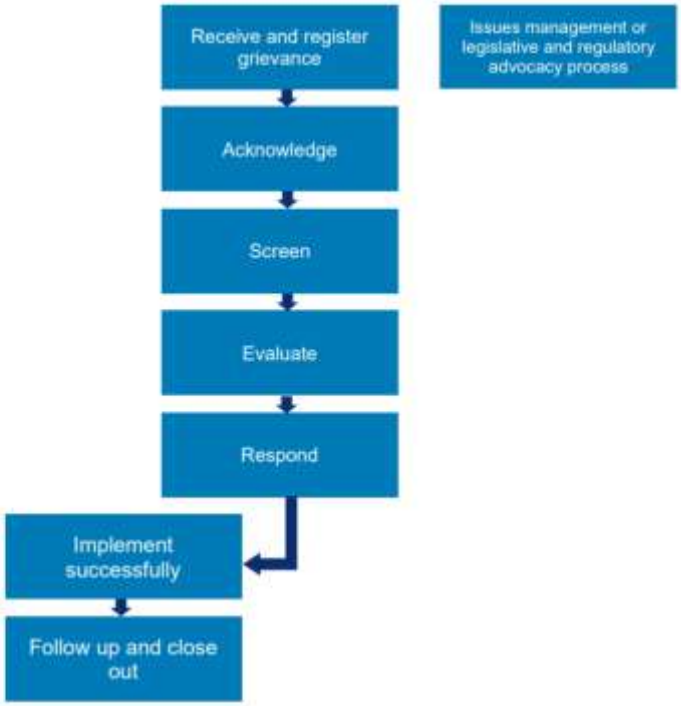
Identifying and responding to any grievances supports the development of positive relationships between the project and its stakeholders. A GM provides a platform for all external stakeholders to engage with the project, and provide ongoing feedback, as well as dispute resolution to minimise social risks that may cause project delays and increase costs.

A GM outlines the approach to accepting, assessing, resolving, and monitoring grievances from stakeholders regarding the project. Timely redress or resolution of grievances is vital to ensure successful implementation of the project.

5.8.1 CNEL GRIEVANCE MECHANISM

CNEL has established a grievance mechanism procedure (2025) to define the process to managing stakeholder concerns and complaints in alignment with the Chevron Operational Excellence Stakeholder Engagement and Issues Management Process and the Chevron Human Rights Policy. CNEL's existing 2025 GM will be applicable to the project and the same grievance mechanism process described in the GM and summarised in Figure 5-2, will be followed.

FIGURE 5-2 CNEL GRIEVANCE MACHANISM PROCESS



Source: CNEL, 2025

CNEL's GM does not replace existing Namibia legal processes, or CNEL administrative processes already in use. In addition, the GM does not impede access to other judicial or administrative remedies that might be available under domestic law or through existing arbitration procedures, or substitute for feedback mechanisms provided through collective agreements.

CNEL Corporate Affairs, under the oversight of the Namibia Country Manager, will administer the GM by providing resources to handle correspondence, coordinate internal resolutions, manage a log, and report (both internally and externally).

CNEL's Grievance Mechanism will be appended to the ESIA.

6. IDENTIFICATION OF KEY ENVIRONMENTAL AND SOCIAL ISSUES AND SCREENING OF KEY IMPACTS

This chapter provides a high-level screening of the interactions between the proposed project activities and the receiving environment. It includes an activity-specific Aspects and Impacts Register, which identifies all relevant environmental and social aspects of the project, along with their associated impacts.

Based on this register, the ESIA project team has identified key potential impacts. This chapter also outlines impacts that were assessed as being insignificant, including the rationale for their exclusion during the scoping phase. These excluded impacts will not be assessed further in the ESIA phase.

6.1 OVERVIEW

A key component of the scoping phase is a preliminary analysis of how the project may interact (positively and negatively) with environmental (including physical and biological receptors) and social resources or receptors. The impacts identified by the project team as potentially significant during the Scoping process provide focus for the studies undertaken during the ESIA phase. The primary objective of scoping is to identify potential interactions between project activities and the environmental and socio-economic baseline. This process defines the Terms of Reference for the ESIA report, excludes areas where significant interactions are not anticipated, highlights any gaps or uncertainties in the baseline data and informs the need for supplementary data collection prior to submission of the ESIA report.

6.2 IDENTIFICATION OF POTENTIAL PROJECT INTERACTIONS

Key environmental and social issues associated with the project have been identified by the project team through:

- Analysis of the project description.
- Review of available secondary data to describe the environmental and social context of the study and other bibliographic resources available at the time.
- Review of stakeholder issues from other available ESIA reports in the region.
- Screening of the project activities against generic activities/scenarios to determine interactions that may result in direct or indirect environmental and/or social impacts. The screening questions considered the following environmental aspects and social categories:
    - Ecosystem disturbance.
    - Natural resource use.
    - Air emissions.
    - Wastewater management.
    - Waste management.
    - Community.
    - Cultural resources.
    - Stakeholders.

A scoping workshop was held on 15 April 2025 by the ESIA team and CNEL representatives to confirm the potential impacts and risks identified. These impacts were then categorized either for detailed assessment by specialists or for limited assessment where they could be effectively managed through established mitigation measures support this process, an adapted version of the Leopold Matrix was used to analyse and document the potential impacts in the Aspects and Impacts Register (Table 6-2).

6.3 RESOURCES AND RECEPTORS

For this project the following key resources and receptors were determined to be relevant:

- Physical: ambient air quality, global climate, noise levels, light, seabed features and geology, seabed sediment and characteristics and marine water quality.
- Biological: benthic communities, deepwater corals, seabirds, fish and pelagic flora and fauna, marine mammals, marine turtles, protected areas/critical habitats, flora and fauna (terrestrial).
- Social: community health, safety & security, traffic & transportation (marine and onshore), fishing & navigation, cultural heritage, tourism/recreation, employment (1st party) & income, workforce (indirect 2nd and 3rd party), local economy, utilities (e.g., cables, pipelines, waste facilities), labour and working conditions, oil and gas infrastructure.

6.4 OUTCOME OF THE SCOPING PROCESS AND IMPACT IDENTIFICATION MATRIX

Table 6-2 below summarizes the results of the screening and scoping process of the planned and unplanned project activities against the aspects and the key environmental and social receptors in the project AoI. A potential interaction between an aspect and the project activity is indicated in grey in Table 6-2. The significance of an interaction between the project activity and an environmental or social resource/receptor was evaluated and rated according to the scale in Table 6-1.

TABLE 6-1 KEY OF EVALUATION OF POTENTIAL SIGNIFICANCE

	No interaction
I	An interaction with the environment or receptor which is not expected to be potentially significant
PS	An interaction with the environment or receptor that could be potentially significant
P	Denotes a positive interaction

TABLE 6-2 SUMMARY OF IMPACT SOURCES AND RECEPTORS

Issue		Aspect											Environmental/ Social /Health Sensitivity																													
													Physical							Biological								Social													
No	Activity	Ecosystem disturbance (Physical footprint)	Ecosystem disturbance [Physical Presence	Air Emissions	Ecosystem disturbance (Noise and Vibrations)	Ecosystem disturbance	Wastewater Management (Liquid Discharges)	Waste Management	Natural Resources use	Community	Cultural resources	Stakeholder	Ambient Air Quality	Global Climate	Noise Levels (Airborne and Underwater)	Light	Seabed	Sediment	Water Quality	Benthic Communities	Fish & Pelagic Flora & Fauna (Plankton)	Marine Mammals	Marine Reptiles	Seabirds/waterfowl other	Coral Outcrops	Protected Areas	Fauna & Flora (Terrestrial)	Community Health, Safety & Security	Traffic & Transportation (Marine and onshore)	Fishing & Navigation	Cultural Heritage	Tourism/ Recreation	Employment (1st party) &	Workforce (indirect 2nd and 3rd party)	Local Economy	Utilities (eg cables, pipelines, waste facilities)	Labour and working	Oil and Gas Infrastructure
A	**Vessel Activities**																																								
1	Operation and presence of supply and support vessels, helicopters from onshore support base												i	i	i	i			i			i	i	i				i	i	i	i	i					i		
2	Power generation by vessels / Helicopters												i	i	i						i	i	i																	
3	Disposal of non hazardous waste																																				i		
4	Disposal of hazardous waste																																				i		
5	Discharge of oily water (eg deck drainage, bilge water, machinery space)																		i																				
6	Discharge of sanitary effluents (black and grey water)																		i																				
7	Disposal of food waste																		i																				
8	Ballast water from support and supply vessels (potentially international)																		i	i	i																		
9	Provision of potable water																																						
10	Labour, equipment and services supply																																p		p				
B	**Exploratory Drilling Programme**																																							
1	Mobilisation and demobilisation of Drillship/MODU (ie semi-sub self propelled)												i	i	i	i			i			i	i	i						i	i						i		

Issue		Aspect											Environmental/ Social /Health Sensitivity																														
													Physical							Biological								Social														
No	Activity	Ecosystem disturbance (Physical footprint)	Ecosystem disturbance [Physical Presence	Air Emissions	Ecosystem disturbance (Noise and Vibrations)	Ecosystem disturbance	Wastewater Management (Liquid Discharges)	Waste Management	Natural Resources use	Community	Cultural resources	Stakeholder	Ambient Air Quality	Global Climate	Noise Levels (Airborne and Underwater)	Light	Seabed	Sediment	Water Quality	Benthic Communities	Fish & Pelagic Flora & Fauna (Plankton)	Marine Mammals	Marine Reptiles	Seabirds/waterfowl other	Coral Outcrops	Protected Areas	Fauna & Flora (Terrestrial)	Community Health, Safety & Security	Traffic & Transportation (Marine and onshore)	Fishing & Navigation	Cultural Heritage	Tourism/ Recreation	Employment (1st party) &	Workforce (indirect 2nd and 3rd party)	Local Economy	Utilities (eg cables, pipelines, waste facilities)	Labour and working	Oil and Gas Infrastructure
2	Power generation by Drillship/MODU												i	i	i						i	i	i																		
3	Drillship positioning (DP)														i						i	ps	i																		
4	Drillship/MODU presence at Site (offshore) including exclusion zone, wellhead and riser															i								i					i	ps							i			
5	Drilling														i	i	i	i		i	ps	ps	ps	i																	
6	Discharge of cooling water																		i																						
7	Provision of water for muds																																				i			
8	Discharge cuttings and WBM at seabed during the riserless drilling stage																ps	ps	ps	ps																				
9	Discharge cuttings below sea surface during the risered drilling stage (closed loop system)																i	i	ps	i	i	i	i		i															
10	Discharge of excess cement at seabed																ps	ps	ps	ps																				
11	Disposal of excess WBF at surface																		i		i	i	i																	
12	Disposal of excess NADF																																				i			
13	Well logging including MWD/LWD and wireline logging																																							
14	Vertical Seismic Profiling														i						i	ps	i																	
15	Well testing for appraisal wells												i	i	i	i			i		i	i	i	i																
16	Riser/ BOP - Structure Removal																i	i		i																				

Issue		Aspect											Environmental/ Social /Health Sensitivity																														
													Physical							Biological									Social													
No	Activity	Ecosystem disturbance (Physical footprint)	Ecosystem disturbance [Physical Presence	Air Emissions	Ecosystem disturbance (Noise and Vibrations)	Ecosystem disturbance	Wastewater Management (Liquid Discharges)	Waste Management	Natural Resources use	Community	Cultural resources	Stakeholder	Ambient Air Quality	Global Climate	Noise Levels (Airborne and Underwater)	Light	Seabed	Sediment	Water Quality	Benthic Communities	Fish & Pelagic Flora & Fauna (Plankton)	Marine Mammals	Marine Reptiles	Seabirds/waterfowl other	Coral Outcrops	Protected Areas	Fauna & Flora (Terrestrial)	Community Health, Safety & Security	Traffic & Transportation (Marine and onshore)	Fishing & Navigation	Cultural Heritage	Tourism/ Recreation	Employment (1st party) &	Workforce (indirect 2nd and 3rd party)	Local Economy	Utilities (eg cables, pipelines, waste facilities)	Labour and working	Oil and Gas Infrastructure
17	Temporary well suspension or P&A																ps	ps	ps	ps																				
18	Disposal of non hazardous waste																																			i			
19	Disposal of hazardous waste																																			i			
20	Discharge of oily water (eg deck drainage, bilge water, machinery space)																		i																				
21	Discharge of sanitary effluents (black and grey water)																		i																				
22	Disposal of food waste																		i																				
23	Ballast water exchange																		i	i	i																		
24	Provision of potable water																																						
25	Helicopter support (crew change)												i	i	i	i						i		i				i											
26	Labour, equipment and services supply												i	i	i														i				p		p				
C	**Shore Base / Supply Base Activities**																																						
1	Waste handling for disposal (by a Third-Party)																																		p	i			
2	Road traffic												i	i	i														i										
3	Liquid mud plant (eg mud, barite)												i	i	i																					i			
4	Storage of chemicals																																						
5	Storage of bulk cement																																						
6	Fuel supply																																		p	i			
7	Water supply																																		p	i			
9	Shorebase workforce (by a Third-Party)																																						

Issue		Aspect										Environmental/ Social /Health Sensitivity																												
												Physical							Biological									Social												
No	Activity	Ecosystem disturbance (Physical footprint)	Ecosystem disturbance [Physical Presence	Air Emissions	Ecosystem disturbance (Noise and Vibrations)	Ecosystem disturbance	Wastewater Management (Liquid Discharges)	Waste Management	Natural Resources use	Community	Cultural resources	Stakeholder	Ambient Air Quality	Global Climate	Noise Levels (Airborne and Underwater)	Light	Seabed	Sediment	Water Quality	Benthic Communities	Fish & Pelagic Flora & Fauna (Plankton)	Marine Mammals	Marine Reptiles	Seabirds/waterfowl other	Coral Outcrops	Protected Areas	Fauna & Flora (Terrestrial)	Community Health, Safety & Security	Traffic & Transportation (Marine and onshore)	Fishing & Navigation	Cultural Heritage	Tourism/ Recreation	Employment (1st party) &	Workforce (indirect 2nd and 3rd party)	Local Economy	Utilities (eg cables, pipelines, waste facilities)	Labour and working	Oil and Gas Infrastructure
10	Equipment and services supply												i	i	i														i						p				
11	Security (by a Third-Party)																																							
13	Onshore crew change												i	i	i														i	i				p	p	p	i	i		
D	**Accidental Event/ Emergency - offshore**	**Likelihood**											**Significance**																												
1	Hydrocarbon Spills (minor)	Seldom											Minor																												
2	Hydrocarbon Spills (medium)	Seldom											Moderate																												
3	Hydrocarbon Spills (major/ including well blowout)	Unlikely											Major																												
4	Fire/explosion	Unlikely											Major																												
5	Hazardous Chemical Release (chemical spills)	Unlikely											Moderate																												
7	General vessel emergency (offshore)	Unlikely											Moderate																												
8	Person overboard	Unlikely											Minor																												
10	Dropped Objects/ Lost Equipment	Unlikely											Moderate																												
E	**Accidental Event/ Emergency - onshore**	**Risk Assessment**											**Consequence**																												
3	Chemical Spill	Seldom											Minor																												
5	Aviation (helicopters)	Unlikely											Catastrophic																												

6.5 SUMMARY OF POTENTIAL IMPACTS AND RISK

This section summarises the potentially significant environmental and social interactions identified during the scoping phase. While the range of impacts presented here is intentionally broad to allow for comprehensive consideration, the actual scope of impacts is expected to be narrower due to the integration of mitigation measures into the project design.

The results of the scoping process are summarized in Table 6-3, which highlights the potentially significant issues that will be subject to further assessment. Table 6-4 presents issues deemed non-significant and therefore excluded from further assessment. Receptors identified in Table 6-2 for which no interaction was identified are not included in this summary, as they are not expected to be affected by the proposed project. All positive interactions will be assessed further in the ESIA report.

TABLE 6-3 POTENTIAL IMPACTS SCOPED IN FOR ASSESSMENT IN THE ESIA PHASE

Aspect	Issue	Activities	Scoping Results
Planned Events			
Ecosystem Disturbance	Seawater and sediment quality degradation /contamination and impacts on marine fauna	• Disposal of cuttings to the seafloor and overboard during drilling •	Cuttings discharged both at the seabed (prior to riser installation) and below the sea surface during risered drilling (closed loop system) may generate a sediment plume that could disturb nearby marine habitats, benthic communities and marine fauna. This impact will be assessed further in the ESIA report, including a discussion on the treatment and base fluid content of these muds and cuttings prior to disposal.
		• Drilling	The impact of drilling on the seabed is expected to be highly localised and short-term. During the initial phase (top hole drilling), only limited physical disturbance is anticipated, primarily from the discharge of cuttings and excess cement. In subsequent phases, the dispersion of cuttings (both from the vessel and at the seabed) will be modelled. These results will be included in the ESIA report, along with an evaluation of potential impacts on benthic fauna.
		• Disposal of excess cement	Already mixed excess cement will be disposed of overboard. Contaminant concentrations in seawater would be expected to return to background levels rapidly, with the assistance of currents and the mixing capacity of the water body (the assimilative capacity of water would be expected to minimise any impacts) and therefore have limited impacts on marine fauna. However, these impacts will be assessed in the ESIA report.
	Disturbance of marine fauna	• Drillship and vessels noise due to dynamic positioning and moving • Noise from drilling activities (including well logging)	Underwater noise from drilling (including well logging) and vessel operations may disturb marine fauna and habitats, especially noise-sensitive species. These impacts, including vibrations, will be assessed in the ESIA report.
Community and Stakeholders	Fishing and Navigation	• Riser/ BOP - Structure Removal • Drillship/MODU presence at Site (offshore) including exclusion zone, wellhead and riser	The activities associated with the exploratory drilling program will require the establishment of temporary safety exclusion zones around the drilling unit, which may be perceived negatively by fishing communities and could affect navigation routes. These impacts will be evaluated in the ESIA report.

Aspect	Issue	Activities	Scoping Results
Stakeholders	Global Climate Change	• Mobilisation, operation, presence and demobilisation of vessels • Well testing and appraisal • Helicopter support • Labour equipment and service • Road traffic • Liquid mud plant • Onshore equipment supply • Onshore crew change	GHG emissions during the drilling program are temporary and not considered potentially significant. However, considering CNEL's project standard (refer to Section 2.4.5) and increased public awareness of the risk associated with global climate change which could raise concerns from stakeholders, the GHG emissions and climate change study (refer to Section 7.2) will be assessed and included in the ESIA report.
Unplanned / Accidental Events			
Ecosystem Disturbance	Disturbance of fisheries and marine fauna	Blowout	The risk of a blowout for the project can be minimised by applying the Chevron WellSafe Standard protocols and verification plan. The risk and potential impact of a blowout of oil/gas will result in marine pollution and disturbance of sensitive receptors and marine and potentially coastal habitats. It will also impact fisheries, the health and safety of the workforce and result in decreased air quality in the region of the blowout. The significance of the impact of a blowout will therefore be assessed further in the ESIA report.
Community	Community health and safety	Vessel collisions	Vessel collisions could lead to health and safety risks, and the mitigation and prevention of these incidents needs to be included in the ESMP. The significance of this impact will therefore be assessed further in the ESIA report.
		Helicopter incidents	The ESMP for this project will include measures to minimise helicopter accidents during crew transfers. The significance of this impact will therefore be assessed further in the ESIA report.

TABLE 6-4 POTENTIAL IMPACTS SCOPED OUT OF ESIA PHASE ASSESSMENT

Aspect	Issue	Activities	Scoping Results
Planned Events			
Air Emissions	Degradation of air quality	• Vessels and helicopter atmospheric emissions • Power generation on the drillship during drilling • Bunkering	Air quality impacts from vessel and exploration activities are expected to be temporary and localized. Given the offshore location, well-mixed airshed, and distance from shore, no significant regional or health impacts are anticipated. Therefore, this impact is not considered significant and will not be assessed further.
Ecosystem disturbance	Disturbance to marine fauna and seabirds due to light	• Operation and presence of support vessels, helicopters from onshore support base • Mobilisation, presence, operation and demobilisation of Drillship/MODU and support vessels • Drilling • Vertical Seismic Profiling • Well testing for appraisal wells	Artificial lighting from offshore project vessels may attract marine fauna and seabirds, but the risk is minimal due to the project's distance from the shore (>80 km), limited duration and restricted lighting use. The likelihood of marine turtles being present is also low, as the area lacks nearby nesting beaches. Overall, the impact is considered not significant and will not be assessed further.
	Seawater quality degradation /contamination and impacts on marine fauna	Wastewater discharges from the drillship, supply and support vessels	Operational discharges from the drillship and support vessels may affect local water quality and marine fauna. However, all discharges will comply with MARPOL 73/78 Annexes I, IV, and V, which regulate oil, sewage and garbage disposal at sea. As a result, the potential impact is considered not significant and will not be assessed further
Wastewater Management	Degradation to sea water quality	• Disposal of excess WBF at surface • Well testing for appraisal wells • Vessel discharge of oily water • Discharge of sanitary effluents (black and grey water) • Disposal of food waste • Ballast water from support and supply vessels (potentially international)	Water quality impacts are expected to be localized and temporary. All discharges will comply with MARPOL 73/78 standards. CNEL will implement a Waste Management Plan and follow best environmental practices, including minimizing WBF volumes and managing well testing fluids. The impact is considered not significant.

Aspect	Issue	Activities	Scoping Results
Community	Community, Health, Safety & Security	Interactions of foreign/ migrant workers with local residents	The project will employ personnel throughout its duration; however, due to the specialised nature of offshore operations, most drillship staff will be expatriates. These workers are expected to transit briefly through Walvis Bay or Lüderitz. Shore base operations will primarily involve existing employees of local logistics companies. Given the short-term nature of the project and the limited number of personnel involved, the potential for significant interaction with local communities is minimal. Therefore, this impact is considered insignificant and will not be assessed further.
		Noise from helicopters	Helicopter transfers for crew changes will occur over the ports of Walvis Bay or Lüderitz. Flight paths will avoid residential areas, minimizing potential noise disturbance. As a result, this impact is considered not significant and will not be assessed further.
	Visual	Drillship	The drillship will be located more than 80 km offshore and therefore is very unlikely to be seen from the shore. Therefore this impact was considered not significant and will not be assessed further.
	Traffic and transportation	• Drillship/MODU presence at Site (offshore) including exclusion zone, wellhead and riser • Labour, equipment and services supply • Road traffic • Equipment and services supply • Onshore crew change	The offshore project activities are not anticipated to increase traffic significantly as the project will add five more vessels for the short term duration of the project. While the safety exclusion zone may be perceived to impact traffic and transportation, the project area in relation to the navigation routes is substantially larger and therefore the impact will be not significant. The volume of road traffic expected to be generated by the onshore project activities is expected to be minimal therefore this impact will not be assessed further in the ESIA report.
	Tourism & recreation	• Operation and presence of supply and support vessels, helicopters from onshore support base	The onshore and offshore elements of the project are not expected to negatively impact on tourism and recreation, particularly in the vicinity of the port, Therefore, this impact will not be assessed further in the ESIA report.
Waste Management	Increase in non-hazardous and hazardous wastes disposal	Disposal of non-hazardous and hazardous wastes generated by the project activities at onshore disposal sites	The project will result in an increase in both non- hazardous (eg: kitchen waste and scrap metals) and hazardous (eg engine lubricants and filters) waste generated in the area. Wastes will be transported by vessels to the onshore in Walvis Bay prior to off-site disposal. Solid non-hazardous waste will be disposed of at a suitably licensed waste facility. Hazardous wastes will be treated/ disposed of at a licensed waste treatment/ disposal facility. Therefore this impact was considered not significant and will not be assessed further.

Aspect	Issue	Activities	Scoping Results
Natural Resource Use	Fresh water supply	Provision of drinking water for the crew on all vessels	The MODU will produce water and where required bottled water may be provided. Therefore this impact was considered not significant and will not be assessed further.
Stakeholder	Disturbance of seabed geology	Drilling	The impact of drilling of the geology will be very localised to the drilling location and where the drill bit will penetrate the seabed geology. Therefore the impact was not considered significant and will not be assessed further.
	Increased pressure on local utilities and infrastructure	Disposal of shore base generated waste	Waste generated at the shore base will be managed and disposed of at a hazardous waste treatment facility established by CNEL, located adjacent to the city's municipal infrastructure. The volumes of waste generated and requiring onshore management will be relatively small therefore this impact is scoped out of further assessment.
Unplanned Events			
Ecosystem Disturbance	Introduction of alien invasive species	Ballast from support and supply vessels (potentially international)	De- and re-ballasting of project vessels will only be undertaken in adherence to International Maritime Organisation (IMO) guidelines governing discharge of ballast waters at sea. The IMO states that vessels using ballast water exchange should, whenever possible, conduct such exchange at least 200 nm from the nearest land and in water of at least 200 m depth. Where this is not feasible, the exchange should be as far from the nearest land as possible, and in all cases a minimum of 50 nm from the nearest land and preferably in water at least 200 m in depth. Based on the implementation of these measures the impact is considered insignificant and will not be further assessed.

7. TERMS OF REFERENCE FOR THE ESIA REPORT

This chapter presents the terms of reference for the ESIA report.

7.1 IMPACT ASSESSMENT METHODOLOGY FOR PLANNED, UNPLANNED AND CUMULATIVE ACTIVITIES

7.1.1 IMPACT ASSESSMENT OVERVIEW

The purpose of conducting an ESIA report is to assess the potential environmental and social effects of a proposed project to the surrounding area.

The impact assessment methodology typically applies the following five step process:

1. Identification of potential impacts through screening against a list of pre-defined activities/scenarios. For the screening questions that identify a potential environmental or social impact, these are carried through to Step 2 to 5.
2. Evaluation of the significance of identified, potential impacts using the definitions outlined in Table 7-1 for Potential Environmental or Social Impacts. The definition for each level of significance is based on the potential nature of a change to the surrounding area (environment or community), its size, scale or intensity, the geographical extent and distribution and duration, frequency, and reversibility of the potential impact. Table 7-2 below, lists the definitions of likelihood (rare, remote, unlikely, seldom, occasional, and likely)
3. Development of mitigation measures to avoid or reduce potentially significant impacts (significant impacts being defined as moderate or above).
4. Re-assessment of potential impacts after mitigation measures are applied, referred to as residual impacts.
5. Development of further mitigation and monitoring measures to reduce residual impacts if potential impacts are identified to be moderate or above.

Similar steps are followed for event related impacts or unplanned activities (e.g., vessel collision, well blow-out etc. that could result in accidental release of hydrocarbons or hydrocarbon-containing fluid to water) with the incorporation of likelihood of the unplanned activity occurring.

7.1.2 IMPACT ASSESSMENT METHODOLOGY

7.1.2.1 METHODOLOGY FOR PLANNED ACTIVITIES

The project planned activities are screened against the generic activities/scenarios to determine interactions that may result in direct or indirect environmental and/or social impacts. The screening questions cover the following environmental aspects and social categories:

- Ecosystem disturbance;
- Natural resource use;
- Air emissions;
- Wastewater management;
- Waste management;

- Community;
- Cultural resources; and
- Stakeholders.

If the screening identifies the potential for impacts for any of the environmental aspects or social categories from project activities, the project specific activity is described, and the assessment of the potential impact significance is determined based on the description for each level of significance (Incidental, Minor, Moderate, Major, or Severe) shown in Table 7-1. The Impact Significance (i.e., severity of potential impact) is determined prior to any mitigation being applied and then re-evaluated with consideration of the mitigation to obtain a residual potential impact.

Table 7-1 lists the significance ratings based on definitions of environmental and social consequences.

TABLE 7-1 DEFINITIONS OF ENVIRONMENTAL AND SOCIAL SIGNIFICANCE CRITERIA AND ASSOCIATED IMPACT SIGNIFICANCE RATING

Impact Significance	Potential Environmental Impact Definition	Potential Social Impact Definition
Incidental	Negligible disturbance or impact, and/or the impact is reversible within a very short period of time (e.g., days to months).	Incidental impact that is indistinguishable from existing and/or pre-project conditions.
Minor	Impact occurs at a local scale (e.g., within, or in the vicinity of a disturbance footprint or operational area) or affects a minor part of a species habitat or population but the impact is recoverable in the short term (e.g., 3 months to 2 years).	Minor, inconvenient social impacts that lasts less than one year and/or are reversible.
Moderate	Impact occurs at a local scale or affects a minor part of a species habitat or population but the impact is recoverable in the long-term (e.g., two to ten years), or impact affects a wide area (e.g., significantly greater than disturbance footprint) or affects a significant proportion of a habitat or population (e.g., >10%) but the impact is recoverable in the short-term (e.g., 3 months to 2 years).	Moderate, localised, or short-term (e.g., 1 to 3 years), recoverable social impact. Community stakeholders likely able to adapt with relative ease.
Major	Impact occurs at a local scale or affects a minor part of a species habitat or population and the impact is persistent (e.g., >10 years for recovery or never expected to fully recover), or impact affects a wide area (e.g., significantly greater than disturbance footprint) or affects a significant proportion of a habitat or population (e.g.,>10%) but where the impact is recoverable in the long-term (e.g., 2 to 10 years).	Major, local-to-regional (sub-national) or medium-term (e.g. 3 to 6 years) recoverable social impact. Community stakeholders may be able to adapt with some targeted support or assistance.
Severe	Impact affects a wide area (e.g., significantly greater than disturbance footprint), or affects a significant proportion of a species habitat or population (e.g.,>10%) and the impact is persistent (e.g., >10 years or never expected to fully recover), or impact affects a very large	Severe, local-to-national, or long-term (up to 10 years) non-recoverable social impacts. Community stakeholders, social services or infrastructure may not be

Impact Significance	Potential Environmental Impact Definition	Potential Social Impact Definition
	area (e.g., an entire region and/or the majority or all of a habitat type or population and/or results in loss of ecosystem function), and lasts long-term (e.g., 2 to 10 years).	able to adapt without sustained targeted support or assistance.
Catastrophic	Impact affects a very large area (e.g., an entire region and/or the majority or all of a species habitat type or population and/or results in loss of ecosystem function) and is persistent (e.g., >10 years for recovery or never expected to fully recover).	Non-recoverable social impacts lasting longer than 10 years, and community stakeholders may not be able to adapt without significant intervention. Total loss of (substantial or significant) community property, cultural asset, or natural resources (e.g., ecosystems services) without the ability to replace.

Source: Chevron, 2023

7.1.3 METHODOLOGY FOR EVENT-RELATED OR UNPLANNED ACTIVITIES

For the purposes of an impact assessment, potential impacts that are dependent on the occurrence of an action that has a finite probability, but might not occur at all, are referred to as "event-related impacts" or unplanned activities. An example of event-related impacts that may occur as a result of this project could be associated with an accidental, uncontrolled release of hydrocarbons that might occur under non-routine operating condition. Because event-related impacts may not occur at all, assessment of potential impacts that are event-related may take into consideration the Likelihood of occurrence. The likelihood of the potential impact is determined based on the definitions shown in Table 7-2 (rare, remote, unlikely, seldom, occasional, or likely).

Likelihood can be derived from historical information, models, industry data, stakeholder input, and professional judgment. In addition, Likelihood takes into account anticipated or planned mitigation measures, engineering controls, and procedures in place to prevent or reduce the potential consequences of the identified event.

TABLE 7-2 LIKELIHOOD OF EVENT-RELATED IMPACTS

Likelihood	Definition
Rare	The impact is rare or unheard of
Remote	The impact has occurred once or twice in the industry
Unlikely	Reasonable to expect the impact will not occur
Seldom	Exceptional conditions may allow impact to occur
Occasional	Conditions may allow the impact to occur
Likely	The impact is expected to occur

Source: Chevron, 2023

7.1.4 MITIGATION OF IMPACTS

Once the significance of a given impact has been characterised using the above methodology, the next step is to evaluate what mitigation measures are warranted. In keeping with the Mitigation Hierarchy, the priority in mitigation is to first apply mitigation measures to the source of impact (i.e., to avoid or reduce the magnitude of the impact from the associated project activity), and then to address the resultant effect to the resource/receptor via abatement or compensation measures or offsets (i.e., to reduce the significance of the effect once all reasonably practicable mitigations have been applied to reduce the impact magnitude. It is important to note that it is not an absolute necessity that all impacts be mitigated to the lowest level of significance; rather in certain cases it may be acceptable to mitigate impacts to an As Low As Reasonably (ALARP) level.

Once mitigation measures are declared, the next step is to assign residual impact significance. This is essentially a repeat of the impact assessment steps, assuming the implementation of the additional declared mitigation measures.

7.2 TERMS OF REFERENCE FOR THE MODELLING AND SPECIALIST STUDIES

Aspects to be investigated in detail by specialists during subsequent phases of the ESIA are listed below, along with a description of the terms of reference for the desktop studies (Table 7-3):

- Oil Spill Modelling;
- Drill Cuttings Discharge Modelling;
- Underwater Noise Modelling;
- Marine Biodiversity Study;
- Fisheries Assessment;
- Socio-Economic Study;
- Cultural Heritage Study; and
- Greenhouse Gas Emissions and Climate Change Study.

TABLE 7-3 SCOPE OF WORK FOR SPECIALIST STUDIES

Modelling / Specialist Studies	Terms of Reference
Oil Spill Modelling	**Modelling Methodology** • Description of metocean conditions in PEL 82 • Model the trajectory and fate of a potential crude oil blow-out. • Consider criteria such as distance from the coast, water depth, and proximity to sensitive areas. • Model two spill scenarios (with and without response) over four seasons. • Present results, including surface and shoreline oiling probability, minimum arrival time, shoreline concentration, etc. **Impact Assessment** • The impact assessment report will evaluate the size, magnitude and duration of potential impacts, providing input to the ESMP to reduce a potential impact during drilling.
Drilling Discharge Modelling	**Modelling Methodology** • The model (one well in each block, at representative water depths range, for four seasonal scenarios) will determine water column suspended sediment concentrations and bottom accumulation to assess impacts on aquatic and benthic organisms. Parameters include Total Suspended Solids (TSS) and depositional thickness. The GEMSS® model will be used, incorporating bathymetric and metocean data to estimate the fate and transport of particulate material. • A study will be conducted to understand the fate of drill cuttings and associated mud during drilling operations. The model will determine water column suspended sediment concentrations and bottom accumulation to assess impacts on aquatic and benthic organisms. **Impact Assessment** • The impact assessment report will evaluate the size, magnitude, and duration of potential impacts, providing input to the ESMP for impact minimization during drilling.
Underwater Noise Modelling	**Modelling methodology** • The model, set up for two wells location modelled, noise propagation modelled along eight transects, will use site-specific inputs to represent noise propagation, considering factors like geometric spreading, water depth, sound absorption, and diffraction. It will account for interactions with the sea surface, seabed, and water, using various modelling codes to capture underwater acoustic complexities. • The model will calculate Cumulative Sound Exposure Level (SELcum) and peak noise levels, comparing them to thresholds for marine fauna. It will simulate animal movement relative to the noise source to assess exposure over time, creating noise contour maps for peak Sound Pressure Level (SPL peak) and Root Mean Square (RMS). **Impact Assessment** • Undertake an underwater Noise Impact Assessment (NIA) based on national and international noise standards. • Assess the impacts of noise and vibration on sensitive receptors.

Modelling / Specialist Studies	Terms of Reference
	• Assess any cumulative impacts of this project in relation to planned activities in the project area. • Recommend mitigation and monitoring measures.
Marine Biodiversity	**Baseline** • Provide an overview of the baseline marine biology in the project AoI, focusing on sensitive and threatened habitats, as well as rare marine fauna and flora. This description will include various aspects of the marine environment, such as: ◦ Geophysical Characteristics: Bathymetry, coastal and shelf geology and seabed geomorphology. ◦ Biophysical Characteristics: Wind patterns, water masses and large-scale circulation, waves and tides, water chemistry and nutrients, upwelling and primary production, organic inputs and turbidity. ◦ Biological Environment: Plankton, benthic and pelagic invertebrates, seamount and submarine canyon communities, benthic and pelagic fish communities, seabirds, turtles and marine mammals. ◦ Other Users in the Area: Beneficial uses, conservation areas, marine protected areas, EBSAs, Critical Biodiversity Areas (CBAs), Important Bird Areas (IBAs), and Important Marine Mammal Areas (IMMAs). **Impact Assessment** • Conduct a review and expert interpretation of relevant local and international publications and information sources on the biological, physical and chemical impacts associated with exploration well drilling, testing, completion and abandonment. This review will cover both direct and indirect impacts, cumulative impacts as well as potential unplanned events. • Assess the impacts of the proposed exploration drilling and any unplanned events on the marine biodiversity of the Walvis Basin area. Summarize, categorize and rank all identified marine impacts in appropriate ESIA tables to be included in the overall ESIA report. The significance of these impacts will be rated according to the impact assessment methodology specified by the lead consultant for the ESIA process. • Recommend practical mitigation measures based on internationally recognized Best Available Technologies (BAT) and Best Environmental Practices (BEP).
Fisheries	**Baseline** • Conduct a literature review focusing on the specific sensitivities of commercial fishing sectors concerning the impacts arising from the proposed activities. • Provide an overview of the commercial fisheries sectors operating within Namibian waters, including a spatial and temporal analysis of recent and historical fishing catch and effort for each sector. • Create detailed maps that outline the fishing grounds in relation to the licence area. **Impact Assessment** • Evaluation of the impacts of the proposed exploration drilling and any unplanned events on commercial fisheries operations within the affected area. The significance of these impacts will be rated using the impact assessment methodology, including a discussion of confounding factors and cumulative impacts. • Suggest practical mitigation measures based on internationally recognized BAT and BEP.
Socio-Economic Study	**Baseline**

Modelling / Specialist Studies	Terms of Reference
	• The economic baseline study will be a desktop analysis focusing on the Erongo Region and its most affected constituencies. Information will be gathered from the 2001, 2011, and 2023 National Population and Housing Censuses, periodic Namibia Household Income and Expenditure Surveys, Intercensal Demographic Surveys, and Urban Structure Plans for Swakopmund, Walvis Bay, and Henties Bay. • Economic and Gross Domestic Product (GDP) data will be sourced from the Namibia Statistics Agency (NSA) National Accounts Reports. Additional data disaggregation will be requested from the NSA to compare regional GDP contributions and breakdowns with the national context. • The economic baseline report will be concise and illustrative, clearly explaining key demographic variables, social service provision, the economy, employment and livelihood systems, economic diversification, infrastructure provision and accessibility, organization and leadership, and community reliance on and relationship with ecosystem services. **Impact Assessment** • Identify and assess socio-economic impacts for planned, unplanned, and cumulative impacts. • Recommend mitigation measures to address identified impacts.
Cultural Heritage Study	**Baseline** • Conduct desk-based research on the legislative framework for cultural heritage in Namibia. • Identify tangible and intangible cultural heritage resources by an appropriately qualified cultural heritage professional within the project AoI using cartographic materials and remote sensing data. • Review the archaeological and historic background of Namibia using academic research, previous investigations, and relevant studies. • Intangible cultural heritage includes ritual and spiritual practices, ancestral veneration, and natural-spiritual beliefs. • Interview key knowledgeable individuals to compile a sufficient baseline of intangible cultural heritage. This can be carried out through stakeholder mapping in collaboration with the social team to identify relevant stakeholders. • Conduct stakeholder engagement interviews to gather information on myths, stories, songs, customs, historical events, and local celebrations. • Compile all identified cultural heritage resources into a Cultural Heritage Baseline Gazetteer with unique identifiers, GPS coordinates, designations, and sensitivity levels. Review side scan sonar and bathymetric data if available as part of the desk based assessment to identify shipwrecks and other marine archaeology. **Impact Assessment** • Assess the consolidated cultural heritage baseline for potential direct or indirect impacts related to the project and its infrastructure. • Consider both tangible and intangible cultural heritage resources in the impact assessment. • Follow national guidance on impact assessment, applying professional judgment where necessary.
Greenhouse Gas Emissions	**Baseline** • Review the local and /or international GHG regulations applicable to the project.

Modelling / Specialist Studies	Terms of Reference
	• Review the country's GHG emissions. **Impact Assessment** • Identify the sources of emissions and compile a GHG inventory resulting from the project activities. • Assess any cumulative impacts of this project in relation to existing activities in the project area if relevant. • Assess the contribution of the project to existing emissions in the area and compare the project GHG emissions with the country's GHG emissions reported to the United Nations Framework Convention on Climate Change. • Recommend any mitigation measures.

7.3 PROPOSED STRUCTURE OF THE ESIA REPORT

The preliminary Table of Contents for the Final EISA Report is as follows:

Non-Technical Summary

1. Introduction

- Purpose of the ESIA Report
- Background to the Project
- Scope and Objectives of the Assessment
- Overview of the ESIA Process

2. Legal and Policy Framework and Project Standards

- Relevant National and Regional Legislation
- Regulatory Requirements for Environmental Assessment
- International Environmental Standards and Guidelines
- Chevron's Project Standards

3. Project Description

- Description of the Previous Activities in PEL 82
- Project Need and Desirability
- Project Location
- Main Project components
- Project activities
- Project schedule
- Planned Emissions and Discharges and Waste Management
- Unplanned Emissions and Discharges
- Project Alternatives

4. Description of the Receiving Environment

- Project Area
- Physical Environment
- Biological Environment
- Other Uses of the proposed Licence Area
- Socio-Economic and Cultural Baseline
- Summary Of Key Sensitivities

5. Stakeholder Engagement

- Overview of Stakeholder Engagement Process
- Legal Framework
- Principles of Stakeholder Engagement
- Stakeholder Identification
- Stakeholder Analysis
- Grievance Mechanism
- Scoping Phase Stakeholder Engagement

- Summary of Consultations Conducted
- Key Issues Raised by Stakeholders

- ESIA Phase Stakeholder Engagement

6. ESIA Approach and Methodology

- ESIA Team
- ESIA Assumptions and Limitations
- ESIA Objectives
- Overview of the ESIA Process
- Impact Assessment Methodology

7. Assessment of Planned Activities

- Identification and Screening of Key Impacts
- Planned Operations: Key Environmental Impacts
- Planned Operations: Key Social Impacts
- Planned Operations: Cumulative Impacts

8. **Assessment of Unplanned Activities**

- Methodology
- Assessment Of Accidental Events

9. Assessment of Alternatives

- Comparison of All Alternatives Identified
- Description of the Evaluation Process
- Recommendations on Preferred Alternatives

10. Environmental and Social Management Plan

- Roles and Responsibilities
- Scope and Objectives
- Training, Awareness, and Competency
- Compliance Verification and Corrective Actions
- Management of Change
- Communication
- Document Control and Reporting
- Environmental and Social Mitigation Measures
- Monitoring
- Auditing

11. Conclusions and Recommendations

- Summary of Impacts Identified and Assessed
- Recommendation on Authorization of Proposed Activity
- Conditions for Authorization (if applicable)

12. References

13. Appendices

- Appendix A: Detailed Curriculum Vitae of EAP

- Appendix B: Acceptance of Scoping Report
- Appendix C: Detailed Stakeholder Engagement Records (including comments and response report)
- Appendix D: Specialist Studies
- Appendix E: Large Scale Maps and Figures

8. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

This chapter provides the framework for the draft ESMP that will be developed in the ESIA phase.

8.1 OBJECTIVES OF THE ESMP

The key objectives of the draft ESMP are to provide mechanisms for compliance with Namibian legislation, CNEL HSE policies, management systems and procedures, as well as international laws and standards. It will aim to implement all proposed mitigation measures identified for potentially adverse impacts are implemented effectively. The ESMP will establish a framework for mitigating impacts that may be unforeseen or unidentified. It will evaluate the effectiveness of mitigation measures and, if required, modify them or include new mitigation/preventive measures.

Additionally, the ESMP will establish a monitoring programme and record-keeping protocols. It will integrate health, safety, social, and environmental issues into the business risk management and decision-making process. The plan will rationalise and streamline health, social, and environmental activities throughout the lifetime of the project to add value and efficiency. It will encourage and achieve the highest environmental performance and response from all employees and contractors. The ESMP will provide standards for overall planning, operation, and review, enabling management to establish environmental priorities.

8.2 PRELIMINARY OPTIONS FOR CONTROL AND MITIGATION

Table 8-1 provides an overview of the receptors anticipated to be impacted by the project activities and the associated control and mitigation measures. The ESMP will be developed further from these measures where the specific management commitments to be implemented to prevent, minimise or manage significant negative impacts and optimise and maximise any potential benefits of the project will be detailed. The commitments will be presented for three project phases: mobilisation, drilling and demobilisation.

TABLE 8-1 SUMMARY OF MITIGATION MEASURES FOR PEL 82

Receptor	Control / Mitigation Measures
Normal Operations	
Marine Ecology	• Pre-drilling ROV surveys will be undertaken. • Well sites will be located to avoid sensitive and vulnerable habitats by 500 meters. • Low toxicity Group III NADF will be used during risered drilling and treatment of cuttings. • Risered cuttings will be discharged at greater than 10 meters below the surface. • Discharges will be monitored. • A Maintenance Management Plan will be implemented. • Vessel speed will be reduced. • MMO & PAM will be used if VSP is conducted. • A pre-shoot watch (visual and acoustic) will be conducted if VSP is undertaken. • "Soft-start" procedures will be implemented if VSP is conducted. • Fauna monitoring will be carried out during VSP, if conducted. • Specified helicopter flight paths will be followed. • Helicopters will maintain an altitude of greater than 1,000 meters. • Shut downs will be implemented if VSP is conducted.

Receptor	Control / Mitigation Measures
Fisheries	• Notices will be issued to mariners. • Navigational warnings will be provided. • Pre-drilling ROV surveys will be conducted. • Low toxicity Group III NADF will be used during risered drilling and treatment of cuttings. • Risered cuttings will be discharged at greater than 10 meters below the surface. • Notices will be issued to mariners. • Navigational warnings will be provided. • A local content plan and employment policies will be developed. • Stakeholder engagement will be conducted. • A grievance mechanism will be established. • Local employment will be maximized. • A logistical plan for crew rotations will be developed. • An onshore Code of Conduct will be implemented. • A grievance mechanism will be established. • Compliance with health and safety measures protocols will be maintained
Unplanned Events	
Vessels Collisions with Marine Fauna	• Monitoring will be conducted. • Transit speed will be reduced.
Loss of Equipment at Sea	• The lifting path between vessels will be minimized. • Storage, maintenance, and lifting procedures will be followed. • A post-drilling ROV survey will be undertaken. • Lost objects/equipment will be retrieved where practicable. • The SAN Hydrographer will be notified.
Minor Oil Spill Caused by Vessel or Equipment Failure and Refuelling	• Compliance with SOPEP and OSCP will be maintained. • Low toxicity dispersants that rapidly dilute to concentrations below most acute toxicity thresholds will be used. • An Emergency Response Plan and notification will be implemented. • Spill training and clean-up techniques will be conducted.
Major Oil Spill Caused by Loss of Well Control/Well Blow-out	• Design and Technical Integrity will be maintained. • Detailed Technical Risk Analysis will be conducted. • A Blow-out Preventer will be used. • An oil spill contingency plan will be developed. • An Emergency Response Plan will be implemented. • Cap and containment equipment will be available.

8.3 PROPOSED ROLES AND RESPONSIBILITIES

CNEL as the operator of PEL 82 will be responsible for meeting environmental and social commitments throughout the project life span. The project will have a dedicated, competent personnel that will manage and oversee the HSE aspects over the project lifecycle. The full list of roles and responsibilities will be detailed in the ESIA phase.

8.3.1 CNEL

CNEL will oversee the overall execution of the ESMP and fulfil the environmental and social commitments. The key responsibilities of CNEL will include:

- Contractors will adhere to the ESMP and any supplementary approval conditions specified in the ECC issued by MEFT;
- Environmental audits will be conducted to assess compliance with the established environmental performance objectives;

- All contractors will carry out environmental monitoring and reporting;
- Engagement with MIME, MEFT, and relevant stakeholders will occur as needed during critical phases of the project;
- Coordination with contractors will be undertaken to promptly inform key stakeholders about project activities, address concerns and inquiries, and manage grievances effectively in accordance with the Stakeholder Engagement Plan; and
- When deemed necessary, a representative will be appointed on the drilling unit to oversee adherence to various commitments and contractor coordination, particularly with MMO and PAM personnel.

8.3.2 DRILLING CONTRACTOR

CNEL will appoint a drilling contractor who will be responsible for overseeing the designated exploration activities and managing any sub-contractors involved. All responsibilities and obligations endorsed by CNEL will extend to both the contractors and sub-contractors.

8.4 PRELIMINARY MANAGEMENT PLANS

The following plans will be developed by the contractor appointed by CNEL as part of the ESMP:

- Contractor HSE Plan;
- Shipboard Oil Pollution Emergency Plan; and
- Site Specific Emergency Response Plan (ERP).

As stated in section 8.3, CNEL will be responsible for the overall implementation of the ESMP. Furthermore CNEL holds and overarching ERP. Additionally CNEL will develop the following plans:

- Source Control Contingency Plan;
- Oil Spill Contingency Plan;
- Stakeholder Engagement Plan;
- Waste, Emissions and Discharge Management Plan;
- Hazardous Substances Management Plan.

9. CONCLUSION

This chapter provides a conclusion of the scoping report, summarising the outcomes of the scoping process.

9.1 SUMMARY OF THE SCOPING OUTCOMES

CNEL intends to conduct an offshore exploration program within PEL 82, covering blocks 2112B and 2212A in the Walvis Basin, Namibia. The initial plan involves a one-well campaign in the Gemsbok prospect location, with potential follow-up drilling of up to nine additional wells based on the success of the initial well.

To date, exploration activities have been conducted in PEL 82, including seismic surveys and previous drilling. CNEL has appointed ERM to undertake a Scoping and ESIA process in compliance with Namibian legislation and international standards. The proposed project has undergone a scoping process by the ESIA Team and CNEL representatives to identify potential environmental and social impacts. The impacts associated with the project are expected to have a limited scope due to the incorporation of mitigation measures into the project design. The potential impacts for the planned events to be further assessed in the ESIA report are summarised below:

- Marine water, seabed, sediment quality and benthic community degradation from discharge cuttings and WBM at seabed, discharge of excess cement and temporary well suspension or P&A may impact water quality, affecting marine fauna.
- Marine water quality degradation from discharge of cuttings below the sea surface
- Disturbance of the marine fauna due to drilling, drillship positioning and VSP activities
- Disruption to fishing and navigation due to safety exclusion zone from drillship presence, including well testing and appraisal.

The potential impacts of the unplanned events to be further assessed in the ESIA report are summarised below:

- Blowout: The risk of a blowout will be minimized through a blowout management protocol. The ESIA report will assess the potential impacts on marine and coastal habitats, fisheries, workforce health and safety, and air quality.
- Dropped Objects: Health and safety risks from dropped objects will be mitigated through measures included in the ESMP. The significance of this impact will be assessed in the ESIA report.
- Helicopter Incidents: Prevention measures for helicopter accidents during crew transfers will be included in the ESMP, with the significance of this impact assessed in the ESIA report.

Following the scoping phase, in the ESIA phase the ESIA report and ESMP will be developed in compliance with the Petroleum (Exploration and Production) Act of 1991, including its amendments, the Environmental Management Act of 2007 along with its regulations, and other pertinent Namibian legislation. Additionally, it will adhere to regional and international standards relevant to the proposed project.

9.2 THE NEXT STEPS IN THE ESIA PROCESS

Following the public review period, the ESIA team updated the draft scoping report based on the comments received from the I&APs. The FSR is then submitted to the competent authority (MIME) and regulatory authority (MEFT) for review. After this review, the ministries will issue a record of decision, outlining their findings and any necessary actions or approvals required for the project to proceed.

Assuming the MEFT approves the final scoping report, the project will then advance to the ESIA phase. During this phase, specialist studies will be conducted, and the draft ESIA report and draft ESMP will be compiled. These documents will undergo a 21-day public review period. After the review period, the ESIA team will update the ESIA and ESMP reports based on feedback and submit them to the competent and regulatory authorities. The final decision of approval or rejection of the ECC will be issued, and I&APs will be informed of the decision.

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