



Environmental and Social Impact Assessment for Field Development in Block 11B/12B and associated production activities, South Africa

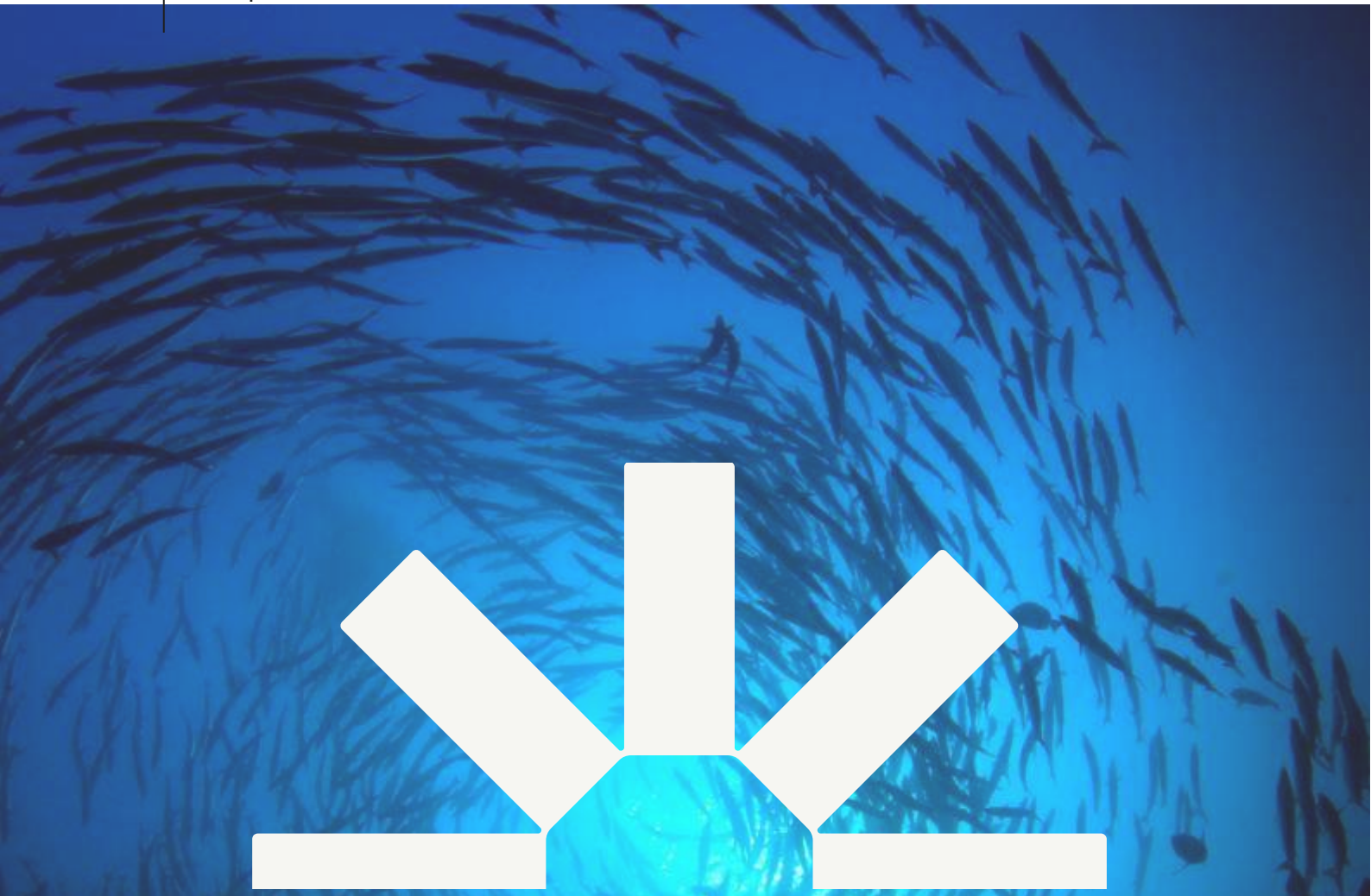
Draft Scoping Report

FOR: Main Street 1549 (Pty) Ltd

SLR Project No.: 700.000130.00001

Revision: 1

14 September 2026



Environmental and Social Impact Assessment for Field Development in Block 11B/12B and associated production activities, South Africa

Draft Scoping Report

Main Street 1549 (Pty) Ltd

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Report Sign Off and Approvals



Jeremy Blood



Basis of Report

This document has been prepared by SLR Consulting (South Africa), as the independent Environmental Assessment Practitioner (EAP), with reasonable skill, care and diligence, and taking account of the timescales and resources devoted to it by agreement with Main Street 1549 (Pty) Ltd (the Client) as part or all of the services it has been appointed by the Client to carry out. It is subject to the terms and conditions of that appointment.

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Draft Scoping Report Non-Technical Summary



This summary contains underlined hyperlinks that provide readers of the electronic version with the option to access additional information on certain aspects, if interested.

1.0 Introduction

Main Street 1549 (Pty) Ltd (Main Street) is applying for an environmental permit (called an Environmental Authorisation) to develop an offshore gas field, with associated light oil (called condensate), that has been discovered in Block 11B/12B. The Block is located off the South Coast, approximately 75 km offshore at its closest point, roughly between Cape St Francis and Mossel Bay (**Figure 1**).

Following the discovery of this gas-condensate field in an area known as the “Paddavissie Fairway”, the Joint Venture (JV) partners at the time applied for a Production Right (PR) to develop the field. The JV, under the lead of TotalEnergies, also started the associated Environmental and Social Impact Assessment (ESIA) process, which included a public participation process conducted in 2022 and 2023. Following the withdrawal of Main Street’s JV partners in late 2024, it elected to continue with the Project and became the company (or operator) responsible for managing and progressing the Project.

Main Street has chosen to assess two development scenarios for the field, which are outlined below and illustrated schematically in **Figure 1** (offshore) and **Figure 2** (onshore).

• Scenario 1: Gas transported to shore via pipeline

- An offshore production facility will be moored at one of two alternative locations: (1) in deep water near the wells or (2) in shallower water on the continental shelf.
- Gas and condensate extracted from offshore wells will be transferred to the production facility where they will be separated.
- Pipelines will transport gas from the production facility to the coast and onto a proposed gas receiving facility (e.g. the proposed gas-to-power (GtP) facility) and/or other potential gas users (also called off-takers).
- Condensate will be exported to local domestic and/or international markets by tanker vessels.

• Scenario 2: Gas processed into Liquefied Natural Gas (LNG) offshore

- An offshore production facility will be moored at one of two alternative locations: (1) in deep water near the wells or (2) in shallower water on the continental shelf.
- Gas and condensate extracted from offshore wells will be transferred to the production facility.
- At the production facility, gas will be separated and converted (or liquefied) to create LNG.
- LNG and condensate will be exported to local domestic and/or international markets by tanker vessels.

Both these scenarios may be preceded by partial development by connecting to existing PetroSA infrastructure and facilities.

The area of interest for the ESIA extends from the southwest portion of the Block along the pipeline route and survey area

to the coast ~6 km west of Mossel Bay and then onshore to potential gas users.

Purpose of this Document

This document provides a **Non-Technical Summary of the Draft Scoping Report (DSR)** and informs you about:

- The proposed Project;
- The ESIA process;
- The biophysical, cultural, and socio-economic baseline environment of the project area;
- Potential project impacts;
- Specialist studies to assess these impacts; and
- How you can participate in the ESIA process.

Who are the Consultants?

SLR Consulting South Africa (Pty) Ltd (**SLR**) is an independent environmental consulting company and has been appointed by Main Street to conduct the ESIA process.



Your Role



If you are interested in this Project or feel that you are affected by it and therefore consider yourself an Interested and/or Affected Party (I&AP), you can:

- Register on the Project’s stakeholder database;
- Get information about the proposed Project;
- Attend meetings (see Table 4) and give your input; and
- Review and comment on DSR (see below)

All comments received will be recorded, responded to and included in the Final Scoping Report (FSR), which will be submitted to the Competent Authority for decision-making.

How to Register and Comment



Please register on the stakeholder database and comment by:

- scanning the QR code;
- following the [link](#) below; or
- contacting SLR at the details listed below.



<https://forms.office.com/e/a65veK87za>

Please submit your comments on the DSR to SLR by 15 October 2026.

SLR Contact Details

Tel: (021) 461 1118, **SMS/WhatsApp:** 071 586 5881

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Website: <https://www.slrconsulting.com/public-documents/11b12bproduction/>

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<https://slrpublicdocs.datafree.co/public-documents/11b12bproduction/>

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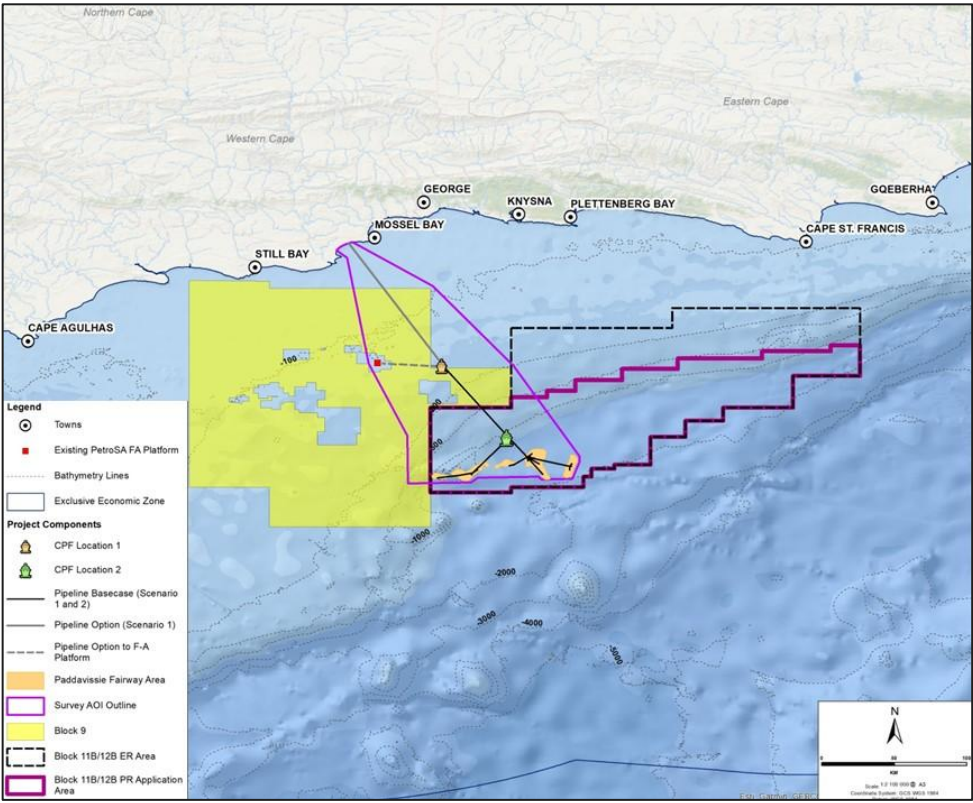


Figure 1: Locality of Block 11B/12B showing the offshore survey area, area of interest (Paddavissie Fairway) and Development Scenarios, off the South African South Coast

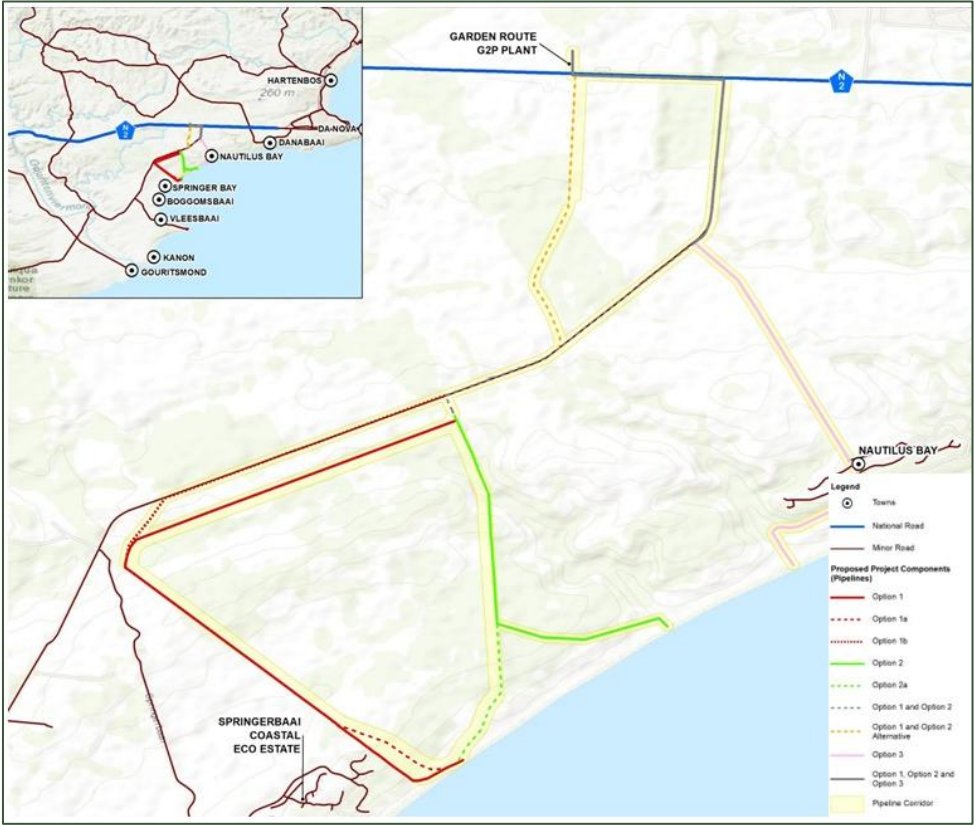


Figure 2: Locality map of proposed onshore pipeline corridors on the South Coast of South Africa (applicable to Production Scenario 1 only)



2.0 ESIA Process

Before starting, Main Street needs to get permission from the Department of Mineral and Petroleum Resources (DMPR). As part of this process, an ESIA must be undertaken.

An ESIA is undertaken to identify and assess potential impacts of a project and help decision-making. The EIA Regulations, 2014 define whether and how an ESIA must be undertaken. This ESIA has two phases (**Figure 3**):

1. **Scoping Phase:** SLR gathers information about the environment and then identifies how the Project might affect the environment and society, and how to study these impacts. This is written up in the **Scoping Report**.
2. **Impact Assessment Phase:** Specialists investigate potential impacts of the Project and suggest ways to avoid or reduce negative impacts and increase positive impacts. This is written up in the **ESIA Report**.

The reports are **shared with the I&APs registered on the Project database**, who can then comment on the findings of the reports. The reports are then submitted to the **Petroleum Agency of South Africa (PASA)** and the DMPR, who decides whether the Project is approved and may proceed or not.

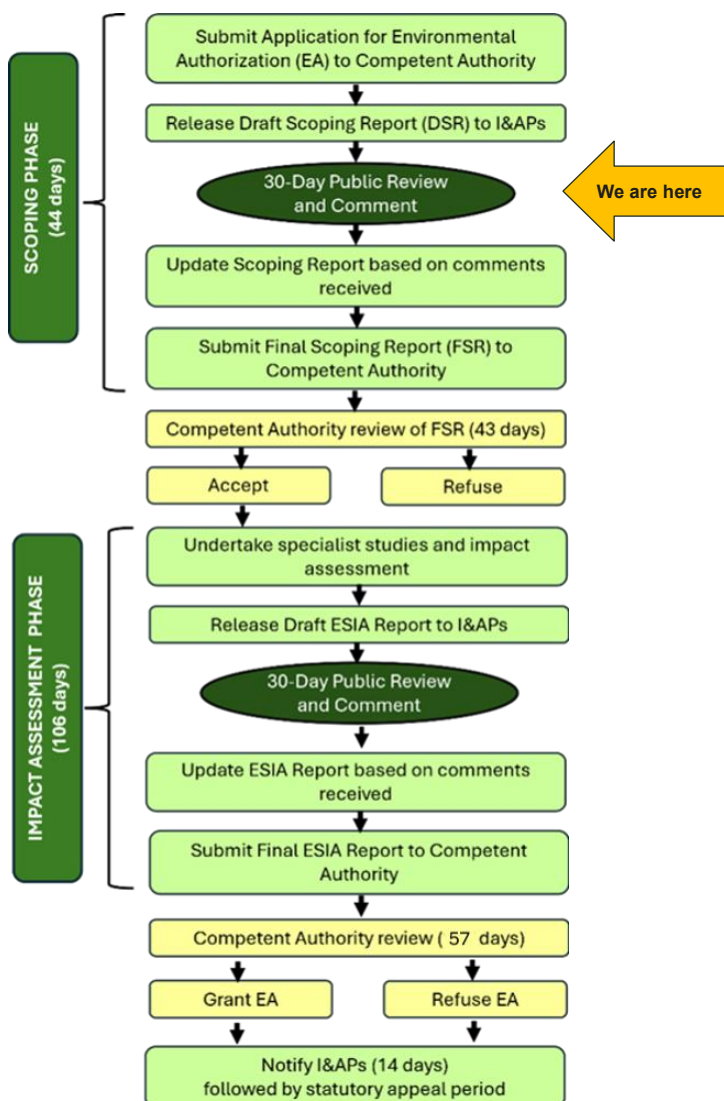


Figure 3: Key steps of the ESIA process

3.0 Public Consultation

Public consultation is an important part of the ESIA process and includes:

- Notifying I&APs of the proposed Project;
- Sharing information about the proposed Project, ESIA and public participation process; and
- Providing the opportunity to see Project information, ask questions and provide comment.

I&APs can review reports and attend public meetings in each phase of the ESIA process. To get involved in the ESIA process please refer to Section 8.0.

4.0 Need and Desirability

South Africa is working to balance energy security, economic development and climate change commitments as it transitions to a lower-carbon economy. While renewable energy is increasing, oil and gas are expected to remain part of the energy mix or the foreseeable future.

South Africa remains heavily reliant on coal for electricity generation and currently imports most of its natural gas, creating concerns about future energy security. In this context, the proposed Project could contribute energy security by providing a local source of natural gas and condensate, supporting economic development and potentially reducing reliance on imported gas.

Global demand for oil and gas is influenced by a range of factors, including energy demand, economic growth, energy security needs and the pace of the energy transition. In this context, the Project is not expected to materially influence global hydrocarbon consumption, and if it does not proceed, equivalent supply may be sourced from alternative domestic or international producers.

The Project is a declared Strategic Integrated Project (SIP) in terms of the Infrastructure Development Act, 2014. SIPs are considered as projects of significant economic or social importance to South Africa and contributing substantially to any national strategy or policy relating to infrastructure development.

Overall, the Project appears, in principle, to align with national objectives related to energy security, economic development and the just energy transition. However, its overall need and desirability will depend on the findings of the ESIA, including detailed assessment of potential environmental, social and climate-related impacts and the effectiveness of proposed mitigation measures. These impacts will be assessed during the Impact Assessment Phase of this ESIA.

5.0 Project Phases and Activities

Key project phases and activities are briefly described below.

5.1 Offshore Route and Site Assessment Surveys

Before any pipelines or infrastructure are installed, a range of site surveys will be undertaken both offshore and onshore. These site surveys are needed to better



understand the environmental conditions and seabed / ground along the proposed pipeline corridors.

- **Offshore:** Survey vessels (**Figure 4**) will collect information about the seafloor, seabed conditions, ocean environment, and proposed pipeline routes between the offshore gas fields and the shoreline. Most of this work will be non-intrusive, although some seabed samples may be collected.
- **Onshore:** Surveys along the pipeline route will mainly involve non-intrusive methods to understand ground conditions and identify any potential constraints. Some limited ground investigations, such as trial pits, coring and soil sampling, will also be undertaken.

Up to four offshore survey campaigns and two onshore / nearshore surveys will be conducted over a period of ~16 months.



Figure 4: Example of a survey vessel

5.2 Construction (Drilling and Installation)

Drilling

Up to 19 wells will be drilled in the offshore area of interest (known as the Paddavissie Fairway). Before they are completed, some wells may be tested to better understand the amount of gas and associated condensate present, and how they can be produced safely and efficiently.

A well is created by drilling a hole into the seabed using a cutting tool ("drill bit"), which crushes the rock into small particles, called "cuttings". Depending on the stage of drilling, these cuttings are either (1) discharged onto the seafloor next to the hole ("riserless drill stage" in **Figure 5**) or (2) brought up to the drilling unit through a riser where they are cleaned and released into the water from the drilling unit ("riser drill stage" in **Figure 5**).

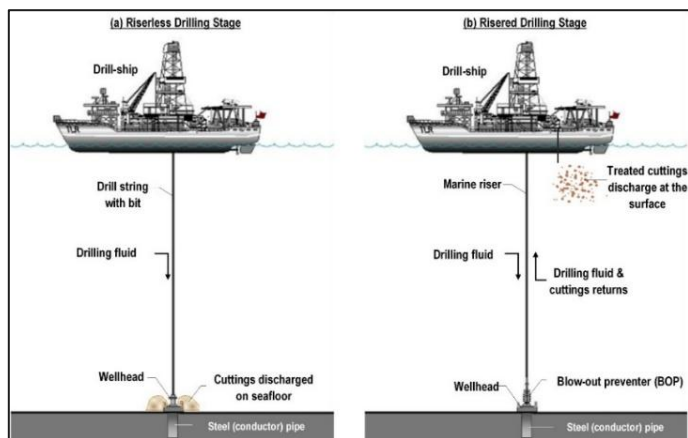


Figure 5: Drilling Stages

Once the desired depth has been reached, steel pipes are inserted and cemented into the hole to ensure it is stable and that the different geological formations are isolated.

Up to seven campaigns will take place at different times over a period of ~11 years (~7 months per three well campaign).

Offshore Infrastructure

Offshore construction will also include the installation and testing of infrastructure located on or below the seabed that is used to extract and collect the gas and condensate from the reservoir and transport it to the offshore production facility, where it will be separated and processed. Depending on the development scenario selected, the facility may consist of either:

- **Scenario 1:** A single facility that processes and stores product offshore called a Floating Production Storage and Offloading (FPSO) vessel (**Figure 6**); or
- **Scenario 2:** Two facilities working together, with one separating the natural gas and converting it to LNG (called a Floating Liquefied Natural Gas (FLNG) facility) and the other providing storage (called a Floating Storage and Offloading (FSO) vessel) before products are transferred to export tankers.

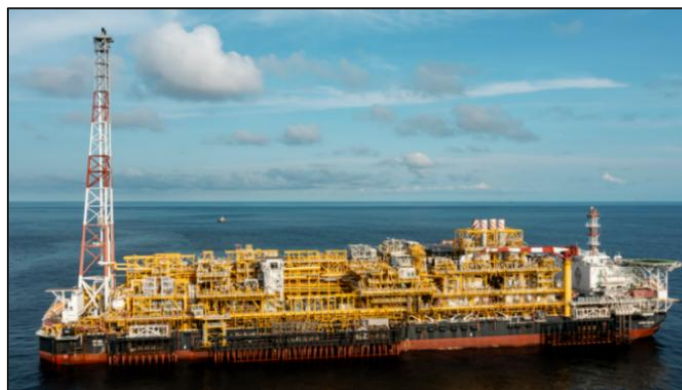


Figure 6: Example of FPSO vessel

Pipeline Shore Crossing (Scenario 1 only)

To connect the offshore pipeline to the onshore pipeline, a ~1.5 km micro-tunnel will be constructed beneath the coastal zone. The pipeline will be installed through this tunnel allowing it to pass under the shoreline, thereby reducing the disturbance to the beach and coastal environment. Once the pipeline is installed, all temporary equipment will be removed and affected areas will be rehabilitated where required.

Onshore Pipeline (Scenario 1 only)

An underground pipeline of up to ~13 km in length will be constructed to transport the gas to a gas receiving facility (e.g. the proposed Garden Route GtP facility). Construction will involve digging a trench, placing the pipeline in the ground, covering it and restoring the land as far as reasonably possible once the work is complete. The pipeline will also be tested to ensure it is safe and functioning properly before operations begin.

5.3 Production (Operation)

During operation, the Project will involve extracting gas and condensate from the offshore wells, separating these and associated fluids, storing products and transporting them to



market. The activities associated with each development scenario are summarised below.

Scenario 1:

Once production begins, gas, condensate and associated fluids from the offshore wells will be transported to the FPSO facility where they will be separated. The gas will then be transported to shore and onwards to the proposed gas receiving facility (e.g. the proposed GtP facility). Condensate will be exported to local domestic and/or international markets by tanker vessels.

Scenario 2:

Gas, condensate and associated fluids from the offshore wells would be separated and converted into LNG on the FLNG facility. The resulting products (LNG and condensate) will be stored on the FLNG and FSO facility, respectively, before being transferred to export tankers for transport to market.

Any associated produced water generated during the process (Scenario 1 and 2) will be treated and managed in compliance with environmental and regulatory requirements.

5.4 Decommissioning

At the end of the Project's operating life, offshore facilities will be safely taken out of service and the affected areas restored as far as reasonably possible. This will include permanently closing and sealing the production wells, cleaning and disconnecting pipelines and other equipment, and removing key offshore facilities. Some infrastructure may be left in place on the seabed if this is considered the safest and most environmentally responsible option. The offshore production facility will be removed from the area.

6.0 Key Environmental and Socio-Economic Components

Understanding the existing environment helps SLR and specialists understand the nature of potential Project impacts, and what needs to be studied in the next phase.

6.1 Receiving Offshore (Marine) Environment



6.1.1 Geophysical Environment

The marine Project area extends from the shoreline up to water depths of ~1 800 m off the South Coast. The seabed contains a mix of rocky areas and softer sandy or muddy sediments. The seabed is generally smooth in shallower waters, while in deeper waters towards the edge of the continental shelf it becomes more uneven with natural ridges, slopes and other seabed features.

The wider marine area is characterised by a broad underwater shelf that extends offshore, called the Agulhas Bank. This shelf becomes narrower towards the east and includes a clear transition between the shallower coastal area and the deeper ocean beyond (i.e. the shelf break and continental slope) (Figure 7).

6.1.2 Physical & Biophysical Environment

The Agulhas Current is the main ocean current influencing the area and plays an important role in moving water,

sediments, nutrients and marine life along the coast and across the continental shelf. Closer to shore, currents are generally weaker and more variable.

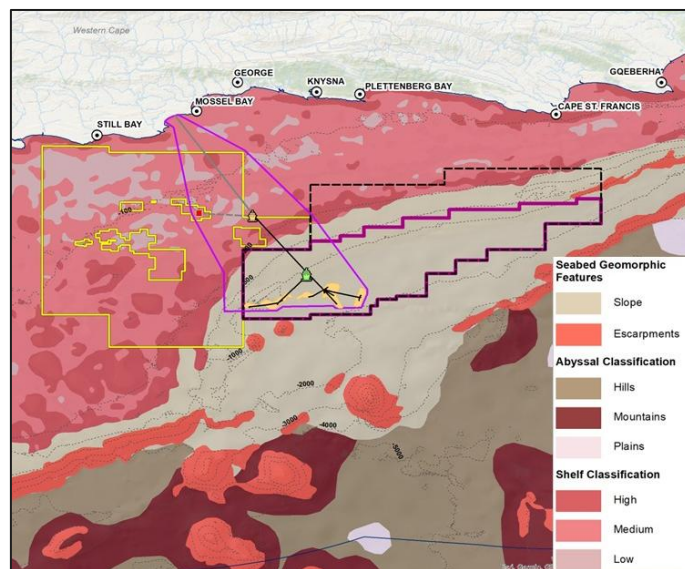


Figure 7: Seabed Characteristics

Waters in the marine Project area are typically warm at the surface and become cooler with depth. The waters are generally clear offshore with relatively low levels of nutrients and primary productivity, while coastal waters are more productive due to coastal upwelling processes.

The coastline comprises sandy beaches and rocky shores that support a variety of marine habitats and species. Offshore, the Project area extends from shallow coastal waters into deeper waters across the continental shelf. The seabed supports a variety of ecosystem and habitat types associated with shelf and slope environments.

6.1.3 Biological Environment

The types of plants and animals on the seabed vary depending on factors such as water depth, seabed conditions and ocean characteristics.



The marine Project area is a large offshore region with a range of seabed habitats that support different marine communities. Species present vary depending on local seabed conditions. Softer sandy and muddy seabed areas support worms, crustaceans, mollusks, sea stars, sea pens, and sponges, while other habitat types support different species. As expected in a large offshore area, marine life is not evenly distributed and varies across the Project area.

The communities in deeper reef areas and canyons are different from those in shallower areas, and are typically support fewer plant and animal species.

A variety of demersal fish (those that live and feed on or near the seabed) occur in the area, including steenbras, bream, spotted grunter, kob, snoek, musselcracker and red roman.

The open-water environment supports a range of pelagic species (those that live and feed in the open water), including:

- Plankton: Phytoplankton (tiny plants) and zooplankton (tiny animals) are most common in areas closer to the sea surface. The area east of Cape Agulhas is an



important breeding (spawning) and nursery area for commercially important fish species, including anchovy, sardine, hake, kingklip and squid, with currents transporting eggs and larvae across the region.

- **Fish and Squid:** The Project area supports a diverse range of fish and squid species. Important species include anchovy, sardine, hake, kingklip, chokka squid, elf (shad), geelbek, yellowtail, kob, seventy-four and Cape stumpnose. Larger migratory predators, including tunas, billfish and several shark species, also occur in offshore waters.
- **Turtles:** Some turtles may occasionally be found in the Project area, most likely Leatherback turtles.
- **Seabirds:** The South Coast supports a variety of seabirds, including Cape gannets, African penguins, cormorants, petrels, shearwaters and albatrosses. Coastal breeding species generally feed closer to shore, while oceanic (pelagic) seabirds are more common offshore, particularly around the shelf edge.
- **Marine mammals:** A diverse range of marine mammals may occur in the Project area, including humpback, southern right, Bryde's, sei and sperm whales, as well as common dolphins, bottlenose dolphins, striped dolphins, Risso's dolphins, pilot whales, beaked whales, killer whales and Cape fur seals. The continental shelf edge provides important feeding and migration habitat for many of these species.

6.1.4 Conservation and Protected Areas

The deeper offshore sections of the marine Project area are located within seabed (benthic) habitats classified as 'Least Concern' (i.e. widespread / abundant), whereas the shallower inshore sections occur within habitats classified as 'Endangered' and 'Critically Endangered' (high to very high threat level) (**Figure 8**). The majority of the oceanic (pelagic) ecosystem types (> 500 m deep) within the Project area is categorised as 'Least Concern'.

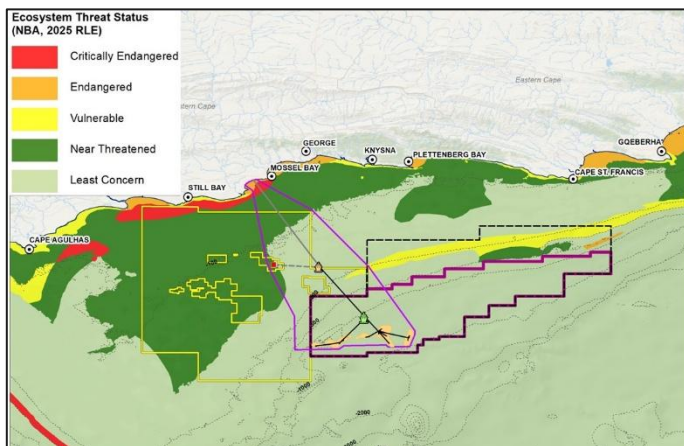


Figure 8: Seabed (benthic) ecosystem threat status

The marine Project area and associated infrastructure do not overlap with any Marine Protected Areas (MPAs) (**Figure 9**). A small portion of the survey area overlaps with the western extent of the Kingklip Corals EBSA, an area identified to be of ecological and/or biological importance (**Figure 10**). The proposed subsea pipeline also overlaps with areas mapped as Critical Biodiversity Area (CBAs) and Ecological Support Areas (ESAs) (**Figure 9**)

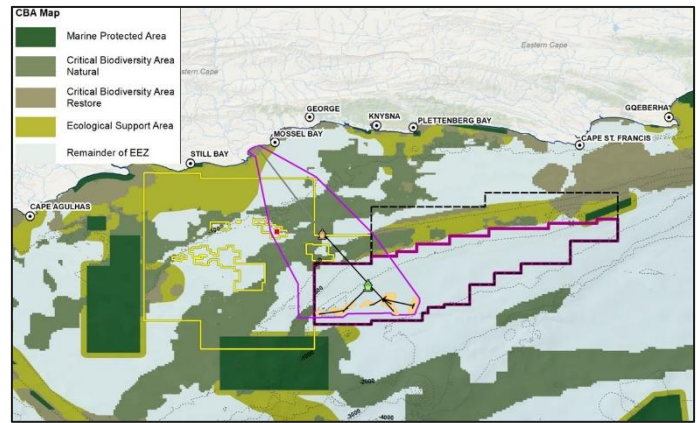


Figure 9: MPAs, CBAs and ESAs

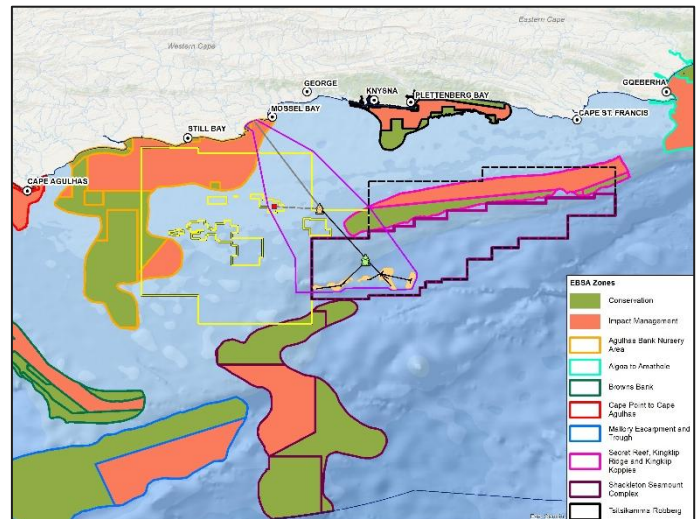


Figure 10: EBSAs

6.2 Receiving Onshore (Terrestrial) Environment

6.2.1 Physical Environment

The onshore Project area is located within a predominantly rural and agricultural landscape between Mossel Bay and Gouritsmond. The terrain is generally gently undulating, with localised valleys, depressions and coastal dune systems.

The region experiences a mild coastal climate with moderate rainfall throughout the year.

6.2.2 Onshore Biodiversity

The Project area falls within the Cape Floristic Region. Although much of the landscape has been transformed by agriculture and other development, significant areas of natural habitat remain, including fynbos, dune thicket, strandveld, coastal vegetation and freshwater features.

Several of these habitats are considered threatened including Albertinia Sand Fynbos and Hartenbos Dune Thicket (Endangered). The area supports a variety of plant and animal species, including protected plant species, threatened birds, and a range of mammals, reptiles, amphibians and invertebrates. Natural habitat remnants and wetlands also provide important ecological corridors that allow wildlife movement across an otherwise fragmented landscape.



6.2.3 Freshwater Ecosystems

The freshwater environment consists of a network of wetlands, seeps, drainage lines, seasonal watercourses and farm dams distributed throughout the agricultural landscape. These systems play an important role in storing and conveying water, reducing flooding, improving water quality and providing habitat for aquatic plants and animals (**Figure 11**).

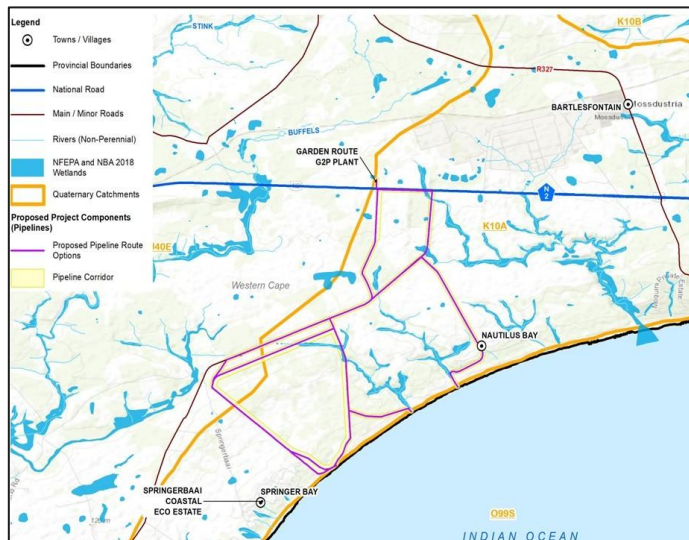


Figure 11: Surface water

6.2.4 Conservation

The Project area forms part of a region of high conservation importance and is located within the Gouritz Cluster Biosphere Reserve and a Key Biodiversity Area (KBA). Although not a formally protected area, it occurs within a landscape that contains threatened ecosystems, important wetlands, CBAs, ESAs and other recognised biodiversity priority areas, and is surrounded by several conservation-oriented estates and stewardship initiatives (**Figure 12**).

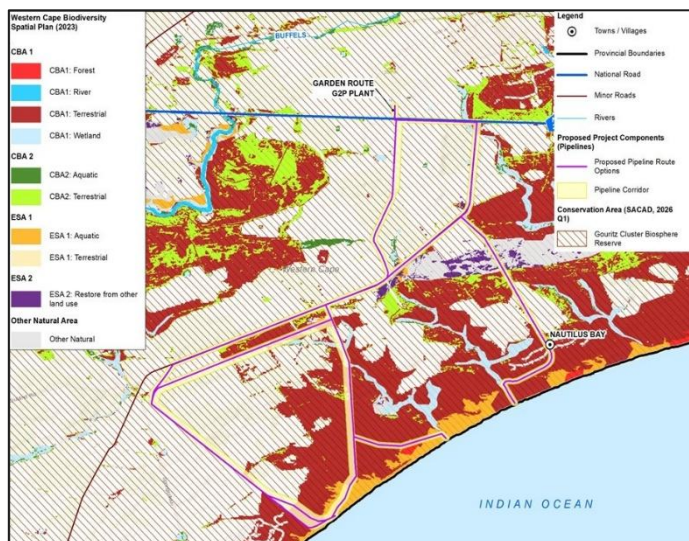


Figure 12: CBAs & ESAs

6.3 Socio-Economic Environment



The onshore Project area is located within a predominantly rural and agricultural setting. The broader area has experienced strong population growth and is supported by

relatively good access to housing, electricity, water, sanitation and healthcare services. However, many communities in the area face challenges related to unemployment, limited education opportunities, income inequality and poverty.

While tourism, recreation and fishing are important contributors to the wider regional economy, agriculture is the dominant land use in the immediate onshore Project area.

6.3.1 Fishing

The commercial fisheries operating off the South Coast include demersal trawl, longline, purse-seine, linefish, rock lobster and squid fisheries. Most fishing activity is concentrated close to shore, along the continental shelf, or within established fishing grounds. Small-scale fisheries also typically operate closer to shore (generally within ~15 km of the coastline), whereas the offshore production facility and field are located more than 65 km offshore.

In relation to the Project, overlap with commercial fishing activities is generally limited. Offshore infrastructure within the Block and the area of interest (Paddavissie Fairway) lies largely outside the main fishing grounds of most fisheries, overlapping with only the large pelagic longline fishery. The nearshore survey area and the proposed export pipeline show some overlap with the fishing grounds of the inshore trawl, mid-water trawl, demersal longline, rock lobster and squid fisheries.

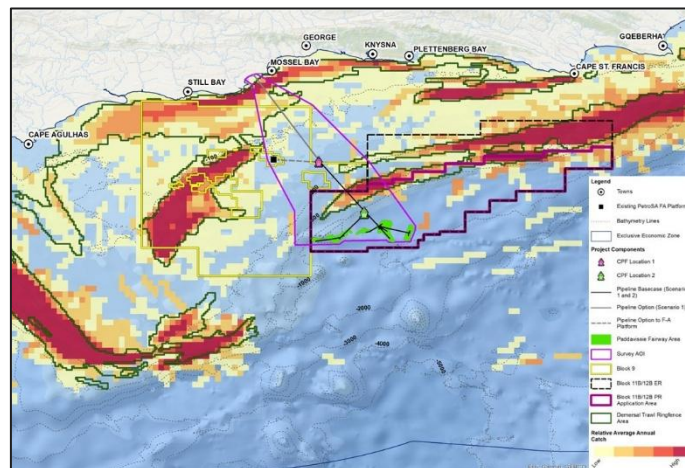


Figure 13: Demersal trawl fishery

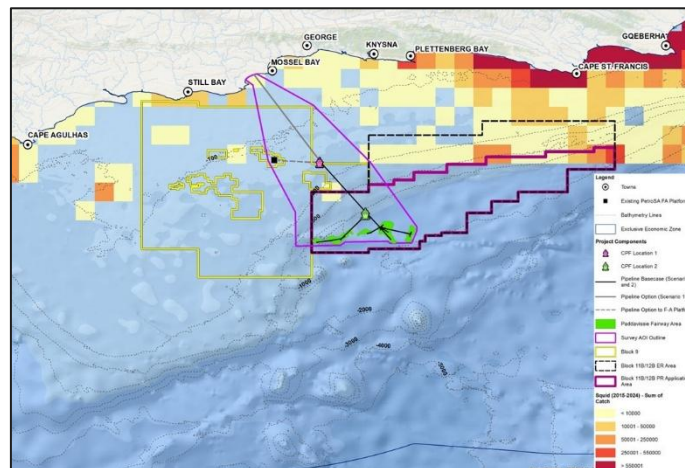


Figure 14: Squid fishery



6.3.2 Cultural Heritage, Archaeology and Palaeontology

The Mossel Bay coastline has a rich cultural heritage that reflects thousands of years of human occupation, from early hunter-gatherers and pastoralists to colonial settlement and modern development. The area contains archaeological sites, shell middens, historic farmsteads, graves and other heritage resources, with the highest sensitivity occurring in coastal dunes and undisturbed coastal areas.

7.0 Key Potential Environmental and Socio-Economic Impacts

7.1 Identified Potential Impacts

During the Scoping Phase, SLR compared Project activities with the existing environment and identified several potential impacts (**Table 1**). These impacts will be assessed by specialists in the Impact Assessment Phase (Section 7.2).

Table 1: Summary of potential key impacts

Potential Key Impacts
Marine Ecology Impacts
- Behavioural disturbance of marine fauna - Injury to marine fauna - Smothering and disturbance of benthic (animals that live in/on seabed) fauna - Ecological effects from pollutants in water column - Modification of benthic habitat
Fisheries Impacts
- Changes in catch due to behavioural change in fish - Displacement of fishing vessels - Loss of income from any disruption of fisheries
Biodiversity (Terrestrial & Aquatic) Impacts
- Loss of vegetation and faunal habitat - Displacement or disturbance of fauna and avifauna - Disturbance to and / or mortality of fauna - Soil disturbance, compaction and erosion - Reduced water quality - Alteration of site characteristics - Increased susceptibility and/or encroachment of alien invasive species - Degradation and/or fragmentation of terrestrial and aquatic habitats
Socio-economic Impacts
- Income and skills training for workers - Income from local procurement and spending - State income from taxes and levies - Loss of arable land - Deterioration of shore-based community health and safety - Health and Safety risks from Project activities - Disturbance to nearby residences - Altered sense of place / change to cultural landscape - Deterioration of cultural heritage links to the sea - Disturbance to archaeological and paleoethological resources

Potential Key Impacts

Climate Change and Air Quality

- Health impacts from atmospheric pollution
- Contribution to GHG emissions

The ESIA also considers unplanned events (**Table 2**). These are not expected to occur and have a very low likelihood of occurrence. Nevertheless, it is important that these potential impacts, if they happen, are understood, so that measures can be taken to prevent and minimise effects. Such unplanned events include gas and condensate spills or leaks from drilling, ship-to-ship transfer and pipeline rupture.

Table 2: Potential impacts of unplanned events

Potential Impacts from Unplanned Events
- Seawater pollution from a hydrocarbon spill could impact animals (and plankton) in the water column and on the sea surface - Fishing vessels may not be able to enter polluted sea areas for some time, and fish species may avoid such areas - Reduction of catch could decrease fishing income - Tourism and other coastal activities may have to reduce their activities and corresponding incomes in case of nearshore pollution - Risk / hazards to humans due to loss of containment from pipeline - Pollution could affect people's cultural heritage value of and links to the sea - Uncontrolled release of gas or evaporated oil could increase pollutants and GHG in the air

7.2 Assessment of Identified Impacts

Specialists will study and assess the key potential impacts and identify measures to avoid or reduce negative impacts to acceptable levels and enhance any benefits (positive impacts).

Technical modelling studies will predict how far disturbance may spread in the sea or land:

- Underwater noise modelling
- Drilling discharges modelling
- Liquid effluent discharges modelling
- Hydrocarbon spill modelling
- Quantitative Risk Assessment – this study evaluates potential risks related to an onshore gas pipeline rupture.

Results from the modelling studies may be used by some of the specialists to assess impacts that may occur. Proposed specialist impact assessments include:

- Marine ecology impact assessment
- Fisheries impact assessment
- Socio-economic impact assessment
- Intangible cultural heritage impact assessment
- Tangible heritage and palaeontology assessment (onshore and offshore)
- Terrestrial biodiversity assessment
- Aquatic biodiversity assessment



- Soils and agriculture assessment
- Air quality impact assessment (including modelling)
- GHG and Climate change risk assessment

These specialist studies will also be informed by a conceptual closure and decommissioning study.

8.0 Way Forward



Your participation in the ESIA process is important. How you can participate is explained below.

8.1 Register as an I&AP

Please register as an I&AP if you are interested in the Project or feel that you may be affected by it.

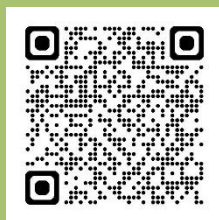
By registering as an I&AP you will receive updates and information about the ESIA process, including access to the reports for comment and notification of public open days.

Registering does not mean you support or oppose the Project and you can also ask to be removed from the stakeholder database at any time.

Please share this information with other people who may wish to register as an I&AP.

To register as an I&AP and submit comments: Please:

- Scan the QR code **or**
- Follow this **link** (<https://forms.office.com/e/a65veK87za>) **or**
- Contact SLR at the details above (see page 1).



8.2 Review Information and Submit Comments

The following documents are available for comment on SLR's: website and/or data-free website

- **Non-Technical Summary** (This document), available in English, Afrikaans and isiXhosa;
- **Audio recordings** of the NTS, available in English, Afrikaans and isiXhosa; and
- Full **Draft Scoping Report (DSR)** in English.

Copies of the DSR and/or NTS are also available at various public libraries / locations (**Table 3**). Please **submit any comments on the DSR by no later than 15 October 2026**. All comments will be included and responded to in the Final Scoping Report, which will be submitted to PASA / DMPP for decision-making.

SLR looks forward to your registration on the stakeholder database and receiving your comments. Should you have any questions please contact SLR.

8.3 Attend Meetings



Stakeholders are invited to **attend the public open days (Table 4)** where you can learn more about the Project and provide your feedback. I&APs can *attend at any time during open day hours* to view Project information and talk directly to the ESIA team.

You can also attend an **online (virtual) meeting**. To attend this online meeting, you must **register** using the link in **Table 4**.

SLR'S COMMITMENT REGARDING THE PROTECTION OF PERSONAL INFORMATION (POPI):

By being registered on the Project database, you authorise SLR to (1) retain and use your Personal Information as part of a contact database for this and/or other ESIA's, (2) contact you regarding this and/or other ESIA processes, (3) disclose the database to other authorised parties for lawful purposes, (4) process it for lawful purposes, and (5) include correspondence received in ESIA Reports. SLR will not process your Personal Information, other than as permitted or required by ESIA processes or as required by Law or public policy. SLR will use reasonable, appropriate security safeguards in order to protect Personal Information, and to reasonably prevent any damage to, loss of, or unauthorised access or disclosure of Personal Information, other than as required for ESIA processes or as required by any Law or public policy. You may request for your Personal Information to be deleted from the project database or comments to be excluded from ESIA Reports at any time by contacting SLR. However, you understand that SLR (and any authorised parties) may not be able to delete or destroy it for legal or public policy reasons. SLR will provide you with the reasons.

This is a non-technical summary of the Draft Scoping Report, which contains a lot more detail. If in doubt, information in the Draft Scoping Report will prevail.



Table 3: Report and NTS Placement

Location	Name of Facility
Full Report and Non-Technical Summary are available at:	
Still Bay	Still Bay Library
Mossel Bay	Kwanonqaba Library
Knysna	Knysna Tourism Offices
Plettenberg Bay	Plettenberg Bay Public Library
St. Francis Bay	Sea Vista Library
Jeffreys Bay	Jeffreys Bay Library
Gqeberha	Newton Park Library
Non-Technical Summary is available at:	
Struisbaai	Struisbaai Public Library
Arniston	Arniston Library
Gourits	Gouritsmond Library
Mossel Bay	Transnet Port of Mossel Bay
Mossel Bay	Mossel Bay Library
George	George Public Library
Sedgefield	Sedgefield Library

Table 4: Details of Public Open Days and Online Meeting

Town	Venue	Date	Public Open Session Time
Mossel Bay	D'Almeida Community Hall	14 September 2026	15:00-19:00
George	Conville Community Hall	15 September 2026	15:00-19:00
Knysna	Hornlee Community Hall	16 September 2026	15:00-19:00
Plettenberg Bay	New Horizons Community Hall	17 September 2026	15:00-19:00
Storms River	Clarence Anthony Draai Multipurpose Centre, Coldstream	18 September 2026	15:00-19:00
Kareedouw	Kagiso Heights Hall	19 September 2026	10:00-14:00
St Francis Bay	Sea Vista Community Hall	21 September 2026	15:00-19:00
Jeffreys Bay	Pellsrus Community Hall	22 September 2026	15:00-19:00
Online (Virtual)		1 October 2026	13:00-15:00
Registration to Attend Online (Virtual) Meeting Please click here (https://events.teams.microsoft.com/event/23558359-3087-4a0d-b23a-5a53851e3a4d@109cec53-a877-42eb-93e8-b9f5c282ba38) or scan QR Code to complete the required form to register to attend the online public meeting. People who register will receive a link to attend the meeting.			

9.0 Frequently Asked Questions

Some questions that I&APs might ask at this stage are listed below. The EAP will provide responses to all questions and comments submitted during the Scoping Phase.

Question	Answer
What is an ESIA? 	An ESIA (Environmental and Social Impact Assessment) helps plan and make decisions about a Project. The ESIA is broken up into two phases: the Scoping phase and the Impact Assessment phase. The Scoping Phase gathers information about the environment before the Project starts. Consultants then determine how the project might affect the environment and society, and how to study these impacts. In the Impact Assessment phase experts investigate both the good and bad impacts of the project and suggest ways to manage them. All of this information is put into reports, which are shared with the public. This information helps decision-makers and the public understand the possible impacts that the project may have. The public can review reports and attend meetings to



Question	Answer
	give their input. The final decision is made by the authorities, and I&APs will be informed about the outcome and their right to appeal if they disagree. A short video which explains the EIA process can be found on the SLR website (link above).
How do I get involved and what happens to my details when I register as an I&AP? 	To get involved in the ESIA process, please register as an I&AP (see Section 8.1 on how to register for this Project). By registering you will receive updates and information about the Project, including access to the reports for review and comment. During the process, the public have opportunities to review reports and attend public meetings (see Section 8.2 and 8.3), where they can learn more about the Project and provide their feedback. All personal information will be managed in accordance with the Protection of Personal Information Act, 2013 (POPI).
How many jobs will be created? 	The Project will create employment and business opportunities during both the construction and production phases, although the nature of these opportunities will differ over time. During the construction phase, there will be a significant increase in project activity over a relatively short period. Much of the specialised offshore construction and installation work is expected to be undertaken by experienced international contractors, as many of the required offshore skills, vessels and technologies are not currently available at the scale required in South Africa. However, this phase is expected to generate a range of temporary employment and business opportunities through support services such as logistics, port operations, transportation, accommodation, catering, security and other local services. The production phase will extend over many years and is expected to provide longer-term employment opportunities. While the Project will not create a large number of direct jobs, it will support ongoing skills development, training and the gradual transfer of knowledge to South African employees. Over time, local capacity is expected to increase as more specialised skills are developed within the country. In addition to direct employment, the Project is expected to contribute to the wider economy through a multiplier effect, creating secondary jobs and business opportunities in industries that support the offshore gas development and its associated infrastructure. Potential socio-economic impacts will be assessed by specialists in the Impact Assessment Phase.
How does the specialist know where we fish?	Commercial fishers must report their catch to the Department of Forestry, Fisheries and Environment (DFFE) who check that fishing is sustainable. The specialist uses the most recent data from the DFFE to identify key fishing grounds and also compares it with data from previous years. This provides a very good baseline to determine where fishing takes place and how much fish is caught.
What is the impact of the Project on fishing? 	Fishing remains very important to many coastal communities - how the project might affect it will be carefully assessed. Here are some ways the Project might affect fishing: - Fish may avoid an area around the Project vessels and/or drilling unit during offshore activities. If this affects areas where fish breed, feed, or where fishers usually go, the specialist will assess the impact and ways to reduce or avoid the impact. - Fishing vessels have to avoid certain Project vessels (as any other vessel) and / or infrastructure on the seabed but can fish in any other part of the marine Project area. Other ships can also pass through the marine Project area.
Does the Project affect coastal areas? 	Although the production facility and well field are located more than 65 km offshore, a subsea pipeline will transport the gas to the shore (Development Scenario 1 only). This pipeline will be drilled through the coastal zone to minimise potential impacts and will also be buried within ~42 km of the coast to mitigate potential interaction with trawl fishing activities within the 90 m water depth contour.
Do I&APs need to give an opinion or agree to the Project? 	The ESIA process (as prescribed in the EIA Regulations, 2014) includes a public participate process that is open to all I&APs, and allows them to review all ESIA documentation, request clarifications, raise questions and provide their views. These views and comments are recorded and submitted to the Competent Authority together with the ESIA reports, so that the Competent Authority has access to all the comments submitted during the ESIA process. I&APs do not have to voice an opinion or agree to the Project.



Table of Contents

Basis of Report	ii
Acronyms and Abbreviations	xxxix
1.0 Introduction	1
1.1 Project Background	1
1.1.1 Project History	1
1.2 Overview of Project Scope	2
1.2.1 Development Scenarios	2
1.2.2 Project Phases and Activities	2
1.2.3 Application for Environmental Authorisation	4
1.3 Objective and Purpose of this Report	4
1.4 Opportunity to Comment and Attend Public Meeting	5
1.5 Structure of this Report.....	6
2.0 Administrative and Legal Framework	10
2.1 South African Institutional and Administrative Framework	10
2.1.1 Department of Mineral and Petroleum Resources	10
2.1.2 Petroleum Agency SA	10
2.1.3 Department of Forestry, Fisheries and Environment.....	11
2.1.4 Heritage Authorities	11
2.1.5 South African Maritime Safety Authority	12
2.1.6 Transnet National Ports Authority	12
2.2 South African Legislation Applicable to Oil and Gas Activities and ESIAs	13
2.2.1 Legal and Policy Framework for ESIA	14
2.2.2 Other Environmental Legislation and Policies.....	32
2.3 Local, National and International Policy and Planning Frameworks	33
2.3.1 Energy-Related Plans and Policies.....	33
2.3.2 Economy-Related Policies.....	40
2.3.3 Climate Change-Related Policies	43
2.3.4 Resource-Related Policies	48
2.3.5 Marine Spatial Planning.....	49
2.4 Relevant International Conventions, Protocols and Agreements	52
3.0 ESIA Approach and Methodology	59
3.1 ESIA Project Team.....	59
3.2 ESIA Assumptions and Limitations	61
3.3 ESIA Objectives	62
3.4 ESIA Process	63



3.4.1 Scoping Phase	64
3.4.2 Impact Assessment Phase	72
3.5 Public Participation Process	74
3.5.1 Principles and Key Guidelines Informing the Approach to Public Participation	74
3.5.2 Scoping Phase	81
3.5.3 Impact Assessment Phase	87
4.0 Need and Desirability	88
4.1 Fit of Petroleum Exploration and Production with the South African Planning Framework	89
4.1.1 Energy-Related Plans and Policies	89
4.1.2 Economy-Related Plans and Policies	91
4.1.3 Climate Change-Related Plans and Policies	93
4.1.4 Marine Spatial Planning and Resource-Related Plans and Policies	94
4.1.5 Summary of the Project's Fit with the South African Planning Framework	95
4.2 Broader Climate Change, Energy and Development Context	97
4.2.1 Summary of the Broader Energy, Climate Change and Development Context	97
4.2.2 Context of GHG Emissions	99
4.2.3 Current Energy and Gas Consumption	108
4.2.4 Current Gas Supply	116
4.2.5 Outlook for Gas Consumption and Supply	121
4.2.6 Other Considerations	131
4.3 Consistency of the Project with NEMA Principles	132
4.4 Consistency of the Project with NEM:ICMA Principles	138
4.5 Preliminary Conclusion on Need and Desirability	139
5.0 Project Description	142
5.1 Project Context	142
5.1.1 Production Right Application	142
5.1.2 Development Strategy	143
5.2 Project Overview	143
5.2.1 Overview of Development Scenarios	143
5.2.2 Overview of Key Project Phases and Activities	147
5.2.3 Project Timeline	149
5.3 Route and Site Surveys	151
5.3.1 Objectives	151
5.3.2 Offshore Surveys	151
5.3.3 Onshore Surveys	166
5.4 Well Drilling	168



5.4.1 Overall Drilling Approach.....	169
5.4.2 Description of Drilling Equipment and Components.....	171
5.4.3 Mobilisation for Drilling	174
5.4.4 Description of Well Drilling.....	175
5.4.5 Resource Requirements.....	186
5.4.6 Emergency Prevention and Response	187
5.5 Installation, Construction and Commissioning	194
5.5.1 Production System and Facilities Overview	194
5.5.2 Subsea Production System	196
5.5.3 Subsea Umbilicals, Risers and Flowlines	199
5.5.4 Central Processing Facility	203
5.5.5 Shore Crossing and Onshore Pipeline.....	209
5.5.6 Resource Requirements.....	214
5.5.7 Emergency Prevention and Response	215
5.6 Production.....	216
5.6.1 Production Profile	216
5.6.2 Subsea Production System Operation and Maintenance.....	217
5.6.3 Processing on the FPSO / FLNG.....	217
5.6.4 Transfer and Transport of Produced Fluids	221
5.6.5 Resource Requirements.....	222
5.6.1 Emergency Prevention and Response	223
5.7 Emissions, Discharges and Wastes.....	224
5.7.1 Discharges to Sea	224
5.7.2 Atmospheric Emissions	228
5.7.3 Noise Emissions.....	229
5.7.4 Light Emissions	230
5.7.5 Waste Management	230
5.8 Project Alternatives	231
5.9 Financial Provision and Insurance.....	238
6.0 Receiving Environment -Marine	239
6.2 Key Data Sources and Limitations.....	241
6.2.1 Primary Data Sources	241
6.2.2 Secondary Data Sources.....	242
6.2.3 Data Gaps and Uncertainty	244
6.3.1 Bathymetry.....	245
6.3.2 Seabed Geology and Sediments	246



6.3.3 Seabed Geomorphology.....	248
6.4.3 Tides and Waves.....	254
6.4.4 Water Characteristics	254
6.5.1 Nutrients, Productivity and Plankton	257
6.5.2 Turbidity	258
6.6.3 Pelagic Communities.....	284
6.6.4 Ecological Network Conceptual Model	308
6.7.2 Ramsar Sites.....	313
6.8.1 Cultural Heritage Resources	329
6.8.2 Fishing Sectors	334
6.8.3 Key Coastal Economic Activities	365
7.0 Receiving Environment - Terrestrial	371
7.1 Onshore Area of Influence.....	371
7.2 Geographic and Planning Context.....	371
7.2.1 Site Location and Regional Setting.....	371
7.2.2 Land Use.....	371
7.2.3 Environmental and Planning Frameworks	374
7.3 Physical Environment.....	375
7.3.1 Topography and Landscape Character	375
7.3.2 Geology and Soils	377
7.3.3 Climate and Meteorological Conditions	377
7.3.4 Key Sensitivities and Constraints (Physical Environment)	380
7.4 Terrestrial Biodiversity (Flora and Fauna).....	381
7.4.1 Regional Biodiversity	381
7.4.2 Vegetation Types and Habitats.....	381
7.4.3 Vegetation Species of Conservation Concern	383
7.4.4 Fauna.....	386
7.4.5 Habitat Types and Ecological Processes.....	387
7.4.6 Biodiversity Priority Areas.....	387
7.4.7 Key Sensitivities and Receptors (Terrestrial Biodiversity)	389
7.5 Freshwater Ecosystems	390
7.5.1 Surface Water Systems.....	390
7.5.2 Hydrology and Flow Regimes.....	392
7.5.3 Aquatic Ecology.....	394
7.5.4 Key Sensitivities and Buffers (Freshwater)	394
7.6 Conservation and Protected Areas.....	395



7.6.1 Protected Areas.....	395
7.6.2 Conservation and Stewardship Areas.....	395
7.6.3 Biodiversity Priority Areas.....	398
7.6.4 Conservation-orientated Estates	399
7.6.5 Conservation Sensitivity Overview	400
7.7 Cultural Heritage, Archaeology and Palaeontology.....	400
7.7.1 Archaeological Resources.....	401
7.7.2 Palaeontological Sensitivity	406
7.7.3 Intangible Cultural Heritage	408
7.7.4 Key Sensitivities and Heritage Constraints	408
7.8 Socio-Economic Environment.....	409
7.8.1 Secondary Study Area.....	409
7.8.2 Primary Study Area	410
7.8.3 Demographic Profile	410
7.8.4 Education	413
7.8.5 Livelihoods	414
7.8.6 Infrastructure and Services.....	416
7.8.7 Economic Activities	418
7.8.8 Community Health, Safety and Wellbeing.....	419
7.8.9 Vulnerable Groups	419
7.8.10 Key Sensitivities and Social Receptors	420
7.8.11 Existing Land Uses	421
7.8.12 Planned Developments	423
7.8.13 Servitudes and Infrastructure Corridors.....	424
7.8.14 Key Land Use Conflicts and Constraints	425
8.0 Environmental and Socio-Economic Screening of Key Impacts	426
8.1 Environmental and Socio-Economic Interaction Matrix.....	426
8.2 Aspects and Impacts Register.....	427
8.3 Summary of Key Potential Impacts for Assessment	447
8.3.1 Impacts on the Biophysical Environment	455
8.3.2 Impacts on the Socio-Economic Environment	457
8.4 Minor Screened Out Impacts	462
8.4.1 Normal Operations	463
8.4.2 Unplanned Events	473
9.0 Plan of Study for Impact Assessment	475
9.1 Description of the Tasks Planned for the Assessment Phase.....	475



9.2	Technical and Specialist Studies	476
9.2.1	Technical Modelling Studies	476
9.2.2	Specialist Studies	484
9.3	Proposed Method for Assessing Impact Significance	492
9.3.1	Approach to Impact Assessment	493
9.3.2	Additional Assessment Criteria	498
9.3.3	Application of the Mitigation Hierarchy.....	500
10.0	References.....	502



Tables in Text

Table 1-1:	Structure and Content of the Draft Scoping Report	6
Table 2-1:	Listed Activities in terms of Listing Notices 1, 2 and 3 triggered by this Project.....	15
Table 2-2:	Guidelines for ESIA process	19
Table 2-3:	Possible listed activities in terms of Section 21 of NEM:AQA triggered by this Project	23
Table 2-4:	Consideration of the NEM:ICMA Requirements in relation to the proposed Project.....	27
Table 2-5:	Listed activities in terms of Section 38 of NHRA triggered by this Project.	31
Table 2-6:	List of Potential Section 21 Water Uses Applicable to the Project	32
Table 2-7:	Additional applicable South African Policies and Legislation	32
Table 2-8:	South African national climate change adaptation strategy objectives, interventions and outcomes	44
Table 2-9:	Ratified International Conventions, Protocols and Agreements	52
Table 3-1:	Details of the ESIA project team and specialists	59
Table 3-2:	Specialist theme sensitivities identified in the Screening Reports.....	65
Table 3-3:	Specialist assessments identified by the DFFE Screening Tool	66
Table 3-4:	Requirements of a Scoping Report in terms of the EIA Regulations 2014 (as amended).....	69
Table 3-5:	Recommended levels of public participation based on project and stakeholder characteristics as per the PPP guideline	77
Table 3-6:	Site notice placement.....	83
Table 3-7:	Locations of hard copies of the Draft Scoping Report and NTS.....	83
Table 3-8:	List of advertising newspapers	84
Table 3-9:	List of radio stations	85
Table 3-10:	In-person public participation open days and meetings	86
Table 3-11:	Details of Focus Group Meetings	87
Table 4-1:	Total CO ₂ emissions by region from 1750 to 2024, in million t CO ₂	101
Table 4-2:	Total GHG emissions by region from 1850 to 2024, in million t CO ₂ -equivalent	102
Table 4-3:	South African CO ₂ and GHG emissions in million t CO ₂ -e.....	103
Table 4-4:	CO ₂ emissions by fuel or industry type – World and South Africa, 2024 (in million t CO ₂)	106
Table 4-5:	Energy sources globally 2024 – 2025, in Exajoules.....	108
Table 4-6:	Share of fossil, renewable and low-carbon energy sources by region in 2025.....	110
Table 4-7:	List of 20 largest gas consumers in 2025	112
Table 4-8:	Energy sources South Africa 2023 – 2024, in Exajoules	113



Table 4-9:	Africa and South Africa energy consumption (Exajoules)	115
Table 4-10:	List of 20 largest gas producers in 2025.....	117
Table 4-11:	Consideration of the NEMA Principles in Relation to the Proposed Project.	133
Table 5-1:	Production Right Application Details	142
Table 5-2:	Key Project phases and activities.....	147
Table 5-3:	Indicative durations of key activities	149
Table 5-4:	Summary of key offshore survey activities	153
Table 5-5:	Example specifications of survey vessel	155
Table 5-6:	Example specification of seabed sampling survey vessel.....	161
Table 5-7:	Summary of key onshore survey activities	167
Table 5-8:	Summary of key project activities	168
Table 5-9:	Drilling schedule.....	171
Table 5-10:	Notional base case well design and estimated drilling discharges.....	182
Table 5-11:	Key FPSO characteristics	204
Table 5-12:	Key FLNG characteristics.....	206
Table 5-13:	Key FSO vessel characteristics.....	207
Table 5-14:	Infrastructure co-ordinates of the proposed onshore pipeline route options	211
Table 5-15:	Details of the properties affected by the proposed onshore pipeline routes	212
Table 5-16:	Active personnel / crew working on installation and construction vessels	214
Table 5-17:	Estimated sources of anticipated discharges to sea from Project vessels	225
Table 5-18:	Summary of potential solid waste streams	230
Table 5-19:	Summary of key project alternatives considered to date	231
Table 6-1:	Date range for fisheries catch and effort datasets used in this study	244
Table 6-2:	Temperature for Western section of Licence Block 11B/12B and neighbouring Block 9 (January 2022 – December 2024).....	250
Table 6-3:	Wind field description	251
Table 6-4:	Threat status of the marine coastal ecosystem types South Coast region (Stilbaai to Groot Brak).....	261
Table 6-5:	Threat status and estuary type of the estuaries in the South Coast region (Gouritz to Knysna)	261
Table 6-6:	Marine ecosystem types, threat status and overlap of Project component on the South African South Coast	262
Table 6-7:	Criteria for sponge classification along the seabed (as per NOROG, 2019)	273
Table 6-8:	SACFOR Abundance Scale for Size Class 3-15cm.....	275



Table 6-9:	Important large migratory pelagic fish likely to occur in the offshore regions of the South Coast	289
Table 6-10:	Global and regional conservation status of the turtles occurring off the South Coast of South Africa coastline, variation depends on the listing used.....	294
Table 6-11:	Breeding seabirds species present along the South Coast and their national and global IUCN classification	295
Table 6-12:	Cetacean occurrence off the South Coast of South Africa, their distribution, seasonality, hearing frequency, and associated South African and Global IUCN Red List conservation status.....	300
Table 6-13:	Key target and bycatch (grey shading) species of the demersal trawl fishery	335
Table 6-14:	Key target and bycatch (grey shading) species of the small pelagic purse-seine fishery.....	343
Table 6-15:	Key target and bycatch (grey shading) species of the large pelagic longline fishery	348
Table 6-16:	Self-reported small-scale fishery co-operative data	360
Table 7-1:	Racial composition in the George LM, Mossel Bay LM, GRDM and Province.....	413
Table 7-2:	Annual household income distribution	414
Table 7-3:	Access to formal housing	416
Table 7-4:	Source of electricity for lighting	416
Table 7-5:	Access to piped water	417
Table 7-6:	Access to sanitation	417
Table 7-7:	Access to refuse removal	418
Table 8-1:	Environmental and Social Interaction Matrix - Marine / Offshore Activities	428
Table 8-2:	Environmental and Social Interaction Matrix – Terrestrial / Onshore Activities.....	433
Table 8-3:	Aspects and Impacts Register – Onshore & Offshore Activities	435
Table 8-4:	Summary of Identified Impacts related to Normal Operations and Preliminary Mitigation / Project Controls.....	448
Table 9-1:	Plan of study requirements as per Appendix 2 (h) in the EIA Regulations 2014.....	475
Table 9-2:	Drilling discharge modelling scenarios	477
Table 9-3:	Liquid effluent discharge modelling scenarios	478
Table 9-4:	Hydrocarbon spill modelling scenarios	479
Table 9-5:	Underwater noise modelling scenarios.....	481
Table 9-6:	Air quality modelling scenarios	490
Table 9-7:	Criteria and definitions for determining consequence and significance...	494
Table 9-8:	Determining consequence.....	495



Table 9-9:	Determining significance	496
Table 9-10:	Interpretation of significance	497
Table 9-11:	Categorisation and description of additional assessment criteria.....	499
Table 9-12:	Sequential application of the mitigation hierarchy.....	501



Figures in Text

Figure 1-1:	Locality map of Block 11B/12B, showing the offshore survey area, Paddavissie Fairway and Development Scenarios, off the South African South Coast.....	8
Figure 1-2:	Locality map of proposed onshore pipeline corridors on the South Coast of South Africa (Production Scenario 1 only).....	9
Figure 2-1:	Energy mix and procurement envisaged in the draft IRP 2023.....	37
Figure 3-1:	Illustration of ESIA process phases and steps.....	63
Figure 4-1:	Global change in temperatures in the period of -2025 compared to the period of 1951-1980 (in °C).....	99
Figure 4-2:	Annual CO2 emissions by region, in absolute volumes.....	100
Figure 4-3:	Annual GHG emissions by region, in absolute volumes.....	102
Figure 4-4:	South African annual CO2 and GHG emissions in million t CO2-e.....	103
Figure 4-5:	Per capita CO2 emissions, 2024.....	104
Figure 4-6:	South African and African CO2 emissions 1884 – 2024.....	105
Figure 4-7:	CO2 emissions by fuel or industry type – World and South Africa.....	106
Figure 4-8:	South African energy sources.....	107
Figure 4-9:	Global energy sources 2000-2023, in Exajoules.....	109
Figure 4-10:	New generation capacity installed globally (percent), 2007-21.....	109
Figure 4-11:	Energy sources per region in 2022 (absolute and relative).....	110
Figure 4-12:	Global oil (top) and gas (bottom) consumption 1965 to 2025.....	111
Figure 4-13:	Total energy supply in South Africa and Africa in 2024 and 2025 (in Exajoules).....	113
Figure 4-14:	Consumption over energy sources time in South Africa and the rest of Africa over time (1965 to 2025).....	115
Figure 4-15:	Year on year growth rate of oil and gas production globally.....	116
Figure 4-16:	Global gas production 1970 to 2022.....	117
Figure 4-17:	Conventional oil and gas discoveries since 1900.....	118
Figure 4-18:	New discoveries since 2000.....	119
Figure 4-19:	High impact well drilling activity 2020 – 2025.....	119
Figure 4-20:	Expected high impact well drilling focus in 2025.....	120
Figure 4-21:	Predicted outlook for global population, GDP per capita, energy intensity and energy-related carbon intensity to 2050.....	123
Figure 4-22:	Outlook for global primary energy use to 2050.....	124
Figure 4-23:	Outlook for global primary energy in 2025.....	124
Figure 4-24:	Projection for electric vehicle penetration in selected regions by 2025 ...	125
Figure 4-25:	Projection for change in global electricity generating capacity (2050).....	126
Figure 4-26:	Possible technology trajectory in selected regions 2020 – 2050.....	126



Figure 4-27:	Outlook for natural gas trade 2020 – 2050	126
Figure 4-28:	Projected development of energy demand to 2050	127
Figure 4-29:	Projected development of oil and gas demand to 2050	128
Figure 4-30:	Predicted LNG demand growth	129
Figure 5-1:	Production Scenario 1: Full field development of the Paddavissie Fairway and piping gas onshore	145
Figure 5-2:	Production Scenario 2: Full field development of the Paddavissie Fairway and liquefying gas offshore	146
Figure 5-3:	High level overview of key Project activities	150
Figure 5-4:	Locality Map of the offshore survey area off the South African Coast.....	152
Figure 5-5:	Example of a typical or representative survey vessel	155
Figure 5-6:	Example of a AUV used for bathymetric and sonar surveys	156
Figure 5-7:	Illustration of a vessel using multi-beam echo sounder	157
Figure 5-8:	Diagram of side scan sonar.....	158
Figure 5-9:	Example of a combined SSS and SBP system.....	158
Figure 5-10:	Example of a hydrophone streamer, Geoeel Solid Streamer	159
Figure 5-11:	Example of a negative discharge sparker used in high resolution geophysical surveys.....	159
Figure 5-12:	Example of a typical or representative survey vessel used for seabed sampling	161
Figure 5-13:	Schematic of a drop or piston core operation at the seabed	162
Figure 5-14:	Box corer	163
Figure 5-15:	Cone penetration test unit	163
Figure 5-16:	Geo-Vibro corer	164
Figure 5-17:	Acoustic doppler current profiler buoy	165
Figure 5-18:	Typical ROV.....	165
Figure 5-19:	Conceptual Well Locations.....	170
Figure 5-20:	Photograph of a drilling unit, the Deepsea Scavenger, with support vessel and anchor handling tug vessel during a previous drilling campaign in Block 11B/12B	172
Figure 5-21:	Photograph of a platform supply vessels along side the drilling unit, the Deepsea Scavenger, during a previous drilling campaign in Block 11B/12B	173
Figure 5-22:	Photograph of an anchor handling tug vessel, the Normand Ranger, and the drilling unit during a previous drilling campaign in Block 11B/12B	174
Figure 5-23:	Well construction sequence	176
Figure 5-24:	Simplified view of well drilling stages.....	177
Figure 5-25:	Drilling stages: (A) riserless (tophole) drilling stage; and (B) risered drilling stage	177
Figure 5-26:	Simplified illustration of a mud circulating system.....	178



Figure 5-27:	Well design alternatives	181
Figure 5-28:	Schematic of a typical VSP arrangement	184
Figure 5-29:	Open hole gravel pack schematic and Xmas tree	185
Figure 5-30:	Schematic of a typical subsea BOP stack	189
Figure 5-31:	Example of an Oil Spill Response Limited (OSRL) capping stack.	193
Figure 5-32:	Schematic cross section of Field Development	194
Figure 5-33:	Field development plan - subsea architecture components	197
Figure 5-34:	Luiperd, Blaasop and Woudboom Subsea Production System.....	198
Figure 5-35:	Platanna & Brulpadda Subsea Production System.....	198
Figure 5-36:	Example of deepwater Subsea Construction Vessel (SCV).....	199
Figure 5-37:	S-lay (top) and J-lay (bottom) pipeline installation method example	200
Figure 5-38:	Example of a flex-lay vessel	201
Figure 5-39:	Example of Subsea System connections to FPSO	202
Figure 5-40:	Conceptual Floating Liquefied Natural Gas (FLNG) vessel layout	205
Figure 5-41:	Example Floating Storage and Offloading (FSO) vessel	207
Figure 5-42:	Onshore gas pipeline options	210
Figure 5-43:	Provisional Paddavissie production profile, based on maximum expected production	217
Figure 5-44:	Floating Liquified Natural Gas (FLNG) process flow diagram	221
Figure 5-45:	Cryogenic floating hose offloading	222
Figure 5-46:	Alternative onshore pipeline route options – screened out	237
Figure 6-1:	Expected Area of Influence	240
Figure 6-2:	Environmental Sampling Sites	243
Figure 6-3:	Marine Project area and associated infrastructure in relation to geomorphic features	247
Figure 6-4:	Seismic-derived seafloor shaded relief in relation to marine Project area and associated infrastructure	249
Figure 6-5:	Historic rainfall and temperature monthly averages for Mossel Bay (top) and Gqeberha (Port Elizabeth) (bottom).....	251
Figure 6-6:	Wind data by season. Summer: December to February, Autumn: March to May, Winter: June to August, Spring: September to November. Data for years 2022 -2024 for a grid point in the west of Licence Block 11B/12B.	252
Figure 6-7:	Major circulatory elements along the South Coast in relation to marine Project area and associated infrastructure	255
Figure 6-8:	Chlorophyll a level off South Coast in relation to the marine Project area and associated infrastructure for March 2026.....	258
Figure 6-9:	Survey AOI, pipeline option (Scenario 1) and onshore pipeline route in relation to coastal ecosystem types.....	260
Figure 6-10:	Benthic ecosystem types in relation to the marine Project area and associated infrastructure	263



.Figure 6-11:	Marine Project area and associated infrastructure in relation to ecoregions in South Africa.....	266
Figure 6-12:	Examples of benthic epifauna recorded during environmental survey activities	272
Figure 6-13:	Sponge density recorded during environmental survey activities.....	273
Figure 6-14:	Examples of corals identified during environmental surveys.....	274
Figure 6-15:	Average soft coral density per transect recorded during environmental survey activities.....	276
Figure 6-16:	Desomphyllum pertusum recorded during environmental survey activities	277
Figure 6-17:	Average hard coral density per transect recorded during environmental survey activities.....	278
Figure 6-18:	Vulnerable Marine Ecosystem Indicator (VMEI) Species recorded during environmental survey activities.....	280
Figure 6-19:	Summer (top) and winter (bottom) distribution of biscuit skate, triangular legskate, slime skate and soupfin shark (from left to right) off southern African coastline.....	282
Figure 6-20:	Distribution of demersal cartilaginous species off southern African coastline.....	283
Figure 6-21:	Examples of skates observed during ROV survey activities	284
Figure 6-22:	Marine Project Area (red polygon) in relation to distribution of sardine (left) and anchovy (right) spawning areas, as measured by egg densities.....	285
Figure 6-23:	Marine Project Area and associated infrastructure in relation to important pelagic and demersal fish and squid spawning areas.....	288
Figure 6-24:	Summer (top) and winter (bottom) distribution of White Shark, Shortfin Mako, Bronze Whaler Shark and Dusky Shark (left to right).....	291
Figure 6-25:	Leatherback (left) and loggerhead turtles (right) occur in South African waters	292
Figure 6-26:	Dispersal maps showing trajectories of 5000 particles released from the respective nesting sites (white circles) in March 2018 for loggerheads (left) and leatherbacks (right). Colours (blue to red) indicate the number of days since release.....	293
Figure 6-27:	Migration corridors of leatherback turtles in the south-western Indian Ocean. Relative use (CUD, cumulative utilisation distribution) of corridors is shown through intensity of shading: light, low use; dark, high use.....	293
Figure 6-28:	Cape Gannets <i>Morus capensis</i> (left) and African Penguins <i>Spheniscus demersus</i> (right) breed primarily on the offshore islands.	295
Figure 6-29:	Marine Project Area (red polygon) in relation to aggregate core home ranges of Cape Gannet (top left) and African Penguin (top right) for different life-history stages and colonies. The foraging areas of Wandering Albatross (bottom left) and Atlantic Yellow-Nosed Albatross (bottom right) are shown in relation to the Licence Block	297
Figure 6-30:	Cory's shearwater (left) and Cape gannet (right) observed during survey activities	297



Figure 6-31:	Marine Project area and associated infrastructure in relation to marine mammal observations recorded during previous exploration activities in the region, collated between 2001 and 2024.....	299
Figure 6-32:	The humpback whale <i>Megaptera novaeangliae</i>	303
Figure 6-33:	Common dolphins (left) and striped dolphin (right) observed during survey activities	305
Figure 6-34:	Marine Project area (red polygon) in relation to Cape Fur seal foraging ranges on the West and South Coast of South Africa Darker shades of red indicate areas of higher use	308
Figure 6-35:	Simplified network diagram Indicating the interaction between the key ecosystem components	310
Figure 6-36:	Marine Project area and associated infrastructure in relation to Marine Protected Areas (MPAs).....	314
Figure 6-37:	Marine Project area and associated infrastructure in relation to RAMSAR sites along the South Coast of South Africa	315
Figure 6-38:	Marine Project area and associated infrastructure in relation to threat status (top) and protection levels (bottom) of benthic ecosystem types	317
Figure 6-39:	Marine Project area and associated infrastructure in relation to threat status (top) and protection levels (bottom) of pelagic ecosystem types.....	318
Figure 6-40:	Marine Project area and associated infrastructure in relation to EBSAs and the marine spatial planning zones within these	322
Figure 6-41:	Schematic illustrating how the National Coastal and Marine Spatial Biodiversity Plan (NCMSBP) informs the MSP process.....	324
Figure 6-42:	Marine Project area and associated infrastructure in relation to Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs)	325
Figure 6-43:	Marine Project area and associated infrastructure in relation to Important Bird Areas (IBAs) and proposed Marine Important Bird Areas (MIBAs) ..	327
Figure 6-44:	Important Marine Mammal Areas (IMMAs) in the area surrounding the survey areas	328
Figure 6-45:	Marine Project area in relation to recorded shipwrecks between Still Bay in the west and Cape Recife in the east.....	333
Figure 6-46:	Trawl gear typically used by demersal trawlers targeting hake	336
Figure 6-47:	Relative annual average hake demersal trawl catch (2016-2023), normalised to the 80th percentile of catch values in relation to the marine Project area. Higher values indicate areas of relatively greater catch intensity. The hake trawl ring-fence is shown.	338
Figure 6-48:	Typical configuration of mid-water trawl gear	339
Figure 6-49:	Midwater trawl fishing intensity derived from 2008 to 2016 trawl effort data (hours trawled), expressed as a relative fishing-intensity surface normalised to the 80th percentile of effort values, in relation to the marine Project Area	340
Figure 6-50:	Typical configuration of demersal (bottom-set) hake longline gear	341
Figure 6-51:	Relative annual average hake demersal longline catch (2016-2024), normalised to the 80th percentile of catch values in relation to the marine	



	Project area. Higher values indicate areas of relatively greater catch intensity.....	342
Figure 6-52:	The annual combined catches of anchovy, sardine and round herring by the small pelagic fishery from 1949 to 2024. Also shown is the long-term average combined annual catch (black dashed line) and for the past five years (2020-2024; red solid line)	344
Figure 6-53:	Purse-seine fishing intensity derived from annual average catch data between 2000 and 2016, expressed as a relative fishing-intensity surface, in relation to the marine Project Area	346
Figure 6-54:	Typical configuration and deployment of a small pelagic purse seine targeting anchovy and sardine as used in South African waters.....	347
Figure 6-55:	Interannual variation of catch landed by the large pelagic longline sector in South African waters for seven main species (2000 - 2024).....	350
Figure 6-56:	Interannual variation of effort (number of hooks set) by the large pelagic longline sector in South African waters (2000 - 2024).	350
Figure 6-57:	Pelagic longline fishing intensity derived from fishing effort data (hooks per square kilometre) between 2000 and 2016, expressed as a relative fishing-intensity surface, in relation to the marine Project Area	351
Figure 6-58:	Annual average linefish catch in kg (2010-2023) in relation to the marine Project Area. Higher values indicate areas of relatively greater catch intensity.....	354
Figure 6-59:	South Coast rock lobster fishing intensity derived from commercial harvesting data (2007-2016) and expressed as a relative fishing-intensity surface, in relation to the marine Project Area	355
Figure 6-60:	Annual catch (trawl- and jig-caught) squid off South Africa, 1971–2023. 357	
Figure 6-61:	Annual average squid catch in kg (2015-2024) in relation to the marine Project Area. Higher values indicate areas of relatively greater catch intensity.....	358
Figure 6-62:	Marine Project area and associated infrastructure in relation to Small Scale Fishers	362
Figure 6-63:	Petroleum Exploration and Production Activities in South Africa as of January 2026	368
Figure 6-64:	Marine Project area in relation to phosphate prospecting areas	369
Figure 7-1:	District and Local Municipalities of the onshore Project area	372
Figure 7-2:	Onshore Project area land cover classification.....	373
Figure 7-3:	Onshore Project area topography	376
Figure 7-4:	Onshore Project area geology.....	378
Figure 7-5:	Onshore project area soils delineation	379
Figure 7-6:	Habitats identified in the onshore project area.....	384
Figure 7-7:	Habitats identified in the onshore project area (continued)	385
Figure 7-8:	Photographs of Species of Conservation Concern observed during field survey: Top left – Blue Crane, Top middle – Secretary bird, Top right –	



	Yellow-billed Duck, Middle – Agulhas Long-billed Lark, Bottom left – Black-winged Kite, Bottom right	387
Figure 7-9:	CBAAs and ESAs in the onshore Project area.....	388
Figure 7-10:	Watercourse features in the onshore project area	391
Figure 7-11:	Surface water features in the onshore Project area.....	393
Figure 7-12:	Key Biodiversity Areas in relation to the onshore project area	397
Figure 7-13:	Heritage Resources Previously identified in and near the onshore project area	403
Figure 7-14:	Map of all conservation-worthy sites noted during heritage specialist fieldwork.....	405
Figure 7-15:	SAHRIS Palaeosensitivity Map indicating fossil sensitivity in the onshore project area	407
Figure 7-16:	Garden Route District Municipality and its Local Municipalities: 2011 and 2022.....	411
Figure 7-17:	Age and sex breakdown of George LM	412
Figure 7-18:	Age and sex breakdown Mossel Bay LM.....	412
Figure 7-19:	Highest level of education population over the age of 20	414
Figure 7-20:	Gini coefficient 2014-2024.....	415
Figure 9-1:	Mitigation hierarchy	500

Appendices

Appendix A	Curricula Vitae of the SLR ESIA Project Team
Appendix B	DFFE Screening Tool Report
Appendix C	EAP Declaration Undertaking
Appendix D	Public Participation Process Documents
Appendix E	Aquatic Biodiversity Theme SSVR
Appendix F	Terrestrial Biodiversity, Plant and Animal Theme SSVR
Appendix G	Archaeological, Palaeontological and Cultural Theme SSVR
Appendix H	Agricultural Theme SSVR



Acronyms and Abbreviations

Acronym/ Abbreviation	Definition
ACAP	Agreement on the Conservation of Albatrosses and Petrels, 2004
AEL	Atmospheric Emissions Licence
AEWA	Agreement on the Conservation of African-Eurasian Migratory Waterbirds, 1995)
AIS	Automatic Identification System
AOI	Area of Interest
ART	Anti-Retroviral Treatments
BCLME	Benguela Current Large Marine Ecosystem
BID	Background Information Document
BOD	Biological Oxygen Demand
BTR	Biennial Transparency Report
CARP	Climate Change Adaptation Response Plan for South Africa's Coastal Sector
CBAs	Critical Biodiversity Areas
CCGT	Combined Cycle Gas Turbine
CCGE	Combined Cycle Gas Engine
CCSBT	Commission for the Conservation of Southern Bluefin Tuna
CEDAW	United Nations Convention on Elimination of all Forms of Discrimination against Women, 1979
CIS	Commonwealth of Independent States
CITES	Convention on International Trade of Wild Fauna and Flora Endangered Species
CMS	Convention on Migratory Species
COLREGS	Convention on the International Regulations for Preventing Collisions at Sea
COP	Convention of Parties
CPF	Central Processing Facility
CSAG	Climate Systems Analysis Group
CSO	Civil Society Organisations
CNRI	Canadian Natural Resources International (South Africa)
CUD	Cumulative Utilisation Distribution
DD	Data Deficient,
CR	Critically Endangered
DEA	Directorate of Environmental Affairs
DFFE	Department of Forestry Fisheries and Environment
DMRE	Department of Mineral Resources and Energy
DMPR	Department of Mineral and Petroleum Resources
DSR	Draft Scoping Report
DWS	Department of Water and Sanitation
EBSA	Ecologically or Biologically Significant Area
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EN	Endangered
EP	Equator Principles
ESAs	Ecological Support Area
ESIA	Environmental and Social Impact Assessment
EMPr	Environmental Management Programme
FAO	Food and Agricultural Organization
FGM	Focus Group Meeting
FLNG	Floating Liquefied Natural Gas
FPSO	Floating Production, Storage and Offloading



Acronym/ Abbreviation	Definition
FRAP	Fishing Rights Allocation Process
FSO	Floating Storage and Offloading
FSR	Final Scoping Report
GHG	Greenhouse Gases
GMPD	Gas Master Development Period
GMP	Gas Master Plan
GN	Government Notice
GTL	Gas-To-Liquid
GtP	Gas-to-Power
HDD	Horizontal Directional Drilling
HWC	Heritage Western Cape
I&APs	Interested and Affected Parties
IBAs	Important Bird Areas
ICCAT	International Convention for the Conservation of Atlantic Tunas
ICE	Internal Combustion Engine
ICH	Intangible Cultural Heritage
ICRP	International Commission on Radiological Protection
IDP	Integrated Development Plan
IEA	International Energy Agency
IEM	Integrated Environmental Management
IEP	Integrated Energy Plan
ILO	International Labour Organisation
IMMAs	Important Marine Mammal Areas
IMO	International Maritime Organisation
IOCT	Indian Ocean Tuna Commission
IPPP	Independent Power Producers Procurement Programme
IRP	Integrated Resource Plan
IUCN	International Union for the Conservation of Nature
JET IP	Just Energy Transition Investment Plan
JV	Joint Venture
KBAs	Key Biodiversity Areas
LC	Least Concern,
LNG	Liquefied Natural Gas
LPG	Liquid Petroleum Gas
MARPOL 73/78	International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978
MFMR	Ministry of Fisheries and Marine Resources
MLRA	Marine Living Resources Act (No. 18 of 1998)
MMO	Marine Mammal Observer
MOC	Management of Change
MHI	Major Hazard Installation
MoU	Memorandum of Understanding
MPA	Marine Protected Areas
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (No. 28 of 2002), as amended
MSC	Marine Stewardship Council
MSDS	Material Safety Data Sheet
MSP	Marine Spatial Planning
NCMP	National Coastal Management Programme
Navtext	Navigational Telex
NBA	National Biodiversity Assessment



Acronym/ Abbreviation	Definition
NCCAS	National Climate Change Adaptation Strategy
NDC	Nationally Determined Contribution
NDP	National Development Plan
NEMA	National Environmental Management Act, 1998 (No. 107 of 1998), as amended
NEM: AQA	National Environmental Management: Air Quality Act, 2004 (No. 39 of 2004), as amended
NEM: ICMA	National Environmental Management: Integrated Coastal Management Act, 2008 (No. 24 of 2008), as amended
NEM: PAA	National Environmental Management: Protected Areas Act, 2003 (No. 57 of 2003), as amended
NEM: WA	National Environmental Management: Waste Act, 2008 (No. 59 of 2008), as amended
NGO	Non-Governmental Organisation
NHRA	National Heritage Resources Act, 1999 (No. 25 of 1999), as amended
NID	Notification of Intent to Develop
NOROG	Norwegian Oil and Gas Association
NOSCP	National Oil Spill Contingency Plan
NT	Near Threatened
NTS	Non-Technical Summary
OEMP	Oceans Economy Master Plan
OGNP	Oil & Gas National Programme
OPRC	Oil Pollution Preparedness, Response and Co-operation Convention
PASA	Petroleum Agency <u>SA</u>
PCAD	Population Consequences of Acoustic Disturbance
PCC	Presidential Climate Commission
PCoD	Population Consequences of Disturbance
PetroSA	Petroleum Oil and Gas Corporation of South Africa
PIM	Particulate Inorganic Matter
PM	Particulate Matter
POM	Particulate Organic Matter
POPI Act	Protection of Personal Information Act, 2013 (No. 4 of 2013)
PPP	Public Participation Process
PR	Production Right
PSDF	Provincial Spatial Development Framework
PWP	Production Work Programme
REIPPP	Renewable Energy Independent Power Producer Procurement Programme
RFMOs	Regional Fisheries Management Organisations
RI&APs	Registered Interested and Affected Parties
ROV	Remote Operating Vehicle
RMS	Root Mean Square
RMU	Regional Management Units
SAAELIP	South African Atmospheric Emission Licensing and Inventory Portal
SACW	South Atlantic Central Water
SAGERS	South African Greenhouse Gas Emissions Reporting System
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SA-LEDS	South African-Low Emission Development strategy
SAMSA	South African Maritime Safety Authority
SAN	South African Navy
SANHO	South African Navy Hydrographic Office
SDGs	Sustainable Development Goals



Acronym/ Abbreviation	Definition
SEAFO	South East Atlantic Fisheries Organisation
SEL	Sound Exposure Level
SIA	Socio-Economic Impact Assessment
SIP	Strategic Integrated Project
SLR	SLR Consulting (South Africa) (Pty) Ltd
SMME	Small, Medium and Micro Enterprise
SMS	Short Message Service
SOLAS	International Convention for the Safety of Life at Sea, 1974
SPL	Sound Pressure Level
SSTs	Sea Surface Temperatures
SSVR	Site Sensitivity Verification Report
SURF	Subsea Umbilicals, Risers and Flowlines
TAC	Total Allowable Catch
TAE	Total Applied Effort
TEEPSA	TotalEnergies EP South Africa S.A.S.
TB	Tuberculosis
TMNP	Table Mountain National Park
TNPA	Transnet National Ports Authority
TOPS	Threatened or Protected Species
UNCBD	United Nations Convention on Biological Diversity
TSPM	Total Suspended Particulate Matter
UNCLOS	United Nations Law of the Sea Convention
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples, 2007
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
US EIA	United States Energy Information Agency
VMEs	Vulnerable Marine Ecosystems
VOC	Volatile Organic Compounds
VU	Vulnerable
WML	Waste Management Licence
WESSA	Wildlife and Environment Society South Africa
WUL	Water Use Licence
WWF	World Wildlife Fund for Nature



1.0 Introduction

This chapter provides the background to the Project, summarises the proposed development scenarios and activities, describes the objectives and purpose of the report, outlines the opportunity for Interested and Affected Parties (I&APs) to comment on the report, and provides an overview of the structure of this report.

1.1 Project Background

1.1.1 Project History

Main Street 1549 (Pty) Ltd (Main Street)¹, together with its Joint Venture (JV) partners at the time², conducted exploration activities in Block 11B/12B, located ~75 km off the South Coast of South Africa, roughly between Mossel Bay and Cape St Francis (see Figure 1-1). These activities, undertaken under their Exploration Right (Ref. No. 12/3/067), included seismic surveys and exploration well drilling, which led to the discovery of gas and associated condensates in the Brulpadda 1AX (2019) and Luiperd 1X (2020) wells. Both discoveries lie within the Paddavissie Fairway, a large turbiditic reservoir fairway clearly imaged on 3D seismic data, situated in the south-western part of the Block adjacent to Block 9, operated by the Petroleum Oil and Gas Corporation of South Africa (PetroSA).

Following the discovery of gas-condensate within the Paddavissie Fairway, the JV partners evaluated several development scenarios, considering both current and potential future domestic gas market demand. In September 2022, the JV partners submitted an application for a Production Right (PR 12/4/013) (PR). This application included a request for a five-year Gas Market Development Period (GMDP), during which obligations under the Production Work Programme (PWP) for the PR are suspended for up to five years. During this period, the Holder must conduct studies to determine whether the gas can be commercially produced, with the PWP deemed provisional until such determination is made.

Under TEEPSA leadership, the JV also applied for an Environmental Authorisation (EA) and commissioned an Environmental and Social Impact Assessment (ESIA) for an early field development scenario, accompanied by a public participation process in 2022 and 2023. However, in 2024, TEEPSA resigned as operator of Block 11B/12B, and together with QatarEnergy and CNRI, withdrew from the project. Main Street elected to continue with the Project and assumed operatorship.

As the new operator, Main Street planned to advance the Project through a downscaled, largely non-intrusive survey campaign to assess the metocean, benthic, geotechnical and geophysical conditions in the area, thereby informing potential future development scenarios. An EA application for this survey campaign was subsequently submitted, and the associated ESIA process commenced in February 2025.

As a result of the progressive evaluation and advancement of technical development work, and in accordance with the principles of integrated environmental management under the National Environmental Management Act, 1998 (No. 107 of 1998) (NEMA), Main Street has expanded the ESIA to encompass the entire field development of the Paddavissie Fairway. This approach ensures comprehensive assessment of all reasonably foreseeable

¹ Main Street is owned by Africa Energy SA Corp (Africa Energy) and Arostyle Investments (RF) Limited.

² Main Street's JV partners in the Exploration right were Canadian Natural Resources International (South Africa) Limited (CNRI), QatarEnergy International E&P LLC (previously Qatar Petroleum International Upstream LLC) and TOTAL Energies EP South Africa (now TotalEnergies EP South Africa S.A.S.) (TEEPSA).



environmental and socio-economic impacts. This expansion in scope has led to the submission of the current EA application, which forms the subject of this ESIA process.

1.2 Overview of Project Scope

1.2.1 Development Scenarios

As noted above, Main Street has elected to assess two optional full-field development scenarios for the Paddavissie Fairway. These scenarios represent conservative, maximum footprint cases that are reasonably foreseeable, ensuring that the environmental assessment captures the upper bound of potential impacts. The final development concept will ultimately be shaped by several factors, including the evolution of the future regional gas market. By assessing the maximum reasonable development envelope, the resulting EA would accommodate a range of potential development configurations. Any development scenario with a smaller environmental footprint than that assessed would, by implication, fall within the authorised impact envelope.

The two development scenarios are outlined below and illustrated schematically in Figure 1-1 (offshore) and Figure 1-2 (onshore).

- **Production Scenario 1: Full field development of the Paddavissie Fairway and piping gas onshore:** Development of the full field using a Floating Production, Storage and Offloading (FPSO) facility for offshore separation and processing. Gas would be exported to shore via new offshore and onshore pipelines, supplying a proposed gas receiving facility (currently a proposed gas-to-power (GtP) facility, subject to a separate EA application) and potentially other off-takers. Condensate would be offloaded, via shuttle tankers, and delivered to domestic and/or international markets.
- **Production Scenario 2: Full field development of the Paddavissie Fairway and liquefying gas offshore:** Development of the full field using a Floating Liquefied National Gas (FLNG) facility for offshore separation and liquefaction. A Floating Storage and Offloading (FSO) vessel is anticipated to be required to provide additional storage for the condensate. Both condensate and Liquefied National Gas (LNG) would be offloaded, via shuttle tankers, and delivered to domestic and/or international markets.

Each of these two full-field scenarios may be preceded by partial development of the field through existing PetroSA facilities, with continued partial export of products via these facilities during and after full development of the Paddavissie Fairway.

The proposed Project is a declared Strategic Integrated Project (SIP) as gazetted in terms of the Infrastructure Development Act, 2014 (No. 23 of 2014). SIPs are considered as projects of significant economic or social importance to South Africa and contributing substantially to any national strategy or policy relating to infrastructure development. The proposed Project forms part of the Energy Strategic Integrated Project No. 20f, that was gazetted on 06 December 2022 (GN 47658) under the Oil & Gas National Programme (OGNP).

1.2.2 Project Phases and Activities

Key project phases and activities with the proposed development, installation and operation are summarised below.

- **Route and Site Assessment Surveys (over ~16 months):**
 - Offshore: A largely non-intrusive survey campaign (including bathymetry, sonar and metocean data collection, as well as seafloor sampling) will be undertaken of



the production sites in Block 11B/12B and along pipeline routes from the Block onto the continental shelf and to shore, as well as into adjacent Block 9.

- Onshore: The onshore survey along the pipeline route will also be largely non-intrusive, including topographical, ground penetrating radar, magnetometer, electromagnetic, multi-channel analysis of surface waves, and electrical resistance tomography. The survey will also include some trial pits, coring and cone penetration tests.
- **Construction (drilling and installation) activities (over ~11 years³):**
 - Drilling of up to 19 wells in the Paddavissie Fairway (including production, appraisal and possibly gas injection wells). Before completion, some wells may be tested to refine the knowledge of the reservoir characteristics.
 - Installation and commissioning of subsea infrastructure, which includes all infrastructure located on or below the seabed used to extract hydrocarbons from the reservoir and connect the wells to the CPF, including wellheads, Xmas trees, flow line tie-ins and end-points, and Subsea Umbilicals, Risers and Flowlines (SURF).
 - Mobilisation, mooring and commissioning of the CPF (either a FPSO or FSO/FLNG depending on the development scenario).
 - Installation and commissioning of gas pipeline from FPSO to shore, with a buried portion from the shore crossing to proposed gas receiving facility (e.g. GtP facility) (Scenario 1) or F-A Platform (Scenario 1 & 2). The pipeline section traversing the coastal zone will be installed using horizontal directional drilling (HDD).
 - Onshore, marine and aviation support operations using available facilities.
- **Production (operation) activities (~25 years)⁴:**
 - Offshore production operations, including the activities of the shuttle tankers, which may be used to offload the processed gas and/or condensate from the CPF; and
 - Onshore, marine and aviation support operations using available facilities.
- **Decommissioning activities (~0.5 year):**
 - Plugging and abandonment of development wells following standard procedures.
 - Flushing and disconnection of pipelines and umbilicals.
 - Retrieval of selected subsea infrastructure, such as production risers and umbilicals. pipelines, structures and wellheads will be left in-situ on the seafloor.
 - Removal and relocation of CPF.
 - Onshore, marine and aviation support operations using available facilities.

³ Construction activities to take place intermittently over an 11-year period as indicated in Figure 5-3.

⁴ Production could extend up to 20 to 30 years.



1.2.3 Application for Environmental Authorisation

The proposed Project triggers listed activities in terms of the Environmental Impact Assessment (EIA) Regulations 2014 (as amended), promulgated under Chapter 5 of NEMA. As such, Main Street requires EA before such activities can commence.

Since the Project triggers activities contained in Listing Notice 1, 2 and 3 (see Table 2-1), a full Scoping and EIA process must be undertaken (hereafter collectively referred to as “Environmental and Social Impact Assessment” or “ESIA” process). SLR Consulting (South Africa) (Pty) Ltd (SLR) has been appointed to undertake the ESIA process.

1.3 Objective and Purpose of this Report

This Draft Scoping Report (DSR) has been prepared in compliance with Appendix 2 of the EIA Regulations 2014 (see Table 2-2) and distributed for review and comment as part of the ESIA process that is being undertaken for the development of the field in Block 11B/12B and associated production activities.

The objectives of the Scoping Phase and this DSR are to, amongst others:

- Identify policies and legislation relevant to the activity;
- Provide an initial discussion of the need and desirability of the proposed activity;
- Describe the proposed development scenarios and Project activities (including any alternatives);
- Describe the receiving (baseline) environment to provide an understanding of the environmental and social context and sensitivities within which the Project activities would occur;
- Identify and screen potential impacts that will be further investigated, and outline the scope of specialist studies to be undertaken in the Impact Assessment Phase, as well as the impact assessment methodology; and
- Outline the public participation process and provide an opportunity to review and comment on the scope of the ESIA process (see Section 3.5).

Following the completion of the DSR review and comment period, the report will be updated into a Final Scoping Report (FSR), giving due consideration to the comments received. The FSR will be submitted to the delegated authority, the Petroleum Agency SA (PASA), which will engage with the Department of Mineral and Petroleum Resources⁵ (DMPR) who will make the final decision regarding the acceptance of the Final Scoping Report.

⁵ It is understood that a split into the Department of Mineral and Petroleum Resources (DMPR) and the Department of Energy is in process, but not yet finalised, and that DMPR remains the authority at present.



1.4 Opportunity to Comment and Attend Public Meeting

This DSR has been distributed for a 30-day public review and comment period from **14 September to 15 October 2026** to provide I&APs an opportunity to comment on any aspect of the Project and scope of the ESIA. Copies of the full report are available as follows:

- Electronic copy available for download from the SLR website:
<https://www.slrconsulting.com/public-documents/11b12bproduction/>
- Electronic copy available for download from the data-free website, where the report can be downloaded without any data charges using an internet-capable mobile phone: <https://slrpublicdocs.datafree.co/public-documents/11b12bproduction/>
- Hard copies of the report are available at the following venues for review and comment:

Location	Name of Facility	Physical Address
Full Report and Non-Technical Summary are available at:		
Still Bay	Still Bay Library	Main Road, Still Bay
Mossel Bay	Kwanonqaba Library	Adriaan Street, Asla Park, KwaNonqaba
Knysna	Knysna Tourism Offices	40 Main Road, Knysna Central
Plettenberg Bay	Plettenberg Bay Public Library	Shop 29, Mervills Shopping Centre, Sewell Street
St. Francis Bay	Sea Vista Library	Geelbek Street, Sea Vista
Jeffreys Bay	Jeffreys Bay Library	43 Diaz Road, Jeffreys Bay
Gqeberha	Newton Park Library	Hurd Street, Newton Park, Nelson Mandela Bay
Non-Technical Summary only is available at:		
Struisbaai	Struisbaai Public Library	1 Deining Avenue, Struisbaai
Arniston	Arniston Library	39 Kamp Street, Arniston
Gourits	Gouritsmond Library	9 Kerk Street, Gourits
Mossel Bay	Transnet Port of Mossel Bay	55 Bland Street, Mossel Bay, Main Port Administration Building, 2nd Floor
Mossel Bay	Mossel Bay Library	4th Floor Montagu Building, 99 Marsh St, Mossel Bay Central
George	George Public Library	4 Caledon St, Campher's Drift
Sedgefield	Sedgefield Library	12 Flamingo Avenue, Sedgefield

Any comments should be sent to SLR by:

- **scanning the QR code below or following the associated link to the online comment form; or**
- **submitting using the contact details provided below.**

For comments to be included in the FSR, comments should reach SLR by **no later than 15 October 2026**.



QR Code and link for the online Registration / Comment Form



<https://forms.office.com/e/a65veK87za>

SLR Contact Details:

Attention: 11B/12B Stakeholder Engagement Team

Tel: +27 21 461 1118

WhatsApp/ SMS: +27 71 586 5881

Email: 11b12bproduction@slrconsulting.com

Address: 5th Floor, 9 Grove Exchange, 170 Main Road, Claremont, 7700

Stakeholders are also invited to attend the following public meetings that will be held during the DSR review and comment period. Specific details of these meetings are presented below.

Location	Date	Venue	Time
Mossel Bay	14 September 2026	D'Almeida Community Hall	15:00-19:00
George	15 September 2026	Conville Community Hall	15:00-19:00
Knysna	16 September 2026	Hornlee Community Hall	15:00-19:00
Plettenberg Bay	17 September 2026	New Horizons Community Hall	15:00-19:00
Storms River	18 September 2026	Clarence Anthony Draai Multipurpose Centre	15:00-19:00
Karredouw	19 September 2026	Kagiso Heights Hall	10:00-14:00
St Francis Bay	21 September 2026	Sea Vista Community Hall	15:00-19:00
Jeffereys Bay	22 September 2026	Pellsrus Community Hall	15:00-19:00
Online (Virtual)	1 October 2026	-	13:00-15:00

1.5 Structure of this Report

An overview of the structure and content of this report is given in Table 1-1 below.

Table 1-1: Structure and Content of the Draft Scoping Report

Section	Contents
Section 1	Introduction Provides the Project background, summarises the proposed development scenarios and activities, describes the objectives, purpose and the structure of this report, and outlines the opportunity to comment.
Section 2	Administrative and Legal Framework Outlines the key South African administrative and legislative framework, key national legislative requirements relevant to oil and gas activities and the ESIA process, policies and planning frameworks relevant to oil and gas activities in South Africa and relevant international agreements.



Section	Contents
Section 3	ESIA Approach and Methodology Presents the ESIA Project Team, ESIA assumptions and limitations, and outlines the approach and process followed during the ESIA, including for public participation.
Section 4	Need and Desirability Provides an overview of the need for and desirability of the Project based on its 'fit' with the policy and planning framework adopted by the South African administration.
Section 5	Project Description Provides general project information and a detailed description of the proposed activities and associated project alternatives.
Section 6	Receiving Environment - Marine Describes the existing marine physical, biological, socio-economic and cultural environment that could potentially be affected by the proposed activities.
Section 7	Receiving Environment - Terrestrial Describes the existing terrestrial physical, biological, socio-economic and cultural environment that could potentially be affected by the proposed activities.
Section 8	Screening of Environmental and Socio-Economic and Key Impacts Provides a high-level screening of the interaction between project activities and the biophysical and social environment; identifies key issues and impacts associated with the proposed activities; and describes project alternatives and options for further consideration in the Impact Assessment Phase.
Section 9	Plan of Study for Impact Assessment Outlines the scope of further investigations (including the technical and specialist studies) to be undertaken during the Impact Assessment Phase and sets out the proposed approach to the assessment of impacts.
Section 10	References Provides a list of the references used in compiling this report.



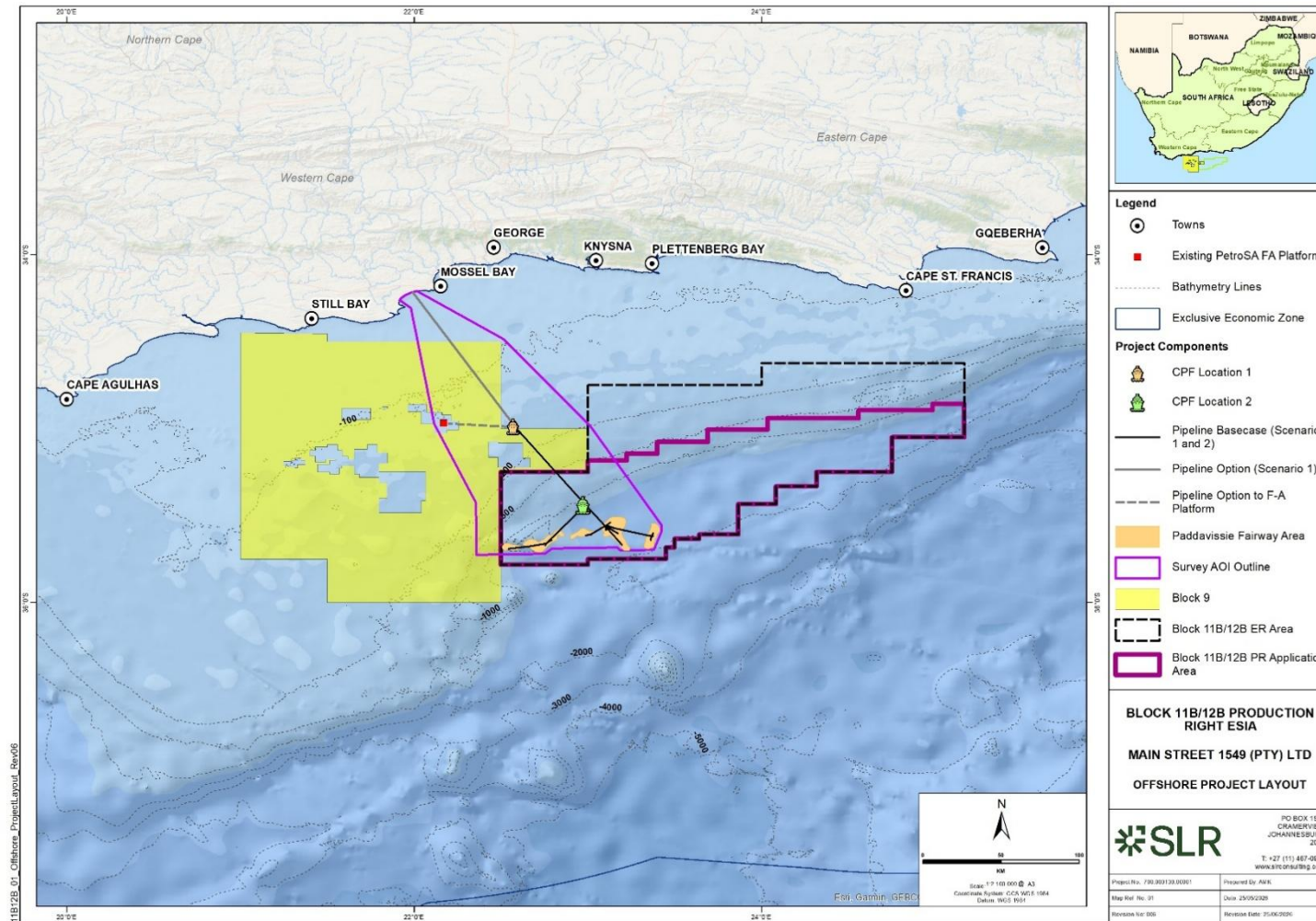


Figure 1-1: Locality map of Block 11B/12B, showing the offshore survey area, Paddavissie Fairway and Development Scenarios, off the South African South Coast



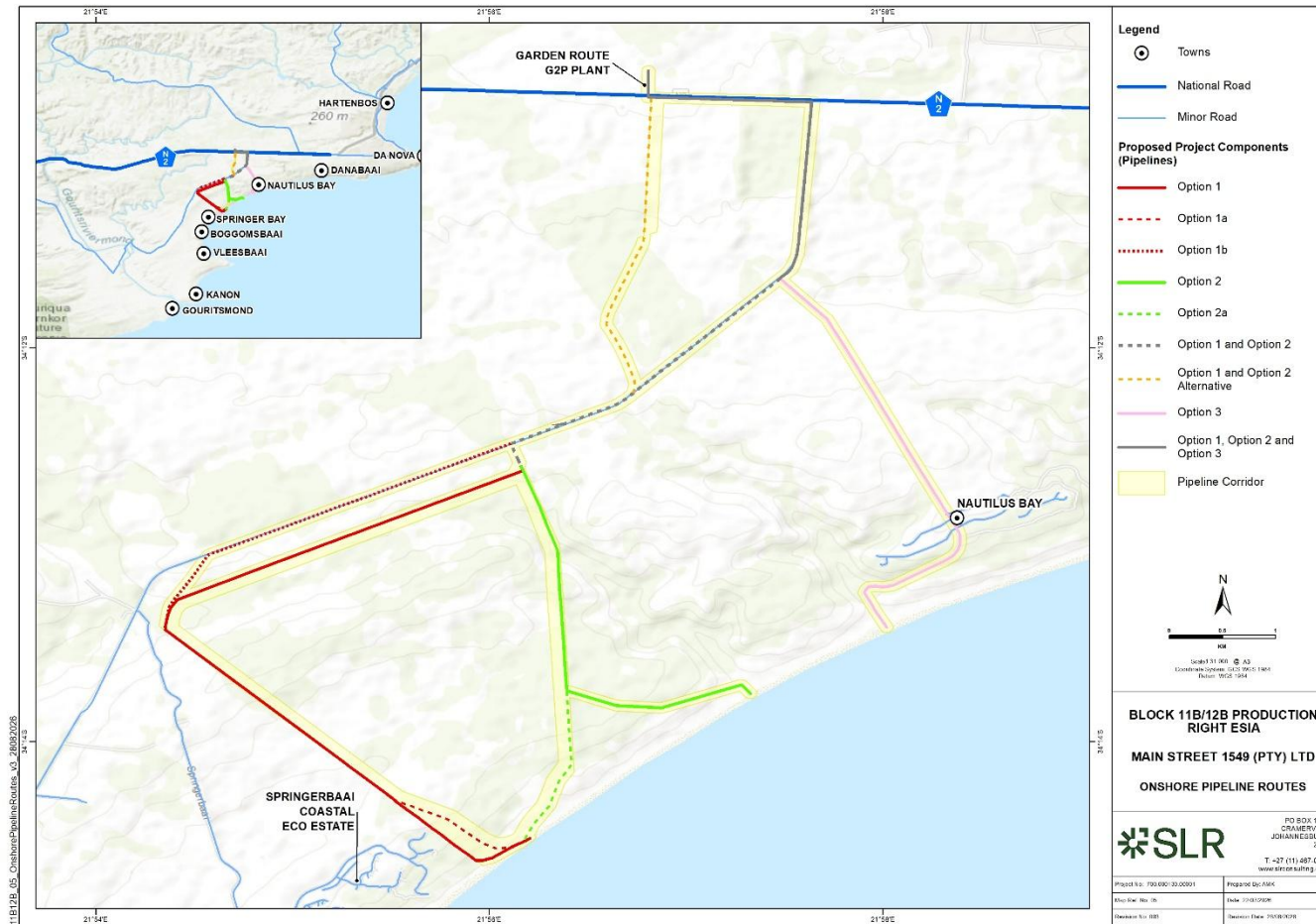


Figure 1-2: Locality map of proposed onshore pipeline corridors on the South Coast of South Africa (Production Scenario 1 only)

Note: The current preferred onshore pipeline route comprises of the Option 1 (red solid, red dashed and red dotted) and the Option 1 and Option 2 Alternative alignment (orange dashed). See Section 5.5.5.2 for further details.



2.0 Administrative and Legal Framework

This chapter outlines the South African administrative framework, key national legislative requirements relevant to oil and gas activities and the ESIA process, policies and planning frameworks relevant to oil and gas activities in South Africa, and relevant international conventions, protocols and agreements.

This section focuses on legal and policy documents that are relevant to environmental management and the ESIA process for this project. There are many additional legal and policy requirements that the Operator may need to comply with should EA to undertake the proposed activities be granted.

2.1 South African Institutional and Administrative Framework

2.1.1 Department of Mineral and Petroleum Resources

DMPR is the public trustee responsible for regulating the development and use of South Africa's mineral and petroleum resources. According to the Mineral and Petroleum Resources Development Act, 2002 (No. 28 of 2002), as amended (MPRDA), read with the NEMA, the Minister of Mineral and Petroleum Resources (or designated authority) is responsible for, *inter alia*, the following:

- Approving or refusing an EA on the basis of environmental reporting prepared in terms of Chapter 5 of the NEMA as part of Exploration or Production Right applications;
- Granting or refusing Exploration Rights and Production Rights; and
- Prescribing and levying any fee, in consultation with the Minister of Finance, payable in terms of the MPRDA.

The Minister of Mineral and Petroleum Resources is required to ensure that the development of South Africa's mineral and petroleum resources is undertaken in a sustainable manner, while promoting economic and social development, through the consideration of environmental policy, norms and standards.

Role in this Project:

DMPR is the competent authority responsible for deciding on the EA and PR for the Project.

2.1.2 Petroleum Agency SA

PASA is responsible for promoting the exploration of oil and gas resources and the optimal development thereof on behalf of the South African government. In June 2004, the then Minister of Mineral Resources and Energy designated various duties pertaining to petroleum exploration and production to PASA (see Section 70 of the MPRDA). This included the receipt of applications for different types of permits and rights, some of which require EAs. Section 71(i) of the MPRDA provides that the designated agency must review and make recommendations to the Minister with regards to the acceptance of environmental reports and the conditions of EAs and amendments thereto. As such, PASA deals with the regulation and monitoring of exploration and production activities. In addition, PASA is the custodian of the national exploration and production database for petroleum.

Role in this Project:

PASA will evaluate the PR and EA application and advise the DMPR on technical, financial and compliance aspects to make a decision.



2.1.3 Department of Forestry, Fisheries and Environment

The Department of Forestry Fisheries and Environment (DFFE) is the custodian of environmental matters and is tasked with ensuring protection of the environment and conservation of natural resources in the context of sustainable development.

DFFE is responsible for the administration of applications for and the issuing of EAs in terms of NEMA and the EIA Regulations 2014 (as amended), excluding applications related to mining and petroleum for which DMPR is the competent authority. The Minister of Forestry, Fisheries and the Environment (or designated authority) deals with appeals in terms of the National Appeal Regulations related to EAs for mining and petroleum projects.

Role in this Project:

DFFE is a commenting authority for this production right and EA application. They are also the competent authority for deciding on any appeals administered as part of the ESIA process for this Project.

DFFE, together with South African Maritime Safety Authority (SAMSA), is also responsible for approving contingency plans for offshore installations.

2.1.4 Heritage Authorities

2.1.4.1 South African Heritage Resources Agency

The South African Heritage Resources Agency (SAHRA) is a statutory organisation established under the National Heritage Resources Act, 1999 (No. 25 of 1999), and serves as the national administrative body responsible for the protection of South Africa's cultural heritage.

SAHRA is responsible for establishing national principles, standards and policy for the purposes of identifying, recording and managing the national estate. SAHRA also manages South Africa's national cultural heritage, identifies and keeps record of nationally significant heritage resources and provides expertise to provincial and local heritage authorities where required. It also administers wrecks (those older than 60 years or which SAHRA considers worthy of conservation) within the territorial waters and the maritime cultural zone.

Role in this Project:

Heritage resources within the territorial waters and the maritime cultural zone fall under the jurisdiction of SAHRA. Thus, SAHRA is a commenting authority for the offshore component of the Project, as it includes a development exceeding 5 000 m² in extent and pipelines longer than 300 m. SAHRA is also the competent authority for issuing any permits relating to the destruction, disturbance, excavation, alteration, etc. of any heritage resources in the offshore project area.

2.1.4.2 Heritage Western Cape

Heritage Western Cape (HWC) was established in terms of the National Heritage Resources Act, 1999 (No. 25 of 1999) and is a provincial heritage resources authority in the Western Cape Province of South Africa. It is mandated to promote co-operative governance between national, provincial and local authorities for the identification, conservation and management of heritage resources.

Role in this Project:

Onshore heritage resources above the high-water mark fall under the jurisdiction of HWC. Thus, HWC is a commenting authority for the onshore component of the Project, as it includes a development exceeding 5 000 m² in extent and a gas pipeline longer than 300 m,



HWC is also the competent authority for issuing any permits relating to the destruction, disturbance, excavation, alteration, etc. of any heritage resources in the onshore project area.

2.1.5 South African Maritime Safety Authority

SAMSA was established in terms of the South African Maritime Safety Authority Act, 1998 (No. 5 of 1998) and reports to the Minister of Transport. The Act specifies that SAMSA's objectives are to ensure safety of life and property at sea, prevent and combat pollution of the marine environment by ships and promote the Republic's maritime interests. To this end, SAMSA provides the following (www.samsa.org.za):

- Safety and environment protection standards for responsible maritime transport operations;
- Monitoring and enforcing compliance with safety and environment protection standards;
- The capability to respond to marine pollution incidents and other maritime emergencies; and
- The capability to detect, locate and rescue people in maritime distress situations.

SAMSA administers several pieces of legislation relating to marine pollution, marine traffic and the transport of goods by sea and issues licences or permits related to these aspects, including:

- Marine Pollution (Control and Civil Liability) Act, 1981 (No. 6 of 1981): Provides for liability and compensation associated with oil pollution damage from ships.
- Marine Pollution (Prevention of Pollution from Ships) Act, 1986 (No. 2 of 1986): Gives effect to the OPRC Convention and provides the framework for oil spill preparedness, response, and contingency planning, including the National Oil Spill Contingency Plan (NOSCP).
- Marine Pollution (Intervention) Act, 1987 (No. 64 of 1987): Enables intervention by authorities in incidents posing a threat of marine pollution.
- Merchant Shipping Act: The primary legislation governing ship safety, maritime operations, marine pollution prevention, and certification of ships and offshore installations. Many regulations administered by SAMSA are promulgated under this Act.

Role in this Project:

The South African NOSCP is overseen by the Department of Transport, with implementation and administration undertaken by SAMSA, which serves as the national authority for marine oil spill preparedness and response. SAMSA is also responsible for reviewing and approving oil spill contingency plans for offshore installations and issuing the safety pollution prevention certificate.

Any and all permits, licenses and plans requiring approval under SAMSA's administrative powers will be decided upon by SAMSA.

2.1.6 Transnet National Ports Authority

The Transnet National Ports Authority (TNPA) is responsible for managing and controlling South Africa's commercial ports (Saldanha, Cape Town, Mossel Bay, Gqeberha (previously Port Elizabeth), Ngqura, KuGompo City (previously East London), Durban and Richards Bay) and is accountable to the Minister of Transport. TNPA's mandate is granted by the



National Ports Act, 2005 (No. 12 of 2005) and its purpose is to “*own, manage, control and administer ports to ensure their efficient and economic functioning*”.

Role in this Project:

TNPA is responsible for the management and operation of South Africa's commercial ports, with an interest in vessel traffic, navigation safety, port infrastructure utilisation, and the potential impacts of project-related marine logistics on port operations. No person other than TNPA may provide a port service or operate a port facility unless an agreement has been entered into with TNPA or in terms of a licence issued by TNPA.

TNPA would be responsible for:

- Issuing permits, leases, licences or commercial agreements for the use of port facilities and land associated with the Project.
- Allocating berths, quaysides, laydown areas and other port facilities required for Project logistics.
- Managing access to port land and infrastructure used for storage, assembly or staging of equipment and supplies.
- Coordinating marine logistics activities, including supply vessels, crew transfer vessels, heavy-lift vessels and construction support vessels operating through the port.
- Liaising with port users to minimise disruptions to existing commercial shipping activities.
- Regulating and coordinating the entry, departure and movement of project-related vessels within port limits.
- Ensuring safe navigation and efficient use of port facilities.
- Coordinating responses to incidents within port limits, including vessel accidents and pollution incidents affecting port waters.

2.2 South African Legislation Applicable to Oil and Gas Activities and ESIAs

In terms of Section 24 of the Constitution of South Africa, 1996 (No. 108 of 1996) (the Constitution), “*everyone has the right:*

- a) *to an environment that is not harmful to their health or well-being; and*
- b) *to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that;*
 - i) *Prevent pollution and ecological degradation;*
 - ii) *Promote conservation; and*
 - iii) *Secure ecologically sustainable development and use of natural; resources while promoting justifiable economic and social development”.*

NEMA provides for the incorporation of environmental considerations in decision-making. It applies alongside the State's responsibility to respect, protect, promote and fulfil the social and economic rights in Chapter 2 of the Constitution, together with the basic needs of categories of persons disadvantaged by unfair discrimination.

The MPRDA gives effect to Section 24 of the Constitution by ensuring that South Africa's mineral and petroleum resources are developed in an orderly and ecologically sustainable manner while promoting justifiable social and economic development.

The above Acts and other laws listed below are the key pieces of legislation in terms of which authorisation / approval is required for the Operator to undertake the proposed



activities. These laws govern the legal requirements, the application processes to be followed and stipulate where certain activities may or may not occur.

2.2.1 Legal and Policy Framework for ESIA

2.2.1.1 National Environmental Management Act, 1998

Chapter 2 of NEMA sets out a range of environmental and social principles that are to be applied by all organs of state when taking decisions that significantly affect the environment. Included amongst the key principles is that all development must be socially, economically and environmentally sustainable. It requires that environmental management must place people and their needs at the forefront of its concern, and must serve their physical, psychological, developmental, cultural and social interests equitably. NEMA also provides for the participation of I&APs and stipulates that decisions must consider the interests, needs and values of all of them.

Chapter 5 of NEMA outlines the general objectives and implementation of Integrated Environmental Management (IEM), which provides a framework for the integration of environmental issues into the planning, design, decision-making and implementation of plans and development proposals. Section 24 of the NEMA provides a framework for the granting of an EA. In order to give effect to the general objectives of IEM, the potential impacts on the environment of listed activities must be considered, investigated, assessed and reported on to the competent authority. Section 24(4) provides the minimum requirements for procedures for the investigation, assessment and communication of the potential impact of activities.

EIA Regulations 2014

The EIA Regulations 2014 (as amended) promulgated in terms of Chapter 5 of NEMA and published under Government Notice (GN) R982 in *Government Gazette* 38282 of 4 December 2014, provide for the control of certain listed activities. These activities are listed in GN R983 (Listing Notice 1), R984 (Listing Notice 2) and R985 (Listing Notice 3) published in *Government Gazette* 38282 of 4 December 2014 (as amended) and are prohibited from being undertaken until an EA has been obtained from the competent authority authorising such listed activities.

The Minister of Mineral Resources and Energy (the Minister) is responsible for the granting or refusing of an application for an EA in connection with a permission, right, permit or consent required in terms of the MPRDA, which includes an Exploration Right or PR. Such EA, which may be granted subject to conditions, will only be considered once there has been compliance with the EIA Regulations 2014 (as amended). The responsibility for processing EA applications relating to petroleum activities under the MPRDA, including activities in connection with the production of petroleum resources, has been delegated to PASA by the Minister of Mineral Resources and Energy. However, the Minister remains the competent authority for the EA decision-making process.

The EIA Regulations 2014 (as amended) set out the procedures and documentation that need to be complied with when applying for an EA. A Basic Assessment process must be undertaken if the authorisation applied for is in respect of an activity or activities listed in Listing Notice 1 and/or 3, while an ESIA process (scoping and impact assessment) must be undertaken if the authorisation applied for is in respect of an activity or activities listed in Listing Notice 2.



Implications for this Project:

The proposed Project triggers activities contained in both Listing Notice 1, 2 and 3 (see Table 2-1), thus an ESIA process must be undertaken to inform the competent authority's decision on whether to grant an EA.

Table 2-1: Listed Activities in terms of Listing Notices 1, 2 and 3 triggered by this Project

Activity	Description of activity in relation to the Project
Listing Notice 1	
12. The development of - (ii) infrastructure or structures with a physical footprint of 100 m ² or more; where such development occurs - (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 m of a watercourse, measured from the edge of a watercourse; ...	The onshore gas pipeline (Scenario 1), which would have a footprint greater than 100 m ² , would pass through or within 32 m of a watercourse. The need for a Water Use Licence (WUL) or General Authorisation (GA) in terms of the National Water Act, 1998 (No 36 of 1998) will be confirmed during the ESIA process. Should it be required, a WUL or GA (whichever is applicable) will be obtained by the applicant.
15. The development of structures in the coastal public property where the development footprint is bigger than 50 m ² , ...	The gas pipeline (Scenario 1), which would have a footprint greater than 50 m ² , would pass through coastal public property.
16. The development and related operation of facilities for the desalination of water with a design capacity to produce more than 100 m ³ of treated water per day.	During production, the FPSO / FLNG and FSO will use freshwater produced onboard via seawater desalination. The design capacity could be more than 100 m ³ of treated water per day.
17. Development - (i) in the sea; (iii) within the littoral active zone; (iv) in front of a development setback; or (v) if no development setback exists, within a distance of 100 m inland of the high-water mark of the sea or an estuary, whichever is the greater; In respect of – (c) embankments; (d) rock revetments or stabilising structures including stabilising walls; or (e) infrastructure or structures with a development footprint of 50 m ² or more...	The Project entails the development of a gas and condensate field in Block 11B/12B. This includes the drilling of up to 19 wells and installation of production related infrastructure with a development footprint >50 m ² , including subsea production system, FPSO or FSO/FLNG moorings, multiphase pipelines, etc. Scenario 1 includes a gas pipeline from the FPSO to shore and onto a gas receiving facility (currently a proposed gas-to-power (GtP) facility, subject to a separate EA application).
18. The planting of vegetation or placing of any material on dunes or exposed sand surfaces of more than 10 m ² , within the littoral active zone, for the purpose of preventing the free movement of sand, erosion or accretion, excluding where - (i) the planting of vegetation or placement of material relates to restoration and maintenance of indigenous coastal	Dune stabilisation (>10 m ²) will be required during rehabilitation of shore crossing. This will be undertaken in accordance with the EMPr and rehabilitation plan, not a maintenance management plan.



Activity	Description of activity in relation to the Project
<i>vegetation undertaken in accordance with a maintenance management plan; or</i> (ii) <i>such planting of vegetation or placing of material will occur behind a development setback.</i>	
19. <i>The infilling or depositing of any material of more than 10 m³ into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 m³ from a watercourse; ...</i>	The onshore gas pipeline (Scenario 1) would result in the removal and moving of soil of more than 10 m³ from a watercourse. The need for a WUL or GA in terms of National Water Act, 1998 will be confirmed during the ESIA process. Should it be required, a WUL or GA (whichever is applicable) will be obtained by the applicant.
19A <i>The infilling or depositing of any material of more than 5 m³ into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 m³ from:</i> (i) <i>the seashore;</i> (ii) <i>the littoral active zone, an estuary or a distance of 100 metres inland of the highwater mark of the sea or an estuary, whichever distance is the greater; or</i> (iii) <i>the sea...</i>	The proposed seafloor sampling survey may result in the moving and/or removal of cumulatively more than 5 m³ of sediment. Furthermore, the drilling of up to 19 wells will result in the removal and discharge of more than 5 m³ of rock (cuttings). Development Scenario 1, which includes the installation of a gas pipeline from FPSO to the shore (approximately 100 km in length), will also involve the moving and/or removal of more than 5 m³ of material.
Listing Notice 2	
2. <i>The development and related operation of facilities or infrastructure for the generation of electricity from a non-renewable resource where the electricity output is 20 MW or more.</i>	The CPF will be powered by a portion of the produced gas. The electricity output will be greater than 20 MW.
4. <i>The development and related operation of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 m³.</i>	The Project involves the offshore handling and storage of more than 500 m³ of dangerous goods including, but not limited to, gas, condensate, diesel, completion fluids, biocides, radioactive material, etc. Onshore, diesel for vehicles and generators used during construction will be temporarily stored in an onshore construction site.
5. <i>The development and related operation of facilities or infrastructure for the processing of a petroleum resource, including the beneficiation or refining of gas, oil or petroleum products with an installed capacity of 50 m³ or more per day, ...</i>	At the CPF, produced fluids will be processed to separate gas, condensate and produced water. The production capacity is greater than 50 m³ or more per day. The CPF may be either an FPSO or FSO/FLNG: - Scenario 1: An FPSO facility is used for production and processing of produced fluids and storage of gas and condensate until it can be offloaded and/or exported. - Scenario 2: On the FSO/FLNG, produced gas would be processed and liquefied offshore. This process would generate two liquid



Activity	Description of activity in relation to the Project
	product streams, namely LNG and stabilised condensate.
6. <i>The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, ...</i>	The Project will involve activities that will trigger activities listed under Section 21 of NEM:AQA, and activities would constitute controlled emitters under Section 23.
7. <i>The development and related operation of facilities or infrastructure for the bulk transportation of dangerous goods –</i> (i) <i>in gas form, outside an industrial complex, using pipelines, exceeding 1 000 m in length, with a throughput capacity of more than 700 tons per day;</i> (ii) <i>in liquid form, outside an industrial complex, using pipelines, exceeding 1 000 m in length, with a throughput capacity of more than 50 m³ per day; or ...</i>	The Project entails the development of a gas and condensate field in Block 11B/12B. This would involve the transport of produced fluids from the well field to the CPF in a multiphase pipeline (~80 km) and, under Scenario 1, the gas will be piped to shore (~100 km).
14. <i>The development and operation of –</i> (ii) <i>an anchored platform; or</i> (iii) <i>any other structure or infrastructure on, below or along the seabed; ...</i>	The Project entails the construction of a subsea production system connecting the wells to the CPF, via a multiphase pipeline. Scenario 1 also includes a gas pipeline from the FPSO to shore. The FPSO or FLNG/FSO would also be moored (anchored) to the seabed.
20. <i>“Any activity including the operation of that activity which requires a production right in terms of Section 83 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity as contained in this Listing Notice, in Listing Notice 1 of 2014 or Listing Notice 3 of 2014, required to exercise the production right.”</i>	The proposed Field development in Block 11B/12B and associated production facilities requires a PR in terms of the MPRDA. Following the discovery of gas-condensate within the Paddavissie Fairway, the JV partners at the time applied for a PR (12/4/013 PR) to develop the Field.
26. <i>Development -</i> (i) <i>in the sea;</i> <i>in respect of -</i> (a) <i>facilities associated with the arrival and departure of vessels and the handling of cargo;</i> (d) <i>breakwater structures; ...</i>	The proposed project includes the installation of wither a FPSO (Scenario 1) or FSO/FLNG (Scenario 2). The condensate and LNG will be directly offshore via shuttle tankers, which would require arrival and departure of these vessels. Although no breakwater system will be constructed, a temporary rock wall will be constructed on the beach for the horizontal directional drilling (HDD) terrace / platform.
Listing Notice 3	
4. <i>The development of a road wider than 4 m with a reserve less than 13.5 m.</i> i. <i>Western Cape:</i> ii. <i>Areas outside urban areas;</i> (aa) <i>Areas containing indigenous vegetation;</i>	Existing roads will be used as far as possible. New roads (or tracks) to be used during construction, following the pipeline route, will be up to 8 m wide.



Activity	Description of activity in relation to the Project
10. <i>The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 m³.</i> i. <i>Western Cape:</i> ii. <i>Areas outside urban areas;</i> (aa) <i>Areas seawards of the development setback line or within 200 metres from the high water mark of the sea if no such development setback line is determined;</i> (bb) <i>Areas on the watercourse side of the development setback line or within 100 metres from the edge of a watercourse where no such setback line has been determined;</i>	The proposed onshore pipeline development may need infrastructure for the storage and handling of dangerous goods (diesel and oils) in containers with combined capacity of more than 30 m³. The capacity will not exceed 80 m³. The gas pipeline would also provide for the storage of gas, but this would be >80 m³.
12. <i>The clearance of an area of 300 m² or more of indigenous vegetation ...</i> i. <i>Western Cape:</i> i. <i>Within any critically endangered or endangered ecosystem listed in terms of Section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;</i> ii. <i>Within critical biodiversity areas identified in bioregional plans;</i> iii. <i>Within the littoral active zone or 100 m inland from high water mark of the sea or an estuarine functional zone, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas;</i> iv. <i>On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning; or</i>	The onshore pipeline, which would result in the clearance of 300 m² or more of indigenous vegetation, passes through Critical Biodiversity Areas (CBA1) and Critically Endangered Ecosystem.
14. <i>The development of -</i> (ii) <i>infrastructure or structures with a physical footprint of 10 m² or more;</i> <i>where such development occurs -</i> (a) <i>within a watercourse;</i> (b) <i>in front of a development setback; or</i> (c) <i>if no development setback has been adopted, within 32 m of a watercourse, measured from the edge of a watercourse;</i> i. <i>Western Cape</i>	The onshore pipelines will have a physical footprint larger than 10 m² and will be constructed within 32 m of the sea. In addition, the pipelines will pass through a CBA 1.



Activity	Description of activity in relation to the Project
<i>i. Outside urban areas:</i> <i>(aa) A protected area identified in terms of NEM:PAA, excluding conservancies;</i> <i>(dd) Sensitive areas as identified in an environmental management framework as contemplated in Chapter 5 of the Act and as adopted by the competent authority;</i> <i>(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</i>	

Regulations pertaining to Financial Provision, 2015

In terms of Section 24P of NEMA, an applicant for an EA relating to production must determine the financial provision required for undertaking progressive rehabilitation, decommissioning, closure and post-closure activities, before the competent authority issues an EA.

The Regulations pertaining to Financial Provision (GN R No. R1147 in *Government Gazette* 39425 of 20 November 2015, as amended) set out the methods for determining and making Financial Provision to guarantee the availability of sufficient funds to undertake rehabilitation and remediation of potentially adverse environmental impacts caused by production related activities.

Implications for this Project:

A Conceptual Decommissioning and Closure Strategy will be compiled as part of the Impact Assessment Phase (Refer to Section 9.2.2.13 for the terms of reference). This study will include planning and costing to detail the requirements for management, rehabilitation and remediation of the environmental impacts associated with the Project.

Refer to Section 5.9 for further detail on the Financial Provision for this Project.

Key Guidelines for ESIA Process

The guidelines for undertaking the EIA Regulatory process listed in Table 2-2 have been and will be considered further during the ESIA process. Key guidelines are further discussed in Section 3.5.1.

Table 2-2: Guidelines for ESIA process

Guideline	Governing body	Applicability
Specialist Studies, Integrated Environmental Management, Information Series 4 (2002)	DFFE	This guideline was consulted to ensure adequate development of terms of reference for specialist studies.
Impact significance, Integrated Environmental Management, Information Series 5 (2002)	DFFE	This guideline was consulted to inform the impact assessment methodology.



Guideline	Governing body	Applicability
Cumulative Effects Assessment, Integrated Environmental Management, Information Series 7 (2004)	DFFE	This guideline will be consulted to inform the consideration of potential cumulative effects of the proposed project.
Criteria for determining Alternatives in EIA, Integrated Environmental Management, Information Series 11 (2004)	DFFE	This guideline has been and will be consulted to inform the consideration of alternatives.
Environmental Management Plans, Integrated Environmental Management, Information Series 12 (2004)	DFFE	This guideline will be consulted to ensure that the EMP is adequately compiled.
Environmental Impact Reporting, Integrated Environmental Management, Information Series 15 (2004)	DFFE	This guideline was / will be consulted to inform the approach to impact reporting.
Guideline on Need and Desirability (2017)	DFFE	This guideline informed the consideration of the need and desirability aspects of the proposed project.
Consultation with Interested and Affected Parties Guideline (2016)	PASA	These guidelines were considered to ensure that an adequate and meaningful public participation process is undertaken during the ESIA process.
Public Participation Guideline in terms of NEMA (2017)	DFFE	

2.2.1.2 Mineral and Petroleum Resources Development Act, 2002

The MPRDA is the principal legislation governing prospecting and mining, and the exploration and production of oil and natural gas. The Act provides for the equitable access to and sustainable development of mineral and petroleum resources and contains provisions governing applications submitted for and granting of Production Rights.

Implications for this Project:

The proposed Field development in Block 11B/12B and associated production facilities requires a PR in terms of the MPRDA. Following the discovery of gas-condensate within the Paddavissie Fairway, the JV partners at the time applied for a PR (12/4/013 PR) to develop the Field. The MPRDA specifies that applications made under the MPRDA must be conducted in accordance with provisions contained in the EIA Regulations 2014 (as amended) with respect to consultation (Section 83(4)a) and submit the relevant environmental reports required in terms of Chapter 5 of NEMA (Section 83(4)b).

Regulation 42 of the MPRDA Regulations 2004 (as amended) requires that a Social and Labour Plan (SLP) be submitted with the PR application. The purpose of a SLP is to promote sustainable socio-economic development within the Project area and to ensure that the exploitation of resources contributes meaningfully to the transformation and development objectives of South Africa. In terms of Regulation 46, a SLP must include the following:

- Human Resource Development Programme: A skills development programme, career progression and mentorship plans, internship and bursary initiatives, employment equity measures, and reporting on employee qualifications and critical vacancies.



- **Local Economic Development Programme:** An assessment of the socio-economic context of the area, identification of key economic activities, evaluation of impacts on local and sending communities, and initiatives relating to infrastructure, poverty alleviation, housing, nutrition, and local procurement aligned with municipal Integrated Development Plan (IDP).
- **Downscaling and Retrenchment Management:** Processes to manage downscaling or closure, including future forums, job retention measures, alternative employment mechanisms, and mitigation of social and economic impacts on workers and affected communities.
- **Financial Provision:** Adequate financial resources for the implementation of the Human Resource Development, Local Economic Development and downscaling/retrenchment programmes.
- **Compliance Commitment:** A formal undertaking by the PR holder to implement the SLP, ensure compliance with its commitments and communicate the plan to employees.

Main Street appointed EVA Solutions to prepare a SLP, which was effectively an update of the initial SLP prepared by the previous operator, TEEPSA. This updated SLP was subject to a public participation process between 14 July 2015 and 14 August 2025, after which it was submitted to PASA on 30 September 2025 for consideration and review. Subject to approval by the regulatory authority, the SLP will be valid for the duration of the life of the production operation, but must be reviewed and updated every five years.

In terms of Section 102 of the MPRDA, a PR, Production Work Programme, Environmental Management Programme (EMPr) and/or EA issued in terms of NEMA may not be amended without the approval of the Minister (of Minerals and Energy).

MPRDA Regulations

The MPRDA Regulations (GN R527 in Government Gazette 26275 of 23 April 2004), promulgated in terms of Section 107 of the MPRDA, provide for a range of matters relating to the administration of the Act. Part 1 details regulations for the lodgement of applications, Part 2 deals with Social and Labour Plans, while Part 3 sets out environmental regulations for mineral development. The MPRDA Regulations contain requirements related to the content of applications for Exploration Rights and PRs submitted in terms of the MPRDA.

These Regulations had not been practicably implementable since December 2014 following the commencement of the "One Environmental System" and the amendments of the overriding legislation (i.e., MPRDA and NEMA).

In March 2020, amendments to the Mineral and Petroleum Resources Development Regulations were gazetted (GN No. R 420 of 27 March 2020), which replaced the vast majority of the environmental provisions contained within Regulations.

Implications for this Project:

The amended Regulations specify that public participation for applications made under the MPRDA must be conducted in accordance with provisions contained in the EIA Regulations 2014 (as amended).

2.2.1.3 Upstream Petroleum Resources Development Act, 2024

The Upstream Petroleum Resources Development Act, 2024 (No. 23 of 2024) (UPRDA), was gazetted in October 2024, but is not yet in force. It will come into effect on a date to be proclaimed by the President in a Government Gazette.

The UPRDA establishes the future legislative framework governing upstream petroleum activities in South Africa, including the granting and administration of petroleum rights,



production rights and development approvals, petroleum processing and transportation, decommissioning obligations, and the financial, technical and environmental responsibilities of right holders.

The Act further seeks to promote the orderly and sustainable development of the nation's petroleum resources, equitable access to petroleum resources, increased State and black persons' participation in the upstream petroleum sector, and the creation of an enabling environment for petroleum exploration and production. The Act also provides for third-party access to upstream petroleum infrastructure, strategic petroleum supply obligations to the State, local content and skills development requirements, and designates PASA as the regulatory authority for the upstream petroleum sector.

Implications for this Project:

Although the UPRDA is not yet in force, the Act is relevant to the proposed development in Block 11B/12B as it establishes the future legislative framework for upstream petroleum activities in South Africa, including petroleum production, processing, transportation, environmental obligations and decommissioning.

The current ESIA process, however, remains regulated under the existing NEMA and MPRDA framework.

2.2.1.4 Infrastructure Development Act, 2014

The Infrastructure Development Act, 2014 (No. 23 of 2014) provides the legal framework for the facilitation and coordination of public infrastructure development. It aims to ensure that infrastructure projects of significant economic or social importance are prioritized and efficiently managed throughout their lifecycle.

The Act established the Presidential Infrastructure Coordinating Commission, which is responsible for overseeing and coordinating the implementation of infrastructure projects. The Presidential Infrastructure Coordinating Commission plays a crucial role in identifying and designating SIPs based on their strategic importance to the country's development goals. These projects must contribute significantly to national strategies or policies related to infrastructure development.

Implications for this Project:

As noted in Section 1.2.1, the proposed Project forms part of the Energy Strategic Integrated Project No. 20f, that was gazetted on 06 December 2022 (GN 47658) under the OGN). In line with the objectives of the Act, the environmental authorisation process for SIP projects is subject to accelerated regulatory timeframes to facilitate decision-making. As a result, the review and decision-making period afforded to the competent authority for the Final ESIA Report is 57 days.

2.2.1.5 National Environmental Management: Air Quality Act, 2004

The National Environmental Management: Air Quality Act, 2004 (No. 39 of 2004), as amended (NEM:AQA) regulates all aspects of air quality, including prevention of pollution, providing for national norms and standards. Section 4(1) specifically states that this Act also applies to the Exclusive Economic Zone (EEZ) and continental shelf of South Africa and is thus applicable to this Project.

The then Minister of Forestry, Fisheries and Environment, in terms of Section 21 of the NEM: AQA, published a list of activities which result in atmospheric emissions and are believed to have significant detrimental effects on the environment, human health and social welfare. Minimum Emission Standards for these listed activities were published under Government Notice 893 in *Government Gazette* 37054 of 22 November 2013. The Minimum Emission Standards, as amended, identify the activities for which an AEL is required. In



terms of Section 22 of NEM:AQA, no person may conduct a listed activity without an AEL. In terms of Section 36(5)(e) of the Act, the Minister of Forestry, Fisheries and the Environment must perform the functions of the licensing authority where the listed activity(ies) relates to production, as contemplated in the MPRDA.

Implications for this Project:

The proposed Project triggers activities listed in Section 21 of NEM:AQA (see Table 2-3) and thus may require an AEL. This will be confirmed with the National Air Quality Authority.

The Operator will also need to comply with relevant specifications in the International Convention for the Prevention of Pollution from Ships, 1973/1978 (MARPOL), to which South Africa is a signatory.

Table 2-3: Possible listed activities in terms of Section 21 of NEM:AQA triggered by this Project

Subcategory	Description	Application	Description of activity in relation to the Project
Category 1: Combustion Installations			
1.4 Gas Combustion Installations	Gas combustion (including gas turbines burning natural gas) used primarily for steam raising or electricity generation.	All installations with design capacity equal to or greater than 50 MW heat input per unit, based on the lower calorific value of the fuel used).	The FPSO or FSO/FLNG will be powered by a portion of the produced gas. Although the design capacity has not been finalised, the Project could trigger these thresholds.
1.5 Reciprocating Engines	Liquid and gas fuel stationary engines used for electricity generation.	All installations with design capacity equal to or greater than 10 MW heat input per unit, based on the lower calorific value of the fuel used.	
Category 8: Thermal Treatment of Hazardous and General Waste			
8.1 Thermal Treatment of General and Hazardous Waste	Facilities where general and hazardous waste are treated by the application of heat.	All installations treating 10 kg per day of waste.	Waste may be incinerated on the FPSO or FSO/FLNG. Installations will be greater than the 10 kg threshold.
Note:			
1. The activities listed above, and other potential activities, will be confirmed with the National Air Quality Authority.			
2. Category 2 (Petroleum Industry, the production of gaseous and liquid fuels as well as petrochemicals from crude oil, coal, gas or biomass) is deemed to be intended for downstream activities.			
3. Drilling operations and flaring are, however, not included in the listed activities and as such do not require an AEL.			

National Greenhouse Gas Emission Reporting Regulations, 2017

NEM:AQA also provides for the monitoring and reporting of greenhouse gas (GHG) emissions. The purpose of the National GHG Emission Reporting Regulations (GNR 275 of 2017 as amended) is to implement a single national reporting system for the transparent reporting of GHG emissions. For oil and gas production activities (Code 1B2) under Annexure 1 of the amended GHG Emission Reporting Regulations, no specific thresholds have been set, which means that the Regulations require that carbon dioxide (CO₂) and



methane (CH₄) levels (calculated based on Tier 2 or 3 methodologies) be reported annually via the South African Greenhouse Gas Emissions Reporting System (SAGERS). The system forms part of the national atmospheric emission inventory component of South African Atmospheric Emission Licensing and Inventory Portal (SAAELIP). The Operator would need to meet this requirement for all operations.

Implications for this Project:

The National GHG Emission Reporting Regulations, 2017 (GNR 275 of 2017) require that the Project's CO₂ and CH₄ levels are reported annually via SAGERS for all activities.

Declaration of Greenhouse Gases as Priority Pollutants, 2017

Persons undertaking certain production processes indicated in Annexure A of the Declaration of Greenhouse Gases as Priority Pollutants (published under GN 710 in Government Gazette 40966 of 21 July 2017) with GHG in excess of 0.1 Megatonne (Mt), measured as CO₂-e, are required to submit a Pollution Prevention Plan to the Minister of Forestry, Fisheries and the Environment for approval. The Pollution Prevention Plan Regulations promulgated in terms of Sections 29(3), 53(o) and (p), read with section 57(1)(a) of the NEM:AQA, prescribe the requirements for the development and submission of Pollution Prevention Plans.

Implications for this Project:

The Production and/or Processing of Natural Gas and the Production and/or Refining of Crude Oil are included in Annexure A of the Declaration of Greenhouse Gases as Priority Pollutants, and as such the Project requires a Pollution Prevention Plan.

National Ambient Air Quality Standards

South Africa's National Ambient Air Quality Standards (NAAQS) were promulgated in 2009 and 2012 and regulate a range of pollutants deemed to be commonly occurring yet which pose a threat to human health and the environment. Ambient air quality standards are defined as *"targets for air quality management which establish the permissible concentration of a particular substance in, or property of, discharges to air, based on what a particular receiving environment can tolerate without significant deterioration"*. The aim of these standards is to provide a benchmark for air quality management and governance.

Each pollutant specified in the NAAQS has specific averaging periods, compliance timeframes, permissible frequencies of exceedance and recognised measurement reference methods.

Implications for this Project:

Project emissions would be required to comply with the NAAQS. Project's emissions and compliance with the NAAQS will be confirmed as part of the Air Quality Impact Assessment (refer to Section 9.2.2.11 for the terms of reference).

2.2.1.6 National Environmental Management: Waste Act, 2008

The National Environmental Management: Waste Act, 2008 (No. 59 of 2008), as amended (NEM:WA), regulates all aspects of waste management and has an emphasis on waste avoidance and minimisation. NEM:WA creates a system for listing and licensing waste management activities. A Waste Management Licence (WML) is required in order to undertake certain waste management activities above certain thresholds stipulated in the List of Waste Management Activities that have, or are likely to have, a detrimental effect on the environment published in terms of NEM:WA published under Government Notice 921 in Government Gazette 37083 of 29 November 2013.



Activities listed in Category A require a Basic Assessment process, while activities listed in Category B require an ESIA process. NEM:WA also provides for the setting of norms and standards for the storage and disposal of waste. These norms and standards are listed in GN R926 of 2013 (storage) and GN R636 of 2013 (disposal). Activities listed in Category C require compliance with these relevant norms or standards.

The incineration of waste regardless of the capacity of the facility (Activity 8 in Category B) is a listed activity that requires a WML.

Implications for this Project:

Although the Act does not expressly exclude offshore installations from its application, and Maritime Zones Act, 1994 (No. 15 of 1994) states that all laws applicable in South Africa are applicable to installations (e.g. FPSO or FSP/FLNG facilities) within the EEZ, it is understood that a WML would not be required as waste generated offshore are not applicable to NEM:WA. This has previously been confirmed by DFFE⁶.

The management, treatment, recycling and disposal of waste arising from offshore activities would take place in compliance with MARPOL 73/78 (see Table 2-5), to which South Africa is a signatory, or brought to shore for disposal at onshore facilities with the appropriate licensing.

2.2.1.7 National Environmental Management: Protected Areas Act, 2003

The National Environmental Management: Protected Areas Act, 2003 (No. 57 of 2003), as amended (NEM:PAA), provides for the declaration and management of protected areas, and the promotion of sustainable utilisation of protected areas for the benefit of people in a manner that would preserve the ecological character of such areas.

Several Marine Protected Areas (MPA) were proclaimed in terms of NEM:PAA for the South African offshore in May 2019. In terms of Section 48(1)(c), no exploration or production activities (read in conjunction with the MPRDA) may take place within an MPA.

Implications for this Project:

Although NEM:PAA does not define any ESIA requirements, it adds spatial and legal constraints which must be considered during the ESIA process. For oil and gas activities, although vessels are permitted to sail through an MPA, no development and production activities are permitted in any proclaimed MPA.

No MPAs occur within the PR application area nor the proposed pipeline corridors. The nearest MPAs include (see Figure 6-36):

- Port Elizabeth Corals MPA: This MPA lies <2 km from the PR application area and 155 km from the Paddavissie Fairway development area.
- Southwest Indian Seamounts MPA: This MPA lies 12 km from the PR application area and 21 km from the Paddavissie Fairway development area.

The proposed development and production activities thus avoid all MPAs and no discharges (e.g. drilling discharges, commissioning effluent or produced water) will take place directly within any MPA. However, technical and specialist studies will be undertaken to confirm any potential impacts on sensitive habitats, including MPAs (refer to Section 9.2 for the terms of reference for all technical and specialist studies).

⁶ Letter from DFFE dated 11 March 2014, submitted as part of an ESIA for offshore exploration well drilling in the Orange Basin Deep Water Licence Area.



2.2.1.8 National Environmental Management: Biodiversity Act, 2004

The National Environmental Management: Biodiversity Act, 2004 (No. 10 of 2004) (NEM:BA) provides a comprehensive framework for the management, conservation and sustainable use of South Africa's biodiversity, within the broader framework of NEMA.

It establishes the State as the trustee of biodiversity and promotes cooperative governance in its protection. NEM:BA provides for the identification and protection of threatened ecosystems and species, supported by regulatory measures such as permitting systems and specific management plans. It also regulates alien and invasive species to prevent harm to indigenous biodiversity. Furthermore, NEM:BA promotes biodiversity planning through instruments such as the National Biodiversity Framework and bioregional plans. It recognises the importance of sustainable resource use and provides for fair and equitable benefit-sharing arising from bioprospecting involving indigenous biological resources. NEM:BA also establishes the South African National Biodiversity Institute (SANBI) to support research, monitoring, and policy implementation

NEM:BA enables the Minister to prohibit activities that may impact on the survival of species in the wild, and to regulate activities to ensure sustainable use of indigenous biological resources.

Implications for this Project:

The Project's area of influence must be screened against listed ecosystems, biodiversity priority areas and other biodiversity planning tools in order to confirm alignment and consistency with relevant biodiversity planning instruments, including the National Biodiversity Framework and applicable bioregional plans.

The ESIA will need to identify and assess the impact on any listed threatened or protected species and ecosystems occurring within the Project's area of influence, including marine, coastal and terrestrial environments potentially affected by offshore infrastructure and onshore gas pipeline. The assessment must also evaluate potential interactions with threatened or protected species (TOPS) and include appropriate avoidance, mitigation and management measures where necessary. Risks associated with the introduction or spread of alien and invasive species, particularly through marine vessels, construction activities and disturbed areas, will also need to be assessed and managed.

Activities that may trigger permitting requirements under NEM:BA will need to be identified and incorporated into the overall Project approvals framework.

Refer to Section 9.2 for the terms of reference for all technical and specialist studies.

2.2.1.9 National Environmental Management: Integrated Coastal Management Act, 2008

The National Environmental Management: Integrated Coastal Management Act, 2008 (No. 24 of 2008), as amended (NEM:ICMA), complements the authorisation requirements of NEMA by prescribing additional considerations for the regulation of activities and developments within the coastal zone (Section 63) and by providing for pollution control within the coastal zone (Sections 69 to 73), where the coastal zone includes "*coastal waters*" which in turn include "*the internal waters, territorial waters, exclusive economic zone and continental shelf ...*".

While NEM:ICMA does not prescribe a separate impact assessment process, as this is governed by NEMA and the EIA Regulations 2014, it does identify specific criteria that must be taken into account during decision-making for activities within the coastal zone.



Implications for this Project:

The Project constitutes a "coastal activity" (activities listed in terms of Chapter 5 of NEMA that occur in the coastal zone -Table 2-1) and is located within "coastal waters" and passes through the "coastal zone" and "coastal public property", and as such the Competent Authority (namely DMPR) must, in terms of Section 63(1) of NEM:ICMA, consider a range of specified criteria when deciding on the EA application.

The competent authority must, in terms of Section 63(5), ensure that the terms and conditions of any EA are consistent with any applicable coastal management programmes / plans and promote the attainment of coastal management objectives in the area concerned.

In considering the EA application, the Competent Authority will need to consider all requirements of Section 63(1) of NEM:ICMA, each of which are listed in Table 2-4 below.

Table 2-4: Consideration of the NEM:ICMA Requirements in relation to the proposed Project

NEM:ICMA Section	Competent Authority must consider the following aspects when considering the application	Relevant Document / Section
63(1)(a)	The representations made by the applicant and interested and affected parties.	All issues raised by I&APs during the public participation process will be consolidated and responded to in the meeting minutes and a Comments and Responses Report and attached to the Final Scoping Report and Final ESIA Report.
63(1)(b)	The extent to which the applicant has in the past complied with similar authorisations.	The Operator has not yet undertaken similar work (production activities) in South Africa, and there is thus no opportunity for past compliance with similar authorisations.
63(1)(c)	Whether coastal public property ⁷ , the coastal protection zone ⁸ or coastal access land will be affected, and if so, the extent to which the proposed development or activity is consistent with the purpose for establishing and protecting those areas.	The ESIA will consider and assess the potential impact of the proposed Project on each of these items. The overall findings will be presented in this ESIA Report. The terms of reference of the technical and specialist studies are presented in Section 9.2.
63(1)(d)	The estuarine management plans, coastal management programmes, coast management lines and coastal management objectives applicable in the area.	The ESIA will consider the various management plans, programmes and lines in the assessment of potential impacts. The overall findings will be presented in this ESIA Report. The terms of reference of the technical and specialist studies are presented in Section 9.2.

⁷ "Coastal Public Property" consists of (a) coastal waters; (b) land submerged by coast waters including (i) land flooded by coastal waters which subsequently becomes part of the bed of coastal waters; and (ii) the substrata beneath such land; (c) any natural island within coastal waters; (d) the seashore, including (i) the seashore of a natural or reclaimed island; and (ii) the seashore of reclaimed land; (e) subject to Section 66A, any admiralty reserve owned by the State; (f) any land owned or controlled by the State declared under Section 8 to be coastal public property; (g) land reclaimed in terms of Section 7C of the NEM:ICMA; or (h) any natural resources on or in any coastal public property of a category mentioned in paragraphs (a) to (g).

⁸ The "Coastal Protection Zone" consists of, inter alia, the littoral active zone, any coastal protected areas, and any land within 1 km of the high-water mark.



NEM:ICMA Section	Competent Authority must consider the following aspects when considering the application	Relevant Document / Section
63(1)(e)	The socio-economic impact if the activity is (i) authorised; or (ii) not authorised.	The proposed project and the no-go alternative will be considered and assessed in the ESIA Report.
S63(1)(g)	The likely impact of coastal environmental processes on the proposed activity.	The impacts of coastal environmental processes on Project infrastructure and production activities, in particular the pipelines, will also be assessed in the ESIA.
63(1)(h)(i)	Whether the development or activity is situated within coastal public property ⁹ and is inconsistent with the objective of conserving and enhancing coastal public property for the benefit of current and future generations.	Refer to Section 63(1)(c) & (d) above in respect of coastal public property.
63(1)(h)(ii)	Whether the development or activity is situated within the coastal protection zone and is inconsistent with the purpose for which a coastal protection zone is established as set out in Section 17.	Refer to Section 63(1)(c) & (d) regarding coastal protection zones.
63(1)(h)(iii)	Whether the development or activity is situated within coastal access land and is inconsistent with the purpose for which coastal access land is designated as set out in Section 18.	Refer to Section 63(1)(c) & (d) regarding coastal access land.
63(1)(h)(iv)	Whether the development or activity is likely to cause irreversible or long-lasting adverse effects to any aspect of the coastal environment that cannot satisfactorily be mitigated.	Refer to Section 63(1)(c) & (d) regarding coastal protection zones.
63(1)(h)(v)	Whether the development or activity is likely to be significantly damaged or prejudiced by dynamic coastal processes.	Refer to Section 63(1)(g).
63(1)(h)(vi)	Whether the development or activity would substantially prejudice the achievement of any coastal management objective.	Refer to Section 63(1)(d) regarding coastal protection zones.
63(1)(h)(vii)	Whether the development or activity would be contrary to the interests of the whole community.	The potential impacts and considerations of the whole community will be discussed and assessed in the ESIA Report. The need and desirability is presented in Section 4.0 of this report.

⁹ "Coastal Public Property" consists of, *inter alia*, coastal waters, land submerged by coastal waters, and the seashore.



NEM:ICMA Section	Competent Authority must consider the following aspects when considering the application	Relevant Document / Section
		All of these factors will be considered and assessed holistically in the ESIA.
63(1)(i)	Whether the very nature of the proposed activity or development requires it to be located within coastal public property, the coastal protection zone or coastal access land.	In order to transfer the gas onshore (Scenario 1), the pipeline will need to pass through the coastal zone. Refer to Section 63(1)(c) & (d) above.
63(1)(j)	Whether the proposed activity or development will provide important services to the public when using coastal public property, the coastal protection zone, coastal access land or a coastal protected area.	The proposed Project (specifically the pipeline through the coastal zone) will not provide important services to the public when using coastal zone. Refer to Section 63(1)(c) & (d) above.
63(1)(k)	The objects of the Act, where applicable.	The objectives of the NEM:ICMA are set out in Section 2(a), 2(b) and 2(d) are not relevant to the proposed project. In respect of Section 2(c), the ESIA Report will set out the mitigation measures to ensure that potential impacts on coastal public property will be avoided or minimised to the extent that they arise. In respect of Section 2(d), the competent authority must allow equal access to opportunities and benefits of the coastal public property. The competent authority is required to take into consideration and balance the competing interests between the proposed Project, landowners, small-scale fishers, commercial fisheries, cultural heritage and the interests of the whole community. The potential impacts will be assessed in the ESIA Report.
63(5)	The competent authority must ensure that the terms and conditions of any environmental authorisation are consistent with any applicable coastal management programmes and promote the attainment of coastal management objectives in the area concerned.	The National Coastal Management Programme (2026 – 2031) and Garden Route District Coastal Management Programme are applicable to this Project (refer to Section 2.3.5.3 and 2.3.5.4).
63(6)	Where an environmental authorisation is not required for coastal activities, the Minister may, by notice in the Gazette list such activities requiring a permit or licence.	N/A – Environmental Authorisation is required.



2.2.1.10 National Heritage Resources Act, 1999

The National Heritage Resources Act, 1999 (No. 25 of 1999), as amended (NHRA), provides for the protection of South Africa's natural heritage, including:

- Offshore: wrecks and associated debris and/or artefacts older than 60 years (or considers to be conservation worthy by SAHRA) that may be found or disturbed on the seabed; and
- Onshore: shell middens, graves, and/or artefacts older than 100 years.

Heritage resources within the territorial waters and the maritime cultural zone fall under the jurisdiction of SAHRA, while onshore heritage resources above the high-water mark fall under the jurisdiction of HWC.

According to Section 35 of the NHRA, any person who discovers archaeological objects or material (including shipwrecks, shell middens, graves and/or artefacts) during a development must immediately report the find to SAHRA or HWC. No person may, without a permit issued by SAHRA or HWC, destroy, damage, excavate, alter, deface or otherwise disturb any archaeological site. In the event that archaeological objects or material are discovered during the construction and implementation phase, the Operator would need to notify SAHRA or HWC.

In addition, Section 38 lists certain activities that would require notification to SAHRA or HWC. NHRA requires that a person who intends to undertake a listed activity notify SAHRA or HWC at the earliest stages of initiating such a development. The relevant heritage authority would then in turn, notify the person whether a Heritage Impact Assessment should be submitted. However, according to Section 38(8) of the NHRA, a separate report would not be necessary if an evaluation of the impact of such development on heritage resources is required in terms of the Environment Conservation Act (No. 73 of 1989) (now replaced by NEMA) or any other applicable legislation. The decision-making authority (namely DMPP) should, however, ensure that the heritage evaluation fulfils the requirements of the NHRA and take into account in its decision-making any comments and recommendations made by the relevant heritage resources authority.

Implications for this Project:

The proposed Project triggers activities listed in Section 38 of the NHRA (see Table 2-5). SAHRA and HWC are registered as stakeholders on the Project database and as such will be notified and kept informed throughout the ESIA process.

As part of the current ESIA, the following heritage studies will be undertaken:

- Onshore Heritage and Palaeontology (see Section 9.2.2.7), including HWC's Notification for Intent to Develop (NID) application form;
- Underwater (Maritime) Heritage Impact Assessment (see Section 9.2.2.8); and
- Intangible Cultural Heritage Impact Assessment (see Section 9.2.2.9).

The relevant ESIA documents will be uploaded to the South African Heritage Resources Information System (SAHRIS) for SAHRA and HWC review and comment.



Table 2-5: Listed activities in terms of Section 38 of NHRA triggered by this Project

NHRA Section	Description	Description of activity in relation to the Project
38(a)	The construction of a road, pipeline, or other similar form of linear development exceeding 300 m in length.	The Project will include the installation of various pipelines (including multiphase, gas, MEG and umbilicals) which would exceed 300 m. A road will be required for the installation of the onshore pipeline, where existing roads cannot be utilised.
38(1)(c)	Any development or other activity which will change the character of a site: (i) exceeding 5 000 m ² in extent; or (ii) involving three or more existing erven or subdivisions thereof; or	The Project will change the character of the site and will have a footprint exceeding 5 000 m ² in extent. The onshore pipeline would traverse more than three erven. Although the pipeline would be buried, it could change the character of the site due to recommended setbacks / buffers (to be confirmed).

2.2.1.11 National Water Act, 1998

The National Water Act, 1998 (No 36 of 1998), as amended (NWA), provides a legal framework for the effective and sustainable management of water resources in South Africa. It serves to protect, use, develop, conserve, manage and control water resources, promoting the integrated management of water resources with the participation of all stakeholders.

Chapter 4 of NWA requires a project proponent to submit an application to the competent authority (Regional Office of the Department of Water and Sanitation, DWS) where a water use listed under Section 21 of the Act is triggered. Water use is defined broadly by the Act and includes, taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), alteration of a watercourse, removing water underground for certain purposes and recreation.

A Water Use Licence (WUL) is required for any new water use that is not listed in Schedule 1 or that is not covered by a General Authorisation. Should a water use be triggered an application for a WUL or General Authorisation must be undertaken in accordance with the regulations of GN R267 of 2017 and be submitted to the competent authority following the granting of an EA by DMPR.

Implications for this Project:

Possible water uses that could be triggered by the Project are outlined in Table 2-6. The need for a WUL or General Authorisation in terms of the NWA will be confirmed during the ESIA process.



Table 2-6: List of Potential Section 21 Water Uses Applicable to the Project

No.	Water Use	Description of activity in relation to the Proposed Project
21c	Impeding or diverting the flow of water in a watercourse	The proposed onshore pipeline, depending on which alternative is selected, may pass through a watercourse. In addition, access roads / tracks would be needed for construction vehicles depending on which pipeline route alternative is selected. Access during operation to, for example, a possible valve station would be via existing roads as far as possible. These Project components may require the temporary diversion of water and / or alter of the bed and banks of the watercourse.
21i	Altering the bed, banks, course, or characteristics of a watercourse	

2.2.2 Other Environmental Legislation and Policies

Other key legislation and policy with environmental implications and relevance for implementation of this Project is briefly summarised in alphabetical order in Table 2-7.

Table 2-7: Additional applicable South African Policies and Legislation

Title	Description
Climate Change Act, 2024 (No. 22 of 2024)	This Act is to enable the development of an effective climate change response and a long-term, just transition to a low-carbon and climate-resilient economy and society for South Africa in the context of sustainable development. Refer to Section 2.3.3.5 for further details.
Hazardous Substances Act, 1983 and Regulations (No. 85 of 1983)	This Act provides for the control of substances which may cause injury or ill-health to or death of human. No person may, without a licence: (1) sell any Group I Hazardous Substance; (2) use, operate or apply any Group III Hazardous Substance (listed electronic products); and (3) install or keep any Group III Hazardous Substance. Authorisation is required to be in possession of, use or dispose of any Group IV Hazardous Substance (which include includes radioactive material).
Marine Living Resources Act, 1998 (No. 18 of 1998)	This Act provides for the conservation of marine ecosystems, the long-term sustainable utilisation of marine living resources and the orderly access to exploitation, utilisation and protection of certain marine living resources.
Marine Pollution (Control and Civil Liability) Act, 1981 (No. 6 of 1981)	The purpose of this Act is to provide protection of the marine environment from pollution by oil and other harmful substances, by giving power to SAMSA to take steps to prevent harmful substances being discharged from vessels. It is the responsibility of the Operator to disclose to SAMSA before the commencement of proposed activities the amounts and types of chemicals that would be used and disposed of during operations.
Marine Pollution (Prevention of Pollution from Ships) Act, 1986 (No. 2 of 1986)	This Act regulates pollution from ships, tankers and offshore installations, and for that purpose gives effect to MARPOL. In terms of the Act, it is an offence to discharge any oil from a ship, tanker or offshore installation within 12 nautical miles (19 km) off the South African coast. The discharge of oily water or oil and any other substance which contains more than a 100 parts per million (ppm) of oil is prohibited between 19 – 80 km offshore.
Marine Pollution (Intervention) Act, 1987 (No. 65 of 1987)	This Act gives effect to the international convention relating to the Intervention of the High Seas in cases of oil pollution casualties, and to the Protocol relating to Intervention of the High Seas in cases of Marine Pollution by substances other than Oil in South African Waters.



Title	Description
Maritime Safety Authority Act, 1998 (No. 5 of 1998)	This Act provides for the establishment and functions of SAMSA. The objectives of the Act are to: (1) ensure safety of life and property at sea; (2) prevent and combat pollution of the marine environment by ship; and (3) promote South Africa's maritime interests.
Marine Spatial Planning Act, 2018 (No. 16 of 2018)	This Act provides a framework for marine spatial planning in South Africa and the development of marine spatial plans. The objectives of this Act are to (1) develop and implement a shared marine spatial planning system to manage a changing environment that can be accessed by all sectors and users of the ocean, (2) promote sustainable economic opportunities which contribute to the development of the South African ocean economy through coordinated and integrated planning, (3) conserve the ocean for present and future generations, and (4) facilitate responsible use of the ocean.
National Policy on South African Living Heritage (March 2009)	This Policy framework was written in response to the need to create national policy on living heritage or intangible cultural heritage. This policy framework is an attempt to arrest continuing marginalisation of this important heritage and is aimed at affirming cultural diversity and mutual social existence, as well as empowering communities and individuals in safeguarding their heritage.
Occupational Health and Safety Act, 1993 (No. 85 of 1993) and Major Hazard Installation (MHI) Regulations	This Act provides for the health and safety of persons at work and the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with the activities of persons at work. Every employer shall provide and maintain, as far as is reasonably practicable, a working environment that is safe and without risk to the health of his employees. The onshore pipeline (Scenario 1) may be classified as an MHI. This will be confirmed in the Quantitative Risk Assessment (refer to terms of reference in Section 9.2.1.5).
Sea Birds and Seals Protection Act, 1973 (No. 46 of 1973)	This Act provides for the control over certain islands and the protection of seabirds and seals. It is an offence to wilfully disturb seabirds and seals on the coast or on offshore islands, unless in possession of a permit.

2.3 Local, National and International Policy and Planning Frameworks

Key relevant planning and policy documents are discussed below, which inform the analysis of the project's need and desirability in Section 4.0. This section broadly considers planning and policy documents of relevance to oil and gas activities to provide a wider perspective to the Project.

2.3.1 Energy-Related Plans and Policies

The energy policy context of the Project is provided below.

2.3.1.1 White Paper on the Energy Policy of the Republic of South Africa (1998)

The White Paper on the Energy Policy (1998), updated in 2011, is the overarching policy which guides planning in the energy sector and has been a foundational document guiding the country's energy policy since its publication.

The White Paper states that the government will "*ensure the optimal and environmentally sustainable exploration and development of the country's natural oil and gas resources to the benefit of all*", "*promote the development of South Africa's oil and gas resources...*" and



“ensure private sector investment and expertise in the exploitation and development of the country’s oil and gas resources”.

This White Paper promotes a comprehensive energy policy aimed at achieving security of supply, social upliftment, effective governance, investment and growth, economic competitiveness, economic efficiency and sustainability. The legislative framework governing upstream oil and gas is well developed, and the White Paper merely clarifies an accepted policy framework which seeks to optimise national benefits while achieving the necessary balance of interests to attract investment. The focus of the White Paper is on creating a policy and legislative framework, which attracts initial investment into the sector, while maintaining options for competition in the future and the fair distribution of economic rents.

2.3.1.2 Draft Integrated Energy Plan (2013)

The development of a National Integrated Energy Plan (IEP) was envisaged in the White Paper on the Energy Policy (1998) and in terms of the National Energy Act, 2008 (No. 34 of 2008). The purpose of the IEP is to provide a roadmap of the future energy landscape for South Africa, which guides future energy infrastructure investments and policy development. The IEP analyses current energy consumption trends within different sectors of the economy (i.e. agriculture, commerce, industry, residential and transport) and uses this to project future energy requirements, based on different scenarios.

Section 6 of the National Energy Act, 2008 requires the Minister of Mineral Resources and Energy to develop and publish an IEP and review it periodically. While the obligation to prepare an IEP has been in place since the commencement of the Act, a final updated IEP has not yet been formally adopted and promulgated as current national policy. The most recent publicly available version remains the Draft IEP (2013) was published for comment in 2016, which has not been finalised.

The Draft IEP (2013) considers how current and future energy needs can be addressed. The plan considers security of supply, increased access to energy, diversity in supply sources and primary sources of energy, and minimising emissions. The plan indicates that projected demand for natural gas between 2010 and 2050 would be second only to petroleum products, primarily due to increased growth in the industrial sector.

The plan states that:

- Since South Africa is a net importer of oil, the liquid fuels industry and its economy is vulnerable to fluctuations in the global oil market.
- The use of natural gas as an alternative electricity generator must be considered in moderation due to limited proven reserves, but that it has significant potential both for power generation, as well as direct thermal uses.
- The role of renewable energy to deliver the intended policy benefits of improved energy security and reduced GHG emissions is acknowledged and the availability of untapped renewable energy resources within the country is highlighted.

The plan notes, however, that due to the intermittent nature of renewable energy systems and the variability in electricity load requirements, storage remains the most important challenge to the widespread use of renewable energy. Consequently, the need to incorporate fossil fuels and nuclear power to ensure that there is both sufficient base-load electricity generating power to meet the minimum needs and peak-load power to meet the needs during peak periods. The use of natural gas for power generation is considered as an option to assist South Africa to move towards a low carbon future given that natural gas has a lower carbon content than coal.



2.3.1.3 Integrated Resources Plan

The IRP serves as South Africa's strategic roadmap for electricity generation, aiming to ensure energy security, economic viability and environmental sustainability. The purpose of the IRP generally is to provide a roadmap for meeting South Africa's forecasted electricity demand, which integrates financial considerations with the country's climate change commitments to ensure a sustainable and economically viable solution.

The Integrated Resource Plan (IRP) 2010-2030 was originally promulgated in March 2011. It identified the preferred generation technology required to meet expected demand growth up to 2030 and incorporated government objectives such as affordable electricity, reduced GHG, reduced water consumption, diversified electricity generation sources, localisation and regional development (DoE, 2018).

The IRP 2010-2030 was envisaged as a "living plan" to be revised at least every two years through IRP updates that balance ensuring security of supply with minimizing cost of electricity, negative environmental impact (emissions) and water usage (DoE, 2018).

IRP 2019

The IRP 2019 was gazetted in October 2019 to guide South Africa's electricity generation and planning through to 2030. It outlines the country's approach to addressing current energy challenges and meeting future energy demands, balancing economic, environmental, and security considerations.

The 2019 IRP affirms that "*South Africa continues to pursue a diversified energy mix that reduces reliance on a single or a few primary energy sources*". This Plan also notes that natural gas is considered a transition fuel globally that can provide the flexibility required to complement renewable energy sources.

The IRP 2019 sets out the planned energy mix, highlighting the capacity additions from various energy sources, and provides for the inclusion of 3 000 MW of gas and diesel capacity to provide flexible, dispatchable power. The IRP 2019 also notes the current reliance on the import of gas and that the use of local and regional gas resources will allow for scaling up within manageable risk levels. In this context the "*exploration to assess the magnitude of local recoverable shale and coastal gas are being pursued and must be accelerated*" with a view to future production if viable, and that the potential availability of gas provides an opportunity to convert to closed-cycle gas turbines (CCGT) and run open-cycle gas turbine plants at Ankerlig (outside Cape Town), Gourikwa (Mossel Bay), Avon (Outside Durban) and Dedisa (Coega IDZ) on gas.

Draft IRP 2023 and further updated in 2024

Several key assumptions have changed since the promulgation of IRP 2019, including the electricity demand projection (which is currently 19% lower than that projected in IRP 2019 due to local and global factors such as the loadshedding, Covid-19 pandemic and the conflict in Eastern Europe), Eskom's existing plant performance (which is below what was envisaged in IRP 2019), as well as new technology costs. These changes necessitated the review and update of the IRP 2019 (although still remaining applicable), which has resulted in the draft IRP 2023 released for public comment in January 2024.

The Draft IRP 2023 outlines two main planning horizons and addresses both short-term (Horizon 1 up to 2030) and long-term (Horizon 2 from 2032 to 2050) energy needs. The



Draft IRP 2023 notes that South Africa continues to pursue a diversified energy mix that will provide security of supply while ensuring compliance with its emission reduction plan. South Africa's approach to energy security is in line with international trends and developments. This phased "horizon" approach is premised on certain key observations and interventions, including the deployment of gas-to-power solutions as a means to add dispatchable generation capacity.

The Draft IRP 2023 notes that gas to power technologies in the form of CCGT, Combined Cycle Gas Engine (CCGE) or Internal Combustion Engine (ICE) provide the flexibility required to complement renewable energy. While in the short-term the opportunity is to pursue gas import options, local and regional gas resources will allow for scaling up within manageable risk levels. It notes that there is enormous potential and opportunity in this respect of the Brulpadda gas resource discovery in the Outeniqua Basin of South Africa (the subject of the current EA application and ESIA process), gas resource discovery in the Free State and Mpumalanga provinces, natural gas from Mozambique and Namibia, indigenous gas like coal-bed methane and shale gas.

The Draft IRP 2023 proposes almost equally weighted new procurement of renewables (~8 GW) and natural gas (~7 GW) over the next five years (see Figure 2-1) and includes:

- Investigations into cleaner and more efficient coal technologies, specifically Carbon Capture Utilisation and Storage options;
- Accelerating exploration activities to assess the availability of local gas reserves;
- Using indigenous and imported gas at Ankerlig (Saldanha), Gourikwa (Mossel Bay), Avon (Durban) and Dedisa (Coega) power stations;
- Increasing the rollout of renewable energy through public and private procurement;
- Improving current energy storage through various storage technologies; and
- Capitalising on South Africa's Green Hydrogen resources (DMRE, 2023).

The IRP 2023 was further updated and released to selected stakeholders in November 2024 but not made available to the general public. While details of the 2024 IRP draft version are not available, it is understood that the IRP still contains a considerable portion of gas-generated power, such as 6 GW of gas by 2030 (which requires an additional 1 GW of gas per annum between 2030 and 2040) or, in the event that 6 GW of gas is not committed, approximately 2 GW per annum of new gas is required between 2030 and 2040, with potentially further increase thereafter (DMRE, 2024).



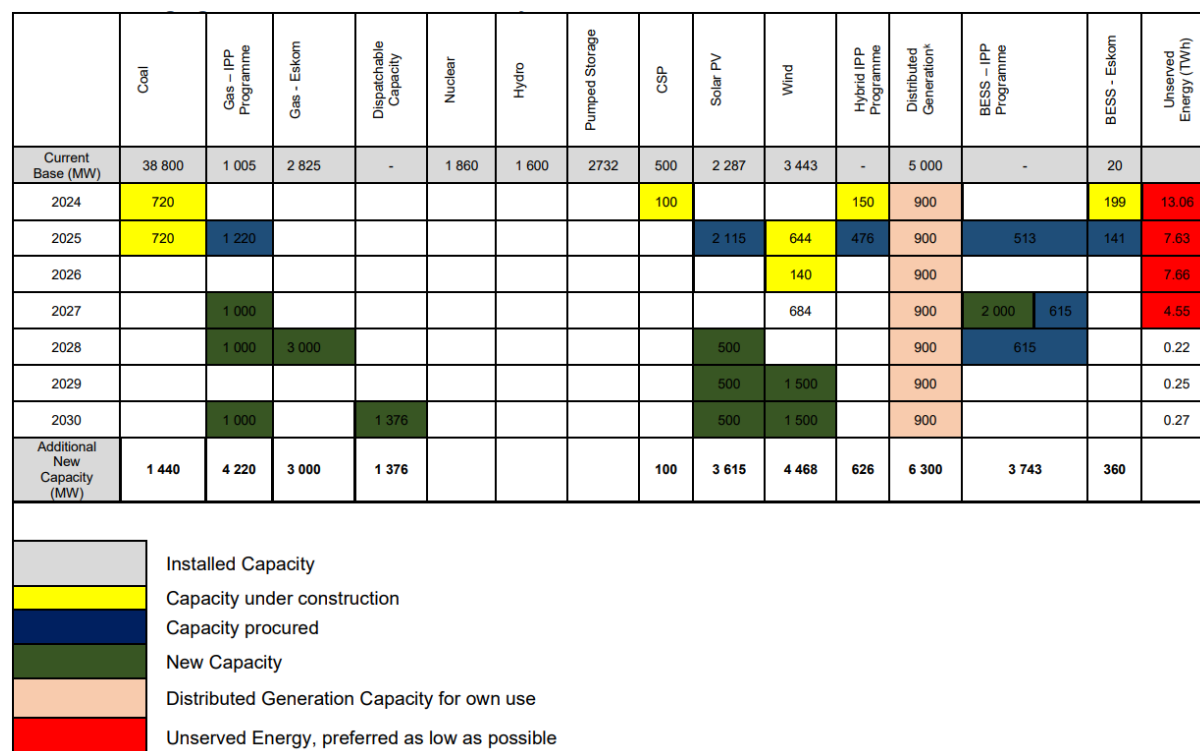


Figure 2-1: Energy mix and procurement envisaged in the draft IRP 2023

Source: (DMRE, 2023)

IRP 2025

Several key assumptions underlying South Africa's electricity planning framework have continued to evolve since the Draft IRP 2023 process, including improved Eskom plant performance (following targeted maintenance interventions), updated electricity demand projections, revised cost assumptions for renewable energy and storage technologies, and increased urgency to resolve transmission constraints. These developments, together with extensive public and stakeholder engagement during 2024, informed the further refinement of the Draft IRP 2023 into a revised IRP 2024 and ultimately the IRP 2025, which was approved by Cabinet and gazetted in October 2025 as the latest official policy plan.

The IRP 2025 reaffirms that South Africa continues to pursue a diversified energy mix that balances security of supply, cost optimisation, and environmental sustainability, while aligning with national policy objectives such as emissions reduction and long-term economic growth. The IRP remains a "living plan", incorporating updated modelling assumptions and multiple scenarios to reflect uncertainties in fuel availability, technology costs, and system performance.

Similar to the Draft IRP 2023, the IRP 2025 adopts a phased planning approach, addressing both:

- Short-term interventions (to 2030) to close the immediate energy supply gap and stabilise the electricity system; and
- Long-term planning (2030–2050) to transition towards a lower-carbon, flexible and secure power system.



This phased approach continues to be premised on key observations and interventions, most notably:

- The need for dispatchable generation capacity to complement variable renewable energy;
- The importance of strengthening and expanding the transmission network; and
- The requirement for flexibility and system resilience under different future scenarios (e.g. delayed coal shutdown, gas availability constraints, and accelerated storage deployment).

The IRP 2025 emphasises the continued role of GtP technologies (including CCGT and related flexible generation technologies) as a critical enabler of system stability and integration of renewable energy (Scenario 1 would feed into a proposed GtP facility, which is the subject of a separate EA application). These technologies are recognised as providing the necessary dispatchability to balance intermittent supply from wind and solar. However, the plan acknowledges risks associated with gas supply, infrastructure development, and reliance on imported resources, and therefore evaluates multiple scenarios, including lower gas uptake and alternative flexibility solutions.

In terms of new generation capacity, the IRP 2025 outlines a balanced and evolving energy mix, including:

- Significant expansion of renewable energy, particularly wind and solar PV, forming the dominant share of new capacity over the planning horizon;
- Approximately 6 GW of new GtP capacity by 2030 to provide dispatchable support to the system;
- Increased deployment of battery energy storage systems (~3 GW) to enhance flexibility and manage peak demand;
- Continued utilisation of coal capacity, including potential delayed decommissioning of certain plants where required to maintain security of supply; and
- Consideration of emerging technologies and future pathways, including hydrogen and cleaner energy solutions.

Key interventions and strategic directions within the IRP 2025 therefore include:

- Scaling up renewable energy procurement through both public and private sector participation;
- Expanding and strengthening transmission infrastructure to integrate new generation capacity, particularly in renewable-rich regions;
- Maintaining and improving Eskom's existing fleet performance to support near-term supply adequacy;
- Developing gas infrastructure and supply options while managing associated risks;
- Accelerating energy storage deployment to enhance system flexibility; and
- Supporting South Africa's broader decarbonisation pathway, including long-term net-zero ambitions.



2.3.1.4 Gas to Power IPPP (2023)

The GtP Independent Power Producers Procurement Programme (IPPP) (2024) bid process was opened by DMPR in January 2024, with the government having announced plans to accelerate South Africa's GtP generation plant through the development of 3 GW of new gas-fired power stations in late 2023. A total of 2 GW capacity is to be procured during the first phase of the GtP IPPP, with the remaining 1 GW capacity to be allocated to a separate procurement process.

This is indicative of the South African Government's continued pursuit of gas-fired power as an eventual replacement of coal fired power (and emergency diesel-fired power) and a supplement to renewable energy generation.

A key requirement of the GtP IPPP is that bidders must demonstrate access to a reliable and secure gas supply over the term of the power purchase agreement, typically 20 years, including evidence of upstream gas availability and associated infrastructure. In this context, the Project would directly support the bankability and feasibility of GtP projects by providing a domestic or regional source of natural gas, thereby reducing reliance on imported liquefied natural gas (LNG) and mitigating fuel supply risk, which has been identified as a critical constraint in the implementation of the programme.

Offshore gas production would enhance the ability of IPP bidders to meet technical, commercial and operational requirements under the GtP IPPP, while also supporting the timely delivery of gas-fired capacity that is currently subject to delays due to infrastructure and supply challenges. Consequently, such a Project would be considered strategically aligned with national procurement objectives and would enable the realisation of planned gas capacity under IRP 2025.

2.3.1.5 Gas Bill (2026)

The Gas Bill, 2026 (B6-2026), currently before Parliament, seeks to repeal and replace the Gas Act, 2001 (No. 48 of 2001), and establish an updated regulatory framework to support the orderly and sustainable development of South Africa's gas industry. The Bill aims to facilitate investment in gas infrastructure, strengthen regulatory oversight, promote socio-economic development and broad-based participation in the sector, and accommodate evolving technologies and market conditions. Importantly, the Bill introduces provisions relating to the development of a Gas Master Plan, strategic integrated energy projects, and the licensing and regulation of gas facilities and supply infrastructure, thereby providing greater policy certainty for long-term gas investments.

Within this context, the proposed offshore gas development would support the objectives of the Bill by contributing to the development of indigenous gas resources, enabling investment in associated transmission and processing infrastructure, enhancing energy security, and supporting economic growth through the establishment of a sustainable domestic gas industry. The project would, therefore, align with the emerging legislative framework that seeks to position natural gas as a strategic component of South Africa's future energy system and industrial development pathway.

2.3.1.6 Draft Gas Master Plan (2024)

The Draft Gas Master Plan (GMP) (2024) was published by the DMPR in April 2024 for public comment. It promotes the role of gas, from indigenous and international sources, in the South African energy mix with a view to improving energy security and electricity



production to stimulate economic and job growth, while reducing carbon emissions. It further aims to ensure future gas supply in South Africa, by diversifying both local and international supply options.

The Gas Master Plan recognises the impending decline of existing gas supplies, particularly from Mozambique beyond approximately 2028, and identifies the urgent need to develop alternative sources of gas, including indigenous offshore resources and regional imports, to avoid a significant supply shortfall. Within this policy framework, domestic offshore gas developments are prioritised as they can provide long-term supply certainty, stimulate investment in midstream infrastructure (such as pipelines, processing facilities and LNG terminals), and underpin downstream demand in both the power generation and industrial sectors. The plan further positions gas as a critical transition fuel that supports the integration of renewable energy by providing flexible, dispatchable capacity, while also contributing to broader economic objectives such as job creation, industrialisation, and regional energy integration.

An offshore gas production project would, therefore, align with the Gas Master Plan by contributing to the diversification of supply sources, enhancing energy security, enabling the scale-up of gas-to-power initiatives, and supporting the development of a competitive and resilient gas market in South Africa.

2.3.2 Economy-Related Policies

A review of economic policies aligned to gas production is provided below.

2.3.2.1 National Development Plan 2030

The National Development Plan (NDP) 2030 provides the context for all growth in South Africa, with the overarching aim of eradicating poverty and inequality between people in South Africa through the promotion of development. It provides a broad strategic framework to address poverty and inequality based on the six focused and interlinked priorities. One of the key priorities is “*faster and more inclusive economic growth*”. To transform the economy and create sustainable expansion for job creation, an average economic growth exceeding 5% per annum is required.

The NDP acknowledges that meeting the development goals represent a challenge in relation to the concurrent pursuit of the needs to:

- Protect the natural environment;
- Enhance the resilience of people and the economy to climate change;
- Reduce carbon emissions in line with international commitments;
- Make significant strides toward becoming a zero-waste economy; and
- Reduce GHG emissions and improve energy efficiency.

The NDP makes numerous mentions of the need to act responsibly to mitigate the effects of climate change and to diversify the energy mix away from fossil fuels. The NDP does, however, indicate that “*the country will explore the use of natural gas as a less carbon intensive transitional fuel*” and that there is a requirement for “*increasing exploration to find domestic gas feedstock... to diversify the energy mix and reduce carbon emissions*”.

The NDP further provides that certain infrastructure investments should be prioritised, including “*infrastructure to import liquefied natural gas and increasing exploration to find*



domestic gas feedstock (including investigating shale and coal bed methane reserves) to diversify the energy mix and reduce carbon emissions.”

2.3.2.2 South African Economic Reconstruction and Recovery Plan (2020)

South African Economic Reconstruction and Recovery Plan (2020) interventions are in pursuit of the NDP goals of reducing unemployment, poverty and inequality. This document sets out a reconstruction and recovery plan for the South African economy that is aimed at stimulating equitable and inclusive growth. For the past decade, the South African economy has experienced stagnation which has put a strain in the effort to tackle the historical structural inequalities, unemployment and poverty. There is consensus that there needs to be substantial structural change in the economy that would unlock growth and allow for development. Government's conviction is that South Africa has to massively mobilise all its resources and efforts in economic activities to put the economy in a sustainable recovery trajectory. The Covid-19 pandemic further deepened the economic crisis in South Africa with many people losing their jobs. As a result, inequality is expected to widen and poverty to deepen.

One of the priority intervention areas is “Energy Security”, which is critical for the maintenance of a stable economy and is also important in ensuring growth. Specific interventions in the energy sector include creating and securing additional supply, including gas, and implementation of the Upstream Petroleum Resources Development Act and related fiscal measures to enable Upstream Sector Investments.

2.3.2.3 Just Energy Transition Investment Plan

The Just Energy Transition Investment Plan (JET IP) for the 2023-2027 period is South Africa's strategy for transitioning to a low-carbon economy, while ensuring social and economic equity. The commitment to the ‘just transition’ is a distinguishing feature of the JET IP recognising the direct and indirect impact that the energy transition has on livelihoods, workers, and communities.

The Plan outlines the investments required to achieve decarbonisation commitments in South Africa's Nationally Determined Contribution (see Section 2.3.3.4) for the 2023-2027 period. Key elements of the plan include:

- Decarbonisation: Focus on reducing carbon emissions across various sectors, particularly energy, by investing in renewable energy sources and phasing out coal.
- Economic diversification: Promoting economic growth and diversification to reduce dependence on fossil fuels and create new job opportunities in green industries.
- Social inclusion: Ensuring that the transition supports vulnerable communities, safeguards jobs, and promotes fair labour practices.
- Infrastructure development: Investing in modern, sustainable infrastructure to support the transition to a low-carbon economy.
- Financing: Mobilising public and private investments, including international support, to fund the transition initiatives.

The JET IP aims to balance environmental sustainability with economic growth and social equity, ensuring a just and inclusive transition for all South Africans. While South Africa is committed to reducing GHG emissions the process of transition must carefully managed, and the social and economic cost of the transition for vulnerable groups must be factored



into the planning process, while the economic opportunities of the transition should be fairly distributed.

2.3.2.4 Provincial and Local Policy and Planning Frameworks

The Guideline on Need and Desirability published in terms of Section 24J of the NEMA states that whether a development option *'is needed and desired...should primarily be strategically and democratically determined beyond the spatial extent of individual ESIAs. The strategic context for informing need and desirability may, therefore, firstly be addressed and determined during the formulation of the sustainable development, goals and objectives of Municipal Integrated Development Plans ("IDPs") and Spatial Development Frameworks during the collaborative and participative processes play an integral part.'*

IDPs are the main planning and development instruments of local government based on the needs and priorities of the relevant community which are determined through public participation processes that the municipality is required to establish under the Local Government: Municipal Systems Act, 2000 (No. 32 of 2000). It is at this level of government that participatory democracy is most available to individuals. As a result, IDPs represent the hopes and desires, goals and targets and action plans for members of the community.

- The **Mossel Bay Local Municipality's IDP** recognises the importance of the petrochemical and energy sectors to the regional economy, including the role of offshore gas production and the PetroSA Gas-to-Liquids (GTL) refinery in supporting industrial activity, employment, and economic development within the municipality. The IDP further promotes infrastructure investment and sustainable economic growth, while emphasising the need to balance development with environmental management and coastal protection objectives. The IDP also positions Mossel Bay as a Special Economic Zone and an established energy and petrochemical hub linked to offshore gas production and downstream processing.
- The **Garden Route District Municipality's IDP** does not contain specific policy provisions for oil and gas exploration or production. However, it recognises the importance of regional economic development and strategic infrastructure within the district, including the PetroSA GTL refinery and associated industrial and port infrastructure in Mossel Bay. The IDP supports infrastructure-led economic growth and investment attraction while emphasising environmental sustainability and compliance with applicable legislation. Oil and gas activities are, therefore, indirectly accommodated within broader economic development and infrastructure objectives, rather than being explicitly promoted as a standalone sector.
- At provincial level, the principal strategic spatial planning instrument applicable to the Western Cape is the **Western Cape Provincial Spatial Development Framework (PSDF)**. The PSDF provides the overarching spatial vision and policy framework for provincial growth, infrastructure investment, environmental management, and land use planning, and guides the alignment of municipal IDPs and Spatial Development Frameworks. The PSDF does not specifically promote oil and gas exploration or production; however, it recognises strategic infrastructure, energy systems and industrial development as key components of the provincial economy, particularly within established nodes such as Mossel Bay. The PSDF supports the efficient use of existing infrastructure and the diversification of the energy economy, while simultaneously emphasising environmental sustainability, biodiversity protection and climate resilience. Oil and gas development is, therefore, considered within a broader framework of spatial trade-offs, requiring alignment with environmental legislation and risk-sensitive planning principles.



2.3.3 Climate Change-Related Policies

Since this ESIA relates to the production of a fossil fuel, and since fossil fuels are critical contributors to GHG and climate change, the climate change policy context is provided below.

2.3.3.1 National Climate Change Response Policy White Paper (2014)

The National Climate Change Response Policy Paper presents the South African Government's vision for an effective climate change response and the long-term, just transition to a climate-resilient and lower-carbon economy and society. South Africa's response to climate change has two objectives:

- Effectively manage inevitable climate change impacts through interventions that build and sustain South Africa's social, economic and environmental resilience and emergency response capacity.
- Make a fair contribution to the global effort to stabilise GHG concentrations in the atmosphere at a level that avoids dangerous anthropogenic interference with the climate system within a timeframe that enables economic, social and environmental development to proceed in a sustainable manner.

The White Paper acknowledges that South Africa has relatively high emissions for an emerging economy, largely due to mining and minerals processing in the economy and the coal-intensive energy system. The White Paper also sets out South Africa's overall response strategy through strategic priorities, leading to a series of adaption, mitigation, response measures and priority flagship programmes. Policy decisions on new infrastructure investments must consider climate change impacts to avoid the lock-in of emissions intensive technologies into the future. In the medium-term, the White Paper indicates that a mitigation option with the biggest potential includes a shift to lower-carbon electricity generation options. Renewable energy is ultimately recommended for climate change mitigation.

2.3.3.2 South African National Climate Change Adaptation Strategy (2019)

The South African National Climate Change Adaptation Strategy was published in 2019. The purpose of the Strategy is to provide a common vision of climate change adaptation and climate resilience for the country, and to outline priority areas for achieving this vision.

Section 3 sets out the vision, notably *"to transition to a climate resilient South Africa, which will follow a sustainable development path, guided by anticipation, adaptation and recovery from a changing climate and environment to achieve our development aspirations"*, and interconnected strategic objectives, interventions and actions (see Table 2-4). This includes interventions and actions for the energy sector.

The National Climate Change Response Strategy and the National Climate Change Response White Paper further state that *"South Africa is committed to making a fair contribution to the global effort to reduce GHG emissions. At the same time, the country must ensure that the necessary climate change-related investments contribute to building South Africa's future economic competitiveness and economic growth and contribute to its over-riding national priorities for sustainable development, job creation, improving public and environmental health and poverty eradication"*.



Table 2-8: South African national climate change adaptation strategy objectives, interventions and outcomes

Strategic objectives	Strategic Interventions	Strategic outcomes
1: Build climate resilience and adaptive capacity to respond to climate change risk and vulnerability	1: Reduce human, economic, environmental, physical and ecological infrastructure vulnerability and build adaptive capacity.	1.1: Increased resilience and adaptive capacity achieved in human, economic, environmental, physical and ecological infrastructure
	2: Develop a coordinated Climate Services system that provides climate products and services for key climate vulnerable sectors and geographic areas.	2.1: Climate products and services for key climate vulnerable sectors and geographic areas developed and implemented.
2: Promote the integration of climate change adaptation response into development objectives, policy, planning and implementation	3: Develop a vulnerability and resilience methodology framework that integrates biophysical and socioeconomic aspects of vulnerability and resilience.	3.1: A Climate Risk and Vulnerability Assessment Framework developed and implemented across 100% of key adaptation sectors
	4: Facilitate mainstreaming of adaptation responses into sectoral planning and implementation.	4.1: Effective adaptation planning that covers at least 100% of the South African sectors identified in the National Climate Change Adaptation Strategy (NCCAS).
		4.2: Achieve a 100% coverage of climate change considerations in sectoral operational plans
3: Improve understanding of climate change impacts and capacity to respond to these impacts	5: Promote research application, technology development, transfer and adoption to support planning and implementation	5.1: Increased research output and technology uptake to support planning and implementation.
	6: Build the necessary capacity and awareness for climate change responses.	6.1: Capacity building and awareness for climate change response enhanced.
4: Ensure resources and systems are in place to enable implementation of climate change responses.	7: Establish effective governance and legislative processes to integrate climate change in development planning.	7.1: Adaptation governance defined and legislated through the Climate Change Act once approved by parliament.
		7.2: Institutional structures for climate change adaptation strengthened.
		7.3: Enhanced public-private-civil society collaboration and stewardship.
	8: Enable substantial flows of climate change adaptation finance from various sources.	8.1: Adequate financial resources for national adaptation priorities from



Strategic objectives	Strategic Interventions	Strategic outcomes
		national fiscus and international sources.
	9: Develop and implement a Monitoring and Evaluation (M&E) system that tracks implementation of adaptation actions and their effectiveness.	9.1: A national M&E system developed and implemented.

The Strategy provides broad direction and does not include specific requirements, but in relation to energy lists “*secure energy supplies for all citizens (within the context of sustainable development)*” as a desired adaption for Outcome 1.1 and emphasises the importance of creating “*a more adaptive energy system to reduce dependence on a centralised system and increase distributed generation, especially in rural areas*”.

2.3.3.3 South African Low-Emission Development Strategy 2050 (2020)

South African-Low Emission Development Strategy (SA-LEDS) (2020) was prepared in response to Article 4 of the Paris Agreement and presents South Africa's first low-emissions development strategy. The Strategy sets out the path going forward to place the country on a low-carbon trajectory towards ultimately reaching a net zero carbon economy by 2050, while at the same time ensuring broader socio-economic development. The strategy acknowledges that as one of the top 20 global emitters, with a high dependency on fossil fuels, substantial emission cuts will be required. It also acknowledges that the rapid transition that will be required presents a potential risk to economic growth and sustainable development if not managed properly.

The strategy centres on measures currently being implemented to address mitigation across the four key sectors of the economy, namely energy; industry; Agriculture, Forestry and Land Use (AFOLU); and waste. With regards to energy supply, the decarbonisation will largely be driven through the following:

- The IEP (see Section 2.3.1.2), which analyses current energy supply and demand trends within the different sectors of the economy, and projects the country's future energy requirements under a variety of different scenarios; and
- The IRP (see Section 2.3.1.3) which guides the South African electricity supply sector, by identifying the preferred electricity generation technologies to meet projected electricity demand. It, thus, provides a mechanism for Government to drive the diversification of the country's electricity generation mix and promote the use of renewable energy and other low-carbon technologies.

The Strategy recognises that many of the current measures address only the short-term and are not considered to be transformational. Thus, the Strategy also presents planned cross sectoral measures that will contribute to driving mitigation action. It acknowledges that a broad range of structural changes will be necessary, in order to ensure the global economy achieves carbon neutrality within the second half of the century. Changes will be required in terms of service demand, technology fleet, infrastructure, operating practice, and energy sources, for all sectors of activity.

2.3.3.4 South Africa's First Nationally Determined Contribution (2021)

South Africa's first updated Nationally Determined Contribution (NDC) under the Paris Agreement, submitted in September 2021, includes enhanced commitments to reduce greenhouse gas emissions and adapt to climate change. The update aims to meet the



requirements of the Paris Agreement by communicating these contributions every five years.

Key aspects include:

- **Strengthened Emission Targets:** More ambitious targets to reduce the country's GHG emissions target range to 398 - 510 MtCO₂e by 2025 and 350 - 420 MtCO₂e by 2030.
- **Adaptation Measures:** Enhanced strategies for adapting to the impacts of climate change.
- **Compliance with Paris Agreement:** Fulfilment of the obligation to update NDC regularly.

The commitments were also stated in South Africa's First Biennial Transparency Report (BTR) submitted to the UNFCCC in December 2024 under Article 13 the Paris Agreement, which provides a reflection of South Africa's ongoing efforts to implement our mitigation and adaptation contributions as outlined in the update of South Africa's first NDC (2021) (DFFE, 2024a)

The BTR notes that South Africa is implementing this NDC under significant developmental complexities, and that addressing high levels of unemployment, as well as persistent poverty and inequality, is of the highest priority for South Africa. It notes that in curbing GHG emissions, South Africa is implementing key policies and measures, including but not limited to the framework National Climate Change Response Policy, Sectoral Emission Targets to provide strategic direction for sectoral decarbonization policy, Carbon Budgets for large emitters, national GHG reporting regulations, the Just Transition Framework, the Carbon Tax, the IRP for electricity, the IEP for the whole energy sector, 12L Tax Incentive Programmes for renewables and energy efficiency, the Renewable Energy Independent Power Producer Procurement (REIPPP) Programme, the Green Transport Strategy, the Waste Management Strategy and the Green Hydrogen Commercialization Strategy, as well as enacting the Climate Change Act as the key legislative instrument to coordinate and enhance climate change action in South Africa.

The BTR states that South Africa has received significant financial support for climate change action, including over USD 816.9 million in bilateral assistance and USD 10.7 million from multilateral sources aimed at supporting and/or benefiting efforts to address climate change in the country, but that South Africa remains concerned that climate finance support still comes mostly in the form of loans rather than grants.

2.3.3.5 Climate Change Act, 2024

The Climate Change Act, 2024 (No. 22 of 2024) came into effect on 23 July 2024 (Republic of South Africa, 2024). The purpose of the Act is to enable the development of an effective climate change response and a long-term, just transition to a low-carbon and climate-resilient economy and society for South Africa in the context of sustainable development.

Chapter 1 sets out the objects, principles, and application of the Act, while Chapter 2 sets out the policy alignment and institutional arrangements. Chapters 3 and 4 set out the requirements for the local, provincial and national response to climate change. Chapter 5 sets out the requirements for GHG emissions and removals, including:

Schedule 3 sets out the country's interim national GHG emissions trajectory:



- Determining the national greenhouse gas emissions trajectory.
- Identifying GHG emitting sectors and determining emissions targets for these sectors.
- Identifying GHGs and GHG emitting activities which are likely to cause climate change.
- Allocating carbon budget to any person that conducts a listed GHG emitting activity.
- Phase down and phase out of synthetic GHGs emissions.
- Establishing a national GHG inventory.

The Act does not have any specific requirements for the proposed activities; however, the impact of the proposed activities GHG emissions on the country's national GHG emissions trajectory will be considered in the ESIA.

2.3.3.6 Climate Change Adaptation Response Plan for South Africa's Coastal Sector, 2025

The Climate Change Adaptation Response Plan for South Africa's Coastal Sector, 2025 (CARP) is a national strategic framework developed by DFFE to guide climate change adaptation in South Africa's coastal sector. It responds directly to the Climate Change Act, 2024, NEM:ICMA and the National Climate Change Adaptation Strategy (NCCAS) and provides high-level actionable governance on how to identify climate risks, develop adaptation responses and mainstream adaptation into planning and governance. CARP is a policy-guidance document (non-legally binding) and a coordinating instrument across sectors and spheres of government.

The importance of the CARP is grounded in the vital role that coastal systems play in South Africa's socio-economic and environmental landscape. Approximately 22% of the population lives within 20 km of the coast, while about 60% of the national economy depends on coastal resources, infrastructure and trade, including ports through which roughly 95% of imports and exports are facilitated. These statistics underline that climate change impacts on coastal systems are not isolated environmental issues but represent systemic economic and social risks. The plan highlights that rising sea levels, increasing storm intensity, coastal flooding, erosion, and ecosystem degradation are already occurring and are expected to intensify, posing escalating risks to infrastructure, ecosystems, livelihoods and communities.

The CARP applies across the entirety of South Africa's coastal zone, encompassing marine ecosystems, estuaries, coastal settlements, infrastructure, and economic activities such as fisheries, ports, tourism and energy development. Offshore gas projects interact closely with the coastal environment through activities such as exploration drilling, subsea infrastructure, pipeline landfalls, and onshore processing facilities. These activities fall squarely within the scope of the coastal sector addressed by the CARP. The plan identifies several key risks that are directly relevant to such developments, including sea-level rise, storm intensification, changes in ocean conditions, and degradation of sensitive coastal and marine ecosystems.

Projects are expected to assess their vulnerability to climate risks, including the resilience of infrastructure to extreme weather and long-term sea-level rise. They must also demonstrate that they do not exacerbate existing vulnerabilities in coastal systems or communities. This includes avoiding development in high-risk areas such as flood-prone zones and estuarine functional zones, as well as ensuring the protection of critical ecological infrastructure such as wetlands and coastal vegetation systems. CARP also emphasises the importance of cumulative impact assessment, recognising that multiple pressures including climate change, industrial activity, and resource use can interact to produce environmental effects.



A Climate Change Risk Assessment will be undertaken as part of the current ESIA (see Section 9.2.2.12).

2.3.4 Resource-Related Policies

As this ESIA is being undertaken in furtherance of a PR application for a resource (condensate and gas), the resources policy context is provided below.

2.3.4.1 Operation Phakisa

In July 2014, the South African Government launched Operation Phakisa to fast-track the implementation of solutions to critical development issues. One of its key focus areas is the "Ocean Economy," aiming to unlock the economic potential of South Africa's oceans, including:

- Marine transport and manufacturing activities, such as coastal shipping, trans-shipment, boat building, repair and refurbishment;
- Offshore oil and gas exploration;
- Aquaculture; and
- Marine protection services and ocean governance.

In terms of offshore oil and gas exploration, the goal was to further enhance the enabling environment for exploration (and by implication production if deemed viable) of oil and gas, resulting in an increased number of exploration wells drilled, while simultaneously maximising the value captured for South Africa, with the goal of eventually producing approximately 370 000 barrels of oil and gas per day over the next 20 years.

In terms of marine protection, the 2011 National Biodiversity Assessment noted that offshore ecosystems in South Africa were poorly protected. An offshore MPA Project (2007- 2011) initiated plans to increase protection of offshore ecosystems, the project was advanced towards implementation during Operation Phakisa Oceans Economy. The process culminated in the gazetting of 20 new MPAs (see Section 2.2.1.7), which came into effect on 1 August 2019 and expand the protection of South Africa's mainland ocean territory to 5%.

In addition, the Marine Sector Plans were developed in response to Operation Phakisa. The Marine Sector Plans were created to guide the sustainable development and management of marine resources, in line with the goals and strategies outlined in Operation Phakisa. These plans cover various aspects such as marine transport, offshore oil and gas exploration (see Section 2.3.5.1), aquaculture, marine protection services and ocean governance.

2.3.4.2 Draft South African Oceans Economy Master Plan (OEMP) (2026)

The Draft South African Oceans Economy Master Plan (OEMP) to 2035 (Draft 5, July 2026) builds on and advances the objectives of Operation Phakisa Oceans Economy by providing a long-term strategic framework for the development, growth and transformation of South Africa's ocean-based sectors. While Operation Phakisa identified key opportunity areas and initiated programmes to unlock the economic potential of South Africa's maritime resources, the OEMP provides a coordinated roadmap to 2035 aimed at increasing the contribution of the ocean's economy to economic growth, investment, industrialisation, employment creation and transformation.



The OEMP identifies a number of priority sectors, including marine transport, marine manufacturing and repair, fisheries, aquaculture, coastal and marine tourism, and offshore oil and gas. The plan further promotes integrated ocean governance, marine spatial planning, infrastructure development, skills development, research and innovation, while emphasising the sustainable and responsible utilisation of marine resources.

In terms of the potential role of South Africa's offshore oil and gas industry in addressing energy, the OEMP identifies the approximately 3.4 Tcf of gas and 192 MMbbl of condensate resources within Block 11B/12B as a potentially important contributor to future domestic energy security, economic development and growth of the oceans economy.

2.3.5 Marine Spatial Planning

Draft Marine Sector Plans were published for public comment on 10 March 2023. Marine Sector Plans are sector-specific planning documents developed under the framework of the Marine Spatial Planning Act, 2018. They set out the development objectives, priorities, and spatial requirements of individual ocean-based sectors (e.g. offshore oil and gas, fisheries, shipping, conservation) as inputs into broader Marine Area Plans. Marine Sector Plans specify the overall development objectives and priorities of each marine sector for the next two decades from a national point of view. While not legislative instruments and currently in draft form, these sector plans outline the spatial claims and interests of each sector and serve as the sectors' proposal that will then be further discussed and negotiated across sectors as part of the Marine Area Plan development.

Where there is a conflict between existing uses, developing uses or activities, maximum coexistence of uses or activities should be preferred wherever possible, but where such coexistence is not possible, the principles in Section 5(1) must be applied to resolve such conflict i.e., a precautionary approach must be applied. This approach must account for, *inter alia*, the sustainable use, growth and management of the ocean and its resources (5.1.a), the identification of economic opportunities which contribute to the development of the ocean economy (5.1.b), the promotion of collaboration and responsible use of the ocean through consultation and cooperation (5.1.c), the advancement of an ecosystem and earth system approach to ocean management which focuses on maintaining ecosystem structure and functioning within a marine area (5.1.c), adaptive management (5.1.e) and the reliance on the best available scientific information (5.1.h).

2.3.5.1 Draft Offshore Oil and Gas Sector Plan

The Draft Offshore Oil and Gas Sector Plan is one of the sector-specific plans developed under South Africa's Marine Spatial Planning framework. This Plan lists the following development objectives, based on South Africa's relevant legislation, regulations and policies:

- 1 *"Create an enabling environment for the exploration and development of oil and gas resources within South Africa's offshore Exclusive Economic Zone (EEZ).*
- 2 *Prioritise the exploration and development of domestic oil and gas reserves to support the broader economic growth objectives of South Africa.*
- 3 *Prioritise early phase exploration with the intention of locating leads and prospectivity in the greater part of the EEZ.*
- 4 *Attract foreign investment interest by international petroleum companies to further develop South Africa's underexplored hydrocarbon reserves, in addition to contributing positively towards job creation and skills development in South Africa, including attracting global service companies to set-up regional hub in South Africa.*



- 5 *Create an industry which delivers effective risk management across all its operations, and which is especially vigilant in testing operational impacts on current and future environments.*
- 6 *Maximize the recovery of potential hydrocarbon reserves sustainably and efficiently through a focus on industry-led innovation, enhancing the skills base and ensuring supply chain growth for the benefit of ordinary South Africans.*
- 7 *Contribute to satisfying the future energy demands for the country while balancing this with the protection of the marine environment and those communities who rely on it.*
- 8 *Exploration and production of oil and gas resources is developed in an orderly and sustainable manner, consistent with section 24 of the Constitution of the Republic of South Africa and environmental legislative framework, to ensure that while benefits are realised, environmental and socio-economic concerns are addressed.*
- 9 *The security of tenure for oil and gas rights holders as provided for in terms of section 2(g) of the Mineral and Petroleum Resources Development Act (No. 28 of 2002) must be safeguarded".*

The Offshore Oil and Gas Sector Plan includes proposed delineated oil and gas production zones, comprising all awarded production licence areas, and proposed oil and gas prospective zones, which were not released to the public due to sensitivity. The Offshore Oil and Gas Sector Plan states that reliable knowledge of resources / reserves is critical to secure marine areas for future production of oil and gas resources, and to inform future Marine Spatial Planning efforts. Furthermore, it highlights the sector's role in diversifying South Africa's energy production portfolio and addressing energy challenges through enhanced use of gas resources.

The Draft Offshore Oil and Gas Sector Plan requires applicants and holders to undertake ESIA's for proposed activities and to obtain all mandatory authorisations and permits before activities are allowed in the EEZ. Thus, this ESIA fulfils the requirements of, and is aligned with, the Draft Offshore Oil and Gas Sector Plan. In terms of the Draft Offshore Oil and Gas Sector Plan, offshore oil and gas activities are permitted to take place everywhere, unless the spatial regulations of other sector's zones list the activity as consent use or prohibited use. Considering that the onshore pipeline for the project may traverse through CBAs, the requirement for any offset and other prohibitions will be investigated as part of the ESIA.

Once finalised, the Marine Sector Plans will inform the development of the draft First Marine Area Plan.

2.3.5.2 Draft Marine Biodiversity Plan

The Draft Marine Biodiversity Sector Plan is also sector-specific plan developed under the Marine Spatial Planning framework. It represents the biodiversity sector's input into how South Africa's ocean space should be used, protected and zoned, rather than a binding conservation plan on its own.

It identifies priority marine biodiversity areas, including MPAs, CBAs and ESA, and sets out spatial guidelines aimed at maintaining ecological integrity and ecosystem services within South Africa's EEZ. Refer to Section 2.2.1.8 for further detail.

2.3.5.3 National Coastal Management Programme

The National Coastal Management Programme (2026 – 2031) (NCMP) is a national policy instrument developed under the NEM: ICMA to guide the management, protection and sustainable use of South Africa's coastal zone. Its primary purpose is to provide a coherent,



integrated, and standardised framework for coastal management across all spheres of government and relevant stakeholders.

The NCMP aims to:

- Establish a national policy framework for integrated coastal management;
- Ensure coordinated and uniform management across national, provincial and municipal levels;
- Translate the NEM: ICMA into specific objectives, priorities and actions;
- Provide a basis for monitoring, evaluation, and accountability; and
- Integrate environmental protection with economic development (Blue Economy).

The NCMP applies broadly across the entire coastal zone of South Africa, including both terrestrial and marine components of the coast. This includes coastal public property, the coastal protection zone, estuaries and nearshore marine environments. It also provides a policy benchmark against which the acceptability of a project is assessed. It does not replace statutory requirements, but it strongly influences how those requirements are interpreted and applied.

Offshore drilling and production activities present risks associated with discharges, spills, and contamination of marine waters. The NCMP requires that such risks be minimised through robust mitigation, monitoring and regulatory compliance. As part of the Impact Assessment Phase, potential pollution impacts related to drilling discharges, underwater noise, infrastructure installation, oil spills, etc. will be assessed (refer to Section 9.2 for the terms of reference for all technical and specialist studies).

2.3.5.4 Garden Route District Coastal Management Programme

The Garden Route District Coastal Management Programme is a statutory planning instrument under the NEM:ICMA that guides how the coastal zone of the Garden Route is managed across all municipalities in the district.

The programme aims to:

- Ensure integrated, sustainable management of the coastal zone;
- Balance economic development (tourism, infrastructure, energy, fisheries) with ecosystem protection;
- Provide a decision-making framework for land-use planning and environmental authorisations in the coastal zone; and
- Strengthen climate change adaptation and coastal resilience.

This Coastal Management Programme is not a stand-alone permitting instrument, but it is used to guide EA decisions under NEMA and inform municipal Spatial Development Frameworks and zoning. Selected Coastal Management Objectives (CMOs) are presented below:

- Public Coastal Access (CMO 1): Reasonable and equitable access to coastal public property for all must be recognised as a basic human right and must be achieved without being to the detriment of the environment, especially high value conservation areas or infringing on the individual rights of people.
- Infrastructure, Spatial Planning and Development (CMO 2): Existing infrastructure and developments within the coastal zone must be maintained or upgraded (rehabilitated) so as to prevent degradation of the environment. Future spatial planning strategies must consider the coastal protection zone as a no-go area for



infrastructure or developments and coastal management lines must be formally established. Off Road Vehicles are regulated through the ORV Regulations which include the need for a permit for the use of the coastal zone (driving).

- Biodiversity Protection, Conservation and Enhancement (CMO 3): Biodiversity must, as a minimum, be protected and conserved through innovative spatial planning strategies, a network of protected and conservation areas (including conservancies), proactive management, the prevention of over exploitation and pollution. There are four Marine Protected Areas (MPAs) within the Garden Route District.
- Heritage and Cultural Heritage Resources (CMO 4): The diverse heritage resources of the Garden Route Municipal area must be recognised, protected and shared with all its people and visitors.
- Disaster Management (CMO 5): The Garden Route District Municipal coastline is at medium to high risk of erosion, inundation, groundwater contamination (increased salinity) and extreme events. As global warming / climate change continues to increase so will the prevalence of natural disasters such as flooding, droughts and wildfires. Greater consideration will need to be given to disaster management in the district.
- Water Quality and Quantity (CMO 6): Water resources must be managed in such a way as to ensure a clean and healthy environment that supports ecosystem functioning and the safety and well-being of all users.
- Economic Development (Job Creation) (CMO 10): An enabling environment must be created in the Garden Route District in order to attract private investors and government programmes to boost the economy, create jobs and raise the profile of the area.
- Tourism and Recreation (CMO 11): All the tourism and recreational opportunities should be pursued in a way that contributes to the enjoyment of all its users, a culture of environmental awareness and a responsibility to promote the benefit of the local economy.
- Sustainable Livelihoods (CMO 12): Manage existing subsistence activities and promote additional opportunities in a way that ensures compliance with legislation and responsible utilization of resources.
- Coastal Erosion (CMO 14): Reduce the direct and indirect impact of coastal erosion and coastal erosion related emergencies and disasters in the Garden Route District Municipal area.

2.4 Relevant International Conventions, Protocols and Agreements

Potentially relevant international conventions, protocols and agreements, which have been ratified by the South African Government, and which have become law through promulgation of national legislation, are listed in Table 2-9 below.

Table 2-9: Ratified International Conventions, Protocols and Agreements

Conventions and Treaties	Summary of legislative provisions
Air and Atmosphere	
Kyoto Protocol on the Framework Convention on Climate Change, 1997	This Protocol was the key instrument on which the 1992 United National Framework Convention on Climate Change is based.



Conventions and Treaties	Summary of legislative provisions
Montreal Protocol on Substances that Deplete the Ozone Layer, 1987	This Protocol lays down a timetable for the reduction of controlled substances that deplete the ozone layer and have adverse effects on health and the environment.
Paris Agreement (United Nations Framework Convention on Climate Change), 2015	The Paris Agreement is a comprehensive framework that aims to guide international efforts to limit GHG emissions and to meet challenges posed by climate change. The Paris Agreement was adopted on 12 December 2015 at the 21st session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC CoP21). The agreement was signed by South Africa on 22 April 2016. The long-term goals of the Paris Agreement are: • Limit the global temperature increase to below 2°C above pre-industrial levels, while pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels. • Increasing countries' ability to adapt to the effects of climate change and to foster climate resilience. • Encouraging low GHG emissions development that does not compromise food production. • Making finance flows consistent with a pathway towards low GHG emissions and climate resilient development. • Reaching a peak in GHG emissions 'as soon as possible', while recognising that the timeframes for achieving this will differ between developed and developing countries. • Achieving carbon neutrality from 2050 onwards. Each country is responsible for determining its contribution (referred to as the "nationally determined contribution") in reaching this goal. The Agreement requires that these contributions should be "ambitious" and "represent a progression over time". The contributions should be reported every five years and are to be registered by the UNFCCC Secretariat. As a signatory to the Agreement, South Africa is required to adopt the agreement within its own legal systems, through ratification, acceptance, approval or accession. As a signatory to the Paris Agreement, South Africa is required to investigate alternatives to existing industries which have high carbon-emissions. A shift away from coal-based energy production within the energy sector and increased reliance on alternative energy sources is therefore anticipated.
United Nations Framework Convention on Climate Change – UNFCCC, 1992	The United Nations Framework Convention on Climate Change (UNFCCC) objective is to stabilise greenhouse gas concentrations in the atmosphere. The framework sets non-binding limits on greenhouse gas emissions for individual countries and contains no enforcement mechanisms.
Vienna Convention for the Protection of the Ozone Layer, 1985	The Convention is the first global agreement that recognised that the ozone was a serious enough problem to warrant international regulation.
Chemicals and Waste	
Convention on the control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel, 1989)	This Convention was designed to reduce the movements of hazardous waste between nations, and specifically to prevent transfer of hazardous waste from developed to less developed countries. It does not, however, address the movement of radioactive waste.



Conventions and Treaties	Summary of legislative provisions
Stockholm Convention on Persistent Organic Pollutants, 2001	This Convention is a global treaty to protect human health and the environment from chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of humans and wildlife, and have harmful impacts on human health or on the environment.
Flora, Fauna and Protected Areas	
African Convention for the Conservation of Nature and Natural Resources (Algeria, 1968) and the revised version (Maputo, 2003)	The objectives of this Convention are to enhance environmental protection, to foster the conservation and sustainable use of natural resources, and to harmonise and coordinate policies in these fields.
Agreement on the Conservation of Albatrosses and Petrels, 2004 (ACAP)	The Agreement protects all the world's albatross species, seven southern hemisphere petrel and two shearwater species. A number of these occur off the South Coast of South Africa.
Agreement on the Conservation of African-Eurasian Migratory Waterbirds, 1995) (AEWA)	AEWA is an independent international treaty developed under the auspices of the United Nations Environment Programme's Convention on Migratory Species. It was founded to coordinate efforts to conserve bird species migrating between European and African nations, and its current scope stretches from the Arctic to South Africa, encompassing the Canadian archipelago and the Middle East as well as Europe and Africa.
Benguela Current Convention	The objective of the Benguela Current Convention is to promote a coordinated regional approach to the long-term conservation, protection, rehabilitation, enhancement and sustainable use of the Benguela Current Large Marine Ecosystem, to provide economic, environmental and social benefits. The Benguela Current Convention applies to <i>"all human activities, aircrafts and ships under jurisdiction or control of a Party to the extent that these activities or operations of such aircraft or ship result in or are likely to result in adverse impacts"</i> . The obligations on South Africa under the Convention are to <i>"take all possible steps to prevent, abate and minimise pollution and take the necessary measures to protect the marine ecosystem against any adverse impacts"</i> , such as conducting an ESIA, identifying risk and implementing mitigation measures aimed at preventing pollution or, where such pollution arises, to combat and control those measures.
Cartagena Protocol on Biosafety to the Convention on Biological Diversity, 2000	This Protocol is an international agreement on biosafety as a supplement to the Convention on Biological Diversity effective since 2003. The Biosafety Protocol seeks to protect biological diversity from the potential risks posed by genetically modified organisms resulting from modern biotechnology.
Convention on International Trade of Wild Fauna and Flora Endangered Species (CITES), 1975	CITES is a multilateral treaty to protect endangered plants and animals.
Convention on the Conservation of Migratory Species of Wild Animals, also known as the Convention on Migratory Species (CMS) or the Bonn Convention, 1983	This Convention is an international agreement that aims to conserve migratory species within their migratory ranges. CMS covers a great diversity of migratory species. The Appendices of CMS include many mammals, including land mammals, marine mammals and bats; birds; fish; reptiles and one insect.



Conventions and Treaties	Summary of legislative provisions
Convention on Wetlands of International Importance (Ramsar Convention), 1971	This Convention is an international treaty for the conservation and sustainable use of wetlands. South Africa has 27 Ramsar sites (see Section 6.7.2)
International Convention for the Conservation of Atlantic Tunas (ICCAT)	This Convention provides for the management and conservation of tuna and tuna-like species in the Atlantic Ocean and adjacent seas.
International Convention for the Regulation of Whaling, 1946	This Convention is an international agreement aimed at the "proper conservation of whale stocks and make possible the orderly development of the whaling industry". It governs the commercial, scientific and subsistence whaling practices of its member nations.
MoU on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia, 2001	The MoU is an intergovernmental agreement that aims to protect, conserve, replenish and recover sea turtles and their habitats in the Indian Ocean and South-East Asian region.
United Nations Convention on Biological Diversity (UNCBD), 1992	The UNCBD has three main goals: (1) the conservation of biological diversity (or biodiversity); (2) the sustainable use of its components; and (3) the fair and equitable sharing of benefits arising from genetic resources.
Marine Pollution	
International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 (MARPOL 73/78)	MARPOL 73/78 was developed by the International Maritime Organization (IMO) with an objective to minimise pollution of the oceans and seas, including dumping, oil and air pollution. MARPOL is divided into Annexes according to various categories of pollutants, each of which deals with the regulation of a particular group of ship emissions: • 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. All ships flagged under countries that are signatories to MARPOL are subject to its requirements, regardless of where they sail and member nations are responsible for vessels registered on their national ship registry.
International Convention on Civil Liability for Oil Pollution Damage (CLC), 1969 and its protocol (Amends the 1969 Convention with regard to the method of calculation for the limitation of liability)	This Convention provides for a compensation fund for clean-up costs and environmental damage subject to certain conditions and ceilings.
International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2017	This Convention aims to prevent the spread of harmful aquatic organisms from one region to another, by establishing standards and procedures for the management and control of ships' ballast water and sediments.



Conventions and Treaties	Summary of legislative provisions
International Convention on Oil Pollution Preparedness, Response and Co-operation, 1990 (OPRC Convention)	This Convention is an international maritime convention establishing measures for dealing with marine oil pollution incidents nationally and in co-operation with other countries.
International Convention on the Control of Harmful Anti-fouling Systems on Ships, 2001	The Convention prohibits the use of harmful compounds in anti-fouling paints used on ships and rigs and establishes a mechanism to prevent the potential future use of other harmful substances in anti-fouling systems.
International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (The Fund Convention), 1971	This is an international maritime treaty, which was drawn up as an enhancement to CLC meant to relieve ship owners from unfair liabilities due to unforeseeable circumstances and remove liability caps that some member states thought were too low. The fund is obliged to pay victims of pollution when damages exceed the ship owner's liability, when there is no liable ship owner, or when the ship owner is unable to pay its liability.
International Convention relating to Intervention on the High Seas in case of Oil Pollution Casualties, 1969	This Convention is an international maritime convention affirming the right of a coastal State to take such measures on the high seas as may be necessary to prevent, mitigate or eliminate danger to their coastline or related interests from pollution or threat of pollution of the sea by oil, following upon a maritime casualty or acts related to such a casualty.
Protocol on the Intervention on the High Seas in Cases of Marine Pollution by substances other than oil, 1973	This Protocol take such measures on the high seas as may be necessary to prevent, mitigate or eliminate grave and imminent danger to their coastline or related interests from pollution or threat of pollution by substances other than oil following upon a maritime casualty or acts related to such a casualty, which may reasonably be expected to result in major harmful consequences.
Marine Safety	
Convention on the International Regulations for Preventing Collisions at Sea (COLREGS), 1972	This Convention sets an international standard for shipping and navigation. It deals with safety at sea issues and prescribes international standards for shipping, particularly to reduce the risk of collisions at sea. The rules for the prevention of collisions at sea apply to all vessels using the high seas.
International Atomic Energy Agency (IAEA) Regulations for the Safe Transport of Radioactive Material, 1984	IAEA is an international organisation that seeks to promote the peaceful use of nuclear energy, and to inhibit its use for any military purpose, including nuclear weapons. These regulations provide international standards and approaches to safety promote consistency, help to provide assurance that nuclear and radiation related technologies are used safely, and facilitate international technical cooperation and trade.
International Convention for the Safety of Life at Sea, 1974 (SOLAS) with its protocol of 1978	This Convention is an international maritime treaty which requires signatory flag states to ensure that ships flagged by them comply with minimum safety standards in construction, equipment and operation.
International Convention on Load Lines, 1966 and its protocol of 1988	This Protocol was adopted to harmonise the survey and certification requirement of the 1966 Convention with those contained in SOLAS and MARPOL 73/78. All assigned load lines must be marked amidships on each side of the ships engaged in international voyages.



Conventions and Treaties	Summary of legislative provisions
International Convention on Standards of Training, Certification and Watch-keeping for Seafarers, 1978	This Convention sets qualification standards for masters, officers and watch personnel on seagoing merchant ships.
International Commission on Radiological Protection (ICRP)	ICRP is an independent, international non-governmental organisation providing recommendations and guidance on radiation protection.
Marine Resources	
Convention of the International Maritime Organisation (IMO), 1948	This Conventions deals with the establishment of the IMO which is a specialist United Nations agency dealing with maritime issues, including development of all the marine pollution control conventions.
United Nations Law of the Sea Convention (UNCLOS), 1982	This Convention seeks to establish a comprehensive legal regime to regulate activities on and in relation to the world's oceans and seas, i.e. requiring states to adopt legislation to reduce marine pollution from seabed activities in the EEZ and on the continental shelf. The International Tribunal for the Law of the Sea (ITLOS), an independent judicial body, was established to handle any disputes concerning the interpretation or application of the Convention.
Archaeology and Cultural Heritage	
Convention concerning the Protection of the World Cultural and Natural Heritage (Paris, 1972)	This Convention provides for the identification, protection and conservation of the cultural and natural heritage for future generations.
United Nations Convention on Elimination of all Forms of Discrimination against Women (CEDAW), 1979	This Convention international treaty adopted in 1979 by the United Nations General Assembly. It is described as an international bill of rights for women.
United Nations Educational, Scientific and Cultural Organization (UNESCO) Convention on the Protection of the Underwater Cultural Heritage, 2001	This Convention is intended to protect all traces of human existence having a cultural, historical or archaeological character, which have been under water for over 100 years. This extends to the protection of shipwrecks, sunken cities, prehistoric art work, treasures that may be looted, sacrificial and burial sites, and old ports that cover the oceans' floors.
United Nations Declaration on the Rights of Indigenous Peoples, 2007 (UNDRIP)	This Declaration delineates and defines the individual and collective rights of indigenous peoples, including their ownership rights to cultural and ceremonial expression, identity, language, employment, health, education, and other issues. It prohibits discrimination against indigenous peoples, and it promotes their full and effective participation in all matters that concern them and their right to remain distinct and to pursue their own visions of economic and social development.
Fishing	
Convention on the Conservation and Management of Fishery Resources in the South-East Atlantic Ocean, 2001	This Convention provides for the long-term conservation and sustainable use of the fishery resources in the South East Atlantic Ocean.



Conventions and Treaties	Summary of legislative provisions
Social	
Equator Principles Equator Principles III (2013)	Large infrastructure and industrial Projects can have adverse impacts on people and on the environment. The Equator Principles (EP) 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. Financial institutions adopt the EP to ensure that the projects they finance are developed in a socially responsible manner and reflect sound environmental management practices. By doing so, negative impacts on project-affected ecosystems and communities should be avoided where possible. If unavoidable, negative impacts should be reduced, mitigated and/or compensated for appropriately.
Guiding principles on Business and Human Rights. Implementing the United Nations “Protect, Respect and Remedy” Framework. United Nations, 2011 (HR/PUB/11/04)	The Guiding Principles apply to all States and to all business enterprises, both transnational and others, regardless of their size, sector, location, ownership and structure. The objective of the Guiding Principles is to enhance standards and practices with regard to business and human rights so as to achieve tangible results for affected individuals and communities, and thereby also contributing to a socially sustainable globalization. These Guiding Principles pays particular attention to the rights and needs of, as well as the challenges faced by, individuals from groups or populations that may be at heightened risk of becoming vulnerable or marginalized, and with due regard to the different risks that may be faced by women and men.
IFC Stakeholder Engagement Stakeholder Engagement: A good practice handbook for companies doing business in emerging markets, 2007	This handbook endeavours to provide a comprehensive overview of good practice in stakeholder engagement, with a dedicated focus on stakeholder groups that are "external" to the core operation of the business, such as affected communities, local government authorities, non-governmental and other civil society organizations, local institutions and other interested or affected parties.
Integrating Human Rights into environmental, social and health impact assessments. A practical guide for the oil and gas industry. 2013 (IPIECA-DIHR)	This Guide describes how human rights can be integrated into environmental, social and health impact assessments (ESHIA), which the oil and gas industry routinely uses to evaluate projects and activities. It provides an introduction to human rights and their relevance to the activities of the oil and gas industry and briefly describes why it is important for the oil and gas industry to consider the impact that its projects and activities have on human rights.



3.0 ESIA Approach and Methodology

This chapter provides the details of the ESIA Project Team and outlines the ESIA assumptions, limitations, approach and methodology.

3.1 ESIA Project Team

The ESIA project team and specialists are presented in Table 3-1. Curricula Vitae for the SLR project team are attached in Appendix A. SLR and specialist consultants have no vested interest in the proposed project other than fair payment for consulting services rendered as part of the ESIA process.

Table 3-1: Details of the ESIA project team and specialists

Company	Name	Qualifications	Experience (years)	Role
ESIA Project Team				
SLR	Sue Reuther	MPhil (Environmental Management), University of Cape Town (UCT) BSc Hons (Economics), University College London	21	Project Advisor
	Jeremy Blood	MSc (Conservation Ecology), University of Stellenbosch BSc Hons (Biology), Rhodes University	25	Project Director and Report Reviewer
	Melissa Schulze	MSc (Zoology), University of Stellenbosch BSc Hons (Biodiversity & Ecology), University of Stellenbosch	7	Project Manager and Report Compiler
	GP Kriel	M. Env. Sci (Water Sciences), North-West University (NWU) BSc (Botany & Geography), NWU	18	Modelling Manager
	Deshni Naicker	MA Geography and Environmental Management, University of KwaZulu-Natal BA Honours Geography and Environmental Management, University of KwaZulu-Natal BA Geography and Environmental Management, University of KwaZulu-Natal	14	Specialist Manager
	Chané Coetzee	BSc Hons (Geography), North-West University (NWU)	13	
	Njabulo Mzilikazi	BSc Hons (Geography), University of the Witwatersrand BSc (Geology & geography), University of the Witwatersrand	9	Stakeholder Engagement Manager
	Lebogang Nkgudi	MA (Environmental Studies and Geography), Stellenbosch University (Current)	1	Project Support



Company	Name	Qualifications	Experience (years)	Role
		BA (Hons) (Environmental Studies & Geography), Stellenbosch University (2023) BSocSci (Anthropology, Environmental & Geographical Sciences), University of Cape Town (2022)		
Specialist Team				
SLR Canada	Justin Eickmeier	Ph.D. in Oceanography (Acoustical Oceanography), University of Delaware MS in Ocean Engineering, Florida Institute of Technology BS in Ocean Engineering, Florida Institute of Technology	20	Underwater Noise Modelling
Tetra Tech	Dr Eric Comerma	PhD, Ocean Science, Marine Pollution, Universitat Politècnica de Catalunya	20	Drilling Discharge, Oil Spill Dispersion and Liquid Effluent Modelling
RISCOM	Mike Oberholzer	BSc (Chemical Engineering), University of the Witwatersrand	41	Quantitative Risk Assessment
SLR	Alice McGrath	MSc (Biological Sciences), UCT BSc Hons (Ocean & Atmosphere Science), UCT	8	Marine Ecology and Fisheries
	Amy Wright	MSc, Biological Sciences (UCT)	12	
The Biodiversity Company	Andrew Husted	MSc Aquatic Health - University of Johannesburg BSc Honours Aquatic Health - Rand Afrikaans University BSc Natural Science	17	Terrestrial and Freshwater Ecology, Soils and Agriculture
TerraMare Archaeology	John Gribble	MA, Archaeology (UCT)	31	Maritime Heritage
Heritage Futures	Prof. Rose Boswell	PhD (Anthropology), Vrije Universiteit, Amsterdam MSc (Anthropology), University of Cape Town	29	Cultural Heritage Impact Assessment
B&K Consulting Group	Justin Bedard	MA Archaeological Studies, Yale University Bachelors – Archaeology, The George Washington University	21	
CTS Heritage	Nic Wiltshire	MSc Archaeology (UCT)	20+	Terrestrial Cultural Heritage Impact Assessment



Company	Name	Qualifications	Experience (years)	Role
SLR	Lisa Ramsay	PhD (Atmospheric Science, political ecology and environmental health), University of Cambridge MPhil (Atmospheric Science, political ecology and environmental health), University of Cambridge MSc (Atmospheric sciences and meteorology), UKZN	12	Air Quality Specialist Input
SLR	Michael van Niekerk	MSc (Geography and Environmental Science), UKZN BSc (Geography and Environmental Science), UKZN	17	Climate Change Risk Assessment
SLR	Danie Otto	MSc (Biogeomorphology), UJ	30	Closure Statement
SLR	Duncan Keal	MA (Geography), Rhodes University BA (Geography and Political Science), Rhodes University	15	Social Specialist Input
Demacon	Hein du Toit	PhD and MSc Real Estate Market Studies BSc Town and Regional Planning	30+	Economics
NMA Effective Social Strategists (Pty) Ltd	Nomi Muthialu	MBA (Negotiation Skills), INA BA (Psych), UKZN Social Impact Assessment Certificate, UP Certificate in Public Participation, IAP2 Emotion, Outrage and Public Participation Certificate, IAP2 Focus Group Moderation Certificate, MARFA Master Moderator Certificate, MARFA	30+	Stakeholder Engagement Specialists and Facilitators
	Julian Drew	BSc Civil Engineering, Bolton Institute of Technology Social Impact Assessment Certificate, UP	30+	

3.2 ESIA Assumptions and Limitations

The assumptions and limitations pertaining to this ESIA are listed below:

- SLR assumes that all relevant project information has been provided and is correct and valid at the time of conducting the ESIA;
- The ESIA is based on an indicative production well, subsea and onshore infrastructure layout. These preliminary layouts may, however, be adjusted slightly within the geophysical survey area (see Section 5.0) when the final design is determined based on detailed engineering. Thus, the ESIA assesses generic



(representative or reasonable conservative scenario) locations within the project area considering, for example, proximity to sensitive receptors (including protected areas, communities, etc.). This ensures that the impact assessment assesses a representative or reasonable conservative scenario layout within the project area. Thus, any slight adjustment to the layout is unlikely to affect the findings of the ESIA;

- The indicative technical specifications for the various components and infrastructure (i.e. pipelines, CPF and production scenarios) are based on client information, generic industry information, previous similar projects, analysis of site-specific exploration data from the project area and project schedules and timing. It is assumed that the technical specifications on which this ESIA is based are representative to that which will be used during the proposed development;
- This ESIA will consider potential impacts of the proposed project on the biophysical and social environments that have been identified within the project's area of influence, which encompasses areas affected by:
 - Activities and facilities that are directly owned, operated or managed by the Operator (including contractors and sub-contractors) as part of the project;
 - Indirect project impacts on biodiversity or ecosystem services upon which potential affected communities' livelihoods depend; and
 - Potential unplanned events, which are unintended but may occur as a result of accidents or abnormal operating conditions.
- No significant changes to the project description or surrounding environment that could substantially influence findings and recommendations with respect to mitigation and management will occur between the submission of the final ESIA Report and implementation of the proposed project; and
- The Operator will undertake the proposed project activities described in Section 5 in line with South African legislation, international regulations and standard industry practices.

These assumptions and limitations are in line with typical assumptions and limitations for (predictive) impact assessments and are not expected to materially affect the confidence in the ESIA results.

3.3 ESIA Objectives

The ESIA process has the following objectives:

- Identify the key environmental and social issues and potential impacts that could result from the proposed project (during the Scoping Phase);
- Identify feasible alternatives related to the project proposal (during the Scoping Phase);
- Assess potential impacts of the proposed project and project alternatives during the different phases of the project (during the Impact Assessment Phase);
- Define feasible mitigation or optimisation measures to avoid or minimise potential impacts or enhance potential benefits (during the Impact Assessment Phase);
- Provide the opportunity for I&APs to comment and input into the ESIA process (during the Scoping and Impact Assessment Phases); and
- Through the above, enable informed, transparent and accountable decision-making by the relevant authorities, as well as the presentation of the findings to the public.



3.4 ESIA Process

The ESIA process consists of two phases: Scoping Phase and Impact Assessment Phase (see flowchart in Figure 3-1).

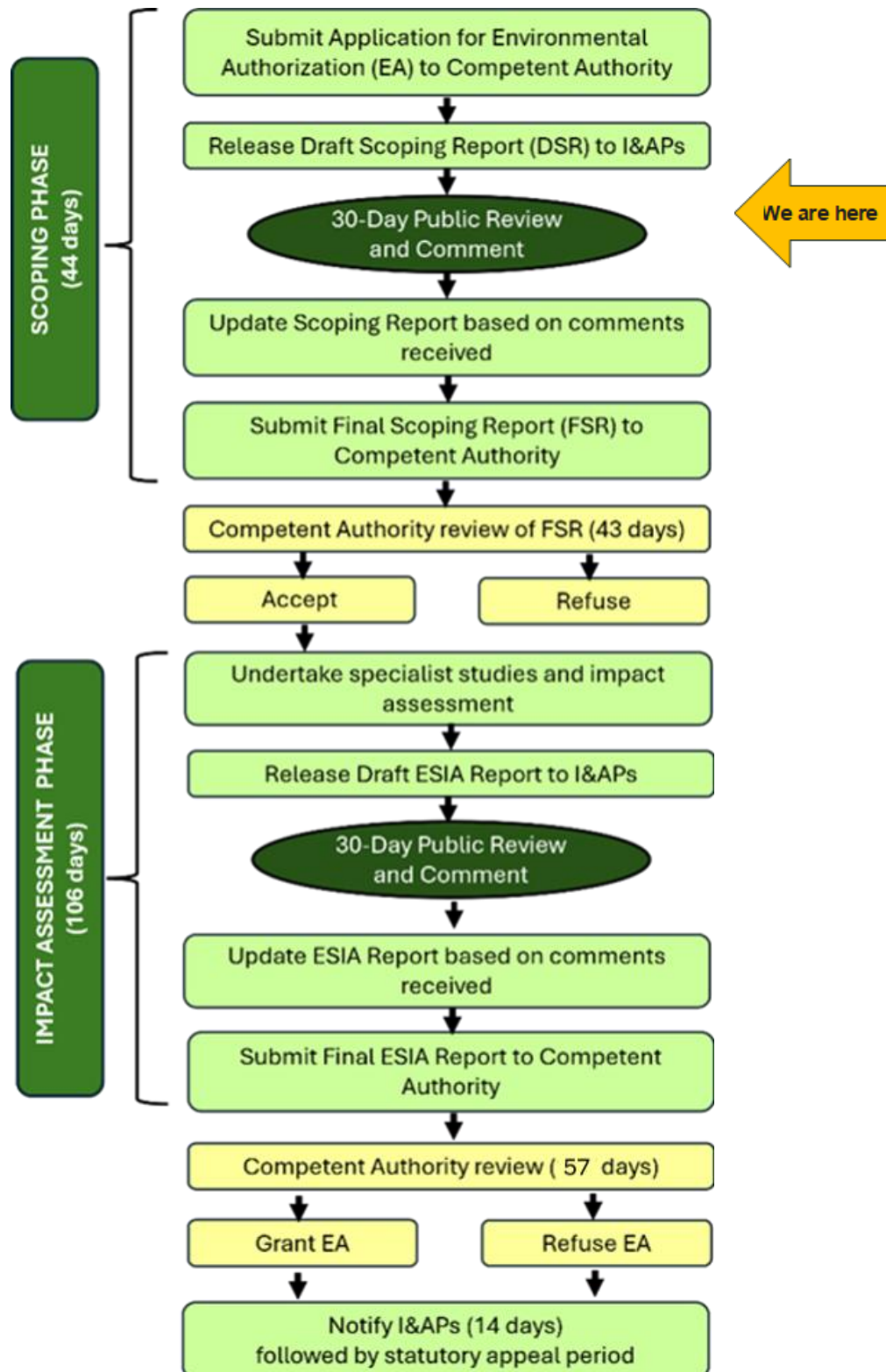


Figure 3-1: Illustration of ESIA process phases and steps



3.4.1 Scoping Phase

3.4.1.1 Objectives

The Scoping Phase consists of a series of steps to ensure compliance with the scoping objectives (as presented in Section 3.4.1.2 to 3.4.1.6 below) and the EIA Regulations 2014 as set out in GN No. R982 of 2014 (as amended). The objectives of the Scoping Phase are to:

- Confirm the ESIA process to be followed;
- Identify the opportunities for I&AP engagement and comment, including:
 - Notifying I&APs of the proposed project and the steps in the ESIA process;
 - Creating an opportunity for I&APs to interact with the ESIA project team; and
 - Providing information for I&APs to ensure that all key environmental and social issues are identified;
- Clarify the Project scope;
- Identify and confirm the Project activities, technologies employed and Project alternatives;
- Identify and confirm the AOI for the Project activity;
- Identify the key issues to be addressed in the impact assessment phase and the approach to be followed in addressing these issues; and
- Confirm the level of assessment to be undertaken during the ESIA.

Key steps (excluding public participation) of the Scoping Phase are summarised below. The PPP is summarised in Section 3.5.

3.4.1.2 DFFE Screening Report

In terms of Regulation 16(1)(b)(v) of the EIA Regulations 2014 (as amended), Screening Reports (for the onshore and offshore project activities) were generated using the DFFE National Screening Tool on 22 June 2026 (see Appendix B). The Screening Reports were submitted to PASA with the Application for EA (see Section 3.4.1.3 below).

The Screening Tool provides site specific information and identifies specific ESIA requirements including specialist studies applicable to the proposed site and/or development, based on the national sector classification and the environmental sensitivity of the site. The associated specialist assessments identified by the DFFE Screening Tool, the level of assessment and the rationale for why they will or will not be undertaken in the ESIA phases is provided in the Site Sensitivity Verification Report (SSVR) in Section 3.4.1.3 below.

3.4.1.3 Site Sensitivity Verification Report

The DFFE Screening Tool identifies potential sensitivities and specialist studies to be considered in an ESIA process. Each specialist may have a different set of deliverables for the report based on the EIA Regulations (and associated Specialist Theme Protocols) and the nature of the sensitivity / activities. These are twofold and include:

1. **SSVR** in terms of GN 320 of 20 March 2020 and/or GN 1150 of 30 October 2020 (as amended); and



2. Assessment Report:

- a. **Specialist Assessment Report / Compliance Statement** as applicable in terms of GN R 320 and GN R 1150 of 2020 (as amended by GN 3717 of 2023); or
- b. Compliance with **Appendix 6 of the EIA Regulations, 2014** (as amended) if no protocols apply to the discipline.

In accordance with the Procedures for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of NEMA, the SSVR engages with the sensitivities identified in the DFFE Screening Tool and provides a rationale for which specialist studies are undertaken.

The DFFE Screening Reports (Appendix B) identified the site environmental sensitivities in Table 3-2.

Table 3-2: Specialist theme sensitivities identified in the Screening Reports

Theme	Very High Sensitivity	High Sensitivity	Medium Sensitivity	Low Sensitivity
Agriculture Theme	X (onshore)	X		
Animal Species Theme		X		
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme	X			
Civil Aviation Theme		X		
Defence Theme				X
Palaeontology Theme		X (onshore)	X	
Plant Species Theme		X (onshore)	X	
Terrestrial Biodiversity Theme	X			

The specialist assessments identified by the DFFE Screening Tool, the level of assessment required in terms of the relevant legislation and the rationale for why they will or will not be undertaken in the ESIA process, is provided in Table 3-3 below.



Table 3-3: Specialist assessments identified by the DFFE Screening Tool

Specialist Assessment	Screening Tool Sensitivity	Verified Site Sensitivity	Included/ Excluded	Rationale for inclusion / exclusion in the ESIA	Level of Assessment
Landscape/ Visual Impact Assessment			Excluded	The proposed project is located between ~96 km (inshore CPF location) and 150 km offshore (Paddavissie Fairway), with the exception of subsea and onshore pipelines extending onshore from the FPSO (Scenario 1) (see Section 8.4.1.9). Due to these distances, offshore activities at the CPF and in the well field will not be visible to sensitive coastal receptors. Onshore activities would be largely temporary and limited to the construction phase, as the pipeline would be buried.	
Aquatic Biodiversity Impact Assessment	Very High	High	Included	A SSVR was compiled which verified High sensitivity aquatic features are present within the onshore Project area (Appendix E), with a High sensitivity assigned to the onshore Project area. An Aquatic Biodiversity Impact Assessment Report will be compiled and included as part of the ESIA Report (Section 9.2.2.5).	Specialist Assessment Report
Marine Ecology Impact Assessment			Included	A Marine Ecology Impact Assessment and Fisheries Impact Assessment will be compiled to address impacts on all coastal and marine ecosystems and species (see Section 9.2.2.2). Potential avifaunal impacts will be assessed as part of the Marine Ecology Impact Assessment for offshore activities.	Appendix 6 of the EIA Regulations, 2014
Terrestrial Biodiversity Impact Assessment	Very High	High	Included	A SSVR was compiled which verified that High to Low sensitivity terrestrial features (animal, plant and avifaunal) are present within the onshore Project area (Appendix F). A Terrestrial Biodiversity Impact Assessment will be compiled and included as part of the ESIA Report. Avifaunal impacts will be assessed as part of this study.	Specialist Assessment Report
Defence Assessment	Low		Excluded	No marine ammunition dumps are located in the Project's area of influence and the Project activities are not expected to impact any national defence operations.	
Noise Impact Assessment			Included	A specialist Underwater Noise Modelling Study will be undertaken during the Impact Assessment Phase (Section 9.2.1.4). The findings of this study will be used to assess the impact of offshore project noise on marine fauna and fisheries, as part of the Marine Ecology Impact Assessment and Fisheries Impact Assessment, respectively. Due to the temporary nature of onshore construction activities, no assessment is considered necessary for the onshore project area.	Technical Modelling Study
Radioactivity Impact Assessment			Excluded	No assessment will be undertaken as the target sampling sites (as part of the offshore survey activities of the project) and drill sites are not expected to be naturally radioactive. If any radioactive sources are used during offshore Project activities, those would be minimal and would be managed in line with the relevant	



Specialist Assessment	Screening Tool Sensitivity	Verified Site Sensitivity	Included/ Excluded	Rationale for inclusion / exclusion in the ESIA	Level of Assessment
				legislation and guidelines for the management of radioactive sources (see Section 8.4.1.12).	
Traffic Impact Assessment			Excluded	Although no standalone Traffic Impact Assessment will be undertaken, impacts related to marine traffic will be assessed in the Socio-economic Impact Assessment. A temporary increase in traffic volumes is anticipated over the onshore construction period (~9 to 12 months). The impacts associated with these construction vehicles travelling to and from the onshore project area are not expected to be greater than those from the many other vehicles already using regional and national roads in and around the Project area. In addition, due to the offshore location of other project components and relatively small impact area, no specific specialist assessment is deemed necessary (see Section 8.4.1.14).	
Geotechnical Assessment			Excluded	As part of the proposed survey activities of the Project, there will be geophysical/geotechnical investigations and thus, no other geotechnical assessment will be commissioned. Potential impact related to these geophysical/geotechnical investigations will be assessed in the ESIA Report.	
Climate Impact Assessment			Included	A Climate Change Risk Assessment will be undertaken (Section 9.2.2.12) to determine the potential impact of the proposed production activities on climate change.	Appendix 6 of the EIA Regulations, 2014
Health Impact Assessment			Excluded	No standalone Health Impact Assessment will be undertaken as the relevant Project activities are located offshore, with the main infrastructure between ~96 km (inshore CPF location) and 150 km offshore (Paddavissie Fairway). The ESIA will consider air emissions associated with Project activities and related impacts on sensitive coastal receptors. Although negligible health impacts on third parties are anticipated, an Air Quality Impact Assessment will be undertaken to provide an analysis of available ambient air quality monitoring data and the identification of possible sensitive receptors and proximate pollution sources within the likely area of impact (see Section 9.2.2.11).	
Socio-economic Assessment			Included	Socio-economic impacts will be assessed as part of the Socio-Economic Impact Assessment (Section 9.2.2.10). Additionally, a Fisheries Impact Assessment (Section 9.2.2.3) will be undertaken to assess the potential impacts on commercial and small-scale fisheries.	Appendix 6 of the EIA Regulations, 2014



Specialist Assessment	Screening Tool Sensitivity	Verified Site Sensitivity	Included/ Excluded	Rationale for inclusion / exclusion in the ESIA	Level of Assessment
Ambient Air Quality Impact Assessment			Included	An Air Quality Impact Assessment will be undertaken which will establish an emissions inventory of key Project emission sources, undertake dispersion modelling to determine surface-level impacts of emissions from key Project activities, and assess potential air quality impacts on sensitive coastal receptors (Section 9.2.2.11).	Appendix 6 of the EIA Regulations, 2014
Air Quality Impact Assessment			Included		
Seismicity Assessment			Excluded	No assessment will be undertaken as the area of interest is not located in a seismically active zone and the proposed project activities are not of a nature that would induce natural seismic activity.	
Archaeological and Cultural Heritage Impact Assessment	Very High	Very High	Included	In terms of onshore heritage, a SSVR was compiled which verified that Very High sensitivity features are present along the coastal zone and in close proximity to the proposed onshore pipelines (Appendix G). An onshore Heritage and Palaeontology Impact Assessment will be undertaken to assess the potential impacts on terrestrial heritage features (Section 9.2.2.7). Additionally, an Intangible Cultural Heritage Impact Assessment will be undertaken to assess the impacts related to the offshore and onshore production activities (Section 9.2.2.9).	Appendix 6 of the EIA Regulations, 2014
Maritime Heritage Impact Assessment			Included	An Underwater (Maritime) Impact Assessment will be undertaken to assess the potential impacts on maritime heritage features (Section 9.2.2.8).	Appendix 6 of the EIA Regulations, 2014
Palaeontology Impact Assessment	High (onshore)	Low (onshore)	Included	In terms of onshore palaeontology, a SSVR was compiled which verified a low sensitivity within the proposed onshore pipeline corridors (Appendix G). As noted above, an onshore Heritage Impact Assessment (including palaeontology) including will be undertaken to assess the potential impacts on terrestrial palaeontology (Section 9.2.2.7). The Underwater (Maritime) Heritage Impact Assessment will assess the potential impacts on maritime palaeontology (Section 9.2.2.8).	Appendix 6 of the EIA Regulations, 2014
Agricultural Impact Assessment	Very High (onshore)	High (onshore)	Included	A SSVR was compiled which verified that High to Low sensitivity agricultural/soil features are present within the onshore Project area (Appendix H). A Soils and Agricultural Impact Assessment will be undertaken as part of the ESIA (Section 9.2.2.6).	Specialist Assessment Report



3.4.1.4 Application Form for Environmental Authorisation

An application for EA, including the DFFE Screening Report, was compiled and submitted to PASA for consideration on 14 September 2026, aligning with the Draft Scoping Report 30-day review and comment period commencing on 14 September and ending on 15 October 2026.

3.4.1.5 Baseline Information Collection, Identification of Potential Impacts and Plan of Study

SLR commissioned specialists to describe critical aspects of the receiving environment (baseline) and identify potential issues and impacts as part of the preparation of the Scoping Report (see Section 7.0).

Based on the identified impacts, a Plan of Study was compiled that lays out how impacts will be assessed, including which specialist studies will be commissioned and the type of stakeholder engagement that will be undertaken (see Section 3.5 and 9.0).

3.4.1.6 Compilation and Review of the Draft Scoping Report

The Scoping Report was prepared in compliance with Appendix 2 of the EIA Regulations 2014 (as amended) (see Table 3-4).

The Scoping Report was informed by the specialist baseline inputs and a review of previous oil and gas production-related activity ESIAs undertaken for offshore projects (including the surveys ESIAs), with a focus on projects off the South African South Coast. The specialist studies that will be undertaken and their terms of reference are presented in Section 9.0.

The Draft Scoping Report is released for a 30-day review and comment period (14 September –15 October 2026). Steps undertaken as part of the Draft Scoping Report review and comment process are summarised in Section 3.5.

Table 3-4: Requirements of a Scoping Report in terms of the EIA Regulations 2014 (as amended)

No.	Content of Scoping Report	Completed (Y/N or N/A)	Location in report
2(a)	(i & ii) Details and expertise of the Environmental Assessment Practitioner (EAP) who prepared the report.	Y	Table 3-1 and Appendix A
(b)	The location of the activity, including:	Y	Section 5.5.5.2, Figure 5-42 and Table 5-15
	(i) the 21-digit Surveyor General code of each cadastral land parcel; or	Y	
	(ii) where available, the physical address and farm name	Y	
	(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	N/A	
(c)	A plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is:	Y	Figure 1-1, Figure 1-2 and Figure 5-46
	(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or	Y	



No.	Content of Scoping Report	Completed (Y/N or N/A)	Location in report
	(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken.	N/A	
(d)	A description of the scope of the proposed activity, including:	Y	Table 2-1
	(i) all listed and specified activities triggered;		
	(ii) a description of the activities to be undertaken, including associated structures and infrastructure.	Y	Section 5.0
(e)	A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process.	Y	Section 2.0
(f)	A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location.	Y	Section 4.0
(g)	A full description of the process followed to reach the proposed preferred activity, site and location within the site, including:	Y	Section 5.8
	(i) details of all the alternatives considered;		
	(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Y	Section 3.5 and associated appendices
	(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	N/A	
	(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Y	Sections 5.8, 6.0 and 7.0.
	(v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts: (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated.	Y	Section 8.3 Specialists will assess impacts in the Impact Assessment Phase (see Section 9.0)
	(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	Y	Section 9.3
	(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing	Y	Section 7.0



No.	Content of Scoping Report	Completed (Y/N or N/A)	Location in report
	on the geographical, physical, biological, social, economic, heritage and cultural aspects;		
	(viii) the possible mitigation measures that could be applied and level of residual risk;	Y	Section 8.3
	(ix) the outcome of the site selection matrix;	Y	Sections 8.1
	(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and	Y	
	(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity.	Y	
(h)	A plan of study for undertaking the environmental impact assessment process to be undertaken, including:	Y	Section 7.0
	(i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity;		Section 5.8
	(ii) a description of the aspects to be assessed as part of the environmental impact assessment process;		Section 8.2
	(iii) aspects to be assessed by specialists;		Section 9.2
	(iv) a description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists;		Section 7.0
	(v) a description of the proposed method of assessing duration and significance;		Section 9.3
	(vi) an indication of the stages at which the competent authority will be consulted;		Section 3.0 and 3.5
	(vii) particulars of the public participation process that will be conducted during the environmental impact assessment process;		Section 3.5
	(viii) a description of the tasks that will be undertaken as part of the environmental impact assessment process; and		Sections 2.2.1, 3.4 and Section 9.0
	(ix) identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.		Section 8.3
(i)	An undertaking under oath or affirmation by the EAP in relation:	Y	Appendix C
	(i) the correctness of the information provided in the report;		
	(ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; and		
	(iii) any information provided by the EAP to interested and affected parties and any responses by the EAP to		



No.	Content of Scoping Report	Completed (Y/N or N/A)	Location in report
	comments or inputs made by interested or affected parties.		
(j)	An undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and interested and affected parties on the plan of study for undertaking the environmental impact assessment.	Y	Appendix C
(k)	Where applicable, any specific information required by the competent authority.	N/A	-
(l)	Any other matter required in terms of Section 24(4)(a) and (b) of the Act.	N/A	-

3.4.1.7 Compilation of Final Scoping Report

The Final Scoping Report (FSR) shall comply with the requirements of Appendix 2 of the EIA Regulations 2014, as amended (see Table 3-2) and be informed by comments received on the DSR and issues raised during public and focus group meetings. All written submissions will be collated and responded to in a Comments and Responses Report.

The key environmental and social impacts that will be addressed and/ or assessed in the next phase of the ESIA are summarised in Section 8.3 of this report. Impacts of little magnitude (consequence) that have been screened out for full description and assessment are presented in Section 8.4.

3.4.1.8 Completion of the Scoping Phase

The FSR will be submitted to PASA for consideration and review. PASA will then forward the FSR with recommendation to DMPR for a decision on the acceptance or rejection of the report. If the FSR is accepted, the project will proceed to the Impact Assessment Phase (see Sections 3.4.1.6 and 3.4.2).

3.4.2 Impact Assessment Phase

3.4.2.1 Objectives

In accordance with Appendix 3 of the EIA Regulations 2014 (as amended), “the objective of the environmental impact assessment process is to, through a consultative process:

- (a) determine the policy and legislative context within which the activity is located and document and how the proposed activity complies with and responds to the policy and legislative context;
- (b) describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the development footprint on the approved site as contemplated in the accepted scoping report;
- (c) identify the location of the development footprint within the approved site as contemplated in the accepted scoping report based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
- (d) determine the -
 - i. nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
 - ii. degree to which these impacts—



- (aa) can be reversed;*
- (bb) may cause irreplaceable loss of resources, and*
- (cc) can be avoided, managed or mitigated;*
- (e) identify the most ideal location for the activity within the development footprint of the approved site as contemplated in the accepted scoping report based on the lowest level of environmental sensitivity identified during the assessment;*
- (f) identify, assess, and rank the impacts the activity will impose on the development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity;*
- (g) identify suitable measures to avoid, manage or mitigate identified impacts; and*
- (h) identify residual risks that need to be managed and monitored.”*

Requirements of the ESIA and EMPr are set out in Appendix 3 and 4 of the EIA Regulations 2014 (as amended), respectively. Chapter 6 of these Regulations sets out the requirements to enable a reasonable opportunity for potential or registered interested and affected parties to comment on the application. The PPP for this study is described in Section 3.5.

3.4.2.2 Specialist Studies and Impact Assessment

Various technical modelling and specialist studies will be undertaken in line with the Plan of Study (see Section 7.0), to address the key issues that require further investigation and detailed assessment identified in the Scoping Report (see Section 9.2).

3.4.2.3 Compilation of the ESIA Report and EMPr

The specialist findings and other relevant information will be integrated into a Draft ESIA Report which holistically assesses the potential project impacts. Specialist studies will be included as appendices. Mitigation measures and other recommendations are incorporated into an Environmental Management Programme (EMPr). The Draft ESIA Report and EMPr will be released to registered I&APs for a 30-day review and comment period (see Section 3.5).

3.4.2.4 Completion of the Impact Assessment Phase

After closure of the comment period on the Draft ESIA Report and EMPr, all comments received will be incorporated into the Final ESIA Report and EMPr, which will include a Final Comments and Responses Report. The Final ESIA Report and EMPr will be submitted to PASA, which will engage with the DMPR regarding the decision on the application. The decision taken by DMPR will be distributed to all I&APs registered on the project database, within 14 days of the date of decision.

A statutory appeal period in terms of the National Appeal Regulations, 2025 (GN No. R5985) will follow the issuing of the decision. In terms of Regulation 4 of GN R5985 of 2025:

“(1)(a) An appellant must submit an appeal within 20 calendar days from the date that the decision is sent by the decision-maker, or, where applicable, by the applicant to registered interested and affected parties;”

“(2) The appellant must submit the appeal (a) to the appeal administrator; (b) to the applicant, where the appellant is not the applicant;”

“(4) An applicant must (a) notify, and make a copy of the appeal available to, registered interested and affected parties where applicable, and to affected organs of state, within 5 calendar days of the expiry of the 20-day period in sub-regulation (1); and (b) submit proof of the notification contemplated in paragraph (a) to the appeal administrator within 5 calendar days of sending the last notification.”



3.5 Public Participation Process

This section presents the principles of public participation and the process undertaken during the Scoping Phase and that proposed for the Impact Assessment Phase.

3.5.1 Principles and Key Guidelines Informing the Approach to Public Participation

The PPP for this ESIA process is based on the following key principles:

- Disclose outcomes and findings of the PPP, or potential changes to the process, to registered I&APs;
- Comply with regulatory requirements and relevant provisions in the Protection of Personal Information (POPI) Act, 2013 (No. 4 of 2013);
- Provide adequate notification to I&APs regarding the proposed project, the ESIA being undertaken and the manner in which comments can be submitted; and
- Provide registered I&APs with adequate information that is understandable and culturally appropriate.

The EAP must:

- Conduct the ESIA independently, i.e. in a neutral manner, by reporting the positive as well as negative impacts of a proposed project along with proposed mitigation measures and presenting the information to the public for input;
- Undertake the ESIA within timeframes stipulated in the EIA Regulations, 2014. This means that length of public review and comment periods is subject to stipulations in law;
- Conduct public participation in accordance with the requirements of the law; and
- Submit an issues and responses summary related to all comments received on ESIA documentation, as well as a copy of the comments, to the competent authority.

3.5.1.1 NEMA Public Participation Guideline, 2017

The NEMA Public Participation Guideline (DEA, 2017)¹⁰ has been developed to assist the proponents or applicants, registered I&APs and EAPs to understand what is required of them and how to comprehensively undertake a PPP.

The guideline states that public participation must:

- Provide for the opportunity for all role-players, including potential and registered I&APs, EAPs, state departments, organs of state, and the competent authority to obtain clear, accurate and understandable information about the environmental impacts of the proposed activity or implications of a decision;
- Provide for role-players to voice their support, concerns and questions regarding the project, application, or decision;
- Provide the opportunity for role-players to suggest ways for avoiding, reducing or mitigating any negative impacts of the project and for enhancing its positive impacts;

¹⁰ DEA (2017), Public Participation Guideline in terms of NEMA EIA Regulations, Department of Environmental Affairs, Pretoria, South Africa



- Enable the person conducting public participation to incorporate the needs, preferences and values of potential or registered I&APs into its proposed development that becomes the subject of an application for an EA;
- Provide opportunities for clearing up misunderstandings about technical issues, resolving disputes and reconciling conflicting interests;
- Encourage transparency and accountability in decision-making process;
- Contribute toward maintaining a healthy, vibrant democracy; and
- Give effect to the requirement for procedural fairness of administrative action as contained in the Promotion of Administrative Justice, 2000 (No. 3 of 2000).

The guideline specifies that the **level of public participation** must be informed by the:

- Scale of anticipated impacts of the proposed project;
- Sensitivity of the affected environment and the degree of controversy of the project; and
- Characteristics of the potentially affected parties.

Based on the criteria provided by the guideline (see Table 3-5), the project fulfils a number of aspects that require thorough notification and consultation with a range of I&APs across the Western Cape and Eastern Cape provinces (which border the South African South Coast). It will be important that the PPP:

- Is comprehensive and exceeds minimum standards as I&APs include vulnerable, rural or historically disadvantaged communities and people with special needs;
- Identifies and works with local structures to increase participation and address potential conflicts;
- Will serve to inform I&APs regarding the project and provide mechanisms to gather comments, concerns and objections – and not to seek permission from I&APs;
- Provides adequate information to manage heightened expectations on the project; and
- Accounts for cultural diversity and indigenous values.

3.5.1.2 PASA Guidelines on consultation with Interested and Affected Parties, 2016

The guidelines assist applicants to undertake consultation as prescribed by the MPRDA and as interpreted by the courts, and list the following attributes for a consultation process to pass the test of proper consultation:

- a) **Informing interested and affected parties in writing** that an application for an exploration right or production right has been received for consideration by PASA – this can be done using a combination of letters, advertisements, notices in public venues and – for offshore applications – notification to CapeNature, fishing industry, SAMSA, relevant authorities such as DFFE: Oceans and Coasts, South African Hydrographic Office, Port Authorities and Marine Research Institutions;
- b) Providing interested and affected persons with **sufficient information** regarding the proposed survey operation to be undertaken so that they can make an informed decision in relation to the representations being made. This includes providing detailed information on the manner in which the applicant intends to modify, remedy, control or stop any action, activity or process which causes



pollution or environmental degradation in reports, public sharing meetings and comments and responses sheets.

- c) Engaging in **good faith** to have a common result or understanding. While the applicant is not obliged to obtain consent or reach agreement, consultation must be undertaken in good faith to attempt to reach a common understanding;
- d) Affording those being consulted with an opportunity to be heard. Participation by potential interested and affected parties must be facilitated in such a manner that all potential interested and affected parties are provided with a **reasonable opportunity to comment** on the application and comments, including proceedings of meetings, should be recorded; and
- e) **Submitting detailed results of consultation** to PASA, including details and proof of the PPP conducted, list of persons or organisations that were identified as interested and affected parties, a summary of the issues raised by interested and affected parties and how the issues were addressed, copies of the minutes of any meetings held with interested and affected parties and other role players which record the views of the participants.

Based on the criteria provided by the guideline, the proposed project fulfils a number of aspects that require thorough consultation with a range of I&APs active in the offshore and nearshore / coastal environments along the South Coast.



Table 3-5: Recommended levels of public participation based on project and stakeholder characteristics as per the PPP guideline

The approach deemed most relevant to the project is shown in bold, and a motivation is provided in the last column.

Aspect	Recommended PPP Approach		Reasoning for the Block 11B/12B Production Project
	If “yes”	If “no”	
Scale of anticipated impacts			
Are the impacts of the project likely to extend beyond the boundaries of the local municipality?	Formal Consultation with other affected municipalities should be carried out during the PPP.	No need to have a formal consultation with other municipalities during PPP. Minimum requirements for public participation in accordance with EIA Regulations must be met.	The project's direct and indirect impacts are expected to arise primarily offshore with a portion onshore relating to the gas pipeline to the gas-to-power plant. However, the overall area of influence is expected to extend along the South Coast (Western and Eastern Cape Provinces).
Are the impacts of the project likely to extend beyond the boundaries of the province?	Formal Consultation with other affected provinces should be carried out during the PPP.	No need to have a formal consultation with other provinces during PPP. Minimum requirements for public participation in accordance with EIA Regulations must be met.	
Does the area already suffer from socio-economic problems (e.g. job losses) or environmental problems (e.g. pollution), and is the project likely to exacerbate these?	Extensive consultation with registered I&APs (RI&APs) within the area should be undertaken, to gather more information on both the socio-economic and environmental problems.	Minimum requirements for public participation in accordance to EIA Regulations must be met.	The coastal areas along the South Coast, which are deemed project areas of influence, suffer from socio-economic problems. The project is expected to have a limited direct impact on those problems.
Is the project expected to have a wide variety of impacts (e.g. socio-economic and ecological)?	Thorough consultation needs to be conducted with RI&APs, in order to address variety of impacts.	Minimum requirements for public participation in accordance with EIA Regulations must be met.	The project is expected to have direct and indirect ecological impacts and some direct and indirect positive socio-economic impacts.
Public and environmental sensitivity of the project			
Are there widespread public concerns about the potential negative impacts of the project?	Broader consultation with all RI&APs will need to be undertaken.	Minimum requirements for public participation in accordance with EIA Regulations must be met.	Previous offshore projects have garnered widespread stakeholder concern.



Aspect	Recommended PPP Approach		Reasoning for the Block 11B/12B Production Project
	If “yes”	If “no”	
Is there a high degree of conflict among RI&APs?	There might need to be more consultation to ensure that there is consensus reached among RI&APs.	Minimum requirements for public participation in accordance with EIA Regulations must be met.	There is evidence of some conflict among stakeholder groups in relation to different socio-economic dependencies, aims and outlooks.
Will the project impact on private land other than that of the applicant?	Consultation with the private landowner must be done, and all their concerns need to be addressed.	Minimum requirements for public participation in accordance with EIA Regulations must be met.	The project's proposed onshore gas pipelines traverse through private property.
Does the project have the potential to create unrealistic expectations (e.g. that a new factory would create a large number of jobs)?	Thorough consultation that addresses the perceptions of unrealistic expectations needs to be carried out.	Minimum requirements for public participation in accordance with EIA Regulations must be met.	The project is of long-term duration and is expected to generate numerous direct and indirect local job and procurement opportunities, but may raise unrealistic expectations due to the high project visibility and long lead time to actual production activities.
Potentially affected parties			
Has very little previous public participation taken place in the area?	More thorough public participation should take place within the area, to ensure that all potential and RI&APs participate.	Minimum requirements for public participation in accordance with EIA Regulations must be met.	Extensive public participation for the recent Surveys ESIA project has been undertaken.
Did previous PPP in the area result in conflict?	Additional consultation might be needed to ensure that issues of conflict are addressed effectively.	Minimum requirements for public participation in accordance with EIA Regulations must be met.	Some communities have had differing and/or divided views on offshore exploration and development projects in the past. However, no physical conflicts are known to have occurred as a result of participation.



Aspect	Recommended PPP Approach		Reasoning for the Block 11B/12B Production Project
	If “yes”	If “no”	
Are there existing organisational structures (e.g. local forums) that can represent I&APs?	Organizational structures might minimise conflict whilst maximising the participation.	Minimum requirements for public participation in accordance with EIA Regulations must be met.	Organisational structures exist e.g. in relation to Small Scale Fishing (SSF) cooperatives, Traditional leadership, community leadership and municipal and councillor representation.
Is the area characterised by high social diversity (in terms of socio-economic status, language or culture)?	Proper consultations that address language and cultural diversity should be promoted.	Minimum requirements for public participation in accordance with EIA Regulations must be met.	The potential area of influence is vast (South Coast), and there is some cultural diversity.
Were people in the area victims of unfair expropriations or relocation in the past?	PPP should be extensive and address any unfair practices that occurred in the past.	Minimum requirements for public participation in accordance with EIA Regulations must be met.	It is possible that unfair practices have occurred in the past however, there is no relocation necessary nor will there be unfair expropriation practices as part of the project. While offshore projects can directly and indirectly affect access to fishing, this is deemed less likely due to the distance of the project area from land and extended distance offshore, with the exception of demersal trawling activities on the continental shelf which may be affected by the gas pipeline to shore. The onshore scope of the project will require landowner consultation for the portions of the gas pipeline onshore however this will not require any relocation nor unfair expropriation.



Aspect	Recommended PPP Approach		Reasoning for the Block 11B/12B Production Project
	If “yes”	If “no”	
Is there a high level of unemployment in the area?	The PPP should ensure that there are no unrealistic expectations created due to the project. The consultation should ensure that any unrealistic expectations are adequately addressed before the project starts.	Minimum requirements for public participation in accordance with EIA Regulations must be met.	The area of influence experiences very high levels of unemployment and poverty. The project is of long-term duration and is expected to generate numerous direct and indirect local job and procurement opportunities but may raise unrealistic expectations due to the high project visibility and long lead time to actual production activities.
Do the RI&APs have special needs (e.g. a lack of skills to read or write, disability, etc)?	Consultation should include mechanisms that will ensure full participation by people with special needs.	Minimum requirements for public participation in accordance with EIA Regulations must be met.	Many I&APs in the area of influence have limited access to secondary or tertiary education opportunities.



3.5.2 Scoping Phase

This section describes the public participation steps undertaken during the Scoping Phase. All supporting personal information and / or documentation will be included in the appendices to the FSR and will be submitted to PASA / DMPR (to ensure compliance with the relevant provisions of the POPI Act and EIA Regulations).

3.5.2.1 Stakeholder Identification

A preliminary I&AP database comprised of approximately 9 779 stakeholders (see Appendix D.1¹¹) was developed based on:

- Existing databases for public stakeholders in South African offshore licence blocks, including the database compiled for the surveys ESIA;
- Stakeholder mapping undertaken by SLR, its appointed specialists (notably fisheries and cultural heritage) and the Applicant during the Surveys ESIA;
- Input from DFFE;
- Input from already identified stakeholders;
- Input from Savannah Environmental (the EAP undertaken the ESIA for the proposed Garden Route GtP Project);
- Input from Civil Society Organisations; and
- Data from the anthropological baseline research undertaken as part of the Cultural Heritage Assessment.

Although some of the proposed production activities are located far offshore (> 75 km offshore), the Project's potential indirect area of influence is considered to include communities on the South Coast approximately from Mossel Bay to Cape St. Francis. Additional landowners and occupiers along the onshore pipeline route will be incorporated into the I&AP database.

The I&AP database will be continually updated throughout the Scoping Phase and will continue to be updated throughout the remainder of the ESIA process. Additional I&APs who submit comments, attended meetings or request registration will be added to the database. In addition, any people wanting to be removed from the initial stakeholder database will be deleted, as requested.

Stakeholders included in the database, at the time of compiling the DSR include:

- Authorities, e.g.:
 - South African Government (National, Provincial, District and Local);
 - Wards located on the coast within Area of Influence (including Ward Councillors);
 - Organs of State; and
 - Maritime Authorities.

¹¹ The project database containing the list and contact details of registered I&APs cannot be provided. This is in line with the requirements of the Protection of Personal Information Act, 2014 (No 4 of 2014) (POPI Act). A copy of the database will, however, be provided to the Competent Authority as required by the EIA regulations 2014 (as amended).



- Community and Traditional Leadership, e.g.:
 - Traditional and indigenous leadership;
 - Community leadership; and
 - Small-scale fishing cooperatives.
- Civil Society, e.g.:
 - Community Outreach Organisations;
 - Community Based Organisations, including Faith Based Organisations;
 - Environmental Groups, Research Institutions and other Non-Governmental Organisations (NGOs);
 - Fishing Associations;
 - Tourism Association Groups;
 - Harbour User Groups/Associations; and
 - Women and the Youth.
- Business, e.g.:
 - Fishing Companies and Operators;
 - Offshore Mining and Oil / Gas Operators;
 - Small, Medium and Micro Enterprises (SMMEs);
 - Community Business Forums;
 - Tourism Operators; and
 - Media
- Individual stakeholders and landowners.

3.5.2.2 Pre-Application Notification and Disclosure

The main purpose of the pre-application notification and disclosure phase is to provide initial notification to stakeholders about the proposed project and ESIA process, and to add onto the I&AP database for the current project.

PASA Pre-Application Meeting

A meeting was held with PASA on 19 June 2026 to provide notification of the proposed project and the Operator's intent to submit an application for EA and consult on the ESIA process (including associated public participation strategy) and PASA / DMPR requirements.

Stakeholder Engagement Plan

A Stakeholder Engagement Plan was prepared to meet international good practice requirements and to demonstrate adherence to the principles contained in the NEMA Public Participation Guidelines. This plan was submitted to PASA for information purposes.

Site Notices

Site notices (in English, Afrikaans and isiXhosa, Appendix D.2) were placed along the South Coast (refer to Table 3-4 for locations). Site notices provided information on the project scope, ESIA process, availability of the Draft Scoping Report for review and comment and



planned public engagements and invite I&APs to register on the ESIA database. Site notices were placed at locations visible to the public and, in particular, coastal users (e.g., small-scale and recreational fishing), vulnerable communities, coastal tourism operators and along proposed onshore pipeline route.

Table 3-6: Site notice placement

Town	Town
Struisbaai	Wilderness
Arniston	Sedgefield
Witsand	Knysna
Still Bay	Plettenberg Bay
Gouritz River	Keurbooms River
Mossel Bay	St Francis Bay
Groot Brak	Jeffreys Bay
George	Gqeberha

3.5.2.3 Consultation and Disclosure Methods

Availability of the Draft Scoping Report

This Draft Scoping Report is available for public review and comment from **14 September – 15 October 2026** to enable I&APs to provide initial comments on the proposed project and scope of the assessment. Copies of the Draft Scoping Report are available on the SLR website and data-free website for download for the duration of the comment period.

An Executive Summary and a Non-Technical Summary (NTS) of the report, summarising the information in shorter and more understandable formats, is also available (see Appendix D.3). The NTS is available in English, Afrikaans and isiXhosa and distributed to I&APs via email and via SMS/ or WhatsApp on request. The NTS is also available in audio format on the SLR websites (in English, Afrikaans and isiXhosa).

Hard copies of Draft Scoping Report and / or the NTS are available at the public libraries and/or municipal offices listed in Table 3-7.

Table 3-7: Locations of hard copies of the Draft Scoping Report and NTS

Location	Name of Facility	Physical Address
Full Report and Non-Technical Summary are available at:		
Still Bay	Still Bay Library	Main Road, Still Bay
Mossel Bay	Kwanonqaba Library	Adriaan Street, Asla Park, KwaNonqaba
Knysna	Knysna Tourism Offices	40 Main Road, Knysna Central
Plettenberg Bay	Plettenberg Bay Public Library	Shop 29, Mervills Shopping Centre, Sewell Street
St. Francis Bay	Sea Vista Library	Geelbek Street, Sea Vista
Jeffreys Bay	Jeffreys Bay Library	43 Diaz Road, Jeffreys Bay
Gqeberha	Newton Park Library	Hurd Street, Newton Park, Nelson Mandela Bay



Location	Name of Facility	Physical Address
Non-Technical Summary only is available at:		
Struisbaai	Struisbaai Public Library	1 Deining Avenue, Struisbaai
Arniston	Arniston Library	39 Kamp Street, Arniston
Gourits	Gouritsmond Library	9 Kerk Street, Gourits
Mossel Bay	Transnet Port of Mossel Bay	55 Bland Street, Mossel Bay, Main Port Administration Building, 2nd Floor
Mossel Bay	Mossel Bay Library	4th Floor Montagu Building, 99 Marsh St, Mossel Bay Central
George	George Public Library	4 Caledon St, Campher's Drift
Sedgefield	Sedgefield Library	12 Flamingo Avenue, Sedgefield

Notification Letter

All I&APs on the initial project database were notified via email and/or SMS of the application and ESIA process in the week on 24 August 2026. The letter provided notification of the commencement of the ESIA process, the availability of the Draft Scoping Report and NTS for review and comment, dates of Scoping Phase public engagements and invited I&APs to register on the ESIA database. The letter also provided notice that the previous EA application for the survey campaign (Reference No. 12/4/013) will be withdrawn.

The letter also requested I&APs to indicate whether they want to be removed from the project database (see Appendix D.4).

Newspaper Advertising

Newspaper advertisements announcing the start of the ESIA process, availability of the Draft Scoping Report for review and comment and planned public engagements (see Appendix D.5) were placed in regional and local community newspapers as shown in Table 3-8 in English, Afrikaans and isiXhosa.

Table 3-8: List of advertising newspapers

No	Paper Name	Distribution	Language
National / Regional			
1	Cape Times	Western Cape	English
2	Netwerk24 Online	South Africa	Afrikaans
3	Die Burger Western Cape	Western Cape	Afrikaans
4	The Herald	Eastern Cape	English
Local			
5	George Herald	George, Gouritz River Mouth, Sedgefield, Stillbaai, Gouritz River Mouth, Knysna, Keurbooms, Plettenberg Bay, Sedgefield	Afrikaans
6	Hermanus Times	Agulhas, Bredasdorp, Betty's Bay, Caledon, Gansbaai, Genadendal, Grabouw, Greyton, Hermanus, Kleinmond, Napier, Riviersonderend, Stanford, Struisbaai, Villiersdorp.	English
7	Isolezwe LesiXhosa	Eastern Cape	Xhosa



No	Paper Name	Distribution	Language
8	Knysna-Plett Herald	Gouritz River Mouth, Knysna, Keurbooms, Plettenberg Bay, Sedgefield	Afrikaans
9	Mossel Bay Advertiser	Mossel Bay Area	English
10	St Francis Bay Chronicle	St Francis Bay, Cape St Francis, Oyster Bay, Humansdorp, Jeffreys Bay and in parts of Gqeberha	English
11	Suidernuus / Southern Post	Bredasdorp, Napier, Waenhuiskrans (Arniston), Struisbaai, Agulhas, Elim, Klipdale, Protea, Wolvengat, Ouplaas, Swellendam and Riviersonderend.	English
12	Suid-Kaap Forum	Stillbaai	Afrikaans
13	Talk of the Town	Alexandria, Bathurst, East London, Grahamstown, Kenton, Port Alfred, Port Elizabeth.	Xhosa

Radio Announcements

Radio announcements were broadcast in the week of 31 August 2026 in the dominant languages spoken in the region (English and Afrikaans) to announce the start of the ESIA process, availability of the DSR for review and comment and planned public engagements and to invite stakeholders to register as I&APs (see Appendix D.5). Radio announcements were broadcast multiple times per day, over multiple days, on stations covering the Project's potential indirect and direct area of influence. Radio stations are presented in Table 3-9.

Table 3-9: List of radio stations

Radio Name	Coverage	Language
Kouga FM	Nelson Mandela Bay Metro, Kouga Municipality, Koukamma Municipality, parts of Western Cape region.	English
S - FM	Hartenbos, Southern Cape, Oudtshoorn	Afrikaans

Public Open Days / Meetings

Stakeholders are invited to attend meetings during the Scoping Phase, including:

- In-person public open days;
- Virtual public meetings; and/or
- In-person and virtual focus group meetings.

In-Person Public Open Days

Eight in-person public information open days will be held during the DSR comment and review period (Table 3-10), facilitated by an independent public participation practitioner. At these engagements, SLR and Main Street will present an overview of the proposed project and ESIA process and provides stakeholders with the opportunity to raise any questions, issues or concerns.

The Public Open Days (in person) will be structured as an informal poster session where I&APs can attend at any time during the hours indicated and engage with the ESIA team.



Table 3-10: In-person public participation open days and meetings

Location	Date	Venue	Time
Mossel Bay	14 September 2026	D'Almeida Community Hall	15:00-19:00
George	15 September 2026	Conville Community Hall	15:00-19:00
Knysna	16 September 2026	Hornlee Community Hall	15:00-19:00
Plettenberg Bay	17 September 2026	New Horizons Community Hall	15:00-19:00
Storms River	18 September 2026	Clarence Anthony Draai Multipurpose Centre	15:00-19:00
Karredouw	19 September 2026	Kagiso Heights Hall	10:00-14:00
St Francis Bay	21 September 2026	Sea Vista Community Hall	15:00-19:00
Jeffereys Bay	22 September 2026	Pellsrus Community Hall	15:00-19:00

Virtual Public Meeting

A virtual public meeting will be held on 1 October 2026 and facilitated by an independent public participation practitioner.

Focus Group Meetings

Five virtual focus group meetings, via an online platform, and three in-person Focus Group Meetings (FGM) will be held during the Scoping Phase (Table 3-11). The purpose of these meetings is to:

- Interact with the directly affected commercial fishing associations, small-scale fishing associations, traditional authorities, indigenous communities, marginalised / disadvantaged groups, business forums, landowners and other possible identified stakeholders;
- Themed focus group sessions are to deal with specific themes (e.g. marine ecology, fisheries, socio-economic and cultural, oil spill response etc.).
- Understand their specific views and issues/concerns; and
- Obtain comments on the project and ESIA process.

Meetings are facilitated by an independent public participation practitioner. The minutes of the meetings will be included in the FSR.



Table 3-11: Details of Focus Group Meetings

Sector/Interest	Date	Time
Mossel Bay Landowners (onshore)	12 September 2026	09:00-12:00
Mossel Bay Business Forum	14 September 2026	09:00-12:00
George Business Forum	15 September 2026	09:00-12:00
Local and District Municipalities and Provincial Departments (Virtual)	9 September 2026	13:00-15:00
Organs of State, State Owned Enterprises and Authorities (Virtual)	29 September 2026	09:00-11:00
Commercial Fisheries (Virtual)	29 September 2026	13:00-15:00
South African Maritime Safety Authority (SAMSA)	30 September 2026	09:00-11:00
Traditional Leaders (Virtual)	30 September 2026	13:00-15:00

Comments and Responses Report and Final Scoping Report

All issues raised by I&APs during the comment period on the DSR will be consolidated and responded to in a Comments and Responses Report, which will be appended to the FSR.

Once submitted for acceptance, all stakeholders on the Project database will be notified of the submission and availability of the Final Scoping Report on the SLR and data free websites.

3.5.3 Impact Assessment Phase

Public participation-related tasks to be undertaken in the Impact Assessment Phase include:

- *Release of Draft ESIA Report and EMPr for review and comment:* The Draft ESIA Report and EMPr will be released for a 30-day review and comment period and will be available for download from the SLR website and data free website. Hardcopy reports will be available at various public venues in the Project's area of influence for the duration of the review and comment period.
- *Notifications:* Notifications will be sent to all I&APs registered on the project database. The notification will provide details of the release of the Draft ESIA Report and EMPr, and information on where the reports can be reviewed and stakeholder open days and meetings. The NTS (in English, Afrikaans and isiXhosa) will be attached to emails or a link provided in SMS and WhatsApp notifications. The NTS will also be available in audio format.
- *Stakeholder open days and meetings:* Stakeholders will be invited to attend public engagements at locations between Mossel Bay and St Francis Bay, as well as online.
- *Notice of ESIA Report submission:* All registered I&APs will be notified via e-mail of the submission of the Final ESIA Report for consideration and decision-making.
- *Disclosure of decision:* DMPR's decision on the EA will be uploaded onto the SLR website and data free website for information purposes. All I&APs registered on the project database will be notified once the decision has been issued.



4.0 Need and Desirability

The DFFE Guideline on Need and Desirability (GN R891 of 2017) notes that while addressing the growth of the national economy, through the implementation of various national policies and strategies, it is also essential that these policies take cognisance of strategic concerns such as climate change, food security, as well as the sustainability in supply of natural resources and the status of our ecosystem services. The guideline further notes that at a project level (as part of an ESIA process), the need and desirability of the project should take into consideration the content of regional and local plans, frameworks and strategies.

This section analyses the need for, and desirability of, the proposed Project based on its 'fit' with the policy and planning framework adopted by the South African administration, as discussed in Section 2.0. It also provides a broader overview and context of the role of hydrocarbons, including natural gas, both globally and within South Africa's energy mix.

In this context it is noted that:

- The evaluation of merits of national government policy, global trends, geopolitics and feasibility of the proposed activities are complex, evolving and sometimes contradictory, and fall outside of the scope of this project-level ESIA¹². The analysis thus relies on relevant current commitments, policies and targets as markers against which to evaluate the need and desirability of the proposed activities;
- The analysis does not evaluate the need and desirability from the applicant's perspective and assumes that the applicant is confident of the economic feasibility of the proposed activities; and
- Need and desirability can relate to different aspects, including social, economic, and environmental consideration, which are not always aligned. As a result, the proposed activities may be needed and desirable in terms of some aspects but not others. The assessment should, therefore, be undertaken through a holistic consideration of the proposed Project, taking into account the range of potential benefits, costs, impacts, opportunities, and constraints associated with it.

As no final off-take agreements have been concluded with potential purchasers of gas, condensate or LNG, the need and desirability of the Project is, therefore, based on the following two potential development and end-user scenarios:

- Production Scenario 1: Full field development of the Paddavissie Fairway and piping gas onshore:
 - Development of the full field using a FPSO facility for offshore separation and processing. Natural gas would be exported to shore via new offshore and

¹² A 2020 ruling by the Norwegian Supreme Court, though it has no legal standing in South Africa, is instructive in that it stated for a similar context in Norway that "Combustion emissions abroad are a general effect of Norwegian petroleum production and petroleum policy. At the same time, the net effect of the combustion emissions is complicated and controversial, since it is linked to the global market and the competition situation for oil and gas. If gas is replaced by coal, cuts in the gas export will have a negative CO₂ effect. If the gas competes with gas from other providers, the effect may be zero. Cuts in Norwegian oil production may be replaced by oil from other countries. And the total emissions will not necessarily be affected if Norwegian oil or gas is used within the sector subject to an emission trading system. To me, it is here sufficient to mention that the net effect of Norwegian export of oil and gas for the global emissions is complicated and controversial. There is clearly a need to consider all emissions from Norwegian petroleum production as a whole. In my view, it would have been up to the Ministry and the Government to decide whether it was appropriate to refer to and to discuss the question of climate effects on a superior level – i.e. as a part of the Norwegian climate policy – rather than addressing them in the individual environmental assessment." (Supreme Court of Norway, 2020).



onshore pipelines, supplying a gas receiving facility (e.g. the proposed Garden Route GtP facility) and potentially other domestic off-takers. Condensate would be offloaded, via shuttle tankers, and supplied to domestic and/or international markets.

- Production Scenario 2: Full field development of the Paddavissie Fairway and liquifying gas offshore:
 - Development of the full field using a FLNG facility for offshore separation and liquefaction. A FSO vessel is anticipated to be required to provide additional storage for the condensate. Both LNG and condensate would be offloaded, via shuttle tankers, and supplied to domestic and/or international markets.

Each of these two full-field scenarios may be preceded by partial development of the field through existing PetroSA facilities.

4.1 Fit of Petroleum Exploration and Production with the South African Planning Framework

4.1.1 Energy-Related Plans and Policies

The energy policy context of the Project is informed by a range of national energy policies, plans and programmes (see Section 2.3.1) that have consistently recognised the need for a diversified energy mix, continued security of energy supply, and the strategic role of natural gas in South Africa's energy transition. Collectively, these policy instruments have for more than a decade identified an existing and continuing demand for hydrocarbon products in South Africa, while increasingly recognising natural gas as an important transition fuel, supporting the transition away from South Africa's heavily coal-dependant energy system towards a lower carbon energy mix, that can support economic development, energy security and the integration of renewable energy resources.

The policy framework consistently highlights South Africa's vulnerability arising from its dependence on imported (by now virtually all) petroleum products (crude oil, petroleum products and, increasingly, natural gas). The development of indigenous energy resources is, therefore, generally viewed as an important mechanism to reduce supply risks, improve energy security, support industrial development and retain economic value within the country.

Importantly, these policies do not present natural gas as an alternative to renewable energy, but rather as a complementary component of the future energy system. National energy planning increasingly adopts a portfolio approach (energy mix) in which renewable energy, energy storage and dispatchable generation technologies operate together to ensure reliability, affordability, emissions reduction and energy security. In this context, natural gas is recognised as providing operational flexibility, dispatchable capacity and system stability necessary to support increasing levels of wind and solar generation.

Several recent Government actions demonstrate its continued commitment to the use of hydrocarbon products, including from indigenous production, in the South African economy, such as the:

- Inclusion of 6 gigawatts (GW) of gas-to-power generation capacity by 2030 within the IRP 2025 planning framework (together with approximately 18 GW from wind and solar PV). By 2039, the plan envisions a total mix that includes approximately 16 GW gas-to-power capacity;



- The launch of the Gas-to-Power Independent Power Producer Procurement Programme (IPPPP) aimed at procuring ~3 GW of gas-generated generation capacity in December 2023;
- Publication of the Draft Gas Master Plan for comment in April 2024, which identifies the need for alternative gas supplies beyond the anticipated decline in Mozambican imports and promotes both indigenous and imported gas sources;
- Publication of the Draft South African OEMP (Draft 5, July 2026), which recognises the potential role of South Africa's offshore oil and gas industry in addressing energy security challenges and identifies the approximately 3.4 Tcf of gas and 192 MMbbl of condensate resources within Block 11B/12B as a potentially important contributor to future domestic energy security, economic development and growth of the oceans economy;
- The enactment of the Upstream Petroleum Resources Development Act, 2024 (No. 23 of 2024), together with publication of draft regulations, on 25 October 2024, establishing a dedicated legislative framework for the upstream petroleum exploration and production in South Africa. This will come into effect on a date to be determined by the President; and
- Introduction of the Gas Bill, 2026 (B6-2026) to Parliament in March 2026, which seeks to repeal and replace the Gas Act, 2001 and establish an updated regulatory framework to promote the orderly development of the gas industry, facilitate gas infrastructure investment, support the development of domestic gas resources, promote the role of natural gas and other emerging gas technologies in the country's future energy mix, and provide for the socio-economic and environmentally sustainable development of the sector.

The Draft IRP 2023, subsequent IRP updates and the IRP 2025 all reinforce the strategic role of natural gas within South Africa's future energy system. These planning instruments recognise gas-to-power generation technologies, including combined-cycle gas turbines and related flexible generation technologies, as important sources of dispatchable generation capacity (i.e. on-demand generation capacity) required to support the increasing contribution of variable renewable energy, such as wind and solar power.

Although imported gas may be required in the short term, these plans consistently emphasise the importance of developing domestic and regional gas resources over the longer term to improve energy security, reduce supply risks and support the development of a sustainable gas market. The Draft Gas Master Plan (2024) also recognise the potential to reduce the cost of energy and capture economic value and broader macroeconomic benefits associated with upstream oil and gas development. In this regard, the Brulpadda and Luiperd gas discoveries in the Outeniqua Basin, together with other domestic and regional gas resources, are specifically identified as a significant opportunity for South Africa's future energy system, economic development and energy transition. Consistent with this, the Draft South African OEMP recognises the potential role of South Africa's offshore oil and gas industry in addressing energy security challenges and identifies the resources within Block 11B/12B as a potentially important contributor to future domestic energy security, economic development and growth of the oceans economy (DFFE, 2026).

South Africa's electricity system is currently undergoing a transition from a predominantly coal-based generation fleet to a more diversified energy mix comprising renewable energy, gas-fired generation and battery energy storage. This transition requires the simultaneous achievement of three interrelated objectives, namely maintaining reliable and affordable electricity supply, reducing GHG emissions and supporting economic development and energy security. As ageing coal-fired power stations are retired, the electricity system



requires sufficient firm capacity, flexibility, ancillary services, system stability and expanded transmission infrastructure to maintain reliable operation while integrating growing levels of renewable energy generation.

Within this context, gas-to-power generation can contribute dispatchable capacity that support grid stability and complement variable renewable energy resources. Renewable energy technologies such as wind and solar PV are expected to provide a substantial proportion of future energy supply, while battery energy storage systems can provide frequency support, load shifting and other flexibility services. However, current planning frameworks recognise that renewable energy and storage alone are unlikely to eliminate the need for additional dispatchable generation capacity, transmission expansion and supporting infrastructure during the transition period.

The proposed development of the Paddavissie Fairway within Block 11B/12B is directly aligned with these policy objectives. Under Production Scenario 1, natural gas would be transported onshore for use in a proposed GtP facility and potentially other domestic industrial applications, thereby directly supporting the objectives of the IRP 2025, Draft Gas Master Plan and related energy planning instruments aimed at expanding generation capacity and developing indigenous gas resources. Under Production Scenario 2, gas would be liquefied offshore, with the resulting LNG and condensate shipped to domestic and/or international markets. Depending on the eventual market demand and end user, the gas resource could contribute directly to domestic gas-to-power generation, including through supply to existing or future domestic gas infrastructure. Even if the gas does not directly support domestic GtP generation, it would contribute to the commercial development of South Africa's offshore gas resources, strengthen the upstream petroleum sector, generate economic benefits and establish infrastructure and expertise that could facilitate future domestic gas utilisation.

The broader energy security context is also relevant. National policy documents have identified concerns associated with increasing dependence on imported energy products, including exposure to international fuel and LNG price volatility, exchange-rate risks, potential supply disruptions and the loss of opportunities for domestic industrial development and employment creation. The development of indigenous gas resources may, therefore, contribute to improving national energy resilience and supporting a degree of energy self-sufficiency during a period of significant transition within global energy markets.

The Project is consistent with the broader policy objective of establishing a balanced energy mix in which renewable energy, battery storage and dispatchable gas-fired generation collectively contribute to energy security, affordability, emissions reduction and long-term economic growth. Through demonstrating the viability of developing offshore resources, supporting the establishment of specialist energy industries, facilitating infrastructure investment, generating national income and potentially contributing to the future gas-to-power initiatives, the Project has the potential to support both the immediate and longer-term objectives of South Africa's energy policy framework.

The Project is, therefore, deemed to be in direct and indirect furtherance of energy-related plans and policy in South Africa.

4.1.2 Economy-Related Plans and Policies

The economic policy context of the Project is naturally complex and is informed by a range of national, provincial and local policy instruments (see Section 2.3.2) that seek to promote economic growth, employment creation, poverty alleviation, energy security and a just transition to a lower-carbon economy.

South Africa has experienced prolonged periods of low economic growth, high unemployment, persistent poverty and significant income inequality. Economic policies



consistently recognise that reliable and affordable energy supply and infrastructure investment are essential preconditions for economic growth and social development. Energy constraints have been identified as one of the key factors limiting economic performance, investment attraction and employment creation. In this context, Government policy seeks to simultaneously improve energy security, stimulate economic growth, reduce GHG and support a just and equitable energy transition.

A consistent theme across national, provincial and local policy frameworks is the need to balance economic development, social upliftment and environmental sustainability. While long-term decarbonisation and climate resilience remain important policy objectives, there is also widespread recognition that South Africa's transition to a lower-carbon economy must be managed in a manner that supports investment, job creation, industrial development and inclusive economic growth. Within this context, natural gas is generally recognised as a transition fuel that may contribute to energy security, industrial competitiveness and economic activity while facilitating a progressive reduction in the carbon intensity of the economy.

Policy frameworks further recognise the importance of infrastructure-led development, strategic investment and the expansion of key economic sectors to support growth and employment. Mossel Bay and its surrounding region are already established as important energy, industrial and petrochemical nodes, with existing infrastructure, skills and institutional capacity associated with the petroleum and energy sectors. The strategic importance of the proposed Project is further reflected in its designation as a SIP in terms of the Infrastructure Development Act, 2014 (see Section 2.2.1.4 for further information). SIPs are recognised as projects of significant economic or social importance that contribute substantially to national infrastructure development objectives. The proposed Project forms part of Energy SIP 20, under the OGNP, which aims to facilitate investment in South Africa's oil and gas sector and support energy security, economic growth, industrial development and employment creation.

The broader economic context is also relevant. South Africa remains dependent on imported energy products and is exposed to international fuel price volatility, exchange-rate fluctuations and potential supply disruptions. The development of indigenous energy resources, therefore, has the potential to contribute to retaining economic value within the country, improving the balance of payments, supporting local procurement and supplier development, creating employment opportunities and generating tax and royalty revenues for the country.

This strategic importance is also recognised in the Draft South African OEMP (Draft 5, July 2026), which identifies the resources within Block 11B/12B as a potentially important contributor to future domestic energy security and economic development (DFFE, 2026). The viable and sustainable production of indigenous gas resources has the potential to contribute to a range of direct, indirect and induced economic benefits, including capital investment, infrastructure development, skills development, enterprise development, government revenue generation and contributions to gross domestic product. Where gas from the Project is utilised domestically, including for potential gas-to-power generation, additional benefits may arise through enhanced energy security, improved electricity system reliability and support for industrial development as well as a transition to lower carbon energy sources.

Accordingly, the proposed development of the Paddavissie Fairway within Block 11B/12B is considered to be largely aligned with the objectives of national, provincial and local economic policy frameworks. Its designation as part of Energy SIP 20 further reflects its strategic importance within South Africa's infrastructure and energy development agenda. Should the Project be approved, it will contribute to economic growth, infrastructure investment, employment creation, energy security and the broader objectives of a managed



and just energy transition, while supporting the development of South Africa's upstream petroleum industry and associated value chains.

The project is, therefore, deemed to be in keeping with and in furtherance of economy-related plans and policy in South Africa.

4.1.3 Climate Change-Related Plans and Policies

Since the Project relates to the production of natural gas, a fossil fuel and source of GHG emissions, its need and desirability must be considered within the context of South Africa's climate change policy framework depending on the eventual market demand and end user. Climate change-related policies in South Africa seek to balance several interrelated objectives, including climate change mitigation, climate change adaptation, economic development, poverty alleviation, energy security and the achievement of a just transition to a lower-carbon economy. These objectives are reflected in the various policy instruments summarised in Section 2.3.3.

South Africa has consistently committed itself to reducing GHG emissions and contributing to the global effort to limit climate change, while simultaneously ensuring that economic and social development proceeds in a sustainable and equitable manner. Climate change policy, therefore, recognises that emissions reductions must be pursued within the context of South Africa's developmental realities, including high levels of unemployment, poverty, inequality, energy insecurity and dependence on fossil fuels for energy supply.

A recurring theme across South Africa's climate change policy framework is the concept of a just transition. This recognises that the transition to a low-carbon economy must not only reduce emissions but must also maintain economic stability, support livelihoods, improve energy security and avoid disproportionate impacts on vulnerable communities, workers and industries. Climate change mitigation, economic development and social equity are, therefore, treated as complementary rather than competing priorities.

Climate-related policy further recognises that South Africa's energy transition will occur over time and that the country's continued dependence on coal presents significant challenges for achieving emissions reduction objectives. Consequently, policy frameworks generally support a progressive diversification of the energy mix through increased deployment of renewable energy and other lower-carbon energy sources, while maintaining security of supply, affordability and electricity system reliability.

Read with South Africa's energy- and economy-related plans and policies, climate change policy does not necessarily regard the continued use of natural gas as incompatible with national climate objectives. Rather, natural gas is generally recognised as a potential transition fuel that may facilitate the gradual displacement of higher-emitting coal-based energy, support renewable energy integration and contribute to a managed transition to a lower-carbon economy, provided that emissions are appropriately accounted for and progressively reduced over time.

This policy position is reflected in national energy planning, which envisages a future electricity system comprising a combination of renewable energy, battery energy storage and dispatchable generation technologies. Within this framework, gas-fired generation is recognised as a potential source of flexibility, dispatchable capacity and system stability required to complement variable renewable energy resources. The role of natural gas within South Africa's energy transition is, therefore, a matter of national policy and strategic planning rather than project-level determination.

The broader legal and policy framework similarly does not prohibit the exploration or production of oil and gas resources. Rather, it requires that climate change implications be appropriately considered in decision-making processes and weighed together with broader



sustainable development objectives, including economic development, energy security and social wellbeing. In this regard, the Supreme Court of Appeal has confirmed, in its 3 June 2024 judgement on Case 58/2023 (Minister of Mineral Resources and Energy and Others v Sustaining the Wild Coast NPC and Others), that petroleum exploration and production are not per se incompatible with South Africa's climate change commitments and that such activities must be assessed within the broader policy and regulatory framework applicable to climate change and sustainable development (Supreme Court of Appeal of South Africa, 2024). More recently, the Constitutional Court (Sustaining the Wild Coast NPC and Others v Minister of Mineral Resources and Energy and Others; Natural Justice and Another v Minister of Mineral Resources and Energy and Others [2026] ZACC 33) emphasised that decisions relating to petroleum activities must be informed by meaningful public participation, climate change considerations, environmental justice principles, and the interests of present and future generations, reinforcing the need for rigorous assessment of climate-related impacts during decision-making.

Project-related GHG emissions (Scope 1 and 2 emissions¹³) may contribute to South Africa's national GHG inventory and, therefore, remain an important consideration in the assessment of the Project. **The significance of these emissions, their consistency with South Africa's emissions reduction trajectory and climate commitments, and their implications within the context of a just energy transition will be evaluated in detail during the Impact Assessment Phase once the Project-specific GHG emissions have been calculated.** Scope 3 emissions may also contribute to South Africa's GHG inventory, in the case of a domestic offtake option or end user. Scope 3 emissions associated with gas produced by the Project, but transported and combusted or used outside South Africa, would generally be accounted for in the GHG inventory of the country where the gas is ultimately consumed.

Accordingly, while South Africa's climate change policy framework seeks substantial long-term reductions in GHG emissions and increased deployment of renewable energy, it also recognises the need to maintain energy security, support economic development and manage a just transition. **The proposed Project is, therefore, not considered to be inherently inconsistent with South Africa's climate change policy framework, although its compatibility with climate-related objectives will ultimately depend on the nature, magnitude and management of Project-specific emissions and their consideration within the broader context of sustainable development and the just energy transition.**

4.1.4 Marine Spatial Planning and Resource-Related Plans and Policies

South Africa's marine and ocean governance policy framework seeks to balance economic development, environmental protection and the sustainable use of ocean resources through an integrated and coordinated approach. This approach is reflected in both Operation Phakisa and the Marine Spatial Planning (MSP) framework, which seek to unlock the economic potential of South Africa's oceans while ensuring the long-term protection and sustainable management of marine ecosystems.

¹³ Scope 1 Emissions: These are direct GHG emissions from sources that are owned or controlled by an organisation.

Scope 2 Emissions: These are indirect GHG emissions associated with the purchase of electricity, heat, cooling, etc. Although these emissions occur at the facility where they are generated, they are accounted for in an organisation's GHG inventory because they result from the organisation's energy use.

Scope 3 Emissions: These are all other indirect emissions that occur in the value chain of the reporting company, both upstream and downstream. This includes emissions from activities such as the production of purchased goods and services, business travel, waste disposal, and the use of sold products.



Operation Phakisa, launched by the South African Government in 2014, identifies offshore oil and gas exploration and production as an important component of South Africa's Oceans Economy and aims to create an enabling environment for the responsible exploration and development of indigenous petroleum resources. The initiative recognises the potential contribution of offshore oil and gas development to economic growth, energy security, employment creation, investment attraction and government revenue generation, while simultaneously promoting marine biodiversity conservation, environmental stewardship and sustainable ocean governance.

Building on these objectives, South Africa's MSP framework seeks to manage competing demands for marine space through an integrated planning process. The framework recognises that multiple sectors, including offshore oil and gas, shipping, fisheries, conservation, tourism and coastal development, may have competing interests within the same marine areas. Accordingly, it promotes the coexistence of compatible uses wherever possible and requires that planning and decisions be guided by principles of sustainable development, ecosystem-based management, adaptive management, stakeholder collaboration and the use of best available scientific information.

The Draft Marine Sector Plans, published in 2023 under the Marine Spatial Planning Act, 2018, provide sector-specific inputs into future Marine Area Plans and establish development objectives and priorities for key marine sectors over the next 20 years. In particular, the Draft Offshore Oil and Gas Sector Plan (see Section 2.3.5.1) recognises offshore petroleum exploration and production as an important contributor to South Africa's ocean economy, energy security objectives, and employment creation. The Plan seeks to facilitate the responsible development of offshore hydrocarbon resources while ensuring appropriate environmental management and regulatory oversight.

At the same time, the Draft Marine Biodiversity Sector Plan and coastal management plans (both national and regional) seek to protect marine and coastal biodiversity, ecosystem functioning and ecological resilience while supporting sustainable economic development within the coastal zone. These planning instruments do not preclude offshore oil and gas activities but require that potential environmental and socio-economic impacts be identified, assessed and appropriately managed through robust planning, environmental assessment and mitigation measures.

Overall, the Project is considered to be broadly aligned with the objectives of South Africa's oceans economy, marine spatial planning and ocean governance frameworks. The Project is consistent, in principle, with the objectives of Operation Phakisa and the Draft Offshore Oil and Gas Sector Plan, while recognising the need to address marine biodiversity, coastal management and other competing marine-use considerations through the ESIA process.

The compatibility of the Project with specific marine spatial planning, marine biodiversity, coastal management and ocean governance objectives will be further evaluated during the Impact Assessment Phase, informed by the findings of the specialist studies and assessment of potential environmental and socio-economic impacts associated with the Project.

4.1.5 Summary of the Project's Fit with the South African Planning Framework

South Africa's policy framework seeks to balance several important and interrelated objectives, including energy security, economic growth, employment creation, poverty alleviation, climate change mitigation, environmental protection and the achievement of a just transition to a lower-carbon economy. Across the energy, economic, climate change and ocean governance policy spheres, there is consistent recognition that South Africa must



address persistent challenges relating to unemployment, poverty, inequality, constrained economic growth and energy insecurity, while simultaneously reducing GHG emissions and improving climate resilience.

Energy-related policies recognise that South Africa is transitioning from a coal-dominated energy system towards a more diversified energy mix comprising renewable energy, battery energy storage and dispatchable generation technologies, including gas-fired power generation. National policy recognises natural gas as a strategic transition fuel that can contribute to energy security, provide flexible and dispatchable generation capacity, support the integration of renewable energy and reduce reliance on imported energy supplies. In this context, the development of indigenous gas resources is generally viewed as supporting national objectives relating to security of supply, industrial development, energy system reliability and long-term economic growth.

Economic policies similarly recognise that reliable energy supply and infrastructure investment are fundamental preconditions for economic growth, industrial competitiveness, investment attraction and social development. South Africa's policy framework, therefore, seeks to pursue economic development, social upliftment and emissions reduction concurrently through a managed and just energy transition. Within this context, the viable and sustainable development of indigenous gas resources is recognised as having the potential to contribute to employment creation, infrastructure development, government revenue generation, skills development and broader economic growth. This position is reflected in recent policy and legislative initiatives, including the IRP 2025, Draft Gas Master Plan, the Gas Bill, 2026, and national electricity planning frameworks, all of which recognise the strategic role of gas within South Africa's future energy mix and the importance of developing domestic gas resources and associated infrastructure. Furthermore, the strategic importance of the proposed Project is further reflected in its designation as a SIP.

Climate change-related policies seek substantial long-term reductions in GHG emissions while recognising that South Africa's transition to a lower-carbon economy must be managed in a manner that maintains energy security, economic growth and social stability. These policies acknowledge South Africa's continued dependence on fossil fuels, particularly coal, and generally recognise that natural gas may play a transitional role in supporting the displacement of higher-emitting energy sources, facilitating renewable energy integration and contributing to a just energy transition. Climate policy does not regard oil and gas development as inherently incompatible with South Africa's climate commitments, but instead requires that climate implications be appropriately considered within broader sustainable development decision-making processes.

South Africa's ocean governance, resource management and marine spatial planning frameworks similarly seek to balance economic development with environmental protection and the sustainable use of marine resources. These frameworks recognise offshore petroleum resources as a potential contributor to energy security, employment creation, investment attraction and economic development, while simultaneously requiring that marine biodiversity, ecosystem functioning and other marine users be protected through appropriate planning, environmental assessment and management measures. This is reflected in the Draft South African OEMP, which identifies offshore oil and gas resources, including those within Block 11B/12B, as potentially important contributors to future energy security, economic development and growth of the ocean's economy.

Accordingly, the proposed development of the Paddavissie Fairway within Block 11B/12B is consistent with and supportive of a range of South African energy, economic, climate change, resource management and marine spatial planning objectives. Under Production Scenario 1, the Project has the potential to directly support national gas-to-power objectives through the supply of indigenous gas for electricity generation and industrial use. Under Production Scenario 2, the Project could also contribute to domestic gas supply, gas-to-



power generation and industrial gas demand where LNG is utilised within South Africa, and would contribute to the development of South Africa's offshore hydrocarbon resources, associated infrastructure and upstream petroleum industry. In both cases, the Project has the potential to contribute to energy security, economic development and the broader objectives of a managed and just energy transition. The Project is also aligned with government initiatives aimed at expanding strategic energy infrastructure and unlocking the economic value of domestic gas resources, including through SIP and Oceans Economy initiatives where applicable.

The compatibility of the Project with South Africa's energy, economy, climate change, resource management and marine spatial planning frameworks will be further evaluated during the Impact Assessment Phase, informed by the findings of the specialist studies and the assessment of Project-specific environmental, social, economic and climate change considerations.

4.2 Broader Climate Change, Energy and Development Context

This section provides broader context relevant to the need for and desirability of hydrocarbon production, including climate change considerations, global and South African energy demand and supply trends, energy security, and other socio-economic considerations.

4.2.1 Summary of the Broader Energy, Climate Change and Development Context

Summarising upfront, climate change mitigation and energy security objectives are being pursued simultaneously across the world, although the pace and pathways of transition differ substantially between countries and regions. While the transition to lower-carbon energy systems is underway and renewable energy capacity continues to expand rapidly, fossil fuels remain the dominant source of global energy supply, accounting for approximately 86% of primary energy consumption in 2025. Oil and natural gas continue to play a central role in global energy systems.

Global GHG emissions remain concentrated in Asia, Europe and North America, which together account for the majority of historic and current emissions. South Africa's contribution to cumulative global GHG emissions is comparatively small (approximately 1% of the global total), although its emissions intensity remains relatively high due to the country's dependence on coal for energy supply.

Although an energy transition is well underway, there is no universally accepted transition path or one-size-fits-all approach, and countries and regions continue to search for, and explore, different means of reaching national and global targets. Empirical evidence, however, shows that hydrocarbon resources continue to provide more than half of the world's energy, with stable (oil) or increasing (gas) consumption and production growth trends at present. It is also not evident that new oil and gas discoveries in themselves increase oil and gas demand, except where gas discoveries can displace high-carbon-intensity coal in the power sector.

Renewable electricity generation, and reliability thereof, must increase many-fold to replace the energy currently produced from fossil fuels (not accounting for rising electricity demand due to electrification of sectors, e.g. transport and data centres, and from higher-income / more energy-intensive lifestyles across the world). For renewables (and/or other low-carbon sources) to replace (rather than supplement) current fossil fuel sources will likely take some time, and hydrocarbon resources are likely to continue to play a significant role in the interim.



The South African context differs materially from many developed economies and faces a unique energy transition challenge. The country remains highly reliant on coal, continues to experience electricity supply constraints, and must simultaneously pursue economic growth, industrial development, poverty alleviation and emissions reduction. South Africa's electricity system is transitioning from a historically coal-dominated generation fleet towards a more diversified energy mix comprising renewable energy, battery energy storage systems and gas-fired generation. This transition requires the achievement of three interrelated objectives, namely maintaining a reliable and affordable electricity supply, reducing GHG emissions and supporting economic development and energy security.

As ageing coal-fired power stations are retired, the electricity system requires adequate firm capacity, flexibility, ancillary services, system stability and expanded transmission infrastructure to maintain reliability while integrating increasing levels of renewable energy generation. Within this context, gas-fired generation can provide dispatchable capacity and base load that supports grid stability and complement variable renewable energy resources. Natural gas is, therefore, widely recognised in national energy planning as an important transition fuel that can support the gradual displacement of coal, improve flexibility and reliability of the electricity system, and provide an energy source for industrial processes that may be difficult to electrify in the short- to medium-term. Renewable energy and battery storage are expected to play an increasingly important role in the future electricity supply mix, but current planning frameworks generally recognise that these technologies alone are unlikely to eliminate the need for additional dispatchable generation capacity and other system support services during the transition period. Consequently, South Africa's future electricity system is likely to rely on a balanced portfolio approach (energy mix) in which renewable energy, storage technologies and selected dispatchable resources collectively contribute to reliability, affordability, emissions reduction and energy security.

South Africa currently imports virtually all of its natural gas requirements from Mozambique and faces significant risk of future gas shortages as production from the Pande and Temane fields declines. Alternative gas supply options, including LNG imports and domestic onshore and offshore gas developments, remain uncertain and are unlikely to provide immediate replacement capacity. Limiting domestic gas development could increase dependence on imported energy resources, expose the economy to fuel price volatility and exchange rate risks, and reduce opportunities for local employment, industrial development and economic participation. Greater reliance on imported LNG could also increase exposure to fluctuations in global energy markets. Indigenous gas resources, therefore, have the potential to contribute to energy security, industrial competitiveness and economic development, while supporting a lower-carbon transition relative to continued dependence on coal and other higher-emitting fuels.

The broader desirability of hydrocarbon production must, therefore, be considered within the context of ongoing global hydrocarbon demand, differing regional energy transition pathways, South Africa's energy security requirements, the need for a balanced and reliable energy mix, the potential socio-economic benefits of domestic resource development, and the country's need to balance climate commitments with economic development and reliable energy supply.



4.2.2 Context of GHG Emissions

4.2.2.1 Global GHG Emissions

The build-up of GHG in the atmosphere (a significant part from the burning of fossil fuels) is accepted as the key driver of climate change, which is resulting in variable increases in average temperatures across the globe (see Figure 4-1).

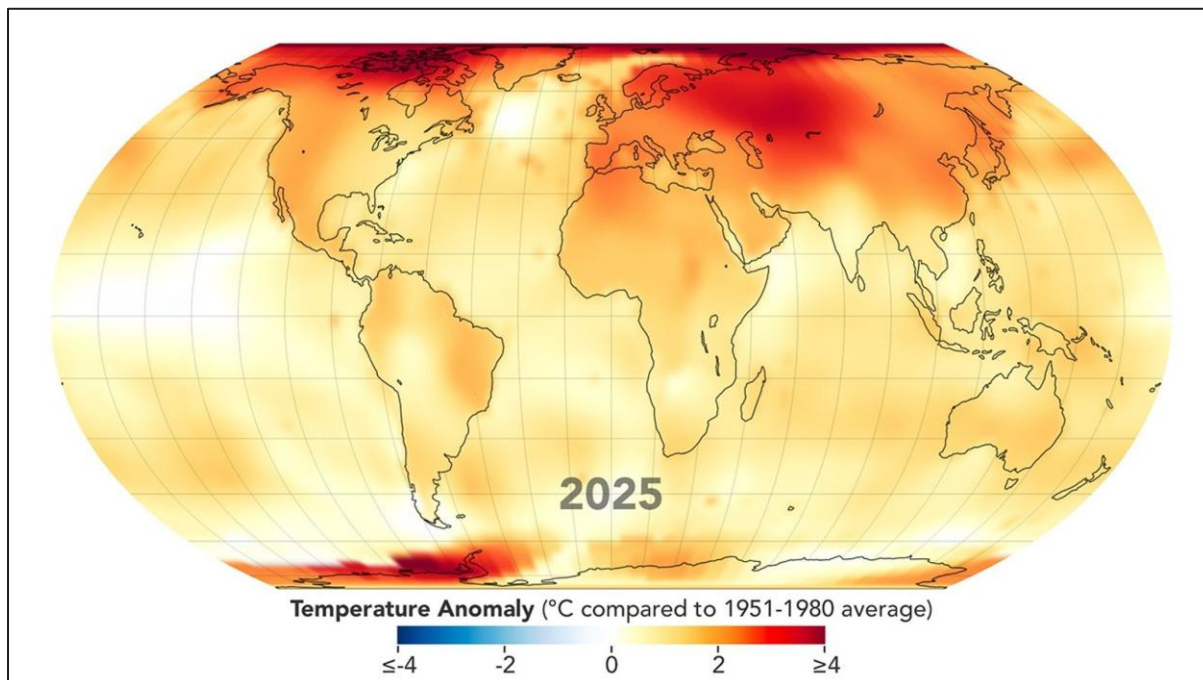


Figure 4-1: Global change in temperatures in the period of -2025 compared to the period of 1951-1980 (in °C)

Note: The above map is based on data that reflects how much warmer or cooler each region was compared to the base period of 1951-1980.

Source: (NASA, 2026),

Annual CO₂ emissions from fossil fuels and industry, which provide an indicator of mostly man-made GHG emission from energy use, have increased from virtually none prior to 1850 to 38.60 billion t in 2024, with the most pronounced increase in CO₂ emissions since the 1950s (see Figure 4-2).

Europe and North America dominated CO₂ emissions *pre-1950s* (see Figure 4-2), emitting a total of 208 billion t CO₂ between 1750 and 1950, which is equivalent to 95% of the 225 billion t CO₂ emitted during that time (see Table 4-1).



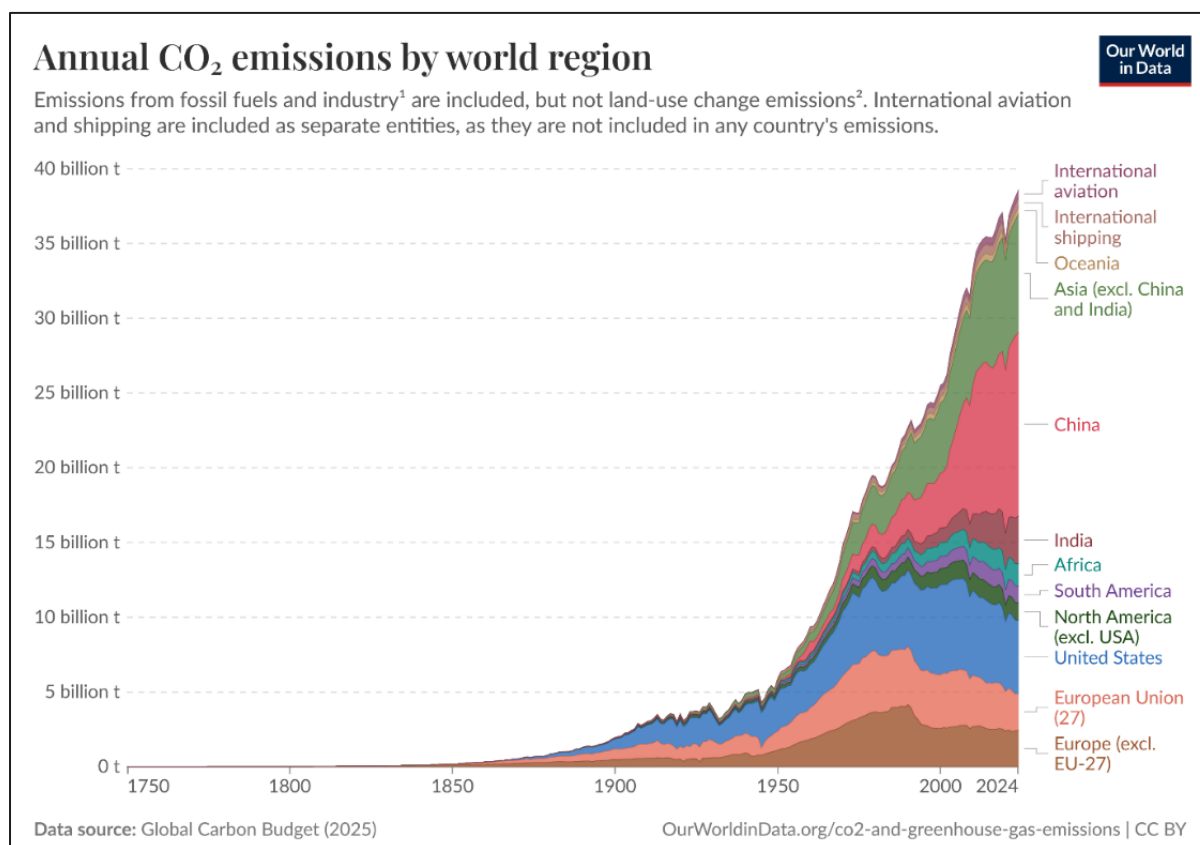


Figure 4-2: Annual CO₂ emissions by region, in absolute volumes

Source: (Our World in Data, 2025)

By 1950, Asia's share of CO₂ emissions had steadily increased, and the region became the greatest CO₂ emitter in 1992. Since then, Asian emissions have tripled, while European and North American emissions declined by 39% and 16% relative to their peaks in 1990¹⁴ and 2005, respectively (see Table 4-1).

By 2024, Asian emissions accounted for ~63% of global emissions, in line with its share of the global population. Due to the slight actual reduction in European and North American emissions, and due the considerable increase in Asian (and hence overall) emissions, the share of European and North American emissions has reduced to 13% and 16%, respectively, still above their world population share of 9.1% and 4.7%, respectively. African and South American emissions are low at 4% and 3%, respectively, and well below their world population shares of 18.6% and 8.1% (see Table 4-1).

Between 2022 and 2024, nominal emissions declined for Europa and North America, remained almost the same for Oceania and South America and increased for Asia and Africa.

Emissions from coal account for 41% of global emissions in 2024, followed by oil (32%) and gas (21%) (see Figure 4-7 and Table 4-4).

Over the total recording period (1750 – 2024), Asia, Europe and North America each account for approximately or close to one third of global emissions (see Table 4-1).

¹⁴ A considerable portion of the ~23% decline in European emissions in the 1990s was associated with the decommissioning of many East European industries after the fall of the Berlin Wall.



Table 4-1: Total CO₂ emissions by region from 1750 to 2024, in million t CO₂

Region	pre-1950	%	post-1950	%	Total	%	2024	%	% of world population in 2024
Africa	1 643	1%	52 482	3%	54 125	3%	1 502	4%	18.6%
Asia	11 936	5%	613 700	39%	625 635	35%	23 392	63%	58.9%
Europe	113 388	50%	439 483	28%	552 871	31%	4 881	13%	9.1%
North America	95 573	42%	404 968	26%	500 540	28%	6084	16%	4.7%
Oceania	1 722	1%	20 862	1%	22 584	1%	437	1%	0.6%
South America	1 698	1%	45 677	3%	47 489	3%	1110	3%	8.1%
Total	225 959		1 577 172		1 803 245		37 406		

Source: (Our World in Data, 2025)

Total GHG emissions, which include CO₂, methane¹⁵ and nitrous oxide¹⁶ from all sources (including land-use change) are approximately double total CO₂ emissions over the reporting timeframe¹⁷. In 2024, total GHG emissions exceeded CO₂ emissions by ~46%.

The most notable difference between the relative contributions to total GHG and CO₂ emissions is the higher relative contribution to GHG by Africa and South America (see Table 4-2). This most likely reflects lower fossil fuel use but higher incidence of land use changes (such as deforestation), agricultural activities that contribute to higher methane and nitrous oxide emissions, higher methane emissions from waste, and higher incidence of biomass burning, which releases methane and nitrous oxide.

¹⁵ Methane is primarily produced by agriculture (notably livestock and rice cultivation), biomass burning, decomposition of organic waste in landfills and as fugitive emission in fossil fuel production. Methane is a much stronger greenhouse gas than CO₂: over a 100-year timescale it is 28 times as potent as CO₂. Despite contributing a small amount of greenhouse gas emissions in terms of mass, methane has been responsible for around one-quarter of radiative forcing since 1750. Methane is a very 'short-lived' greenhouse gas: the average 'lifetime' of methane in the atmosphere is around 12 years. This means that reductions in methane *emissions* quickly result in reductions in the methane *concentrations* in the atmosphere (Our World in Data, 2024a).

¹⁶ Most nitrous oxide emissions come from agriculture, notably the application of (synthetic and organic) nitrogen fertilizers to soils, which makes more nitrogen readily available for microbes to convert to N₂O (because not all of the applied nutrients are taken up by crops). Nitrous oxide is a much stronger greenhouse gas than CO₂: over a 100-year timescale it is 265 times as potent as CO₂. The average 'lifetime' of nitrous oxide in the atmosphere is around 121 years, typically shorter than CO₂ (which can persist for centuries or even thousands of years), but longer than methane (Our World in Data, 2024a).

¹⁷ Measured in CO₂-equivalents over a 100-year timescale. Carbon dioxide is the most important greenhouse gas, but not the only one. To capture all greenhouse gas emissions, researchers express them in "carbon dioxide equivalents" (CO₂eq). This takes all greenhouse gases into account, not just CO₂. To express all greenhouse gases in carbon dioxide equivalents (CO₂eq), each one is weighted by its global warming potential (GWP) value. GWP measures the amount of warming a gas creates compared to CO₂. CO₂ is given a GWP value of one. If a gas had a GWP of 10 then one kilogram of that gas would generate ten times the warming effect as one kilogram of CO₂. Source: (Our World in Data, 2025)



Table 4-2: Total GHG emissions by region from 1850 to 2024, in million t CO₂-equivalent

Region	pre-1950	%	post-1950	%	Total	%	2024	%	% of world population in 2024
Africa	49 314	6%	224 933	8%	274 247	8%	4 771	9%	18.6%
Asia	206 703	23%	1 041 474	38%	1 248 177	35%	30 120	55%	58.9%
Europe	286 140	32%	599 749	22%	885 889	25%	6 676	12%	9.1%
North America	262 711	30%	558 592	21%	821 303	23%	7 849	14%	4.7%
Oceania	18 083	2%	50 198	2%	68 281	2%	748	1%	0.6%
South America	63 480	7%	247 986	9%	311 467	9%	4 269	8%	8.1%
Total	886 432		2 722 932		3 609 364		54 433		

Source: (Our World in Data, 2025)

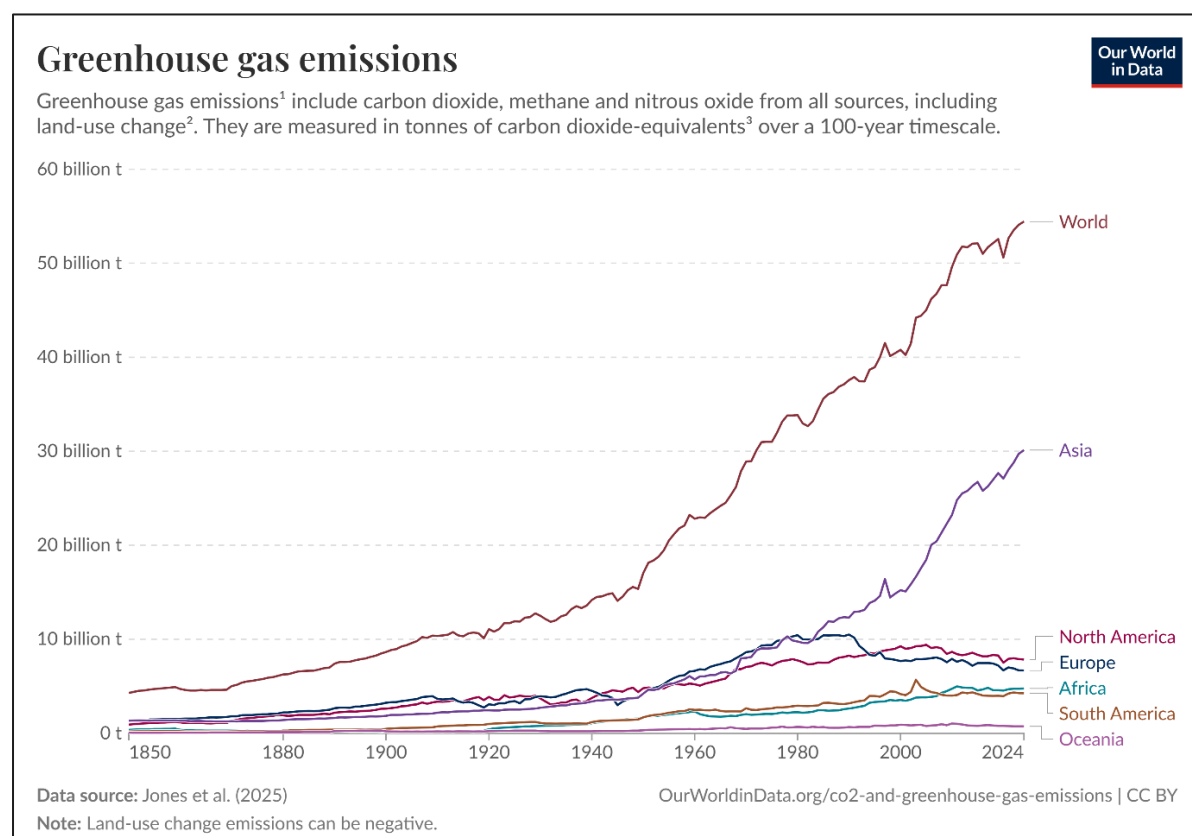


Figure 4-3: Annual GHG emissions by region, in absolute volumes

Source: Our World in Data (2025)

4.2.2.2 South African GHG Emissions

South Africa has contributed 0.63% (1.4 billion t CO₂) to global emissions *pre-1950* and 1.36% (21.3 billion t CO₂) *post-1950*. South Africa's *overall contribution* to historic global CO₂ emissions is 1.27% (22.8 billion t CO₂). For total GHG, the relative contribution is slightly lower (see Table 4-3).



In 2024, South African emissions of 440 million t CO₂ / 543 million t CO₂-e were somewhat higher than South Africa's 0.78% share of the global population. South African emissions in 2024 had declined from their peak by 11% for CO₂ (495 million t CO₂ in 2008) and 12% for GHG (618 million t CO₂-e in 2008) (see Table 4-3 and Figure 4-4).

Average *per capita* CO₂ emissions in 2024 were 6.87 t in South Africa (8.5 t for total GHG), down from a high of 9.7 t per capita in 2008 (or 12.6 t in 1956 for GHG), and 43rd highest in the world in 2024. By way of example, South African emissions were (Our World in Data, 2025):

- Very similar to that of Germany (6.8 t per capita), New Zealand (6.3 t) and Austria (6.2 t);
- Lower than those of the Middle East (~25 t), the United States (14.2 t), Canada (13.4 t), Russia (12.3 t), China (8.3 t) and Germany (8.7 t); and
- Higher than those of the UK (4.6 t) (which uses a lot of wind energy), France (4 t) (which uses a lot of nuclear energy), Brazil (2.3 t) (with extensive hydropower) and India (2.2 t), as well as world average of 4.7 t CO₂ per capita (see Figure 4-5).

Table 4-3: South African CO₂ and GHG emissions in million t CO₂-e

	pre-1950 ¹⁸	%	post-1950	%	Total	%	2024	%	% world population
CO ₂	1 432	0.63%	21 395	1.36%	22 827	1.27%	440	1%	0.78%
GHG	4 174	0.47%	29 425	1.08%	33 599	0.93%	543	1%	

Source: (Our World in Data, 2025)

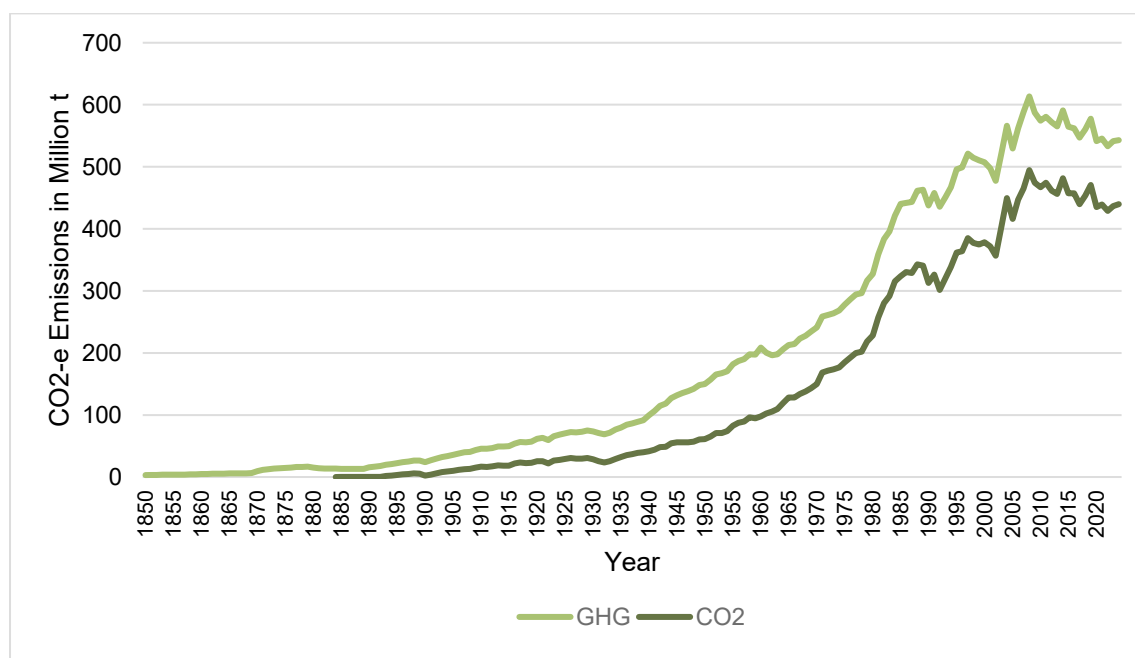


Figure 4-4: South African annual CO₂ and GHG emissions in million t CO₂-e

Source: (Our World in Data, 2025)

¹⁸ CO₂ from 1884, GHG from 1850



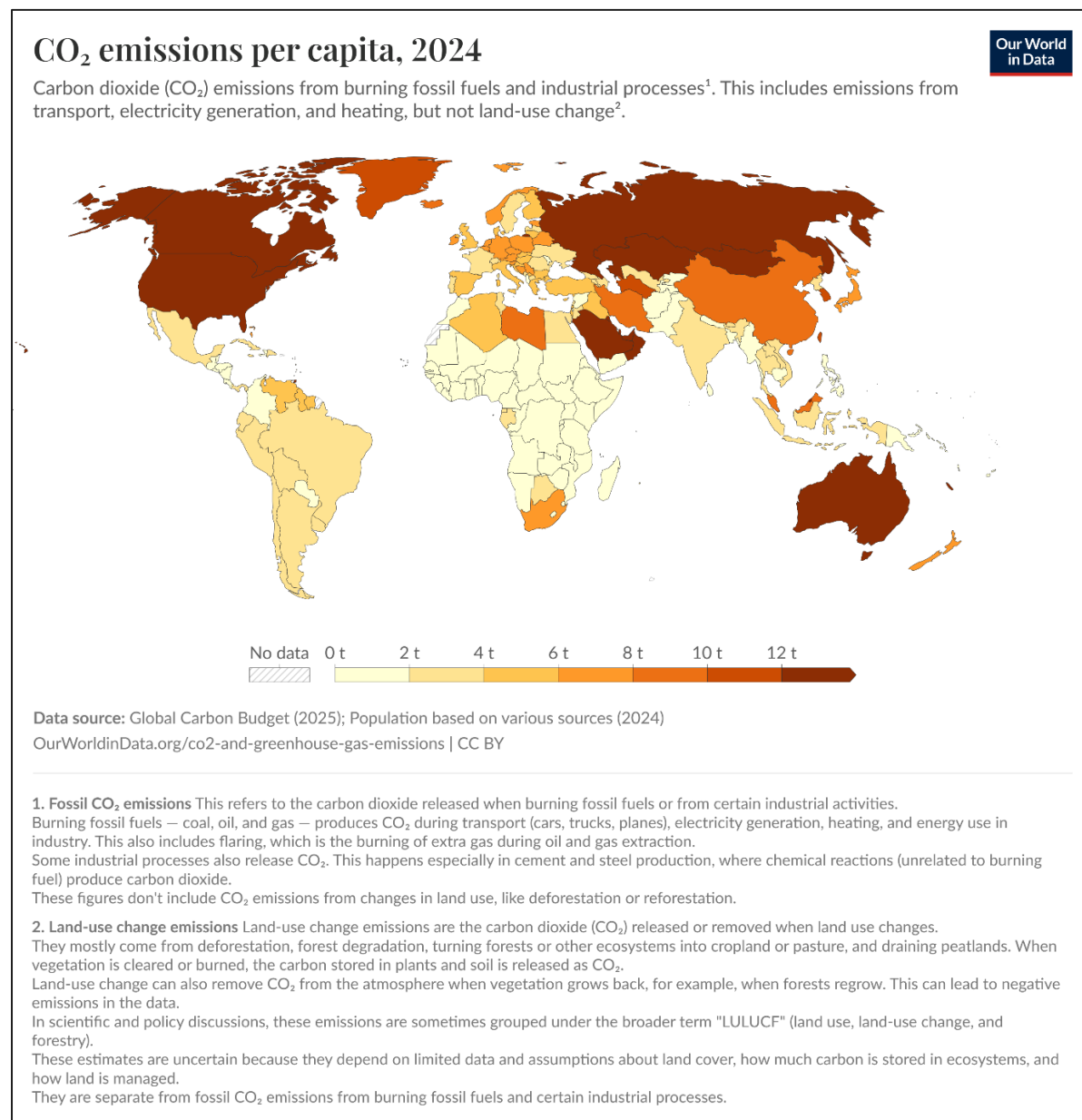


Figure 4-5: Per capita CO₂ emissions, 2024

Source: (Our World in Data, 2025)

Pre-1950, nearly all African CO₂ emissions could be attributed to South Africa. Since then (1950 inclusive), African CO₂ emissions growth of 1 843% has far outstripped South African CO₂ emissions growth of 626% (see Figure 4-6).



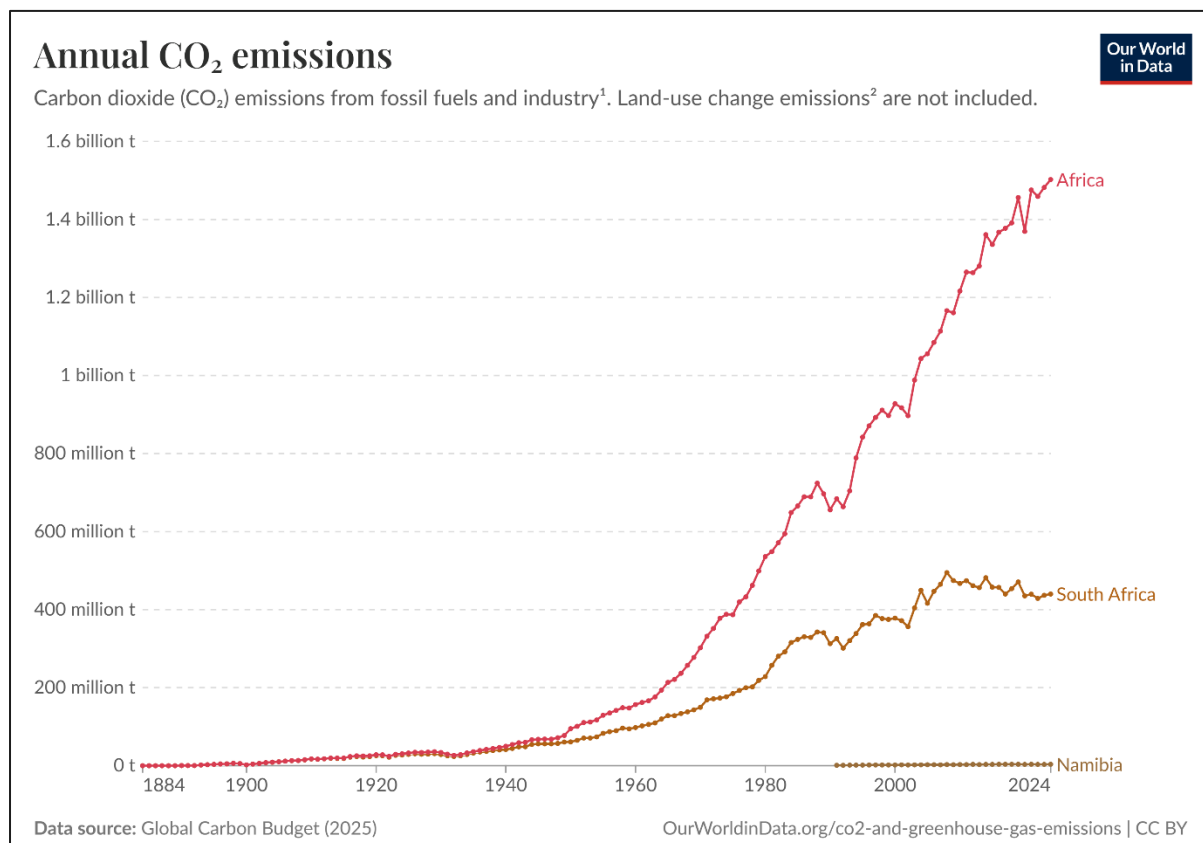


Figure 4-6: South African and African CO₂ emissions 1884 – 2024

Source: (Our World in Data, 2025)

Some 84.4% of South African CO₂ emissions are coal-related, which is double the world average of 40.9% of CO₂ emissions arising from coal. This is due to a virtual absence of gas and relatively low contribution of oil to South Africa's energy consumption, which is almost wholly reliant on coal (see Figure 4-7 and Table 4-4). In 2024, energy consumed in South Africa was derived from coal (71.8%), oil (22.4%), renewables (3.3%¹⁹), gas (3.5%), nuclear (1.4%) and hydropower (0.2%) (see Figure 4-8).

¹⁹ Comprised of wind at 2.0% of overall energy consumption, solar at 1.2% and other renewables at 0.1%



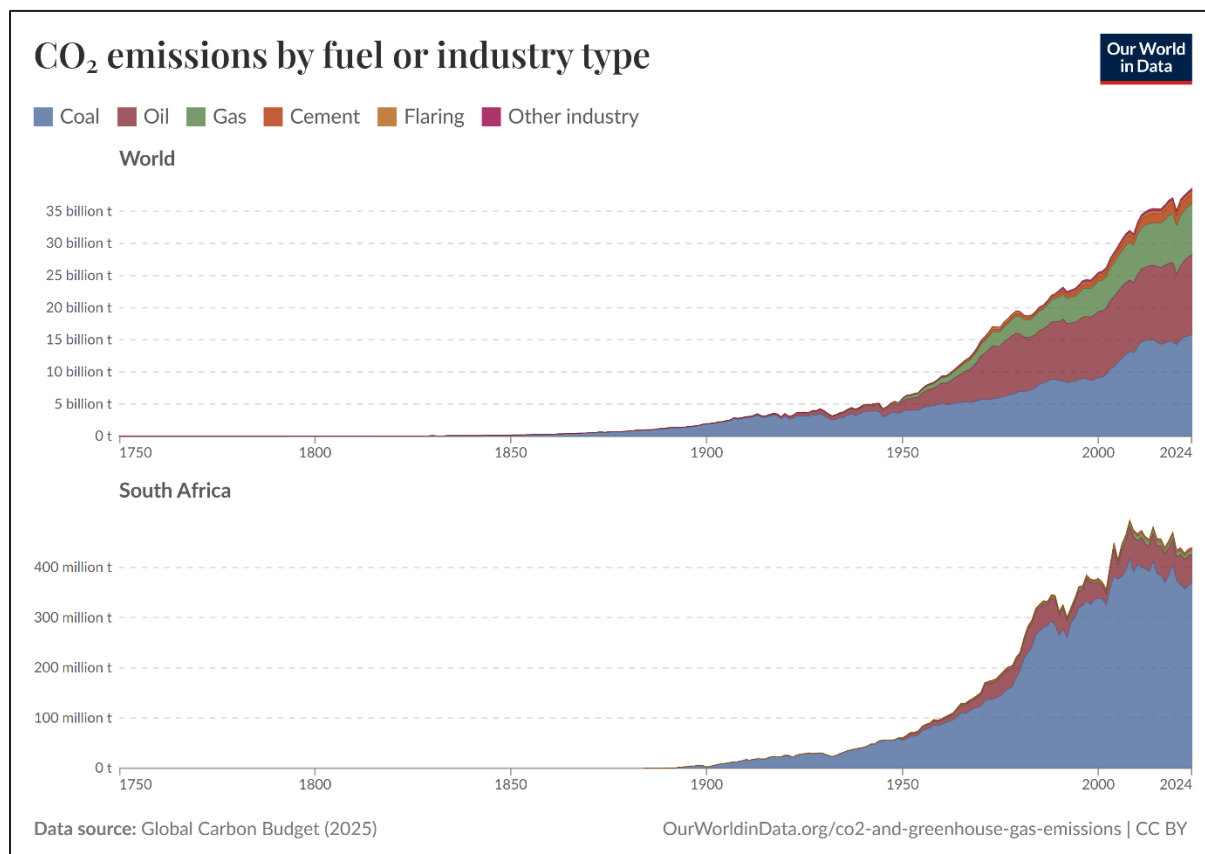


Figure 4-7: CO₂ emissions by fuel or industry type – World and South Africa

Source: (Our World in Data, 2025)

Table 4-4: CO₂ emissions by fuel or industry type – World and South Africa, 2024 (in million t CO₂)

Emission source	World	%	South Africa	%
Coal	15 805	40.9%	371	84.4%
Oil	12 471	32.3%	55	12.5%
Gas	8 010	20.8%	8	1.8%
Cement	1 473	3.8%	6	1.3%
Flaring	416	1.2%	0.005	0.001%
Other industry	424	1.1%	-	-
Total	38 599		440	

Source: (Our World in Data, 2025)



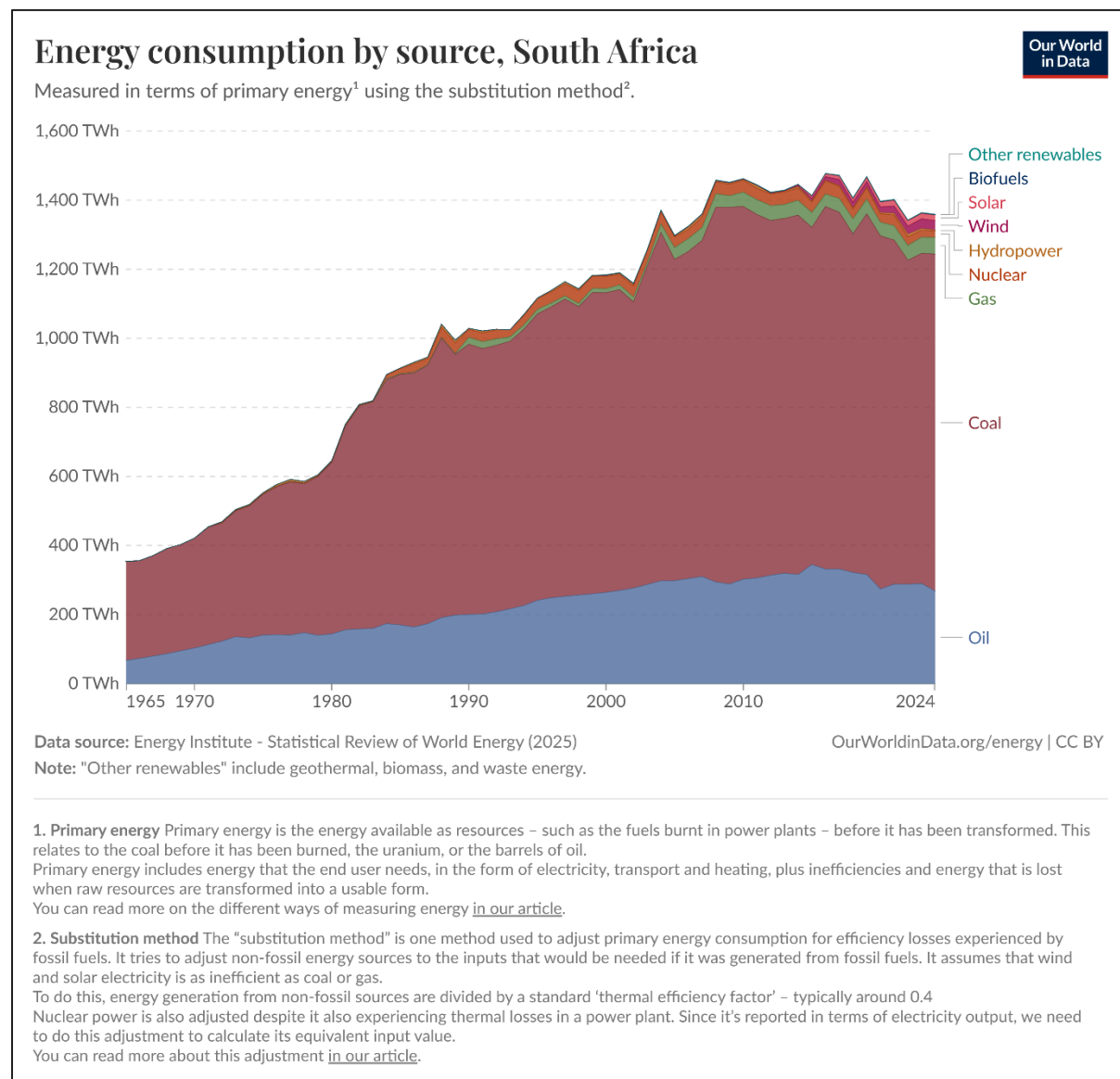


Figure 4-8: South African energy sources

Source: (Our World in Data, 2025)

As a signatory to the Paris Agreement, South Africa has committed to reducing its GHG emissions and contributing to the global effort to combat climate change. The country's coal-heavy energy sector is a key focus area for achieving these goals.

The NDC outlines a country's plans to mitigate carbon emissions. South Africa's NDC aims to reduce emissions to between 398 and 510 Mt CO₂-e by 2025 and between 420 and 350 Mt CO₂-e in 2030. South Africa's total GHG emissions (including land use) of 543 Mt CO₂-e in 2024 fall outside the upper end of the 2025 NDC target range.

In support of these objectives, national energy planning recognises the role of natural gas as a transition fuel that can facilitate the gradual shift away from coal while maintaining energy security (see Section 4.2.6.1) and supporting economic development (see Section 4.2.6.2). Natural gas is therefore considered an important component of the future energy mix, complementing the expansion of renewable energy technologies envisaged in the IRP (see Section 2.3.1.3) and contributing to South Africa's longer-term ambition of achieving carbon neutrality by 2050.



4.2.3 Current Energy and Gas Consumption

4.2.3.1 Global Consumption

Fossil fuel consumption remains high globally, and the share of fossil fuels in overall energy provision remained steady at a share of 86.3% in 2025 (slightly down from 86.6% in 2024, but slightly increased contribution of 517 Exajoules compared to 413 Exajoules in 2024 due to overall growth of energy consumption) (see Figure 4-9 and Table 4-5):

- Oil continues to provide nearly one third (33.5%) of the world's energy consumed, and consumption remained stable with a 0.1% decrease in 2025;
- Coal provided 27.7% of global energy in 2025, with a small decrease of 0.2% from 2024; and
- Natural gas provided 25.1% of energy in 2025 and consumption remained stable as compared to 2024.

Low-carbon energy sources (renewables, nuclear and hydro) jointly produced 13.8% of global energy in 2025 (or 82.61 Exajoules), a slight increase from 13.3% in 2024:

- Renewables provided 5.9% of overall energy consumed in 2025 and have become the fourth largest energy source – but provide less than a 10th of the energy produced by fossil fuel sources (see Table 4-5). Renewables showed the largest growth of ~10% from 2024 to 2025. Renewables (primarily solar) accounted for some ~75% of *new* capacity installed globally in 2021, followed by gas, which accounted for ~10% of new installed capacity (see Figure 4-10).
- Other low-carbon energy sources include hydropower (2.7% of energy production in 2025) and nuclear power (5.2% in 2025).

Table 4-5: Energy sources globally 2024 – 2025, in Exajoules

Energy source	2024	% of total	2025	% of total	Growth 2024-2025
Oil	199.04	33.6%	200.97	33.5%	0.97%
Coal	165.35	27.9%	166.03	27.7%	0.41%
Natural Gas	148.72	25.1%	150.70	25.1%	1.33%
Renewables	32.24	5.4%	35.45	5.9%	9.96%
Hydro electric	16.10	2.7%	16.12	2.7%	0.12%
Nuclear energy	30.71	5.2%	31.04	5.2%	1.07%
Total	592.16		600.31		1.38%

Source: (Energy Institute, 2026)



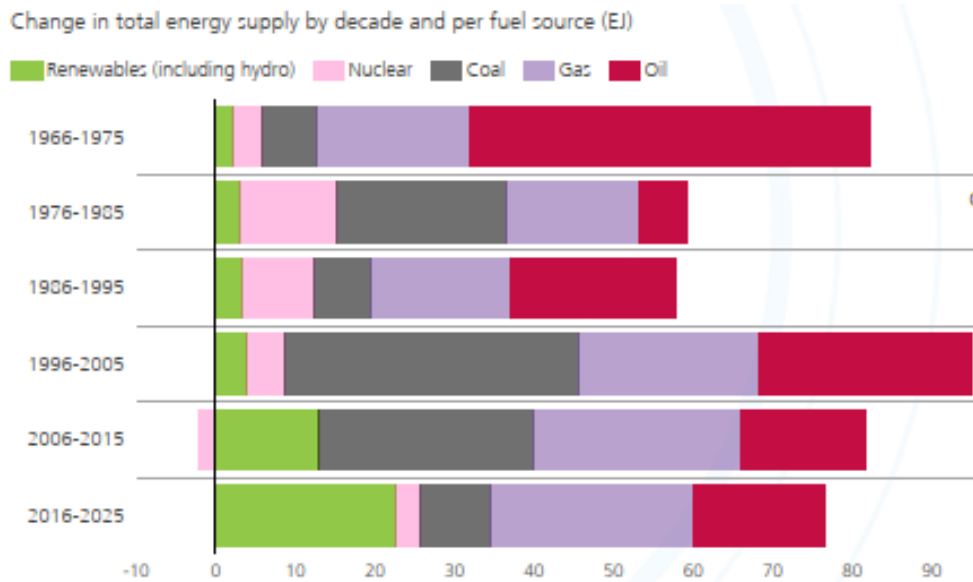


Figure 4-9: Global energy sources 2000-2023, in Exajoules

Source: (Energy Institute, 2026)

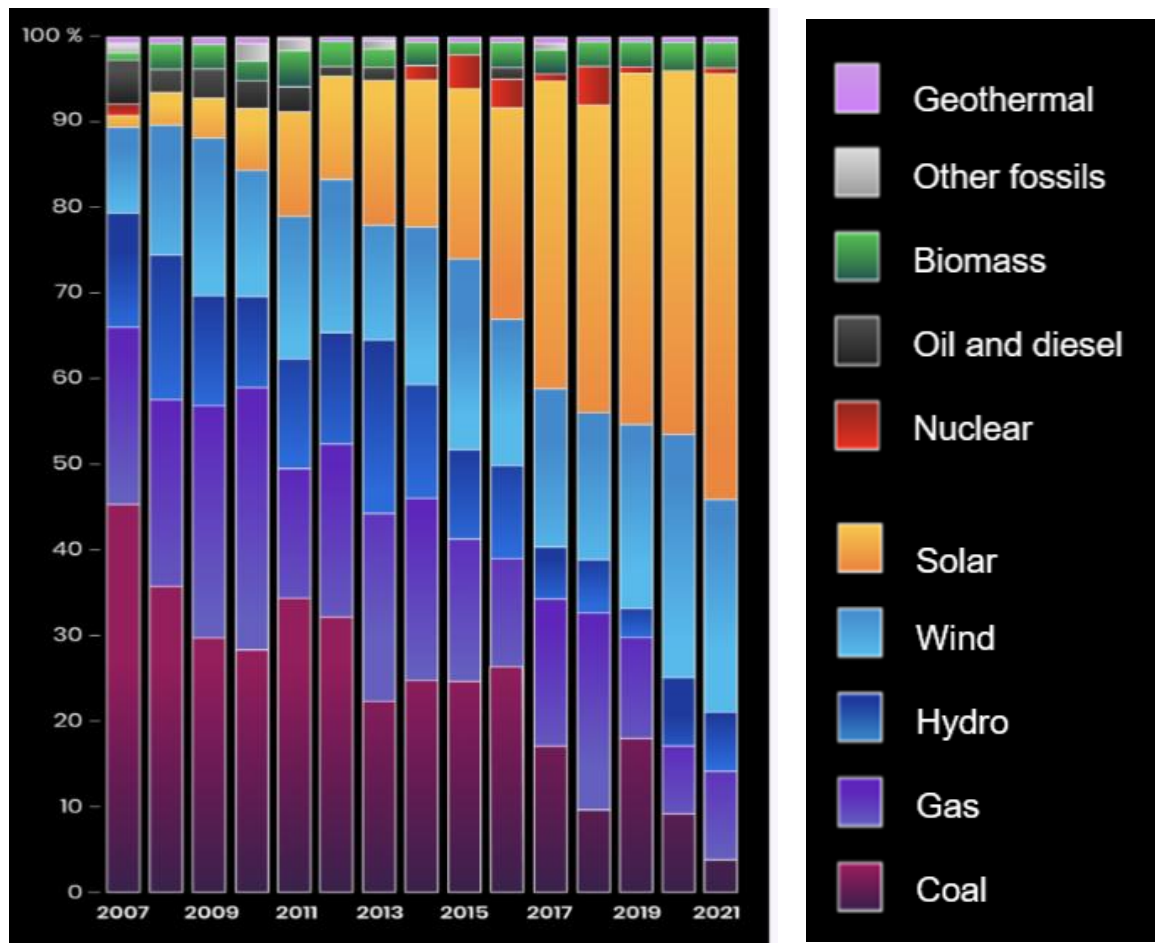


Figure 4-10: New generation capacity installed globally (percent), 2007-21

Source: (ThePioneer, 2022)



Regionally, fossil fuels provided between 69% (in Europe) and 98% (in the Middle East) of energy in 2025 (see Table 4-6 and Figure 4-11), with energy predominant sourced from:

- Coal in the Asia Pacific Region;
- Oil in North America, South and Central America, Europe and Africa; and
- Natural Gas in the Commonwealth of Independent States (CIS) Region and the Middle East.

Table 4-6: Share of fossil, renewable and low-carbon energy sources by region in 2025

Fuel source	North America	South and Central America	Europe	CIS	Middle East	Africa	Asia Pacific
Fossils	83%	75%	74%	91%	98%	94%	88%
Renewables	6%	13%	11%	0.4%	1%	3%	6%
Hydro and nuclear	11%	11%	15%	9%	1%	4%	6%

Source: (Energy Institute, 2026)

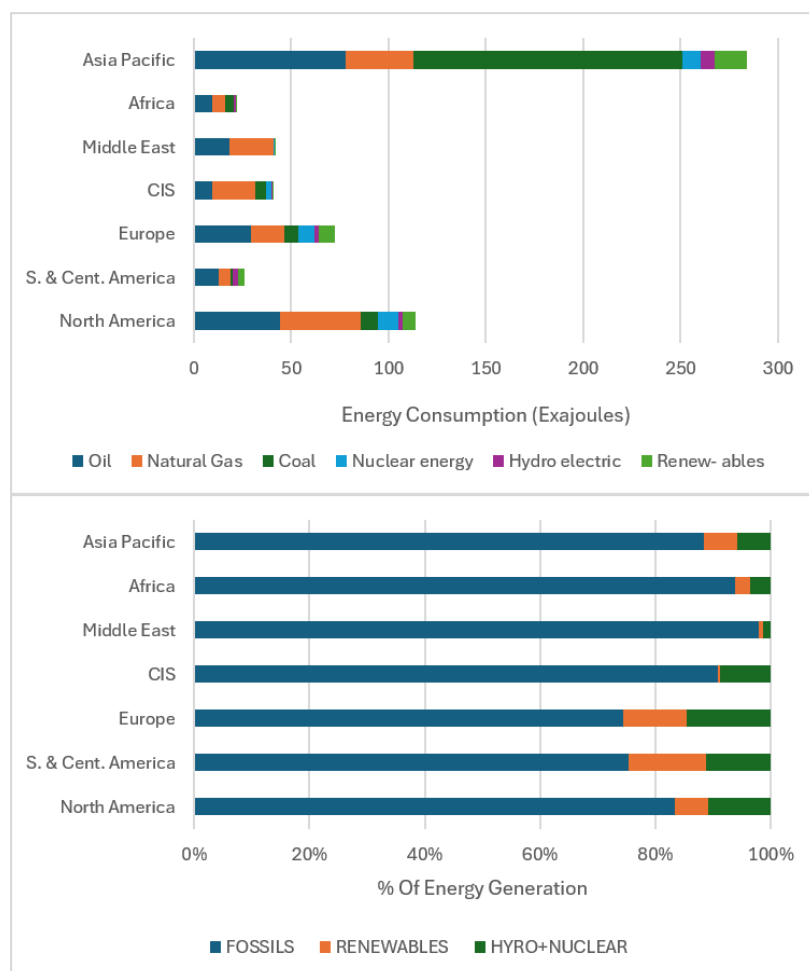


Figure 4-11: Energy sources per region in 2022 (absolute and relative)

Source: (Energy Institute, 2026)



Oil and gas consumption has considerably increased from 1965 to 2025. Global gas consumption grew by 20.62% from 3 470.5 (2015) to 4 186 (2025) billion cubic metres (bcm) (see Figure 4-12).

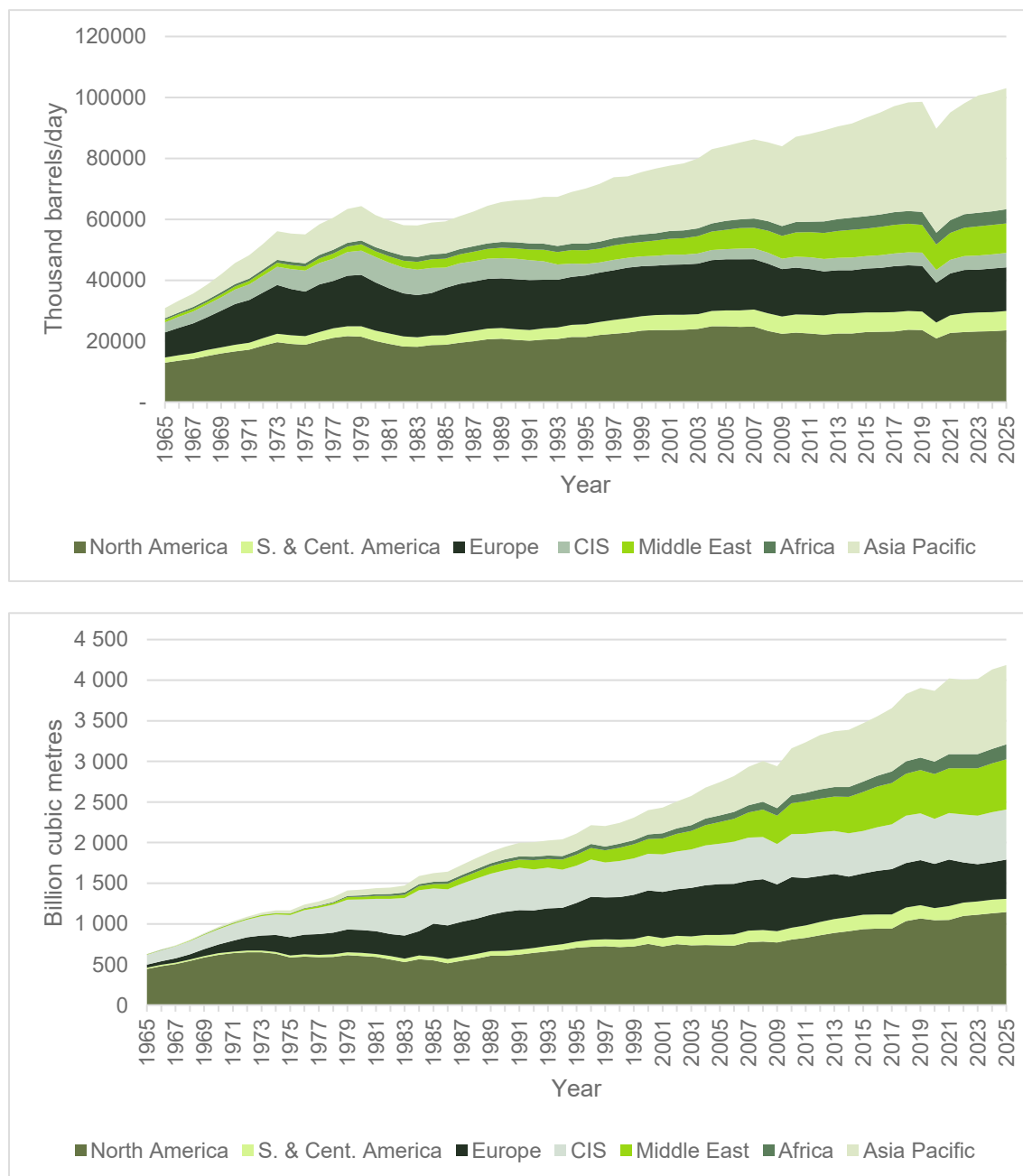


Figure 4-12: Global oil (top) and gas (bottom) consumption 1965 to 2025

Source: (Energy Institute, 2026)

Overall, global natural gas output and demand increased by 1.6% in 2025. The modest 0.6% rise in gas-fired electricity generation indicates that most of the growth in gas consumption came from other sectors, particularly energy-intensive industries such as chemicals. Regional demand growth was strongest in Europe (4.2%), followed by Africa (3.6%) and the Middle East (2.9%). North America recorded a 1.6% increase, while consumption in the Asia-Pacific region remained relatively stable, expanding by just 0.3% (Energy Institute, 2026).



Year-on-year growth remains somewhat volatile, as it is heavily influenced by global economic activity, but year-on-year consumption *growth* has generally declined from ~5% in the mid-1960s to closer to ~0% – 3% in 2025. As such, while growth has slowed, it has remained overall positive. Oil consumption has remained stable in recent years, while gas consumption still continues to grow.

Five countries (the United States, Russian Federation, China, Iran and Saudi Arabia) accounted for half of the world's gas consumption in 2025, with the 20 largest gas consumers accounting for 78% of total consumption. Fifteen of the top 16 consumers had average annual increases in oil consumption between 2015 and 2025, while only four showed a decrease in consumption over the past 10 years (see Table 4-7).

Table 4-7: List of 20 largest gas consumers in 2025

Country	Consumption in 2025 (bcm)	Share of global Consumption 2025	Growth (pa) in Consumption 2015-25
United States	913.4	21.8%	2.1%
Russian Federation	480	11.5%	1.6%
China	441.9	10.6%	8.5%
Iran	256.3	6.1%	3.4%
Saudi Arabia	133.8	3.2%	3.0%
Canada	132.3	3.2%	1.8%
Mexico	99.7	2.4%	2.1%
Japan	90.4	2.2%	- 2.7%
Germany	78.5	1.9%	0.2%
United Arab Emirates	70.6	1.7%	- 0.1%
India	66.6	1.6%	3.4%
South Korea	63.0	1.5%	3.3%
Egypt	61.5	1.5%	2.9%
United Kingdom	61.2	1.5%	- 1.6%
Italy	60.1	1.4%	- 0.7%
Turkey	56.4	1.3%	2.1%
Algeria	54.0	1.3%	3.6%
Indonesia	48.3	1.2%	0.3%
Thailand	47.3	1.1%	- 0.7%
Malaysia	46.2	1.1%	- 0.1%

Source: (Energy Institute, 2026)

4.2.3.2 South African Consumption

Fossil fuel consumption in South Africa remains high, and the share of fossil fuels in overall energy provision remained steady at 95.5%% in 2025 (or 4.8 Exajoules) (see Table 4-8 and Figure 4-13):

- Coal provided 72.6% of South African energy in 2025, a 1.6% decrease from 2024 indicative of suppressed economic activity, load shedding and declining coal-fired capacity;
- Oil provided 19.5% of South African energy in 2025, an increase of 2.1% compared to 2025 (possibly related to increased diesel-generated power to supplement declining coal-fired capacity); and
- Natural gas provided 3.4% of energy in 2025, a similar value to 2024.



Low-carbon energy sources (renewables, nuclear and hydro) jointly produced 4.8% of South African energy in 2025 (or 0.24 Exajoules):

- Renewables provided 2.2% of overall energy consumed in 2025 and have become the fifth largest energy source, having increased marginally as compared to 2024; and
- Other low-carbon energy sources include nuclear power (2.4% in 2025) which significantly increased in 2025 as compared to 2024 (33.3% growth), albeit from a low base.

Table 4-8: Energy sources South Africa 2023 – 2024, in Exajoules

Energy source	2024	% of total	2025	% of total	Growth 2024-2025
Oil	0.96	19.0%	0.98	19.5%	2.1%
Natural Gas	0.17	3.4%	0.17	3.4%	0.0%
Coal	3.72	73.7%	3.65	72.6%	-1.9%
Nuclear energy	0.09	1.8%	0.12	2.4%	33.3%
Hydro electric	-	-	0.01	0.2%	n/a
Renewables	0.11	2.2%	0.11	2.2%	0.0%
Total	5.05		5.03		

Source: (Energy Institute, 2026)

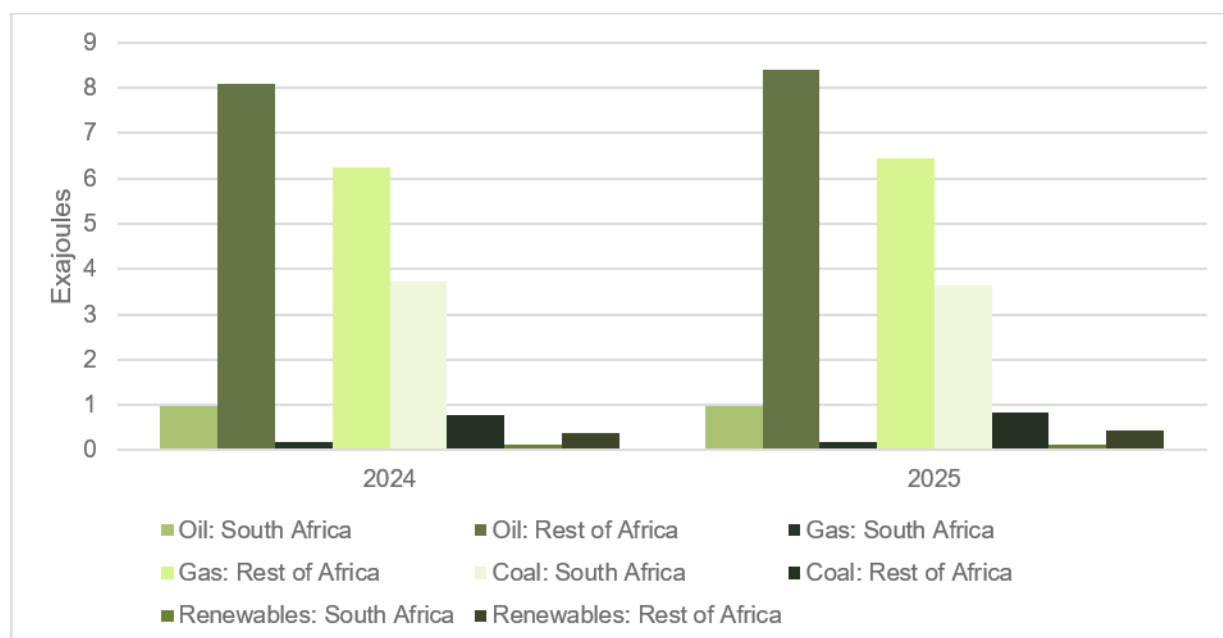


Figure 4-13: Total energy supply in South Africa and Africa in 2024 and 2025 (in Exajoules)

Source: (Energy Institute, 2026)

Gas consumption in South Africa was approximately 4.7 bcm in 2025, slightly decreased from the total consumption of 4.8 bcm in 2024. South African gas consumption accounted for 0.1% of global consumption and 2.5% of African consumption in 2025 (Energy Institute, 2026).



Natural gas in South Africa is primarily used for chemical and industrial heating applications in industry clusters located in Gauteng and KwaZulu Natal that are supplied by the Romco and Lily gas pipelines. Consumers of natural gas in South Africa include companies in a wide range of sectors (Human, 2024), such as:

- Building and other materials (e.g. glass, ceramics, aluminium, steel), including ArcelorMittal, Ardagh Group, CBC Fasteners, Ceramic Industries, Columbus Stainless Steel, Consol, Corobrik, Hulamin, norcross, PFG Building Glass, Samancor Chrome, Sarco, Scaw Metals Group, Wispeco Aluminum;
- Food (e.g. sugar, beverages), including AB InBev, AVI, Coca Cola, Illovo, SAB;
- Packaging and paper, including Mondi, Mpact;
- Refining and beneficiation, including ArcelorMittal, Rand Refinery, South32, Tronox; and
- Manufacturing (e.g. chemicals, parts, plastics), including AlchoNCP, Brochem, Brother CISA, Ingrain, Isegen, Lanxess, Maxion Wheels, Metsep.

While many companies are actively exploring alternatives to gas use, some applications (such as industrial heat or chemical processes) cannot currently be replaced effectively with electricity-based technologies (Human, 2024).

South African industrial gas users had a joint turnover of approximately R600 billion in 2023 and employ some 60 000 to 70 000 people (Human, 2024). Gas is also used in households and catering businesses for cooking and heating.

South Africa generates virtually no electricity using gas. The open cycle gas turbine power plants installed in South Africa, including Ankerlig (1327 MW, Cape Town, WC), Gourikwa (740MW, Mossel Bay, WC), Avon (670MW, Shakaskraal, KZN) and Dedisa (335 MW, Gqeberha, EC) operate on diesel rather than gas, due to unavailability of a secure gas supply.

Within the African context (see Figure 4-13 and Table 4-9):

- South Africa accounts for most of the coal consumption on the continent, owing to its comparably coal-intensive economy (see Figure 4-7 and Figure 4-8);
- Conversely, South Africa accounts for a small proportion of African oil and, particularly, gas consumption. Oil and gas consumption has grown at a much faster pace in the rest of Africa than in South Africa, especially since the 2000s for gas; and
- Renewables have only recently started contributing to the energy supply. South Africa consumed about one fifth of the continent's total renewable energy in 2025. While renewable energy generation growth rates in South Africa and the rest of Africa were broadly similar between 2000 and 2025, they significantly accelerated in the rest of Africa and surpassed those in South Africa from 2015 onwards.



Table 4-9: Africa and South Africa energy consumption (Exajoules)

Resource	Region	% of 2025 Africa share (Ej)	Consumption growth (Ej)	Growth period
Coal	South Africa	81%	254%	1965 - 2025
	Rest of Africa	-	546%	
Oil	South Africa	10%	308%	1965 - 2025
	Rest of Africa	-	758%	
Gas	South Africa	3%	1 600%	1975 - 2025
	Rest of Africa	-	3 300%	
Renewables	South Africa	21%	1 000%	2000 - 2025
	Rest of Africa	-	1 333%	

Source: (Energy Institute, 2026)

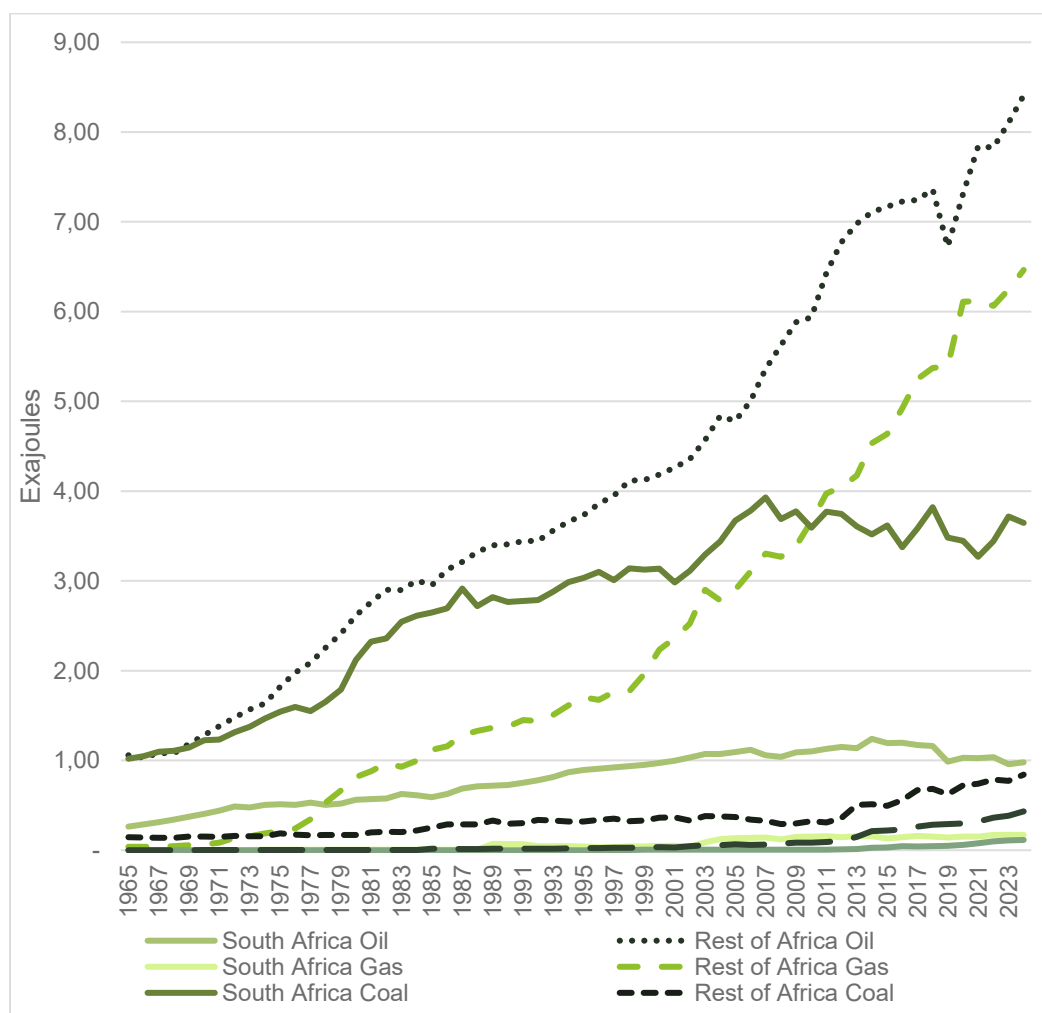


Figure 4-14: Consumption over energy sources time in South Africa and the rest of Africa over time (1965 to 2025)

Source: (Energy Institute, 2026)



4.2.4 Current Gas Supply

4.2.4.1 Global Supply

Overall global oil and gas supply mirror the consumption patterns described in Section 4.2.3.1 and have increased by 213% from 32 to 100 million bbl/day respectively between 1965 to 2023 for oil and by 330% from 976 to 4 197 bcm between from 1970 to 2023 for gas.

Year-on-year growth remains somewhat volatile, as it is heavily influenced by global economic activity. Nevertheless, over the 2015-2025 period, average annual growth rates slowed to approximately 0.9% for oil and 1.8% for gas. As such, while production *growth* has slowed, it has remained overall positive. While oil production has been stable, gas production is still continuing to grow (Figure 4-15).

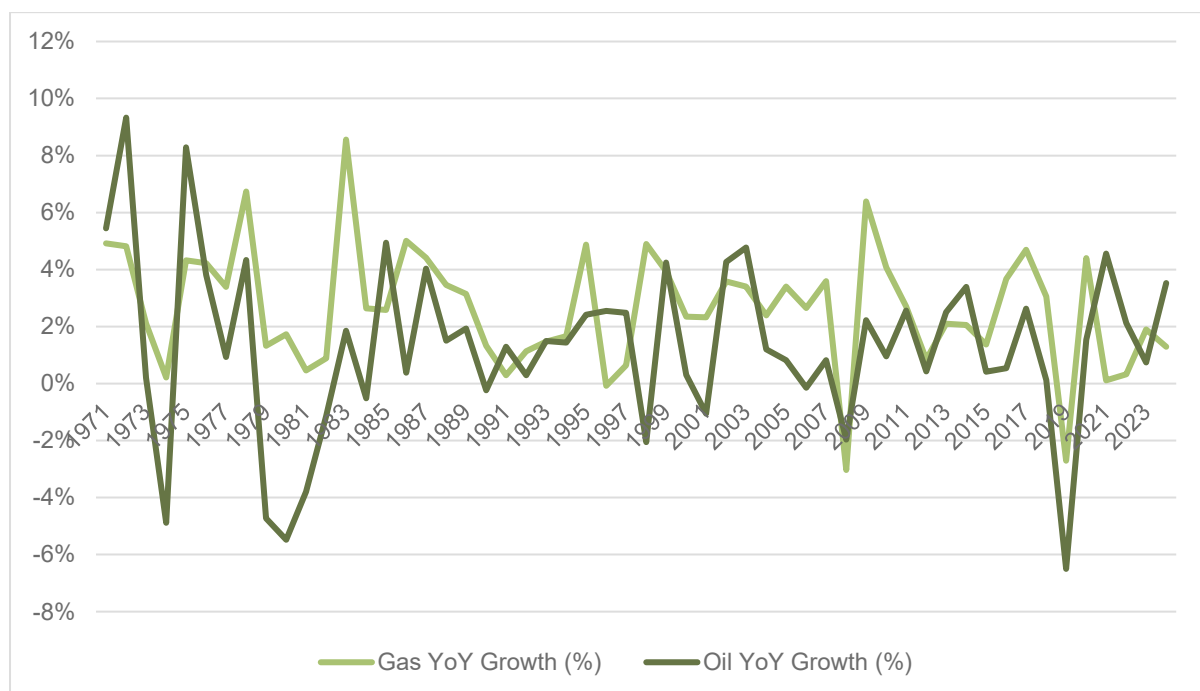


Figure 4-15: Year on year growth rate of oil and gas production globally

Source: (Energy Institute, 2026)



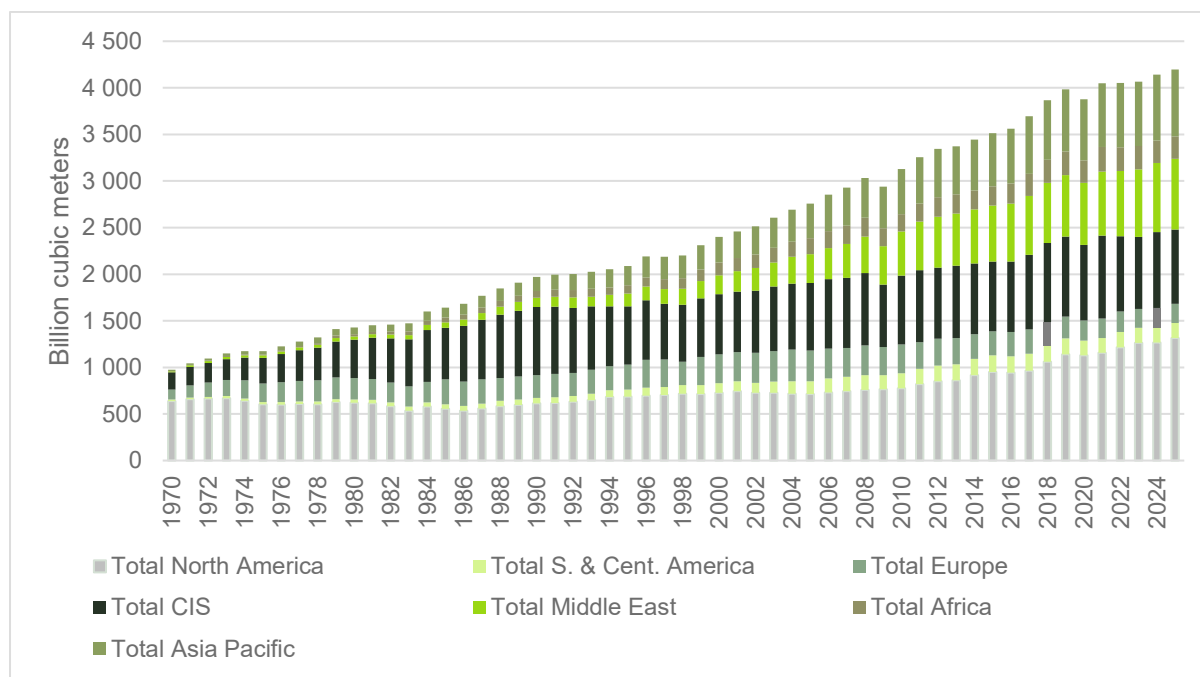


Figure 4-16: Global gas production 1970 to 2022

Source: (Energy Institute, 2026)

The 20 largest gas producers jointly accounted for 87% of global gas production in 2025. The United States and the Russian Federation also account for 40% of all gas produced in 2025 (see Table 4-10 and Figure 4-16).

All except three of the 20 largest gas producers have continued to increase their average annual production rates between 2015 and 2025, most significantly in China. Gas production has only declined in Indonesia, Egypt and Uzbekistan between 2015 and 2025 (see Table 4-10).

Table 4-10: List of 20 largest gas producers in 2025

Country	Production in 2025 (bcm)	Share of global production 2025	Growth (pa) in production 2015-25
US	1073.7	25.6%	3.8%
Russian Federation	609.4	14.5%	0.4%
Iran	264.8	6.3%	3.7%
China	264.1	6.3%	6.9%
Canada	206.2	4.9%	2.5%
Qatar	183.5	4.4%	0.4%
Australia	148.6	3.5%	7.2%
Saudi Arabia	133.8	3.2%	3.0%
Norway	120.6	2.9%	0.5%
Algeria	98.0	2.3%	1.9%
Malaysia	80.2	1.9%	0.4%
Turkmenistan	72.4	1.7%	1.0%
Indonesia	71.8	1.7%	-1.9%
UAE	58.6	1.4%	-
Nigeria	50.8	1.2%	0.7%



Country	Production in 2025 (bcm)	Share of global production 2025	Growth (pa) in production 2015-25
Oman	45.6	1.1%	1.0%
Argentina	45.2	1.1%	2.4%
Egypt	40.8	1.0%	-0.4%
Uzbekistan	40.0	1.0%	-2.5%
Mexico	38.4	0.9%	3.5%

Source: (Energy Institute, 2026)

Overall exploration activity has declined in recent years compared with previous decades, as fewer wells were drilled (see Figure 4-17), while the average volume of resource found per well drilled (including dry wells) remains stable at ~30 million boe. Since 2000, an overwhelming majority of large discoveries lie in deepwater basins (see Figure 4-18) (Wood Mackenzie, 2024).

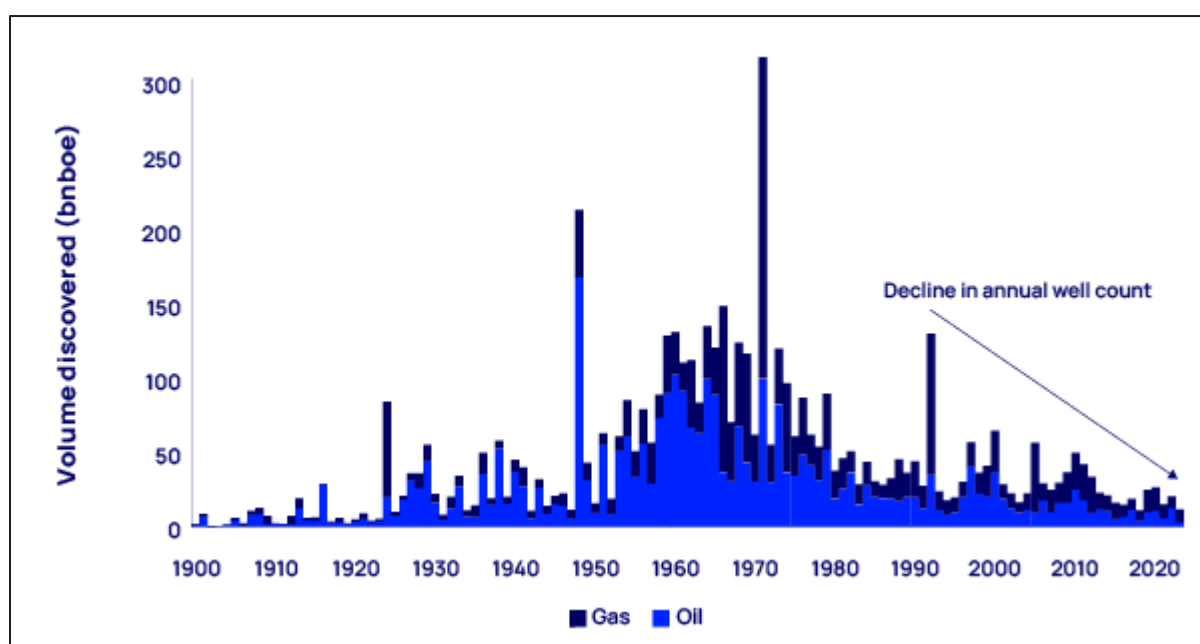


Figure 4-17: Conventional oil and gas discoveries since 1900

Source: (Wood Mackenzie, 2024)

High impact exploration²⁰ is expected to remain stable in 2025 compared to previous years, with 65-75 high impact wells expected to be drilled worldwide in 2025 (compared to 66 to 83 high impact wells drilled annually between 2020 and 2024, see Figure 4-19) (Offshore Magazine, 2025).

²⁰ High impact exploration refers to drilling activities aimed at discovering large, commercially viable quantities of oil and gas. These explorations target significant resources that can justify the development of new infrastructure and have the potential to transform the energy landscape of a region, and that only begin to add revenues several years into the future.



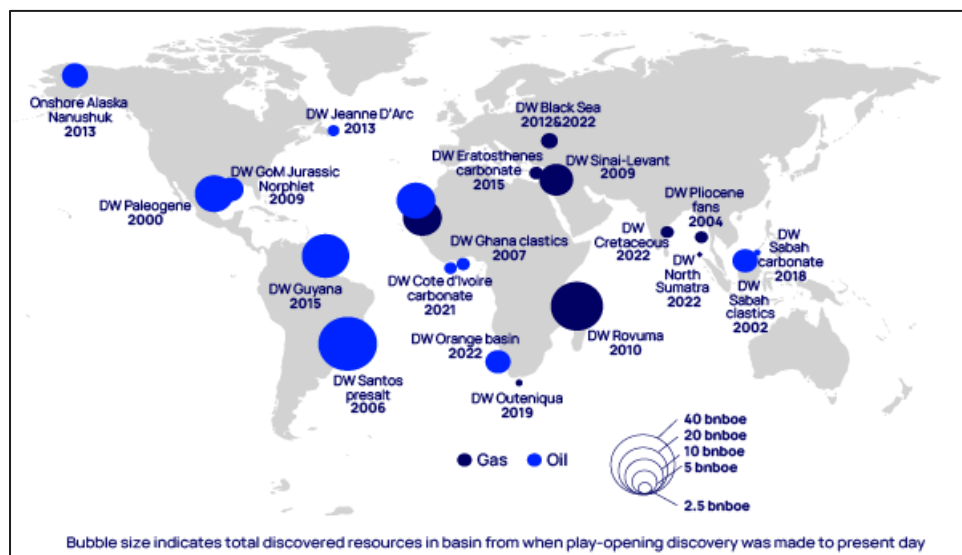


Figure 4-18: New discoveries since 2000

Source: (Wood Mackenzie, 2024)

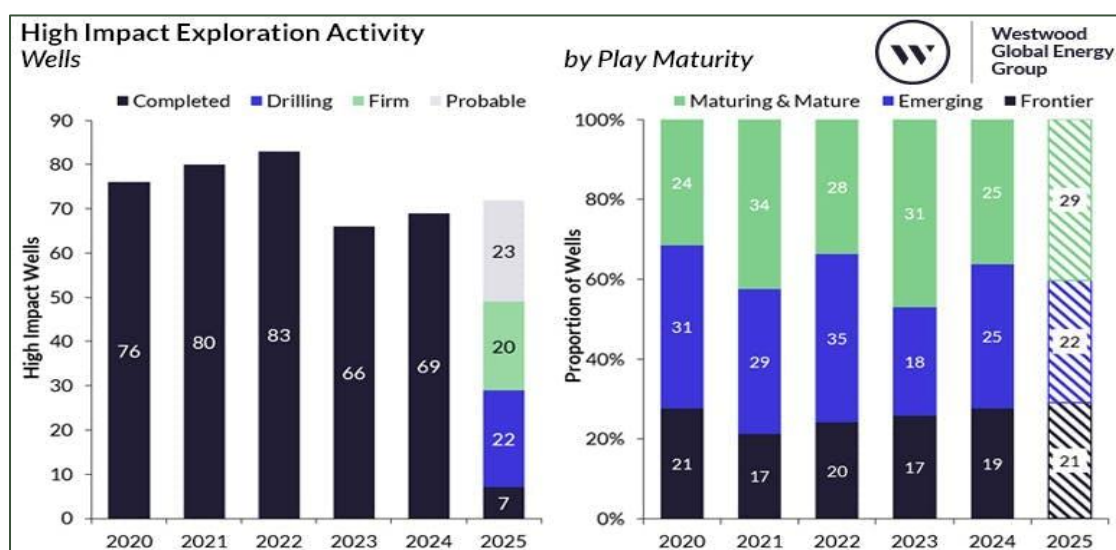


Figure 4-19: High impact well drilling activity 2020 – 2025²¹

Source: (Offshore Magazine, 2025)

Exploration focus areas in 2025 include the West Coast of central and southern Africa, east and north coasts of South America, the Gulf of Mexico, the North / Norwegian Sea, the China South Sea, Bengal Sea and the Black Sea (see Figure 4-20).

²¹ Frontier is defined as having no production from similar reservoirs in the same basin. Emerging relates to areas where initial exploration has identified potential hydrocarbon resources. Mature refers to formations that have been extensively explored and developed over a long period.



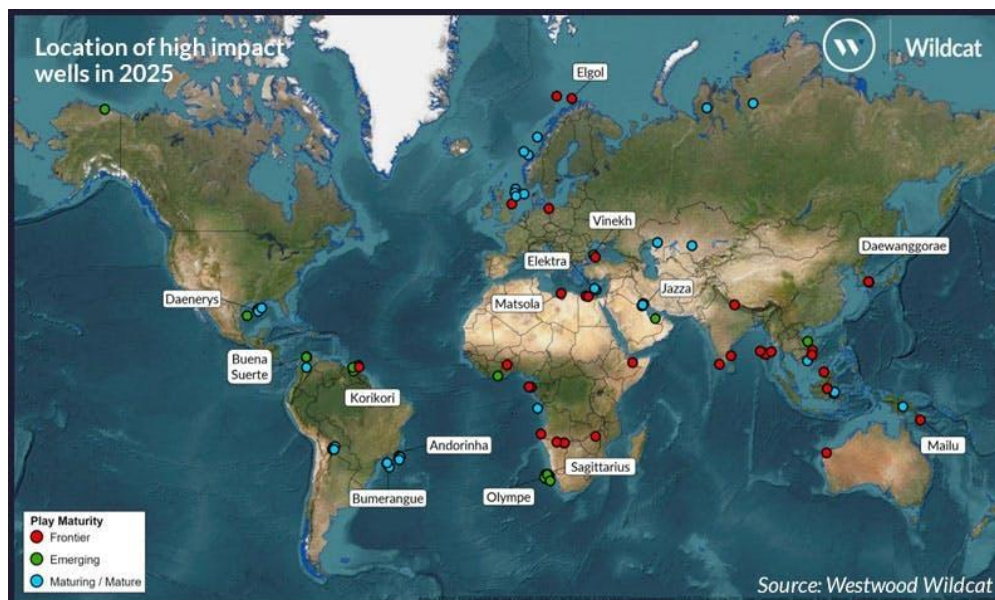


Figure 4-20: Expected high impact well drilling focus in 2025²²

Source: (Offshore Magazine, 2025)

Reasons for continued high impact exploration cited by Wood Mackenzie (2024) include:

- Improvement of portfolio quality by adding more “advantaged barrels” (oil and gas resources that are economically attractive and environmentally favourable) even with retreat from oil and gas under an accelerated energy transition scenario (with production growth or replacement secondary considerations in many cases);
- Better returns when discovering rather than buying new advantageous assets; and
- Lower scope 1 and 2 emissions in new fields thanks to modern decarbonisation technologies and higher facilities throughput²³, while retrofitting old fields is expensive.

The IEA also notes that nearly 90% of annual upstream oil and gas investment since 2019 has been dedicated to offsetting production declines rather than to meet demand growth. Filling the remaining supply gap to maintain today’s production through to 2050 would require annual discoveries of 10 billion barrels of oil and around 1 000 bcm of natural gas. These amounts are just above what has been discovered annually in recent years. Developing these resources would add around 18 mb/d and 650 bcm of new oil and gas production by 2050 (IEA, 2025).

²² Frontier is defined as having no production from similar reservoirs in the same basin. Emerging relates to areas where initial exploration has identified potential hydrocarbon resources. Mature refers to formations that have been extensively explored and developed over a long period.

²³ With minimal influence on demand, such benefits are limited to upstream scope 1 and 2 emissions rather than the order-of-magnitude larger scope 3 emissions. New fields about to begin production in the next few years will average scope 1 and 2 emissions intensity of 17 kgCO₂e/boe over 2025-30, compared with existing supply from mature fields averaging 28 kgCO₂e/boe. If exploration through the current decade provides the anticipated 12% of global oil and gas supply and displaces existing supply options with emissions intensity typical of older fields, then global scope 1 and 2 emissions in 2030 would reduce by ~6%, or 100 Mtpa CO₂e. Deepwater projects enjoy high recovery per well and tend to have lower emissions intensity (<15tCO₂e/kboe) than shelf and onshore projects (Wood Mackenzie, 2024).



4.2.4.2 South African Supply

South Africa imports virtually all of the natural gas consumed in the country via the 865 km ROMPCO pipeline from the Pande and Temane fields located near Inhassoro, some 600 km north of Maputo in Mozambique, and operated by Sasol Petroleum Temane, Empresa Nacional de Hidrocarbonetos, Companhia Moçambicana de Hidrocarbonetos, and the Government of Mozambique. Gas imports are constrained by Pande and Temane production and pipeline capacity, and demand for gas in South Africa is considered to outstrip available supply (Human, 2024).

Historic and recent offshore oil and gas discoveries have not yet translated into domestic production and supply.

4.2.5 Outlook for Gas Consumption and Supply

Demand for gas is difficult to forecast, as it depends on a wide range of factors such as economic activity, performance of other energy technologies and degree of electrification of various sectors.

4.2.5.1 Global Outlook

At the Convention of Parties (COP) 28 held in November 2023, parties adopted a decision on the first Global Stocktake under the Paris Agreement, which recognizes the need for deep, rapid, and sustained reductions in GHG emissions in line with 1.5°C pathways and *inter alia* calls on parties to contribute, in a nationally determined manner, to global efforts on:

- Tripling renewable energy capacity globally and doubling the global average annual rate of energy efficiency improvements by 2030;
- Accelerating efforts towards the phase down of unabated coal power;
- Accelerating efforts globally towards net zero emission energy systems, utilizing zero- and low-carbon fuels well before or by around mid-century;
- Transitioning away from fossil fuels in energy systems, in a just, orderly, and equitable manner, accelerating action in this critical decade, so as to achieve net zero by 2050 in keeping with the science;
- Accelerating zero- and low-emission technologies, including, *inter alia*, renewables, nuclear, abatement and removal technologies such as carbon capture and utilization and storage, particularly in hard-to-abate sectors, and low-carbon hydrogen production;
- Accelerating and substantially reducing non-carbon-dioxide emissions globally, including in particular methane emissions by 2030;
- Accelerating the reduction of emissions from road transport on a range of pathways, including through development of infrastructure and rapid deployment of zero and low-emission vehicles; and
- Phasing out inefficient fossil fuel subsidies that do not address energy poverty or just transitions, as soon as possible with developing countries taking the lead (IISD, 2023) (UNFCCC, 2023).

COP29 held in November 2024 further developed a number of the themes discussed at COP28, and reached agreement on (UNFCCC, 2024) (WEF, 2024):

- Tripling finance to developing countries, from the previous goal of USD 100 billion annually to USD 300 billion annually by 2035, for which delivery is led by developed



countries. Further, parties should secure efforts of all actors to cooperate and scale up finance to developing countries, from public and private sources, to USD 1.3 trillion per year by 2035; and

- How carbon markets will operate under the remaining sections of Article 6 of the Paris Agreement, to make country-to-country trading and a carbon crediting mechanism fully operational.

While COP28 and COP29 signal increasing global momentum towards reducing greenhouse gas emissions and transitioning energy systems towards net-zero emissions, neither conference adopted decisions that prohibit the development of new natural gas projects. The outcomes of COP28 emphasize the need to transition away from fossil fuels in energy systems in a just, orderly and equitable manner, while recognising differing national circumstances, pathways and development needs. Accordingly, consideration of new gas developments is increasingly focused on their contribution to energy security, economic development and affordability, as well as their consistency with national climate commitments, their potential role in supporting the displacement of more carbon-intensive energy sources, and their alignment with longer-term decarbonisation pathway.

Key decisions on agreements around fossil fuel transition, mechanisms for scaling and distributing funds, and linking biodiversity with climate action remained unresolved and were postponed to COP30.

The United States Energy Information Agency (US EIA) published an International Energy Outlook in 2023, which is based on a set of policy-neutral baselines that focus on the current trajectory of the global energy system (US EIA, 2023). The International Energy Agency's World Energy Outlook 2025 (WEO-2025) provides a more recent assessment of the global energy system, incorporating developments in policies, technologies and markets through 2025. The WEO-2025 does not present a single forecast. Instead, it examines three main scenarios: the Current Policies Scenario (CPS), based on policies and regulations already in place; the Stated Policies Scenario (STEPS), which also considers formally proposed policies and official strategies; and the Net Zero Emissions by 2050 (NZE) Scenario, which maps a pathway towards achieving net-zero energy-sector emissions by 2050. These scenarios illustrate the range of possible future energy pathways and the extent to which outcomes depend on policy implementation, technology deployment, infrastructure development and market conditions (IEA, 2025).

While the Outlook expects global energy intensity to decline from ~48 000 to ~31 000 British thermal units (Btu) per 2015 purchasing power parity (PPP) dollars of GDP from 2020 to 2025, and energy-related carbon intensity to reduce from ~56 to 48 t CO₂ per billion Btu, it also expects increasing population and incomes (see Figure 4-21) to offset the effects of declining energy and carbon intensity on emissions.



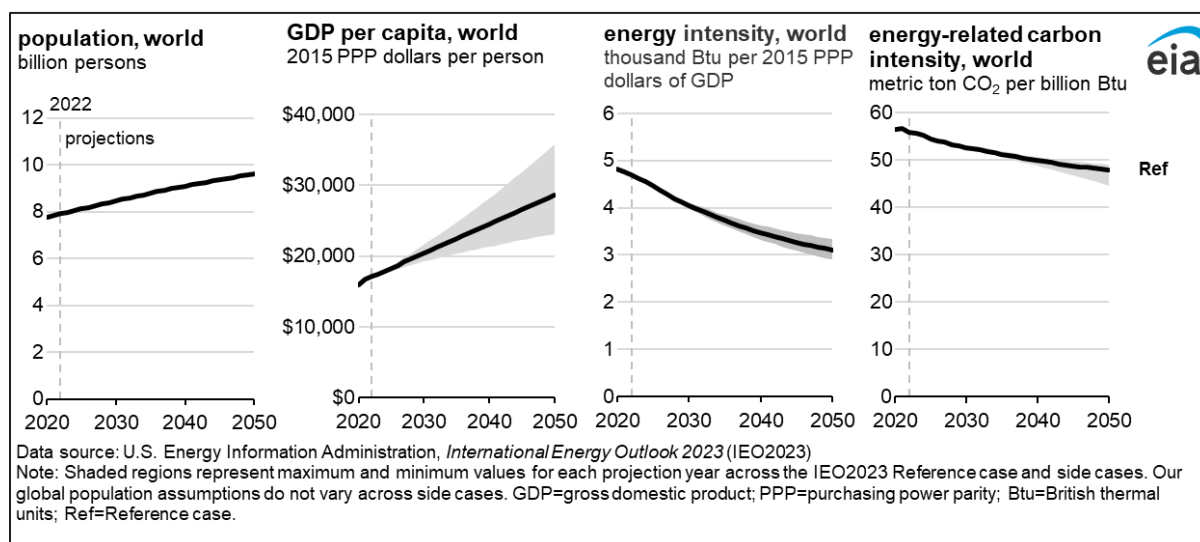


Figure 4-21: Predicted outlook for global population, GDP per capita, energy intensity and energy-related carbon intensity to 2050

Source: (US EIA, 2023)

While energy provided by non-fossil fuels is expected to more than double by 2050 relative to 2022 (from ~110 quads²⁴ to ~250 quads), fossil fuel use is also expected to remain at least equal to 2022 levels in the low projection (at ~500 quads), and to grow by ~20% (to ~600 quads) in the reference case (see Figure 4-22).

Compared to 2022, coal consumption is expected to remain approximately the same or reduce slightly by 2050. Oil (and oil products) and gas would provide the majority of energy supply, coupled with pronounced growth in wind and solar (see Figure 4-23). The IEA 2025 Report similarly identifies substantial growth in renewable energy across all scenarios but shows a wider range of possible outcomes for fossil fuels. Under the CPS, global oil and natural gas demand continues to grow to 2050, while coal demand begins to decline before 2030. Under STEPS, coal demand peaks before 2030, oil demand levels off around 2030 and natural gas demand continues to grow into the 2030s before stabilising. Under the NZE Scenario, accelerated deployment of low-emissions technologies results in declining demand for all fossil fuels. The IEA therefore confirms that the future role of natural gas is highly dependent on the pace of renewable-energy deployment, electrification, efficiency improvements and climate-policy implementation (IEA, 2025).

²⁴ 1 quad = 1 quadrillion (10¹⁵) BTUs = 1.055 exajoules (EJ)



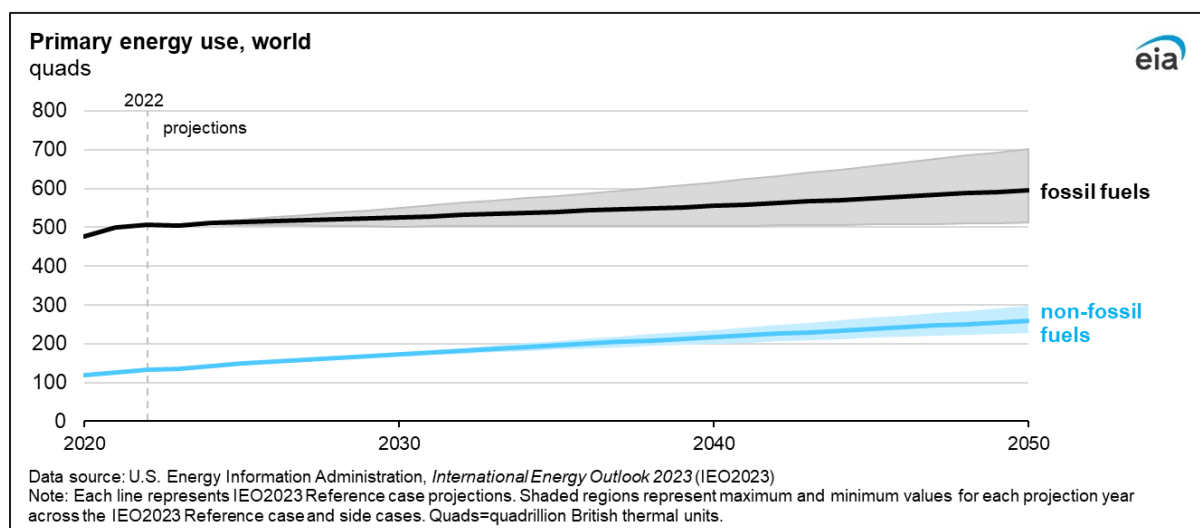


Figure 4-22: Outlook for global primary energy use to 2050

Source: (US EIA, 2023)

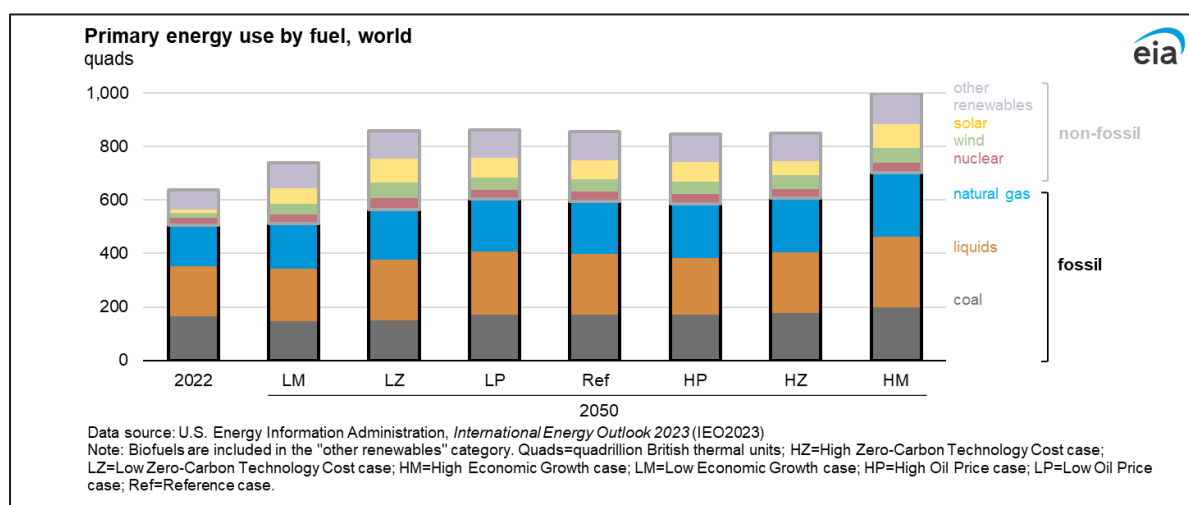


Figure 4-23: Outlook for global primary energy in 2025

Source: (US EIA, 2023)

This Outlooks further note that:

- The shift to renewables to meet growing electricity demand is driven by regional resources, technology costs and policy. For example, the US EIA (2023) notes that the speed and level of electric vehicle penetration will depend on policy incentives, battery costs, efficiency standards and electricity prices (see Figure 4-24). While coal-fired and liquid-fired electricity generation capacity²⁵ is expected to decrease by 2050, the degree to which new renewable electricity generation capacity will outweigh new fossil fuel (particularly gas)-based generation depends on economic growth, technology and price factors (see Figure 4-25) The IEA (2025) similarly projects that electricity demand and its share of final energy consumption will continue to increase and rapidly grow, increasing by approximately 40% by 2035

²⁵ Electricity generation only accounts for a portion of overall energy consumption, currently in the region of ~20%; this will increase as sectors and processes are increasingly electrified, which also increases the absolute demand for electricity.



under both the CPS and STEPS. Although renewables provide a growing share of electricity supply, continued investment in grids, storage, demand-side management and dispatchable generation will be required to maintain electricity security and integrate variable wind and solar generation. Natural gas-fired generation may therefore continue to provide flexibility and backup capacity, although its role varies between scenarios. These findings align with the BCG which notes that there is no single transition, but multiple country and regional transitions unfolding with differences in pace and technology choices (BCG, 2025);

- Energy security concerns hasten a transition from fossil fuels in some countries, although they drive increased fossil fuel consumption in others, e.g. due to poor (remaining) indigenous fossil fuel resources a transition to low carbon resources is faster in Western Europe, India and China than in Africa (see Figure 4-26), while Asia and Europe may import more natural gas to meet growing demand, mostly supplied from the Middle East (see Figure 4-27);
- Across all IEA (2025) scenarios, the future uptake and climate-related role of natural gas and LNG depend partly on the industry's ability to reduce methane emissions, with the IEA identifying methane detection, prevention and reduction as an important requirement for aligning continued gas use with emissions-reduction objectives (IEA, 2025); and
- New policies, geopolitical events, and technology breakthroughs will happen that shift the trajectory of the global energy system and add uncertainty to any projection.

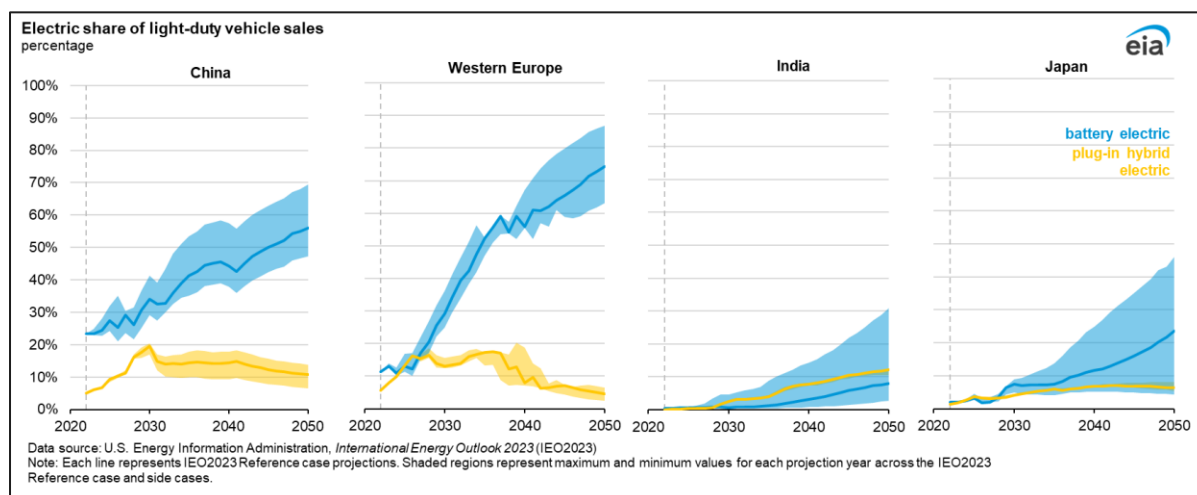


Figure 4-24: Projection for electric vehicle penetration in selected regions by 2025

Source: (US EIA, 2023)



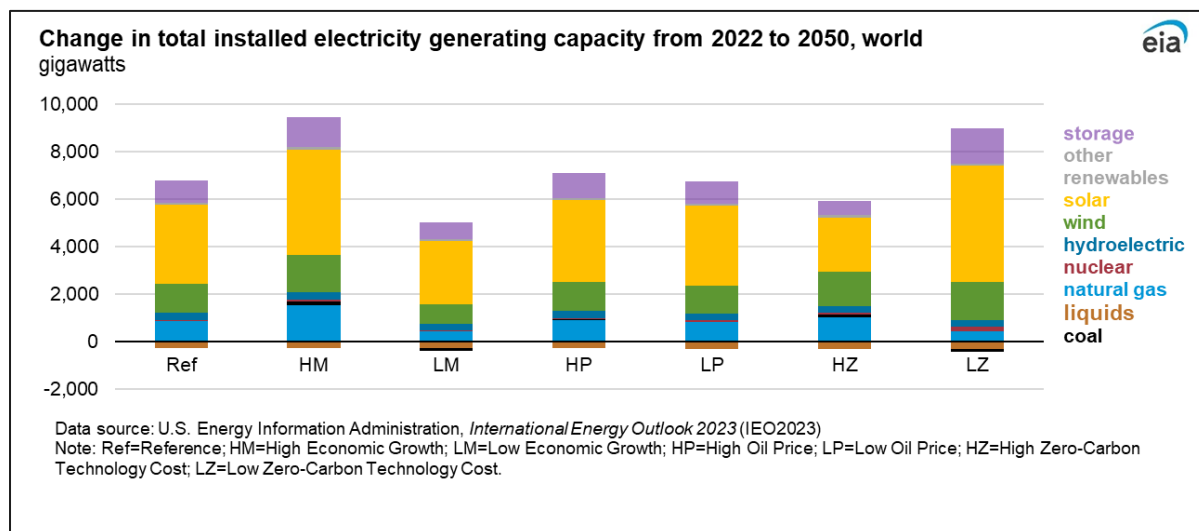


Figure 4-25: Projection for change in global electricity generating capacity (2050)
Source: (US EIA, 2023)

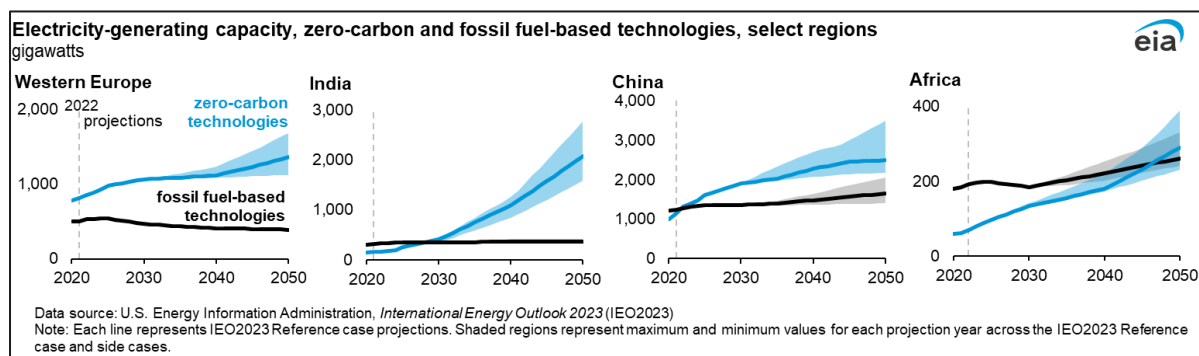


Figure 4-26: Possible technology trajectory in selected regions 2020 – 2050
Source: (US EIA, 2023)

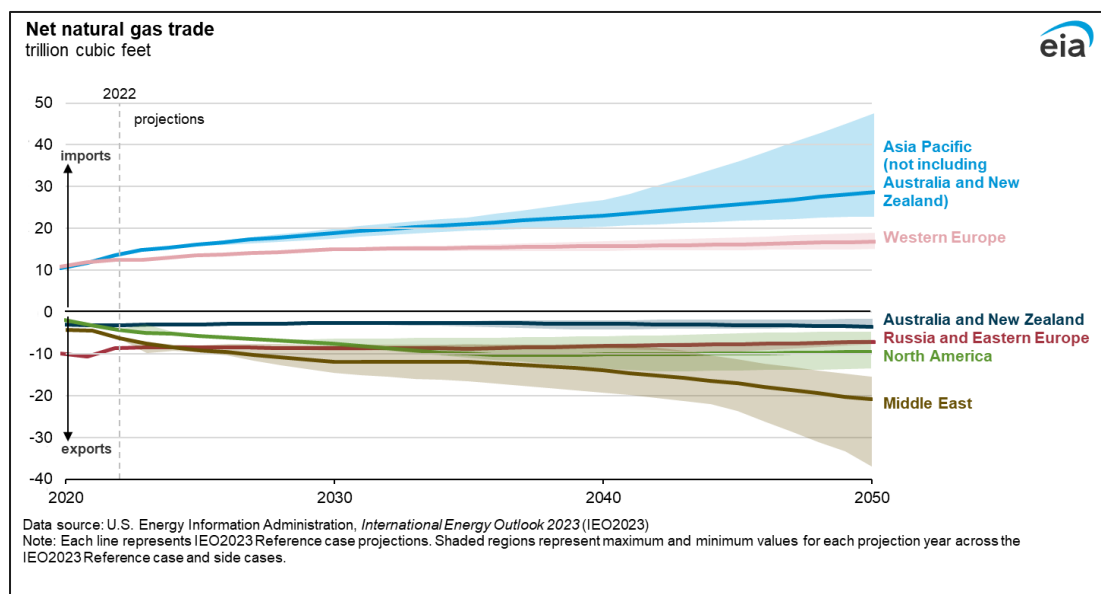


Figure 4-27: Outlook for natural gas trade 2020 – 2050
Source: (US EIA, 2023)



Overall, both the IEA and US EIA outlooks indicate continued growth in global demand for energy services, alongside substantial expansion of renewable energy and electrification. However, the magnitude and composition of future energy demand vary materially according to assumptions regarding policy, technology, efficiency and infrastructure.

For Africa, the IEA anticipates continued growth in energy and electricity demand, driven by population growth, economic development and the need to expand access to modern energy. More than 70% of new electricity capacity additions in Africa to 2035 under STEPS are expected to be renewable, with solar PV accounting for approximately half of additions. Nevertheless, natural gas remains an important source of electricity generation in the regional outlook, while investment in grids, storage, flexible generation and energy access infrastructure remains critical. The IEA also notes that Africa continues to face comparatively high financing costs and lower levels of energy investment, which may constrain the pace at which both conventional and low-emissions energy infrastructure can be developed (IEA, 2025).

Wood Mackenzie (2024a) also anticipates that energy intensity will reduce in future: while GDP growth of 96% between 2000 and 2024 resulted in end-use energy demand growth by 64%, anticipated further GDP growth of 81% between 2024 and 2050 is expected to further increase end-use energy demand by only 19%, of which ~40% each are used in the Asia Pacific region and Europe, Middle East and Africa region, with the remainder 20% used in the Americas.

Wood Mackenzie (2024a) reports a somewhat lower global energy demand of ~450 EJ (~426 quads) in 2025 than US EIA (2023), and projects overall energy demand by 2050 to either increase by ~15% to ~515 EJ (488 quads) in the base case or decrease by ~15% to ~380 EJ (~360 quads) in the net zero case. This is considerably lower than US EIA (2023) projections and based on an assumption that each unit of electricity generated from renewable sources displaces three times as much in fossil fuel demand (see Figure 4-28), possibly due to efficiency gains, though such a displacement ratio (i.e. renewables reducing overall energy demand) is not universally accepted.

On that basis, Wood Mackenzie (2024a) predicts a steeper decline in oil and gas use to 2050 than US EIA (2023), but anticipates oil and biofuels demand of ~30 to ~95 million bbl per day and gas demand of ~2 000 to 4 500 billion m³ per day in 2050 (see Figure 4-29).

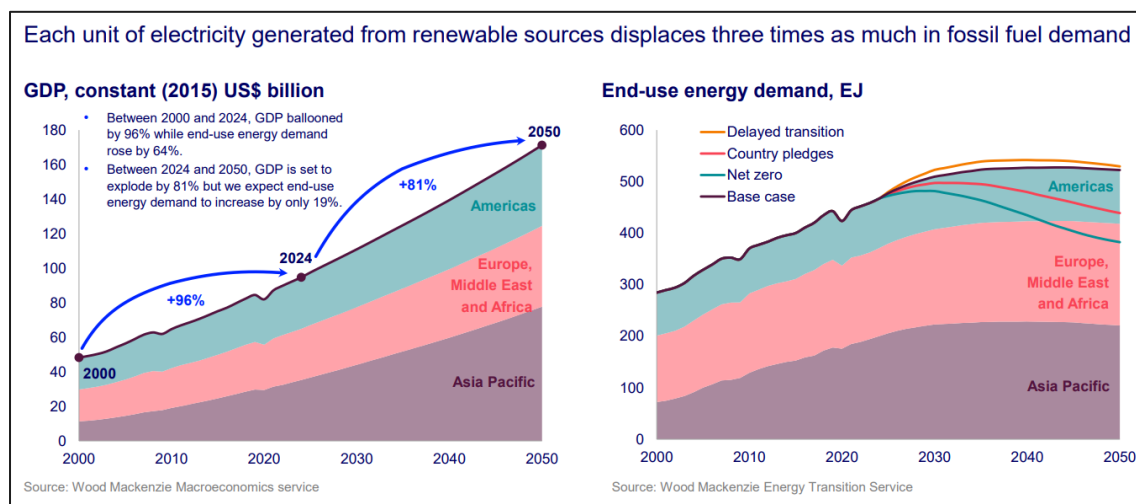


Figure 4-28: Projected development of energy demand to 2050

Source: (Wood Mackenzie, 2024)



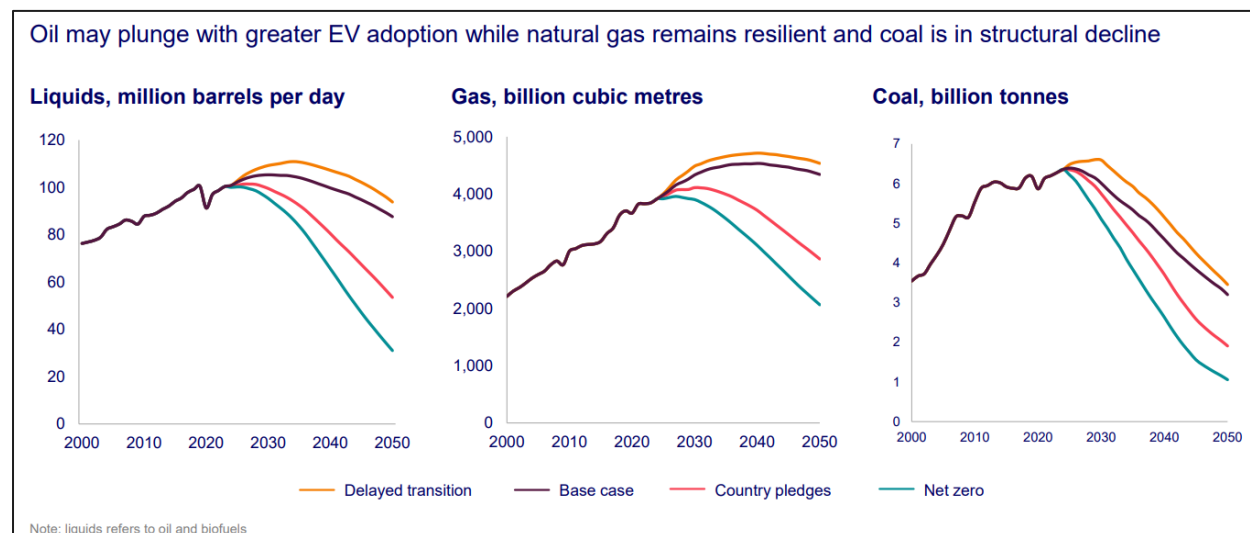


Figure 4-29: Projected development of oil and gas demand to 2050

Source: (Wood Mackenzie, 2024)

More recently and somewhat conversely – highlighting the challenge in forecasting future demand – BCG (2025) expect that “oil and gas will very likely continue to play a significant role in the global energy mix for longer than many previous estimates had predicted. Even in accelerated transition scenarios, sectors such as aviation, heavy transport, and petrochemicals lack scalable alternatives, keeping oil demand structurally resilient. Projections of peak oil demand continue to be pushed out further in time. Meeting this demand will require sustained upstream investment of, on average, \$350 billion per year through 2050, including the appraisal and development of discovered resources and, under most scenarios, the development of new resources. Only under the normative Net Zero Emissions scenario would discovered and economically viable resources be sufficient to meet projected oil demand through 2050.

Meanwhile, gas (particularly LNG) is seeing a more robust and strategic expansion. Global LNG demand is expected to rise 80% by 2040, with 38 new importing countries projected joining the market (Figure 4-30). LNG is now seen as a geopolitical fuel, with flows increasingly shaped by national alliances. The US has emerged as the leading exporter, overtaking legacy suppliers. Continued gas reliance makes addressing methane emissions critical, given that its short-term warming potential is 80 times greater than CO₂.



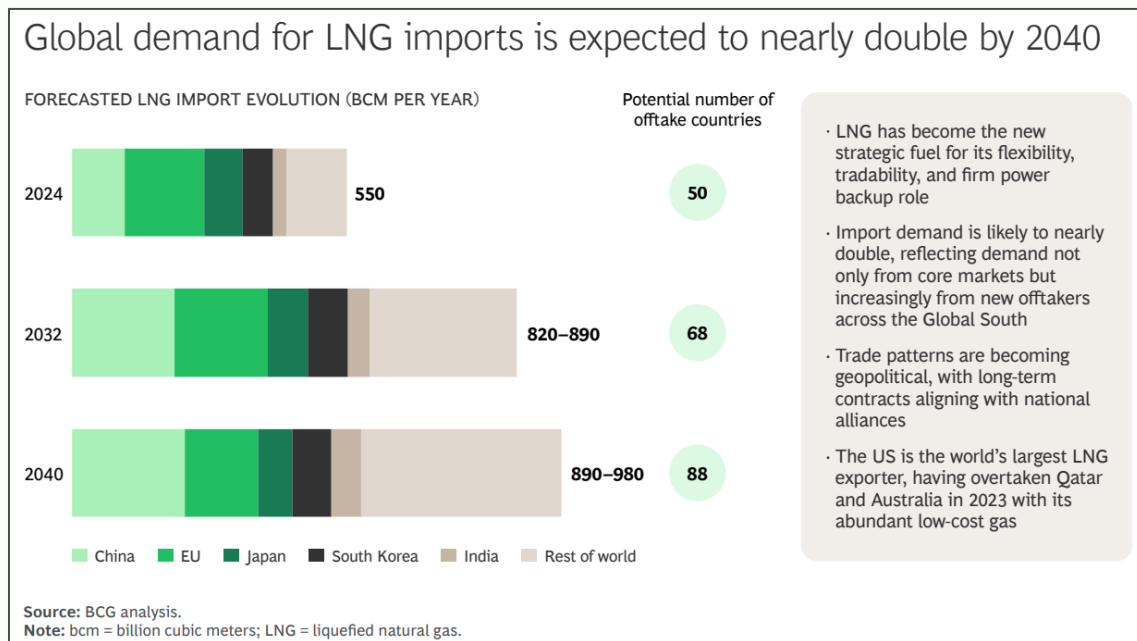


Figure 4-30: Predicted LNG demand growth

Source: (BCG, 2025)

4.2.5.2 South African Outlook

South African gas is primarily obtained via the ROMPCO pipeline that connected to the Pande and Temane fields (see Section 4.2.4.2). Production in the field is expected to taper off from ~2025, and in 2023 Sasol notified South African users it supplies with natural gas from Mozambique and methane rich gas from its operations in South Africa that such supply would stop from mid-2026. This is expected to result in a shortfall in natural gas supply, and associated consequences for directly and indirectly affected companies, as South Africa has no alternative gas supply options to replace the Pande and Temane gas in the short term:

- There is no alternative source of Mozambiquan gas production that could supply South Africa via the ROMPCO pipeline;
- South Africa does not have LNG gas import facilities, and can thus not accommodate large-scale gas imports; and
- South Africa does not have notable indigenous onshore or offshore gas production.

Potential mid-term solutions to supplying gas to South Africa include:

- Import of gas from a new Matola LNG terminal in Maputo via a new ROMPCO pipeline link;
- Import of LNG via a proposed new import terminal at the Port of Richard's Bay;
- Import from any new offshore developments in Namibia or Mozambique; and
 - **Indigenous production onshore (where gas production yields smaller volumes than offshore but is located near industrial users) and offshore (requiring greater investment and infrastructure, but likely yielding larger quantities)** This is reflected in the Draft South African OEMP, which identifies offshore oil and gas resources, including those within Block 11B/12B, as potentially important contributors to future energy security, economic development and growth of the ocean's economy, and that the



strategic importance of the proposed Project is further reflected in its designation as a SIP.

All of these solutions are at various stages of investigation, and none of them have firm commitment or implementation timelines at present. Overall, natural gas currently contributes a relatively small portion of South Africa's primary energy mix (see Section 4.2.3), suggested to be as a result of limited/no domestic production and constrained import infrastructure. However, national energy planning has identified natural gas as an important component of South Africa's future energy mix, with a potential role in supporting energy security (Section 4.2.6.1), enabling industrial development and facilitating the transition to a lower carbon economy (Section 4.2.2.2). However, current and future gas supply is constrained with future domestic production and import projects highlighted as being required to meet future demand.

It is unclear at present how existing industrial gas users will deal with the anticipated gas shortage, and how this will affect manufacturing – and hence gas demand – in the future. Potential responses may include fuel switching, investment in alternative energy sources, implementation of energy-efficiency measures, curtailment or restructuring of operations and, in some cases, relocation of production. It is expected that some demand will persist, and industry sources expect industrial demand to increase if greater volumes of gas become available in South Africa.

South Africa's potential future gas demand may be driven by four key sectors with proven use cases for gas as a transition fuel or lower emission feedstock (National Business Institute, 2021):

- **Power:** Use gas in gas-to-power plants to enable a high penetration of renewable energy in the power system by providing the flexible capacity to manage the long-duration intermittency, which battery storage cannot currently address. In addition to providing flexible capacity, gas-fired power generation can contribute important system services that support grid reliability and stability. As a synchronous generation technology, gas-fired generation can provide inertia, spinning reserve, voltage control and other ancillary services required for the secure operation of the electricity network. These attributes become increasingly important as ageing coal-fired power stations are retired and larger proportions of inverter-based renewable generation are incorporated into the grid. In addition, many modern CCGT technologies can accommodate hydrogen blending and may be adapted to utilise increasing proportions of hydrogen over time, potentially reducing the risk of long-term asset stranding as lower-carbon fuel alternatives emerge.
- **Synfuels:** Introduce additional gas to enable the phase-out of significantly more carbon-intense coal feedstock in the production of liquid fuels.
- **Industry:** Phase out higher emitting coal, and to a lesser extent diesel, with additional gas as an energy source for industrial heat generation and other processes.
- **Transport:** Use gas as an alternative to diesel, albeit at a small scale, for heavy-duty commercial road transport in the short- to mid-term, while alternative greener technologies mature and become economically viable.

Interest in utilising gas for electricity generation has been recently evidenced in the following Government actions:

- A number of gas-fired power plants have received approvals, but construction has not commenced;



- In December 2023, the then DMRE released a Request for Proposals to procure 2 GW of gas-fired power as part of an Independent Power Producer Procurement Programme;
- The IRP released in December 2023 anticipates new procurement of 7 GW of gas-fired power by 2030 and switching the Ankerlig (Saldanha), Gourikwa (Mossel Bay), Avon (Durban) and Dedisa (Coega) power stations to gas (rather than diesel);
- The IRP 2025 confirms the continued importance of gas-to-power generation in supporting grid stability and renewable energy integration, with approximately 6 GW of new gas-to-power capacity planned by 2030; and
- Overall, some 15 GW of coal power is set for retirement by ~2035 (Hunt, 2024).

At the same time, South Africa continues to experience electricity supply constraints and requires substantial new generating capacity to support economic growth and improve energy security. Gas-fired generation may, therefore, play an important role in supplementing renewable energy generation when such generation, and storage systems, are insufficient to meet demand (refer to Section 2.3.1.3). Specifically, gas-fired power plants can operate as firm, dispatchable generation that is available when required, while also responding more rapidly to changes in system demand than conventional coal-fired generation. These characteristics may assist in maintaining grid adequacy and reliability while supporting the growth and penetration of renewable energy. Furthermore, gas-fired power generation can reduce dependence on emergency diesel-fired generation, which is typically more expensive and carbon intensive.

4.2.6 Other Considerations

Other potential considerations that inform the desirability of certain energy forms and sources are briefly discussed below; they are complex and continuously evolving topics that affect a range of national policy aspects and decisions.

4.2.6.1 Energy Security

Recent geopolitical events have again demonstrated the vulnerability of countries highly dependent on energy imports to fluctuating supply and prices and possible associated shocks. For example, following Russia's invasion of Ukraine in February 2022, Russian gas supply to the EU and United Kingdom fell by approximately 88% during the post-invasion winters compared with the preceding period. Europe responded through increased LNG imports, reduced gas consumption, additional import infrastructure and accelerated renewable-energy and efficiency measures (Zhou et al., 2025; Hunter, 2024). Specifically, total gas consumption declined by 19%, primarily due to changes in household heating behaviour and lower industrial production, which accounted for 29% and 25% of the reduction, respectively. Warmer weather accounted for a further 11%, increased renewable electricity generation for 10%, reduced gas-fired electricity generation for 9%, industrial heat-pump adoption for 4%, and increased use of other electricity sources, including coal, oil and nuclear power, for 1% (Zhou, et al., 2025). More recently, the 2026 conflict involving the USA and Iran disrupted flows through the Strait of Hormuz, through which approximately 20% of global LNG and one-fifth of global oil supply ordinarily pass. The disruption contributed to sharp increases in international gas prices and particularly affected diesel and jet-fuel markets (IEA, 2026a; IEA, 2026b).

As noted in Section 4.2.5.1, energy security concerns are likely to hasten a transition from fossil fuels to low carbon resources in those countries without an indigenous or otherwise secure supply of such resources, while they drive increased fossil fuel consumption in other countries (notably those with an indigenous or secure supply).



In a similar vein, BCG states that “energy security, energy affordability, and economic resilience and competitiveness are tightly linked. As the geopolitical landscape becomes more fragmented, altering the economic dynamics in many countries, energy security has taken on even greater urgency. This development has profound implications for the energy transition. Increasingly, countries are focusing on expanding the share of their energy that comes from indigenous sources” (BCG, 2025). It further notes that trade barriers for some green technologies are now reaching similar levels as those for oil products (especially for lithium batteries, solar PV and electric vehicles) and that many clean technologies are highly exposed to global supply chains (BCG, 2025), decreasing relative security of supply of the technology (irrespective of generation reliability).

In South Africa, insufficient energy supply (both in terms of electricity and gas) has significantly impacted economic performance and quality of life of its citizens. This will be further aggravated by the projected phase out of coal-fired power plants as the facilities are ageing and polluting. Determining the appropriate future energy mix is a key task of national government.

However, from an energy security perspective, indigenous gas resources will provide benefits beyond the direct supply of fuel. Domestic gas production reduce exposure to international LNG markets, foreign exchange volatility, and geopolitical could disruptions affecting imported energy supplies. In addition, gas-fired generation will contribute to power system resilience through the provision of firm capacity, support, and voltage control services. As South Africa transitions away from an electricity system dominated by coal-fired generation, replacement of these system support functions will become increasingly important to maintaining grid reliability and affordability. Locally produced gas, therefore, has the potential to contribute both to security of fuel supply and to security of electricity supply.

4.2.6.2 Economic Contribution

While importing energy effectively represents a leak of national funds to suppliers of the resource, domestic production may provide additional economic benefits. Domestic production can contribute to employment creation, local procurement opportunities, government revenue through taxes and royalties, skills development and broader economic activity associated with development and operations. The extent of these benefits will depend on the commercial competitiveness of indigenous resources, the contractual arrangements in place and prevailing market conditions.

Determining appropriate contractual and taxation regimes of any extractive industry is a key task of national government.

4.2.6.3 Stranded Assets and Liabilities

Under South African law, companies must make upfront financial provisions for the closure and decommissioning of projects at any time of its lifecycle, and to attend to potential pollution events, to avoid burdening the State with such costs (see Section 2.1). The risk of not being able to fully recover investment in the project is that of the company. As noted in Section 4.2.5, there is very limited sight of new policies, geopolitical events and technology breakthroughs that shift the trajectory of the global energy system.

4.3 Consistency of the Project with NEMA Principles

As set out in the DFFE Guideline on Need and Desirability (2017), the national environmental management principles contained in NEMA serve as a guide for the interpretation, administration and implementation of NEMA and the EIA Regulations 2014 (as amended). In order to demonstrate consistency with the NEMA principles, a discussion



of how these principles have been taken into account during the ESIA process to date is provided Table 4-11.

Table 4-11: Consideration of the NEMA Principles in Relation to the Proposed Project.

National Environmental Management Principles	Comment
(2) <i>Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.</i>	The Project aims to develop the indigenous hydrocarbon reserves in Block 11B/12B. National policy recognises that energy security, economic development, emissions reduction and social development are interrelated objectives that must be pursued concurrently through a managed and just energy transition. The Project may contribute to these objectives through the development of indigenous energy resources, including the potential supply of gas for domestic gas-to-power generation and other industrial users. The sector is known to have economic benefits and environmental impacts which need to be balanced. In addition, confirmation of the viability of producing (and transporting) the resource will enable the country to refine its long-term planning for energy security, gas supply, infrastructure development and the future role of indigenous gas resources within South Africa's evolving energy mix. The ESIA also serves to identify the needs and interests of potentially interested and affected parties and to address issues and concerns raised through the course of the study.
(3) <i>Development must be socially, environmentally and economically sustainable.</i>	The South African Government has indicated that there is a need for the country to reduce its reliance on coal-based electricity and is committed to a just transition to a low carbon and climate resilient economy (as per SA-LEDS and draft NDC). Natural gas has been identified within national planning instruments as a transition fuel capable of complementing renewable energy and providing dispatchable generation capacity during the energy transition. The Project is also aligned, in principle, with national policy objectives that seek to establish a balanced energy mix comprising renewable energy, battery energy storage and dispatchable generation technologies. Where gas produced from the Project is utilised domestically, including for potential gas-to-power generation, it will contribute to energy security, electricity system reliability and the broader objectives of a just energy transition. Producing condensate and gas from Block 11B/12B may contribute to the sustainable



National Environmental Management Principles	Comment
	development of the petroleum sector within the country.
(4)(a) <i>Sustainable development requires the consideration of all relevant factors including the following:</i> (i) <i>That the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied;</i> (ii) <i>that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;</i> (i) <i>that the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied;</i> (ii) <i>that waste is avoided, or where it cannot be altogether avoided, minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner;</i> (iii) <i>that the use and exploitation of non-renewable natural resources is responsible and equitable, and takes into account the consequences of the depletion of the resource;</i> (iv) <i>that the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised.</i>	The ESIA will consider potential social, economic, and biophysical impacts that could result through the implementation of the proposed Project. While the determination of South Africa's future energy mix, energy transition pathway and national climate policy is beyond the scope of a project-level ESIA, these broader policy considerations provide important context for understanding the need and desirability of the Project and the role of indigenous gas resources within national planning frameworks. The ESIA will also identify measures to avoid, minimise and/or remedy potential pollution and/or degradation of the environment that may occur as a result of the proposed Project. These will be presented in the ESIA Report and the EMP.
(vii) <i>that a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and</i>	The operator plans to undertake further engineering, route selection and technical studies (e.g. onshore and offshore surveys) prior to implementation so as to identify the most feasible and least impacting development configuration. This improves understanding of potential risks and allows sensitive features to be avoided or impacts minimised through design. This is considered a risk-averse and cautious approach. Assumptions, uncertainties and limitations associated with this ESIA process are discussed in Section 3.2.
(viii) <i>that negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.</i>	Potential environmental and social impacts will be identified, assessed and, where necessary, mitigated through the ESIA process. Appropriate avoidance, mitigation, management and monitoring measures will be incorporated into the EMP.



National Environmental Management Principles	Comment
(4)(b) <i>Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated, and it must take into account the effects of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option.</i>	The ESIA process recognises that all elements of the environment are linked and interrelated. The assessment further recognises the interrelationship between environmental protection, energy security, economic development, climate change objectives and sustainable use of marine resources, which is reflected in South Africa's energy, climate change and marine spatial planning frameworks.
(4)(c) <i>Environmental justice must be pursued so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons.</i>	The ESIA process will identify potential environmental and socio-economic impacts and assess whether any impacts may disproportionately affect particular groups, including vulnerable or disadvantaged communities. Findings will inform decision-making and mitigation measures where necessary.
(4)(d) <i>Equitable access to environmental resources, benefits and services to meet basic human needs and ensure human well-being must be pursued and special measures may be taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination.</i>	Due to the offshore location of the majority of the proposed production activities, it is not anticipated that access to environmental resources that meet basic human needs would be significantly affected. Proposed onshore gas pipeline route corridor options (<15 m) have been selected taking environmental and social constraints into account. The development of indigenous energy resources may also contribute indirectly to public well-being through improved energy security, economic activity, employment opportunities and government revenue generation, although the significance of such benefits will be assessed during the Impact Assessment Phase.
(4)(e) <i>Responsibility for the environmental health and safety consequences of a policy, programme, project, product, process, service or activity exists throughout its life cycle.</i>	The operator and its contractors will be required to comply with applicable legislative requirements, recognised industry standards and all environmental specifications included in the EMP. Environmental responsibilities will apply throughout the life cycle of the Project.
(4)(f) <i>The participation of all interested and affected parties in environmental governance must be promoted, and all people must have the opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation, and participation by vulnerable and disadvantaged persons must be ensured.</i>	The requirements of the public participation process are clearly set out in Section 6 of the EIA Regulations 2014 (as amended) and have been / will be, as a minimum, adhered to during current ESIA process (see Section 3.5.1). Efforts have been made to ensure meaningful participation by all interested and affected parties.



National Environmental Management Principles	Comment
(4)(g) <i>Decisions must take into account the interests, needs and values of all interested and affected parties, and this includes recognizing all forms of knowledge, including traditional and ordinary knowledge.</i>	The ESIA process will consider and document the interests, concerns, needs and values of I&APs, through the submission of comments on the proposed project, during the Scoping and Assessment phases. This information will be provided to the Competent Authority (CA) to support informed decision-making.
(4)(h) <i>Community wellbeing and empowerment must be promoted through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means.</i>	This Draft Scoping Report has been made available for public review and comment, including coastal communities and other interested and affected parties (see Section 3.5.2). The Draft ESIA Report will also be made available for public review and comment, including coastal communities (see Section 3.5.3). Final reports will be uploaded to the SLR and data-free websites for information purposes. This process contributes to public awareness, knowledge sharing and understanding of the Project.
(4)(i) <i>The social, economic and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed and evaluated, and decisions must be appropriate in the light of such consideration and assessment.</i>	The ESIA process will consider the identified potential social, economic, and biophysical impacts of the Project in an integrated manner. The significance of these impacts will be assessed in according to pre-defined rating scales (see Section 9.3). The assessment will also be undertaken within the broader context of South Africa's stated objectives of achieving energy security, economic development, environmental protection and a just energy transition. This said, national strategic policy decisions relating to energy and climate change fall beyond the scope of this project-level ESIA.
(4)(j) <i>The right of workers to refuse work that is harmful to human health or the environment and to be informed of dangers must be respected and protected.</i>	The operator (and its appointed contractors) must comply with the relevant Occupational Health and Safety legislation and other labour legislative requirements, as well as all environmental specifications presented in the EMPr. Appropriate training, awareness and reporting mechanisms will be implemented where required.
(4)(k) <i>Decisions must be taken in an open and transparent manner, and access to information must be provided in accordance with the law.</i>	The public participation process is being undertaken in accordance with the requirements of the EIA Regulations 2014 (as amended) and allows for the distribution of the Draft Scoping Report and Draft ESIA Report for public review and comment (see Section 3.5). Information will be provided in an open and transparent manner.



National Environmental Management Principles	Comment
(4)(l) <i>There must be intergovernmental co-ordination and harmonisation of policies, legislation and actions relating to the environment.</i>	The public participation process provides relevant organs of state with an opportunity to review and comment on the Project and to identify any policy, planning or regulatory issues relevant to decision-making.
(4)(m) <i>Actual or potential conflicts of interest between organs of state should be resolved through conflict resolution procedures.</i>	It is not anticipated that the Project would result in any conflicts between organs of state. Where any such issues arise, they will be addressed through the applicable statutory mechanisms.
(4)(n) <i>Global and international responsibilities relating to the environment must be discharged in the national interest.</i>	DMPR, as the decision-making authority, will be responsible for taking cognisance of any international obligations that could have an influence on the Project. This includes South Africa's commitments under the Paris Agreement and broader climate change obligations, which must be considered together with national development, energy security and just transition objectives.
(4)(o) <i>The environment is held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage.</i>	The Project involves the potential development of indigenous offshore gas and condensate resources, which national policy identifies as assets that may contribute to the public interest through enhanced energy security, economic development and responsible utilisation of South Africa's natural resource base, subject to the subject to the findings of the ESIA process and the requisite regulatory approvals being obtained. This said, national strategic policy issues relating to energy and climate change fall beyond the scope of this project-level ESIA. The ESIA process will consider and assess the identified potential social, economic, and biophysical impacts of the Project.
(4)(p) <i>The costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimizing further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.</i>	As the applicant, the operator will be responsible for the implementation of the mitigation, management and monitoring measures included in the EMPr.
(4)(q) <i>The vital role of women and youth in environment management and development must be recognised and their full participation therein must be promoted.</i>	The public participation process being undertaken as part of this ESIA aims to be inclusive and accessible to all interested and affected parties, including women, youth and potentially vulnerable groups. The participation and development needs of women, youth and vulnerable groups are also addressed more specifically through the SLP, which falls outside the scope of this ESIA (see Section 2.2.1.2 for further information).



National Environmental Management Principles	Comment
<i>(4)(r) Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.</i>	The ESIA process will identify relevant sensitive and/or vulnerable environmental features and assess potential impacts associated with the Project. Appropriate mitigation measures will be proposed, where required, and be included in the EMP.

4.4 Consistency of the Project with NEM:ICMA Principles

As highlighted in Section 2.2.1.8, the Project falls under the definition a "coastal activity" and is located within "coastal waters" and passes through a "coastal zone", thus the Competent Authority (namely DMPR), in terms of Section 63(1) of NEM:ICMA, must take several factors and specified criteria into consideration in deciding on the application for EA. Table 2-4 indicates how the ESIA will consider the NEM:ICMA requirements in the Impact Assessment Phase, as well as how the Project is consistent with NEM: ICMA objectives.

In summary, the Project has the potential to interact with coastal public property, the coastal protection zone and a range of marine and coastal resources, particularly under Production Scenario 1 where gas would be transported ashore via pipeline.

The review undertaken to date indicates that the Project is not inherently inconsistent with the objectives of NEM:ICMA, provided that potential impacts on marine and coastal resources are appropriately identified, assessed and managed. NEM:ICMA does not prohibit offshore petroleum development within the coastal zone; rather, it requires that such development be assessed within the context of sustainable coastal development, integrated coastal management, protection of coastal public property, responsible ocean governance and the interests of current and future generations.

The Project is also broadly consistent, in principle, with South Africa's marine spatial planning and oceans economy objectives, which recognise offshore oil and gas development as a legitimate marine use capable of contributing to energy security, employment creation, investment attraction and economic development, while simultaneously requiring the protection of marine biodiversity, ecosystem functioning and coastal resources.

The ESIA will, therefore, evaluate the Project against the provisions of NEM:ICMA, applicable coastal management programmes, marine spatial planning objectives, biodiversity priorities and coastal governance requirements. This will include consideration of potential impacts on coastal public property, biodiversity, fisheries, coastal communities, cultural resources, ecosystem functioning and other marine users, together with the potential contribution of the Project to broader public-interest objectives such as energy security, economic development and the just energy transition.

Accordingly, based on the information available at this stage, the Project is considered to be capable of alignment with the objectives and principles of NEM:ICMA, subject to the findings of the Impact Assessment Phase and the implementation of appropriate avoidance, mitigation, management and monitoring measures where required.



4.5 Preliminary Conclusion on Need and Desirability

Fundamental issues relating to energy systems, energy security, climate change mitigation, and the pace and configuration of the energy transition are complex to be comprehensively and conclusively resolved in a project-level ESIA. Decisions regarding national energy policy, future energy mixes, climate commitments and appropriate transition pathways must ultimately be made at national policy and planning levels, taking into account country-specific economic, social, environmental, technological and energy security considerations.

Empirical data indicates that hydrocarbon resources remain a significant component of the global and South African energy supply at present, and are expected to continue to play an important role for the foreseeable future, notwithstanding significant investment in renewable energy and other low-carbon technologies. Global oil demand has remained broadly stable, while natural gas demand continues to increase in many regions. At the same time, renewable energy deployment continues to grow rapidly but from a comparatively low base relative to total global energy demand. These trends suggest that the energy transition is likely to be gradual, with hydrocarbons continuing to form part of the global energy mix for some time.

The manner and pace of the energy transition differ significantly between countries and regions, reflecting differing levels of economic development, available natural resources, infrastructure, energy-security requirements and social priorities. Consequently, transition pathways are not uniform and must be considered within their specific national contexts.

The South African context differs from many developed economies. South Africa remains highly dependent on coal for electricity generation, continues to face ongoing electricity supply constraints, and currently imports virtually all of its natural gas requirements from Mozambique. At the same time, production from the Pande and Temane gas fields is expected to decline, creating concerns regarding future gas supply security. Given the importance of reliable energy for economic activity, industrial competitiveness and social well-being, retaining optionality, diversification and security of energy supply appears desirable in itself. In this context, the development of conventional domestic gas resources could contribute to greater energy supply diversification and security and, where gas displaces more carbon-intensive fuels, may support a reduction in the continued reliance on coal; however, these potential benefits would need to be considered alongside the associated environmental, social, economic and climate-related impacts, to be assessed in the Impact Assessment Phase.

The analysis of South African policy and planning frameworks shows that government seeks to balance several interconnected objectives, including energy security, economic growth, industrial development, employment creation, poverty alleviation, climate change mitigation, environmental protection and the achievement of a just energy transition. These frameworks consistently recognise the need to reduce South Africa's dependence on coal while maintaining a reliable and affordable energy supply and supporting economic development.

National energy and climate-policy frameworks seek to reduce South Africa's reliance on coal and progressively lower GHG emissions while maintaining energy security, economic stability and social well-being. Within this context, natural gas is generally recognised as having the potential to support system flexibility, renewable-energy integration, dispatchable power generation and industrial demand during the transition to a lower-carbon energy system. The extent to which gas contributes positively to climate objectives depends on the broader energy-transition pathway, the displacement of higher-emitting fuels, and the management of project-specific emissions and impacts.

The analysis of South African climate-change policies further indicates that the country seeks substantial reductions in GHG emissions over time, while recognising that the



transition to a lower-carbon economy must occur in a manner that maintains energy security, economic stability and social well-being. Within this context, natural gas is recognised as having the potential to play a transitional role in supporting the displacement of higher-emitting energy sources, particularly coal. Compatibility with climate-change objectives ultimately depends on the trajectory of South Africa's broader energy transition, implementation of emissions reduction measures across the economy, and the management of project-specific impacts.

In this context, domestic gas resources have the potential to contribute to energy security, industrial competitiveness, economic development and a more diversified energy mix. Under Production Scenario 1 and Scenario 2 (should LNG be used domestically), gas from the Project could potentially support future gas-to-power developments and industrial gas demand. In addition, the Project could contribute to the development of South Africa's offshore petroleum sector and associated infrastructure. In addition to natural gas, the Project is expected to produce condensate, a light liquid hydrocarbon that is commonly refined into products such as petrol, diesel, jet fuel, petrochemical feedstocks and other liquid-fuel products. South Africa continues to rely heavily on liquid fuels to support the transport, industrial and petrochemical sectors and remains dependent on imported crude oil and refined petroleum products. To the extent that Project condensate could be processed and utilised within domestic or regional markets, it has the potential to contribute to liquid-fuel supply diversification and associated economic activity.

Climate change considerations are likely to represent one of the key issues that will need to be evaluated during the Impact Assessment Phase. However, GHG emissions are inherently different from many other environmental impacts because they contribute to a global atmospheric system influenced by cumulative emissions from countries, sectors and activities around the world. Consequently, the significance of project-related emissions must be considered within the broader context of global and national emissions trajectories, South Africa's climate commitments, the role of gas within the national energy transition and the potential for gas to displace higher-emitting energy sources.

More broadly, global oil and gas consumption is primarily influenced by factors such as energy demand, economic growth, energy-security requirements, technological change, the availability and affordability of alternatives, and the pace of the energy transition. These factors largely determine overall hydrocarbon demand, irrespective of the specific source of supply. A similar consideration applies to condensate and other liquid hydrocarbons, for which demand is largely linked to transportation fuels, petrochemical production and industrial activities.

In this context, the development of condensate and gas resources from the Project would not be expected to materially influence global oil consumption or the pace of the global energy transition. If the Project does not proceed, and demand for oil, condensate or gas remains, equivalent volumes may be supplied from alternative domestic developments or from international producers. The Project is, therefore, not considered a determining factor enabling or constraining global oil use or associated GHG emissions, but rather one potential source of supply within a larger regional and global energy system. The trajectory of global and South African GHG emissions is likely to depend primarily on broader factors such as changes in energy demand, technological advancement, energy-efficiency improvements, renewable-energy deployment, electrification and climate policy, rather than solely on whether hydrocarbons from Block 11B/12B are developed.

The extent to which the Project may contribute to, or affect, South Africa's climate-change objectives cannot be evaluated solely by reference to the Project's direct emissions. Consideration must also be given to the broader energy-system context, including future demand for gas, the potential substitution of coal and other higher-emitting fuels, energy



security requirements and the pace of deployment of alternative technologies. These issues will be assessed further during the Impact Assessment Phase.

Notwithstanding the likely continued demand for (and supply of) hydrocarbon resources globally, the policy support for indigenous gas development in South Africa, and the Project's alignment with several national policy and planning objectives, the need and desirability of a *particular* project is also determined by the acceptability of residual environmental and social impacts and the extent to which these can be avoided, managed or mitigated. The assessment of Project-specific impacts remains a critical component of determining whether the development represents a sustainable development outcome in the particular circumstances of the receiving environment. These potential impacts will be assessed during the Impact Assessment Phase through technical and specialist investigations. The findings of those studies will inform the assessment of the sustainability of this particular Project, and the need and desirability of the proposed development will be re-evaluated in the ESIA Report on that basis.

Based on the information currently available, the Project is, in principle, aligned with a number of South Africa's energy security, economic development, resource-management and just-transition objectives. However, the ultimate determination of need and desirability will depend on the findings of the technical and specialist studies, the assessment of potential Project-specific impacts, the effectiveness of proposed mitigation measures, and the balancing of environmental, social, economic and climate-change considerations within the broader context of South Africa's policy objectives and sustainable development principles.



5.0 Project Description

This chapter describes the project history, scope and activities, provides technical information on the proposed activities, and summarises the project alternatives.

5.1 Project Context

5.1.1 Production Right Application

As detailed in the Project history (see Section 1.1.1), following the discovery of gas-condensate within the Paddavissie Fairway, the JV partners at the time evaluated several development scenarios and, in September 2022, submitted an application for a PR (12/4/013 PR) to develop the resource in the Block and produce condensate and gas for commercialisation. The details of the PR application are included in Table 5-1.

Table 5-1: Production Right Application Details

Aspect			Description		
Licence Block No.			Block 11B/12B		
PR Application Ref. No.			12/4/13 PR		
Size of PR Application Area			11 870 km ²		
Water depth range of PR application area			175 m - 2 150 m		
Distance of PR application area offshore (at closest boundary)			~75 km to Cape St. Francis from the north-east boundary ~ 120 km to Mossel Bay from the north-west corner		
Co-ordinates of PR application area (WGS84)					
Corner	Latitude (°) (S)	Longitude (°) (E)	Corner	Latitude (°) (S)	Longitude (°) (E)
1	35° 11' 7.153" S	22° 59' 58.345" E	18	35° 15' 0.234" S	24° 18' 58.377" E
2	35° 11' 7.153" S	23° 13' 19.258" E	19	35° 20' 0.231" S	24° 18' 58.366" E
3	35° 8' 43.165" S	23° 13' 19.258" E	20	35° 20' 0.261" S	24° 4' 58.308" E
4	35° 8' 43.165" S	23° 23' 56.914" E	21	35° 26' 0.227" S	24° 4' 58.300" E
5	35° 4' 35.136" S	23° 23' 56.914" E	22	35° 26' 0.211" S	23° 51' 58.246" E
6	35° 4' 35.136" S	23° 41' 18.761" E	23	35° 36' 30.158" S	23° 51' 58.270" E
7	35° 0' 23.268" S	23° 41' 18.761" E	24	35° 36' 30.139" S	23° 38' 28.284" E
8	35° 0' 23.268" S	24° 2' 7.072" E	25	35° 38' 0.136" S	23° 38' 28.292" E
9	34° 56' 30.663" S	24° 2' 7.072" E	26	35° 38' 0.143" S	23° 29' 58.307" E
10	34° 56' 30.663" S	24° 33' 29.791" E	27	35° 41' 0.145" S	23° 29' 58.314" E
11	34° 53' 39.513" S	24° 33' 29.791" E	28	35° 41' 0.148" S	23° 26' 58.313" E
12	34° 53' 39.513" S	24° 59' 2.233" E	29	35° 45' 0.147" S	23° 26' 58.313" E
13	34° 51' 28.391" S	24° 59' 3.896" E	30	35° 45' 0.199" S	22° 59' 58.293" E
14	34° 51' 28.391" S	25° 9' 58.403" E	31	35° 47' 0.192" S	22° 59' 58.290" E
15	35° 3' 0.239" S	25° 9' 58.403" E	32	35° 47' 0.292" S	22° 29' 58.216" E
16	35° 3' 0.260" S	24° 44' 58.378" E	33	35° 15' 0.334" S	22° 29' 58.109" E
17	35° 15' 0.209" S	24° 44' 58.381" E	34	35° 15' 0.324" S	22° 59' 58.359" E



5.1.2 Development Strategy

The final configuration and development timeline for Block 11B/12B are ultimately determined by the regional gas market conditions and the associated market uncertainties.

While natural gas demand exists elsewhere in South Africa, and substantial volumes of liquid fuels are currently imported, the regional market remains uncertain following the shutdown of the PetroSA Gas-To-Liquid (GTL) facility several years ago. The timing, commercial viability, and scale of any potential restart of this facility remain undefined, creating uncertainty regarding its role as an anchor gas demand source in the region. In any event, the resources available from the Paddavissie Fairway reservoirs exceed the design capacity of the GTL facility, thus requiring new markets.

The Eskom Gourikwa power station is currently configured as an Open-Cycle Gas Turbine (OCGT) facility that relies primarily on diesel. Although conversion to CCGT operation using natural gas is technically feasible, the timing, funding, feedstock source and implementation of such a conversion remain uncertain. In parallel, the potential development of new gas-fired power generation capacity, either within the existing PetroSA industrial complex (not yet been confirmed) or at alternative greenfield locations, such as the proposed Garden Route GtP Project near Mossel Bay (proposed by another applicant and the subject of a separate EA application and ESIA process being undertaken by Savannah Environmental), remains indeterminate in terms of scale, phasing and offtake profiles.

In addition, Greenleaf Energy has secured an EA for the development of a GtP plant in Mossel Bay, to be fuelled by imported LNG provided adequate port infrastructure can be developed. This project represents a tangible step toward establishing new anchor demand in the region, but its ultimate scale, phasing and offtake arrangements remain to be defined.

Collectively, these initiatives indicate that GtP in Mossel Bay is still evolving and cannot yet be relied upon as a definitive demand anchor.

Beyond Mossel Bay, there are also plans to import LNG to fuel GtP plants in Coega and Richards Bay. While these markets are geographically too distant to be supplied via pipeline from Block 11B/12B, they could potentially be supplied with LNG produced from the Block should a FLNG scenario be pursued. This option introduces flexibility in market access and could provide a strategic outlet for gas resources beyond the immediate regional market.

Taken together, these factors indicate that the gas market is currently latent and requires further maturation before a definitive, optimised gas field development concept can be finalised. Market development and infrastructure planning must, therefore, proceed in parallel. Recognising these uncertainties, Main Street has confirmed its intention to enter into a GMDP following the award of the PR. The purpose of the GMDP is to advance market engagement, confirm offtake agreements, refine infrastructure concepts, and mature the development strategy prior to Final Investment Decision (FID).

5.2 Project Overview

5.2.1 Overview of Development Scenarios

Main Street has elected to assess two optional full-field development scenarios for the Paddavissie Fairway. These scenarios represent conservative, maximum footprint cases that are reasonably foreseeable, ensuring that the environmental assessment captures the upper bound of potential impacts. The final development concept will ultimately be shaped by several factors, including the evolution of the future regional gas markets.

The two development scenarios are outlined below and illustrated schematically in Figure 5-1 to Figure 5-2.



- **Production Scenario 1: Full field development of the Paddavissie Fairway and piping gas onshore (Figure 5-1 & Figure 1-2):**
 - Mooring a FPSO facility at one of two alternative locations: (1) in deep water near the wells or (2) in shallower water on the continental shelf. The FPSO will separate and process the produced liquid/gas from the wells.
 - Installing up to two ~80 km multiphase pipelines (including MEG pipeline and umbilical) from the wells to the FPSO, a ~100 km gas pipeline from the FPSO to the shore²⁶, and an up to ~13 km onshore pipeline to the proposed gas receiving facility associated with the reference development case (currently a proposed GtP facility, subject to separate EA application). This pipeline infrastructure will convey the produced well fluids from the wells to the FPSO for separation / processing and then transport the dry gas onshore for supply to the reference development case and/or other potential gas off-take opportunities that may be identified during the gas marketing phase (i.e. to the end user).
 - Transferring separated condensate from the FPSO to Dynamically Positioned Shuttle Tankers (DPST), which will then transport the condensate to its final destination. Treated produced water will be discharged overboard from the FPSO.
- **Production Scenario 2: Full field development of the Paddavissie Fairway and liquefying gas offshore (Figure 5-2):**
 - Mooring a FLNG facility at one of two alternative locations: (1) in deep water near the wells or (2) in shallower water on the continental shelf. The FLNG will separate the produced liquid and gas streams from the well fluids, and will undertake liquefaction of the produced gas. A Floating Storage and Offloading (FSO) vessel is anticipated to be required to provide additional storage for the condensate which will be received from the FLNG facility. The FSO provides a condensate offloading point separate to the LNG offloading point which increases operational flexibility.
 - Installing a ~80 km multiphase pipeline (including MEG pipeline and umbilical) from the wells to the FLNG, which will convey the produced well fluids to the FSO.
 - Transferring separated condensate from the FSO to DPST and LNG from the FLNG to DPST (LNG carrier), which will then transport the products to their final destinations. Treated produced water will be discharged overboard from the FLNG.

Each of these two full-field options may be preceded by partial development of the field through existing PetroSA facilities, with continued partial export of products via these facilities during and after full development of the Paddavissie Fairway. In the event that the use of the PetroSA facilities precedes the full-field development, the ~80 km multiphase pipeline from the wells will be extended by ~40 km to the PetroSA offshore facility, whilst continued use of the PetroSA facilities during and post full-field development is envisaged by exporting a portion of the gas via a ~40 km dry gas pipeline from the FPSO or FLNG vessel to the PetroSA facility and/or delivering processed condensate to PetroSA's receiving terminal in Mossel Bay. More detail on each Project scenario, phases and activities is provided in Sections 5.3 to 5.6.

²⁶ The alignment of the offshore gas pipeline will only be finalised after the offshore surveys have been completed. The base case routing is ~100 km in length from the FPSO to the shore.



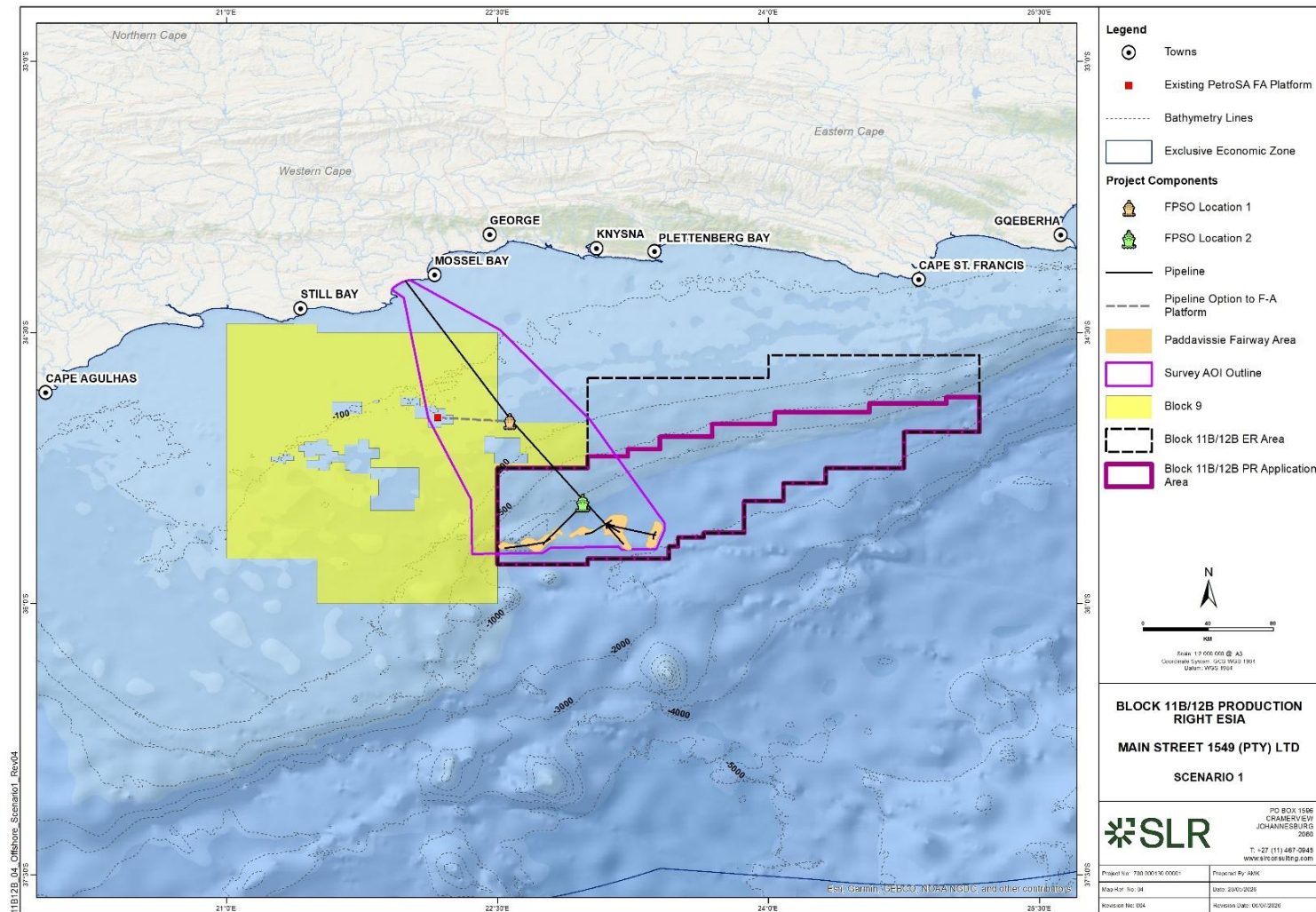


Figure 5-1: Production Scenario 1: Full field development of the Paddavissie Fairway and piping gas onshore



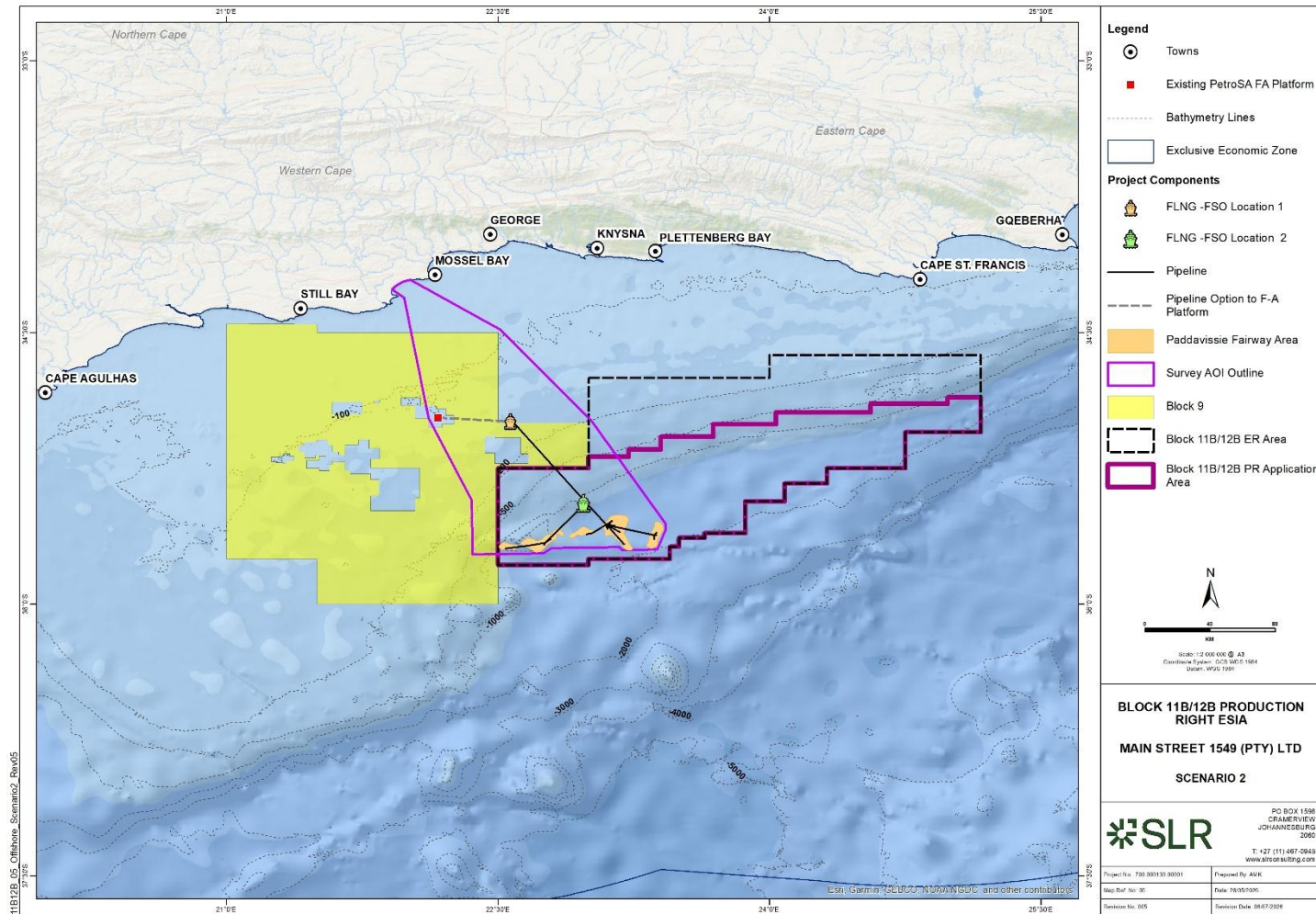


Figure 5-2: Production Scenario 2: Full field development of the Paddavissie Fairway and liquefying gas offshore



5.2.2 Overview of Key Project Phases and Activities

The key phases and activities associated with the proposed development, installation and operation are summarised in Table 5-2 below.

Table 5-2: Key Project phases and activities

Activity	Details
Route and Site Investigation Surveys	Offshore
	Up to four offshore survey campaigns will be conducted, including bathymetry, sonar, seafloor sampling and metocean data collection.
	Onshore
	Up to two onshore / nearshore surveys will be conducted, including geophysical and geotechnical investigations.
Well Drilling	Offshore
	- Up to 19 wells (including production, appraisal and gas injection) to be drilled, with associated testing and well clean-up. - Drilling to be undertaken over multiple (non-concurrent) campaigns (~3 wells per campaign, up to seven campaigns over a period of 6 years).
Installation, Construction and Commissioning	Offshore
	- Installation of subsea Xmas trees on completed wells. ~3 trees will be installed per campaign, with there being up to seven campaigns (Scenario 1 & 2). - Infield pipeline (20" nominal diameter (ND)) from Luiperd development field to CPF (FPSO or FLNG) (Scenario 1 & 2): - Seabed preparation, pipe-laying (up to ~80 km) and installation of Pipeline End Termination Structures (PLETs). - Free-span correction and pipeline stabilisation (e.g. mattresses, grout bags). - Pipeline testing and commissioning. - Umbilical and subsea infrastructure (Scenario 1 & 2): - Installation of main umbilical between Luiperd manifold and CPF. - Installation of manifolds, Subsea Distribution Units (SUDUs), flowlines and jumpers. - Installation of CPF mooring system, riser bases and risers. - Floating facilities (Scenario 1 & 2): - Installation and hook-up of CPF to mooring. - Offshore export pipeline (Scenario 1 only): - Installation of ~100 km pipeline (24" ND) from Shore to CPF. - Trenching and backfilling along pipeline corridor (length depends on fishing interaction). - Pipeline commissioning (flooding, cleaning, testing). - Offshore interconnecting pipelines (Scenario 1 & 2): - Installation of a 40 km dry gas pipeline between CPF and F-A platform; or - Installation of a ~120 km multiphase pipeline connecting the Luiperd field directly to the PetroSA F-A Platform for processing. - Infield pipeline (20" ND) from CPF location to subsea Inline Tee (ILT) (Scenario 1 & 2)



Activity	Details
	- Installation of second up to 80 km pipeline between CPF and Luiperd manifold. - Expansion tie-backs (Scenario 1 & 2): - Subsequent development of Brulpadda, Blaasop, Woudboom and Platanna fields. - Similar installation activities to Luiperd.
	Onshore
	- Shore crossing construction (Scenario 1 only): - Installation of ~1.5 km Horizontal Directional Drilled (HDD) micro-tunnel through the coastal zone, lined with a high-density polyethylene (HDPE) pipe, which will be fabricated offshore on a barge and pulled through the tunnel from the shore. - Installation of the offshore pipeline by pull-through within the pre-installed HDPE liner from the offshore lay vessel, followed by tie-in to onshore pipeline. - Site reinstatement and demobilisation of equipment. - Onshore pipeline construction (Scenario 1 only): - Construction of up to ~13 km pipeline (24" ND) from beach crossing to proposed gas receiving facility (e.g. GtP facility which is excluded from the current scope). - Trenching, pipe fabrication, installation, backfilling and site reinstatement. - Pipeline testing (cleaning, gauging, pressure testing and dewatering). - Support activities (Scenario 1 & 2): - Establishment of logistics base at the port in Mossel Bay. - Supply vessel and helicopter operations for personnel and material transport. - Ongoing delivery of equipment and materials from regional ports.
Production	Offshore (Scenario 1 & 2)
	- Operation of subsea infrastructure, pipelines and CPF facilities. - Ongoing maintenance, inspection and logistics support (vessels and helicopters).
	Onshore (Scenario 1 only)
	Ongoing maintenance and inspection of onshore pipeline.
Decommissioning	Offshore (Scenario 1 & 2)
	- Plugging and abandonment of wells (including wellheads) and removal of subsea equipment (e.g. Xmas trees). - Flushing and disconnection of pipelines and umbilicals. - Removal and relocation of CPF. - Retrieval of selected infrastructure, with some seabed infrastructure left in situ. - Demobilisation of all vessels and recovery of equipment.
	Onshore (Scenario 1 only)
	Disconnect, flush, clean and plug pipeline at both ends or re-purpose.



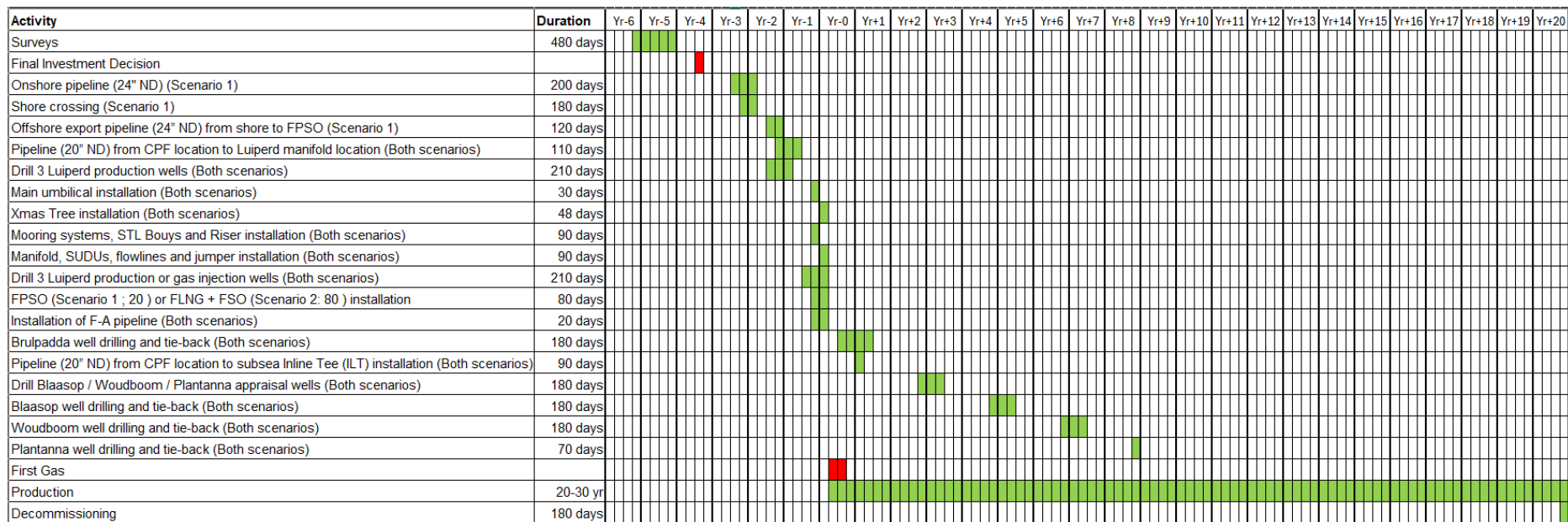
5.2.3 Project Timeline

An indicative duration of key activities and timeline highlighting key milestones of the Project are summarised in Table 5-3 and Figure 5-3, respectively. Where relevant, activity durations also incorporate expected operational weather or other routine interruptions, to provide a realistic schedule basis.

Table 5-3: Indicative durations of key activities

Activity	Duration
Route and Site Surveys (~16 months)	
Offshore and onshore geophysical and geotechnical surveys	Up to 480 days in total (including mobilisation and standby time). Some surveys will take place concurrently.
Well Drilling (over ~11 years)	
Offshore well drilling (up to 19 wells): production, appraisal and potentially gas injection wells	Up to 210 days (~7 months) per three well campaign (including mobilisation), and up to seven campaigns over a period of ~11 years.
Offshore Installation & Construction (over ~11 years)	
Xmas Tree installation (Scenario 1 & 2)	15 – 24 days per three well campaign
Pipeline (20" ND) from CPF location to Luiperd manifold location (Scenario 1 & 2)	Up to 110 days total for installation and commissioning activities.
Mooring lines, manifolds, Subsea Umbilical Distribution Unit (SUDUs) and Subsea Umbilical Risers and Flowlines (SURF) Installation (Scenario 1 & 2)	Up to 180 days
Main umbilical installation (Scenario 1 & 2)	Up to 30 days
FPSO Installation (Scenario 1 & 3)	Up to 20 days
FLNG / FSO Installation (Scenario 2 only)	Total installation duration of up to 80 days.
Offshore export pipeline (24" ND) from shore to FPSO (Scenario 1 only)	Total duration of up to 120 days: - Up to 90 days for pipelay - Up to 30 days for trenching
Installation of F-A pipeline (Scenario 1 & 2)	Up to 20 days
Pipeline (20" ND) from CPF location to subsea Inline Tee (ILT) (Scenario 1 & 2)	Up to 90 days to install a second pipeline from CPF location to ILT, prior to tie-back of Brulpadda, Blaasop, Woudboom and Plantanna.
Brulpadda, Blaasop, Woudboom, Platanna Tie-Backs (Scenario 1 & 2)	Up to 180 days per campaign (including well drilling).
Onshore Installation & Construction (Scenario 1 only)	
Onshore pipeline (24" ND)	Up to 200 days
Shore crossing	Up to 180 days
Production	
Operation of gas field and infrastructure	Up to 20 to 30 years
Decommissioning	
Decommissioning	Up to 180 days





Notes:

- The year of first gas is designated as Year 0, with FID assumed to occur four years prior (Year -4).
- Production in this overview is indicated as up to Yr+20, but could extend up to 30 yrs.

Figure 5-3: High level overview of key Project activities



5.3 Route and Site Surveys

5.3.1 Objectives

The undertaking of geophysical, geotechnical and metocean surveys, which will identify and mitigate risks associated with metocean and geophysical and geotechnical conditions in the Project area, is vital for obtaining the necessary data to develop oil and gas projects that are safe, environmentally responsible and economically viable. Main objectives include:

- Precise subsurface data: Surveys will provide accurate information on geophysical and geotechnical conditions and potential hazards.
- Informed design: This data is crucial to ensure the routing and design of pipelines and subsea facilities can withstand both environmental conditions and operational demands, representing a cautious, risk-averse approach.
- Data-driven due diligence: Project-specific survey data allows for thorough due diligence, reducing uncertainty and speculation.
- Regulatory compliance: Surveys will ensure the Project can meet, and where possible, exceed regulatory environmental and safety standards.

The alignment of the offshore gas pipeline to shore (Scenario 1) will only be finalised after the offshore surveys have been completed.

5.3.2 Offshore Surveys

5.3.2.1 Offshore Survey Area

The area of interest (AOI) for the survey campaign is 11 380 km² in extent and is located ~6 km west of Mossel Bay at its closest point in water depths from the coast up to 2 200 m (Figure 5-4).



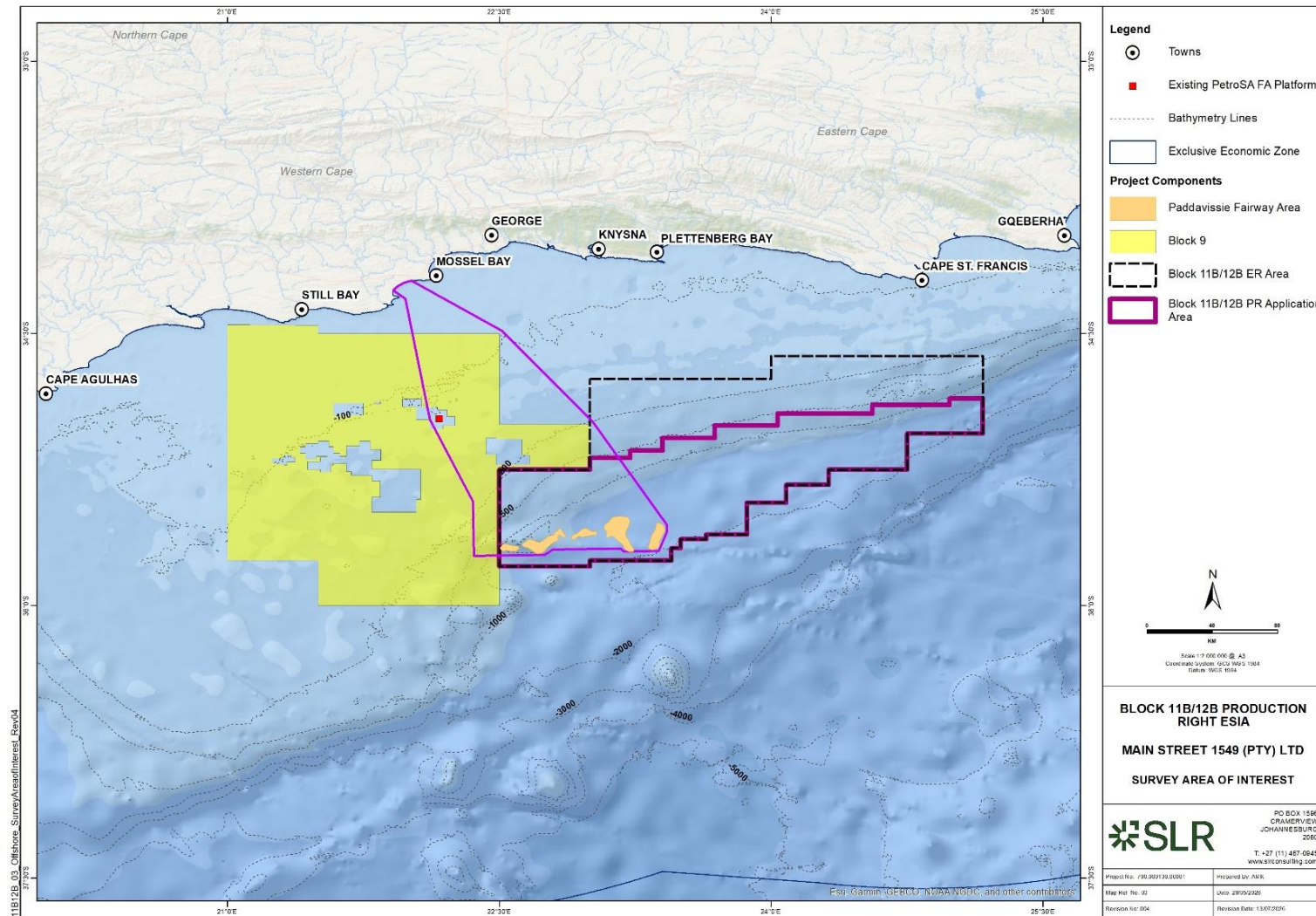


Figure 5-4: Locality Map of the offshore survey area off the South African Coast



5.3.2.2 Offshore Survey Activities

A summary of the survey activities is provided in Table 5-4 below and include the following:

- Bathymetry and sonar surveys;
- Seafloor sampling;
- Metocean survey; and
- Remote operated vehicle (ROV) surveys.

Some surveys will take place concurrently over the ~16-month survey campaign. Further details are provided in Section 5.3.2.3 to 5.7.

Table 5-4: Summary of key offshore survey activities

Aspect	Description
Bathymetry and Sonar Surveys	
Purpose	Investigate the structure of the ocean bed sediments
Methods	• Multibeam / single beam echo sounding (12 - 700 kHz) • Side scan sonar (typically 120 – 850 kHz) • Sub-bottom profiler (non-impulsive, sonar based) (1 - 24 kHz) • Ultra-high resolution seismic (0.45 – 4 kHz) • Magnetometer
Number of vessels	Up to 3 vessels plus an autonomous underwater vehicle (AUV): one vessel for a dense grid, another for a wider grid and one for very shallow water, for example
Duration	Up to 12 months (incl. standby time)
Extent and location	~5 000 km ² (cumulative) (see Figure 5-4)
Survey grid and area	~50 – 750 m line spacing, average 200 m (depends on the vessel, equipment and survey method)
Safety zone	500 m
Seafloor Sampling	
Purpose	Sampling of seabed sediment with the purpose of determining the environmental baseline, geophysical ground truthing and geotechnical engineering
Methods	• Grab samples • Piston cores • Vibro cores • Box cores • Dredge pipes • Cone penetration testing • Cyclic T-bar testing
Number of vessels	One vessel and one helicopter (for deployment of coring unit in surf zone/ very shallow water)
Duration	Up to 6 months
Extent and location	Based on the outcome of the geophysical surveys, seafloor sampling will likely be undertaken every 5 km along the preferred pipeline route, with a maximum interval of every 100 m (in high-graded areas) and 30 m in the nearshore area in water depths < 30 m
Number of samples	Up to 400 samples at ~0.15 m ³ per sample (~60 m ³ total volume)
Safety zone	500 m



Aspect	Description
Metocean Surveys	
Purpose	Measurement of near seabed currents
Method	Buoy deployment
Number of buoys	15 buoys positioned ~20 m above the seabed
Type of buoy	Acoustic doppler current profiler (ADCP)
Duration of survey	Installation: 30 days Monitoring: One year
Number of vessels / associated vessel traffic	One vessel to deploy, service (after 6 months) and retrieve (after 12 months)
Extent and location	At sub-sea installation sites and along the preferred pipeline route
ROV Surveys	
Purpose	Capture detailed images of the seafloor to ground-truth geophysical survey results, and gather information on the condition of existing infrastructure, identify benthic habitats and inspect potential pipeline routes
Methods	ROV-towed camera or AUV-camera imaging surveys
Duration	~3 months or in combination with bathymetry and sonar surveys and seabed sampling
Extent and location	Along the preferred pipeline route, proposed and existing infrastructure, and any ecological requirements
Safety zone	500 m

5.3.2.3 Bathymetry and Sonar Surveys

Bathymetry and sonar surveys will employ Single-Beam Echosounders (SBES) or Multi-Beam Echosounders (MBES) to produce detailed three-dimensional maps of the seabed. Side-Scan Sonar (SSS), Sub-Bottom Profilers (SBP), High Resolution Geophysical Survey and a Magnetometer may also be utilised to create high-resolution images of the seafloor and the near-subsurface underlying layers, helping to identify sediment types, underwater structures, and any obstacles. These surveys are critical for understanding the depth variations and seafloor morphology, which influence the design, the location and installation approach of subsea infrastructure (e.g. pipelines, umbilicals, manifolds and wellheads).

Such surveys entail transmitting frequency pulses down to the seafloor to produce a digital terrain model and identify any seafloor obstructions or hazards (see Figure 5-7). These surveys would be focused on selected areas within the survey AOI. A description of examples of the proposed equipment and techniques that may be used is provided below.

The operator has not yet identified contractors to undertake the proposed surveys. As such, this section presents typical or representative specifications of survey vessels and equipment that are broadly representative of the vessels and equipment that may be employed.

The bathymetric and sonar surveys will be undertaken by up to three survey vessels similar to a vessel shown in Figure 5-5 and provided in Table 5-5. It is not expected that the survey vessels will require the use of dedicated or full-time support / supply vessels, nor routine helicopters support. The use of support vessels will, however, be reviewed with the guidance of the eventual survey contractor.





Figure 5-5: Example of a typical or representative survey vessel

Source: (Fugro, 2022)

Table 5-5: Example specifications of survey vessel

Vessel Specifications	Values
Length	75.4 m
Width	12.5 m
Gross tonnage	2 065 t
Maximum transit speed	12 kts
Cruising speed	10 kts
Combustible to be used	HFO + MGO
Fuel consumption	5.5 m ³ per day at cruising speed
Maximum people onboard	55

Source: (Fugro, 2022)

The instrumentation to be used to carry out the surveys can be hull mounted on a survey vessel, towed behind the survey vessel or mounted on an AUV (see Figure 5-6). AUVs provide cost-effective, efficient and safe means of conducting surveys along the seafloor, and are capable of operating in harsh underwater environments, collecting high-resolution data. The AUV would survey (SSS, MBES and SBP) at ~38 m above the seafloor, but would go within ~4 m of the seafloor to take photographs and/or videos.





Figure 5-6: Example of a AUV used for bathymetric and sonar surveys

Source: (Kongsberg Maritime, 2025)

Echo Sounders

Echo sounders can be hull mounted or as part of an AUV. The majority of hydrographic depth / echo sounders are dual frequency, transmitting a low frequency pulse at the same time as a high frequency pulse. This system produces a digital terrain model of the seafloor (see Figure 5-7). The operator is proposing to utilise a SBES or MBES with a frequency range of as detailed in Table 5-4. The source levels for a typical hull mounted MBES system show a Root Mean Square (RMS²⁷) SPL of 237 dB re 1 μ Pa @ 1 m. The source levels for a typical AUV mounted MBES show a RMS SPL of 217 dB re 1 μ Pa @ 1 m.

²⁷ The Root Mean Square sound pressure is the average of the squared pressure over the pulse duration. The root mean square sound pressure level is the logarithmic ratio of the root of the mean-square pressure to the reference pressure. Pulse duration is taken as the duration between the 5% and the 95% points on the cumulative energy curve.



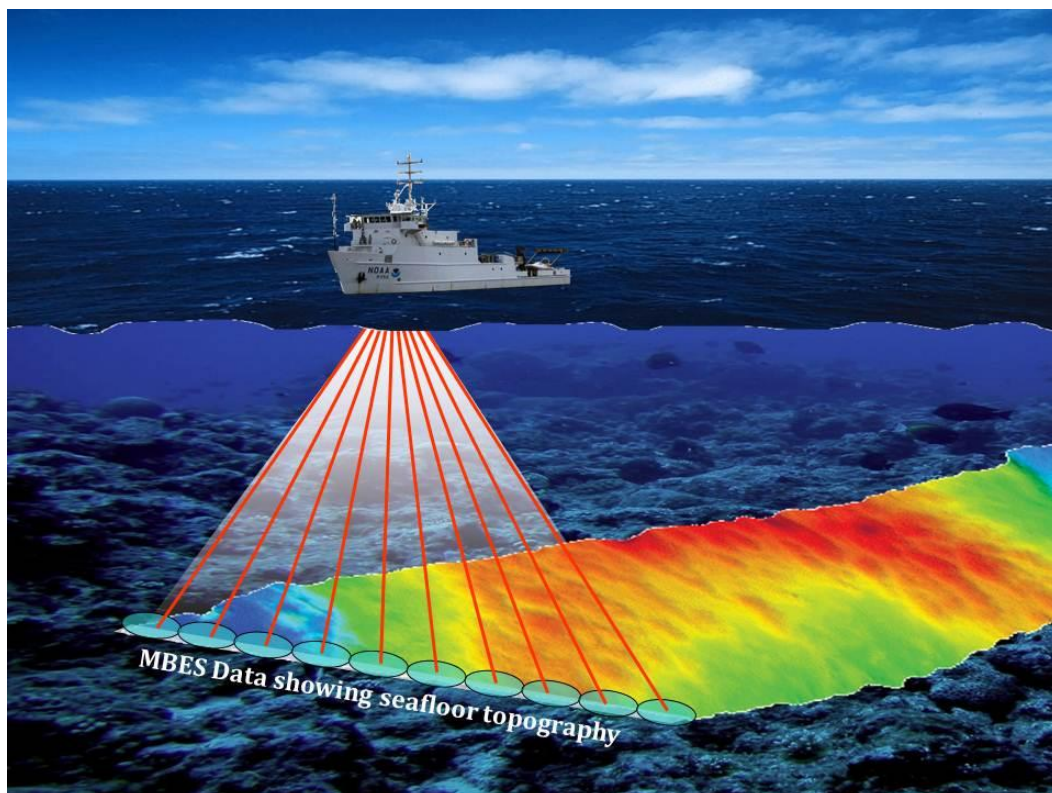


Figure 5-7: Illustration of a vessel using multi-beam echo sounder

Source: (US National Oceanic and Atmospheric Administration, 2016)

Side Scan Sonar

SSS systems produce acoustic intensity images of the seafloor and are used to map the different sediment textures of the seafloor. Side-scan uses a sonar device that emits conical or fan-shaped pulses down toward the seafloor across a wide-angle perpendicular to the path of the sensor through the water (see Figure 5-8). The intensity of the acoustic reflections from the seafloor of this fan-shaped beam is recorded in a series of cross-track slices. When stitched together along the direction of motion, these slices form an image of the sea bottom within the swath (coverage width) of the beam.

It can record data at different sound frequencies, depending on the survey goals: a lower frequency can cover large swathes of the seafloor at low image resolution. Higher-frequency pulses record smaller areas, but in much greater detail (<https://oceanexplorer.noaa.gov/>). For the current project, the operator proposes a frequency range as detailed in Table 5-4, typically producing sound levels in the order of 210 dB re 1 μ Pa at 1m.



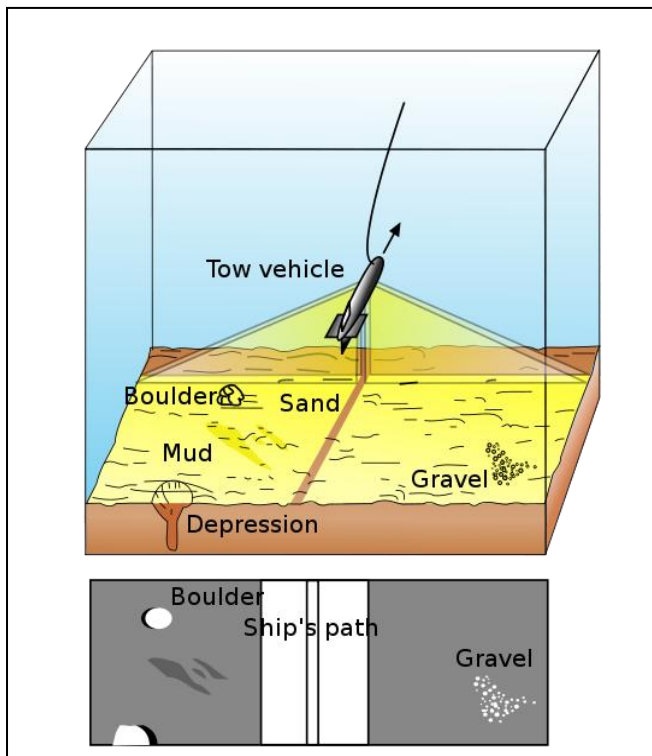


Figure 5-8: Diagram of side scan sonar

Source: (Wikimedia Commons, 2007)

Sub-Bottom Profilers

SBPs (Figure 5-9) can be hull mounted or as part of an AUV. SBPs are low frequency echo-sounders that provide a profile of the upper layers of the ocean floor. The operator is proposing to utilise a SBP emitting an acoustic pulse at frequencies as detailed in Table 5-4, typically producing sound levels in the order of 209 dB re 1 μ Pa at 1m.



Figure 5-9: Example of a combined SSS and SBP system

Source: (EdgeTech, 2024)



High Resolution Geophysical Survey

A High Resolution Geophysical Survey is a shallow imaging technique that samples sound waves at a high rate to create detailed images of the near subsurface. These surveys are used in a variety of shallow investigation applications, including offshore bathymetry, bedrock profiling for drill site investigation and infrastructure installation stability, as well as in offshore windfarm feasibility studies. In contrast to a conventional seismic system, the sound source for a High Resolution Geophysical Survey is small. This is because the depth of investigation beneath the seafloor is less than 100 m, compared to 2 000 – 3 000 m for conventional seismic surveys.

For a High Resolution Geophysical Survey, a set of hydrophones, embedded within a cable called a 'streamer' are towed behind a vessel (Figure 5-10), typically less than 100 m long. For most shallow imaging applications, a high-frequency sound source is used, such as a sparker or boomer (Figure 5-11). The operator is proposing to utilise a High Resolution Geophysical Survey emitting acoustic pulses at frequencies as detailed in Table 5-4, typically producing sound levels in the order of 214 dB re 1 μ Pa at 1m.



Figure 5-10: Example of a hydrophone streamer, Geoeel Solid Streamer
Source: Fugro



Figure 5-11: Example of a negative discharge sparker used in high resolution geophysical surveys
Source: (Geo Marine Survey Systems, 2024)



Magnetometer Survey

A magnetometer is a passive instrument that measures changes in the earth's magnetic field to characterise geological features and detect existing infrastructure and shipwrecks on the seafloor. During surveying, the magnetometer is generally towed behind the survey vessel with a cable. The magnetometer samples background magnetism unless the magnetometer detects something ferrous (containing iron). This registers as an unexpected change in magnetism, or an anomaly, on the magnetometer's display. This tool can thus detect ferrous geological formations, artifacts, existing infrastructure and even shipwrecks, whether they are exposed above the seafloor or completely buried (<https://oceanexplorer.noaa.gov/>).

5.3.2.4 Seafloor Sampling Surveys

Seafloor sampling surveys involve the collection of physical samples from the seabed to analyse sediment composition, grain size distribution, other geotechnical properties and environmental baseline data. Techniques, such as grab sampling, drop coring, box coring or vibro-coring, may be employed to retrieve sediment samples from various depths beneath the seafloor. The collected samples then undergo laboratory testing to determine their mechanical properties, such as shear strength, density and compressibility. This information is essential for assessing the seabed's stability and suitability for supporting subsea structures, as well as for understanding the environmental baseline conditions that could be affected by development activities. Accordingly, some samples will also undergo physico-chemical and biological laboratory testing.

The bathymetry and sonar surveys described in Section 5.3.2.3 above will provide a detailed bathymetry map of the seabed, as well as show the presence of mass-transport deposits²⁸ and boulder fields, soft sediment thickness and potentially ecologically sensitive areas. These interpretations need to be ground-truthed with actual seabed samples. Once this has been undertaken, engineers may require additional seafloor samples to test the geomechanical properties of the seafloor (i.e. mechanical behaviour of seabed sediments / rock). This will inform for example how subsea infrastructure must be routed, designed and installed. Typical equipment and techniques are described below.

As with the bathymetry and sonar surveys, the operator has not yet identified contractors to undertake the proposed sampling. As such, this section presents generic specifications of sampling vessels that are broadly representative of the vessels to be employed.

For the sampling surveys, a single vessel, similar to that shown in Figure 5-12 and provided in Table 5-6, will be equipped with the equipment listed below. It is not expected that the survey vessels will require the use of dedicated or full-time support / supply vessels, nor routine helicopters support for the reasons explained in Section 5.3.2.3.

²⁸ A mass-transport deposit is a body of sediment that has been moved downslope in a relatively sudden, gravity-driven event, usually underwater on a continental slope or seabed.





Figure 5-12: Example of a typical or representative survey vessel used for seabed sampling

Source: (Fugro, 2022)

Table 5-6: Example specification of seabed sampling survey vessel

Vessel Specifications	Values
Length	79.6 m
Width	16 m
Gross tonnage	2 925 t
Maximum transit speed	12 kts
Combustible to be used	HFO + MGO
Fuel consumption	17.5 m ³ per day at cruising speed
Maximum people onboard	60

Source: (Fugro, 2022)

Piston / Drop Coring

Piston core (or drop core) is one of the more common methods used to collect seabed geochemical samples, with the sequence of operation illustrated in Figure 5-13. The piston coring rig is comprised of a trigger assembly, the coring weight assembly, core barrels, tip assembly and piston. The core barrels are in lengths of up to 10 m with a diameter of 10 cm (i.e. 0.0785 m³).

The piston corer is lowered over the side of the survey vessel on a line and allowed to free fall from about 3 m above the seafloor to allow better penetration (see Figure 5-13A). As the trigger weight hits the bottom (see Figure 5-13B), it releases the weight on the trigger arm and the corer is released to "free-fall" the 3 m distance to the bottom (see Figure 5-13B & C), forcing the core barrel to travel down over the piston into the sediment (see Figure 5-13D). The movement of the core barrel over the piston creates suction below the piston and expels



the water out the top of the corer. When forward momentum of the core has stopped, a slow pull-out of the winch commences. This suction triggers the separation of the top and bottom sections of the piston. The corer and sample are then slowly pulled from the seafloor and retrieved.

The recovered cores are visually examined at the surface) and sub-samples retained for further geochemical analysis in an onshore laboratory.

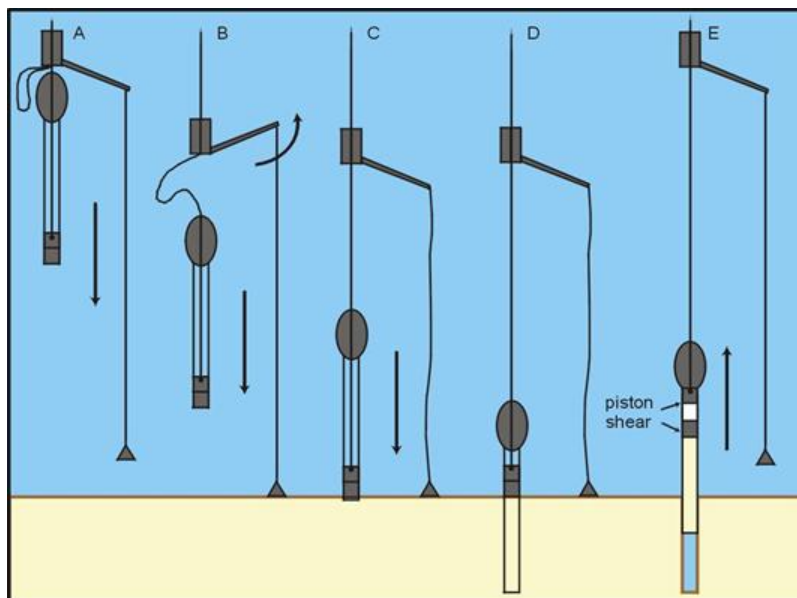


Figure 5-13: Schematic of a drop or piston core operation at the seabed

Source: (TDI-Brooks International, 2023)

Box Coring

Box corers (see Figure 5-14) are deployed from a survey vessel by lowering it vertically to the seabed. At the seabed the instrument is triggered by a trip as the main coring stem passes through its frame. The stem has a weight of up to 800 kg to aid penetration into the sediment. While pulling the corer out of the sediment, a spade swings underneath the sample to prevent loss. The recovered sample is completely enclosed after sampling, reducing the loss of finer materials during recovery. Stainless steel doors, kept open during the deployment to reduce any “bow-wave effect” during sampling, are triggered on sampling and remain tightly closed, sealing the sampled water from that of the water column. On recovery, the sample can be processed directly through the large access doors or via complete removal of the box together with its cutting blade. A spare box and spade can then be added, ready for an immediate redeployment. The operator is proposing to take box core samples (50 cm x 50 cm) at a depth of about 60 cm (0.15 m³).

Cone Penetration Testing

Cone penetration tests provide an empirical assessment of seabed sediments based on the resistance of the sediment to a cone-tipped probe or a penetrometer (see Figure 5-15), as it is pushed into the seabed at a constant rate of penetration (typically 2 cm/s). The penetrometer uses strain gauge load cells to measure the resistance to penetration.



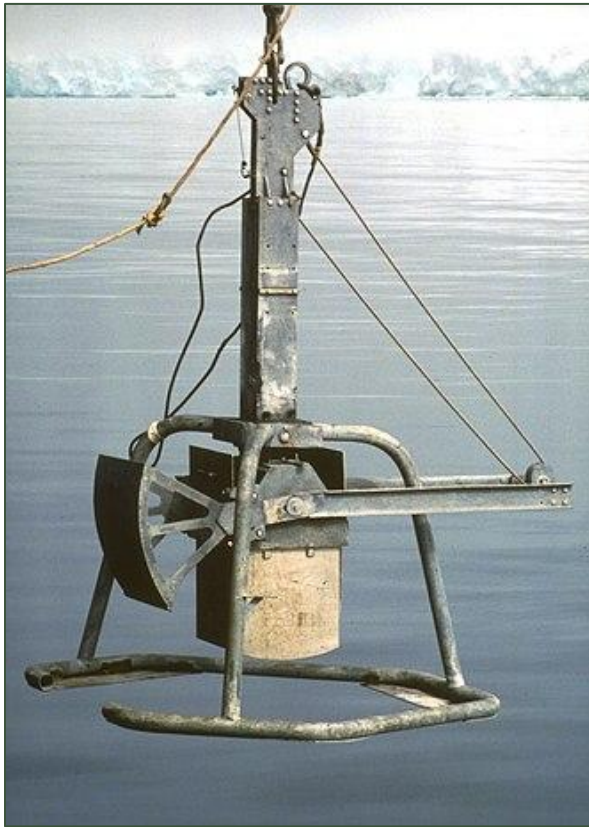


Figure 5-14: Box corer

Source: (Grobe, 2006)



Figure 5-15: Cone penetration test unit

Source: (Peneson, 2023)

Vibro Coring

Vibro coring is a method used to collect core samples from the seafloor, particularly in harder, unconsolidated sediments, especially those with high sand content. It involves driving a core tube into the sediments using a vibrating head unit.



A vibro corer is mounted on a tower and lowered from the survey vessel to the seafloor. Applying power to the head unit causes the core barrel to vibrate, creating a standing wave that liquefies the sediment outside the barrel, reducing friction and allowing the barrel to penetrate the seafloor. The sediment inside the barrel remains relatively undisturbed, and a core catcher retains the core in the outer barrel. It can take high-quality cores of 3 or 6 m in length using standard PVC (polyvinyl chloride) liners with a 106 mm internal diameter (0.03 – 0.05 m³). Water injection can be used for deeper cores of up to 12 m.

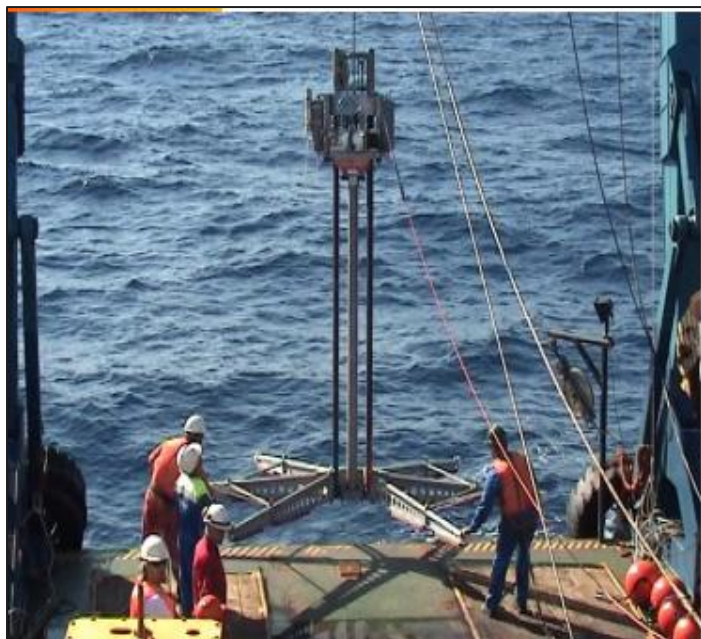


Figure 5-16: Geo-Vibro corer

Source: Geo-spark

5.3.2.5 Metocean Surveys

Metocean surveys focus on collecting data about the marine environment, including meteorological and oceanographic conditions. These surveys will measure currents near the seabed, using up to 15 acoustic doppler current profiler buoys positioned along the preferred pipeline route, ~20 m above the seabed (Figure 5-17).

This information is crucial for the design and operational planning of offshore facilities, as it provides insight into the dynamic conditions that the infrastructure will need to withstand. Understanding metocean conditions is important for determining the safe operational and installation limits of the subsea systems (including pipelines, umbilicals, manifolds and wellheads).

5.3.2.6 ROV Surveys

ROV surveys will be conducted to obtain high-resolution visual and video documentation of the seafloor and existing subsea infrastructure. ROVs are equipped with cameras, sonar, and various sensors to capture detailed images and gather data on the condition of the seafloor, identify benthic habitats, and inspect potential pipeline routes (Figure 5-18).

These vehicles can operate at significant depths and are capable of navigating complex underwater terrains. ROV surveys are essential for identifying any ecological sensitivities, potential hazards, and the precise locations for installing subsea equipment. They also allow for real-time monitoring and adjustments during the planning and execution of construction activities.





Figure 5-17: Acoustic doppler current profiler buoy

Source: ADCPs and DVLs available for rental



Figure 5-18: Typical ROV

Source: Blu-Sub Mechatronics | Subsea Robotics Parts & Underwater Components

5.3.2.7 Survey Vessel Safety Exclusion Zone

Conducting offshore surveys, as described above, requires that the position of the survey vessel and the equipment be accurately known. Bathymetry and sonar surveys consequently require accurate navigation of the sound source over pre-determined survey transects. This, and the fact that the survey equipment needs to be towed in a set configuration behind the survey vessel, means that the survey vessel has little manoeuvrability while operating.



Under the Convention on the International Regulations for Preventing Collisions at Sea (COLREGS, 1972, Part B, Section II, Rule 18), a vessel that is engaged in surveying is defined as a “vessel restricted in its ability to manoeuvre”, which requires that power-driven and sailing vessels give way to a vessel restricted in her ability to manoeuvre. Vessels engaged in fishing are required to, so far as possible, keep out of the way of the survey operation.

Furthermore, under the Marine Traffic Act, 1981 (No. 2 of 1981), a survey vessel and its equipment fall under the definition of an “offshore installation” and as such it is protected by a 500 m safety exclusion zone (Section 8B (2)). Unauthorised vessels may not enter the exclusion zone. The temporary 500 m safety exclusion zone around the survey vessel will always be enforced during operation. The safety exclusion zone will be described in a Notice to Mariners as a navigational warning.

5.3.2.8 Staffing and Logistics

The primary onshore port for supplies, crew changes and emergencies will most likely be the Port of Mossel Bay, or alternatively Gqeberha or Cape Town. At all the port alternatives, the service infrastructure required to provide the necessary onshore support is already in place. Thus, no additional onshore infrastructure will be required for the survey campaign.

The survey vessels will accommodate a crew of up to 55 per vessel, working on 12-hour rotations. The survey vessels would call into port every 14 to 30 days during the survey for supplies (equipment, fuel, food and water) and crew changes. The survey vessel would occupy the quay for about 24 hours per trip, depending on the quantity of material to be loaded / unloaded.

The methods of refuelling depend on the contractor and the vessels selected. It is not anticipated that the survey vessel would be refuelled at sea (‘bunkering’) and that refuelling will take place in port.

5.3.3 Onshore Surveys

5.3.3.1 Onshore Survey Area

Onshore surveys will be undertaken along the proposed pipelines routes(s) (see Figure 1-2).

5.3.3.2 Onshore Survey Activities

A summary of the survey activities is provided in Table 5-7 below and include the following:

- Topographical survey;
- Ground Penetrating Radar (GPR);
- Magnetometer;
- Electromagnetic survey;
- Multi-channel Analysis of Surface Waves (MASW);
- Electrical Resistance Tomography (ERT);
- Trial pits;
- Coring; and
- Cone Penetration Tests (CPT).

These surveys will be undertaken over a period of 6 months.



Table 5-7: Summary of key onshore survey activities

Aspect	Description
Topographical Survey	
Purpose	To map ground surface elevations and landform features to support route planning, engineering design and environmental baseline characterisation
Methods	• Use of GPS and surveying equipment • Aerial survey using drone photogrammetry or LiDAR (where applicable) • Establishment of survey control points and generation of digital terrain model (DTM)
Ground Penetrating Radar	
Purpose	To detect shallow subsurface features such as utilities, buried objects, voids, and stratigraphic changes
Methods	• Transmission of high-frequency electromagnetic pulses into the ground • Recording of reflected signals from subsurface interfaces • Data processing to generate 2D/3D subsurface profiles
Magnetometer	
Purpose	To detect variations in the Earth's magnetic field caused by buried ferrous objects or geological structures
Methods	• Measurement of magnetic field intensity along survey transects • Detection of anomalies associated with metal objects or lithological contrasts • Data interpretation to identify targets for further investigation
Electromagnetic survey	
Purpose	To map subsurface electrical conductivity variations for identification of soil types, groundwater conditions and buried infrastructure.
Methods	• Induction of electromagnetic fields into the ground • Measurement of secondary field responses • Interpretation of conductivity contrasts to infer subsurface conditions
Multi-channel Analysis of Surface Waves	
Purpose	To determine shear wave velocity profiles for geotechnical characterisation of subsurface materials
Methods	• Generation of surface waves using a sound source • Recording wave propagation using geophone arrays • Processing dispersion curves to derive shear wave velocity profiles
Electrical Resistance Tomography	
Purpose	To image subsurface resistivity variations to identify soil layers, moisture content and groundwater conditions
Methods	• Installation of electrode arrays along survey lines • Injection of electrical current and measurement of potential differences • Inversion modelling to produce 2D/3D resistivity profiles
Trial Pits	
Purpose	To provide direct visual inspection and sampling of near-surface soils for geotechnical and environmental assessment
Methods	• Excavation of up to 50 trial pits using mechanical excavators to shallow depths: 3 m L, 2 m W and 3 m D (18 m³) • Logging of soil profiles and stratigraphy



Aspect	Description
	- Collection of disturbed and undisturbed samples where required - Backfilling and reinstatement after completion
Coring	
Purpose	To obtain continuous subsurface samples for detailed geological and geotechnical analysis
Methods	- Rotary drilling of up to 20 core holes: 10 – 30 m deep - Retrieval of continuous cylindrical soil/rock cores - Logging, preservation and laboratory testing of samples
Cone Penetration Tests	
Purpose	To determine soil stratigraphy and geotechnical parameters such as bearing capacity, density and shear strength
Methods	- Hydraulic pushing of an instrumented cone into the ground at a constant rate: up to 50 CPTs may be undertaken - Measurement of tip resistance, sleeve friction and pore pressure - Continuous profiling of subsurface geotechnical properties

5.4 Well Drilling

A summary of the key well drilling activities is provided in Table 5-8 below.

Table 5-8: Summary of key project activities

Production, Injection and Appraisal Well Drilling	
Purpose	- Confirm and test the presence and quality of hydrocarbon resources. - Production of hydrocarbon resources. - Potentially gas injection.
Number of wells	Up to 19 wells (exploration, appraisal, production and potentially gas injection wells)
Well depth (below seafloor)	Variable depending on depth of resource. A notional well depth of 2 360 m is assumed for the ESIA
Water depth range	Water depth range of area of interest: ~1 200 m to 2 000 m
Number of drilling campaigns	Up to seven campaigns
Duration of each campaign (3 wells)	Up to 210 days (~7 months) per 3 well campaign (including mobilisation)
Commencement of drilling and anticipated timing	Commencement is not confirmed but anticipated to be 2 years prior to first gas. Two campaigns will initially be drilled, followed by a further five (i.e. 7 campaigns in total over a period of 6 years).
Type of drilling fluids (muds)	The current drilling programme is based on the use of high-performance Water-Based Mud (WBM) or drilling fluids, which will be discharged offshore. However, future conditions and circumstances may necessitate, or make preferable, the use of Non-Aqueous Drilling Fluids (NADF) in certain sections of selected wells. In such circumstances, any drill cuttings generated during NADF operations will be returned to the drilling unit and transported to shore for treatment, handling and disposal at appropriately licensed waste management facilities. All such activities will be undertaken in accordance with



Production, Injection and Appraisal Well Drilling	
	applicable national regulations, approved waste management procedures, and Good International Industry Practice.
Drilling and support vessels	Dynamically Positioned deepwater Mobile Offshore Drilling Unit (MODU) – semi-submersible drilling Up to four vessels (two Platform Supply Vessels (PSVs) and two Anchor Handling Tug Vessel (AHTV)) to support drilling operations. Vessels will move equipment and materials between drilling unit and onshore base, as well as provide services as standby vessel.
Operational safety zone	Minimum 500 m around drilling unit. The safety zone will, however, be larger to encompass the AHTV and tow line.
Flaring (non-routine)	If hydrocarbons are discovered, well testing (including non-routine flaring) may be performed.
Logistics base	Logistics base will be in existing ports suitable for oil and gas support services located within the region (e.g. Mossel Bay, Gqeberha and/or Cape Town).
Logistics base components	Office facilities, laydown area, warehouse and quay for loading and offloading (existing).
Support facilities	Crew accommodation in Mossel Bay, Gqeberha or Cape Town.
Staff requirements:	- Specialised drilling staff supplied with hire of drilling unit and support vessels. - Additional specialised international and local staff at logistics base. - Other support services.
Staff changes	Rotation of offshore staff by helicopter to shore: ~1 trip per day.

5.4.1 Overall Drilling Approach

5.4.1.1 Number and Location of Wells

Up to 19 wells may be drilled, including:

- Up to six wells in the Luiperd field (of which up to 3 may serve as initially gas re-injection wells),
- Four production wells in Brulpadda field, one of which would be for Brulpadda deep²⁹,
- Three appraisal wells, one each in the Blaasop, Woudboom and Platanna reservoirs, respectively, and
- Up to six additional production wells within the Blaasop, Woudboom and Platanna reservoirs.

The notional well locations are shown in Figure 5-19. The final well locations will be selected following integrated interpretation of seismic data and pre-drill survey results, with final confirmation through a pre-spud inspection by a ROV to verify seabed conditions, identify potential obstructions and avoid environmentally sensitive features.

²⁹ Note: Brulpadda wells may be drilled in lieu of Luiperd injection wells in the second drilling campaign.



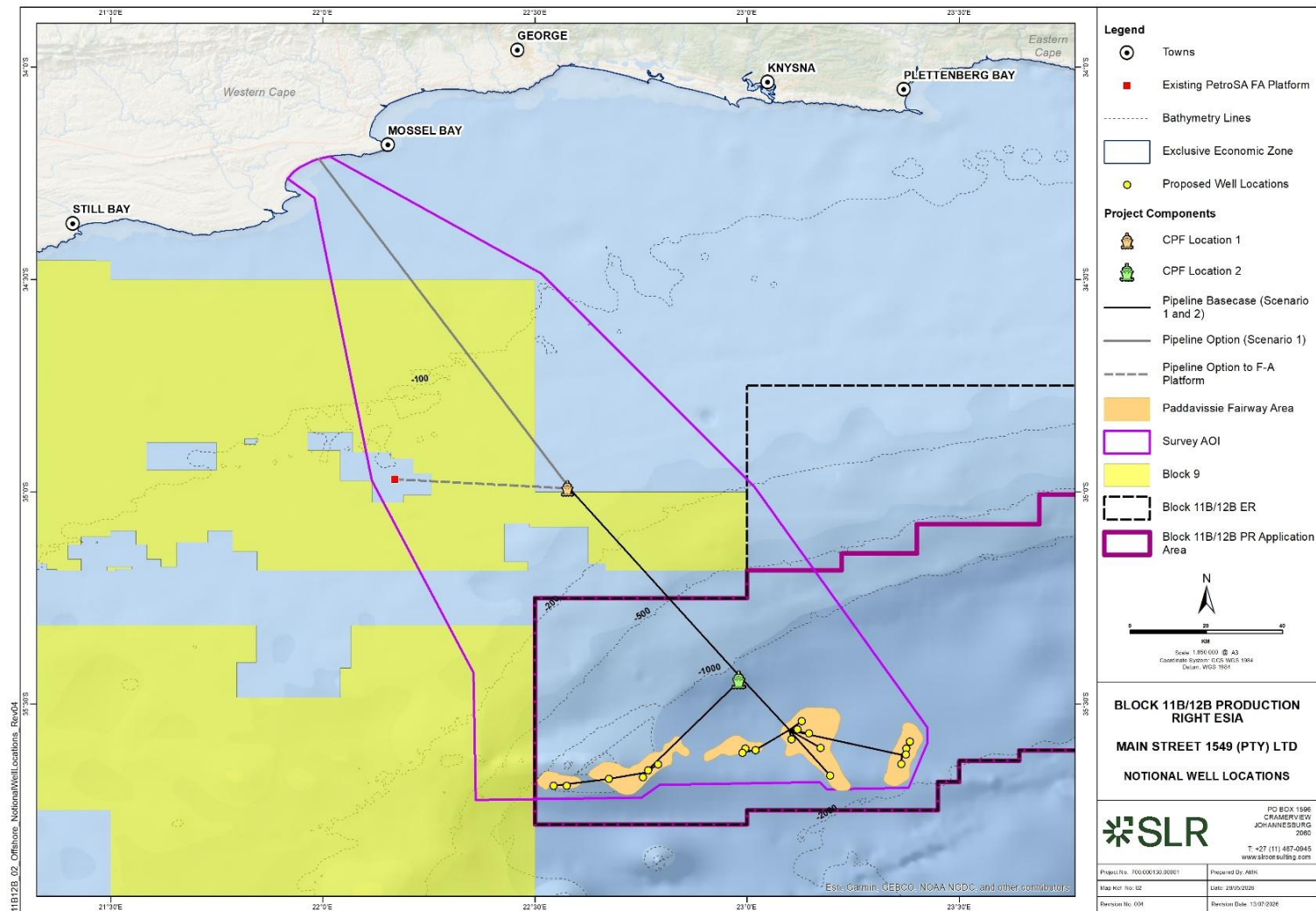


Figure 5-19: Conceptual Well Locations



5.4.1.2 Well Scheduling and Drilling Duration

The wells would be drilled sequentially, with only one drilling campaign (~3 wells) planned at any one time. Drilling activities would predominantly be scheduled during the Austral summer period, limiting operations to a maximum of three wells per year; although, drilling throughout the year is not excluded.

Table 5-9 presents the most aggressive drilling schedule; however, it is likely that the wells will be spaced further apart in practice.

The base-case duration for vertical production wells is ~57 days per well, increasing to ~76 days under more conservative assumptions, with a maximum three-well campaign duration of ~210 days. A similar duration is expected for appraisal wells, as time savings from the absence of completion and suspension activities are offset by the additional time required for well testing and plugging.

Table 5-9: Drilling schedule

Reservoir	Well Type	Start of drilling campaign relative to 1 st Gas (Yr 0)	No. Wells
Luiperd	Production	-2	3
Luiperd	Gas re-injection / Production ¹	-1	3
Brulpadda	Production	0	3
Blaasop	Appraisal	+2	1
Woudboom	Appraisal	+2	1
Platanna	Appraisal	+2	1
Blaasop	Production	+4	3
Woudboom	Production	+6	2
Brulpadda deep	Production	+6	1
Platanna	Production	+8	1
1. Note: If gas re-injection is not required, drilling of Brulpadda wells may be advanced.			

5.4.2 Description of Drilling Equipment and Components

This section describes the main drilling equipment and components.

5.4.2.1 Drilling Unit (Rig)

Well drilling will most likely be undertaken using a dynamically positioned deepwater Mobile semi-submersible Offshore Drilling Unit (MODU); the final drilling unit will be selected depending on availability and final design specifications.

A semi-submersible drilling unit is a purpose-designed offshore vessel engineered for stability in deep and exposed waters. It essentially comprises of a drilling rig located on a floating structure of pontoons. When at the well location, the pontoons are partially flooded (or ballasted), with seawater, to submerge the pontoons to a pre-determined depth below the sea level where wave motion is minimised. This gives stability to the drilling vessel, thereby facilitating drilling operations.

The derrick is typically positioned centrally on the vessel, with drilling conducted through a moonpool in the deck. Crane-supported activities and supply handling are undertaken on either side of the unit. Depending on forecast metocean conditions during the drilling



campaign, one or more support tugs may be deployed to assist with station-keeping and operational safety.

Operational experience gained during the drilling of Brulpadda-1AX and Luiperd-1X demonstrated that a high-specification DP semi-submersible provides appropriate motion characteristics, station-keeping performance, and operational resilience under the prevailing metocean conditions. The Odfjell Drilling semi-submersible Deepsea Stavanger shown in Figure 5-20, a sixth-generation harsh-environment unit was utilised for both wells. Performance data from these campaigns confirmed the technical suitability of this class of rig for continued operations within the block.



Figure 5-20: Photograph of a drilling unit, the Deepsea Scavenger, with support vessel and anchor handling tug vessel during a previous drilling campaign in Block 11B/12B

Source: <https://africaenergycorp.com/operations/south-africa-block-11b-12b/>

A temporary safety exclusion zone of minimum 500 m radius around the drilling unit will be enforced at all times during operation and will be described in a Notice to Mariners as a navigational warning. Under the Convention on the International Regulations for Preventing Collisions at Sea (COLREGS, 1972, Part B, Section II, Rule 18), a drilling unit that is engaged in underwater operations is defined as a “*vessel restricted in its ability to manoeuvre*”, and power-driven and sailing vessels must give way to such vessels. Fishing vessels are required to keep out of the way of the well drilling operation and observe the operational safety zones. Furthermore, under the Marine Traffic Act, 1981 (No. 2 of 1981), a vessel used for the purpose of exploiting the seabed falls under the definition of an “offshore installation” and as such it is protected by a 500 m safety exclusion zone. The safety zone may, however, be larger (up to 2 km) to encompass the AHTV and tow line.

5.4.2.1 Support Vessels

The drilling unit will be supported / serviced by two Platform Support Vessels (PSV) operating with regular trips (Figure 5-21), to facilitate the transportation of goods, equipment, tools and waste between the drilling unit and the onshore logistics base.



A supply frequency of up to twice per week per vessel is anticipated, subject to operational demand and weather constraints.

A support vessel will always be on standby near the drilling unit to provide support for firefighting, oil containment / recovery, rescue in the unlikely event of an emergency and supply any additional equipment that may be required. Support vessels can also be used for medical evacuations or transfer of crew if needed.



Figure 5-21: Photograph of a platform supply vessels along side the drilling unit, the Deepsea Scavenger, during a previous drilling campaign in Block 11B/12B

Source: <https://www.businessday.co.za/bd/national/2020-08-12-total-brings-rig-to-drill-fresh-prospect-at-mossel-bay-gas-find/>

Up to two high-capacity Anchor Handling Tug Vessels (AHTVs) may be deployed to provide towed station-keeping assistance, ensuring full redundancy in thrust capability during peak current conditions (Figure 5-22). Bollard pull ratings are expected to be ~300 metric tonnes or larger, consistent with vessels deployed during previous campaigns.





Figure 5-22: Photograph of an anchor handling tug vessel, the Normand Ranger, and the drilling unit during a previous drilling campaign in Block 11B/12B

Source: <https://africaenergycorp.com/operations/south-africa-block-11b-12b/>

5.4.2.2 Helicopters

Helicopter services will be utilised for routine crew changes, medical emergency evacuation (MEDEVAC) and time-critical logistics. Aircraft selection, flight routing, and offshore helideck operations will comply with applicable South African Civil Aviation Authority (SACAA) requirements and offshore aviation safety standards.

The heliport adjacent to the George airport is the proposed base for helicopter operations.

5.4.2.1 Onshore Logistics Base

Onshore logistics is expected to be provided from Mossel Bay (which is closest) and further support from Cape Town or Gqeberha (where other facilities may be located).

The shore bases will provide for the storage of materials and equipment (including pipes, drilling fluid, cement, chemicals) that will be transported by sea to / from the drilling rig, and quay space for loading and offloading. The shore base will also be used for coordination of support services: accommodation, waste management services, bunkering vessels, and stevedoring / customs clearance services.

It is anticipated that the ports will have the necessary service infrastructure required to provide the necessary onshore support in place and it will not be required to add any additional permanent onshore infrastructure for the project.

5.4.3 Mobilisation for Drilling

The mobilisation phase will entail the required notifications, establishment of the onshore base, appointment of local service providers, procurement and transportation of equipment and materials from various ports and airports, accommodation arrangements and transit of the drilling unit and support vessels to the drilling area. This phase will also include obtaining the required permits and permissions to commence with operations.



A formal notification will be submitted to PASA prior to mobilisation of the drilling unit. This will include details of the activity location, drilling schedules, drilling unit / supply vessel specifications, contractor details, and confirmation that all permits / permissions and pre-drilling requirements, as per the EMP, are in place. PASA will be routinely notified through regular reports and meetings on the progress of activities throughout the drilling campaign.

Key stakeholders (e.g., fishing associations and companies, operators of the neighbouring licence blocks, local authorities, I&APs, etc.) from the stakeholder database will also be notified of planned drilling activities prior to commencement. Relevant authorities will be engaged as necessary for the establishment of an onshore logistics base (e.g., TNPA, local authority, etc.).

The drilling unit and supply vessels will sail to the well site. Ballast water discharge will follow the requirements of the International Maritime Organisation's (IMO) 2004 International Convention for the Control and Management of Ships' Ballast Water and Sediments.

Drilling materials, such as casings, mud components, cement and other equipment, and materials will be brought into the country or procured locally, if possible. Equipment will be transferred between the onshore logistics base and the drilling unit by the supply vessels.

5.4.4 Description of Well Drilling

5.4.4.1 Drilling Sequence

The sequence for a single well is shown in Figure 5-23 and summarised below.

- Drill top hole³⁰ (riserless stage)
- Complete well drilling (risered stage):
- Clean-up and test (where required), and then abandon / suspend well.
- Disconnect and move the drilling unit to second well location and drill, clean-up and test (where required) and abandon /suspend well. The drilling unit then will move to third drill location.

It should, however, be noted that it is likely that the top-hole sections (riserless) for each of the three wells will be drilled first in a single campaign. Thereafter, the blow-out preventor (BOP) and riser would be deployed and the lower reservoir sections would be drilled. This approach will save time as multiple BOP runs are avoided. Thus, a three-well campaign is expected to take between 150 and 210 days to complete from the time the rig arrives in the field.

The approach to drilling wells differs as described below:

- **Appraisal wells** may be logged, cored and, where required, flow tested and flared. Vertical Seismic Profiling (VSP) will also be undertaken to review the log data to the seismic data. Following evaluation of the results, the wells will either be permanently plugged and abandoned or suspended for potential future production.
- **Production and gas re-injection wells** will be back-flowed to remove residual drilling fluids and debris from the wellbore and near-wellbore formation. VSP could also be undertaken on production wells. The wells will then be completed through installation of the lower and upper completion assemblies and placed in suspension.

³⁰ The top hole refers to the initial (riserless) phase of drilling a well, i.e. drilling the uppermost section of the wellbore. The top hole is usually drilled to a relatively shallow depth compared to the total depth of the well and with a larger diameter bit to accommodate the installation of surface casing.



A production tree will subsequently be installed on the wellhead, most likely using a construction vessel. Upon completion of these activities, the well will be configured and ready for tie-in to the production system.

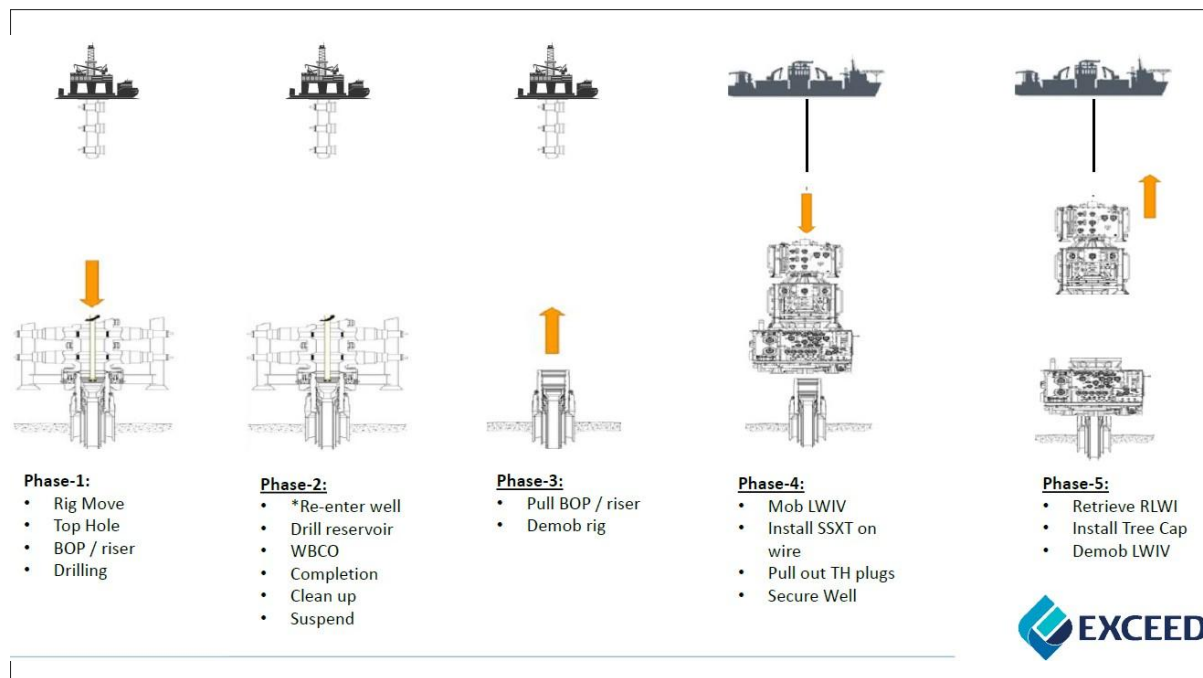


Figure 5-23: Well construction sequence

Source: Exceed

5.4.4.2 Drilling Stages

The well will be created by drilling an initially shallow hole into the seafloor with a drill bit attached to a rotating drill string, which crushes the rock into small particles, called “cuttings”. After the initial hole is drilled, casings (sections of steel pipe) are placed in the hole and permanently cemented in place (cementing operations are described below). The next (deeper and narrower) section of the well is then drilled and casing cemented in place. This is repeated until the well has reached the desired depth. The hole diameter decreases with increasing depth (see Figure 5-24).

The casings provide structural integrity to the newly drilled wellbore, in addition to isolating different geological formations from each other and from the surface. With these zones safely isolated, and the formation protected by the casing, the well will be drilled deeper with a smaller drill bit and also cased with a smaller sized casing. For the current project, it is anticipated that there will be four sets of subsequently smaller hole sizes drilled inside one another, each cemented with casing, except the last phase that will remain an open hole without casing.



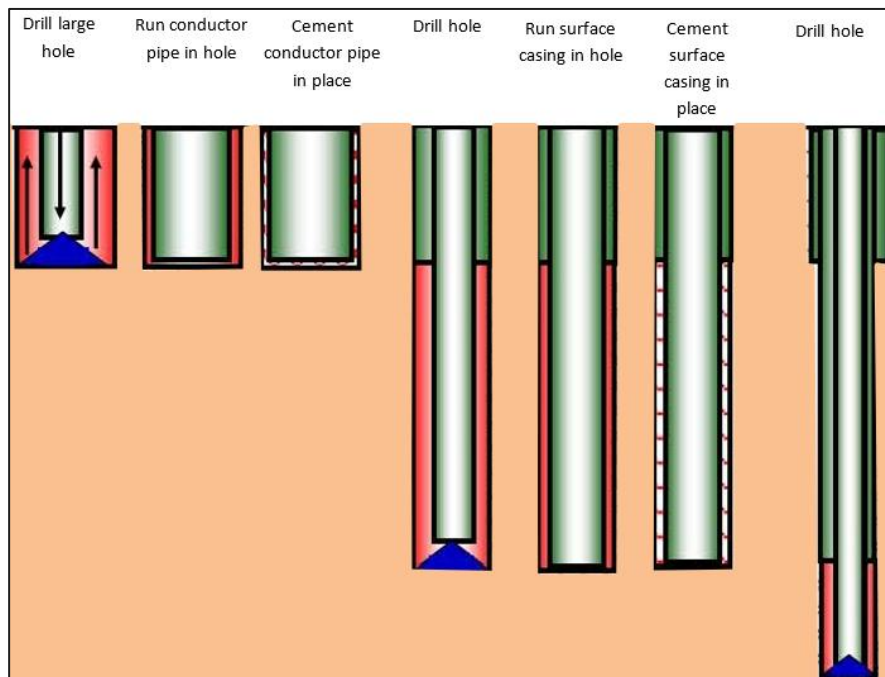


Figure 5-24: Simplified view of well drilling stages
Adapted from Nergaard, 2005

Drilling operations are undertaken in two principal phases: a riserless stage / tophole (when the riser is not in place) followed by a risered stage (see Figure 5-25).

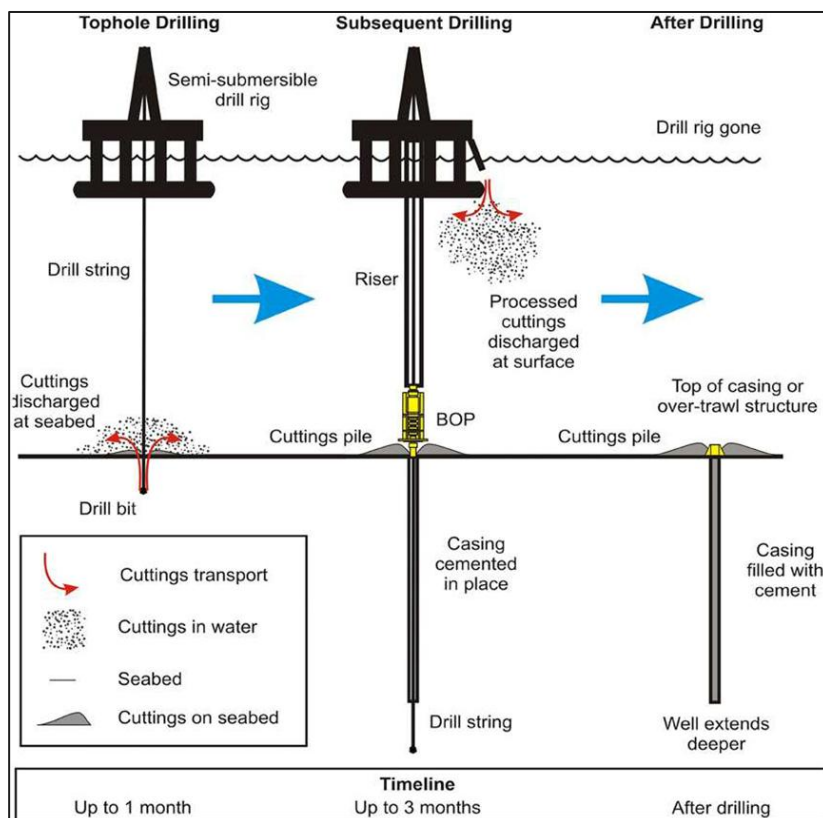


Figure 5-25: Drilling stages: (A) riserless (tophole) drilling stage; and (B) risered drilling stage

Source: <http://www.kochi-core.jp/cuttings/>



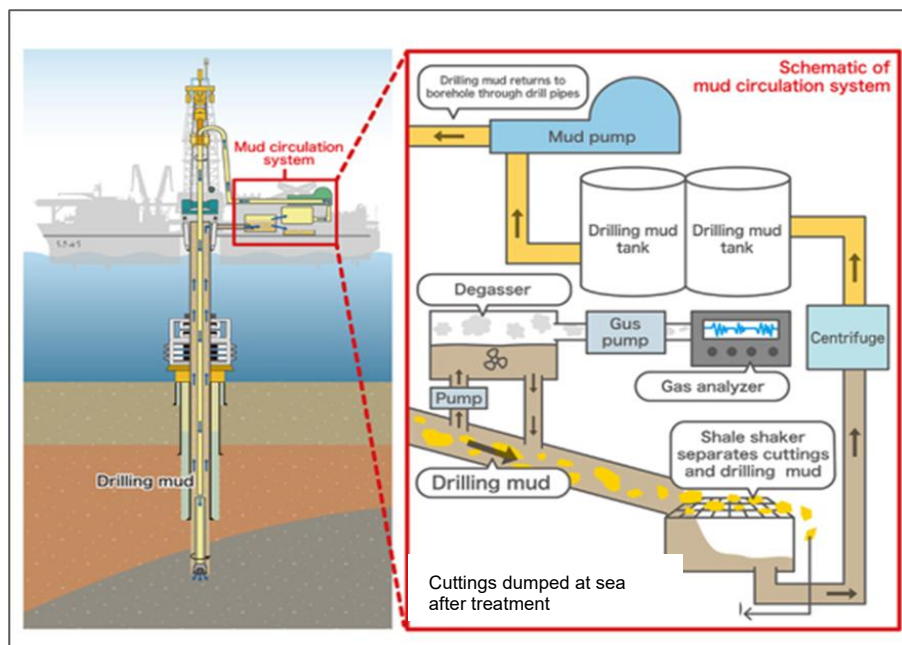


Figure 5-26: Simplified illustration of a mud circulating system

Source: Apostolidou, 2019

Initial (Riserless) Drilling Stage

The process of preparing the first section of a well is referred to as “spudding” (i.e. the process of beginning to drill a well). Sediments just below the seafloor are often very soft and unconsolidated. To prevent the well from collapsing and to provide structural support for the wellhead, a 36-inch diameter structural conductor pipe is installed. Jetting is the primary means of setting the 36-inch conductor pipe where no cement is required. If jetting fails, then the hole is drilled to 42-inch and then the 36-inch conductor pipe is installed and then cemented.

When the conductor pipe and low-pressure wellhead are at the correct depth (~70 m deep depending upon substrate strength), a new drilling assembly will be run inside the structural conductor pipe and the next hole section will be drilled by rotating the drill string and drill bit.

Below the conductor pipe, a hole of approximately 26 inches in diameter will be drilled with a length of ~1 000 m. The rotating drill string causes the drill bit to crush rock into small particles, called “cuttings”. While the wellbore is being drilled, drilling fluid is pumped from the surface down through the inside of the drill pipe, the drilling fluid passes through holes in the drill bit and travels back to the seafloor through the space between the drill string and the walls of the hole, thereby removing the cuttings from the hole. At a planned depth, the drilling is stopped and the bit and drill string is pulled out of the hole. A surface casing of 20-inch diameter is then placed into the hole and secured into place by pumping cement through the casing at the bottom of the hole and back up the annulus (the space between the casing and the borehole). The 20-inch casing will have a high-pressure wellhead on top.

These initial hole sections will be drilled using seawater (with high-viscosity sweeps) and Water Based Muds (WBM) (see Box 5-1). All cuttings and WBM from this initial drilling stage will be discharged directly onto the seafloor adjacent to the wellbore.



Risered Drilling Stage

The risered drilling stage (refer to Figure 5-25) commences with the lowering of a BOP and installing it on the wellhead (see Section 5.4.6.1 for further detail on the BOP and its purpose). A lower marine riser package is installed on top of the BOP and the entire unit is lowered on riser joints. The riser isolates the drilling fluid and cuttings from the environment, thereby creating a “closed loop circulation system”. A simplified illustration of a mud circulating system is shown in Figure 5-26.

Drilling is continued by lowering the drill string through the riser, BOP and casing, and rotating the drill string. During the risered drilling stage, the proposal is to continue use WBMs, rather than NADF. However, future conditions and circumstances may necessitate, or make preferable, the use of NADF in certain sections of selected wells. The drilling fluid emerges through nozzles in the drill bit and then rises (carrying the rock cuttings with it) up the annular space between the drill string and the sides of the hole, casing and riser to the drilling unit.

The cuttings are removed from the returned drill mud and discharged overboard after treatment (see Section 5.7). In circumstances where NADF are used, any drill cuttings generated will be returned to the drilling unit and transported to shore for treatment, handling and disposal at appropriately licensed waste management facilities.

5.4.4.3 Cementing

Cementing is the process of pumping cement slurry through the drill pipe and / or cement stinger at the bottom of the hole and back up into the space between the casing and the borehole wall (annulus). Cement fills the annulus between the casing and the drilled hole to form an extremely strong, nearly impermeable seal, thereby permanently securing the casings in place. To separate the cement from the drilling fluid to minimise cement contamination a cementing plugs and/or spacer fluids are used. The plugs are pushed by the drilling fluid to ensure the cement is placed outside the casing filling the annular space between the casing and the hole wall.

Cementing has four general purposes: (i) it isolates and segregates the casing seat for subsequent drilling, (ii) it protects the casing from corrosion, (iii) it provides structural support for the casing, and (iv) it stabilises the formation.

To ensure effective cementing, an excess of cement is often used to account for uncertainties of the borehole diameter. Until the marine riser is set, excess cement from the first casings emerges out of the top of the well onto the seafloor. This cement does not set and is slowly dissolved into the seawater.

Offshore drilling operations typically use Portland cements, defined as pulverised clinkers consisting of hydrated calcium silicates and usually containing one or more forms of calcium sulphate. The raw materials used are lime, silica, alumina and ferric oxide. The cement slurry used is specially designed for the exact well conditions and temperatures encountered.

Additives can be used to adjust various properties in order to achieve the desired results. There are over 150 cementing additives available. The amount (concentrations) of these additives generally make up only a small portion (<10%) of the overall amount of cement used for a typical well. Usually, there are three main additives used: retarders, fluid loss control agents and friction reducers. These additives are polymers generally made of organic material and are considered non-toxic.

Once the cement has set, a short section of new hole is drilled, then a pressure test is performed to ensure that the cement and formation are able to withstand the higher pressures of fluids expected to be encountered from deeper formations.



BOX 5-1: Drilling Fluids or Muds

Drilling fluid is a complex mixture of fluids, solids and chemicals that are carefully tailored to provide the correct physical and chemical characteristics required to safely drill the well. The main functions of drilling fluid or drilling mud (terms used interchangeably) are to:

- Provide sufficient hydrostatic pressure to control subsurface pressures and prevent kicks or blow-outs;
- Maintain a stable wellbore and prevent deterioration of the open hole, such as collapsing;
- Transport the cuttings to the surface;
- Cool and lubricate the drill bit and drill string (reduce friction);
- Power the mud motors / downhole tools during the drilling process;
- Regulate the chemical and physical characteristics of returned mud slurry on the drilling unit; and
- Displace cements during the cementing process.

Two types of drilling fluid may be used during offshore drilling, namely Water-Based Mud (WBM) and Non-Aqueous Based Mud (NABM), or Non-Aqueous Drilling Fluid (NADF) as it is hereafter referred to.

For this project, the proposal is to only use WBMs, unless future conditions and circumstances necessitate, or make preferable, the use of NADF for certain well sections. Due to the variability in conditions that can be encountered, drilling fluid mixtures vary to some extent. Typically, the major ingredient making up 85 to 90% of the total volume of a WBM is freshwater and / or seawater.

The remaining 10 to 15% of the volume of WBMs typically comprise barite, potato or corn starch, cellulose-based polymers, xanthan gum, bentonite clay, soda ash, caustic soda and salts (these are usually either potassium chloride [KCl], Calcium chloride [CaCl₂] or sodium chloride [NaCl]). Other minor additives may be used in special circumstances such as citric acid for pH control; or polyethylene glycol butyl ether for clay inhibition, amongst others. Details for some of these are provided below:

- Barite (barium sulphate) is an inert compound used as a weighting agent
- Potato or corn starch and other cellulose-based polymers are used to control the rate of filtration of water in the mud into the formation being drilled by forming a thin filter cake on the borehole wall
- Xanthan gum and minor amounts of bentonite clay are used to provide viscosity and impart rheological properties (i.e. materials responding with plastic/liquid flow or flow of matter as a “soft solid”) to the mud for cuttings transport, as well as to provide gel strength for cuttings suspension
- Caustic soda (sodium hydroxide) is used to maintain the required pH in the drilling fluid
- KCl, CaCl₂ or NaCl (table salt) are used to reduce the swelling tendencies of clays being drilled and help to maintain a stable wellbore

All chemicals to be used will have associated Material Safety Data Sheet (MSDS) or other bioassay information for ecotoxicology data, where applicable. Selection of constituents will follow good industry practices and will consider ecotoxicity, biodegradability and bioaccumulation criteria.



5.4.4.4 Notional Well Design (Base Case)

The well design depends on factors such as planned depth, reservoir pore pressure and anticipated hydrocarbon-bearing formations.

The base case design for all production wells will be vertical slim-bore wells. Although, the option of deviated production wells requiring an additional casing string will be retained. Appraisal wells may also incorporate an additional casing string. Figure 5-27 shows the three designs schematically.

A notional base case well design and estimated drilling discharges are indicated in Table 5-10 below.

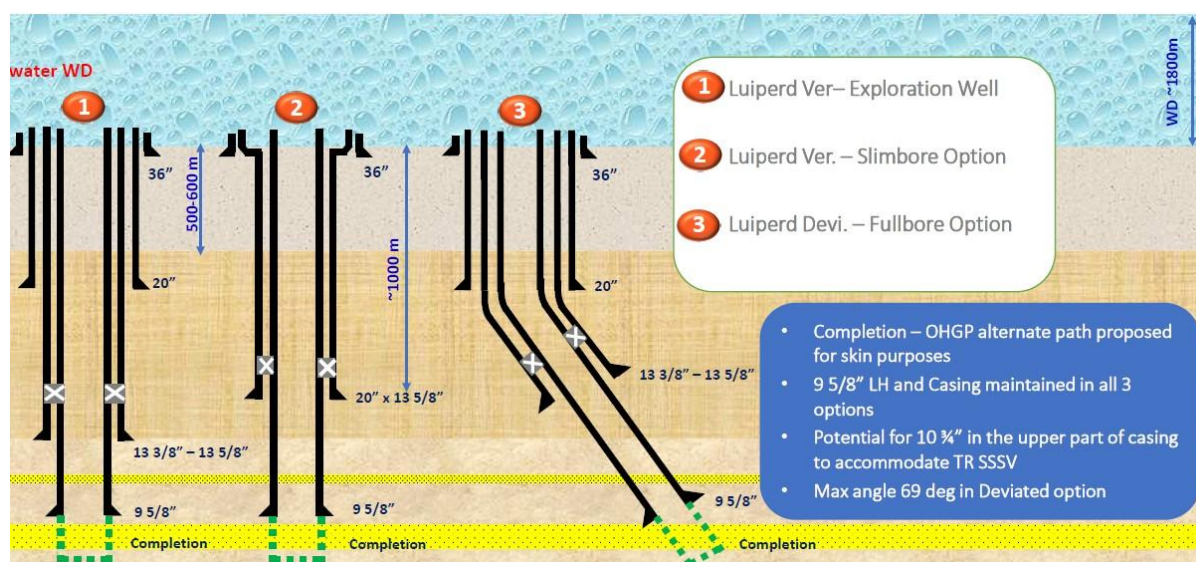


Figure 5-27: Well design alternatives

Source: Exceed



Table 5-10: Notional base case well design and estimated drilling discharges

Drill Section	Hole diameter (in)	Pipe diameter (in)	Length of section (m)	Drilling duration (days from start date)	Discharge Duration (days)	Type of drilling fluid used	Drilling Cuttings		Drill Fluid			Discharge location (and water depth)
							Volume (m³)	Rate (m³/d)	Mud Mixture Vol. (m³)	Mud Solid Vol. (m³)	Mud Solid Discharge Rate (m³/d)	
Riserless drilling stage												
1	42"	36"	90	0	0.2	Seawater with Gel Polymer Sweeps	133	665	175	8.75	43.75	Seabed (1 395 – 1 718 m)
2	42"	36"		1	0.1	KCl Polymer Mud	0	0	265	24.61	49.21	
3	26"	20"	710	2.2	1.2	Seawater with Gel Polymer Sweeps	401	334.17	778	38.90	29.92	
4	26"	20"		3.8	0.1	KCl Polymer Mud	0	0	904	83.89	83.89	
Totals			800		1.6		534		2122	156.15		
Risered drilling stage												
5	17.5"	13½	476	10.6	0.8	WBM / NADF*	122	152.5	1 068	30.54	15.27	5 m below sea surface
6	12.25"	9½	583	15.1	1.3		73	56.15	1 025	51.00	11.33	
7	8.5"	7	501	19.1	2.1		30	14.29	883	81.94	30.35	
8	8.5"	7		34.3	0.4		0	0	1 023	94.93	316.43	
Totals			1 560		4.6		225		3 999	258.41		
* The proposal is to use WBMs, rather than NADF. However, future conditions and circumstances may necessitate, or make preferable, the use of NADF in certain well sections. In circumstances where NADF are used, any drill cuttings generated will be returned to the drilling unit and transported to shore for treatment, handling and disposal at appropriately licensed waste management facilities.												



5.4.4.5 Logging and Profiling

Mud Logging

Evaluation of the petro-physical properties of the penetrated formations is carried out routinely during the drilling operation. Mud logging involves the examination of the drill cuttings brought to the surface by the drilling fluid. Mud logging also monitors for hydrocarbon gases that relate to changes in formation pressure and the volume or rate of returning fluid, which can aid in controlling the well, and to the intersection of reservoir rocks.

Well Logging

Once target depth is reached well logging tools may be employed. Well logging involves the insertion of specialised instruments into a borehole to determine the properties of the geological formations penetrated by the well bore, using:

- Logging While Drilling (LWD) will be conducted with logging tools incorporated into the drill string that provide critical real-time well information.
- Wireline logging, performed by lowering a logging tool (or a string of one or more instruments) into the well bore after removal of the drill string, and recording petrophysical properties using a variety of sensors.

Both methods may be employed to varying degrees.

The logs can be broadly classified into three classes, namely electrical, nuclear and mechanical. They can also be further classified into passive or active measuring type. The passive type directly measures the properties of the rocks (e.g. the electrical potential in the formation fluids). The active types transmit from the tool into the rock and measure the response (e.g. measuring current induced magnetic fields in the rock caused by the emission of electromagnetic waves from the tool).

Mechanical logging tools can typically take samples of the rock or formation fluids and directly measure the pore pressure in permeable formations. The various responses can be correlated to the properties of the rocks or formation fluids. From this data, different rock and fluid types, their thickness, depths and properties can be determined during the petrophysical evaluation.

Radioactive sources may be used for certain types of data acquisition. These are used for the gamma ray measurements (where it generates a radioactive field that interacts with the rocks penetrated at the wellbore) and for calibrating wireline tools that measure either natural or induced radioactivity, which are recovered at the end unit in specially designed secured (locked) storage containers. The tools are inventoried upon arrival and tested for leaks. A detailed log is kept of any access to the storage container and tools. Drilling units have special storage locations designated for radioactive containers and only certified logging engineers are allowed to handle the radioactive devices. They also wear personal monitoring devices to measure any unusual exposure. The equipment is handled as little as possible by the engineers and is immediately returned to the storage containers upon completion of the logging run.

Vertical Seismic Profiling

VSP may be undertaken as part of the conventional wireline logging programme when the well reaches target depth to generate a high-resolution seismic image of the geology in the well's immediate vicinity. The VSP images are used for correlation with surface seismic images and for forward planning of the drill bit during drilling.



VSP uses a small sound source (sound pressure generating), which is operated from the drilling unit. The sound source is made up of several sound sources with a total array volume of up to 1 200 cubic inches (CUI). The sound source is deployed on average 10 m below sea level and has a source pressure of 2 000 pounds per square inch (psi).

During VSP operations, a string of receivers (usually four to five) is placed in a section of the borehole and the sound source is discharged approximately five times at 20 second intervals. The generated sound pulses are reflected through the seabed and are recorded by the receivers to generate a profile along a 60 to 75 m section of the well. This process is repeated as required for different stations in the well and it may take typically 8 – 12 hours to complete approximately 250 pulses, depending on the well's depth and number of stations being profiled.

A typical VSP arrangement is provided in Figure 5-28.

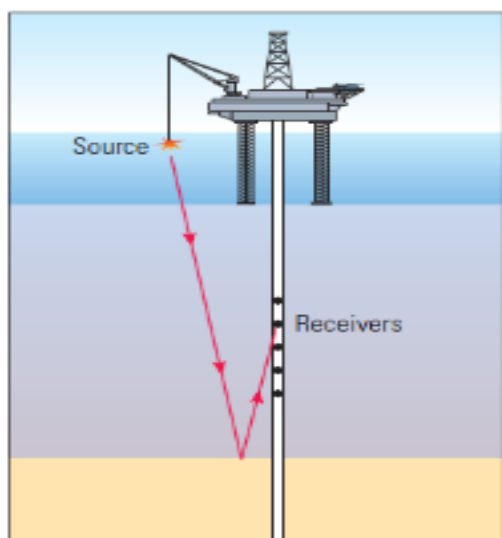


Figure 5-28: Schematic of a typical VSP arrangement

Source: Source: <http://researchgate.net/figure/Rig-Source-Vertical-Seismic-Profile>

Well (Flow) Testing

In case of hydrocarbon discovery, a well or flow test can be undertaken to determine the economic potential of the discovery before the well is either abandoned or suspended. A typical well test would comprise a clean-up period of approximately 1–2 days, followed by a flow testing period of approximately 2–5 days. However, for development wells, the total duration of clean-up and testing is generally expected to be up to ~4 days at a nominal average flow rate of 60 mmscf/d, depending on well performance and stabilisation requirements. For well flow-testing, hydrocarbons would be burned at the well site. A high-efficiency flare is used to maximise combustion of the hydrocarbons. Burner heads which have a high burning efficiency under a wide range of conditions will be used.

The amount for fluids (hydrocarbons and water) to be produced during a well test cannot be reliably predicted due to variations in fluid composition (influenced by oil/gas/water saturation) and flow rates (influenced by reservoir pressure and permeability). Burners are manufactured to ensure emissions are kept to a minimum. The volume of hydrocarbons to be burned cannot be estimated with much accuracy because the actual test requirements can only be established after the penetration of a hydrocarbon-bearing reservoir. However, an estimated 60 mmscf (million standard cubic feet) of gas per day and 6 000 bbl/d condensate could be flared per test (refer to emissions in Section 5.7). If produced water is



generated during well testing, it will be separated from the hydrocarbons, treated and discharged to sea (see Section 5.7).

5.4.4.6 Well Completion, Suspension and Abandonment

Well Completion and Xmas Tree Installation

Once the wells have been drilled to final depth in the reservoir, the lower completion equipment will be installed across the reservoir section of the well, and then the upper completion equipment (production tubing and safety isolation valve) will be installed.

The lower completion design is still under study; however, the base case is expected to comprise an Open Hole Gravel Pack (OHGP) (Figure 5-29), designed to ensure high productivity while preventing sand production. A production valve assembly block (commonly referred to as a Xmas tree) is then installed at the wellhead to control flow and provide valved isolation barriers. A vertical, rather than a horizontal, Xmas tree is the preferred configuration.

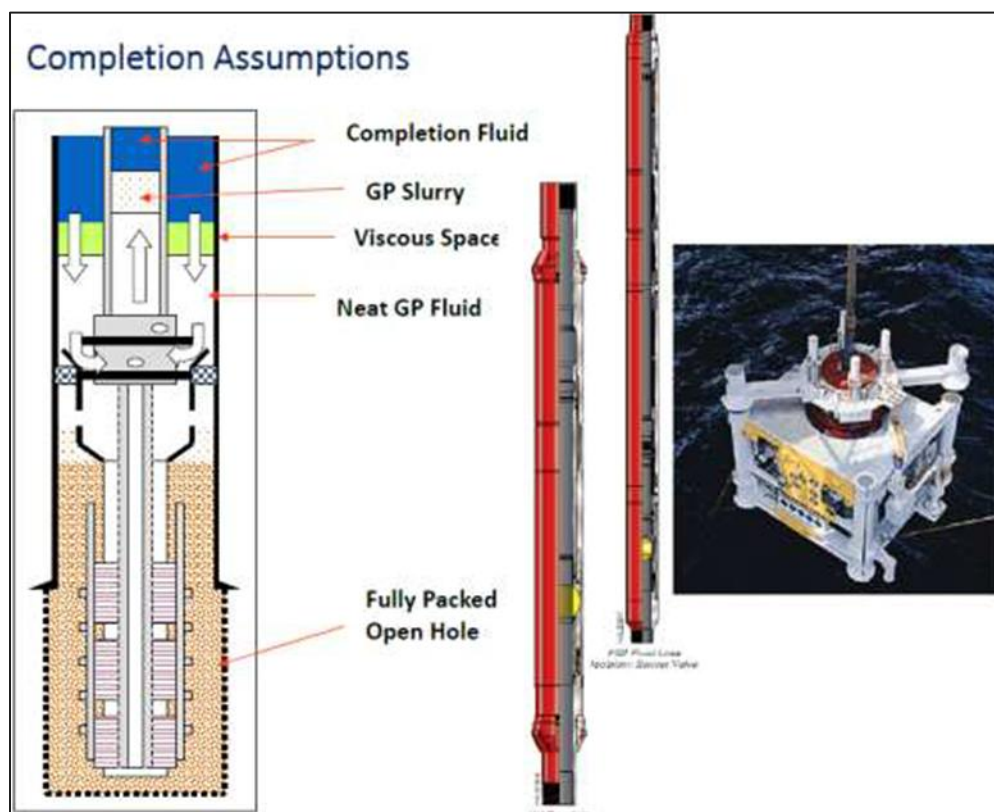


Figure 5-29: Open hole gravel pack schematic and Xmas tree

Source: TotalEnergies

Temporary Well Suspension

Once wells are completed and until they are connected to the CPF, they may also be temporarily suspended by introducing treated brine, which will protect them from any pressurised formations. The type of brine to be used will still need to be further studied and defined, however typical suspension brines could include calcium bromide, calcium chloride or sodium chloride brine. In addition, small quantities of other additives, such as monoethylene glycol (MEG) for example, could be added (still to be defined). Discharge of well suspension fluids to sea is not planned except in case of emergency.



The wells will be isolated using the isolation valves located in the upper completion and a corrosion cap will be installed on the subsea wellhead to seal the well until the Xmas Tree is installed later (using a separate installation vessel) and the CPF is in place.

Monitoring gauges may be fitted to temporarily abandoned wells intended for future re-entry but will not be installed on permanently abandoned wells.

Well Plugging and Abandonment

The purpose of well sealing and plugging is to isolate permeable and hydrocarbon bearing formations. Well sealing and plugging aims to restore the integrity of the formation that was penetrated by the wellbore. The principal technique applied to prevent cross flow between permeable formations is plugging of the well with cement, thus creating an impermeable barrier between two zones.

Upon completion of well drilling or following termination of production operations, wells will be permanently sealed with cement plugs, tested for integrity and abandoned according to international good practices. Cement plugs will be set to isolate hydrocarbon bearing and / or permeable zones and cementing of perforated intervals (e.g., from well logging activities) will be evaluated where there is the possibility of undesirable cross flow. These cement plugs are set in stages from the bottom up. Depending on the subsurface configuration, it is envisioned that multiple cement plugs would be installed: i.e. for isolation of the deep reservoir and the main reservoir; and as a barrier for the main reservoir.

The integrity of cement plugs can be tested by a number of methods. The cement plugs will be tag tested (to validate plug position) and weight tested, and if achievable then a positive pressure test (to validate seal) and/or a negative pressure test will be performed. Additionally, a flow check may be performed to ensure sealing by the plug. Once the well is plugged, seawater will be displaced before disconnecting the riser and the BOP.

In deep water, wellheads are typically left in situ on the seabed. Only where justified on a cost-benefit basis and following a risk assessment, an over-trawl structure may be installed to protect the wellhead and fishing gear.

Following abandonment, a final ROV clearance survey will be undertaken. The drilling unit and support vessels will then demobilise and either proceed to their next assignment or return to port for maintenance or resupply.

5.4.5 Resource Requirements

5.4.5.1 Personnel

The majority of the workforce involved in the drilling activities will comprise highly specialised skilled staff. Whenever possible, the use of local workers will be prioritized. A drilling rig usually accommodates around 120 - 150 people at the same time. Offshore workers on drilling rigs typically remain on board for 3 - 4 weeks, which is followed by 4 weeks off duty, while locals typically remain on board for 2 weeks at a time.

Each drilling unit is expected to be supported by two support vessels, which will be used to transfer equipment between shore and the drilling unit. Each support vessel usually accommodates ~12 - 20 people at the same time.

Transportation of personnel to and from the drilling unit will be done by helicopter, with ~1 helicopter trip per day between the drilling rig and the helicopter support base (most likely in George).



5.4.5.2 Water

The drilling campaign will use an estimated 100 - 250 m³ of fresh water per week for drilling, cement and mud preparation. Fresh water (20 and 50 m³ per day) will be supplied by supply vessels in plastic containers and / or will also be produced onboard via seawater desalination.

5.4.5.3 Fuel

Low sulphur (0.5%/50ppm) Marine Gas Oil (MGO) will be used as fuel for all vessels. Fuel will preferentially be obtained locally and transported to the drilling unit by the supply vessels. Jet-A1 fuel will be used for helicopters.

5.4.5.4 Explosive and Radioactive Materials

The drilling unit will be equipped with a secure store for explosives, plus igniter, booster, detonator and detonating cord. The drilling unit will also ensure proper storage of radioactive materials.

5.4.6 Emergency Prevention and Response

5.4.6.1 Prevention

Safety Exclusion Zone

As outlined in Section 5.4.2.1, a temporary safety exclusion zone of minimum 500 m radius unit will be enforced at all times during operation around the drilling unit and will be described in a Notice to Mariners as a navigational warning. The safety zone may be larger to encompass the AHTV and tow line.

Well Blow-Out

Although the probability of a well blow-out is extremely low (see Box 5-2), it is a worst-case scenario with the potential for significant environmental risk during drilling operations and will be modelled in the next phase of the ESIA (see Section 9.2.1). The operator will have an Oil Spill Contingency Plan (OSCP) in place that sets out its detailed response plan and intervention strategy, to be implemented in the unlikely event of a gas-condensate blow-out or leak.

The primary safeguard against a blow-out is the column of drilling fluid in the well, which exerts hydrostatic pressure on the wellbore. Under normal drilling conditions, this pressure should balance or exceed the natural rock formation pressure to help prevent an influx of gas or other formation fluids. As the formation pressures increase, the density of the drilling fluid is increased to help maintain a safe margin and prevent “kicks” or “blow-outs”. However, if the density of the fluid becomes too heavy, the formation can break down and fracture. If drilling fluid is lost in the resultant fractures, a reduction of hydrostatic pressure occurs which can lead to an influx from a pressured formation. Therefore, maintaining the appropriate fluid density for the wellbore pressure regime is critical to safety and wellbore stability.

Well control monitoring systems include pit volume indicators, return flow sensors, and gas detection equipment, overseen by both the drilling crew and mud logging personnel. Drilling fluids are routinely tested and adjusted to reflect downhole conditions.

The likelihood of a blow-out is further minimised by installing a specially designed item of safety equipment called a BOP, which is a secondary barrier or control system. BOPs



contain a stack of independently operated cut-off mechanisms, so there is redundancy in case of failure, and the ability to work in all normal circumstances with the drill pipe in or out of the well bore. The BOP is installed on the wellhead (on the seabed) and is designed to close in the well to prevent the uncontrolled flow of hydrocarbons from the reservoir in case the pressure of the reservoir exceeds the pressure of the drilling fluid in the reservoir resulting in hydrocarbons entering the wellbore. If this cannot be controlled, hydrocarbons could eventually exit the wellbore into the marine environment / atmosphere. Hence, the BOP system plays a key role in preventing potential risks to people, the environment and equipment. The BOP will undergo a thorough inspection prior to installation and will be subsequently pressure and function tested on a regular basis during operations aligned with industry good practices.

The BOP stack usually consists of the following:

- Annular preventer: The annular-type blow-out preventer can close around the drill string, casing or a non-cylindrical object, such as a Kelly (i.e. a piece of equipment shaped like a pipe that is used in drilling). The drill pipe, including the larger-diameter tool joints (threaded connectors), can be "stripped" (i.e. moved vertically while pressure is contained below) through an annular preventer by careful control of the hydraulic closing pressure. Annular BOPs are typically located at the top of a BOP stack, with one or two annular preventers positioned above a series of several ram preventers.
- Ram type preventers: Ram type preventers are similar in operation to gate valves but use a pair of opposing steel plungers or rams. The rams extend toward the centre of the wellbore to restrict flow or retract open in order to permit flow. There are four common types of rams or ram blocks used in a BOP stack (or combination thereof):
 - Pipe rams close around a drill pipe, restricting flow in the annulus (ring-shaped space between concentric objects) between the outside of the drill pipe and the wellbore, but do not obstruct flow within the drill pipe. Variable-bore pipe rams can accommodate tubing in a wider range of outside diameters than standard pipe rams, but typically with some loss of pressure capacity and longevity;
 - Blind rams (also known as sealing rams), which have no openings for tubing, can close off the well when the well does not contain a drill string or other tubing and seal it;
 - Shear rams cut through the drill string or casing with hardened steel shears; and
 - Blind shear rams (also known as shear seal rams or sealing shear rams) are intended to seal a wellbore, even when the bore is occupied by a drill string, by cutting through the drill string as the rams close off the well.

In deeper offshore operations, there are four primary ways in which a BOP can be controlled, including (in order of priority):

- Electrical control signal, which is sent from the surface through a control cable (MUX cable). Functioning valves on the stack release high pressurised hydraulic fluid to function the rams or annulars. This method allows for multiple commands to be sent via a single conductor very rapidly;
- Acoustical control signal, which is sent from the surface via a modulated / encoded pulse of sound transmitted by an underwater transducer. This new technique allows for communication with the subsea BOP without the need of an umbilical;
- ROV intervention, which mechanically controls valves and provides hydraulic pressure to the stack (via "hot stab" panels); and



- Emergency Disconnect System - in the event the rig loses communication with the subsea BOP, then the BOP will automatically close the blind shear rams. High pressurised hydraulic fluid (released from accumulator bottles) is used to engage the shear rams.

Provisions in the event of an emergency blow-out are described in Section 5.4.6.

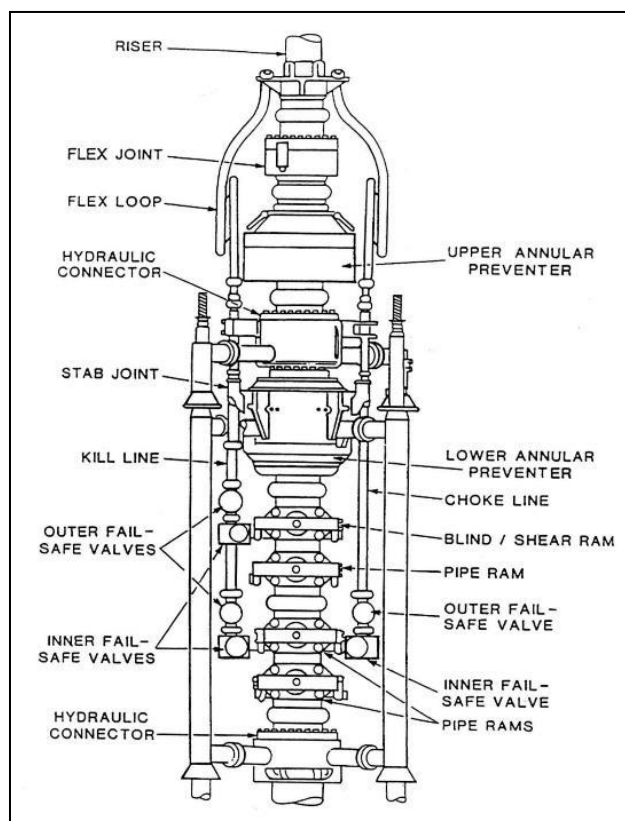


Figure 5-30: Schematic of a typical subsea BOP stack

Source: CCA & CSM, 2001

BOX 5-2: Well Blow-Outs in Offshore Oil And Gas Projects

What is a well blow-out?

The IOGP (International Association of Oil & Gas Producers) report 434-02 (2019) defines a “blow-out” as “*an incident where formation fluid flows out of the well or between formation layers after all the predefined technical well barriers or the activation of the same have failed*”. This report further describes different types of blow-outs and notes that not all blow-outs lead to an uncontrolled release of oil to the surface.

Drilling operations are designed and managed to prevent loss of well control through the application of established engineering standards, operational controls, and multiple layers of preventative and mitigation measures. While an uncontrolled release of oil or gas may occur in the event of a loss of well control, this is considered a low-likelihood event with potentially high consequences.

For a blow-out to occur, there must be a loss of well barrier integrity (referred to as a Well Control Incident; Figure A). This is where one or more well barriers (e.g. mud weight, casing, cement,



BOX 5-2: Well Blow-Outs in Offshore Oil And Gas Projects

Blow-out Preventer (BOP), etc.) fail or are no longer sufficient to contain formation pressure. This loss of integrity may potentially result in formation fluids (gas, oil, water) entering the wellbore, which is referred to as a “kick”.

If a kick is not controlled, this may progress whereby fluids move beyond intended containment and becomes a “well release” (i.e. an unintended escape of fluids due to loss of well control). This can quickly escalate into a blow-out if not promptly identified and addressed. Thus, not all well releases result in blow-outs, and in fact the majority don't.

Blow-outs can be split into two categories:

- Underground blow-out: Uncontrolled flow of well fluids and/or formation fluids from the wellbore into lower pressured subsurface zones. An underground blow-out may occur, for example, due to casing failure, poor cement integrity, weak formation breakdown and high annular pressure. An underground blow-out does not necessarily lead to hydrocarbons escaping into the marine environment.
- Surface blow-out: A blow-out, surface or underwater, is an uncontrolled flow of gas, oil or other well fluids into the atmosphere or between the sea floor and the water surface. A surface blow-out may occur due to, for example, BOP failure, wellhead casing failure, insufficient mud weight and shallow gas zones. A surface blow-out leads to a spill into the environment. This is usually what people mean by “blow-out.”

The term “blow-out” is often utilised without defining the type of blow-out referred to. It is, however, clear from the definitions above that the term “blow-out” does not necessarily infer that this will lead to an uncontrolled release of hydrocarbons to the seabed, sea surface or atmosphere. In fact, most blow-outs do not result in an uncontrolled surface release of oil or gas into the environment.

Probability of a Blow-out

Blow-outs are not common during offshore oil and gas exploration and production drilling, including in deep offshore environments, as demonstrated by empirical industry data.

According to the IOGP Report 434-02, which compiles blow-out statistics from the SINTEF³¹ Offshore Blowout Database (Sept 2019), the frequency of kicks and blow-outs during drilling in regions operating to North Sea standards are as follows:

- Exploration wells
 - Well release (kick): $\sim 1.3 \times 10^{-3}$ per well drilled. This equates to fewer than 1 kick per ~ 770 wells drilled.
 - Deep, normal wells: $\sim 1.4 \times 10^{-4}$ per well drilled. This equates to fewer than 1 blow-out per ~ 7100 wells drilled.
- Production / development wells:
 - Well release (kick): $\sim 1.7 \times 10^{-4}$ per well drilled. This equates to fewer than 1 kick per ~ 5900 wells drilled.
 - Deep, normal wells: $\sim 3.9 \times 10^{-5}$ per well drilled. This equates to fewer than 1 blow-out per ~ 25600 wells drilled.

³¹ Foundation for Industrial and Technical Research (Stiftelsen for industriell og teknisk forskning).



BOX 5-2: Well Blow-Outs in Offshore Oil And Gas Projects

The SINTEF data shows that blow-outs are infrequent as most kicks are successfully controlled using modern well control systems and operational safeguards (i.e. technical and operational measures). Of the small percentage of kicks that escalate, the majority result in underground blow-outs (Tarr & Flak, n.d.). This is largely due to:

- Subsurface formations are often weaker than surface barriers;
- Cement or casing issues are more common than total BOP failure; and
- Pressure naturally seeks the lowest resistance path, which is often into another formation rather than all the way to surface.

The very low blow-out frequencies presented in the SINTEF data is consistent with that observed locally in Namibia and South Africa, where to date ~381 wells have been drilled in South African waters (based on the PASA shapefile provided on 11 June 2024), with no recorded surface blow-outs.

This evidence reflects the effectiveness of modern well design, barrier management and well control practices, and that when applied, the risk of blow-outs is effectively minimised, even in technically challenging environments.

Advances in Blow-out Prevention and Response

The current state of knowledge, available technology and response capability has advanced significantly, particularly following the Deepwater Horizon incident in 2010, Key advancements include:

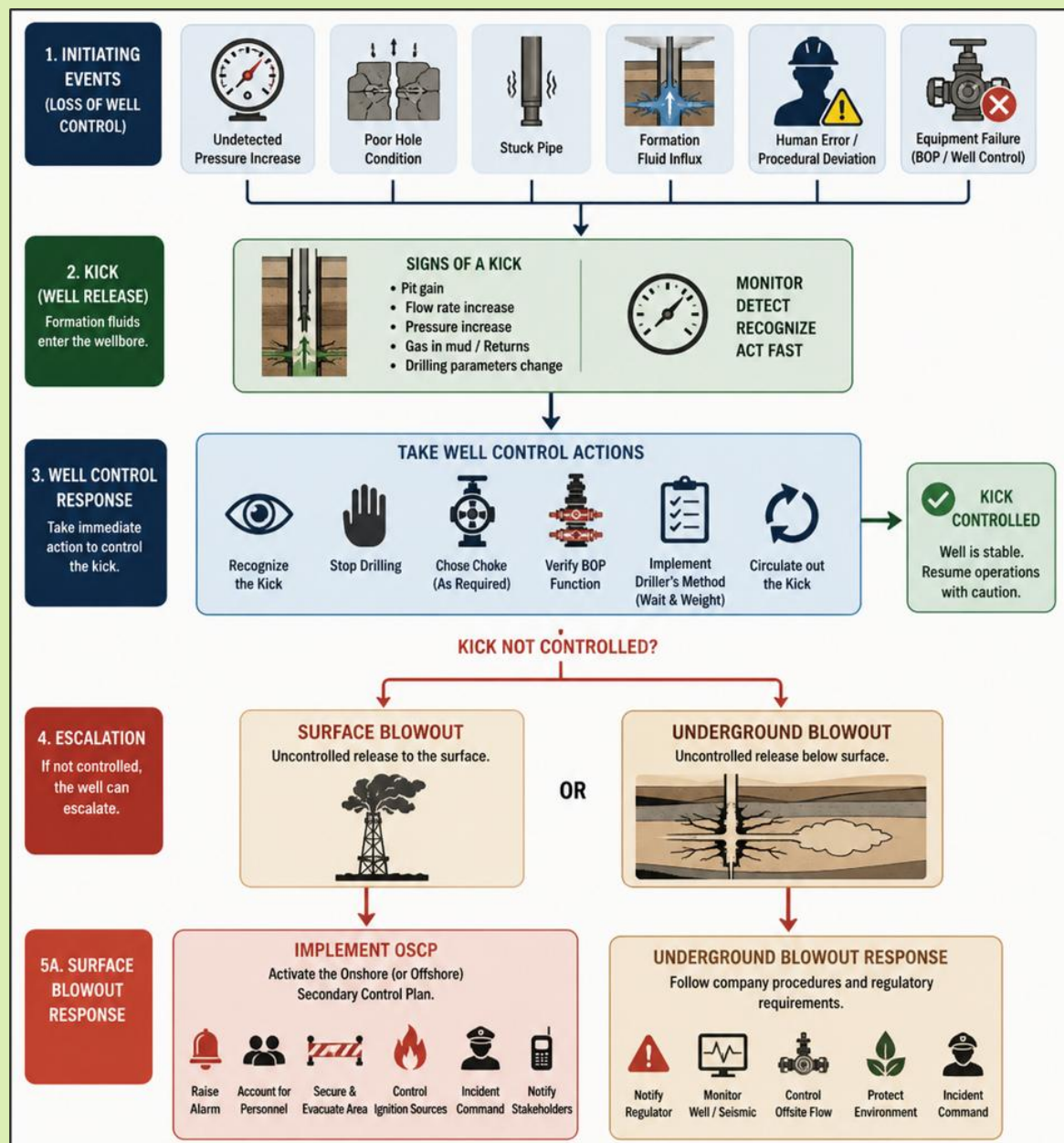
- Technology Changes
 - Enhanced oil spill modelling tools for improved prediction and response planning.
 - Improved satellite monitoring enabling near real-time spill detection.
 - Development and global deployment of capping stacks to rapidly contain well blow-outs.
- Knowledge advancements:
 - Improved understanding of oil spill behaviour and impacts on marine ecosystems.
 - Better insight into long-term environmental effects and recovery processes.
- Improved approaches:
 - Strengthened regulatory oversight and industry standards
 - Enhanced preparedness and response capability through organisations such as the Marine Well Containment Company (MWCC) and Oil Spill Response Limited (OSRL)
 - Adoption of coordinated incident management systems to improve response efficiency

As a result of these advancements, response times and effectiveness have improved significantly, and large-scale spill durations such as those observed during Deepwater Horizon are no longer considered representative of current industry capability.



BOX 5-2: Well Blow-Outs in Offshore Oil And Gas Projects

Figure A: Well Control Incident Flow Diagram showing the relationship between kicks and blow-outs



Source: AI-generated (OpenAI), April 2026

5.4.6.2 Response

The Operator will have access to a range of specialist companies that provide emergency response support services. These include organisations with globally recognised capabilities for well control and oil spill response, such as the provision of capping stacks and associated equipment (e.g. dispersants, booms, and aerial application systems) in the event of a well blow-out. Capping stacks are designed to shut-in an uncontrolled subsea well in the unlikely



event of a blow-out. One such resource is a 10K³² capping stack located at Saldanha Bay on the West Coast of South Africa (see Figure 5-31), which is available for mobilisation by sea and/or air. The Operator anticipates augmenting its access to these capabilities through formal membership arrangements as drilling activities progress.



Figure 5-31: Example of an Oil Spill Response Limited (OSRL) capping stack.

Source: <https://www.oilspillresponse.com/services/subsea-well-intervention-services/capping>

The **capping stack** would only be deployed in a situation where the BOP has failed to serve its purpose and a blow-out has occurred. It is a piece of equipment that is placed over the blown-out well as a “cap”. Its purpose is to stop or redirect the flow of hydrocarbons and to buy time for engineers to permanently seal the well. It weighs as much as 100 tonnes and requires co-ordinated logistical planning and execution in quickly transporting it to the emergency location.

Before a capping stack arrives, an ROV would be deployed to inspect the seabed site for engineers to confirm precisely what equipment is needed. Any debris would then be removed and the wellhead prepared. After the equipment arrives, the capping stack would be carefully manoeuvred into place over the wellhead. The stack’s valves would be closed to cap the well (“cap only”) or, if necessary, the flow will be redirected to surface vessels through flexible pipes and risers (“cap and flow”).

The mobilisation of these and other incident response equipment and services will be contained in the operator’s OSCP and Blow Out Contingency Plan (BOCP).

Dispersants can play a role in managing oil spills from a blow-out. Dispersants are chemical agents designed to break up oil spills into smaller droplets. This facilitates natural processes to degrade the oil (e.g. through) microbial degradation and reduces the likelihood of oil reaching the shore. Dispersants are either applied to oil on the sea surface (via spraying from airplanes or vessels) or subsurface (injected directly at the wellhead). Dispersants can

³² 10 k refers to a pressure rating of 10 000 pounds force per square inch (psi).



also have negative environmental consequences, and their use must be carefully considered based on the specific circumstances of the spill, including the type of oil, sea conditions, and environmental sensitivities. It is, however, unlikely that dispersants will be used for the current Project, in the unlikely event of a blow-out, due to the nature of the resource (gas-condensate, rather than oil).

Physical barriers, such as containment booms, are also used both offshore and nearshore to contain oil spills. Floating barriers are deployed around a spill to prevent the surface oil from spreading from or to an area or redirect it to an area where it can be more easily collected. Once the oil is contained, skimmers are used to remove the oil from the water surface.

The Operator will also have the necessary insurances and global service agreements (e.g., with companies such as OSRL) in place to manage the consequences of any unplanned event. Refer to Section 0 for further details.

5.5 Installation, Construction and Commissioning

5.5.1 Production System and Facilities Overview

The production facilities will comprise the following main components:

- Wells (refer to Section 5.4)
- Subsea Production System (SPS) (refer to Section 5.5.2)
- Subsea Umbilicals, Risers and Flowlines (SURF) (refer to Section 5.5.3)
- CPF, envisaged as a turret-moored FPSO (Scenario 1) or FLNG and FSO vessel configuration (Scenario 2) (refer to Section 5.5.4)
- Dynamically Positioned Shuttle Tankers (DPST) for condensate and LNG export.
- Offshore Export Pipeline (Scenario 1)
- Pipeline Shore Crossing (Scenario 1) (refer to Section 5.5.5)
- Onshore Gas Pipeline (Scenario 1) (refer to Section 5.5.5)

The configuration of the production facilities is shown schematically in cross-section in Figure 5-32.

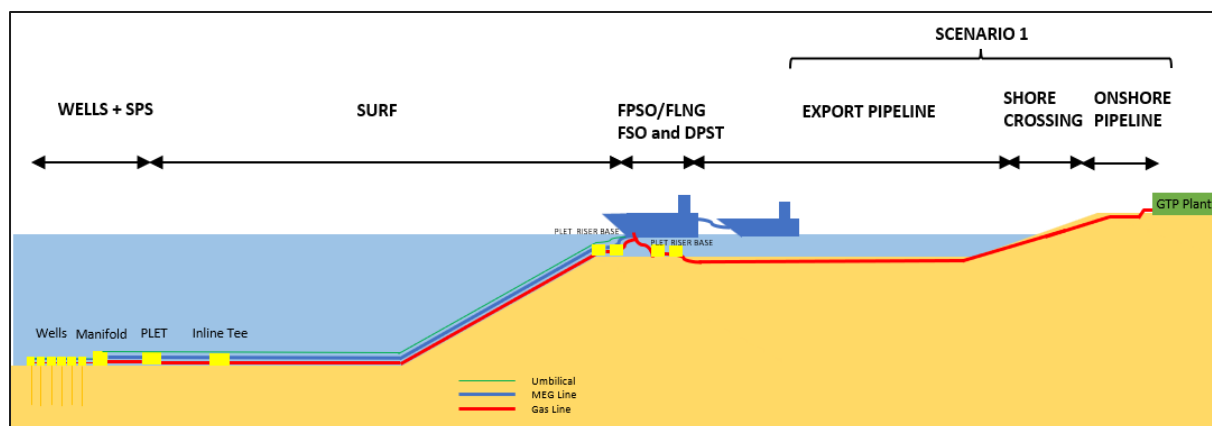


Figure 5-32: Schematic cross section of Field Development

Source: Main Street (2026)



The in-field SPS will be centred around a subsea manifold located at the Luiperd reservoir. Initially, the manifold will gather production fluids from the Luiperd wells. In subsequent development phases, additional tie-backs may be connected from the Woudboom and/or Blaasop reservoirs, located ~11 km and ~23 km from the Luiperd manifold, respectively.

Fluids from the Luiperd wells will flow to the manifold via flexible or rigid flowlines. From the Luiperd manifold, production fluids will be transported via an approximately 80 km multiphase pipeline to the turret moored CPF (FPSO / FLNG-FSO) facility located on the continental shelf, in shallower water, or alternatively in deeper water closer to the wells. Should the CPF be moored in deeper waters, this will eliminate the need for the multiphase pipeline from the well field to the continental shelf, replacing the multiphase pipeline with a dry gas pipeline.

The Brulpadda reservoir, and then the Platanna reservoir, will tie into this multiphase pipeline via a subsea Inline Tee (ILT) located approximately 20 km north of the Luiperd manifold. These fields will be connected via tie-back flowlines of ~40 km (Brulpadda to ILT) and ~11 km (Platanna to Brulpadda), respectively.

A second pipeline (20" ND) from the ILT to the CPF may be required from the outset or preceding the Brulpadda and Blaasop tie-backs to deal with a higher flow volume.

MEG will be supplied from the CPF to the wells via a 4-inch pipeline piggy-backed to the main 20-inch multiphase pipeline, or alternatively via dedicated lines within the umbilical system. Jumpers from the manifolds and Pipeline End Termination Structures (PLETS) will connect the MEG line to the injection points at the Xmas Trees. MEG will enter the production stream and flow with the well fluids to the CPF, where it will be recovered, regenerated, and reused where practicable.

To provide chemical injection and well control functions, an electro-hydraulic and chemical umbilical will be installed from the CPF to the wells. Distribution will be managed via a series of Subsea Umbilical Distribution Units (SUDUs) and associated jumpers.

At the CPF, produced fluids will be processed to separate gas, condensate and produced water. As summarised in Section 5.2.1, there are two potential development scenarios:

- **Production Scenario 1:** Treated dry gas will be exported from the FPSO to shore via a new ~100 km export pipeline (24" ND), depending on the final pipeline alignment. At landfall, the pipeline will transition to shore through a HDD shore crossing to minimise environmental and coastal disturbance and to protect the pipeline from coastal wave and current interactions. From the exit point, an ~13 km onshore pipeline, installed by trenching and burial, will transport the gas to a proposed new gas receiving facility (e.g the proposed GtP facility subject to separate EA application) and, over time, to additional industrial and commercial off-takers. Should the onshore gas market be delayed or not realised, gas re-injection may be implemented prior to gas export, while condensate is produced as normal and transferred to DPST for export.
- **Production Scenario 2:** Treated dry gas could be liquefied and exported as LNG from an FLNG facility, which would take the place of the FPSO. LNG would be stored in cryogenic tanks integrated within the hull of the FLNG unit and periodically offloaded to a DPST via a cryogenic transfer system. Condensate will be produced as normal and transferred to a DPST for export. A FSO vessel is anticipated to be required to provide additional storage for the condensate which will be received from the FLNG facility.

Each of these two full-field options may be preceded by partial development of the field through existing PetroSA facilities, with continued partial export of products via these facilities during and after full development of the Paddavissie Fairway. In the event that the



use of the PetroSA facilities precedes the full-field development, the ~80 km multiphase pipeline from the wells will be extended by ~40 km to the PetroSA offshore facility, whilst continued use of the PetroSA facilities during and post full-field development is envisaged by exporting a portion of the gas via a ~40 km dry gas pipeline from the FPSO or FLNG vessel to the PetroSA facility and/or delivering processed condensate to PetroSA's receiving terminal in Mossel Bay.

The overall subsea layout and tie-back configuration and the key architecture component items are shown in Figure 5-33.

5.5.2 Subsea Production System

The SPS represents the active component of the overall subsea infrastructure. It comprises subsea structures equipped with valves and control systems, including electronics required for valve actuation and production control. The SPS is connected to the more passive SURF (Section 5.5.3) system via short jumpers and flowlines.

The foundations for the subsea manifolds and associated structures are expected to be gravity-based, although this will be confirmed through planned geophysical and geotechnical surveys (see Section 5.3). The final design, including the size, number and type of foundations, will be refined during later engineering phases.

The **initial development** concept includes up to six production wells at the Luiperd field. Each well will be fitted with a subsea Xmas Tree and connected to a central Luiperd manifold via a dedicated production flowline (~10-inch internal diameter), which can either be flexible or rigid. In addition, each well will be connected by an electro-hydraulic umbilical jumper and a MEG jumper for hydrate inhibition and control functions, respectively.

Future development phases may include tie-backs from nearby discoveries and prospects, which are subject to successful appraisal drilling, as outlined in Section 5.5.1.

Figure 5-34 illustrates the SPS configuration for the Luiperd, Woudboom and Blaasop development reservoirs, while Figure 5-35 illustrates the configuration for Platanna and Brulpadda reservoirs.

Ensuring that subsea components are accurately placed on the seabed requires detailed surveys of the seabed (see Section 5.3), and the use of various techniques and equipment, including:

- Installation vessels equipped with DP system to maintain their position precisely over the installation site, high-capacity active heave-compensated cranes, reel-lay systems and associated deepwater construction support systems.
- ROVs equipped with cameras, sonar and manipulator arms to assist in the precise placement and connection of subsea equipment.
- Acoustic Positioning Systems to reference subsea locations to the vessels GPS system.
- ROVs to ensure the lines are laid along the predetermined path.

It is anticipated that the installation of the subsea equipment will require a DP deepwater Subsea Construction Vessel (SCV), capable of operating safely in the prevailing water depths and metocean conditions (e.g. Saipem Constellation, the TechnipFMC Deep Blue and Subsea7 Seven Oceans) (Figure 5-36).



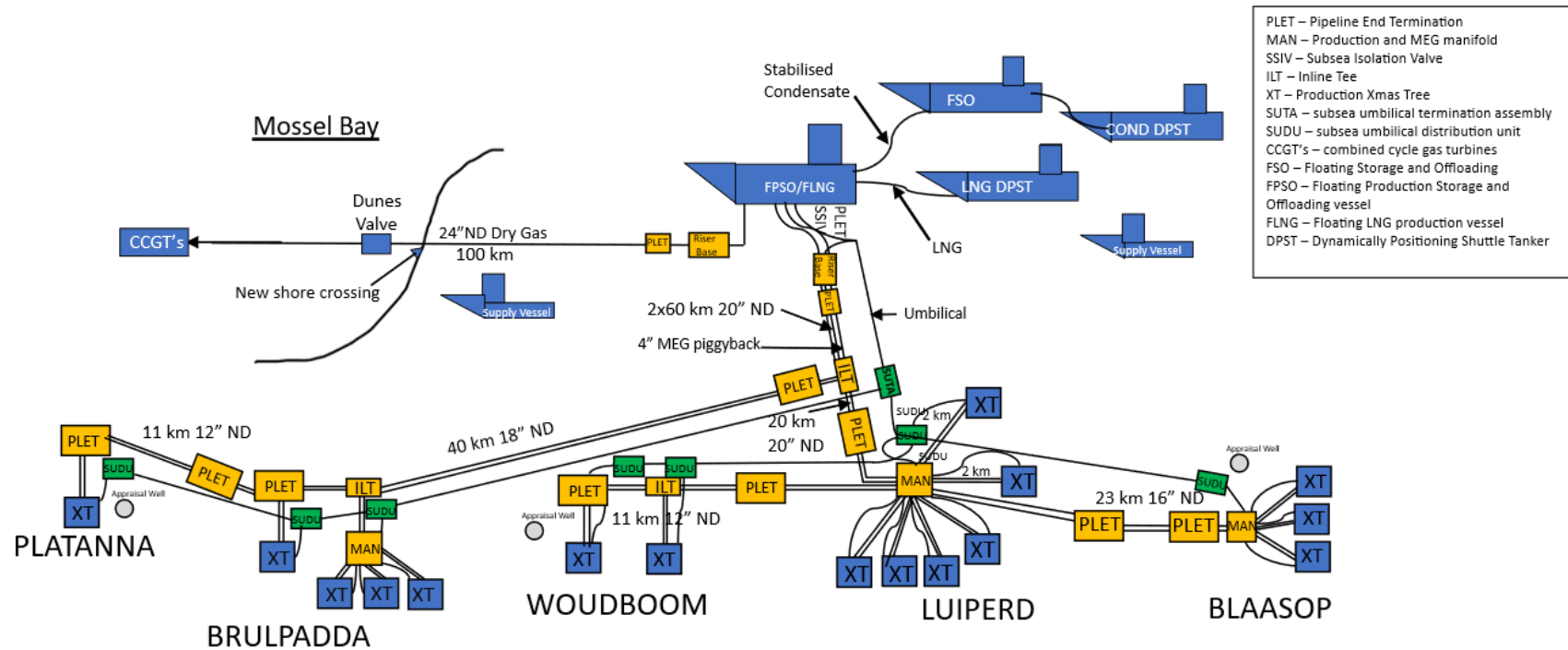


Figure 5-33: Field development plan - subsea architecture components

Source: Main Street



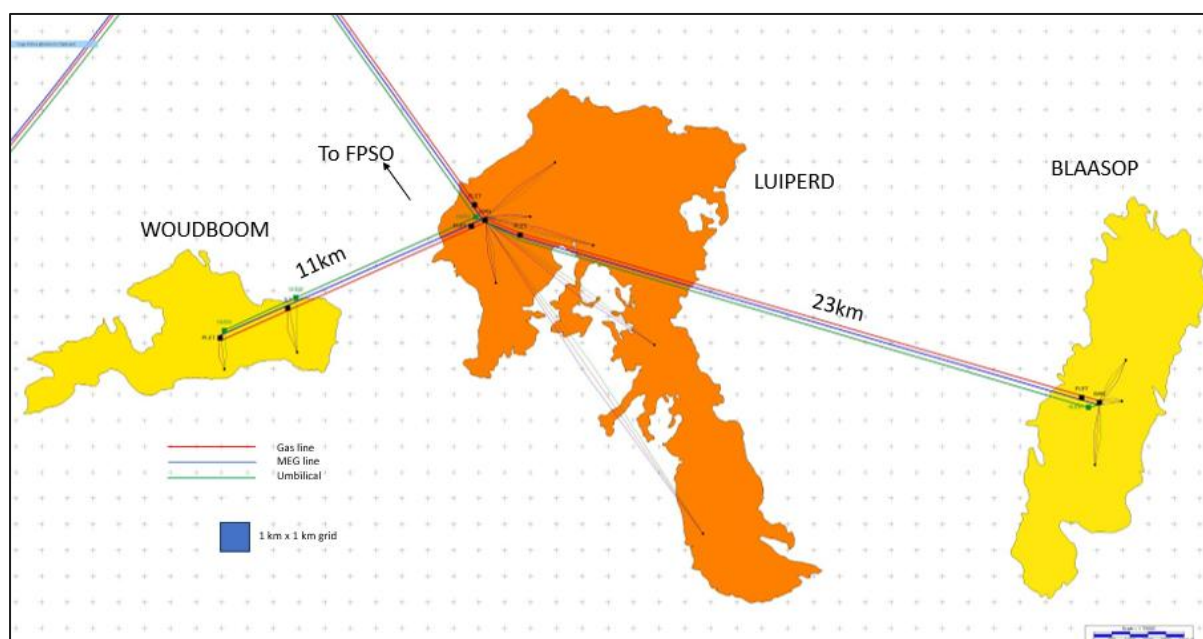


Figure 5-34: Luiperd, Blaasop and Woudboom Subsea Production System



Figure 5-35: Platanna & Brulpadda Subsea Production System





Figure 5-36: Example of deepwater Subsea Construction Vessel (SCV)

Source: Technip

5.5.3 Subsea Umbilicals, Risers and Flowlines

5.5.3.1 Pipeline Installation

The SURF scope includes the installation of up to two 20-inch pipelines from the deepwater field locations to the CPF. One of these pipelines may include a 4-inch piggyback line for the delivery of MEG to the wells. The pipelines will terminate at PLET structures at either end. An umbilical (see Section 5.5.3.2) will also be installed between the CPF and the Luiperd manifold for the distribution of control signals and fluids.

Longer tie-backs, such as those from Blaasop to the Luiperd manifold and from Brulpadda to the in-line connection on the main export line, form part of the SURF scope.

The deepwater pipeline sections will be installed using high-specification pipelay vessels, such as S-lay or J-lay vessels, capable of operating in deepwater conditions and accommodating the associated metocean environment. In shallower water, pipelines will be installed using an S-lay method, potentially using lower-specification vessels. Separate vessels may, therefore, be utilised to optimise installation schedule and cost.

During pipeline installation, individual pipe sections will be welded together onboard the installation vessel. Welds will be inspected and tested prior to coating for corrosion protection. As installation progresses, the pipeline will be deployed from the vessel to the seabed in a controlled manner. In the S-lay method, the pipeline is assembled horizontally and gradually lowered to the seabed, while in the J-lay method the pipeline is assembled vertically and deployed with minimal bending (see Figure 5-37). In both cases, vessels will operate using DP, and the pipeline itself represents the only direct interaction with the seabed.

Each pipeline will start and end with a PLET. These will include valves and diverless connection hubs allowing connection of flowline jumpers by ROV.



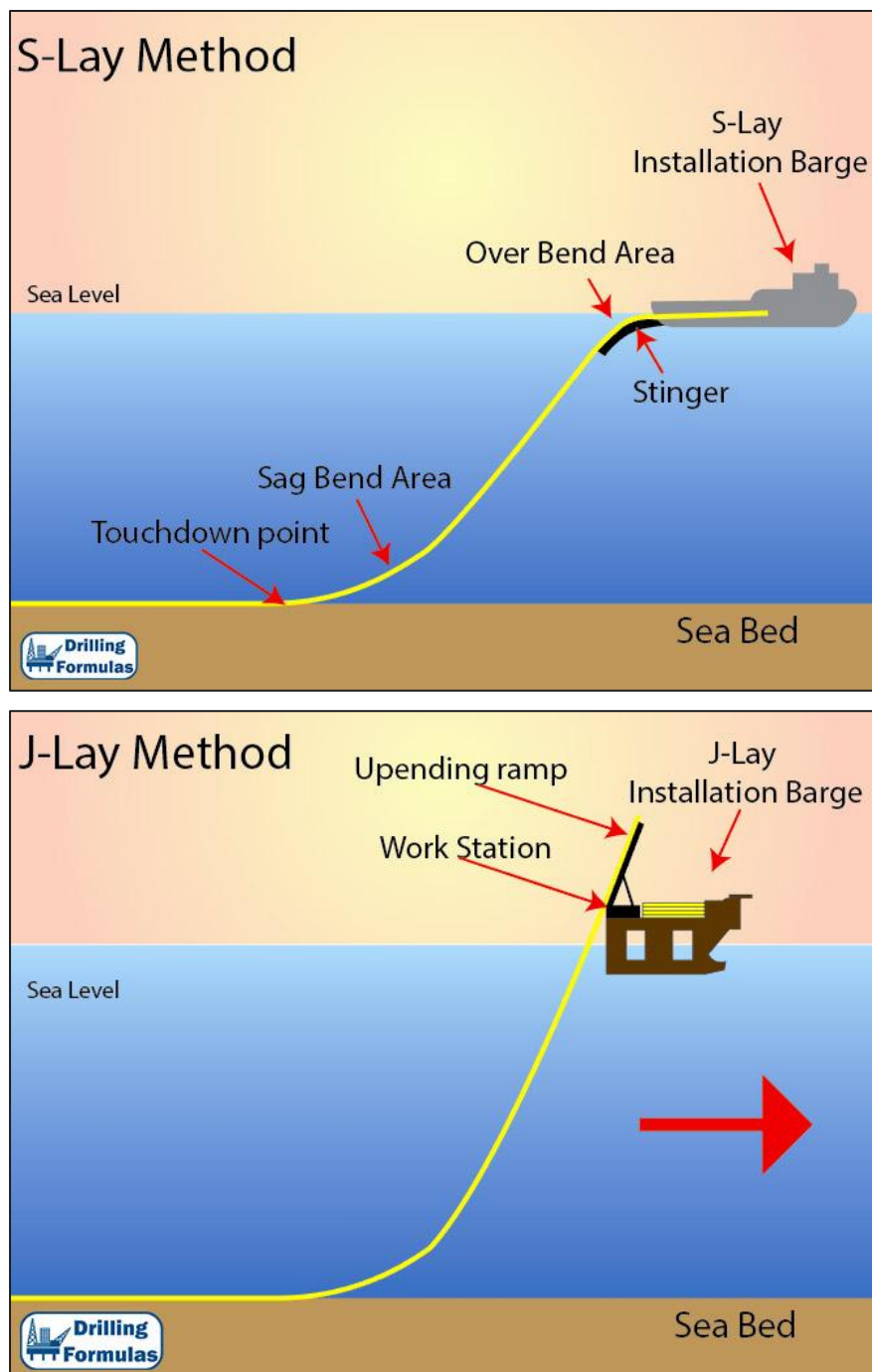


Figure 5-37: S-lay (top) and J-lay (bottom) pipeline installation method example

Source: <https://www.drillingformulas.com/pipe-line-s-lay-method/>; <https://www.drillingformulas.com/j-lay-pipeline-installation/>

The SURF and production facilities will be installed in a phased and predominantly sequential manner to ensure safe access and efficient operations for marine construction vessels. The installation sequence has been developed to minimise vessel interaction and optimise offshore campaign durations. Where technically feasible, certain activities may be undertaken in parallel, provided that vessel spread and safety requirements can be accommodated. For example, drilling and completion of subsea wells may occur concurrently with installation of the main pipelines.



It is anticipated that the initial Luiperd production wells will be drilled and completed while installation of the main export pipeline is underway (Scenario 1). For Scenario 1, the pipelay vessel will first install the 24-inch gas export pipeline from shore to the FPSO location, followed by the installation of the piggybacked 20-inch multiphase pipeline from the FPSO to the Luiperd manifold. For Scenario 2, where the gas will remain offshore for processing and export via the FSO, only the piggybacked 20-inch multiphase pipeline from the FLNG to the Luiperd manifold will be installed. The pipelay vessel will also install the associated PLETs and may install key subsea structures, including the Luiperd manifold and riser bases.

The pipelay vessels will load pipe sections and structures at a logistics base either in Cape Town or Gqeberha and will return to the logistics base for re-supply or be re-supplied via pipe-carrier vessels. Small and less voluminous items may be supplied from Mossel Bay.

Upon completion of installation, pipelines will undergo pre-commissioning activities (including flooding, cleaning, gauging and hydrostatic pressure testing) to confirm integrity and compliance with design specifications prior to operation.

5.5.3.2 Umbilicals

The default method of controlling the subsea Xmas tree and manifold valves is via an electro-hydraulic umbilical. The umbilical provides electrical power, electrical or optical control signals, hydraulic power, and production chemicals required for the wells.

The diameter of such umbilicals range from < 20 cm to ~30 cm.

Umbilicals are installed by a flex-lay vessel (see Figure 5-38), which has a DP system to maintain precise positioning during installation, specialized lay systems such as carousels or reels to store and deploy the umbilicals, ROVs and cranes to assist in the installation and connection of umbilicals and advanced monitoring and control systems ensure the umbilicals are laid accurately and safely.

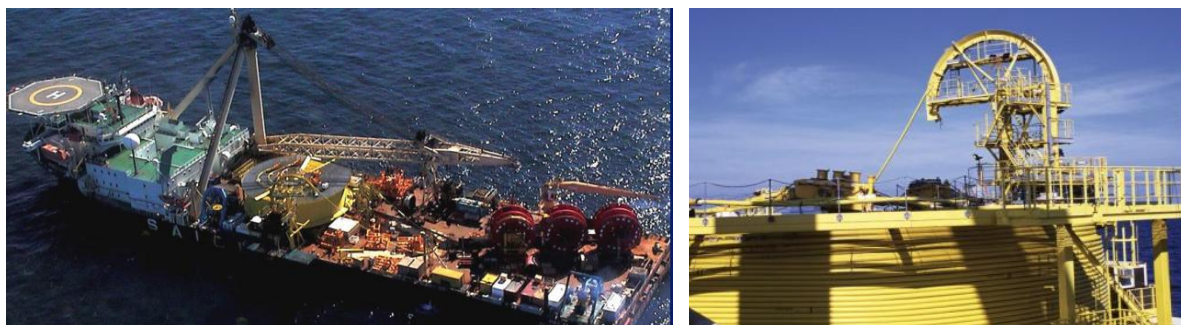


Figure 5-38: Example of a flex-lay vessel

Source: (Johnson & Collins, 2020)

The adoption of an all-electric subsea control system supplied via a Direct Current Fibre Optic (DCFO) system will be studied in subsequent engineering phases. This system would have a much smaller footprint.

5.5.3.3 Risers

Several risers will connect the subsea systems to the FPSO. The incoming multiphase production pipelines will terminate at PLETs, which will in turn be connected to subsea riser bases.

From the riser bases, multiple production risers will extend to the CPF (FPSO or FLNG and FSO configuration) via a turret loading buoy system, likely to be submerged, and internal turret swivel stack (see Figure 5-39). These risers will convey commingled well fluids from the seabed to the topsides processing facilities.



The production risers will typically have a smaller nominal diameter than the in-field flowlines. This reduction in diameter is driven primarily by dynamic performance requirements rather than hydraulic capacity alone.

Similarly, for Scenario 1, treated dry gas for export will be routed from the FPSO to the seabed via dedicated gas export risers connected to riser bases. These risers will tie into the export pipeline (24' ND) on the seabed. Depending on the final configuration, one or more parallel export risers may be installed to meet hydraulic capacity and operational requirements.

In addition to hydrocarbon risers, the system will include at least one MEG injection riser, which will convey regenerated MEG from the CPF to the subsea distribution system for hydrate inhibition, as well as one electro-hydraulic control umbilical riser. The umbilical will provide hydraulic power, chemical injection, electrical supply and fibre-optic communication between the CPF and the subsea control system.

The MEG riser will connect topside regeneration facilities to the subsea MEG distribution network via the riser base and associated jumpers. The umbilical riser will interface with the turret's topside control systems and distribute services subsea via SUDUs.

The risers will likely be flexible lines, but the final riser design and configuration will be selected in future engineering phases and will be based on water depth, seabed conditions, fatigue performance, flow assurance requirements and overall field life considerations.

Figure 5-39 illustrates the typical configuration of the SURF and SPS, including their connection to the topside processing facility.

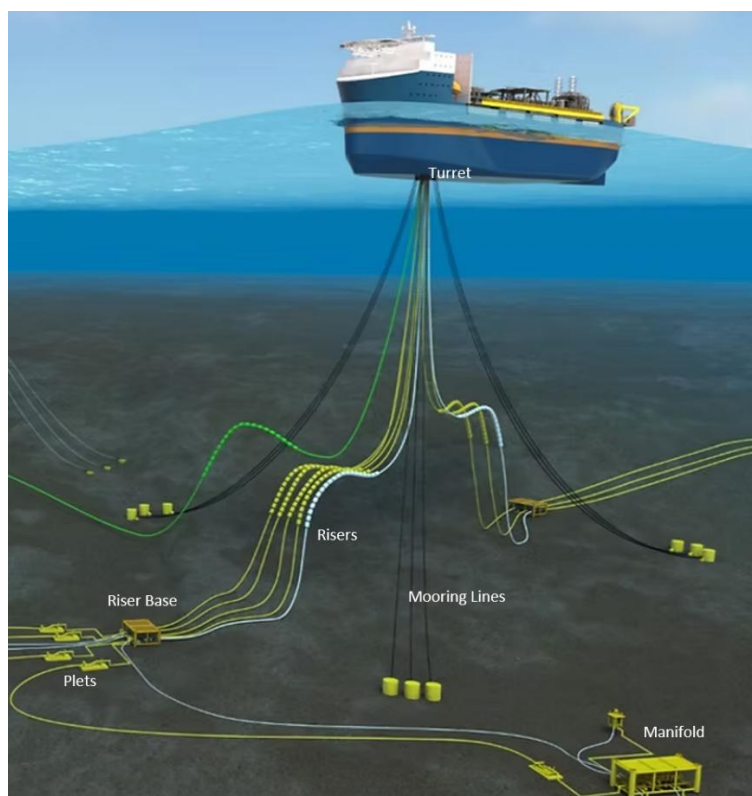


Figure 5-39: Example of Subsea System connections to FPSO

Source: Crondall Energy



5.5.3.4 Other Subsea Equipment / Structures

Several structures will need to be installed on the seabed, including manifolds, riser bases and SUDUs. The structures could also incorporate distribution units, control modules, flowmeters, isolation valves and pressure and temperature monitoring instruments. Pig launchers and receivers may also be incorporated in the subsea system. A 'pig' is a device used for cleaning, clearing or inspecting pipelines, which is driven through the pipeline by fluid pressure.

These components will be installed using a crane from a construction vessel. The subsea components will be tested to verify integrity after installation, and subsea protection will be installed where required.

5.5.3.5 Commissioning of Flowlines

Once laid on the seabed, the pipelines will be cleaned, filled with treated seawater, gauged to ensure bore geometry and pressure tested to ensure integrity. They will then be internally inspected to establish a baseline for future inspections. They will be subsequently dewatered using a dewatering pig train with the treated seawater discharged to sea at the seafloor.

5.5.4 Central Processing Facility

The multiphase fluids from the subsea production system will be transported via multiphase pipelines to either a:

- Scenario 1: FPSO facility, where the hydrocarbons will be processed and stabilised condensate offloaded to a DPST, while the processed gas is routed to shore via a dry gas export pipeline; or
- Scenario 2: FLNG and FSO vessel configuration if an onshore gas market or export infrastructure has not been established.

5.5.4.1 Description of the FPSO

An FPSO facility is used for production and processing of produced fluids, transfer of gas to shore and storage of condensate until it can be offloaded and/or exported (Scenario 1).

In addition to the hydrocarbon processing systems (see Section 5.6.3.1), the FPSO will include a comprehensive suite of utility systems required to support safe and continuous operations. These utilities will typically include:

- Power generation and electrical distribution systems, normally based on gas turbines or dual-fuel generators utilising produced gas as the primary fuel.
- Instrument air and plant air systems to supply pneumatic controls and general service air.
- Produced water treatment facilities to treat separated water to discharge specifications prior to overboard disposal.
- Seawater lift, treatment, and distribution systems for cooling water, firewater, and utility services.
- Cooling medium systems (seawater or closed-loop cooling) for process heat exchangers and rotating equipment.
- Chemical storage and injection systems for hydrate inhibition, corrosion control, scale inhibition, demulsification, and other production chemicals.
- Fuel gas conditioning and distribution systems to supply treated gas to power generation units and other fuel consumers.



- Flare and vent systems for the safe disposal of excess hydrocarbons and pressure relief.
- Fire and gas detection and firefighting systems, including firewater pumps, deluge systems, and foam systems.
- Heating systems for process heating and stabilisation duties.
- Hydraulic power units for valve actuation and subsea control interfaces.
- Waste heat recovery systems, where applicable, to improve energy efficiency.

The FPSO facility design and construction will follow the selected Classification Society's rules for FPSOs and will comply with applicable international maritime conventions, industry codes and standards, relevant local laws and regulations, and other requirements of the selected Flag state as applicable.

The FPSO will also incorporate a range of marine and support systems, including ballast water systems, tank inerting systems, cargo pumping and offloading equipment, helideck facilities, accommodation modules, and integrated control and safety systems.

Key features of the proposed FPSO are summarised in Table 5-11. Final configuration of FPSO will depend on supplier.

Table 5-11: Key FPSO characteristics

Aspect	Design characteristic
Production capacity	50 000 barrels per day of condensate
Produced water treatment capacity	1 050 barrels/day
Gas separation capacity	560 MMscfd
Storage capacity	Approximately 600 000 to 2 000 000 barrels
Power generation capacity	Generation configuration is subject to later design phases, but will be either dual fuel gas turbines or engines Powered by approx. 15 MMscfd of the produced gas
Crew capacity	~160 personnel
Mooring	Up to 20 mooring lines

Safety systems on the FPSO will include the following:

- Fire-fighting system: A combination of fixed and portable fire-fighting systems including fire pumps and hydrants.
- Fire and gas detection systems: These include fire and smoke detectors located throughout the topsides and living quarters and wired centrally with alarms sounding in the central control room, which will activate the general alarm system on the FPSO. Gas detectors are placed in areas where gas might be released or could accumulate.
- Blanket and inert gas systems: To prevent fires, blanket and inert gas systems will be provided for cargo tanks and other flammable fluid tanks.
- Lifeboats and life rafts: Freefall lifeboats will be placed at the aft of the FPSO. A fast rescue boat will also be provided, complete with a launching and retrieving system. Life rafts with escape chutes systems are provided at fore and aft.



5.5.4.2 Description of the FLNG

Production Scenario 2 provides for offshore liquefaction using a FLNG facility (see Section 5.2). Under this scenario, produced gas would be processed and liquefied offshore, enabling export to regional or international markets without reliance on onshore gas infrastructure in Mossel Bay.

The processing configuration would include several stages of gas treatment and conditioning prior to liquefaction (see Section 5.6.3.2)

This process would generate two liquid product streams: Liquefied Natural Gas (LNG) and stabilised condensate. LNG would be stored in cryogenic tanks integrated within the hull of the FLNG unit and periodically offloaded to a DPST via a cryogenic transfer system. Condensate would be transferred via conventional ambient-temperature pipelines to a separate FSO (Section 5.5.4.3) vessel for storage. The condensate would then be periodically offloaded to DPST for transport to market (see Section 5.6.4).

The conceptual FLNG facility is expected to be approximately 360 m in length and 64 m in width, although the final design will depend on detailed engineering studies and vendor selection. The facility will incorporate LNG storage tanks within the hull, as well as topside process modules housing the gas treatment and liquefaction systems. A conceptual layout and characteristics of the FLNG facility is provided in Figure 5-40 and Table 5-6, respectively.

Further details of the FLNG and FSO design, mooring configuration, and export logistics will be developed during the detailed engineering and project development phases.

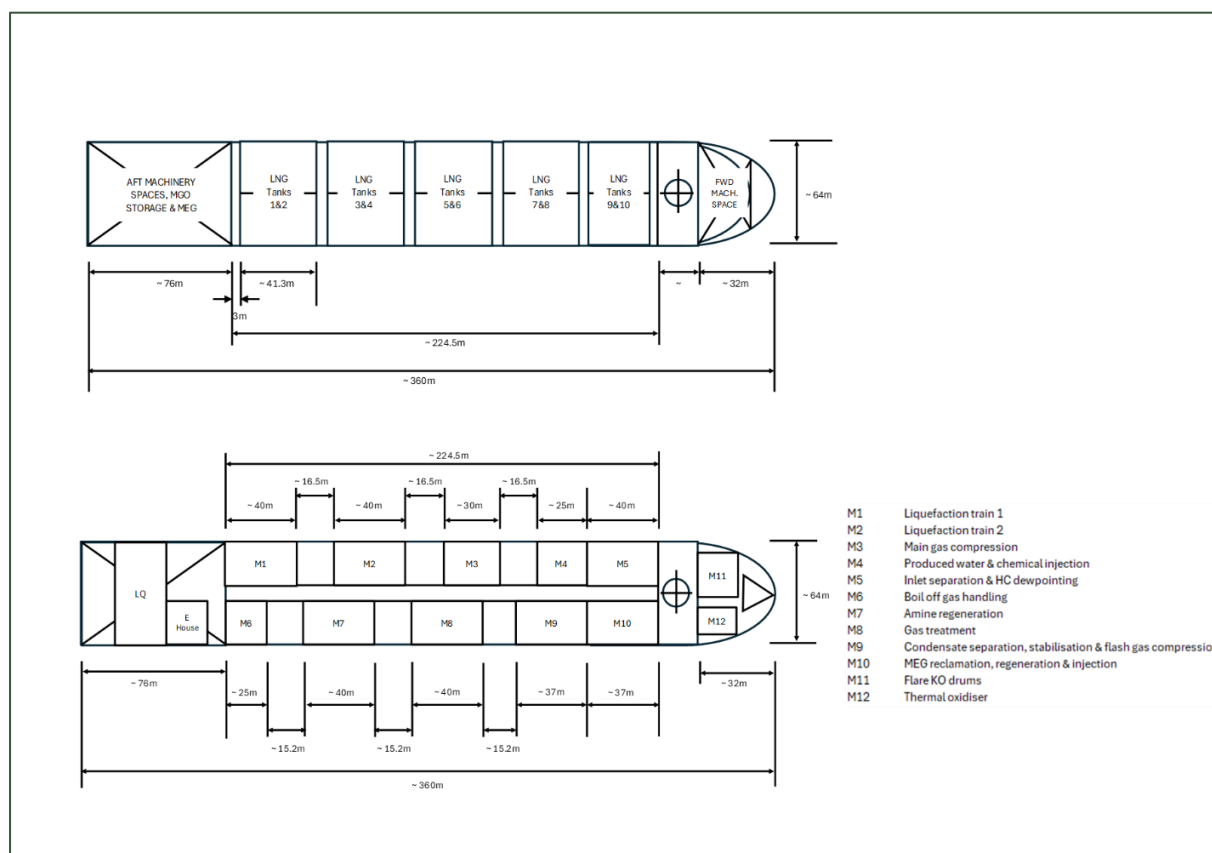


Figure 5-40: Conceptual Floating Liquefied Natural Gas (FLNG) vessel layout
Source: Crondall Energy



Table 5-12: Key FLNG characteristics

Aspect	Design characteristic
Production capacity	LNG: 3.6 million tonnes per annum (MTPA) Condensate: 16.5 MMbbl per annum
Produced water treatment capacity	1 050 barrels per day
Gas separation capacity	560 MMscfd
Storage capacity	LNG: 220 000 - 280 000 m ³
Power generation capacity	Generation configuration is subject to later design phases, but will be either dual fuel gas turbines or engines Powered by approx. 57 MMscfd of the produced gas
Crew capacity	150 - 300
Mooring	Up to 20 mooring lines

5.5.4.3 Description of the FSO

If produced gas were to be processed and liquefied offshore (Scenario 2), through the use of an FLNG (Section 5.5.4.2), condensate would be transferred to the FSO vessel for storage.

An FSO vessel is an offshore facility used for the storage and offloading of hydrocarbons, including condensate. Unlike an FLNG and/or FPSO unit, an FSO does not process hydrocarbons, but instead receives stabilised fluids from a production facility (e.g. FLNG) and stores them prior to transfer to DPSTs.

The vessel generally consists of a repurposed oil tanker or purpose-built vessel equipped with storage tanks, offloading systems, mooring systems and auxiliary support equipment. Offloading will be undertaken via transfer to DPST through floating hoses.

From a technical perspective, FSOs comprise of:

- Cargo storage tanks for condensate;
- Offloading systems, including loading hoses and pumping systems;
- A turret mooring;
- Utility systems, including power generation, inert gas systems, and ballast systems;
- Safety systems, including fire and gas detection, firefighting systems, and emergency shutdown systems.

An example of an FSO and conceptual characteristics are provided in Figure 5-41 and Table 5-13, respectively.





Figure 5-41: Example Floating Storage and Offloading (FSO) vessel

Source: Sembcorp delivers Culzean FSO vessel | Offshore Magazine

Table 5-13: Key FSO vessel characteristics

Aspect	Design characteristic
Storage capacity	Condensate: 1 000 000 bbl
Power generation capacity	Up to 4 MW diesel generators
Crew capacity	Up to 72 people
Mooring	Up to 20 mooring lines

5.5.4.4 Installation of the FPSO or FLNG & FSO

The FPSO or FLNG facility and FSO vessel (referred to as CPF) will be turret-moored, which allow weather vaning (i.e. free rotation around the mooring point) in response to multidirectional metocean conditions (wind, waves, and currents). The turret may be of the Submerged Turret Loading (STL) type, which allows all mooring lines and risers to be pre-installed prior to the arrival and hook-up of the vessel, thereby decoupling the subsea installation and vessel commissioning schedules.

The mooring system may comprise up to four clusters of five mooring lines (i.e. up to 20 mooring lines and anchors in total). Anchor types will be selected based on site-specific geotechnical conditions and may include driven piles, suction piles, gravity-based anchors, or drag-embedment anchors.

Each mooring line will typically consist of chain segments at the upper section (near the turret) and at the touchdown point where seabed contact occurs, with polyester rope used in the intermediate section to reduce weight and improve fatigue performance in deepwater applications. In shallower water locations, the mooring lines may comprise chain along their entire length.



A heading control system incorporating thrusters may be installed to optimise vessel orientation under certain operating conditions; however, continuous thruster use is not anticipated. Installation of the mooring system and CPF is expected to involve several Anchor Handling Tug Supply (AHTS) vessels (typically up to four).

The anchors and mooring lines ensure the CPF remains securely moored in place even in challenging deep-water environments. Engineering is performed taking into account seabed characteristics and metocean data.

Anchors and mooring lines are installed before the CPF arrives. Anchors are transported to site on installation vessels equipped with heavy lifting cranes and specialized equipment to handle the anchors.

The installation process is closely monitored using ROVs and/or subsea sensors. The data is transmitted to the surface vessel, where operators can make real-time adjustments to ensure proper installation.

Mooring lines are connected to the installed anchors using subsea connectors or shackles. The mooring lines are deployed from the installation vessels and laid out along the seabed.

When the CPF arrives at the site, the mooring lines are recovered by surface vessel using winch and ROVs. The CPF is hooked up to the pre-installed mooring lines. Typically, four tugs are required for the hook-up operations to hold CPF position on site, while an installation vessel is used to ensure the connection of the chains with the CPF and the appropriate tensioning through the in-line tensioner. For STL buoy systems, the mooring lines will be retrieved and connected to the buoy. The buoy will be submerged and subsequently retrieved and connected to the CPF turret.

It is anticipated that the CPF installation will require the following vessels during part of the austral summer installation campaigns:

- One support vessel; and
- Four ocean-going tugs for hook-up.

5.5.4.5 Commissioning and Start-up of the Central Processing Facility

Commissioning will consist in a comprehensive series of checks and tests to be carried out in order to demonstrate and ensure that the facilities are ready to operate safely and steadily in compliance with project specifications.

Commissioning phase will include four main types of activities:

- Preliminary checks to ensure that the construction and mechanical completion works are completed and documented.
- Functional tests to ensure that each plant elementary function performs properly.
- Piping and vessels preparations of the pipe work to ensure tightness and ability to receive live fluids safely (such as piping drying-out, process leak testing and inerting, or loading of various chemicals).
- Operational tests to ensure the readiness of the equipment for continuous operation by running them during a significant period of time.

The commissioning will be validated upon successful completion of all these activities, including if required, the operational tests with hydrocarbons and hazardous material to allow start-up activities during which "Utility" and "Process" packages and equipment are gradually put into service.



Gas compression commissioning activities will require start-up flaring (non routine) when performing each compression unit operational test. Limited additional start-up flaring may also occur during final complete start-up and other tests (Emergency Shutdown (ESD), etc.).

5.5.5 Shore Crossing and Onshore Pipeline

5.5.5.1 Shore Crossing (Scenario 1)

To connect the offshore export pipeline from the FPSO to the onshore gas pipeline, a shoreline crossing will be constructed. The preferred method for installation involves the construction of a HDD micro-tunnel beneath the coastal zone, extending ~1-1.5 km from a temporary onshore drilling platform and exiting the seabed at an approximate depth of 20 m below sea level.

Once the micro-tunnel has been completed, it will be lined with a HDPE liner. The HDPE liner will be fabricated offshore on a barge and pulled through the tunnel from the shore, providing a stable and protected conduit that secures the tunnel until the pipelay vessel arrives.

Given the local topography, which includes a “mobile” primary coastal dune and an elevated escarpment with intervening valleys, the final onshore pipeline route may require drilling beneath the dune and potentially constructing a tunnel through the dune or other geomorphological features, thereby minimising surface disturbance.

When the pipelay vessel arrives on site, offshore pipeline installation will commence. As the vessel lays the export pipeline offshore, the first 1-1.5 km of pipeline will simultaneously be pulled through the lined micro-tunnel from shore using a linear winch system. This approach eliminates the need for an onshore pipeline fabrication area and roller launch system, substantially reducing the construction footprint and associated disturbance within the coastal zone.

Once installed, the pipeline will be tested and connected (tied-in) to the offshore export and onshore pipeline infrastructure.

Following completion of construction activities, all temporary infrastructure, including the drilling platform and associated facilities, will be demobilised, and the disturbed areas will be rehabilitated and reinstated to as close to original condition as practicable.

5.5.5.2 Onshore Pipeline (Scenario 1)

An onshore dry gas pipeline of up to ~13 km in length will be installed to transport the dry gas from the offshore landfall to downstream users and/or gas processing or power generation facilities (e.g. the proposed GtP facility). The pipeline will be buried and is expected to have a diameter of up to 24” ND and a design pressure of up to 150 barg.

Proposed route options, co-ordinates and potentially affected properties are shown in Figure 5-42, Table 5-14 and Table 5-15, respectively. As shown in Figure 5-42, two route alignments to the proposed offtake location (e.g. the proposed GtP facility) are proposed for Options 1 and 2. One alignment follows the existing arterial road corridor, while the second represents an alternative route that does not follow the route alignment but diverts northwards (“Options 1 & 2 Alternative”).

Notably, the route alignment following the arterial road converges at a common point for all three pipeline options (point V) before continuing northwards towards the proposed offtake location (e.g. the proposed GtP facility).

Based on the findings of the preliminary site assessments and stakeholder engagement completed to date, the preferred pipeline route comprises Option 1 (up to Point AG), followed by the “Option 1 and Option 2 Alternative” pipeline corridor (i.e. Points AG-AK & Z) (Figure 5-42, Table 5-14). Provisional route lengths are approximately 13 km (Option 1), 10 km (Option 2) and 7 km (Option 3), respectively.



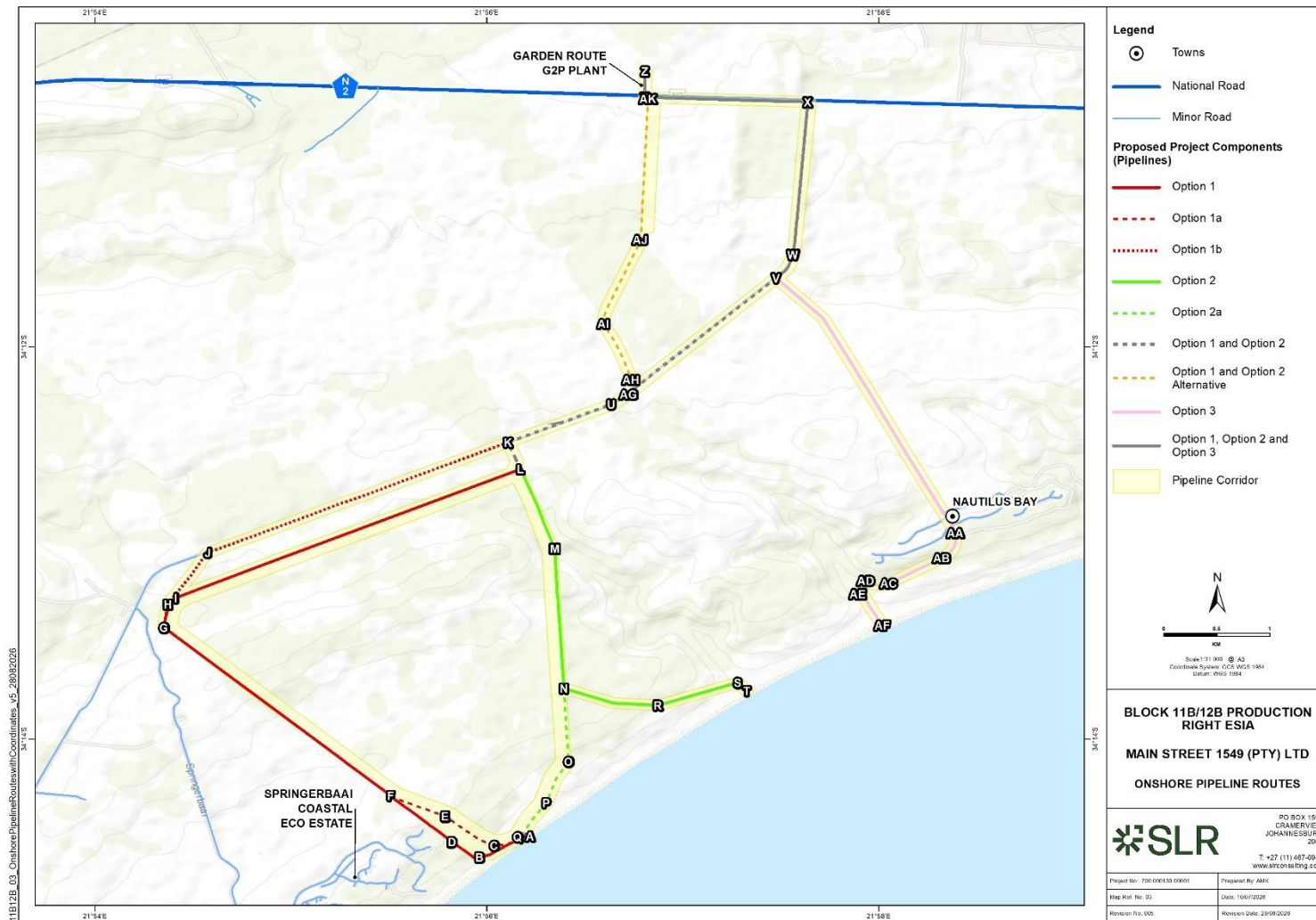


Figure 5-42: Onshore gas pipeline options



Table 5-14: Infrastructure co-ordinates of the proposed onshore pipeline route options

Point	Longitude (South)	Latitude (East)	Onshore Pipeline Route Option
A	34° 14' 29.528" S	21° 56' 12.332" E	Option 1
B	34° 14' 36.250" S	21° 55' 57.781" E	
C	34° 14' 32.616" S	21° 56' 02.186" E	
D	34° 14' 31.515" S	21° 55' 49.385" E	
E	34° 14' 23.667" S	21° 55' 47.169" E	
F	34° 14' 17.386" S	21° 55' 30.587" E	
G	34° 13' 25.956" S	21° 54' 21.150" E	
H	34° 13' 18.827" S	21° 54' 22.374" E	
I	34° 13' 16.805" S	21° 54' 24.820" E	
J	34° 13' 02.946" S	21° 54' 34.585" E	
K	34° 12' 29.205" S	21° 56' 06.484" E	Option 1 & 2
L	34° 12' 37.394" S	21° 56' 10.256" E	Option 2
M	34° 13' 01.808" S	21° 56' 20.774" E	
N	34° 13' 44.491" S	21° 56' 23.594" E	
O	34° 14' 6.958" S	21° 56' 25.046" E	
P	34° 14' 19.597" S	21° 56' 18.173" E	
Q	34° 14' 30.030" S	21° 56' 10.623" E	
R	34° 13' 49.732" S	21° 56' 52.414" E	
S	34° 13' 42.739" S	21° 57' 16.905" E	
T	34° 13' 45.301" S	21° 57' 19.572" E	
U	34° 12' 17.616" S	21° 56' 38.078" E	Option 1 & 2
V	34° 11' 38.895" S	21° 57' 28.562" E	Option 1, 2 & 3
W	34° 11' 31.775" S	21° 57' 33.728" E	
X	34° 10' 45.064" S	21° 57' 38.282" E	
Y	34° 10' 43.622" S	21° 56' 48.387" E	
Z	34° 10' 35.612" S	21° 56' 48.447" E	
AA	34° 12' 56.943" S	21° 58' 23.420" E	Option 3
AB	34° 13' 04.648" S	21° 58' 19.282" E	
AC	34° 13' 12.394" S	21° 58' 03.031" E	
AD	34° 13' 12.842" S	21° 57' 55.718" E	
AE	34° 13' 14.623" S	21° 57' 54.304" E	
AF	34° 13' 25.171" S	21° 58' 01.099" E	
AG	34° 12' 13.898" S	21° 56' 43.789" E	Option 1 & 2 (<i>Alternative</i>)
AH	34° 12' 11.258" S	21° 56' 44.376" E	
AI	34° 11' 52.920" S	21° 56' 35.663" E	
AJ	34° 11' 27.204" S	21° 56' 46.938" E	
AK	34° 10' 44.098" S	21° 56' 49.304" E	

Note: The provided co-ordinates relate to the proposed pipeline, with a 100 m corridor applied to each route option as indicated in Figure 5-42.



Table 5-15: Details of the properties affected by the proposed onshore pipeline routes

Farm name	SG Code	Onshore Pipeline Route Option
Farm 419	C05100000000041900000	Option 1, 2 & 3
Farm Driefontein RE/7/243	C05100000000024300007	Option 1, 2 & 3
Farm Driefontein 243, Portion 23	C05100000000024300023	Option 1, 2 & 3
Farm 247, Portion 1	C05100000000024700001	Option 1, 2 & 3
Farm Klipfontein 249, Portion 3	C05100000000024900003	Option 1 & 2
Farm Klipfontein 249, RE/4	C05100000000024900004	Option 1 & 2
Farm Klipfontein 249, Portion 5	C05100000000024900005	Option 1
Farm Klipfontein RE/344	C05100000000034400000	Option 1, 2 & 3
Farm Klipfontein 344, Portion 2	C05100000000034400002	Option 2 & 3
Farm Klipfontein 344, Portion 3	C05100000000034400003	Option 3
Farm Klipfontein 344, Portion 85	C05100000000034400085	Option 3
Farm Klipfontein 344, Portion 86	C05100000000034400086	Option 3
Farm Klipfontein 344, Portion 87	C05100000000034400087	Option 3
Farm Klipfontein 344, Portion 88	C05100000000034400088	Option 3
Farm Klipfontein 344 Portion 92	C05100000000034400092	Option 1, 2 & 3
Farm Klipfontein 344 Portion 91	C05100000000034400091	Option 1, 2 & 3

To provide flexibility in avoiding technical, environmental and social constraints at the coastline and along the pipeline corridor, alternative route alignments have been identified for Options 1 and 2. For Option 1, two alternative beach access/landfall locations are proposed, resulting in route alignments Option 1 and Option 1a. In addition, a northern alignment variation (Option 1b) is proposed between the inland corridor and the common pipeline route. Similarly, Option 2 includes two alternative beach access/landfall locations and associated route alignments, referred to as Option 2 and Option 2a (Figure 5-42).

The pipeline will be installed within a dedicated servitude, which will be ~30 – 40 m wide during construction, reducing to 10 – 15 m during operation following rehabilitation. Where possible, the pipeline will be routed within or adjacent to existing infrastructure corridors to minimise environmental disturbance and land-use conflicts. However, a new servitude may be required in areas where access, land ownership, environmental sensitivities, or engineering constraints prevent use of existing corridors.

The final alignment will take into consideration routing constraints and environmental considerations, which will be assessed during the ESIA phase (see Section 9.2.1.5).

Final routing will be confirmed during detailed engineering and will consider:

- Terrain and geotechnical conditions;
- Existing infrastructure and utilities;
- Watercourse crossings (Section 7.5);
- Environmental sensitivities (Section 7.0);
- Land ownership and land-use constraints;



- Access for construction and maintenance; and
- Required safety distances from populated areas.

The pipeline will typically consist of high-strength carbon steel (e.g. API 5L Grade X65), with an external anti-corrosion coating such as Fusion Bonded Epoxy (FBE) or three-layer polyethylene (3 LPE). Pipe wall thickness will be based on design pressure, safety requirements, and ground conditions, and is expected to be approximately 1 inch.

Typical design parameters include:

- Nominal diameter: 24 inches (610 mm);
- Design pressure: up to 200 bar;
- Burial depth: 1.0–1.5 m, deeper at crossings;
- External coating: corrosion protection system;
- Cathodic protection: impressed current or sacrificial anodes; and
- Block valve stations at key locations (e.g. landfall interface).

Construction Approach

Pipeline installation will follow a sequential spread method, where pipeline installation activities progress continuously along the pipeline route in a coordinated sequence.

Pre-construction activities will include:

- Route survey and demarcation;
- Vegetation clearing (where necessary, with sensitive areas avoided where possible);
- Temporary access road establishment;
- Installation of erosion and sediment controls; and
- Stripping and stockpiling of topsoil for reinstatement.

A trench will then be excavated along the route, typically 1.5 – 2.5 m wide, depending on conditions. Excavation may include mechanical trenching, rock breaking (where required), and temporary stockpiling of material.

Pipe sections (typically 12 m in length) will be delivered to site, aligned and welded together. Welds will be inspected using non-destructive testing (e.g. radiographic or ultrasonic methods), and joints will be coated for corrosion protection. The pipeline string will then be lowered into the trench, followed by backfilling using excavated material, with protective bedding where required.

At crossings (such as roads, railways, and watercourses), trenchless methods (e.g. HDD or micro-tunnelling) may be used to minimise disturbance.

Testing and Commissioning

Following installation, the pipeline will undergo hydrostatic pressure testing to confirm integrity and leak tightness. This will involve:

- Filling the pipeline with water;
- Pressurising to ~1.5 times the design pressure;
- Monitoring over a defined period (typically ~24 hours); and
- Dewatering and drying prior to commissioning.



Associated Infrastructure

The pipeline may include associated infrastructure such as:

- Block valve stations;
- Pig launchers and receivers;
- Pressure regulation and metering stations;
- Cathodic protection systems; and
- Telemetry and control systems.

Construction is expected to take ~6 to 12 months (Table 5-3), depending on route length, terrain and environmental conditions.

Rehabilitation

Following construction, disturbed areas will be rehabilitated through:

- Topsoil replacement;
- Land recontouring;
- Re-vegetation; and
- Removal of temporary infrastructure.

Long-term access will be maintained within the operational servitude for inspection and maintenance activities.

5.5.6 Resource Requirements

5.5.6.1 Personnel

During **offshore** installation and construction operations, personnel will be distributed across the various vessel types as shown in Table 5-16). The majority of the workforce will comprise highly specialised skilled staff on the installation and support vessels.

Table 5-16: Active personnel / crew working on installation and construction vessels

Vessel Type	Estimated Crew
Pipelay vessel	300 - 450
Trenching vessel	80 - 150
Umbilical lay vessel	90 - 180
Heavy Construction vessel	250 - 400
Medium Construction vessel	120 - 220
AHT	15 - 40
Support Vessel	12 - 20
Pipe Carrier vessel	15 - 40

Construction of the **onshore** pipeline will involve a mobile workforce (typically 150–300 personnel at peak) and temporary facilities such as site offices, storage areas, fuel storage, and sanitation systems.



5.5.6.2 Water

Most vessels involved in the installation activities will assure their own freshwater supply produced directly offshore. Specific activities, for example commissioning activities such as leak test or process safety test may require *ad hoc* quantity of freshwater which may not be able to be produced directly offshore. For these activities, freshwater could be sourced from onshore providers and transported to the field by supply vessels. Smaller vessels may also need to source freshwater from shore.

Onshore, freshwater will be required for the HDD fluid and other construction activities including dust suppression. Water will be provided via temporary connection to municipal mains or via tanker from licenced provider.

5.5.6.3 Fuel

Low sulphur (0.5%/50ppm) Marine Gas Oil (MGO) will be used as fuel for all vessels. Fuel will preferentially be obtained locally and transported to the installation vessels by the supply vessels. Jet-A1 fuel will be used for helicopters.

Onshore, diesel will be used for vehicles and generators and/or temporary grid connection possibly augmented with solar panels and batteries.

5.5.6.4 Facilities

Offshore installation and construction operations will be supported by crew accommodation located in Mossel Bay, Gqeberha, or Cape Town. The logistics base will be an existing port suitable for oil and gas support services located within the region (e.g. Mossel Bay, Gqeberha and/or Cape Town).

Construction of the **onshore** pipeline will involve temporary facilities such as site offices, storage areas, fuel storage, and sanitation systems, with construction estimated to take up to 12 months.

5.5.7 Emergency Prevention and Response

5.5.7.1 Prevention

A temporary safety exclusion zone of minimum 500 m radius around all offshore construction and installation vessels will be enforced at all times during operation and will be described in a Notice to Mariners as a navigational warning.

Under the Convention on the International Regulations for Preventing Collisions at Sea (COLREGS, 1972, Part B, Section II, Rule 18), a construction and installation vessel that is engaged in underwater operations, including pipelaying and towing, is defined as a “vessel restricted in its ability to manoeuvre”, and power-driven and sailing vessels must give way to such vessels. Fishing vessels are required to keep out of the way of the well drilling operation and observe the operational safety zones. Furthermore, under the Marine Traffic Act, 1981 (No. 2 of 1981), a vessel used for the purpose of exploiting the seabed, FPSO / FLNG and a pipeline fall under the definition of an “offshore installation” and as such it is protected by a 500 m safety exclusion zone.

Onshore trenched areas will be appropriately demarcated, where necessary, to restrict access and ensure public and worker safety. Demarcation measures may include fencing, barrier tape, signage and controlled access points, depending on the location and level of risk. These controls will be implemented to prevent unauthorised entry into open excavations or unstable ground conditions and to reduce the risk of slips, trips, falls or vehicle-related incidents. All trenching activities will be undertaken in accordance with applicable



occupational health and safety requirements, with additional precautions implemented in areas of higher public exposure or environmental sensitivity.

5.5.7.2 Response

All vessels will have equipment, systems and protocols in place for prevention of pollution by oil, sewage and garbage in accordance with international MARPOL 73/78 requirements. Any vessel oil spill related discharges would be managed by an OSCP that the operator will be required to compile and share with government prior to installation and commissioning activities, as well as a SOPEP (Regulation 37 of MARPOL Annex I).

All vessel owners will have emergency procedures in place identifying accident scenarios and responses. Furthermore, all appointed contractors will have the necessary vessel insurances in place in order to manage the consequences of any unplanned event. Refer to Section 0 for further details.

Specific coordination documents will be established between the various vessels and operators to define role and responsibilities in event of emergency.

5.6 Production

5.6.1 Production Profile

Production rates will be governed by several key factors / constraints, including the number of producing wells, surface processing capacity, pipeline export capacity, and the availability of firm market offtake agreements. These factors will collectively determine the achievable and sustainable plateau production level.

To assess the **maximum development potential** of the Paddavissie Fairway, a plateau production rate of **~560 MMscf/d** (million standard cubic feet per day) is considered technically achievable. This rate could be sustained for up to ~20 years, subject to the successful development of additional reservoirs, including Blaasop, Woudboom and Platanna. Thereafter, production is expected to decline as reservoir pressures decrease over time.

At this production rate, initial condensate production is estimated to be ~47 600 BBL/day (barrels per day), based on a condensate yield of ~85 BBL/MMscf. Condensate yields are expected to decline over time, at an average rate of ~5% per year, as increasing volumes of hydrocarbons condense within the reservoir and are not produced to surface. The addition of new reservoirs during the production phase may temporarily increase condensate yields, resulting in a non-linear overall decline profile.

Production is not expected to commence immediately at the maximum plateau rate. Instead, production will typically ramp up progressively as infrastructure is commissioned and market demand develops. Alternatively, a lower plateau production rate could be adopted, extending the production period over a longer duration while achieving a similar overall recovery.

Figure 5-43 illustrates the maximum development case, showing the plateau phase followed by a gradual decline. Under this scenario, the ultimate recoverable gas volume over the life of the field is estimated to be up to approximately 7 TCF (trillion cubic feet), depending on reservoir performance, operational efficiency and commercial considerations. This volume represents a maximum estimate and may be produced over an extended timeframe.



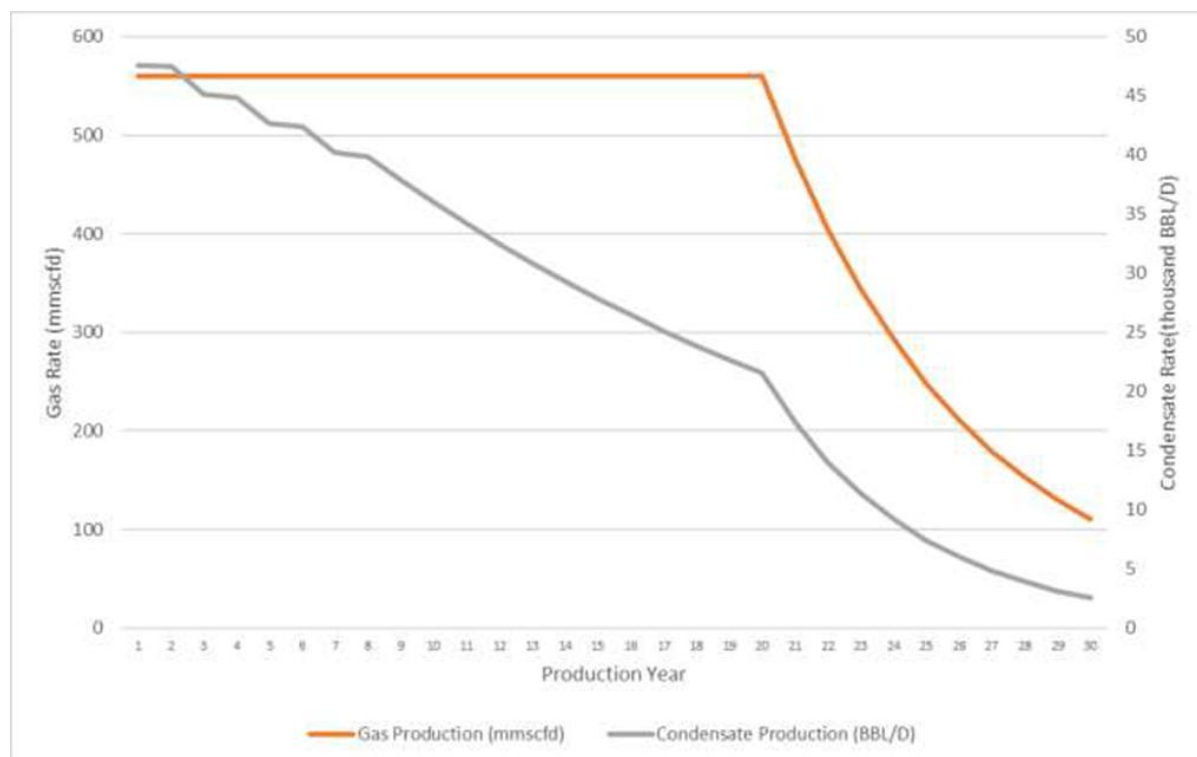


Figure 5-43: Provisional Paddavissie production profile, based on maximum expected production

Source: Main Street

5.6.2 Subsea Production System Operation and Maintenance

The flowlines will be externally protected against corrosion by a high integrity polyethylene coating together with a sacrificial anode cathodic protection system.

Corrosion inhibitor fluid will be added to the production stream via the MEG system and/or umbilicals before it passes through the pipelines to minimise internal corrosion.

Leak detection is monitored by several methods, including alerts for high and low pressure, temperature and/or flow. Pipeline and associated subsea equipment will be externally visually inspected with ROV typically every 3 years. In-line inspection with intelligent pigging will be performed typically every 5 years. Cathodic protection system efficiency will be monitored and subsea measurement shall be done by ROV typically every 9 years.

5.6.3 Processing on the FPSO / FLNG

Key processes that will take place on the FPSO / FLNG, dependant on the final development scenario (see Section 5.2.1), are summarised below.

5.6.3.1 FPSO

Water / Condensate / Gas Separation and Processing

The FPSO facility will receive and process production fluids as follows;

- Receive multiphase production fluids from subsea wells,
- Separate produced fluids into gas, condensate and produced water through high- and low-pressure separation stages;



- Dehydrate the gas stream (typically using a glycol-based system) to remove water vapour and prevent hydrate formation and corrosion;
- Further process the gas through hydrocarbon dew-point control systems (e.g. refrigeration or Joule–Thomson cooling) to meet export specifications;
- Export treated dry gas via the pipeline system (Scenario 1);
- Operate, initially without compression, with reservoir pressure allowing direct export of gas and at a later stage (anticipated after ~8 years) install and commission gas compression facilities to maintain export pressure and production rates;
- Route condensate to stabilisation systems to reduce vapour pressure and meet storage and transport specifications;
- Store stabilised condensate in segregated cargo tanks within the double-hulled FPSO hull (typically 600 000 to 2 000 000 barrels capacity);
- Periodically offload condensate to DPSTs via a tandem offloading system; and
- Treat produced water to reduce hydrocarbon content and discharge the treated, produced water overboard in compliance with specified limits.

During equipment maintenance and process upsets, including start-up and shutdown scenarios, part or all of the off-gas from the separation / stabilisation process may be sent to the High Pressure (HP) or Low Pressure (LP) flare systems. Flaring would be temporary and non-routine.

Produced water treatment

The produced water treatment system will be designed to collect produced water from process facilities and treat the water for discharge overboard via a dedicated caisson. Dispersed oil in water content will be no higher than 30 mg/l, as per the OSPAR Recommendation 2001/1. An online oil in water monitoring system will be in place to ensure specification is met.

If the hydrocarbon content exceeds 30 mg/L, the produced water will either be treated again or will be transported ashore to be treated.

FPSO utility systems

Additional Key FPSO utility systems are summarised below.

Process cooling: Cooling of process streams via a closed-loop, water-based cooling medium system is required to dissipate heat generated by the separation and treatment systems, compression systems, and miscellaneous utility systems. The seawater lift system will supply the required seawater for cooling the cooling medium closed-loop. Process hydrocarbon fluids will not come into contact with this seawater. While the lifted seawater will be discharged after heat exchange with the cooling medium closed-loop. There will be no routine discharge of cooling medium.

Process heating: A process heating system is required as part of the treatment process to achieve the required specifications. A closed-loop, water-based heating medium system will be used to add heat to the incoming production stream. Waste heat from the power generation system will be used as the source of heat.

Flaring system: A closed flare system, also known as a Flare Gas Recovery System (FGRS), will be designed and employed to minimise continuous operational flaring. While the system is intended to recover and recycle flare gas wherever practicable, operational flaring cannot be guaranteed to be completely eliminated under all operating conditions. For



example, start-up of the FPSO is a critical period due to the unavailability of the compression chain, during which the flare system will be required.

Topsides and subsea chemical injection: The FPSO will have storage and injection facilities to inject the required amounts of chemicals and methanol into the production fluids to support production operations, both for subsea chemical injection requirements and for topsides chemical injection requirements.

Air compression system: An air compression system will be provided to supply hull and topsides equipment. Compressed air is required primarily for the operation of control valves and other process instrumentation requirements.

Nitrogen generation system: Instrument air will feed the nitrogen generation system. Nitrogen will be provided as required for purging, inerting and blanketing, and as required for miscellaneous utilities.

Drain systems: The topsides will be equipped with the following drain systems:

- Closed drain system – used to collect drain fluids from large hydrocarbon vessels and high-pressure gas vessels and route them back into the process.
- Open drain system – used to collect spillage, overflow, washdown from equipment and rain / deluge water. Consists of:
 - Hazardous open drains – used to collect drain fluids (e.g. oil contaminated waters) from hydrocarbon areas and route them to the slop tank in FPSO hull.
 - Non-hazardous open drains – used to collect drain fluids (e.g. rainwater) from non-hydrocarbon areas and route them to the slop tank in the FPSO hull or directly overboard in case of excessive drain rates.

The oil and water in the slop tank will be gravity-separated by a minimum residence and retention time. Once separated, the oil will be skimmed off the top and sent to the cargo tanks and the water will be discharged overboard to residual oil and grease in water discharge specifications. Overboard discharge of oily water streams from the FPSO hull will be in line with MARPOL 73/78 Annex I (oil in water content < 15 mg/l).

Other utility systems: A minimum of two deck cranes will be provided for supply boat offloading and materials handling and to support general maintenance activities. Workshops, a laboratory capable of checking the properties of the produced and injection fluids as well as select discharges for compliance, a medical facility, and a storage facility for supplies and spare parts will also be provided. Heating, ventilation, and air conditioning systems will be provided for buildings and enclosures.

Integrated Control and Safety System (ICSS): Monitoring and control of the FPSO production operations will be undertaken through a combination of automated control, monitoring and safety systems, which may comprise an ICSS or a series of interlinked control and safety systems, depending on the final facility design. Located in the main control room of the FPSO, the ICSS will include process shutdown, emergency shutdown, and fire and gas systems to protect the facilities and personnel. These systems will interface with a public address and general alarm system to provide distinct audible and visual alarm notification. The ICSS includes the following subsystems:

- Process Control System (PCS) – will perform primary process control, monitoring, and data acquisition functions
- Safety Instrumented System (SIS) – will implement functions for abandoning the host facility, emergency shutdown, fire and gas detection, and process shutdown. Also included in the SIS will be a shutdown function for the subsea control / safety system.



The SIS will provide detection, logic sequencing, and actuation of devices to place the facility in a safe state.

- Alarm management system
- Operator graphics / consoles
- Third-party interfaces to packaged systems (such as compressors, subsea, marine, etc.).

Communication systems: Telecommunications equipment will be installed on the FPSO to enable safe operation of the facilities in normal and emergency conditions. This equipment will allow communication with the onshore logistics base, support vessels, helicopters, DPST, as well as communication within the FPSO.

5.6.3.2 FLNG

The FLNG processing configuration would include several stages of gas treatment and conditioning prior to liquefaction, as outlined below:

- Receive produced fluids from subsea wells into an inlet slug catcher to separate bulk liquids and stabilise flow;
- Remove mercury from the gas stream to prevent contamination and equipment damage;
- Remove acid gases (including carbon dioxide (CO₂) and hydrogen sulphide (H₂S));
- Dehydrate the gas to remove water vapour and prevent hydrate formation;
- Control the hydrocarbon dew point to meet product specifications;
- Compress the gas to the required conditions for liquefaction;
- Liquefy the gas using cryogenic processes to produce LNG;
- Stabilise condensate separated during processing prior to storage and export; and
- Treat produced water and discharge it in accordance with regulatory requirements.

This process is illustrated in Figure 5-44.



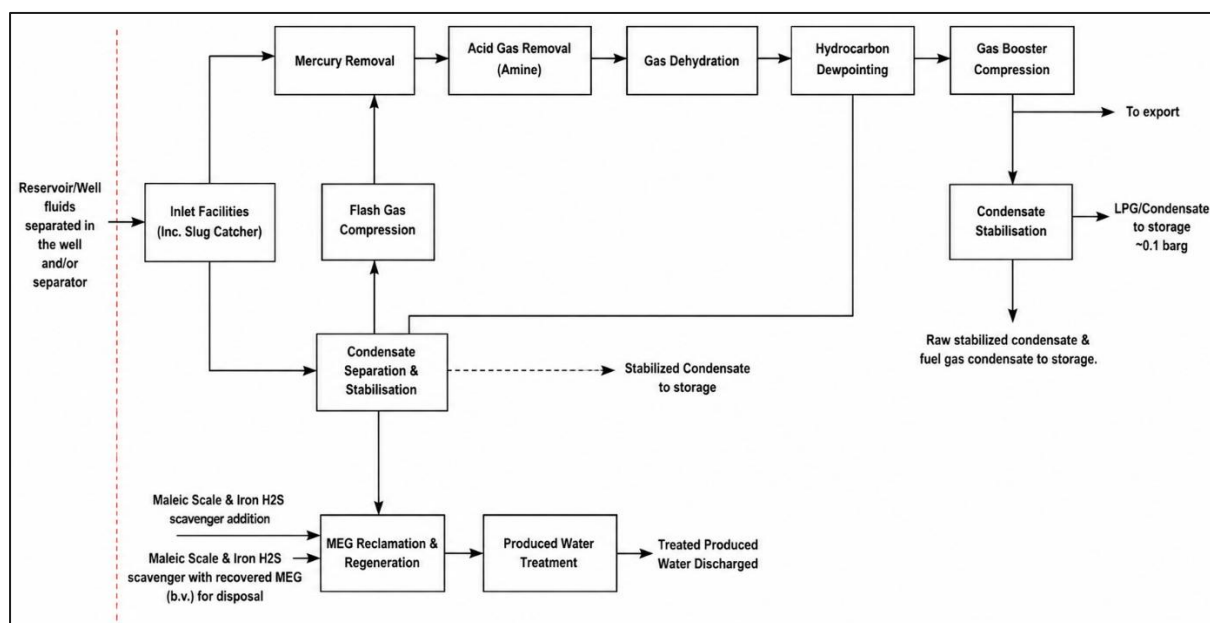


Figure 5-44: Floating Liquefied Natural Gas (FLNG) process flow diagram

Source: Crondall Energy

This process would generate two liquid product streams: Liquefied Natural Gas (LNG) and stabilised condensate. LNG would be stored in cryogenic tanks integrated within the hull of the FLNG unit and periodically offloaded to a DPST via a cryogenic transfer system. Condensate would be transferred via conventional ambient-temperature pipelines to a separate FSO vessel for storage. The condensate would then be periodically offloaded from the FSO to DPSTs for transport to market (see Section 5.6.4).

FLNG utility systems will be similar to that described for the FPSO (see Section 5.6.3.1).

5.6.4 Transfer and Transport of Produced Fluids

Condensate produced via the FPSO (Scenario 1) will be periodically offloaded to DPSTs, using a stern-mounted tandem offloading system designed for safe operation across a range of environmental conditions.

Under the FLNG development scenario (Scenario 2), two liquid product streams will be generated, LNG and stabilised condensate. LNG will be stored in cryogenic tanks integrated within the hull of the FLNG facility and periodically offloaded to DPSTs using specialised offshore cryogenic transfer systems. Stabilised condensate will be transferred via conventional pipelines to a separate FSO vessel for storage, before being offloaded to DPSTs for transport to market.

The use of separate vessels for LNG (FLNG) and condensate (FSO) storage and offloading reflects the expected high production volumes of both products. Dedicated offloading systems allow each product stream to utilise independent weather windows for transfer operations, thereby improving operational flexibility and reducing scheduling constraints that could arise if both products relied on a single storage vessel.

Cryogenic LNG transfer from the FLNG facility to DPSTs will be undertaken using specialised offshore loading systems designed for open-ocean conditions. Several cryogenic offloading technologies are considered suitable for the metocean conditions in the proposed offloading locations, where conventional side-by-side transfer is unlikely to be feasible due to wave and current conditions. Potential systems include tandem offloading arrangements and other articulated cryogenic transfer systems specifically designed for offshore environments.



Further engineering evaluation and qualification testing will be required prior to final technology selection. A cryogenic floating hose offloading system is shown diagrammatically in Figure 5-45.



Figure 5-45: Cryogenic floating hose offloading

Source: [In pictures: Prelude FLNG arrives - Offshore Technology](#)

Further details of the export logistics will be developed during the engineering and project development phases.

5.6.5 Resource Requirements

5.6.5.1 Personnel

The production phase is estimated to generate the following direct jobs:

- Maximum FPSO / FLNG crew capacity: 160 (FPSO/FLNG) – 300 (FLNG) crew per vessel.
- Crew on support vessels, including DPSTs: 12 - 20 crew per vessel.
- Onshore support: 60 – 160 jobs.

The majority of the workforce will comprise highly specialised skilled staff on the CPF and support vessels.

The use of local labour will be prioritised whenever possible.

Transportation of personnel to the CPF will be by helicopter, through an estimated 2 - 5 helicopter trips per week between the CPF and the helicopter support base, most from likely George.

Onshore project support staff will be either based in Mossel Bay and at the onshore logistics support base.



5.6.5.2 Water

During production, the FPSO / FLNG and FSO will use freshwater produced onboard via seawater desalination.

5.6.5.3 Fuel

The FPSO / FLNG will be powered by a portion of the produced gas.

Low sulphur (0.5%/50ppm) Marine Gas Oil (MGO) will be used for the support vessels and DPSTs. Fuel will preferentially be obtained locally and transported to the installation vessels by the supply vessels.

5.6.5.4 Facilities

Offshore operations will be supported by crew accommodation located in Mossel Bay, George, Gqeberha, or Cape Town. The logistics base will be an existing port suitable for oil and gas support services located within the region (e.g. Mossel Bay, Gqeberha and/or Cape Town). Additional onshore logistics support, office, warehousing and storage requirements may utilise existing port-based or industrial land and facilities through existing operators or lease/sublease arrangements.

5.6.1 Emergency Prevention and Response

Offshore Exclusion and Restriction Areas

Both the offshore Project area will be subject to certain exclusion and restrictions.

Safety exclusion zones will be established around Project infrastructure in accordance with the Marine Traffic Act, 1981 (No. 2 of 1981), which defines the CPF, pipelines and associated infrastructure as “offshore installations”. The safety zone will be up to 500 m surrounding subsea infrastructure and up to 2 km for the CPF to encompass the DPST and offloading operations. Within these zones, vessels are prohibited from anchoring, dragging anchors, or undertaking activities that may pose a risk to the integrity of the infrastructure.

In addition, the Draft Merchant Shipping Bill, 2020 reinforces these protections by prohibiting vessels from entering designated safety zones or conducting activities such as trawling within 500 m of subsea pipelines, except in cases of emergency or authorised operations.

Main Street will coordinate with the South African Maritime Safety Agency (SAMSA) to determine the appropriate application of safety zones, including consideration of site-specific risks. Following installation, the location of subsea infrastructure will be charted and communicated to relevant authorities (e.g. SAMSA) and stakeholders, including through a Notices to Mariners, to ensure safe navigation. Where required, safety zones around key subsea infrastructure (e.g. wells, SPS components and pipelines) will be implemented, subject to regulatory approval.

During operation, a surveillance area of 5 NM will be established around the CPF. This area will be monitored and vessels entering this area will be notified via radio regarding the safety requirements.

Flowline / Pipeline Leak

Although flowline leaks are very rare, failures are most likely during and shortly after pipeline construction and installation (where the cause may be attributed to inherent defects, errors and omissions that are generally identifiable, and for the most part, preventable) and at the end-of-life period (due to fatigue) (Kenny, 2018).



The major hazards for offshore pipelines include corrosion failure (e.g., internal, external - ~50% for pipelines in the Gulf of Mexico), mechanical damage (e.g., trawl gear, anchors, dropped objects - ~15%), construction and material failure (e.g., weld, fitting, clamp - ~10%), natural hazards (e.g., wave, geotechnical – 10%), and other unknown factors (Kenny, 2018). For the current Project, pipelines will be either concrete coated or buried or both, making them over-trawlable in established trawling areas; thereby reducing the risk of failure due to trawling.

The Project has a flowline and riser network located at a depth of ~2 000 m. As such, the water column exerts a hydrostatic pressure of ~200 bar at the seabed.

Considering the water depths in the Block, the hydrostatic pressure at the seabed exceeds the internal operating pressure of the flowline and in the event of an **oil flowline leak** the seawater would push into the flowline rather than the oil flowing out provided the wells can be shutdown at Xmas tree. This may not, however, be the case in shallower water. Although the risk of sustained condensate loss due to pipeline rupture is extremely low, a condensate flowline leak will be modelled in the next phase of the ESIA (see Section 9.2.1.3).

Gas, however, is compressed (injected) at pressure that exceeds the hydrostatic pressure, and the rupture of a **gas flowline** would mean that the pressure of gas in the pipeline exceeds the hydrostatic pressure of the water column and that gas escapes. A gas flowline leak will also be modelled in the next phase of the ESIA (see Section 9.2.1.3).

As detailed in Section 5.6.3, the FPSO/ FLNG production operations will be monitored and controlled through an ICSS. The ICSS will include process shutdown, emergency shutdown, and fire and gas systems to protect the facilities and personnel.

5.7 Emissions, Discharges and Wastes

This section presents the main sources of emissions to air, discharges to water and waste generated that will result from Project operations.

All vessels will have equipment, systems and protocols in place for prevention of pollution by oil, sewage and garbage in accordance with South African legislation, international MARPOL 73/78 requirements, and national and international standards and good practices. Any oil spill related discharges would be managed by an Oil Spill Contingency Plan (OSCP) that the operator will be required to compile and shared with government prior to drilling. Furthermore, Regulation 37 of MARPOL Annex I will be applied, which requires that all ships of 400 gross tonnage and above carry an approved Shipboard Oil Pollution Emergency Plan (SOPEP).

A specific Waste Management Plan (covering all wastes generated offshore and onshore) will be developed in accordance with these requirements and standards. Licenced onshore waste disposal sites and waste management facilities will be identified, verified and approved prior to commencement of survey operations.

5.7.1 Discharges to Sea

All vessels will have equipment, systems and protocols in place for prevention of pollution by oil, sewage and garbage in accordance with international MARPOL 73/78 requirements. When onshore treatment or disposal is needed, only onshore licenced waste disposal sites and waste management facilities will be used.

Anticipated sources of discharges to sea are summarised in Table 5-17.



Table 5-17: Estimated sources of anticipated discharges to sea from Project vessels

Discharge stream	Source	Discharge criteria
From Project vessels (routine discharges)		
Slops from vessel machinery spaces (Bilge water)	Slops include primarily bilge water (drainage water that collects in a ship's bilge space ³³) and possibly lab effluent, which can contain some oily and other contaminants from e.g. machinery onboard.	Bilge water generated in machinery spaces will either be retained onboard for disposal at an approved reception facility or treated through an approved oily water separator prior to discharge, in accordance with MARPOL Annex I. Oil residues and sludge from the treatment process will be collected and disposed of at licensed onshore waste treatment facilities
Deck drainage	Deck drainage consists of liquid waste resulting from rainfall, deck and equipment washing (using water and a water-based detergent). Deck drainage will be variable depending on the vessel characteristics, deck activities and rainfall amounts. In areas where oil contamination of rainwater is more likely, drainage is routed to an oil/water separator for treatment before discharge in accordance with MARPOL 73/78 Annex I (i.e., 15 ppm oil and grease maximum). There will be no discharge of free oil that could cause either a film, sheen or discolouration of the surface water or a sludge or emulsion to be deposited below the water's surface.	Only non-oily water (i.e. <15 ppm oil and grease, maximum instantaneous oil discharge monitor reading) will be discharged overboard. If separation facilities are not available (due to overload or maintenance) the drainage water will be retained on board until it can be discharged to an approved reception facility. The oily residue from the onboard oil / water separator will be treated / disposed of onshore at an approved hazardous waste treatment facility.
Food wastes	Food waste from the galley on vessels	The disposal into the sea of food waste is permitted, in terms of MARPOL 73/78 Annex V, when it has been comminuted or ground to particle sizes smaller than 25 mm and the vessel is <i>en route</i> more than 3 nm (approximately 5.5 km) from land. Disposal overboard without macerating is permitted for moving vessels greater than 12 nm (approximately 22 km) from the coast.
Sewage and grey water	Discharges of sewage (or black water) and grey water (i.e. wastewater from the kitchen, washing and laundry activities and non-oily water used for cleaning) will occur from vessels intermittently throughout the project and will vary according to the number of persons on board.	Grey water may be discharged to sea (without treatment) providing no floating matter or sheen is observable. Black water will be treated onboard in accordance with MARPOL 73/78 Annex IV prior to discharge. Effluent to comply with the following criteria: Biological Oxygen Demand (BOD) of <25 mg/l (if the treatment plant was installed after 1/1/2010) or

³³ The bilge is the lowest compartment on a ship, below the waterline, where the two sides meet at the keel.



Discharge stream	Source	Discharge criteria
		<50 mg/l (if installed before this date) - Minimal residual chlorine concentration of 0.5 mg/l - No visible floating solids or oil and grease
Ballast water	Ballast water is used during routine operations to maintain safe operating conditions onboard a ship by reducing stress on the hull, providing stability, improving propulsion and manoeuvrability, and compensating for weight lost due to fuel and water consumption. While it is essential for safe operations, discharge of ballast water can pose a risk to the receiving environment when discharged due to foreign marine species (e.g., bacteria and larvae) being carried in a ships' ballast water from one location to another when mobilising the drilling unit to site.	Ballast water is discharged subject to the requirements of the 2004 International Convention for the Control and Management of Ships' Ballast Water and Sediments. The Convention stipulates that all ships are required to implement a Ballast Water Management Plan and that all ships using ballast water exchange will do so at least 200 nautical miles (nm) (± 370 km) from nearest land in waters of at least 200 m deep when arriving from a different marine region. 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 (± 93 km) from the nearest land and preferably in water at least 200 m in depth. Project vessels will comply with this requirement.
Brine	Seawater is desalinated on the drill ships for potable and other purposes. The waste stream from the desalination plant is brine (concentrated salt), which is produced in the reverse osmosis process. The brine stream contains high concentration of salts and other concentrated impurities that may be found in seawater. Water chemical agents will not be used in the treatment of seawater and therefore the brine is a natural salt in concentrated state. Approximately 35 g of salt for each litre of water produced will be discharged to sea.	Combine waste streams (e.g. produced water and brine), where possible depending on drilling units
From drilling-related activities		
Drill cuttings and mud	Drill cuttings, which range in size from clay to coarse gravel and reflect the types of sedimentary rocks penetrated by the drill bit, are the primary discharge during well drilling. During the riserless drilling stage, all cuttings and associated WBM will be discharged directly onto the seafloor adjacent to the wellbore. During the risered drilling stage the operator will treat WBM cuttings on the drillship and then discharge the treated cuttings overboard, where they are dispersed by the	None – if NADF are used, any drill cuttings generated will be returned to the drilling unit and transported to shore for treatment, handling and disposal at appropriately licensed waste management facilities.



Discharge stream	Source	Discharge criteria
	current and settle to the seafloor. In circumstances where NADF are used, any drill cuttings generated will be returned to the drilling unit and transported to shore for treatment, handling and disposal at appropriately licensed waste management facilities. Discharge at any one location is intermittent, as actual drilling operations are interspersed with cementing and other technical work that does not generate cuttings.	
Cement and cement additives	During cementing of the surface casing, excess cement emerges out of the top of the well and onto the seafloor to ensure that the conductor pipe is cemented all the way to the seafloor.	None
BOP hydraulic fluid	The BOP control system will use hydraulic fluids to actuate the BOP valves. It is anticipated that BOP testing will take place twice for each well (for safety reasons).	BOP fluids completely biodegrade in seawater within 28 days.
Produced water	Produced water may be generated during well flow testing. Where present, this water will be separated from the hydrocarbon (oily) components and treated onboard to reduce residual hydrocarbon content. The separated hydrocarbon component will be directed to the flare system and combusted, while the treated water will be temporarily stored in a slop tank prior to further management or discharge.	The water is then either directed to: - a settling tank prior to transfer to supply vessel for onshore treatment and disposal; or - a dedicated treatment unit where, after treatment, it is either: - if hydrocarbon content is < 30 mg/l, discharged overboard; or - if hydrocarbon content is > 30 mg/l, subject to a second treatment or directed to tank prior to transfer to supply vessel for onshore treatment and disposal.
From installation and commissioning-related activities		
Production lines	Filling production lines with treated seawater up to 1.2 times of flowline volume, which equates to 20% of volume at seabed.	None
Hydrostatic test and dewatering – release from CPF	The 24" line may be dewatered to the FPSO and discharged directly overboard.	None
Production lines	Filling pipelines with treated seawater up to 2.2 times of pipeline volume, which equates to 20% of volume at seabed.	None
Hydrostatic test and dewatering – release directly to sea	Shortly thereafter (4-48 hrs), following completion of the initial intelligent pig run, full pipeline volume release. Thereafter (4-12 months) another full volume at seabed using a combination of MEG (20 m ³) and methanol (7 m ³) per flowline, with release at seabed	



Discharge stream	Source	Discharge criteria
Umbilical commissioning	Umbilicals are installed either filled with a glycol-water mixture or with the service fluid they will carry. The fill fluid depends on the application; for example, an umbilical may be filled with a mixture of 50% MEG and 50% freshwater.	None
From CPF and subsea system		
Routine discharges	See above	
Produced water ³⁴	Project generates very little produced water as the resource has a low water content. Contains oil and grease and residual production and water treatment chemicals. Discharged at increased temperature of 45°C at point of discharge.	Less than 30 mg/l hydrocarbon content (TPH, Total Petroleum Hydrocarbon) IFC guideline – temperature rise <3°C at 100 m from discharge point
Cooling water	Temperature increase is controlled to ensure the hot water rejected will not harm the environment	IFC guideline – temperature rise <3°C at 100 m from discharge point.
Hydraulic fluid (water soluble and low toxicity)	Control system process and subsea system	None
	BOP system testing	None

5.7.2 Atmospheric Emissions

The principal sources of emissions to air from the offshore activities will be from:

- Fuel combustion: The vessels will be supplied with marine gas oil (MGO) or heavy fuel oil (HFO) with less than 0.5% sulphur (mass), which will lead to emissions of sulphur oxides (SO_x), oxides of nitrogen (NO_x, N₂O), carbon dioxide (CO₂), carbon monoxide (CO), volatile organic compounds (VOC), Methane (CH₄), non-methane volatile organic compounds (NMVOC) and particulate matter (PM). These emissions are released during the normal operation of any marine vessel and have the potential to result in a short-term localised increase in pollutant concentrations. Emissions from fuel combustion also contribute to regional and global atmospheric pollution and greenhouse gas (GHG) emissions. Furthermore, the FPSO / FLNG will be powered by a portion of the produced gas.
Emissions from visiting tankers are outside the scope of this assessment as these vessels are not owned or controlled by the operator.
- Well flow testing (flaring), if any, during drilling.

³⁴ Produced water is a sometimes large corrosive byproduct to oil and gas processing on floating production installations that generally contains salt, dissolved solids, suspended oil, grease, dissolved hydrocarbons, and metals. The water is produced along with oil and gas that is brought to surface and treated through the processing equipment. Gravity separation, flotation separation, and hydrocyclone technology are the standard treatment methods to process produced water. The two forms of disposal are to discharge to sea after treatment or re-inject into the reservoir. Discharge to sea is strictly governed at a local and international level. Primarily, regulations typically allow for less than 30 ppm oil in water content. Though this number varies from location, some local regulatory agencies have more stringent requirements, and the industry is attempting to lower this requirement further (ABS, 2022)



- Fugitive emissions and small-scale venting discharges.
- Incineration of certain wastes onboard (assuming Project vessels have onboard incinerators) would also produce limited occasional emissions³⁵.
- Emergency / abnormal operations flaring during start-up and process;

The related atmospheric emissions and GHGs will be calculated and assessed in the ESIA (Section 9.2.2.11 and 9.2.2.12).

Onshore, the principal sources of emissions to air from the offshore activities will be from fuel combustion (construction vehicles and generators) and dust (vegetation clearance and vehicle entrainment).

5.7.3 Noise Emissions

The key sources generating underwater noise are vessel propellers, with a contribution from the hull (e.g., noise originating from within the hull and on-deck machinery), and from survey source operations (see Section 5.3.2.3).

The extent of project-related noise above the background noise level depends on the vessels used, the number of supply vessels operating and the survey sound source, as well as the variation in the background noise level with weather and proximity of other vessels that are not associated with the project.

The key sources of underwater noise during drilling are described below and are expected to result in variable sound levels, depending on the operational status at any one time:

- *Drilling noise*: Drilling units generally produce underwater noise in the range of 10 Hz to 100 kHz (OSPAR commission, 2009) with major frequency components below 100 Hz and average source levels of up to 190 dB re 1 μ Pa at 1 m (rms) (the higher end of this range from use of bow thrusters). These noise levels will be assumed as indicative for the current project.
- *Vessel propeller and positioning thrusters*: Noise from propellers and thrusters is predominately caused by cavitation around the blades whilst transiting at speed or operating thrusters under load to maintain a vessel's position. The noise produced by a drilling unit(s)' dynamic positioning systems can be audible for many kilometres. Noise produced is typically broadband noise, with some low tonal peaks. The supply vessels will also contribute to an overall propeller noise generation.

The FPSO / FLNG and FSO (i.e. CPF) will be moored with 1 thruster to be used for heading control as required.

- *Well logging*: Some VSP will be undertaken to generate a high-resolution image of the geology in the well's immediate vicinity. VSP is described in Section 5.4.4.5.
- *Helicopter noise*: Underwater noise due to helicopters is limited, as broadband noise generated underwater by helicopters flying at altitudes of 150 m or more is expected to be ~109 dB re 1 μ Pa (Richardson et al. 2013) at the most-affected point, which is broadly in line with ambient levels and considerably less than underwater noise generated by vessels – it can thus be considered negligible in terms of the overall noise levels. Helicopter noise can significantly affect fauna out of water (e.g. on the coast).

³⁵ Although it is Main Street's preference not to incinerate waste offshore during operation; this may occur onboard the FPSO or FLNG.



A Sound Transmission Loss Modelling will be undertaken during the next phase of the ESIA (see Section 9.2.1.4).

5.7.4 Light Emissions

Operational lighting will be required on Project vessels for safe operations and navigation purposes during the hours of darkness. Where feasible, operational lights will be shielded in such a way as to minimise their spill out to sea.

5.7.5 Waste Management

Several other types of wastes generated during the Project will not be discharged at sea, but – depending on the incinerator specification – can be incinerated (e.g. paper waste, food waste, wood, oily residues and plastics) or transported to shore for ultimate disposal (e.g. glass, metal and ash from incinerators). All onboard waste will be segregated, duly identified, and transported to shore for disposal at a licenced waste management facility approved by the operator. The disposal of all waste onshore will be fully traceable.

General waste landfill sites are located at Cape Town, Mossel Bay or Gqeberha. The landfill site at Cape Town is designated to accept hazardous waste. The Operator will, however, evaluate the suitability of this site prior to the start of operation and will decide on the best waste facilities to be used according with international good practices and South African legislation. The services of a waste contractor will be used to collect and transport all operational waste for disposal or recycling.

In the event that bulk volumes of WBMs remain at the end of the well drilling, these will either be shipped for onshore treatment and disposal through a licenced waste disposal company or reused during the drilling of subsequent wells in the area or another drilling campaign. The services of a licenced waste contractor will be used to collect all operational waste for treatment, disposal or recycling.

A summary of the typical wastes expected to be generated, and their management options, is provided in Table 5-18.

Table 5-18: Summary of potential solid waste streams

Waste stream	Main sources	Main possible constituents	Comment
General waste (non-hazardous)	Various	Recyclables, e.g. metal, paper / cardboard, plastic, wood, glass	Transferred onshore for recycling.
		General domestic waste, e.g. Packaging materials, edible oil and grease, absorbents / filters, alkaline batteries (without mercury), organic waste etc.	Project vessels may be equipped with incinerators. Some waste will be transported ashore (including metallic waste, and other waste such as glass and incinerator ash). Onshore disposal will be at a licenced landfill site.
Medical waste	Dressings, clinical and cleaning materials	Pathogenic organisms, plastic, glass, drugs, needles	A syringe box will be made available onboard to collect medical equipment which may be disposed of by incineration (depending on incinerator



Waste stream	Main sources	Main possible constituents	Comment
			specifications) or at an approved facility ashore.
Potentially hazardous waste	Batteries, paint cans, lubricating oils, etc.	Hydrocarbons, metals, acids, etc.	Transferred to land for disposal by an approved facility. There will be no discharge of hazardous waste at sea.

5.8 Project Alternatives

“Alternatives” to a proposed activity are generally defined as feasible and reasonable different means of meeting the general purpose and requirements of the activity (namely field development in Block 11B/12B and associated production activities), which may include activity, site, design or layout or technology alternatives. The ‘No-Go’ or ‘No Project’ alternative will be considered. Not all categories of alternatives are applicable to all projects.

The consideration of alternatives is also inherent in the development of the Project design and the identification of mitigation measures. Numerous alternatives were identified and considered during the early feasibility and design screening phases of the project. Several of these alternatives were not considered viable options by the proponent for reasons summarised in Table 5-19. Alternatives that are considered viable and will be assessed in the ESIA are also indicated.

Table 5-19: Summary of key project alternatives considered to date

Aspect	Alternative	Consideration in ESIA	Key reason for screening out
1. Activity alternatives			
Resource	Production of condensate	To be assessed in the ESIA - separated condensate will be transferred from the FPSO or FSO to DPSTs, which will then transport the condensate to its final destination.	n/a
	Production of gas	To be assessed in the ESIA – separated gas will be piped to shore (Scenario 1) or liquified on the FLNG (Scenario 2).	n/a
No-Go alternative	Option of not proceeding with Project, i.e. status quo as described in the baseline	To be assessed in the ESIA	n/a



Aspect	Alternative	Consideration in ESIA	Key reason for screening out
2. Operational alternatives			
Production of gas	Pipe to shore (Scenario 1)	To be assessed in the ESIA	n/a
	Liquify offshore (Scenario 2)	To be assessed in the ESIA	n/a
	Partial development of the field through existing PetroSA facilities (Scenario 1 & 2)	To be assessed in the ESIA	n/a
Well design	The well design depends on factors such as planned depth, reservoir pore pressure and anticipated hydrocarbon-bearing formations (see Figure 5-27).	Base case to be assessed in the ESIA (see Table 5-10). The base case design for all production wells will be vertical slim-bore wells. Although, the option of deviated production wells requiring an additional casing string will be retained.	n/a
MEG supply from CPF to wells	Via a 4-inch pipeline piggy-backed to the main 20-inch multiphase pipeline	To be assessed in the ESIA	n/a
	Via dedicated lines within the umbilical system		
Production rate	Commence immediately at the maximum plateau rate	To be assessed in the ESIA	n/a
	Commence at a lower plateau production rate, extending the production period	The ESIA will assess the maximum potential production rate, in order to assess the conservative annual GHG emissions related to the project.	Production at the maximum production rate to be considered in ESIA



Aspect	Alternative	Consideration in ESIA	Key reason for screening out
Transfer of LNG and condensate to offtake / customer	Transfer between CPF and DPSTs	To be assessed in the ESIA– separated gas will be piped to shore (Scenario 1) or liquified on the FLNG (Scenario 2).	n/a
	Export to shore via subsea pipeline	Screened out during project design	A condensate export pipeline to shore would require new offshore and onshore infrastructure, resulting in increased Project footprint, environmental impacts, costs and implementation complexity, while commercial demand for condensate in the local market remains uncertain. Exporting LNG to shore via pipeline is not considered technically or economically practical, as LNG must be maintained under cryogenic conditions (i.e. at extremely low temperatures) and is typically transported using specialised LNG carriers rather than subsea export pipelines. Thus, direct offshore offloading of LNG and condensate to a DPST and/or conventional tanker was identified as the preferred export method.
3. Site or location alternatives			
Well locations	Currently anticipated locations are shown in Figure 5-19 and will continue to be refined during technical modelling	This representative layout is assessed will be assessed in the ESIA Since this is preliminary layout and may be adjusted slightly during final design, the ESIA will assess representative (or reasonable worst-case) locations within the offshore Project area.	n/a
CPF Location	Offshore in deep water near the wells	To be assessed in the ESIA	n/a
	Offshore in shallower water	To be assessed in the ESIA	n/a



Aspect	Alternative	Consideration in ESIA	Key reason for screening out
	on the continental shelf		
	In nearshore waters closer to coast	Screened out during Project design	Mooring locations closer to the shoreline were deemed unsuitable due to the increased pipeline length from development field required, associated engineering constraints, and the potential for greater environmental sensitivity in coastal and nearshore habitats.
Condensate and LNG transfer between CPF and DPSTs	Offshore in deep water near the wells	To be assessed in the ESIA	n/a
	Offshore in shallower water on the continental shelf	To be assessed in the ESIA	n/a
Offshore pipeline	Alignment of pipeline from CPF to shore	To be assessed in the ESIA – the alignment of the offshore dry gas export pipeline will only be finalised after the offshore surveys have been completed (see Section 5.3). The base case routing is ~100 km in length from the FPSO to the shore (see Figure 5-1). The ESIA will assume that the pipeline can be located anywhere within the survey area, taking cognisance of various sensitivities.	n/a
Onshore pipeline	Option 1	To be assessed in the ESIA (see Section 5.5.5 & Figure 5-42)	n/a
	Option 2		
	Option 3		
	Option 4 to Option 7	Screened out (see Figure 5-46)	Alternative onshore pipeline route options located further east and west of the proposed pipeline corridors (Options 1–3) were screened out during the alternatives assessment. Alternative options were screened out following



Aspect	Alternative	Consideration in ESIA	Key reason for screening out
			consideration of geological and engineering constraints, potential environmental and social sensitivities, and stakeholder and landowner input. The alternative routes presented increased technical challenges, greater potential interaction with sensitive receptors and more significant land access constraints than the preferred route options, namely Options 1 - 3.
Onshore logistics	Port of Mossel Bay, Gqeberha or Cape Town	All alternatives to be assessed in the ESIA	n/a
4. Design or technology alternatives			
CPF type	FPSO (Scenario 1)	To be assessed in the ESIA	n/a
	FLNG & FSO (Scenario 2)		
CPF anchoring	Turret-moored (see Section 5.5.4.4)	To be assessed in the ESIA	n/a
	Spread mooring, where CPF is secured to the seabed by multiple mooring lines	Screened out during project design	A spread mooring system was ruled out during project design, considering metocean conditions within the region.
Treated drill cuttings disposal methods	Disposal at sea	To be assessed in the ESIA	n/a
	Disposal onshore	Screened out during project design	For onshore disposal, the treated drill cuttings will need to be transferred to shore by PSV. Considering the distance (~160 km offshore at its closest point) between the offshore Project area and shore, this would result in additional fuel usage and create additional emissions. This would also result in additional pressure on existing waste facilities. Moreover, once onshore, further transportation may be required to reach the waste facility. Hence, not only does this option leads to additional emissions, but it also creates additional safety risk



Aspect	Alternative	Consideration in ESIA	Key reason for screening out
			related to the handling of the cuttings.
FPSO power source	Gas-powered (using a portion of the produced gas)	To be assessed in the ESIA	n/a
	Renewable sources	Screened out	Power from renewable sources or via connection to the shore are not feasible due to total power requirement, need for reliable power supply, distance to shore and the lack of existing infrastructure. Gas turbine generators are the most feasible solution given their relative low footprint and weight and readily available gas from the production stream.
Well abandonment	Leave wellheads in place	To be assessed in the ESIA	n/a
	Remove wellheads from seafloor	Screened out during project design	Standard practice for deep-water wells. Given water depth in offshore Project area and lack of demersal fishing in the area, no impact is expected on these sectors.
Subsea infrastructure	Removal of selected subsea infrastructure	To be assessed in the ESIA	n/a
	Removal of all subsea infrastructure	Screened out	Where feasible and required by regulatory authorities, subsea infrastructure would be removed during decommissioning. However, certain components may be left in situ where studies demonstrate that removal would result in greater environmental, technical, safety, or socio-economic impacts than retention. In particular, the removal of buried or heavily embedded infrastructure could require substantial seabed disturbance, sediment mobilisation, vessel activity, underwater noise generation, and associated emissions. Retaining selected infrastructure in situ may, therefore, represent the option with the lowest overall environmental impact, provided that it does not pose an unacceptable risk to navigation,



Aspect	Alternative	Consideration in ESIA	Key reason for screening out
			fishing activities, marine users, or the receiving environment.
Onshore pipeline	Disconnect, flush, clean and plug pipeline at both ends or re-purpose	To be assessed in the ESIA	n/a
	Pipeline removal	Screened out	Removal would require substantial excavation and ground disturbance, potentially resulting in impacts on rehabilitated areas, habitats, soils, and land uses, as well as additional noise, dust, emissions, traffic, waste generation, and safety risks. Retaining the pipeline underground may also preserve opportunities for future repurposing of the infrastructure, while avoiding the environmental impacts associated with removal.

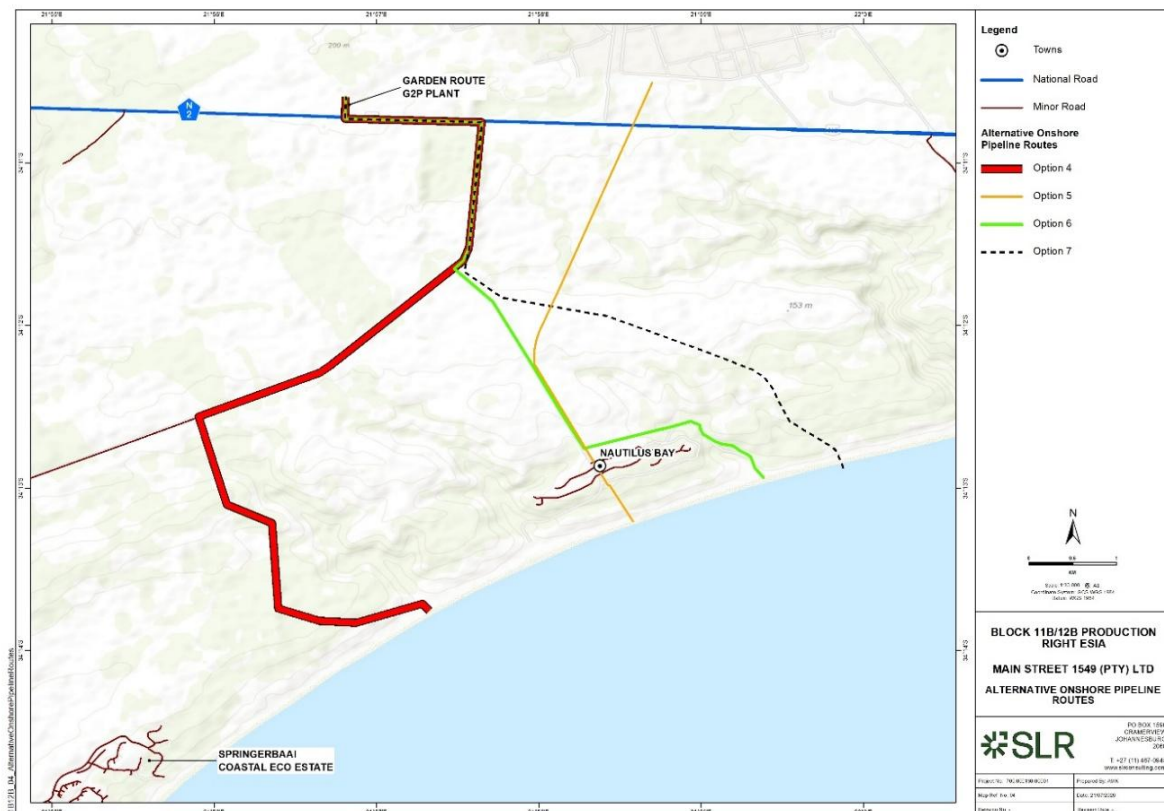


Figure 5-46: Alternative onshore pipeline route options – screened out



5.9 Financial Provision and Insurance

In terms of Section 24P of NEMA, where prescribed, an applicant for an EA relating to production, must, before the Competent Authority issues an EA, determine the financial provision, which is required for undertaking progressive rehabilitation, decommissioning, closure and post-closure activities. The Regulations pertaining to Financial Provision (GNR No. R1147 of 2015, as amended) set out the methods for determining and making Financial Provision to guarantee the availability of sufficient funds to undertake rehabilitation and remediation of the adverse environmental impacts caused by production.

The Operator will thus put in place the required financial provision for the proposed production activities. The estimated cost for management and / or rehabilitation of potential negative environmental impacts that might be incurred during the proposed production activities will be determined by a financial provisioning study (see Section 9.2.2.13).

In terms of NEMA, the holder of an Production Right is accountable for any pollution or degradation of the environment as a result of their activities and would be responsible for funding the response to an oil spill. The operator will have the necessary insurances and global service agreements (e.g., with companies such as OSRL) in place to manage the consequences of any unplanned event. Proof of such insurance and global service agreements will be submitted to the regulator before activities commence.



6.0 Receiving Environment -Marine

This chapter provides a description of the physical, biological, socio-economic, and cultural receiving environment of the **marine Project Area** and surrounding region. The marine Project Area is defined as the southwest section of Licence Block 11B/12B and the survey AOI within which offshore survey, drilling and production activities will take place as well as where subsea infrastructure (e.g. SURF, SPS, CPF mooring etc.) will be placed. The marine, fisheries, terrestrial and social baselines have been compiled with inputs from the relevant specialist teams.

An understanding of the environmental and social context and sensitivity within which the proposed project activities would be located is important to understanding the potential impacts.

6.1 Marine Project Area of Influence

The spatial extent of potential environmental and socio-economic impacts in the marine environment (i.e. the Marine Area of Influence) will be confirmed during the impact assessment phase based on the findings of the technical and specialist studies, including underwater noise, drilling discharge and liquid effluent modelling.

The marine area of influence can be separated into the area of influence for normal operations and for unplanned events, summarised below:

- The Marine Area of Influence (normal operations) (see Figure 6-1) includes:
 - The **marine Project Area** comprising the southwest section of Licence Block 11B/12B and the survey AOI within which offshore survey, drilling and production activities will take place as well as where subsea infrastructure (e.g. SURF, SPS, CPF mooring etc.) will be placed;
 - Airspace between the airport (located in George) and the marine Project area for helicopter-based crew changes;
 - Marine traffic and livelihood routes between the Ports of Mossel Bay, Gqeberha or Cape Town and the marine Project area (in which development fields (Paddavissie Fairway) and associated infrastructure are located); and
 - Areas (or zones of impact) where marine resources, such as commercial fishing stocks and marine mammals, may be affected by the proposed activities, e.g. underwater noise, safety exclusion zones etc.³⁶; and
 - Coastal communities in the broader South Coast Region, potentially impacted (socio-economically) by the proposed activities (see Section 7.0).
- The extended Marine Area of Influence in the case of any unplanned events occurring will be confirmed based on the hydrocarbon spill modelling results and may include coastal and nearshore areas that could be affected in the very unlikely event of a spill.

The potential impacts of the Project have been further delineated to include the direct area of influence and the indirect area of influence, shown in Figure 6-1. Further detail is provided below.

³⁶ The spatial extent of potential environmental and socio-economic impacts (i.e. the Marine Project Area of Influence) will be confirmed during the impact assessment phase based on the findings of specialist studies, including underwater noise, drilling discharge and liquid effluent modelling.



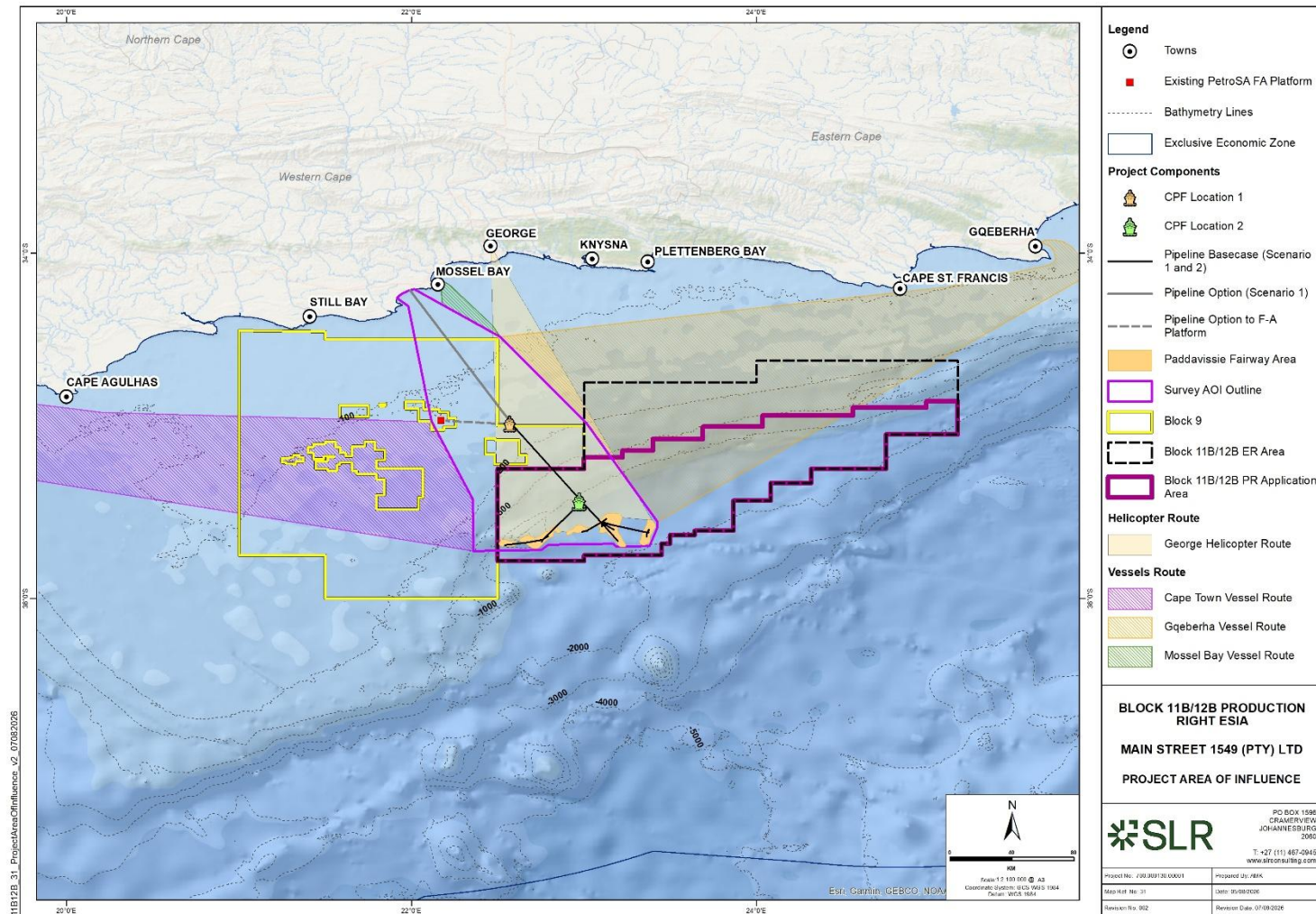


Figure 6-1: Expected Area of Influence



6.2 Key Data Sources and Limitations

The description of the baseline marine environment has been developed using a desktop-based approach, drawing on the review, synthesis and interpretation of existing information and available datasets. The baseline description incorporates both primary (site-specific) and secondary (regional) data sources.

Primary data sources include the various environmental and geophysical surveys which have been undertaken by Operators, government agencies and private organisations to provide a better understanding of the receiving environment in the Project area. These datasets are detailed in Section 6.2.1. These have been supplemented by secondary sources, including scientific literature, Marine Mammal Observer (MMO) records, fisheries catch logs, previous EIA reports, marine spatial planning reports and other relevant published information. The full list of references consulted are provided in Section 10.0, however key sources have been highlighted in Section 6.2.2.

Together, these data sources provide an understanding of the physical, biological and socio-economic characteristics of the receiving marine environment. While the available information is considered sufficient to characterise baseline conditions and inform the impact assessment, inherent data gaps and limitations are associated with all environmental datasets. These data gaps and uncertainties, and their implications for the assessment, are discussed in Section 6.2.2.4.

6.2.1 Primary Data Sources

During the exploration phase, environmental and geophysical survey activities were conducted within Licence Block 11B/12B to generate baseline data and information on the marine environment in the marine Project area.

The following data collection activities have been undertaken within the marine Project area:

- In 2019 and 2020, two 3D seismic surveys were undertaken by TEEPSA to obtain a better understanding of the seafloor and subsurface structure and composition in Licence Block 11B/12B. These data were used to generate high-resolution imagery of the seafloor relief in the Paddavissie Fairway.
- In 2020, environmental sampling was undertaken by TEEPSA at the Blassop-1AX and Luiperd-1X proposed well locations (PWL) in Licence Block 11B/12B. The survey comprised seabed sampling at eight stations, with seven stations located around the Blassop-1AX PWL and one station approximately 35 km east-northeast of the PWL. Water column sampling was conducted at three depth intervals at both the Blassop-1AX and Luiperd-1X PWL.
- In 2022, TEEPSA undertook further environmental sampling within Licence Block 11B/12B and along a potential pipeline corridor to the existing PetroSA production platform in Block 9 (see Section 1.1 for project background and history). The survey area encompassed water depths ranging from approximately 114 m to 1 871 m. Seabed sampling included 36 physico-chemical samples and 30 macrofaunal samples, collected using a combination of box corers, grab samplers and ROV-mounted equipment. Seawater samples were collected at five stations from three depths (near seabed, mid-water and surface), with full water column profiles obtained at each station. In addition, seabed video footage was acquired along 23 transects (Figure 6-2).

The objectives of these surveys were to characterise the baseline conditions, describe the benthic habitats and invertebrate macrofauna living on or in the seabed, identify any sensitive habitats and species within the broader survey area, and establish an



understanding of natural environmental variability against which the potential impacts of future oil and gas activities can be assessed (SLR, 2026).

Given the large extent of Licence Block 11B/12B, the available survey data were collected at discrete locations across the licence area and therefore provide a representative understanding of environmental conditions at the sampled sites rather than a comprehensive characterisation of the entire block. Nevertheless, the surveys identified a range of physical, chemical and biological conditions, highlighting the environmental variability present within the broader licence area. The results and key findings from these exploration phase surveys have been used to inform the baseline description presented in this chapter.

6.2.2 Secondary Data Sources

6.2.2.1 National Biodiversity Assessment (2025)

South Africa's National Biodiversity Assessment (NBA) 2025 is the country's flagship assessment of biodiversity status and trends. Coordinated by the South African National Biodiversity Institute (SANBI), it represents a collaborative effort involving more than 100 institutions and nearly 500 experts, bringing together the best available scientific information to support policy development, environmental decision-making, conservation planning, and national development priorities.

The assessment covers all of South Africa's territory. Information is presented by realm, including estuarine, marine and coastal environments relevant to this assessment. The assessment provides an integrated understanding of biodiversity patterns, ecosystem condition, pressures, threats, conservation status and management effectiveness across the country and/or environment.

6.2.2.2 National Coastal and Marine Spatial Biodiversity Plan (2019)

The National Coastal and Marine Spatial Biodiversity Plan (NCMSBP) is South Africa's first national biodiversity spatial plan for the marine and coastal environment. Developed by SANBI, the DFFE, and research partners, the plan provides a science-based framework to support biodiversity conservation while enabling sustainable ocean-based economic development. Specifically, the plan identifies and maps Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) across South Africa's coastal and marine environment. It was developed to inform marine spatial planning, integrated coastal management, protected area expansion, and other marine resource management decisions. The NCMSBP represents the best available data at the time, and is therefore subject to ongoing refinement as new data become available.



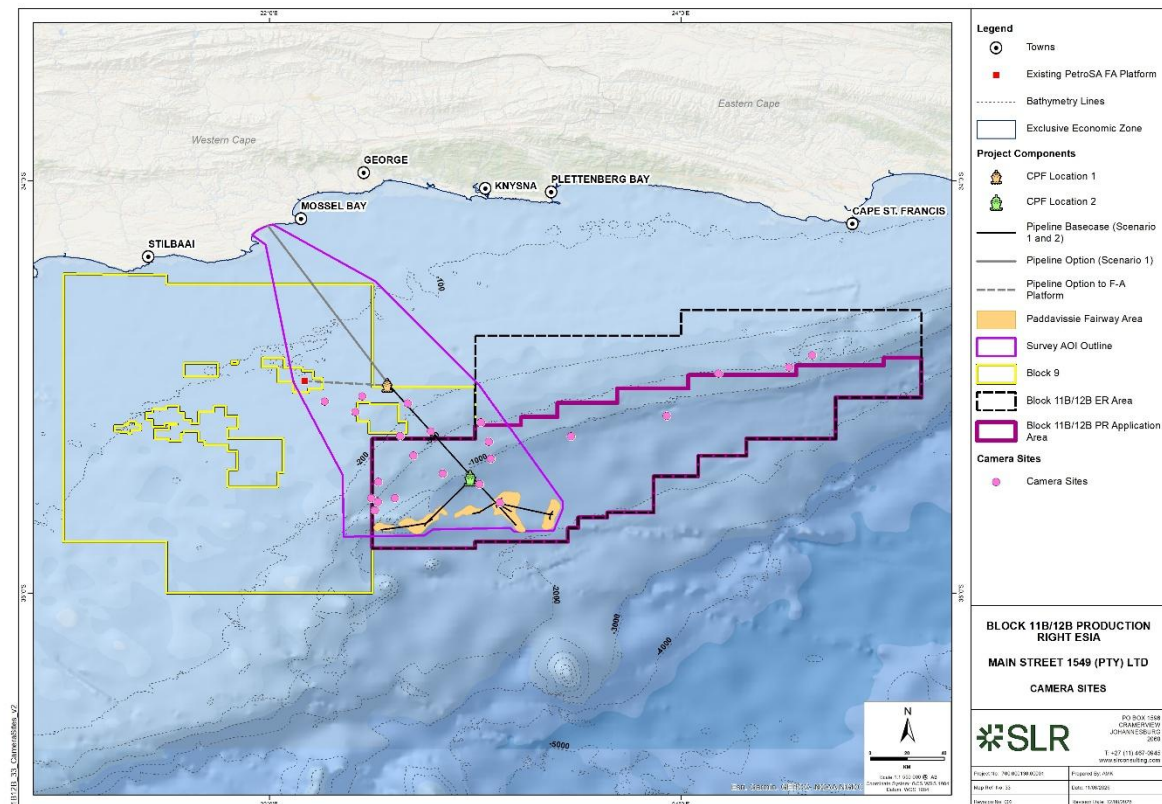
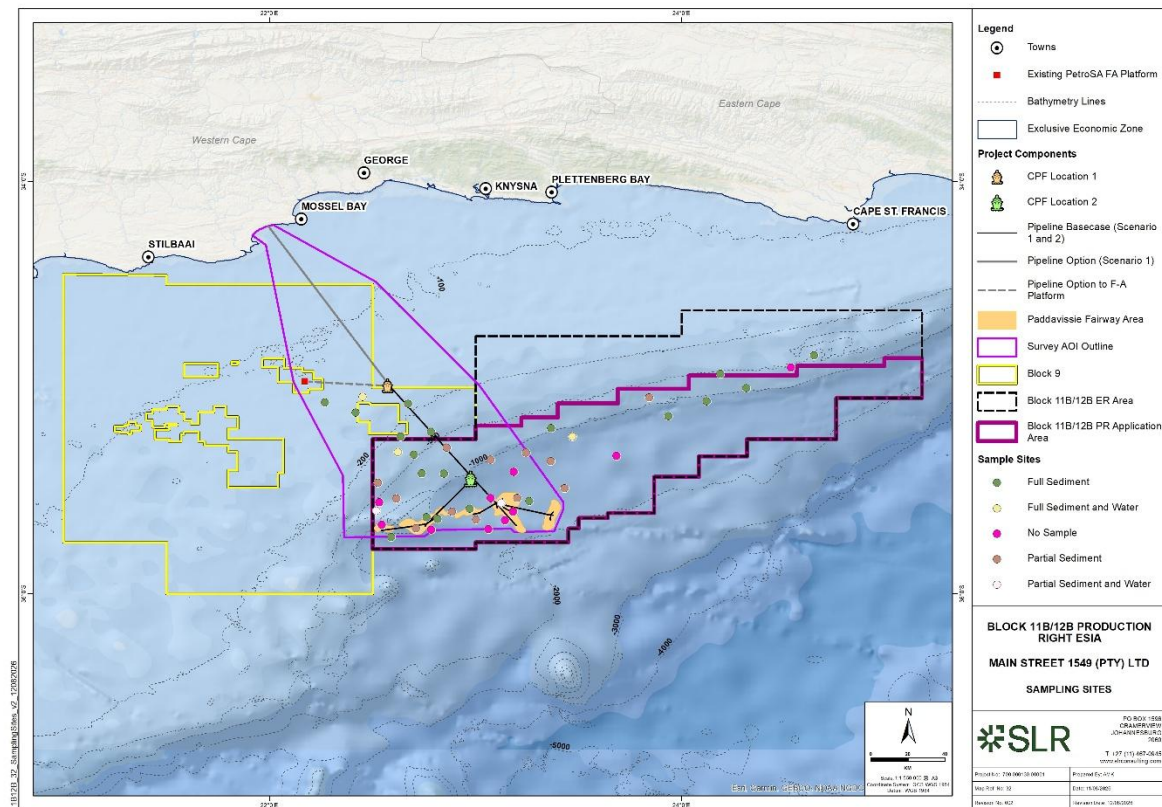


Figure 6-2: Environmental Sampling Sites



6.2.2.3 Marine Mammal Observer Records

Cetacean sightings recorded by Marine Mammal Observers (MMOs) and consolidated within SLR's MMO database comprise records collected between 2001 and 2024 across the South African and Namibian EEZs. The database represents a regional dataset of cetacean occurrence, gathered primarily during offshore activities that required MMO monitoring, including hydrocarbon exploration, appraisal programmes, and environmental surveys.

It should be noted, however, that the dataset is subject to survey effort bias, as sightings have predominantly been recorded in areas where offshore activities and associated MMO monitoring have occurred. As such, the spatial distribution of records reflects both cetacean occurrence and survey effort and should not be interpreted as a direct representation of cetacean abundance or distribution across the region. Areas with few or no records may simply reflect limited survey coverage rather than the absence of cetaceans. Similarly, areas with few or no records should not be interpreted as indicating an absence of cetaceans, as these areas may simply have experienced limited or no survey effort. The dataset is therefore most appropriately used to identify broad patterns of occurrence and species presence within the region, while recognising the inherent limitations associated with opportunistic and industry-derived observation data.

6.2.2.4 Fisheries Catch and Effort Records

South African commercial fisheries catch and effort data were sourced from the Department of Forestry, Fisheries and the Environment (DFFE) (see Table 6-1). For highly migratory fish species in the south Atlantic, the International Commission for the Conservation of Atlantic Tuna (ICCAT) Statistical Bulletin for 2025 provided annual catch data for the South African fleets fishing for this species group.

Table 6-1: Date range for fisheries catch and effort datasets used in this study

Sector	Date Range
South Africa	
Demersal trawl	2012-2023
Large pelagic longline	2013-2024
Demersal longline	2015-2023
Traditional linefish	2010-2023
Small pelagic purse-seine	2015-2024
Squid jig	2015-2025

6.2.3 Data Gaps and Uncertainty

While the available information provides a robust basis for characterising baseline conditions and informing the impact assessment, a number of data gaps and limitations have been identified:

- Environmental survey results should be interpreted within the context of the survey coverage and sampling locations. While the results and key findings from these exploration phase surveys have been used to inform the baseline description presented in this chapter, they provide a description of conditions observed at surveyed locations and are not intended to represent a complete inventory of biodiversity across Licence Block 11B/12B.
- Details on benthic communities and potentially vulnerable species beyond the shelf break and outside previous surveyed/sampled areas, as highlighted by the NBA 2025;



- Details on demersal fish communities beyond the shelf break;
- Information specific to the marine communities associated with topographic features (Mallory, Shackleton and Natal as well as unnamed seamounts within or close to the marine Project area), particularly species-level data and Red List assessments as highlighted by the NBA 2025; and
- Consolidated, current (2025/2026) information on the distribution, population sizes and trends of most pelagic seabird, turtle and cetacean species occurring in South African waters and the marine Project area in particular.
- The official governmental record of South African commercial fisheries data was used to show fishing catch and effort relative to the licence area and various zones of impact. These data are derived from logbooks that are completed by skippers whilst at sea and then transcribed into electronic format by DFFE (South Africa). It is assumed that there would be a proportion of erroneous data due to inaccurate reporting and recording, but that this is likely to be minimal in comparison to the total volume of the dataset. Where obvious errors in the reporting of fishing positions were identified these were excluded from the analysis; and
- Spatially explicit catch-and-effort data for Small-Scale Fisheries (SSF) within and surrounding the marine Project area were not available from, or provided by, DFFE. The assessment of potential impacts on SSF therefore relies on available proxy information, including the locations of registered cooperatives, vessel operating restrictions, likely vessel ranges and areas where fishing may occur.

The identified data gaps introduce some uncertainty into the baseline description, particularly for offshore and deep-water environments where ecological information remains limited. Consequently, the distribution of certain benthic communities, demersal fish species, offshore communities, and highly mobile marine fauna may not be fully characterised.

Despite these limitations, the baseline is based on the best available scientific literature, regional datasets, biodiversity assessments, fisheries records and industry monitoring data. The available information is sufficient to identify the key ecological features, sensitive receptors and broad patterns relevant to the assessment. Furthermore, the fisheries datasets provide extensive temporal coverage (10 years or more) and are considered representative of long-term fishing activity, despite the absence of 2025 data. Overall, the identified uncertainties and data gaps may influence the accuracy and completeness of the baseline description; however, the baseline has been developed using the best available data and information currently available and is considered sufficient to characterise the receiving environment and inform the impact assessment.

6.3 Geophysical Characteristics

6.3.1 Bathymetry

The South Coast of South Africa is considered a transitional area, exhibiting topography characteristic of both the East and West Coast boundaries (Sink, et al., 2019; Sink, et al., 2026a). The continental shelf along the South Coast is generally broad and shallow (Agulhas Bank), although notable variations in both width and depth occur.

The continental shelf reaches its maximum width (~260 km) south of Cape Infanta, from where it progressively narrows eastwards across the Outeniqua Basin towards Cape Seal, Plettenberg Bay (de Wet & Compton, 2021).

The South Coast is characterised by three distinct shelf zones; the inner, middle and outer shelf. The inner shelf comprises a narrow nearshore platform extending from the coastline to the middle shelf at water depths of approximately 60–70 m. This zone reaches its maximum



width (up to ~20 km) off Cape Agulhas and Arniston, but narrows significantly eastwards, typically measuring less than 5 km wide off Cape Infanta. Along the Outeniqua shelf, the inner shelf remains narrow (generally <5 km wide), with its seaward boundary closely following the 50 m isobath, before widening again to approximately 12 km off Cape St. Francis (de Wet & Compton, 2021).

The middle and outer shelf zones along the South Coast are generally low-relief and gently sloping, with gradients increasing slightly towards the shelf break. The shelf break is typically well defined along the Agulhas Bank; however, a distinct double shelf break occurs along the Outeniqua shelf (Agulhas Slump), characterised by inner and outer breaks at approximately 130–150 m and 180 m deep. This feature transitions into a single, well-defined shelf break between Cape Seal and Cape Recife as the shelf narrows eastwards. The upper continental slope is relatively steep (approximately 6–7°) and is locally characterised by stepped slope terraces (at ~240–260 m and 360–390 m depths).

The middle to outer shelf along the eastern Agulhas Bank is generally uniform, although a localised rise occurs approximately 90 km south of Cape St. Blaize. This feature is situated between the middle shelf and the shelf break.

Beyond the shelf break, water depths increase rapidly to greater than 1 000 m. Within the marine Project area the water depths increase progressively from the shoreline (0 m) to approximately 2 000 m within Licence Block 11B/12B (SLR, 2026). The Paddavissie Fairway and CPF Location 2 is located offshore on the continental slope, in water depths >1 000 m, whilst CPF Location 1 is located in shallower waters (~ 120 m deep) on the middle shelf. The pipeline corridor extends from the shallow nearshore and inner shelf environments (Scenario 1) across the middle- and towards the outer-shelf and deeper continental slope waters (Figure 6-3).

The Mallory, Shackelton and Natal Seamounts are prominent bathymetric features located along the outer margin of the South Coast continental shelf (Figure 6-3). These features are isolated seamounts rising from the continental slope and adjacent deep-water areas.

6.3.2 Seabed Geology and Sediments

The South Coast represents a transitional environment between the West and East Coast systems, exhibiting characteristics of both in terms of sedimentology and seabed morphology (Sink, et al., 2019; Sink, et al., 2026a). Two distinct types of continental margins formed during the Cretaceous break-up. The western and north-eastern margins developed through extensional rifting and faulting, while the southern and south-eastern margins formed under shear motion along the Agulhas–Falkland Fracture Zone (AFFZ). The distinct triangular shape of the South Coast continental shelf, characterised by the broad Agulhas Bank that narrows significantly eastwards across the Outeniqua Basin, reflects the tectonic evolution associated with the separation of the African and South American plates along the AFFZ.

The seabed is influenced by underlying geological structures, including the Cape Fold Belt and associated sedimentary basins. The inner shelf along the South Coast is generally underlain by older consolidated bedrock, while the middle and outer shelf comprise predominantly Cretaceous and Tertiary sediments (Dingle et al., 1987; Rogers, 1977; Rogers and Bremner, 1991). Due to ongoing erosion and reworking, sediment cover across the middle shelf on the Agulhas Bank comprise either exposed rock or areas with thin sediment cover. Sediments are finer seawards, changing from sand on the inner and outer shelves to muddy sand and sandy mud in deeper water. The continental slope, seaward of the shelf break, is characterised by calcareous ooze and mixed fine-grained sediments.



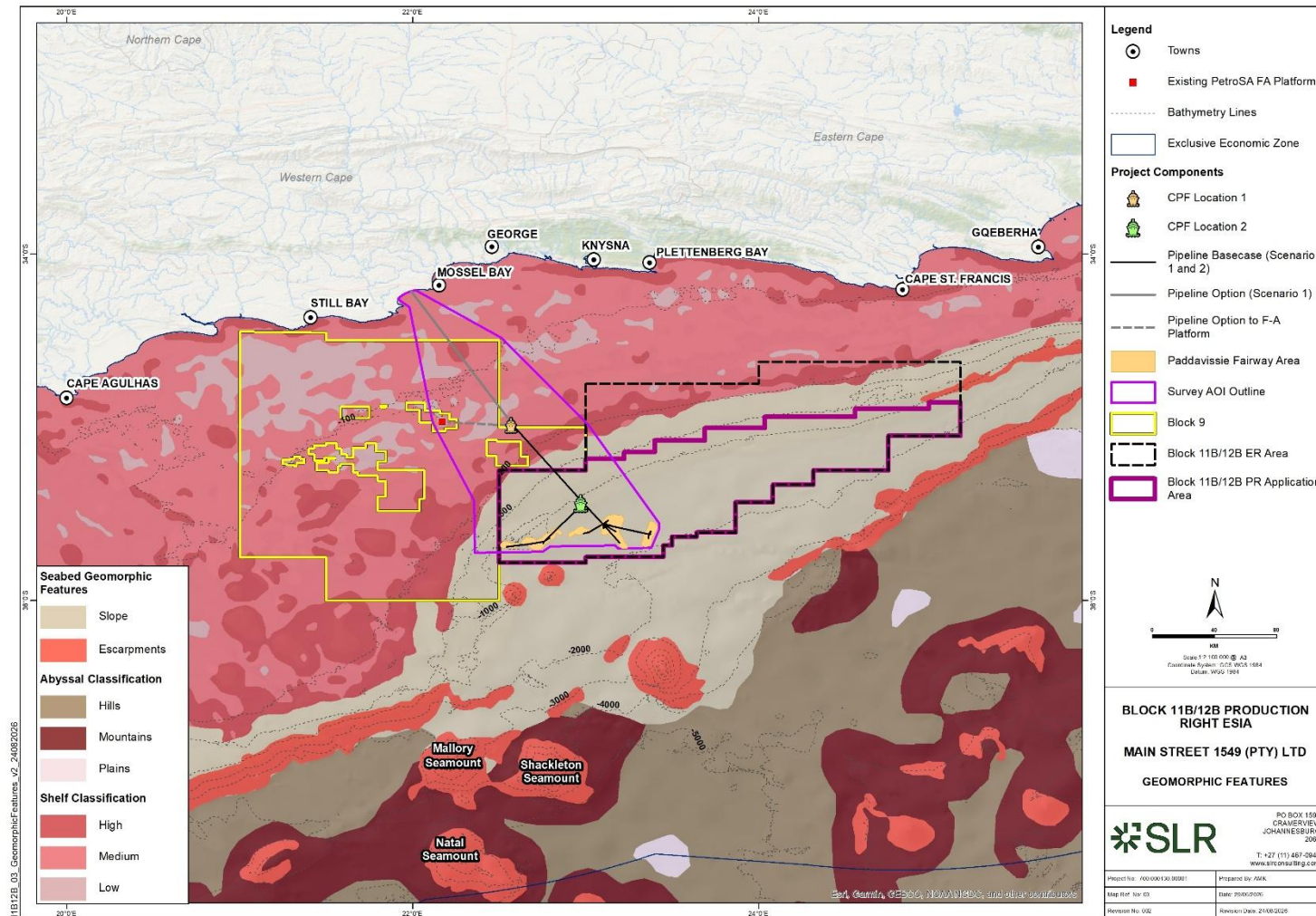


Figure 6-3: Marine Project area and associated infrastructure in relation to geomorphic features



The rocky nearshore platform is formed predominantly of folded rocks of the Cape Supergroup, with resistant Table Mountain Group sandstones forming prominent coastal headlands. Intervening bays and embayments are developed in less resistant Bokkeveld Group shales and Cretaceous Uitenhage Group sediments, overlain by Holocene sands. These features are particularly noticeable east of Cape Agulhas, where geological structures influence the coastal shape (Birch, et al., 1976).

A band of fine, muddy sediment (i.e. a terrigenous Holocene mudbelt, approximately 25 km wide, occurs offshore between Cape Seal and False Bay, formed by material from local rivers that is redistributed westwards by bottom currents (Dingle et al., 1983). Outside of this feature, much of the Agulhas Bank seabed is either erosional in nature or covered by a relatively thin layer of unconsolidated sediment (Rogers, 1971).

The landward margin of the middle shelf is underlain by Upper Jurassic to Lower Cretaceous Uitenhage Group deposits as well as the Upper Cretaceous Alphen Group and extend offshore to approximately the 90 m isobath, beyond which they are overlain by younger Paleogene and Neogene sediments.

Beyond the shelf break, the seabed comprising predominantly mixed sediments. Licence Block 11B/12B and Block 9 are characterised by a mosaic of seabed types, including rocky reefs and areas with limited sediment cover. The northern portion of the area is dominated by harder substrates, where a thin layer of unconsolidated sand overlies more compact clay material. Towards the north-east, sediments become sandier across the outer shelf and shelf edge, while harder substrates are more prevalent to the west. In deeper areas beyond approximately 1 000 m water depth, the seabed is predominantly composed of unconsolidated sediments, whereas along parts of the eastern South Coast, rocky reef habitats remain more dominant (Birch & Rogers, 1973). These variations in sediment type, together with depth-related changes, play an important role in shaping benthic environments and associated biodiversity (see Section 6.6.2).

Particle size analyses further confirmed that sediments collected from 36 stations within and around Licence Block 11B/12B (Section 6.2.1) were heterogeneous, reflecting the large spatial extent and varying seabed conditions. Shallower stations (< 500 m depth) were reported to be predominantly sandy with relatively low proportions of fines and gravel. In contrast, deeper stations (> 500 m depth) showed increased variability, with higher proportions of fines and gravel present.

Sediment samples showed low concentrations of Total Organic Carbon (TOC), Total Organic Matter (TOM) and nitrogen throughout the survey area. Phosphorus concentrations were variable across the survey area with significantly high levels observed at stations with an accumulation of phosphorite, a rock type rich in phosphorus, present in grab samples.

Total Polycyclic Aromatic Hydrocarbon (PAH) concentrations were generally low to moderate but showed high spatial variability across the survey area.

6.3.3 Seabed Geomorphology

The South Coast is characterised by a range of geomorphological features associated with the evolution of the continental shelf and slope.

The Gouritz River palaeo-valley extends approximately 190 km from the coastline across the shelf and beyond the shelf break, where it appears to have formed a small relict submarine canyon on the upper continental slope (de Wet & Compton, 2021).

In addition, the inner to middle shelf between Mossel Bay (Cape St. Blaize) and Cape St. Francis is characterised by a series of low, east–west trending ridges. These features, proposed to be relict wave-cut platforms formed during Pleistocene sea-level lowstands, are located at water depths of approximately 40–45 m, 50 m, 75–80 m, 100–105 m, and 110–



115 m (Dingle, 1970; Dingle, et al., 1983; Flemming, et al., 1983; Martin & Flemming, 1986; Cawthra, et al., 2015; Cawthra, et al., 2018).

The stepped slope terraces occurring on the upper continental slope at approximately 260 m and 360-390 m water depth are associated with large-scale post-Pliocene slumping (Dingle & Robson, 1985; Dingle, et al., 1987).

The Kingklip Ridge is a prominent geomorphological feature located on the continental slope between Gqeberha and Cape St. Francis, approximately 150 km east of the marine Project area. The ridge extends for approximately 40 km and is about 500 m wide, rising from depths of approximately 700 m to 350 m. It is also characterised by strong currents along its outer margin (Sink, et al., 2019; Sink, et al., 2026a).

Environmental sampling within and around Licence Block 11B/12B identified areas of localised topographic relief and showed that seabed morphology becomes increasingly heterogenous from the continental shelf towards the shelf edge and continental slope. While the shelf was generally characterised by relatively smooth, low-relief terrain, the shelf edge comprised a more variable landscape, with rocky ridges, small undersea hills (“koppies”), escarpments, boulders and irregular hard substrate features. These features contribute to localised variation in seabed elevation and structural complexity (SLR, 2026). Overall, the seabed across the area is diverse and patchy in appearance, with a high degree of variability in its shape and features, particularly around the shelf edge and deeper offshore areas.

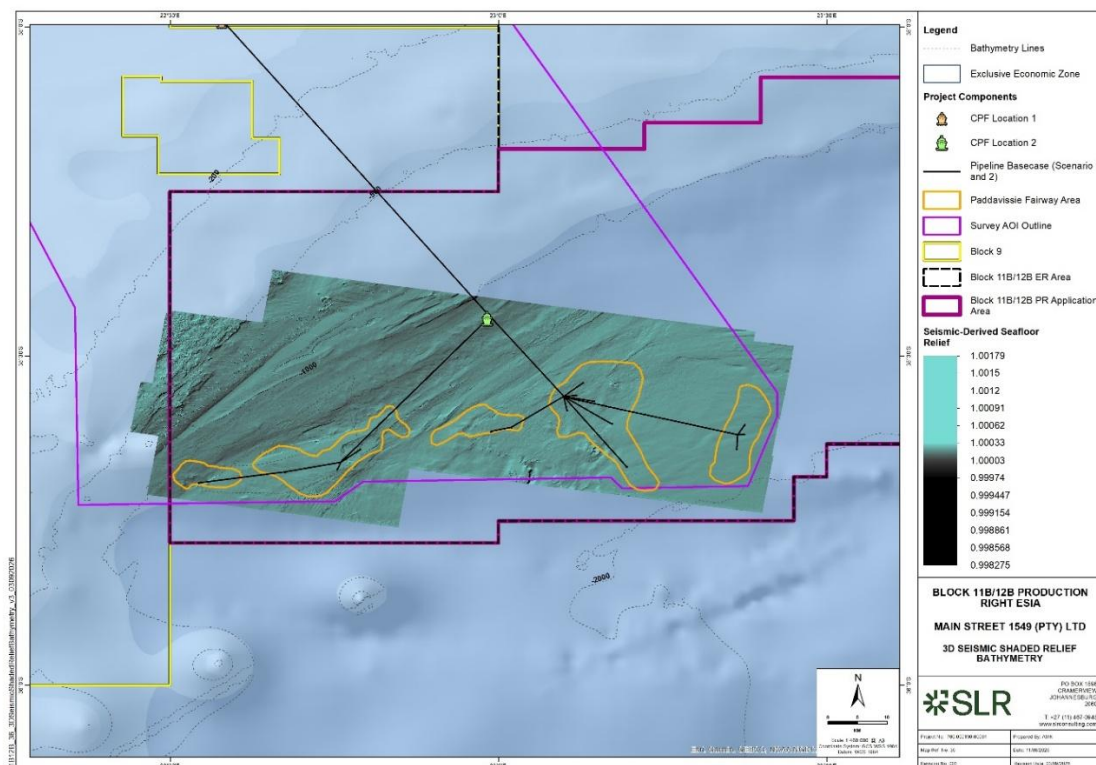


Figure 6-4: Seismic-derived seafloor shaded relief in relation to marine Project area and associated infrastructure³⁷

³⁷ Hillshading (or shaded relief) is a cartographic and GIS technique that creates the appearance of three-dimensional terrain on a two-dimensional map. It simulates the effect of sunlight shining across a landscape from a specific direction and angle. Surfaces facing the light source appear brighter, while those facing away appear darker, producing shadows and highlights that enhance the visibility of terrain features. Surrounding bathymetry, outside of surveyed area, represented by lower resolution bathymetry.



Summary of the key geophysical characteristics of the marine Project area

The marine Project area spans water depths from the shoreline to approximately 1 800 m, extending across the continental shelf and upper continental slope of the South Coast. The regional bathymetry is characterised by the broad Agulhas Bank, which narrows eastwards across the Outeniqua Basin, and includes a well-defined shelf break and continental slope.

The seabed comprises a heterogeneous mix of hard and soft substrates, including rocky reefs, exposed bedrock and unconsolidated sediments. Survey findings indicate that seabed complexities generally increases from the relatively smooth shelf to the more rugged shelf edge and continental slope.

6.4 Physical Oceanographic Characteristics

6.4.1 Climate and Meteorological Conditions

The climate along the South and East Coast of South Africa transitions from the Mediterranean winter (May to August) rainfall climate in the Western Cape (between Cape Town and Cape Agulhas) to the subtropical Summer (November to February) rainfall climate of Kwazulu-Natal. The South Coast represents a transitional zone between these climatic regimes, with predominantly Winter rainfall in the west (April to October) grading eastward into a year-round rainfall pattern, with a peak in Spring (refer to Figure 6-5). Rainfall patterns are influenced by the seasonal migration of the subtropical high-pressure belt, which shifts northwards during Winter and southwards during Summer by approximately six degrees of latitude. The seasonal shift allows mid-latitude frontal systems to influence the Southern Cape during Winter, while tropical-temperate systems extend southwards into the region during Summer (Van Zyl, 2003). Tim et al. (2023) demonstrated important links between Agulhas Current variability and rainfall patterns across southern Africa.

The mean annual air temperature and relative humidity are approximately 19.1°C and 78%, respectively. Temperatures were highest during Summer (24.2°C) and lowest during Winter (13.4°C) (Table 6-2).

Table 6-2: Temperature for Western section of Licence Block 11B/12B and neighbouring Block 9 (January 2022 – December 2024)

Parameter	2022	2023	2024	Period Average
Maximum hourly temperature (°C)	24.1	24.0	24.5	24.2
Minimum hourly temperature (°C)	14.1	13.5	12.6	13.4
Average temperature (°C)	19.2	18.9	19.3	19.1
Average humidity (%)	78	77	78	78

Source: (SLR, 2025)

Winds are predominantly westerly and easterly during Summer, Spring and Autumn. During winter, westerly winds become more frequent and stronger than other seasons. Wind speed and directional frequency are illustrated using wind rose charts (Figure 6-6).

Wind speed classes and associated descriptions used in this study align with the Beaufort Wind Force Scale³⁸. A summary of the wind field characteristics is provided in Table 6-3.

³⁸ The Beaufort wind force scale is an empirical measure that relates to observed conditions at sea or on land.



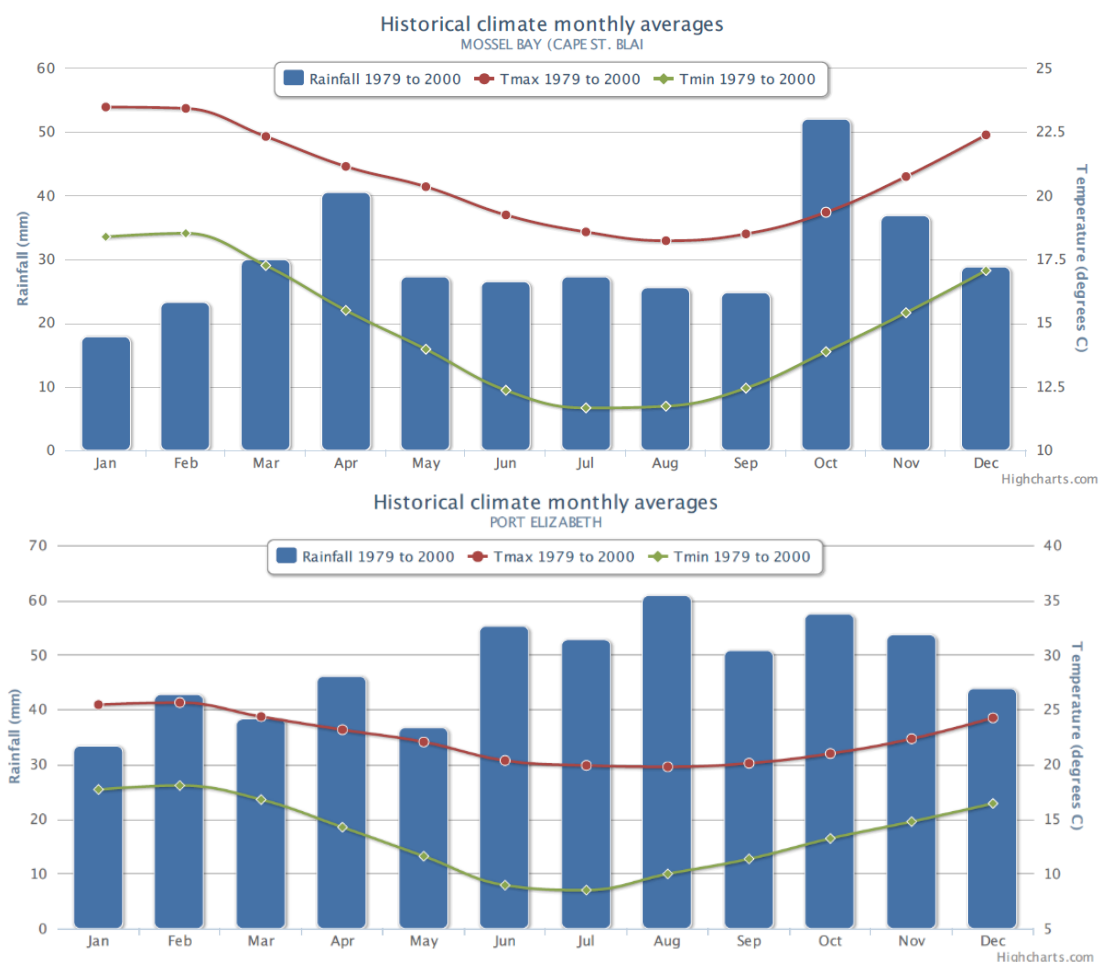


Figure 6-5: Historic rainfall and temperature monthly averages for Mossel Bay (top) and Gqeberha (Port Elizabeth) (bottom)

Source: (Climate Systems Analysis Group, 2020b)

Table 6-3: Wind field description

Feature	Description
Proportion calm (<0.5 m/s) conditions	1.34 % of the time
Wind speed range	Wind speeds range from light (defined as 0.5 – 1.6 m/s) to gale (defined as 17.2 – 20.7 m/s).
Prevailing wind direction	West
Peak gust wind speed and direction	18.8 m/s from the west-northwest on a winter afternoon (12h00-18h00).
Highest average wind speed and direction	7.8 m/s from the west-northwest. Wind speeds were highest on average during winter (7.4 m/s) and during the afternoon (12h00-18h00) hours (6.6 m/s).
Diurnal variation	Winds are consistent throughout the day prevailing along a westerly and easterly trajectories.
Seasonal variation	Winds prevail along westerly and easterly trajectories during spring, summer and autumn. Westerly winds prevail during winter at increased speed and frequency.



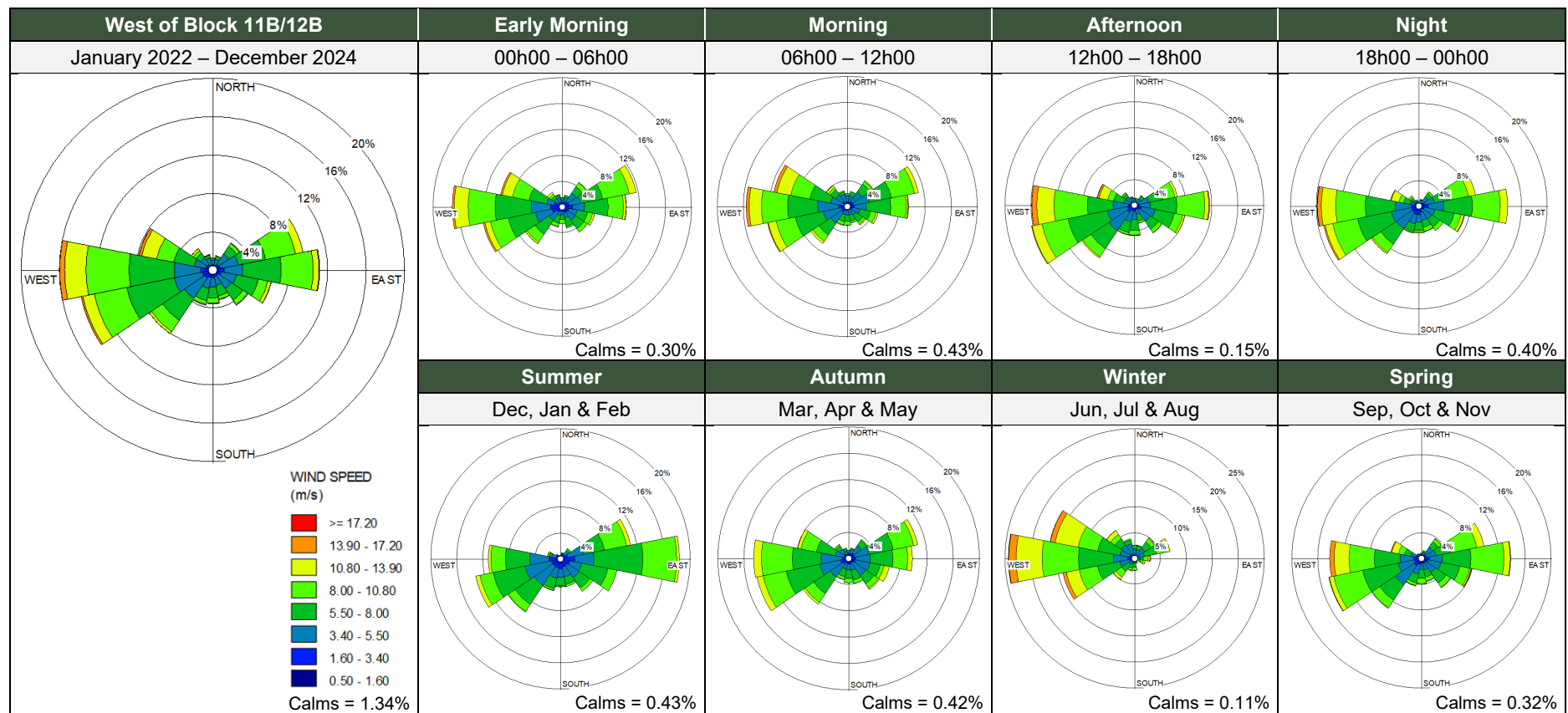


Figure 6-6: Wind data by season. Summer: December to February, Autumn: March to May, Winter: June to August, Spring: September to November. Data for years 2022 -2024 for a grid point in the west of Licence Block 11B/12B.

Source: (SLR, 2025)



6.4.2 Large Scale Circulation and Currents

The South Coast of South Africa is strongly influenced by the warm Agulhas Current and the circulation patterns associated with the Agulhas Bank, which together dominate the oceanography of the marine Project area (Figure 6-7). The Agulhas Bank represents a transition zone between the warm Agulhas Current system to the east and the colder Benguela system to the west. As a result, circulation across the region is complex and characterised by interactions between shelf currents, mesoscale eddies, localised upwelling and the Agulhas Current system (Lutjeharms, 2006; Halo, et al., 2026).

The Agulhas Current originates from the confluence of the Mozambique Current and East Madagascar Current and becomes fully developed between approximately 25°S and 30°S, flowing southwards along the shelf edge of the East Coast of southern Africa as a western boundary current of the anticyclonic Indian Ocean gyre (Schumann, et al., 1982). It is a well-defined and intense jet, approximately 100 km wide and extending to depths of 1 000 m, flowing south-westwards at high velocities (Schumann 1998). After diverging offshore of the Tugela Bank into deeper water, current velocities exceed 2.5 m/s, and transport volumes greater than $60 \times 10^6 \text{ m}^3/\text{s}$ have been recorded. The current subsequently re-attaches to the coast south of Durban, where the continental shelf narrows once again, before continuing southwards towards the coastline at Port Edward (Pearce, 1977).

Along the eastern South Coast, the Agulhas Current follows the shelf break at speeds of up to 3 m/s. South of Still Bay (34° 28' S, 21° 26' E), the current temporarily diverges offshore before realigning near Cape Agulhas (Heydorn & Tinley, 1980). The widening of the continental shelf at the eastern margin of the Agulhas Bank promotes increased meandering of the current and the formation of mesoscale and sub-mesoscale features, including eddies and warm-water plumes, which may extend shoreward over significant portions of the Agulhas Bank (Lutjeharms, 2006; Krug, et al., 2017). These features influence circulation over the shelf and contribute to the transport and retention of biological material.

The Agulhas Current is characterised by large meanders, with cross-shelf dimensions of approximately 130 km, which propagate downstream at about 20 km per day (Lutjeharms, 2006). In addition, the current periodically sheds eddies that advect onto the Agulhas Bank at speeds of around 0.20 m/s (Swart & Largier, 1987; Penven, et al., 2001).

Unlike the extensive wind-driven upwelling characteristic of the West Coast, upwelling along the South Coast is generally localised around major capes and headlands. During summer, cool upwelled water is transported westwards across the Agulhas Bank, forming a broad, quasi-permanent subsurface cold-water ridge over the central Agulhas Bank (Swart & Largier, 1987; Roberts, 2005).

Occasionally large warm-water rings detach from the Agulhas Current and drift into the South Atlantic Ocean, transporting heat, salt and pelagic organisms characteristic of the Agulhas Current system westwards (Gründlingh 1988; Lutjeharms 2006). This process, known as Agulhas leakage, forms an important component of the global circulation of water, by transferring heat and salt from the Indian Ocean into the Atlantic Ocean. Long-term variations in this exchange have been linked to climatic fluctuations between glacial and inter-glacial periods (Peeters, et al., 2004; Beal, et al., 2011).

After detaching from the continental margin near 15° E, the Agulhas Current retroflects and flows eastwards as the Agulhas Return Current (Schumann 1998). The Agulhas Return Current interacts with bathymetric features such as the Agulhas Plateau, producing broad meanders, cyclonic eddies and warm-water plumes that can extend over part of the Agulhas Bank (Lutjeharms 2006) (see Figure 6-7). These features may influence shelf waters and coastal ecosystems along the South Coast (Goschen & Schumann, 1988; Goschen & Schumann, 1994).



Currents over the inner and mid-shelf are generally weaker and more variable than the Agulhas Current, with velocities ranging from approximately 25-75 cm/s over the mid-shelf and 10-40 cm/s in nearshore areas. Eastward flow may occur close to the coast, particularly off Gqeberha (Boyd, et al., 1992), while bottom waters exhibit a generally westward flow, although short-term reversals may occur (Swart & Largier 1987; Boyd & Shillington 1994; CCA & CSIR 1998). In common with other western boundary current systems, a northward-flowing Agulhas undercurrent is present along the continental slope at depths of approximately 800-3 000 m (Beal & Bryden, 1997).

6.4.3 Tides and Waves

Tides along the South Coast of South Africa are semi-diurnal, with two high and two low tides occurring each day, and a typical tidal range of approximately 2–2.5 m (Searson, 1995). The influence of tides on circulation within the deeper offshore waters of the marine Project area is generally limited.

The wave climate is dominated by south-westerly swells, particularly during winter and spring (Whitefield et al., 1983; Carter and Brownlie, 1990). Significant wave heights frequently exceed 6 m during storm events and may occasionally reach 10 m (Heydorn, 1989). Typical wave periods on the Agulhas Bank range from 5 to 14 seconds, with 10–12 seconds most common, and average significant wave heights of approximately 2.7–3 m (Rossouw, 1989; Flemming & Martin, 2021). Locally generated shorter-period wind waves (5–7 seconds) are often superimposed on these longer-period swells, increasing overall wave energy. During summer, extreme wave conditions exceeding 20 m may occur within the Agulhas Current when easterly winds oppose the south-westerly swell, resulting in steep and hazardous sea states (Heydorn & Tinley, 1980; Heydorn, 1989; Carter & Brownlie, 1990).

6.4.4 Water Characteristics

The surface waters across most of the marine Project area comprise a mixture of Tropical Surface Water, originating from the South Equatorial Current, and Subtropical Surface Water, originating from the mid-latitude Indian Ocean. Surface waters associated with the Agulhas Current typically exceed 25°C in Summer and 21°C in Winter and generally exhibit lower salinities than the underlying South Indian Ocean Central Water, which occurs at depths of approximately 150-800 m. Surface water properties are subject to spatial and temporal variation as a result of solar heating and vertical mixing processes (Schumann 1998).

Water column profiles recorded within Licence Block 11B/12B indicate the presence of Agulhas Current Surface Water overlying South Indian Central Water. Below these depths, conditions transition into Antarctic Intermediate Water, extending to around 1 000 m, while North Atlantic Deep Water occupies the deeper parts of the water column to the seabed.

The thermal structure of waters over the Agulhas Bank reflects the interaction between warm Agulhas Current waters, coastal and shelf-edge upwelling processes, and seasonal surface heating (Schumann 1998; Hutchings 1994). These processes drive the development of strong temperature and salinity gradients across the shelf and contribute to the formation of persistent thermoclines and haloclines.

A prominent hydrographic feature of the central Agulhas Bank is a cool-water ridge extending across the middle shelf, which contributes to the thermal structure of the region (Swart & Largier 1987; Schumann 1998).

Thermoclines on the central and eastern Agulhas Bank are resistant to breakdown during strong wind conditions due to pronounced temperature gradients and the continued influence of advective processes.



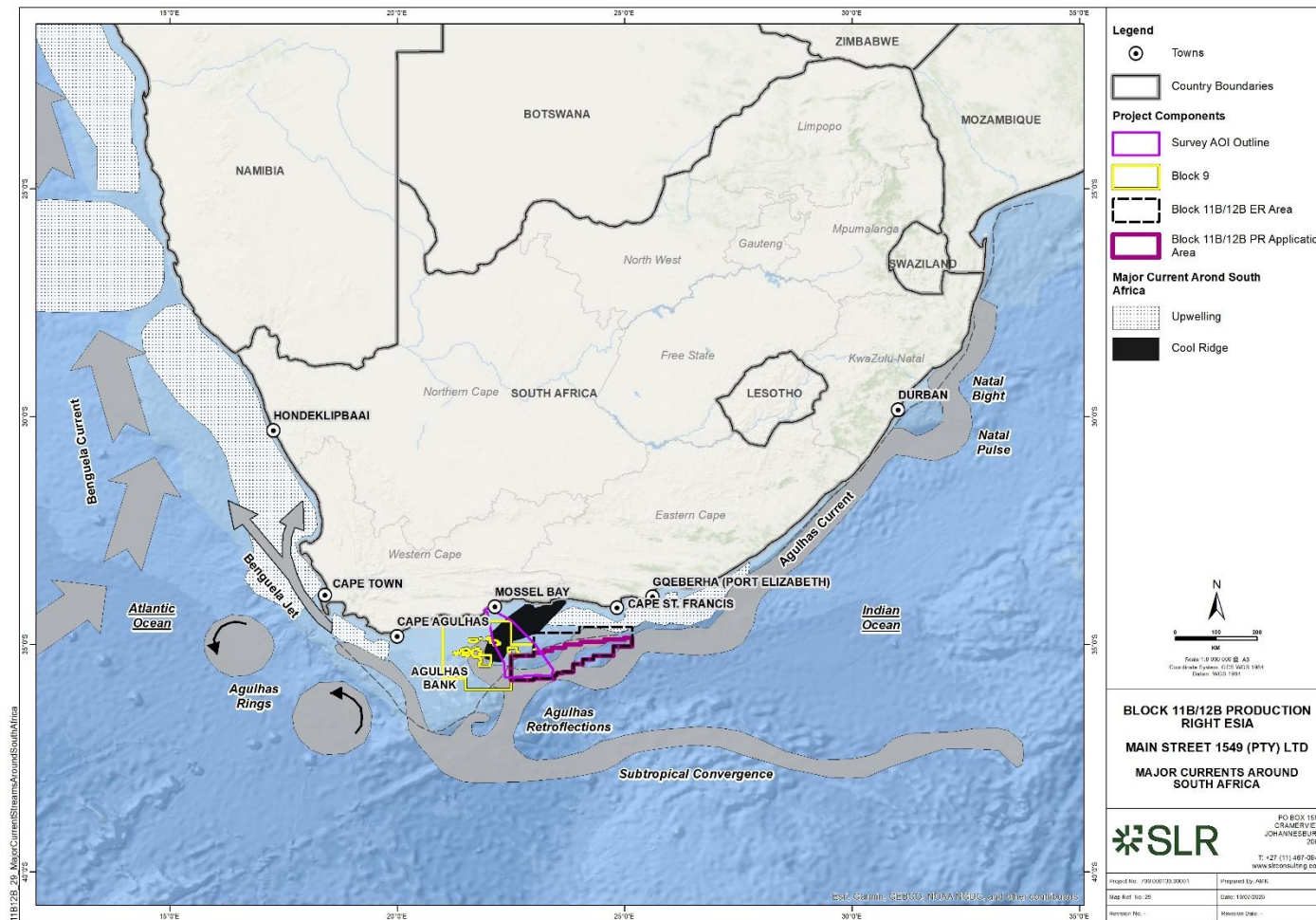


Figure 6-7: Major circulatory elements along the South Coast in relation to marine Project area and associated infrastructure

Source: Adapted from Roberts (2005) and Lutjeharms (2006)



Temperature gradients typically range from 5-6°C per 10 m in nearshore areas east of Cape Agulhas and may reach 10°C per 10 m around the Alphard Banks and further east towards Cape St. Francis. Thermocline depths along the eastern South Coast generally occur at depths of 20-40 m (Largier & Swart 1987). In contrast, thermocline development on the outer Agulhas Bank, seaward of the cool-water ridge, is comparatively weak. (Schumann & Beekman 1984; Boyd & Shillington 1994).

Environmental survey and sampling activities conducted at five stations within Licence Block 11B/12B (Section 6.2.1) showed that the upper 20 m of the water column was thermally well mixed, with temperatures exceeding 20°C. A pronounced thermocline extended from approximately 20 m to 120 m water depth, below which temperatures declined more gradually to approximately 1 100 m. The minimum recorded temperature was 2.7°C at a depth of 1 750 m. Overall, the observed temperature profiles are consistent with the hydrographic characteristics reported for the central and eastern Agulhas Bank. Salinity profiles mirrored the thermal structure, with salinity decreasing rapidly between 20 m and 120 m, indicating a well-developed halocline (SLR, 2026).

Dissolved oxygen (DO) concentrations remained relatively stable in the upper 20–40 m of the water column, at approximately 100% saturation, before declining to around 70% at a depth of 100 m. Below this depth, DO concentrations decreased more gradually, reaching a minimum of 31.5% at around 1 750 m, after which values remained relatively constant to the seabed (SLR, 2026). Wihsgott et al. (2026) describe strong shelf-edge exchange, persistent stratification, and deoxygenation processes on the eastern Agulhas Bank driven by the Agulhas Current and South Indian Central Water intrusions.

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Dissolved oxygen (DO) concentrations remained relatively stable in the upper 20–40 m of the water column, at approximately 100% saturation, before declining to around 70% at a depth of 100 m. Below this depth, DO concentrations decreased more gradually, reaching a minimum of 31.5% at around 1 750 m, after which values remained relatively constant to the seabed (SLR, 2026). Wihsgott et al. (2026) describe strong shelf-edge exchange, persistent stratification, and deoxygenation processes on the eastern Agulhas Bank driven by the Agulhas Current and South Indian Central Water intrusions.



Summary of the key oceanographic characteristics of the project area

The Project area is located within a transitional climatic zone along the South Africa's South Coast, characterised by a year round rainfall regime with a spring rainfall peak and predominantly easterly and westerly winds conditions. Tides are semi-diurnal, while the wave climate is dominated by south-westerly swells, with occasional extreme sea states associated with interactions between swell conditions and the Agulhas Current.

Ocean circulation within and around the Project area is strongly influenced by the Agulhas Current, which flows along the shelf edge and drives regional circulation patterns. In contrast, currents over the inner and mid-shelf are generally weaker and more variable. Interactions between the Agulhas Current, shelf circulation, upwelling processes and mesoscale oceanographic features play an important role in the transport and retention of sediments, nutrients and biological material across the continental shelf.

Water column conditions in Licence Block 11B/12B are characteristic of the Agulhas Current system, with warm, well-mixed surface waters ($>20^{\circ}\text{C}$) overlying cooler intermediate and deep waters. Survey data indicate the presence of a well-developed thermocline and halocline, reflecting strong vertical stratification within the water column. This stratification is driven by the combined influence of the Agulhas Current, shelf-edge and coastal upwelling processes, and seasonal heating and mixing, which together govern water column structure and variability within the Project area.

6.5 Biophysical Characteristics

6.5.1 Nutrients, Productivity and Plankton

Nutrient distribution across the Agulhas Bank can be broadly divided into three distinct provinces: a nutrient-rich western region associated with coastal upwelling; an eastern shelf-edge zone characterised by nutrient-poor surface waters overlying nutrient-rich bottom waters; and a broader eastern region influenced by upwelling processes that supply nutrient-rich bottom water to the shelf. Seasonal variability is driven by strong water-column stratification in Summer and increased vertical mixing in Winter, with surface nutrient concentrations reflecting Subtropical Surface Water and deeper nutrient pools derived from South Indian and South Atlantic Central Waters (Jacobs, et al., 2022; Halo, et al., 2026).

Seawater nutrient concentrations measured from five locations within and near Licence Block 11B/12B during data collection activities indicated generally low nutrient levels, consistent with the oligotrophic nature of offshore waters. Nitrite concentrations were below the analytical detection limit throughout the survey area, while nitrate and orthophosphate concentrations were generally low and spatially variable. Nutrient concentrations were indicative of seawater in generally good condition and reflect the influence of offshore Agulhas Current waters, where nutrient availability is typically limited.

Chlorophyll-a is widely used as an indicator of phytoplankton biomass and marine primary productivity (Prakash, et al., 2025). Chlorophyll-a concentrations at the sampling stations within and near Licence Block 11B/12B were generally low throughout the water column, ranging from approximately 0.002 to 0.838 $\mu\text{g/L}$. Concentrations were typically highest in surface waters and decreased with depth, reflecting the distribution of photosynthetically active radiation and primary production within the upper water column (SLR, 2026).

Phytoplankton abundance measured at the sampling stations was variable, ranging from 0.017 to 2.326 cells/L. The phytoplankton community was dominated by Bacillariophyta (diatoms), with additional groups including Ciliophora, Cyanobacteria, Dictyochophyceae, Holodiniophyta, Polycystinea, Rhizaria, and Thecofilosea. These results indicate a taxonomically diverse, but generally low-biomass phytoplankton assemblage characterise of offshore waters influenced by the Agulhas Current system (SLR, 2026).



Overall, the low nutrient concentrations, chlorophyll-a concentrations and phytoplankton abundances recorded across Licence Block 11B/12B are indicative of generally oligotrophic offshore conditions characterised by relatively low levels of primary productivity. In contrast, the nearshore region is influenced by coastal upwelling (Figure 6-8), where enhanced nutrient availability likely supports higher phytoplankton biomass and elevated levels of biological productivity (Jacobs, et al., 2022; Prakash, et al., 2025).

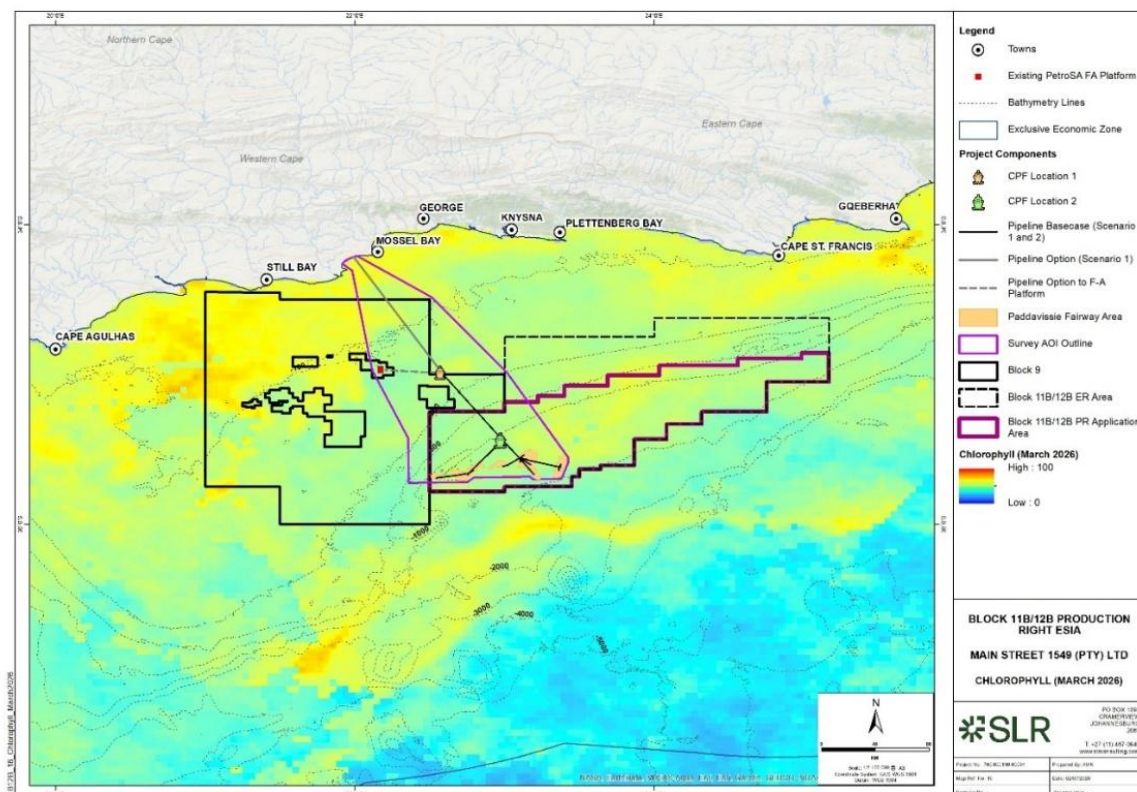


Figure 6-8: Chlorophyll a level off South Coast in relation to the marine Project area and associated infrastructure for March 2026

6.5.2 Turbidity

Turbidity is a measure of the concentration of suspended particulates in the water column and influences water clarity, light penetration and primary production. On the Agulhas Bank, near-bottom turbidity is strongly influenced by the resuspension of seabed sediments, with observations indicating a general decrease in turbidity from inshore to offshore waters (Gardner et al., 2018).

This cross-shelf pattern reflects the combined influence of sediment characteristics, hydrodynamic conditions and water column processes. Finer sediments in nearshore environments are more readily resuspended by waves and currents, while stronger shelf-edge circulation associated with the Agulhas Current and the periodic intrusion of clearer oceanic waters influence turbidity conditions further offshore (Boyd et al., 1992; Hutchings, 1994; Sink et al., 2012; Wilkinson & Japp, 2005).

Environmental sampling results from five locations within and around Licence Block 11B/12B indicate generally low turbidity environment. Measured turbidity values were typically low,



generally remaining below 0.5 FTU³⁹, with occasional localised increases to approximately 1.8 FTU. A slight increase in background turbidity was observed in the upper 50 m of the water column, likely reflecting wave induced mixing and elevated plankton concentrations within the surface mixed layer (SLR, 2026).

Near-seabed turbidity was locally elevated in some areas, most likely as a result of sediment resuspension by bottom currents within the benthic boundary layer. Total Suspended Solids (TSS) concentrations were generally low, ranging from 5.3 mg/L to 52 mg/L, with no consistent spatial or depth related pattern observed. This supports the interpretation of relatively low turbidity conditions across the offshore survey area (SLR, 2026).

Overall, turbidity within Licence Block 11B/12B is considered low and characteristic of offshore waters influenced by the Agulhas Current system. As the marine Project area extends shoreward across the continental shelf, turbidity is expected to increase towards the coast in response to greater sediment resuspension, enhanced biological productivity and the influence of nearshore hydrodynamic processes. In contrast, offshore waters are expected to remain comparatively clear due to lower suspended sediment loads and the greater influence of oceanic water masses.

6.5.3 Coastal Ecosystem types

The coastline of the marine Project area is characterized by a mosaic of intertidal sandy beaches, rocky shores, estuaries and rocky subtidal habitats. These ecosystem types have been classified by Harris et al. (2025) and assigned a threat status based on their geographic extent and degree of ecosystem degradation (Harris, et al., 2026).

Marine communities along the South Coast are widespread but vary based on substrate type and depth. These communities comprise diverse assemblages of flora and fauna and exhibit considerable spatial and temporal variability, even at relatively small scales.

South Africa supports 190 coastal ecosystem types, comprising terrestrial, estuarine, and marine ecosystem types. Two marine coastal ecosystem types occur within the marine Project area, one of which overlaps the shore crossing (Figure 6-9 and Table 6-4).

Estuarine ecosystem types occurring within the South Coast region are listed in Table 6-5. One estuary (the Blinde) is located directly inshore of the marine Project area, with its temporary mouth situated along the coastline at the northeastern extent of the survey AOI. This estuary is classified as a large temporary closed estuary type and is considered to be in good ecological condition. The next closest estuary is the Gouritz Estuary, located approximately 9 km west of the marine Project area.

³⁹ FTU (Formazin Turbidity Unit) is a unit of turbidity measurement based on the scattering of light by suspended particles in water relative to a formazin polymer standard. FTU is broadly equivalent to Nephelometric Turbidity Units (NTU) for low turbidity waters and is commonly used in marine and environmental water quality assessments.





Table 6-4: Threat status of the marine coastal ecosystem types South Coast region (Stilbaai to Groot Brak)

Ecosystem Type	2025 RSA Regional Threat Status
Agulhas Boulder Shore	Near Threatened
Agulhas Dissipative Intermediate Sandy Shore	Least Concern
Agulhas Dissipative Sandy Shore	Near Threatened
Agulhas Exposed Rocky Shore	Vulnerable
Agulhas Exposed Stromatolite Rocky Shore	Near Threatened
Agulhas Intermediate Sandy Shore	Least Concern
Agulhas Inner Shelf Mosaic	Vulnerable
Agulhas Island	Vulnerable
Agulhas Kelp Forest	Vulnerable
Agulhas Mixed Shore	Near Threatened
Agulhas Muddy Mid Shelf	Critically Endangered
Agulhas Reflective Sandy Shore	Endangered
Agulhas Sandy Inner Shelf	Vulnerable
Agulhas Sheltered Rocky Shore	Endangered
Agulhas Stromatolite Mixed Shore	Vulnerable
Agulhas Very Exposed Rocky Shore	Least Concern
Agulhas Very Exposed Stromatolite Rocky Shore	Near Threatened

Note: Marine coastal ecosystems overlapping with marine Project area (specifically survey AOI and pipeline option Scenario 1) are indicated in bold.
Source: Sink et al. (2026b).

Table 6-5: Threat status and estuary type of the estuaries in the South Coast region (Gouritz to Knysna)

Estuary	Estuary Type	2025 RSA Regional Threat Status
Gouritz	Warm Temperate Predominantly Open	Vulnerable
Blinde	Warm Temperate Small Temporarily Closed	Least Concern
Tweekuilen	Warm Temperate Small Temporarily Closed	Least Concern
Gericke	Warm Temperate Small Temporarily Closed	Least Concern
Hartenbos	Warm Temperate Large Temporarily Closed	Vulnerable
Klein Brak	Warm Temperate Large Temporarily Closed	Vulnerable
Groot Brak	Warm Temperate Large Temporarily Closed	Vulnerable
Maalgat	Warm Temperate Large Temporarily Closed	Vulnerable
Gwaing	Warm Temperate Small Temporarily Closed	Least Concern
Kaaimans	Warm Temperate Predominantly Open	Vulnerable
Touw/Wilderness	Warm Temperate Estuarine Lake	Endangered
Swartvlei	Warm Temperate Estuarine Lake	Endangered
Goukamma	Warm Temperate Large Temporarily Closed	Vulnerable
Knysna	Warm Temperate Estuarine Bay	Vulnerable

Bold: Estuaries located inshore of the marine Project area. Source: Van Niekerk et al. (2025)



6.5.4 Benthic Ecosystem types

While coastal ecosystem types describe habitats occurring at the land-sea interface, benthic ecosystem types characterise the seabed habitats of the continental shelf and deep-sea environments. These ecosystem types are defined based on a combination of depth, substrate type, oceanographic setting and associated biological communities.

In the marine environment, ecosystem types are broader ecological units that represent the distribution of biodiversity patterns and ecological processes at a regional scale, while habitat types describe areas with similar physical and biological characteristics, such as sediment type, depth and associated biological communities. Consequently, multiple habitat types may occur within a single ecosystem type, and individual habitat types may extend across more than one ecosystem type.

The benthic ecosystem types of South Africa were comprehensively mapped through the National Biodiversity Assessment (NBA) programme (Sink, et al., 2019) and subsequently updated in 2023. The 2023 marine ecosystem map includes 128 shore and shelf ecosystem types, considered benthopelagic, as well as 22 deep-sea benthic ecosystem types. These datasets provide the basis for the identification of benthic ecosystem types and the assessment of their ecological condition, ecosystem threat status and level of protection.

The most recent ecosystem threat and protection classifications were published as part of the 2025 NBA (Table 6 6). The threat status assessment is undertaken in accordance with the IUCN Red List of Ecosystems (RLE) Categories and Criteria. The classification is determined based on factors including habitat loss, ecosystem distribution, the number of threat-defined locations, and the extent and severity of ecosystem degradation. Assessments of ecosystem degradation are informed by ecosystem condition and cumulative pressure analyses, which consider the influence of human activities on individual ecosystem types (Sink, et al., 2026b).

The marine Project area encompasses several benthopelagic and deep-sea benthic ecosystem types associated with the continental shelf, shelf edge and deeper offshore environments. These ecosystem types are listed below together with their associated threat status and expected project infrastructure overlap (Sink, et al., 2026b) (Table 6 6 and Figure 6 10).

Table 6-6: Marine ecosystem types, threat status and overlap of Project component on the South African South Coast

Marine Ecosystem Type	2025 RSA Regional Threat Status	Project Component / Activity Overlap
Agulhas Sandy Mid Shelf	Near Threatened	Survey AOI & Pipeline Option (Scenario 1)
Eastern Agulhas Outer Shelf Mosaic	Least Concern	Survey AOI, Pipeline Option (Scenario 1), Pipeline Basecase & CPF Location 1
Agulhas Coarse Sediment Shelf Edge	Vulnerable	Survey AOI
Agulhas Rocky Shelf Edge	Least Concern	Survey AOI & Pipeline Basecase
Southwest Indian Upper Slope	Least Concern	Survey AOI & Pipeline Basecase
Southwest Indian Mid Slope	Least Concern	Survey AOI, Pipeline Basecase, CPF Location 2, Paddavissie Fairway
Southwest Indian Lower Slope	Least Concern	Survey AOI, Pipeline Basecase, & Paddavissie Fairway

Source: Sink et al. (2026b)



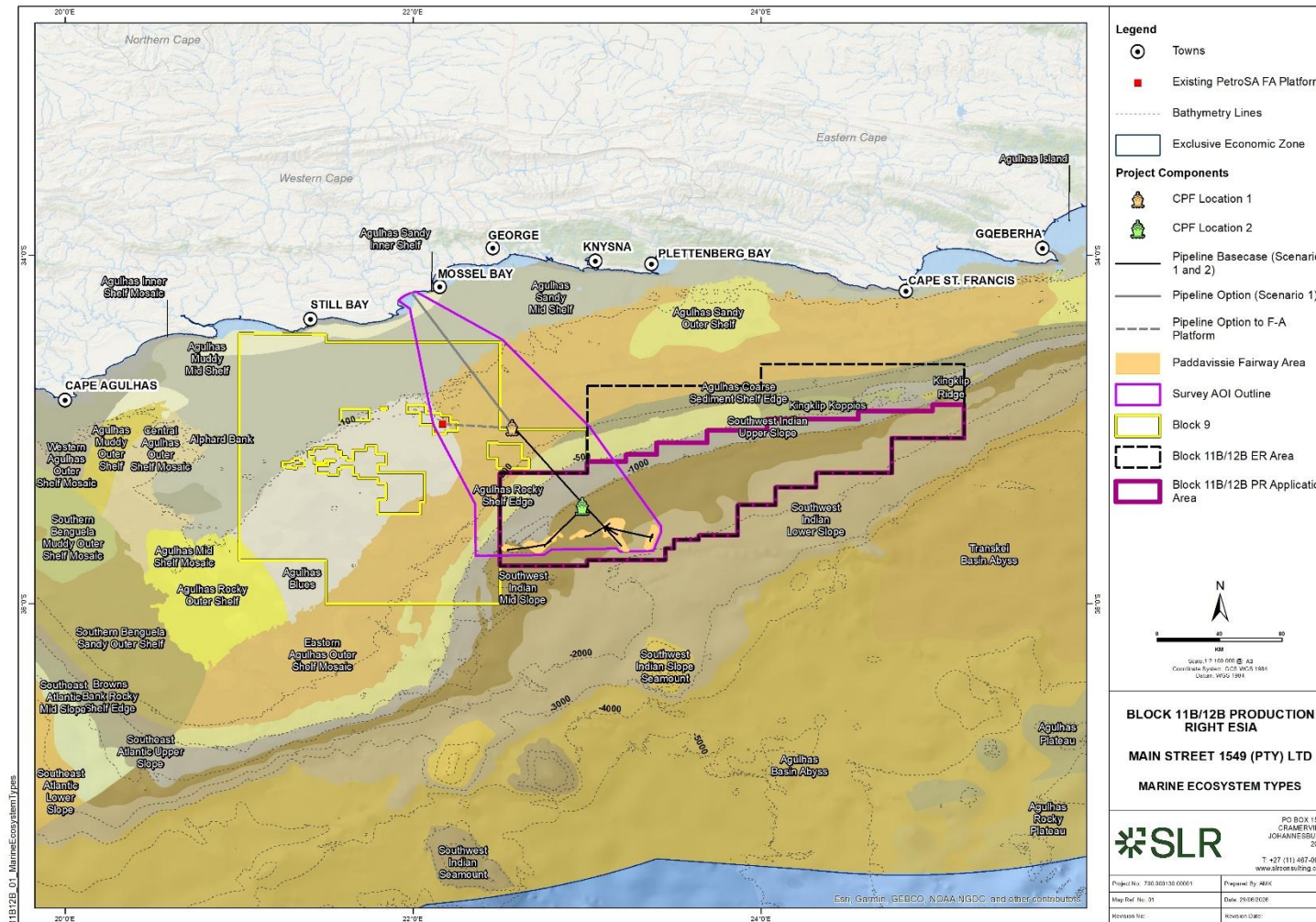


Figure 6-10: Benthic ecosystem types in relation to the marine Project area and associated infrastructure

Source: Adapted from (Sink, et al., 2026a).



Environmental sampling undertaken within and near Licence Block 11B/12B indicated that shelf associated ecosystem types comprised a mosaic of European Nature Information System (EUNIS)⁴⁰ habitat types occurring to depths of 723 m. Deeper areas surveyed within the Block corresponded to 'Southwest Indian' slope ecosystem types, which were predominantly characterised by mixed sediments at water depths ranging from 778 m to 1 779 m.

A total of seven EUNIS habitat types were identified within the surveyed area, with several habitat types occurring across more than one ecosystem type (SLR, 2026). Given the large extent of Licence Block 11B/12B, habitat characterisation was based on observations from discrete survey locations and transects and should therefore be considered representative of conditions encountered at the sampled sites rather than a comprehensive map of habitat distribution across the entire block. The surveys identified a range of habitat types and seabed conditions, including mixed sediment habitats, hard-substrate habitats supporting epifaunal communities, areas containing dead coral, and locations where potentially sensitive features were recorded, highlighting the spatial variability of habitats within the licence area.

Summary of the key biophysical characteristics of the Marine Project area

Licence Block 11B/12B is situated within an offshore environment on the Agulhas Bank that is generally oligotrophic, although localised enrichment may occur through shelf-edge upwelling and the intermittent intrusion of nutrient-rich deeper waters. Nutrient concentrations, chlorophyll-a levels and phytoplankton abundances recorded during survey activities indicate relatively low primary productivity within the marine Project area. In contrast, nearshore waters are influenced by coastal upwelling processes that support enhanced nutrient availability and higher biological productivity.

The offshore waters of Licence Block 11B/12B are generally clear, with low turbidity and suspended sediment concentrations characteristic of oceanic waters influenced by the Agulhas Current system. Environmental survey/sampling results recorded generally low turbidity throughout the water column, with only localised increases associated with suspended material and near-seabed sediment resuspension. Turbidity is expected to increase towards the coast, where wave action, coastal currents and sediment mobilisation exert stronger influence.

The coastline of the marine Project area comprises a mosaic of intertidal sandy beaches, rocky shores, estuaries and rocky subtidal habitats, which support diverse and spatially variable biological communities. Two marine coastal ecosystem types occur within the marine Project area, including one associated with the shore crossing (Agulhas Intermediate Sandy Shore).

Offshore, the marine Project area extends across the continental shelf, shelf edge and continental slope to water depths of approximately 2 000 m. Benthic habitats comprise a variety of ecosystem and habitat types associated with both shelf and slope environments. Survey results indicate that shelf habitats support a mosaic of seabed habitat types, while deeper slope environments are predominantly characterised by mixed-sediment habitats. Most offshore ecosystem types are classified as 'Least Concern', however some shelf-associated ecosystem types are classified as 'Near Threatened' and 'Vulnerable'.

⁴⁰ Habitat types represent areas with similar physical and biological characteristics, whereas ecosystem types are broader ecological units that reflect biodiversity patterns and ecological processes at a regional scale. Consequently, multiple habitat types may occur within a single ecosystem type. The EUNIS marine habitat classification system categorizes and describes various marine habitats, providing a hierarchical framework that supports biodiversity monitoring, and environmental reporting. The EUNIS classification system uses several input variables including physical characteristics, biological features, environmental parameters and geographic information.



6.6 Biological Characteristics

South Africa's marine bioregional classification is hierarchical, with broad-scale marine ecoregions encompassing multiple habitat types and environmental settings, while coastal bioregions provide a finer-scale classification of ecological patterns along the coastline.

The national assessment of marine biodiversity identified nine marine bioregions encompassing both coastal and offshore environments. While the coastal bioregions have been well defined based on detailed faunal and floral distribution patterns, offshore bioregions are largely defined by physical characteristics (e.g. temperate, depth and substratum).

The South African marine environment includes the Atlantic, Indian and Southern Oceans, the contrasting cold Benguela upwelling region and the warm, fast-flowing Agulhas current and a diverse geological setting. The broad range of climatic, oceanographic and geological settings results in a wide array of ecoregions.

The biological characteristics of the marine Project area are influenced by its location across two marine ecoregions recognised under South Africa's marine bioregional classification system. The marine Project area falls within both the Agulhas and Southwest Indian Deep Ocean ecoregions. The offshore components of the Project, including the Paddavissie Fairway, CPF Location 2 and associated pipelines, are located within the Southwest Indian Deep Ocean ecoregion, while the CPF 1 location and the dry gas export pipeline (Scenario 1) occur within the Agulhas ecoregion (Figure 6-11).

The Agulhas ecoregion encompasses the continental shelf and shelf-edge environments of South Africa's South Coast and is strongly influenced by the Agulhas Current.

The Southwest Indian Deep Ocean ecoregion comprises the deeper offshore environments beyond the continental shelf, including continental slope and abyssal habitats.

In terms of coastal biogeography, the marine Project area falls within the Agulhas bioregion, one of five coastal bioregions recognised along the South African coastline. The Agulhas bioregion extends across much of the South Coast and supports biological communities that reflect environmental conditions intermediate between the nutrient-rich west coast and the warmer east coast.

The physical oceanographic characteristics of the region, particularly water temperature, nutrient availability and oxygen concentrations, are the primary drivers shaping marine communities. The marine Project area is influenced by both the strong-flowing Agulhas Current and localised oceanographic processes.

The biological communities occurring within the marine Project area are briefly described below, with emphasis on dominant, commercially important, conspicuous and potentially vulnerable species that may be affected by the proposed activities.



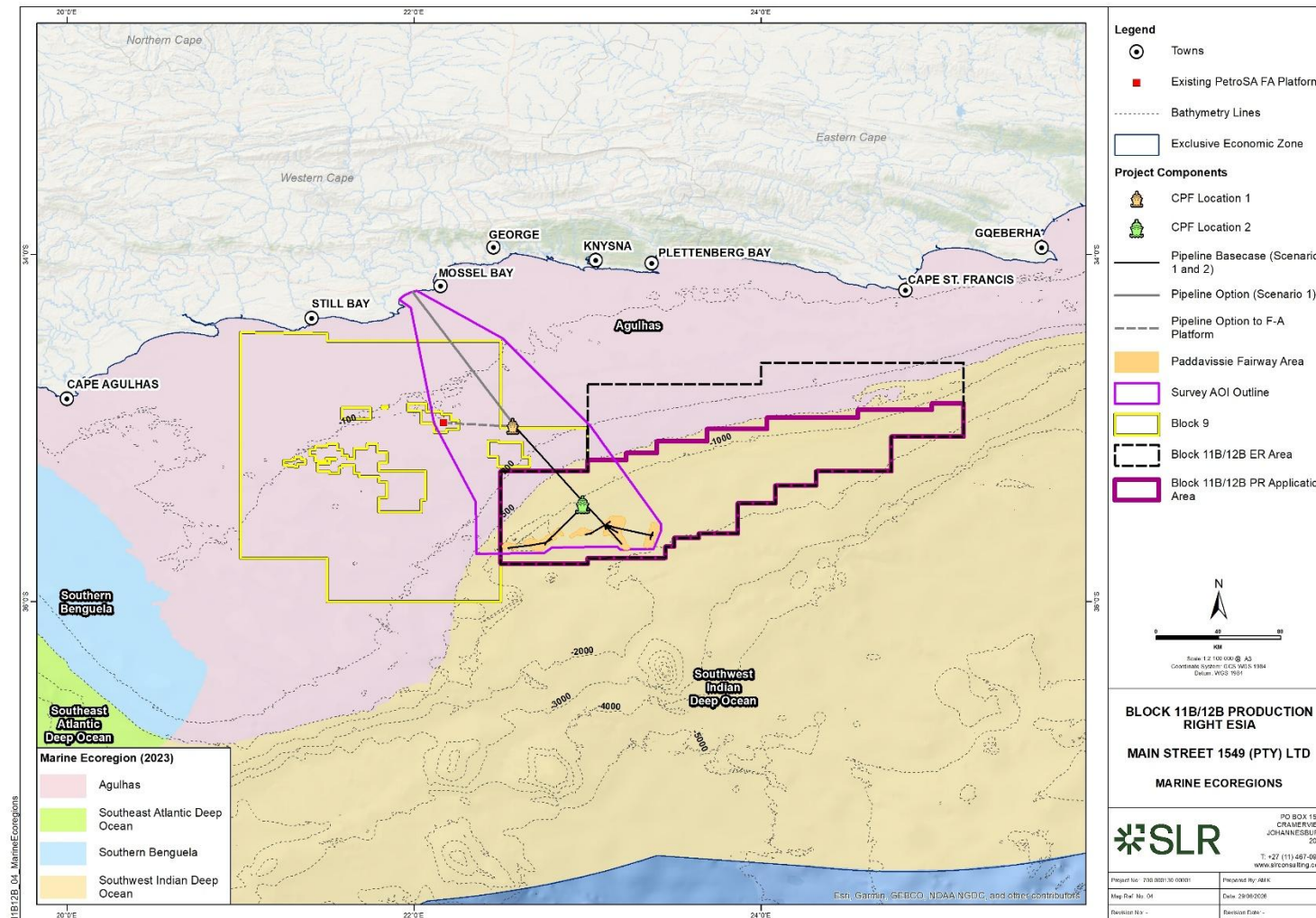


Figure 6-11: Marine Project area and associated infrastructure in relation to ecoregions in South Africa



6.6.1 Coastal and Intertidal Communities

The coastline of the broader marine Project area comprises a mixture of sandy beaches, rocky shores and estuarine habitats. Community composition varies according to substrate type, wave exposure, coastal geomorphology and environmental conditions.

Further details on terrestrial coastal ecosystems and communities outside of the marine and intertidal communities are described below and included in Section 7.0.

6.6.1.1 Intertidal Sandy Beaches

Sandy beaches are among the most dynamic coastal environments. Along the South African Coast, beaches are largely wave-dominated, with the composition of faunal communities primarily determined by the interaction between wave energy, beach slope, and sediment grain size; a concept known as beach morphodynamics (Short and Wright 1983; McLachlan et al. 1993; McLachlan and Defeo 2018). Biogeographic factors also influence community composition and species distributions.

Three broad morphodynamic beach types are recognised: dissipative, reflective, and intermediate beaches (McLachlan et al. 1993; McLachlan et al., 2018). Dissipative beaches are typically wide and flat, with fine-grained sands and relatively low wave energy, and generally support the highest abundance and diversity of intertidal fauna. In contrast, reflective beaches are narrow and steep, with coarser sediments and have high wave energy, resulting in comparatively species-poor communities. Intermediate beaches exhibit characteristics of both dissipative and reflective beach types and typically comprise medium medium-grained sands. They are often associated with cusped beach formations, rip currents and nearshore sandbars. Faunal communities on intermediate beaches can be highly variable and are strongly influenced by food availability, including stranded macrophytes such as kelp wrack, which support diverse drift-line assemblages (Branch & Griffiths 1988).

Reflective beaches generally support communities dominated by robust, mobile and fast-burrowing species, such as ghost crabs (*Ocypode spp.*) and the mole crab *Emerita austroafricana*. Along the morphodynamic continuum towards more dissipative conditions, habitat suitability increases for a wider range of taxa, including surf-zone bivalves such as *Donax* and *Latona* species (clams), as well as more specialised organisms including polychaete worms. Consequently, both species richness and abundance generally increase from reflective to dissipative beach environments (McLachlan et al. 1993; Defeo and McLachlan 2005).

In addition to supporting diverse invertebrate assemblages, sandy beaches also provide important foraging and breeding habitat for a range of vertebrate species that utilise these environments for foraging and reproduction. These include numerous shorebird species (see Section 6.6.3.5) (Harris et al. 2014).

Biological communities on sandy beaches exhibit clear zonation patterns. The upper beach supralittoral zone lies above high-water spring tide mark and is inundated only during exceptionally high tides or storm events. This zone supports a mixture of terrestrial and semi-terrestrial fauna. The mid-shore and swash zones are typically inhabited by a variety of amphipods, isopods, polychaete worms, while the outer surf zone supports species adapted to highly turbulent conditions, including mysids, ribbon worms, cumaceans and polychaetes. Characteristic species include the mysid *Gastrosaccus psammodytes*, the ribbon worm *Cerebratulus fuscus*, the cumacean *Cumopsis robusta*, and the scavenging gastropod *Bullia digitalis*, which may occur in high abundances where suitable swash-zone conditions exist.



Although sandy beach habitats occur widely along the South Coast, one mapped sandy shore ecosystem types (Agulhas Intermediate Sandy Shore) overlaps with the coastal components of the marine Project area (Figure 6-9). Along the South Coast, intermediate beach types are most common, reflecting the wave-dominated coastline and the prevalence of medium-grained sandy beaches.

6.6.1.2 Intertidal Rocky Shores

Rocky shore biodiversity in South Africa shows clear spatial variation both along the coastline and across the intertidal zone. At a broad scale, there is a west-to-east gradient in environmental conditions, with nutrient availability declining toward the east. This gradient results in a substantial reduction in biomass, by approximately two-thirds, from the West Coast to the East Coast. In contrast, species richness increases eastwards, reflecting a combination of biogeographic and ecological factors including warmer temperatures and changes in species interactions (Bustamante and Branch 1996; Branch and Branch 2018).

Within the Agulhas bioregion, rocky shore communities reflect intermediate environmental conditions between the more nutrient-rich West Coast and the warmer, East Coast. Community composition is influenced by factors such as tidal range, wave exposure, shoreline morphology, and substrate type.

Across the shore profile, organisms are distributed in distinct horizontal zones according to their tolerance to environmental stressors such as desiccation, temperature fluctuations and wave action. This pattern, known as intertidal zonation, is a consistent feature of rocky shores, including those along the South Coast (Branch and Branch 2018; Pfaff and Nel 2019). In general, both biomass and species richness increase from the upper to the lower shore, where conditions are wetter and food availability and larval settlement are more consistent. While zonation patterns are broadly predictable, they are strongly influenced by local wave conditions (Menge and Branch 2001).

Wave exposure is a key determinant of community structure on rocky shores. Highly exposed headlands, which are common along parts of the South Coast, favour the dominance of filter-feeding organisms that rely on a continuous supply of suspended food particles. These physically demanding environments require species to have strong attachment mechanisms. Consequently, mussels (e.g. *Perna perna*, *Aulacomya atra*), barnacles (e.g. *Chthamalus dentatus*, *Tetraclita* spp.), and their associated predators are typically abundant in these settings.

In contrast, more sheltered areas such as bays and inlets, which also occur along the South Coast, experience reduced wave energy and lower delivery of suspended particulate food. These conditions favour the growth of macroalgae (e.g. *Gelidium*, *Dictyota*, *Plocamium*) and support higher abundances of grazing invertebrates, including limpets (e.g. *Scutellastra*, *Cymbula*) and periwinkles (e.g. *Oxystele* spp.), while filter-feeders are less prominent.

The Agulhas Exposed Rocky Shore ecosystem type is located adjacent to the nearshore portions (<100 m) of the marine Project area (Figure 6-9).

6.6.1.3 Mixed Shore

Mixed shores are characterised by the co-occurrence of sandy and rocky habitats, occurring where rocky substrate occupies one or more of the across-shore zones typically associated with sandy beaches over a stretch of coastline longer than the width of the shore. These habitats represent transitional environments that incorporate ecological characteristics of both rocky and sandy shore systems (Harris et al., 2025).

Four mixed-shore ecosystem types have been identified in South Africa, broadly corresponding to the country's major coastal regions. Along the South Coast, mixed shores



support communities comprising species adapted to both hard and soft substrates (Smith 1999; Garner 2013). These assemblages typically include organisms capable of tolerating periodic sand inundation as well as exposure to rocky surfaces, resulting in community compositions that differ from those found on purely rocky or sandy shore habitats.

Despite comprising a substantial proportion of the South African coastline, mixed shores remain relatively poorly studied compared to rocky and sandy shore ecosystems. Consequently, knowledge of their ecological structure and functioning remains limited, and no comprehensive ecological classification of mixed shore communities is currently available.

Mixed shores occur at various locations along the South Coast where rocky and sandy habitats occur in close proximity. No mixed shore ecosystem types overlap the coastal and onshore components of the marine Project area (Figure 6-9).

6.6.1.4 Estuaries

South Africa's estuarine ecosystems are delineated into four biogeographical regions (cool temperate, warm temperate, subtropical and tropical) according to broad patterns of species distribution and ecological characteristics. Estuaries along the South Coast generally fall within the Warm Temperate region and comprise a variety of estuarine types, including permanently open, temporarily open/closed and predominantly closed systems. These dynamic environments support diverse biological communities and provide important nursery, feeding and refuge habitats for fish, invertebrates, birds and other wildlife (Whitfield, 1992; van Niekerk et al., 2020; van Niekerk et al., 2026).

Several estuaries occur within the broader South Coast region, including the Gouritz, Great Brak, Klein Brak, Hartenbos, Knysna and Keurbooms estuarine systems (Table 6-5). These estuaries support a range of aquatic, intertidal and riparian habitats and contribute significantly to regional biodiversity and ecosystem functioning (van Niekerk et al., 2019; Harris et al., 2025).

Estuarine environments are characterised by strong spatial and temporal variability in salinity, temperature, dissolved oxygen and nutrient concentrations, resulting from interactions between freshwater inflows, tidal exchange and seasonal climatic conditions. This variability supports specialised biological communities adapted to changing environmental conditions. Estuaries are also highly productive ecosystems that provide important ecosystem services, including nutrient cycling, fisheries support and biodiversity conservation (Whitfield, 1992; Whitfield & Elliott, 2002; van Niekerk et al., 2019).

The marine Project area does not overlap/ any estuarine ecosystem types. The nearest estuarine habitats are associated with river systems along the South Coast and are separated from the offshore development areas and shore crossing infrastructure.

6.6.2 Benthic and Demersal Communities

6.6.2.1 Benthic Invertebrate Macrofauna

The benthic biota of unconsolidated marine sediments comprises invertebrates living on (epifauna) or within (infauna) the seabed. These organisms are classified according to size, with macrofauna (>1 mm) and meiofauna (<1 mm) representing the dominant benthic components. Benthic macrofauna perform important ecosystem functions, including organic matter remineralisation, nutrient cycling, pollutant metabolism, and sediment stabilisation, while also providing an important food source for fish and other higher order consumers. As a result of their relatively limited mobility and long-term association with seabed habitats, benthic communities are widely used as indicators of environmental conditions and disturbance (Gray, 1974; Warwick, 1993; Salas, et al., 2006).



The structure and composition of benthic communities are influenced primarily by abiotic factors such as water depth, substratum type, sediment grain size, seabed topography, current velocity and organic content, as well as biological processes including food availability, recruitment and (Snelgrove & Butman 1994, Flach & Thomsen 1998; Ellingsen 2002).

Numerous studies have examined benthic communities on the South African continental shelf, particularly in relation to fisheries, mining and offshore development activities (e.g Christie & Moldman, 1977; Field & Parkins, 1998; Pulfrich & Penney, 1999; Atkinson, et al., 2011; Steffani, et al., 2015; Biccard, et al., 2020). However, benthic communities occurring on the outer continental shelf, continental slope and deeper bathyal environments remain comparatively poorly understood as a result of sparse datasets due to the logistical challenges associated with deep-water sampling and the limited availability of ROV-based surveys (Sink, et al., 2019; Harris, et al., 2022).

The marine Project area spans a broad depth range across the Agulhas shelf and Southwest Indian Upper Bathyal environments (Figure 6-11), encompassing a diverse range of seabed habitats including unconsolidated sand and mud sediments, coarse sediments, coral rubble, phosphate rich substrates, rocky outcrops and reef habitats (Section 6.3.2). Soft sediment habitats support diverse benthic assemblages of polychaetes, crustaceans, molluscs and echinoderms, while hard substrate and reef habitats are characterised by sessile suspension feeders such as sponges, soft corals, hard coral, gorgonians, bryozoans and ascidians, together with associated mobile fauna (Quick & Sink, 2005; Sink, et al., 2006b; Sink, et al., 2010; Shipton & Atkinson, 2010).

Macrofaunal sampling undertaken at 30 stations during environmental sampling within and near Licence Block 11B/12B recorded 6 459 individuals representing 412 taxa, of which 379 taxa were infaunal. Diversity indices varied across sampling locations, with Shannon-Weiner diversity indices (H') ranging from 2.25 to 5.69 and species richness ranging from 12 to 90 taxa per station. Annelids arthropods, molluscs and echinoderms were the dominant taxonomic groups. Community composition reflected the transition from the Agulhas Shelf ecosystem to deeper Southwest Indian bathyal environments. Overall, the results show a diverse community across stations sampled with a slightly higher species richness and abundance at shelf stations (<500m). Given the large spatial extent of Licence Block 11B/12B and the discrete nature of the sampling programme, these findings represent conditions at the sampled locations and may not capture the full range of macrofaunal communities present across the Block.

Statistical analyses showed that differences in benthic community composition were related to water depth and sediment and sediment characteristics. Water depth exhibited the strongest correlation with community structure (RELATE⁴¹: $\rho = 0.715$, $p = 0.001$), indicating that sites at similar depths tended to support similar biological communities. Sediment particle size distribution was also significantly correlated with community composition, although to a lesser degree ($\rho = 0.323$, $p = 0.002$). Communities from the continental shelf (<500 m) and bathyal zone (>500 m) differed significantly from each other (ANOSIM⁴²: $p <$

⁴¹ RELATE is a non-parametric test that assesses the correlation between two similarity (or dissimilarity) matrices, indicating whether two multivariate patterns are significantly related.

⁴² ANOSIM tests whether the composition of biological communities differs significantly between predefined groups (e.g., shelf and bathyal habitats).



0.001). Additional analyses (nMDS⁴³ and SIMPROF⁴⁴) showed that samples grouped into distinct assemblages that correspond closely with depth-related habitat types.

ROV surveys conducted along 23 transects within and near Licence Block 11B/12B approximately 357 taxa from 11 phyla. Taxonomic richness varied among the habitat types and depth zones, ranging from 21 to 83 taxa per transect. The observed richness is likely attributable to the variety of habitat types encountered along the transects (see Section 6.3.2), including unconsolidated sediments, mixed substrates, rocky reefs and coral associated habitats distributed across a depth range of approximately 114 m to 1 871 m. Given the large spatial extent of Licence Block 11B/12B and the discrete nature of the ROV survey transects, these findings represent conditions observed along the surveyed transects and may not capture the full range of epifaunal communities and habitats present across the Block. Recorded benthic invertebrates included representatives of the Porifera (sponges), Cnidaria (including soft and hard corals, anemones and related taxa), Annelida (segmented worms), Arthropoda (crustaceans such as lobsters, prawns and crabs), Bryozoa (lace animals), Mollusca (gastropods and related molluscs) and Echinodermata (starfish, sea urchins, brittle stars, and related taxa), together with a variety of cephalopods and other mobile benthic fauna (Figure 6-12) (SLR, 2026).

To quantify sponge aggregations observed during ROV survey transects within and near Licence Block 11B/12B, sponge coverage at the seabed per section of habitat was logged as a running category with sponge coverage classified into four categories as per NOROG (Norwegian Oil and Gas Association) guidance (2019) (Table 6-7). Although this guidance focusses on sponge coverage estimations across Norwegian waters, its application to the Southern Atlantic Ocean was deemed the most appropriate criteria to follow by the survey team at the time of the survey. Figure 6-13 provides an indication of the highest sponge density category recorded from each ROV transect.

ROV transects confirmed the presence of sponges at 19 of the 23 survey locations, however sponge cover/density was generally low across the sites. Of the 2 604 images assessed, over half (54.2%) showed no sponges, while 33.4% showed less than 1% sponge cover. Only 12.3% of images contained scattered sponge occurrences, and no images recorded sponge cover at levels classified as common or high.

⁴³ Non-metric Multidimensional Scaling (nMDS) is a visualisation technique that plots samples according to their biological similarity, with samples that are more alike appearing closer together.

⁴⁴ SIMPROF identifies groups of samples that are significantly more similar to each other than would be expected by chance.





Raspberry sea star
(Solasteridae:
Crossaster penicillatus)



Koffiekoekie sea star
(Asteroiidae *Tarsastrocles* sp.?)



Giant orange sea star
(Stichasteridae:
Perissasterias polyacantha)



Actinostolidea sp? ("pink
sunflower")



Peach played anemone
(Hormathiidae *Hormathia* sp.?)



Transparent clonal plumose anemone
(Zeeanjelier sp 1)



Mint green soft coral
(Gorgoniidae sp.)



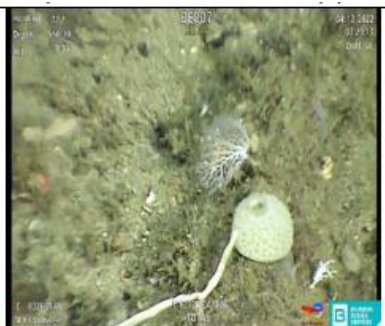
White cream soft coral
(Carnation coral, Nephtheidae sp?)



Yellow white soft coral
(Carnation coral, Nephtheidae sp?)



Funnel glass sponge
(Euplectellidae: *Dictyaulus* sp.)



Round glass sponge (Porifera)



Glass sponge
(Hyalonematidae sp.)

Figure 6-12: Examples of benthic epifauna recorded during environmental survey activities

Source: (SLR, 2026)



Table 6-7: Criteria for sponge classification along the seabed (as per NOROG, 2019)

Sponges	Seabed Coverage	Comment
Single individual	<1%	As single point
Rare	<1%	Running category
Scattered	1-5%	Running category
Common	5-10%	Running category
High	>10%	Running category

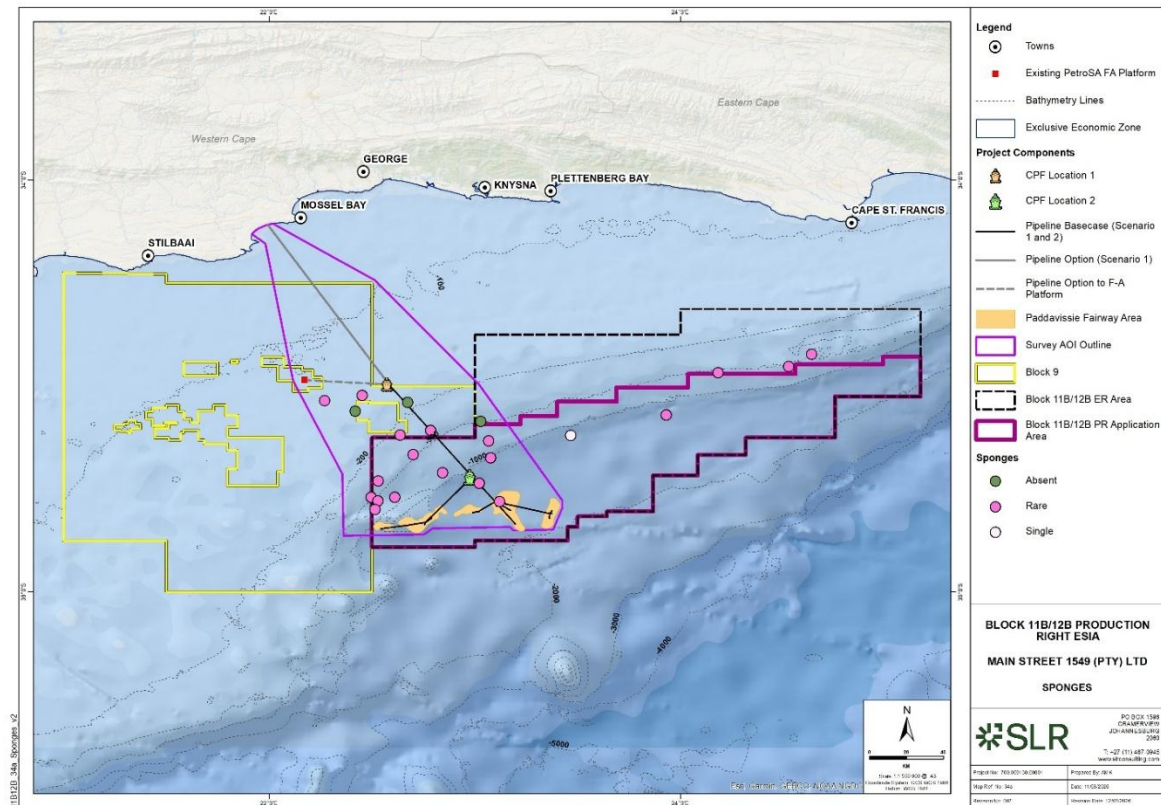


Figure 6-13: Sponge density recorded during environmental survey activities

Source: (SLR, 2026)

6.6.2.2 Coral Communities

Coral communities occur across a broad depth range within the South Coast marine environment, from shallow rocky reefs and hard-substrate habitats on the continental shelf to deep-water reef systems associated with the shelf edge and upper continental slope. In South Africa, shallow-water corals do not form extensive tropical reef systems but occur as solitary and colonial hard corals, soft corals and hydrocorals associated with rocky reef habitats. These organisms contribute to habitat complexity and provide attachment surfaces, shelter and feeding opportunities for a variety of marine species (Roberts, et al., 2006; Sink & Samaai, 2009).

There has been increasing scientific and conservation interest in deep-water corals due to their sensitivity to disturbance, slow growth rates and long generation times. These benthic suspension feeders typically occur at depths exceeding 150 m, although some species have been recorded at depths greater than 3 000 m. Deep-water corals range from small solitary forms to extensive reef-building species that create structurally complex habitats on the



seabed. By increasing habitat heterogeneity and providing refuge for associated organisms, these communities support elevated levels of biodiversity relative to surrounding unconsolidated sediments (Breeze, et al., 1997; MacIsaac, et al., 2001).

Deep-water corals generally occur below the thermocline, in cold waters, where strong currents, localised upwelling and topographically-driven circulation processes concentrate particulate organic matter. These conditions provide a reliable food supply and promote the settlement and persistence of coral communities on suitable hard substrates (Hovland, et al., 2002).

The Agulhas Bank supports a range of deep-water coral and sponge communities associated with shelf-edge reefs, submarine canyons and hard-substrate habitats. Cold-water coral systems have been documented from the Agulhas Sandy Outer Shelf, Agulhas Shelf Edge and the Southwest Indian Upper Slope ecosystem types, where they occur in association with rocky reefs and other structurally complex habitats (Sink & Samaai, 2009, Sink et al., 2011 and Pisces, 2018).

Regional surveys, including the Deep Secrets Offshore Research programme, have identified sensitive coral habitats within the Agulhas Bank Region associated with hard-substrate environments (Sink, 2016, cited in Sink et al., 2019). These coral assemblages include representatives of the Scleractinia (stony corals), Octocorallia (soft corals, sea fans, and bamboo corals), Antipatharia (black corals), and Stylasteridae (lace corals) (Roberts et al., 2006).

ROV surveys undertaken within and near Licence Block 11B/12B confirmed the presence of deep-water corals (soft and hard corals) at 11 of the 23 survey locations, particularly in the western and south-western portions of the survey area (Figure 6-14).

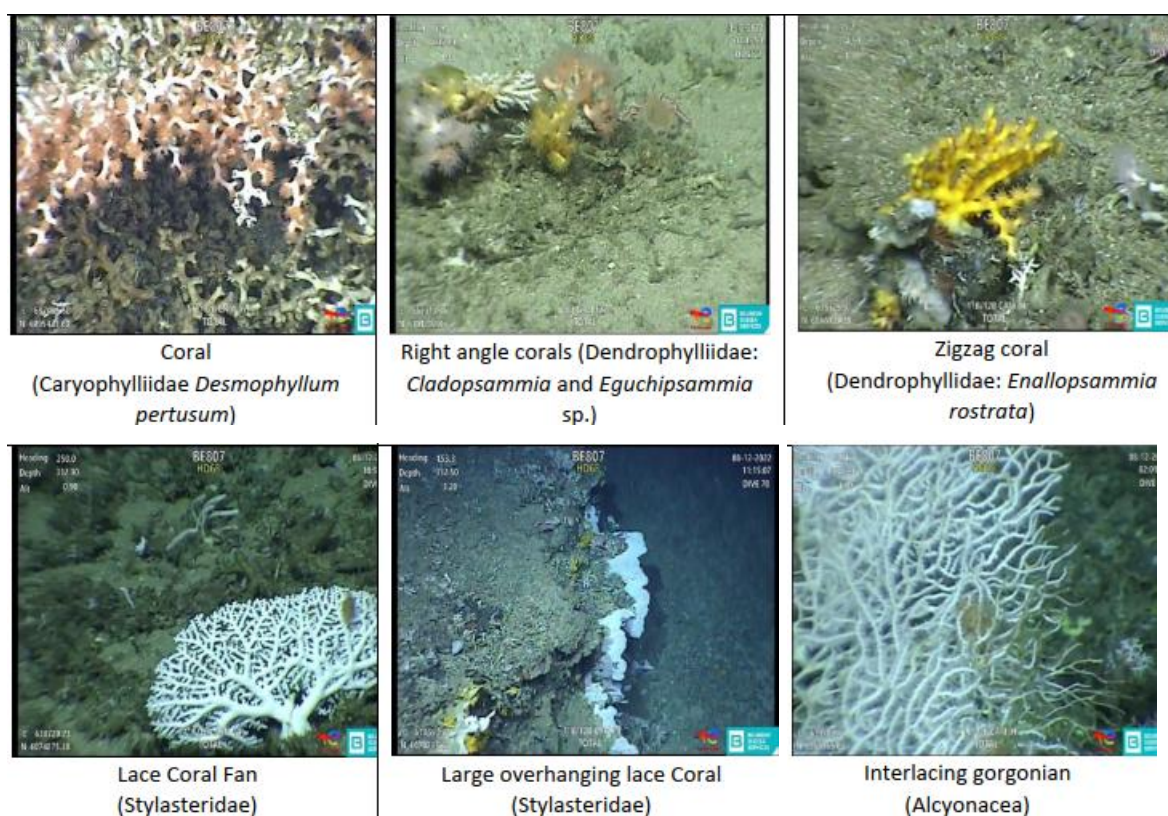


Figure 6-14: Examples of corals identified during environmental surveys

Source: (SLR, 2026)



Recorded taxa included the reef-forming cold water coral (*Desmophyllum pertusum*), right angle corals (*Cladopsammia* and *Eguchipsammia* spp.), zigzag corals (*Enallopsammia rostrata*), bottlebrush sea fans (*Thouarella* spp.), stylasterid lace corals, bryozoans including *Adeonella* spp., and a variety of associated sponges and hydrozoans (SLR, 2026). Overall, variability was observed between survey sites, with some areas characterised by living coral communities and by dead coral material and alternative habitat types, indicating a heterogeneous deep-water seabed environment.

Soft corals, including bottlebrush sea fans (*Thouarella* spp.), *Anthomastus* spp. and stoloniferans, were recorded at 10 of the 23 survey locations. Abundance assessments undertaken using the semi-quantitative SACFOR (Super-abundant, Abundant, Common, Frequent, Occasional and Rare) scale (Table 6-8) indicated that soft corals ranged from Rare to Common within the surveyed areas.

The highest densities were associated with rocky seabed, coral rubble and other heterogeneous hard-substrate habitats, while soft corals were absent from unconsolidated sandy habitats. Although locally abundant at some survey stations, soft corals generally occurred at low to moderate densities across the survey area. Their distribution reflects a preference for structurally complex habitats that provide suitable attachment surfaces and contribute to overall benthic habitat complexity (SLR, 2026). All recorded soft corals fell within the 3–15 cm size category. Figure 6-15 shows the average soft coral density per transect.

Table 6-8: SACFOR Abundance Scale for Size Class 3-15cm

Cover (%)	Size class: 3-15cm	Density	
20-39%	Super abundant	1-9/0.01 m ²	100-999/m ²
10-19%	Abundant	1-9/0.1 m ²	10-99/m ²
5-9%	Common	1-9/m ²	1-9/m ²
1-5% or density	Frequent	1-9/10 m ²	0.1-0.9/m ²
<1% or density	Occasional	1-9/100 m ²	0.01/m ²
	Rare	1-9/1000 m ²	-
	Absent	<1/1000 m ²	-



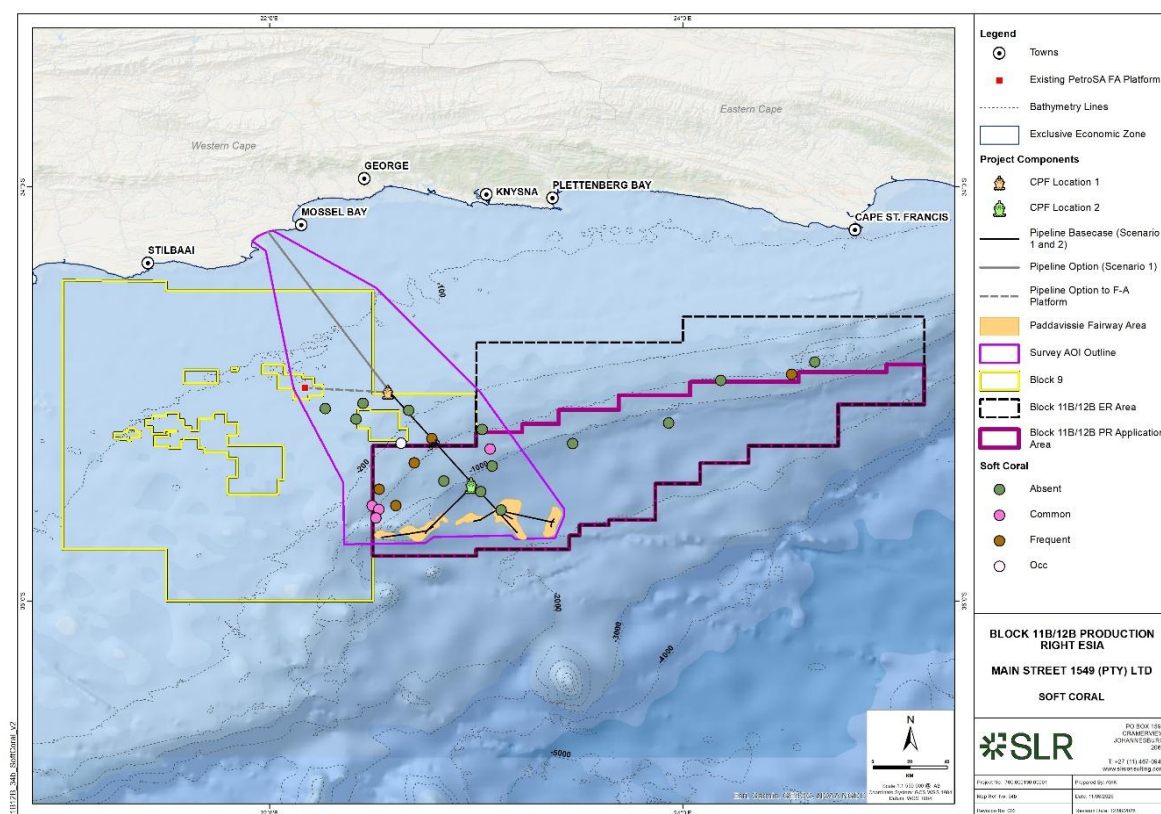


Figure 6-15: Average soft coral density per transect recorded during environmental survey activities

Source: (SLR, 2026)

Desmophyllum pertusum colonies forming locally developed reef structures were recorded during 3 ROV transects in the southwestern portion of Licence Block 11B/12B. These colonies support diverse assemblages of sessile and mobile organisms. An assessment of 58 *D. pertusum* colony observations across these transects was undertaken following NOROG (2019) guidelines, which classify colonies according to colony size and the density of living polyps (Table 6-7). This found that 31 colonies (53%) were classified as Dead, 25 (43%) as Poor, and only 2 (3%) as Fair, with no colonies classified as Good (Figure 6-16). While all three transects contained well-developed *D. pertusum* reef structures, only a relatively small proportion comprised living coral, with the majority consisting of dead coral framework. ROV images showed the dead coral framework providing shelter and attachment surfaces for associated fauna, including sponges, soft corals and anemones (SLR, 2026).



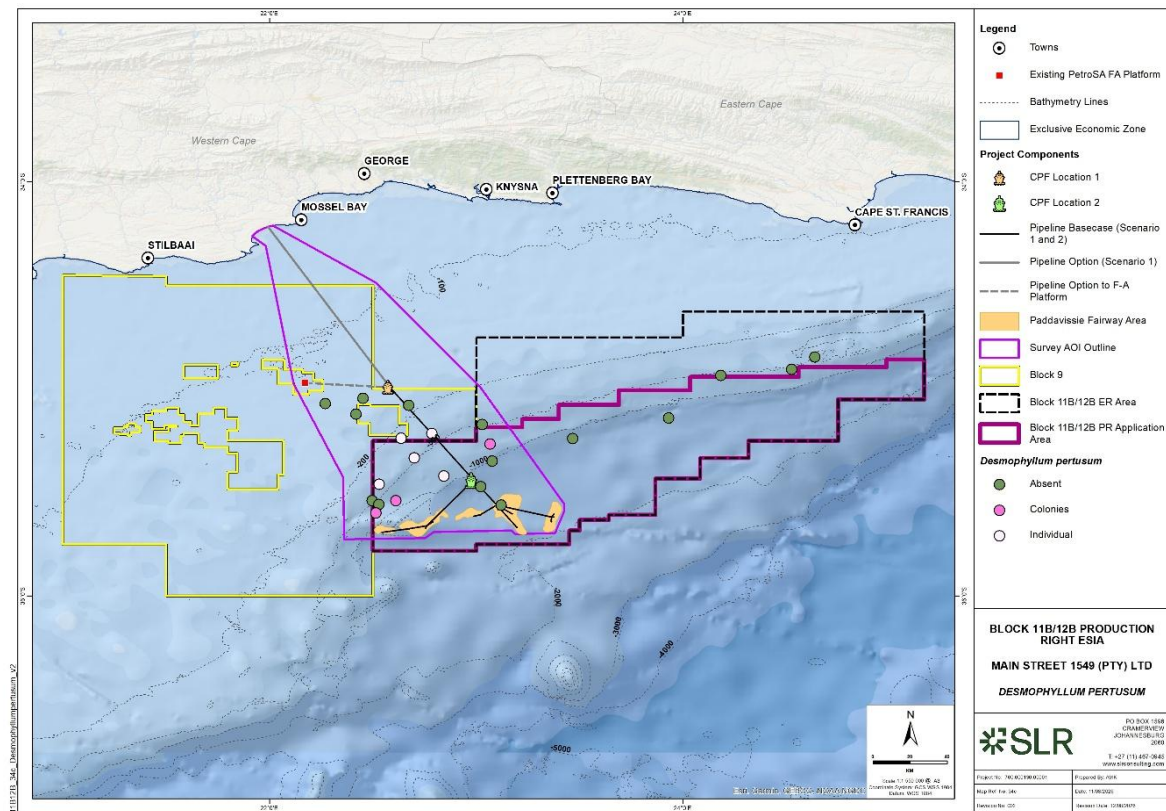


Figure 6-16: *Desomphyllum pertusum* recorded during environmental survey activities

Source: (SLR, 2026)

The occurrence and density of other hard coral, such as lace corals (Stylasteridae), the right-angled coral (*Cladopsammia* and *Eguchipsammia* spp.) and the zigzag coral (*Enallopsammia rostrata*), was assessed using the SACFOR scale by counting individuals observed along ROV camera transects where corals were present. Counts were converted to abundance per unit area using the camera field of view and averaged by habitat type. These corals fell within the 3–15 cm size category. Figure 6-17 shows the average hard coral density per transect.



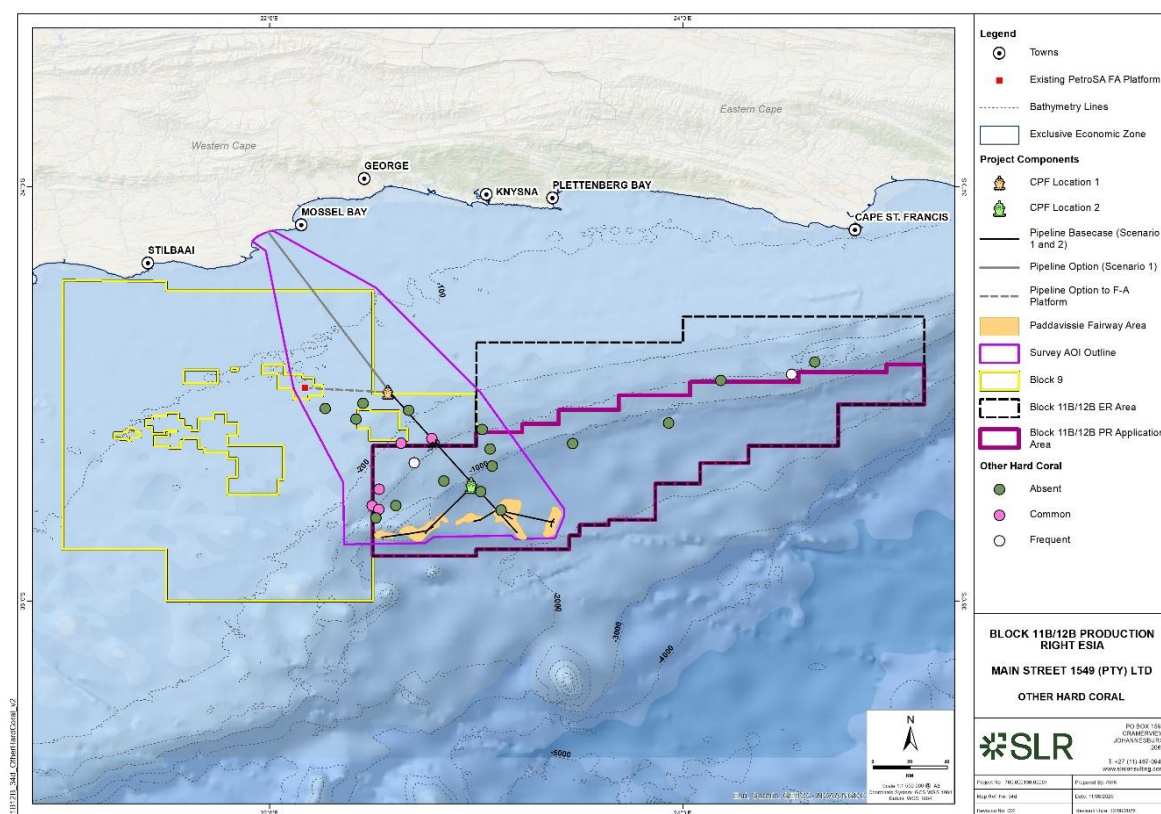


Figure 6-17: Average hard coral density per transect recorded during environmental survey activities

Source: (SLR, 2026)

6.6.2.3 Seamount and Shelf-edge Communities

Seamounts, banks, ridges, knolls, and other related seabed features can have a strong influence on local oceanographic conditions and biological communities. Along the South Coast, prominent offshore bathymetric features include the Shackleton Seamount Complex, Kingklip Ridge, shelf-edge reefs and submarine canyons associated with the Agulhas Bank continental margin (see Section 6.3.1). True seamounts are generally defined as isolated submarine elevations rising at least 1 000 m above the surrounding seabed (NOAA, 2024).

These features interact with ocean currents, generating localised turbulence, current acceleration and upwelling. Such processes can enhance nutrient availability and primary productivity, creating favourable conditions for both pelagic and benthic organisms (Clark, et al., 1999). Consequently, seamounts and shelf-edge topographic features often support biological communities that differ substantially from those of the surrounding seabed habitats.

The hard substrata, steep gradients and enhanced current regimes associated with these features provide suitable habitat for a wide variety of suspension-feeding organisms, including corals, sponges, bryozoans, molluscs and hydrozoans. Associated mobile fauna include crustaceans, echinoderms and demersal fishes (Rogers, 1994; Rogers, 2004). These habitats may also attract pelagic predators such as tunas, sharks, cetaceans and seabirds, which utilise areas of enhanced productivity as feeding grounds (Hui, 1985; Haney, et al., 1995) (SPRFMA, 2007; Derville, et al., 2020)



In the broader Project region, the Kingklip Ridge and associated shelf-edge reef systems are recognised as important areas of habitat heterogeneity and biodiversity. These features support structurally complex benthic habitats characterised by hard substrata, coral assemblages and diverse associated fauna. Regional biodiversity assessments have identified the Kingklip Coral EBSA and the adjacent (~8 km north of the marine Project area) Shackleton Seamount Complex EBSA as important offshore biodiversity features of the South Coast (Sink et al., 2019; Harris et al., 2022) (see Section 6.7.3.2 for further information).

6.6.2.4 Vulnerable Marine Ecosystems

Vulnerable Marine Ecosystems (VMEs) are marine habitats that are particularly sensitive to disturbance due to the biological characteristics of their constituent species. VMEs are typically characterised by habitat-forming organisms such as corals, sponges and bryozoans that exhibit slow growth, delayed maturation, low recruitment rates and high longevity. As a result, these communities may require decades to centuries to recover from physical disturbance, and in some cases recovery may never occur (FAO, 2008; Rogers et al., 2008).

Common VME habitats include cold-water coral reefs, coral gardens, sponge grounds and bryozoan-dominated communities associated with seamounts, ridges, shelf-edge reefs and canyon systems. These habitats provide structural complexity and refuge for a wide range of associated organisms, often supporting biodiversity levels substantially higher than those occurring in surrounding soft-sediment environments (Rogers, 2004; Roberts et al., 2006).

Harris et al. (2022) mapped the distribution of VME habitats using geomorphological features, DFFE and SAEON (South African Environmental Observation Network) trawl survey data, and visual survey observations. The mapped features include potential VME habitat associated with seamounts, submarine canyons, steep rocky areas and other hard-substrate features that may support VME communities, as well as potential VME records based on the occurrence of VME indicator taxa. Many of the latter represent trawl start locations where indicator taxa were recorded during demersal research surveys; however, because abundance data of these records had not yet been analysed against VME thresholds, these sites were classified as potential VME records rather than confirmed VMEs. Additional visual survey data have also identified locations where VME taxa are present, although some sites require further assessment to confirm their status.

The mapping indicates that portions of the broader marine Project Area overlap with areas identified as potential VME habitat, particularly in association with hard-substrate shelf-edge features and complex bathymetry (Figure 6-18). Interpretation of the available seismic data indicates that the hard-substrate features are generally spatially discrete, comprising separated rocky outcrops interspersed with areas of soft sediment. The potential VME habitat is therefore expected to have a heterogeneous and localised distribution. Potential VME records considered by Harris (2022) are also shown on Figure 6-18.

Vulnerable Marine Ecosystem Indicator (VMEI) species were identified in 18 of the 23 camera transects (Figure 6-18). The VMEI species identified included reef-building and habitat-structuring corals, stylasterid lace corals, bamboo corals (Isididae), soft corals, bryozoans and sponge assemblages associated with hard-substrate habitats (SLR, 2026). The occurrence of these taxa indicates the presence of structurally complex benthic habitats that support elevated biodiversity and ecological functioning at those sites. Detailed descriptions of the coral communities recorded are provided in Section 6.6.2.2.

The highest number of VMEI taxa were observed primarily at sampling sites in the west and south-west region of Licence Block 11B/12B, where localised hard-substrate habitats, including reef systems and topographically complex shelf-edge features were recorded to be most prevalent (SLR, 2026). Coral reefs, coral rubble habitats, boulder fields and mixed



hard-substrate habitats supported the greatest diversity of sessile suspension feeders and associated fauna.

Deep-sea sponge communities were recorded across 7 habitat types, particularly within mixed coarse-sediment and rocky habitats. Although sponge densities were generally low, these habitats contribute to overall benthic diversity and provide additional structural complexity on the seabed. Similarly, soft-coral and lace-coral communities occurred across a range of shelf-edge and upper-bathyal habitats, frequently in association with reef structures and hard substrata (SLR, 2026).

Overall, the occurrence of cold-water coral reefs, coral gardens, lace-coral assemblages, sponge-dominated habitats and other VMEI taxa at certain surveyed locations within and near Licence Block 11B/12B highlights the ecological significance of these areas. These habitats represent the most sensitive benthic features recorded within the marine Project area and contribute to the biodiversity of the Agulhas shelf edge and Southwest Indian Upper Bathyal ecosystem.

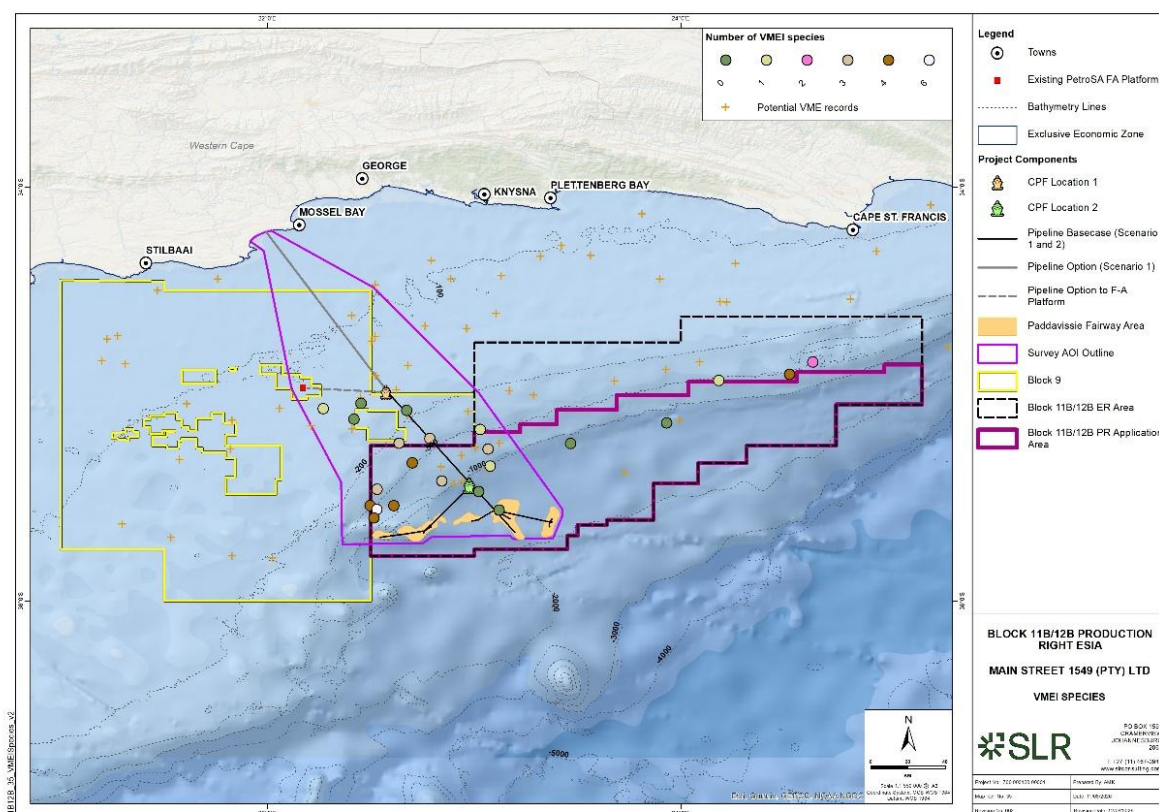


Figure 6-18: Vulnerable Marine Ecosystem Indicator (VMEI) Species recorded during environmental survey activities

Source: (SLR, 2026) and Harris (2022)

6.6.2.5 Demersal Fish

Demersal fishes, together with associated skates, rays and demersal sharks, comprise an important component of seabed associated marine communities and are strongly influenced by depth, substrate type and habitat complexity. Along the South African coast, demersal fish communities exhibit distinct spatial patterns both along the coastline and across depth gradients (Roel, 1987; Smale, et al., 1993; MacPherson & Gordoa, 1992; Bianchi, et al., 2001; Atkinson, 2009). On the Agulhas Bank, one of the most pronounced transitions in



demersal fish assemblages occurs in the shelf break region between approximately 300 m and 400 m depth, where continental shelf communities give way to deeper shelf-edge and slope assemblages (Roel, 1987; Atkinson, 2009).

Beyond the shelf edge, demersal fish communities transition to deeper slope and upper bathyal assemblages associated with colder waters and reduced habitat heterogeneity. These communities are generally less well understood than shelf communities due to limited sampling in deep-water environments.

The marine Project area encompasses a broad depth range supporting a variety of demersal fish species associated with soft-sediment, reef and shelf-edge habitats. In the shallower shelf and nearshore environments, rocky reefs and mixed substrate habitats support characteristic reef-associated fish assemblages comprising seabreams (Sparidae), rockcods (Serranidae), croakers (Sciaenidae) and other resident reef fishes. These assemblages are strongly influenced by reef complexity, depth and substrate type and include species such as red roman (*Chrysoblephus laticeps*), carpenter (*Argyrozona argyrozona*), dageraad (*Chrysoblephus cristiceps*), poenskop (*Cymatoceps nasutus*), musselcracker (*Sparodon durbanensis*), seventy-four (*Polysteganus undulosus*) and Scotsman (*Polysteganus praeorbitalis*). Soft-sediment habitats support species such as Agulhas sole (*Austroglossus pectoralis*), kob (*Argyrosomus* spp.) and white stumpnose (*Rhabdosargus globiceps*). Many of these species are important components of South Coast commercial, small-scale and recreational fisheries (discussed further in Section).

Hakes (*Merluccius capensis* and *M. paradoxus*) are among the dominant demersal predators in the region and are widely distributed across the Agulhas Bank and continental slope (Boyd et al., 1992; Hutchings, 1994; DFFE, 2025). Juveniles generally occupy shallower shelf waters, while adults occur in deeper waters along the shelf edge and upper slope (Payne, 1986; Botha, 1989; Roel, 1987; DFFE 2020).

Other important demersal species include kingklip (*Genypterus capensis*), a commercially valuable species associated with rocky reefs, shelf-edge habitats and other structurally complex seabed features along the South Coast (Japp et al., 1994; Pisces, 2018). The species is thought to spawn beyond the 200 m isobath between Cape St Francis and Gqeberha (see Section 6.6.3.1), while juveniles occur in shallower coastal waters along the South Coast.

The Agulhas or East Coast sole (*Austroglossus pectoralis*) is characteristic of the Agulhas Bank and inhabits soft-sediment habitats on the continental shelf, particularly muddy and sandy-mud substrates in relatively shallow shelf waters between Cape Agulhas and Algoa Bay (Boyd et al. 1992).

Cartilaginous fishes also comprise an important component of the demersal fauna of the Agulhas Bank and adjacent slope habitats. Several skates were identified during previous survey activities (Figure 6-21). Habitat suitability assessments undertaken by Harris et al. (2022) indicate the occurrence of several skate, ray and shark species within the broader marine Project area, including the biscuit skate, triangular legskate, slime skate and soupfin shark (Figure 6-19 and Figure 6-20). These species occupy a variety of soft-sediment, shelf-edge and bathyal habitats and contribute to the ecological functioning of demersal food webs within the region.



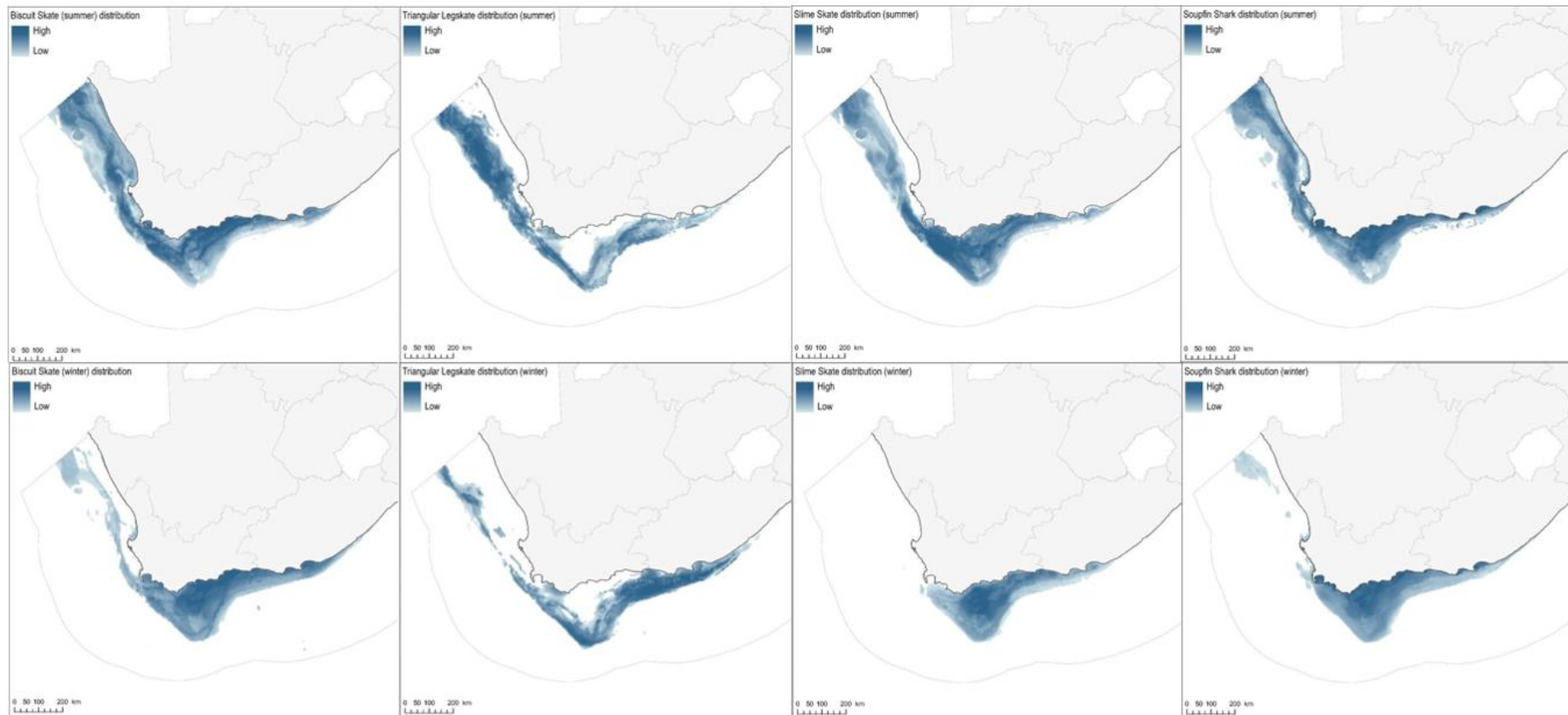


Figure 6-19: Summer (top) and winter (bottom) distribution of biscuit skate, triangular legskate, slime skate and soupfin shark (from left to right) off southern African coastline

Adapted from Harris et al. (2022). ⁴⁵Note: IUCN conservation status as per as of Harris et al. (2022) provided.

⁴⁵ The distributions provided by Harris et al. (2022) are based on data from demersal fisheries. The apparent absence of fish offshore is thus due to a lack of survey data rather than an indication that no species occur there.



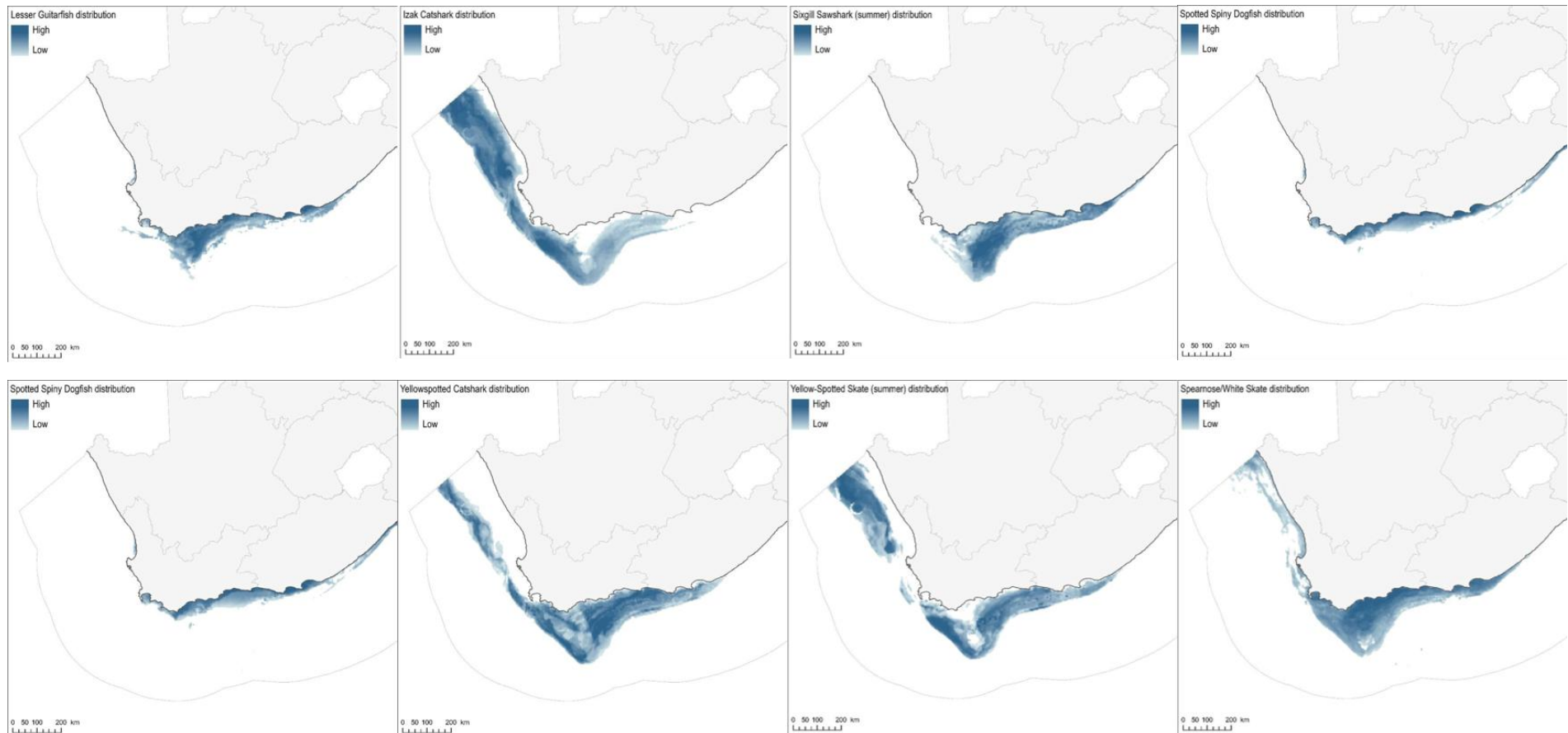


Figure 6-20: Distribution of demersal cartilaginous species off southern African coastline.

Adapted: Harris et al. (2022) ⁴⁶.

⁴⁶ The distributions provided by Harris *et al.* (2022) are based on data from demersal fisheries. The apparent absence of cartilaginous species offshore is thus due to a lack of survey data rather than an indication that no species occur there.





Figure 6-21: Examples of skates observed during ROV survey activities

Source: (SLR, 2026)

6.6.3 Pelagic Communities

6.6.3.1 Plankton

Phytoplankton biomass over the Agulhas Bank is strongly linked to environmental and oceanographic conditions (Brown et al., 1991; Brown 1992). Reduced phytoplankton biomass in the surface waters of the Agulhas Bank typically occurs during periods of deep winter mixing, or when strong thermoclines are present, resulting in low nutrient availability (Probyn et al., 1994; Pisces, 2019). Under these conditions, phytoplankton communities are generally dominated by large-celled diatoms and dinoflagellates. Phytoplankton productivity in surface waters typically ranges from of 200-800 mgC/m²/hr, declining with depth to near zero in bottom waters (Pisces, 2019).

Zooplankton communities along the South Coast have comparatively high species diversity and biomass, ranging between approximately 3-6 gC/m² (De Decker, 1984). South Coast mesozooplankton (>200 µm) communities are dominated by the calanoid copepod *Calanus agulhensis*, an important food source for pelagic fish stocks (Peterson et al., 1992). Similar to phytoplankton patterns, mesozooplankton biomass generally increases from west to east, reaching its highest levels on the central and eastern Agulhas Bank during summer in association with the subsurface ridge of cool upwelled water (see Section 6.4.2 and 6.4.4) (Noyon et al. 2022). Average standing stocks between Cape Agulhas and Cape Recife have been estimated at approximately 0.079 gC/m². Macrozooplankton (>1 600 µm) communities include aggregations of euphausiids, which are an important food source for pelagic fishes and other higher trophic levels (Cornew et al. 1992, Verheye et al. 1994, Pulfrich 2019). Together, zooplankton communities form an important trophic link between primary producers and higher-order consumers, including fish, squid, seabirds, turtles and marine mammals.

Ichthyoplankton comprises the eggs and larval stages of fishes and cephalopods. The Agulhas Bank and South Coast constitute an important spawning and nursery region for a variety of commercially and ecologically important species. As many pelagic, demersal and cephalopod species spawn on the Agulhas Bank, their eggs and larvae contribute substantially to regional ichthyoplankton assemblages. In particular, the area east of Cape Agulhas, between the shelf-edge upwelling zone and the cold-water ridge, provides favourable spawning habitat and larval retention conditions (Crawford, 1980; Hutchings, 1994; Roel & Armstrong, 1991; Hutchings et al., 2002; Jacobs et al., 2022) (Figure 6-23).

Among the small pelagic species, anchovy (*Engraulis encrasicolus*) and sardine (*Sardinops sagax*) are particularly important contributors to ichthyoplankton communities on the Agulhas Bank. Anchovy spawn widely across the Agulhas Bank, with a major spawning area along



the 200 m depth contour between Mossel Bay and Plettenberg Bay between October and January, after which adults migrate inshore and eastwards. Sardines also spawn extensively across the Agulhas Bank, primarily during Spring and Summer, with spawning peaks occurring in early Spring and Autumn on either side of the anchovy spawning peak. Following spawning, adults move eastwards and northwards, while recruits commonly occur in nearshore waters along the South Coast. Eggs and larvae of both species are transported around Cape Point and northwards along the coast by surface currents (Crawford, 1980; Hutchings, 1994; Harris et al., 2022; Teske et al., 2021). While the marine Project Area occurs within the broader distribution of anchovy and sardine spawning activity on the Agulhas Bank, the spawning grounds extend over a large geographic area. As such, the marine Project Area constitutes a relatively limited proportion of the habitat available for spawning and early life-history stages of these species (Figure 6-22).

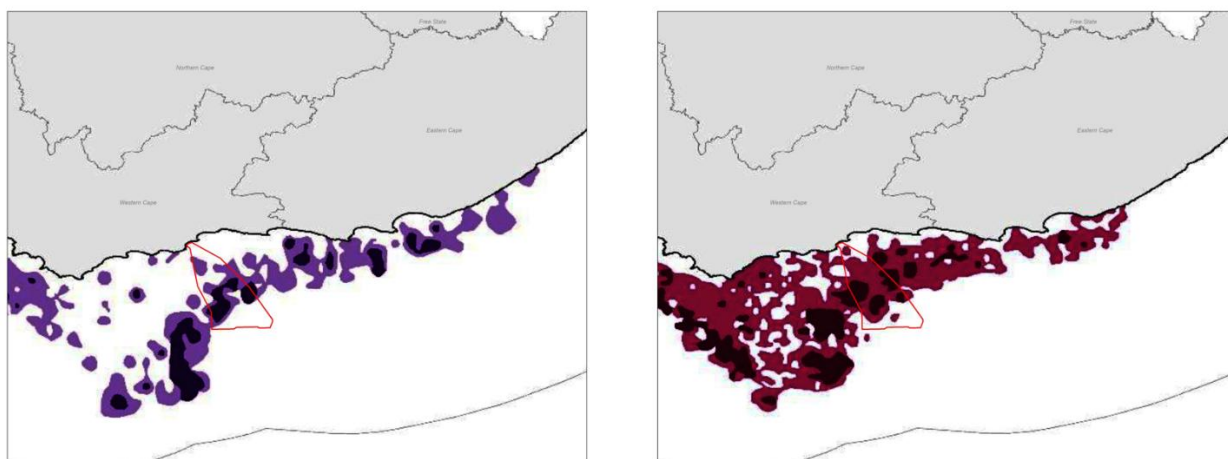


Figure 6-22: Marine Project Area (red polygon) in relation to distribution of sardine (left) and anchovy (right) spawning areas, as measured by egg densities.

Adapted from Harris et al. (2022).

In addition to the main Spring and Summer spawning period, localised winter (June–July) sardine spawning has been reported on the central Agulhas Bank in areas associated with elevated phytoplankton concentrations (van der Lingen et al., 2006). Upwelling along the Southeast Coast also influences sardine distribution, attracting cool-temperate populations that track the seasonal movement of cooler water masses. Round herring (*Etrumeus whiteheadi*) are also reported to spawn along the South Coast, contributing further to regional ichthyoplankton abundance (Roel & Armstrong, 1991).

Several demersal species also utilise different parts of the continental shelf and shelf edge for spawning thereby contributing to offshore ichthyoplankton assemblages. The shallow-water hake (*M. capensis*) spawns primarily on the continental shelf in waters shallower than 200 m, whereas the deep-water hake (*M. paradoxus*) spawns predominantly beyond the shelf edge (Shelton 1986; Hutchings 1994). Kingklip (*G. capensis*) spawning occurs along the shelf edge south of St Francis and Algoa Bay, towards the eastern extent of the marine Project area (Hutchings, 1994). Eggs and larvae of these species form an important component of the offshore plankton community.

Cephalopod paralarvae also contribute to regional plankton communities. Chokka squid (*Loligo reynaudii*) spawning is concentrated in nearshore waters shallower than 50 m between Knysna and Gqeberha. Following hatching, larvae and juveniles are dispersed westwards from these spawning grounds by prevailing currents (Hutchings, 1994; Pisces,



2019) (The ecology and distribution of cephalopods within the marine Project area are discussed further in Section 6.6.3.2).

Overall, the Agulhas Bank and South Coast support diverse assemblages of planktonic organisms, fish eggs and larvae and cephalopod paralarvae, with regional oceanographic processes playing a key role in the retention, transport and dispersal of early life-history stages throughout the ecosystem (Figure 6-23).

Plankton sampling undertaken within Licence Block 11B/12B confirmed the presence of diverse phytoplankton, zooplankton and ichthyoplankton communities. Phytoplankton assemblages were dominated by diatoms (Bacillariophyta), while zooplankton communities were dominated by copepods and other arthropods. Fish larvae (Actinopterygii), appendicularians, doliolids and salps were also recorded throughout the survey area, demonstrating the importance of planktonic communities in supporting regional pelagic food webs. Chlorophyll-a concentrations and phytoplankton biomass were generally low, reflecting the offshore nature of much of the survey area; however, all trophic components of the plankton community were recorded, confirming the occurrence of productive pelagic ecosystems throughout the water column (SLR, 2026).

The western portion of Licence Block 11B/12B occurs predominantly in offshore waters exceeding 500 m depth, where the relative abundance of phytoplankton, zooplankton and ichthyoplankton is generally lower than that associated with the more productive coastal and shelf-edge regions of the central and eastern Agulhas Bank. As such, increased plankton productivity and abundance is anticipated within shallower shelf waters (< 400 m), intersected by the offshore pipeline corridor and potential CPF-1 location. Nevertheless, the offshore marine Project area remains connected to regional circulation patterns and may support transported planktonic organisms fish eggs and larvae originating from spawning areas elsewhere on the Agulhas Bank. (Figure 6-23).

6.6.3.2 Cephalopods

The Chokka squid (*L. reynaudii*) is the most commercially important cephalopod species occurring along the South Coast of South Africa. Its primary spawning grounds are located in nearshore coastal waters shallower than approximately 60 m between Plettenberg Bay and Algoa Bay east of the marine Project area (Figure 6-23) (Sauer et al., 1992; Jacobs et al., 2022a). The fishery targets spawning aggregations during the Spring and Summer spawning season, when males and females congregate over suitable sandy substrates and egg beds or “nests” are formed on the seafloor.

Chokka squid deposit egg capsules directly onto the seafloor, where embryonic development is strongly influenced by environmental conditions. Optimal development occurs within a relatively narrow range of temperatures (12-20°C) and dissolved oxygen concentrations exceeding 3 ml/l, making the Agulhas Bank a particularly favourable spawning environment (Roberts, 2005).

The extent of the known spawning grounds between Plettenberg Bay and Algoa Bay has been estimated at approximately 90 km² (Sauer et al., 1992). Following hatching, paralarvae are transported westwards by prevailing currents towards the central Agulhas Bank, where productive feeding conditions associated with the cold-water ridge and related oceanographic processes support growth and survival (Huggett and Richardson, 2000, Roberts, 2005 and Jacobs et al., 2022b).

Although the principal spawning grounds occur east of the marine Project area, both juvenile and adult Chokka squid utilise the wider Agulhas Bank as feeding grounds before migrating eastwards to spawn (Jacobs et al., 2022a).



Although chokka squid (*Loligo reynaudii*) is the dominant commercial cephalopod species of the South Coast, the broader marine Project area is likely to support a variety of octopus, cuttlefish and oceanic squid species associated with shelf, shelf-edge and upper bathyal habitats. Collectively, these cephalopods occupy an important ecological role as both predators of fish, crustaceans and zooplankton, and as prey for larger fishes, seabirds, seals and cetaceans, thereby forming an important trophic link within regional marine food webs.

6.6.3.3 Pelagic Fish and Sharks

Small pelagic fish species of the Agulhas Bank include anchovy (*E. encrasicolus*), sardine (*S. sagax*), round herring (or redeye; *Etrumeus whiteheadi*), chub mackerel (*Scomber japonicus*) and horse mackerel (*Trachurus capensis*) (Crawford, et al., 1987) Hutchings, 1994; DFFE, 2020). These species typically occur in mixed shoals of varying size and form an important trophic link between lower trophic levels and higher predators. Most small pelagic fish occur predominantly within the continental shelf environment, generally inside of the 200 m isobath, although they may also occur in nearshore waters and along the shelf-edge.

Chub mackerel (*S. japonicas*) undertake seasonal movements associated with the distribution of anchovy and sardine shoals, which constitute an important component of their diet (Payne & Crawford, 1989). Horse mackerel (*T. capensis*) are semi-pelagic shoaling fish associated with the continental shelf habitats of southern Africa and are generally more abundant on the South Coast and Agulhas Bank than the West Coast (DFFE, 2020). Round herring (*E. whiteheadi*) similarly occur in nearshore waters during their juvenile life stages before moving offshore with age (Roel et al., 1994; Hutchings, 1994).

Since the mid-1990s, the distribution of anchovy and sardine stocks has shifted eastward from the West Coast towards the central and eastern Agulhas Bank (DFFE, 2020). This shift has altered the spatial distribution of prey resources within the southern Benguela and Agulhas ecosystems and has implications for predator distributions and fisheries operating along the South African coast.

Within the broader marine Project area, anchovy are most abundant within the productive shelf waters located between the cool upwelling ridge and the Agulhas Current, corresponding largely to the shallower portions of the continental shelf and marine Project Area (Hutchings, 1994). Sardines similarly occur throughout the Agulhas Bank ecosystem and are strongly influenced by seasonal oceanographic conditions. Episodic upwelling along the Southeast Coast expands the extent of cool, suitable habitat available to sardines and contributes to the well-known annual 'sardine run', during which large shoals migrate northwards along the East Coast during late Autumn and Winter (van der Lingen et al., 2010; Teske et al., 2021).

In addition to the small pelagic species discussed above, the Agulhas Bank and adjacent offshore waters support a variety of larger pelagic and semi-pelagic predatory species. These include yellowtail (*Seriola lalandi*), elf (*Pomatomus saltatrix*), geelbek (*Atractoscion aequidens*), snoek (*Thyrsites atun*), tunas (*Thunnus* spp.) and billfishes. These highly mobile species are associated with productive shelf waters, shelf-edge habitats and the Agulhas Current system, where they prey on smaller pelagic fishes, squid and crustaceans. Many undertake extensive seasonal movements between coastal and offshore environments and contribute significantly to the transfer of energy between lower and upper trophic levels within the ecosystem. The offshore waters of the marine Project area also provide important feeding and migratory habitat for highly migratory pelagic species, including tunas, billfishes and oceanic sharks.



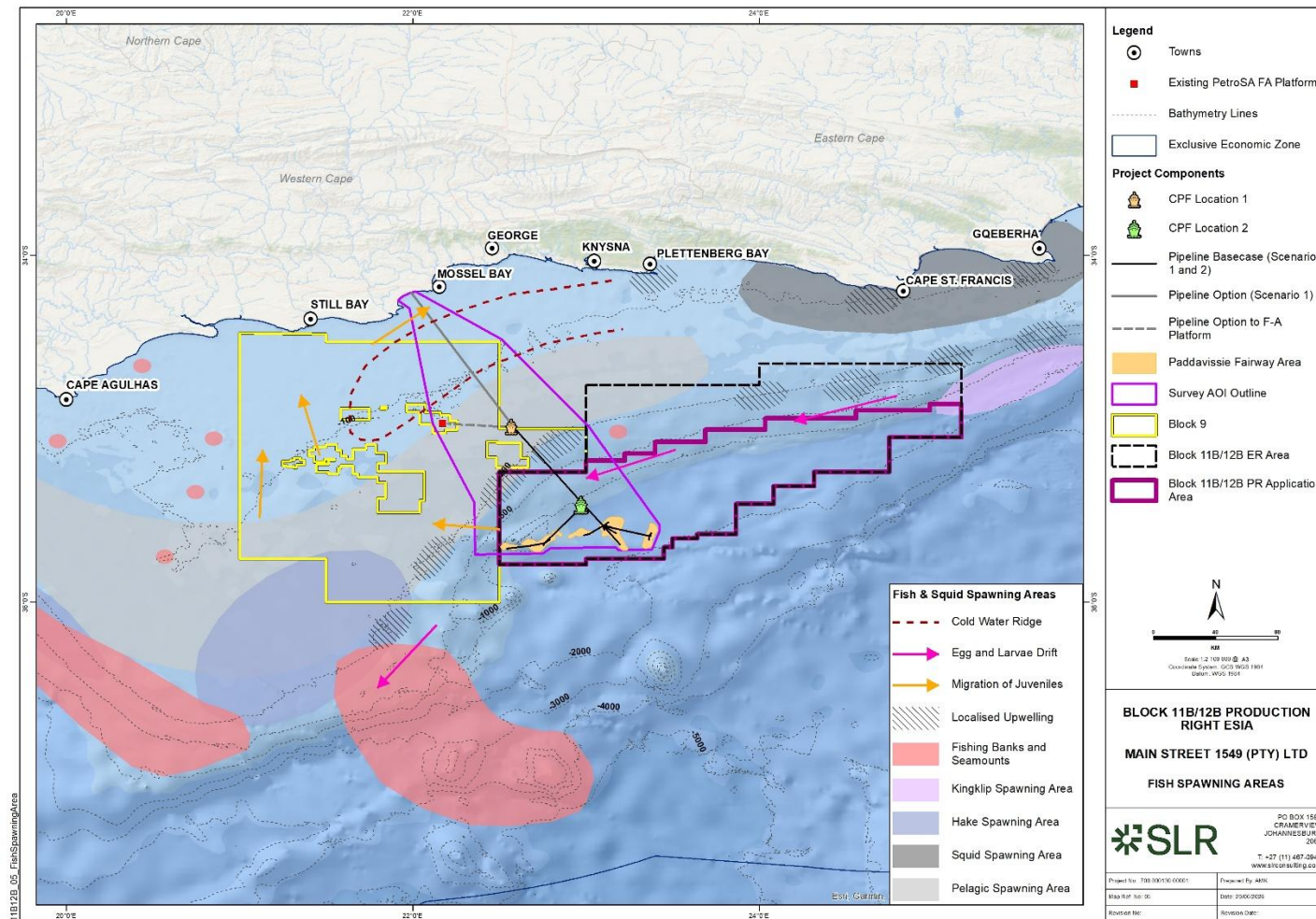


Figure 6-23: Marine Project Area and associated infrastructure in relation to important pelagic and demersal fish and squid spawning areas



Many of these species are considered globally ‘Threatened’ or ‘Near Threatened’ due to fishing pressure, incidental bycatch and cumulative impacts experienced across their migratory ranges (Table 6-9) (Lascelles et al., 2014; Allan et al., 2021).

The Agulhas Bank adjacent offshore waters also support a variety of pelagic and oceanic shark species. The productive shelf-edge environment, interaction between the Agulhas Current and shelf waters, and the concentration of forage fishes contribute to elevated predator abundance in the region. Species recorded from or predicted to occur within the broader marine Project area include the great white shark (*Carcharodon carcharias*), copper shark (*Carcharhinus brachyurus*), blue shark (*Prionace glauca*), dusky shark (*C. obscurus*) and shortfin mako (*Isurus oxyrinchus*), common thresher shark (*Alopias vulpinus*) and a variety of other pelagic and shelf-edge associated shark species (Harris et al., 2022; Sink et al., 2019) (Figure 6-24). These predators occupy upper trophic levels and play an important role in maintaining the structure and functioning of pelagic food webs. Several highly migratory pelagic fish and shark species known or predicted to occur within the offshore waters of the broader marine Project area are presented in Table 6-9.

Large shoals of sardine and anchovy may seasonally attract concentrations of predators, including sharks, tunas, seabirds and marine mammals, particularly during the annual sardine run along the East Coast (O'Donoghue et al., 2010a; van der Lingen et al., 2010).

Pelagic fauna recorded during environmental sampling included sharks (Squaliformes), rattails (*Macrouridae*) and oreos (*Oreosomatidae*) within the water column, confirming the occurrence of both pelagic and deep-water fish species within Licence Block 11B/12B (SLR, 2026).

Collectively, pelagic fish and sharks form a critical component of the South Coast marine ecosystem, linking planktonic production to higher trophic levels and providing an important prey resource for seabirds, marine mammals and larger predatory fishes.

Fisheries catch data and areas of operation relative to the marine Project area are presented in Section 6.8.2.

Table 6-9: Important large migratory pelagic fish likely to occur in the offshore regions of the South Coast

Common Name	Species Name	IUCN Conservation Status	National Assessment
Tunas			
Southern Bluefin tuna	<i>Thunnus maccoyii</i>	Endangered	Not Assessed / Depleted
Bigeye tuna	<i>Thunnus obesus</i>	Vulnerable	Vulnerable / Depleted
Longfin tuna/albacore	<i>Thunnus alalunga</i>	Least concern	Near Threatened / Optimal
Yellowfin tuna	<i>Thunnus albacares</i>	Least concern	Near Threatened / Optimal
Frigate tuna	<i>Auxis thazard</i>	Least concern	No Assessed
Eastern little tuna/Kawakawa	<i>Euthynnus affinis</i>	Least concern	Least Concern
Skipjack tuna	<i>Katsuwonus pelamis</i>	Least concern	Least Concern
Atlantic bonito/Katonkel	<i>Sarda sarda</i>	Least concern	



Common Name	Species Name	IUCN Conservation Status	National Assessment
Billfish			
Black marlin	<i>Istiompax indica</i>	Data deficient	Data Deficient
Blue marlin	<i>Makaira nigricans</i>	Vulnerable	Vulnerable
Striped marlin	<i>Kajikia audax</i>	Least concern	Near Threatened
Sailfish	<i>Istiophorus platypterus</i>	Least concern	Least Concern
Swordfish	<i>Xiphias gladius</i>	Near Threatened	Data Deficient / Depleted
Pelagic Sharks			
Great Hammerhead shark	<i>Sphyrna mokarran</i>	Critically Endangered	Not Assessed
Smooth Hammerhead shark	<i>Sphyrna zygaena</i>	Vulnerable	Not Assessed
Pelagic Thresher shark	<i>Alopias pelagicus</i>	Endangered	Not Assessed
Bigeye Thresher shark	<i>Alopias superciliosus</i>	Vulnerable	Not Assessed
Common Thresher shark	<i>Alopias vulpinus</i>	Vulnerable	Not Assessed
Dusky shark	<i>Carcharhinus obscurus</i>	Endangered	Data Deficient / Depleted
Great White shark	<i>Carcharodon carcharias</i>	Vulnerable	Least Concern
Shortfin Mako shark	<i>Isurus oxyrinchus</i>	Endangered	Vulnerable
Longfin Mako shark	<i>Isurus paucus</i>	Endangered	Endangered
Whale shark	<i>Rhincodon typus</i>	Endangered	Endangered
Blue shark	<i>Prionace glauca</i>	Near Threatened	Least Concern
Oceanic whitetip shark	<i>Carcharhinus longimanus</i>	Critically Endangered	Not Assessed
Bronze whaler shark	<i>Carcharhinus brachyurus</i>	Vulnerable	Data Deficient
Soupfin shark	<i>Galeorhinus galeus</i>	Critically Endangered	Heavily Depleted

Note: The global IUCN conservation status and that of the 2025 National assessment are provided.
Source: Sink et al. (2019); IUCN; Status of the South African Marine Fishery Resources (2025).



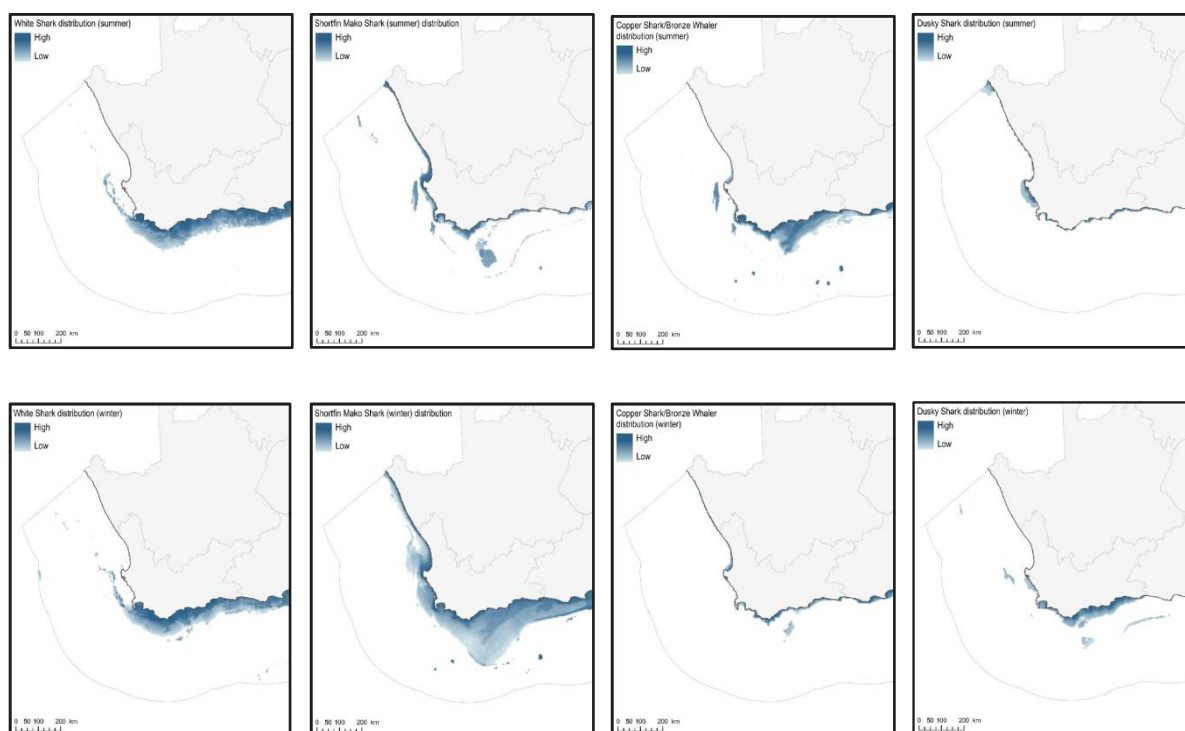


Figure 6-24: Summer (top) and winter (bottom) distribution of White Shark, Shortfin Mako, Bronze Whaler Shark and Dusky Shark (left to right)

Adapted from Harris et al. (2022)⁴⁷.

6.6.3.4 Marine Turtles

Three marine turtle species regularly occur within South African waters, namely the leatherback (*Dermochelys coriacea*), loggerhead (*Caretta caretta*) and green (*Chelonia mydas*) turtle (Bianchi, et al., 1999). In addition, the olive ridley (*Lepidochelys olivacea*) and the hawksbill turtle (*Eretmochelys imbricata*) are occasionally recorded as vagrants. Leatherback turtles (Figure 6-25, left) are the species most likely to occur in offshore waters of the Project area, whereas loggerhead and green turtles are primarily associated with continental shelf and coastal habitats.

⁴⁷ The distributions provided by Harris *et al.* (2022) are based on data from demersal fisheries. The apparent absence of cartilaginous species offshore is thus due to a lack of survey data rather than an indication that no species occur there.





Figure 6-25: Leatherback (left) and loggerhead turtles (right) occur in South African waters

Source: Ketos Ecology 2009; www.aquaworld-crete.com.

Green turtles nest mainly along the coast of Mozambique and on the Europa and Tromelin Islands (Lauret-Stepler et al. 2007). Loggerhead and leatherback turtles nest along the sandy beaches of southern Mozambique and northern KwaZulu-Natal. Following nesting season (October to March) both species undertake long-distance migrations between nesting and foraging areas throughout the Southwest Indian Ocean. Juvenile loggerheads typically recruit to coastal and continental shelf habitats where they feed on molluscs, crustaceans and other benthic organisms, whereas leatherbacks remain predominantly pelagic throughout much of their life cycle and forage primarily on gelatinous zooplankton.

The Agulhas Current plays an important role in the dispersal and movement of turtle hatchlings and juveniles. Between January and April, newly emerged loggerhead and leatherback hatchlings enter the Agulhas Current system either directly or via coastal currents and rip current transport (Hughes 1974). Once entrained, hatchlings are dispersed southwards and westwards along the South African coastline, with some individuals ultimately reaching the West Coast and southeast Atlantic (Hughes, 1974; Harris et al., 2018; Le Gouvello et al. 2024) (Figure 6-26). The Agulhas Current corridor is therefore considered an important migratory pathway for marine turtles.

Satellite tracking studies have shown that leatherback individuals from the KwaZulu Natal Coast regularly utilise waters along the South and East Coast of South Africa, including offshore regions associated with the Agulhas Current, following the nesting season. Specifically, based on telemetry-derived information the relative utilisation of movement corridors was determined (CUD, cumulative utilisation distribution). Overall, the mapped distribution illustrates that the offshore waters along the South Coast, including areas within the vicinity of the marine Project area, form part of the broader habitat utilised by the Southwest Indian Ocean population (Figure 6-27) (Luschi et al., 2006; Lombard et al., 2008; Harris et al., 2018).

Foraging leatherbacks are capable of diving to depths exceeding 600 m and may remain submerged for prolonged periods (Hays et al., 2004). Loggerhead and green turtles, more commonly associated with continental shelf and coastal habitats, may also occur within the shallower portions of the marine Project area associated with the pipeline route and nearshore environment.



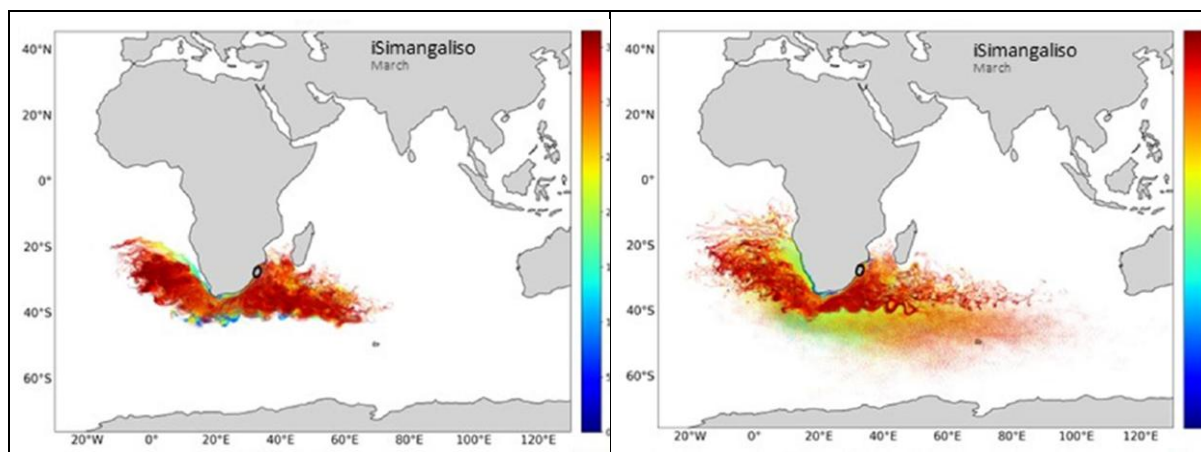


Figure 6-26: Dispersal maps showing trajectories of 5000 particles released from the respective nesting sites (white circles) in March 2018 for loggerheads (left) and leatherbacks (right). Colours (blue to red) indicate the number of days since release

Adapted from Le Gouvello et al. (2024)

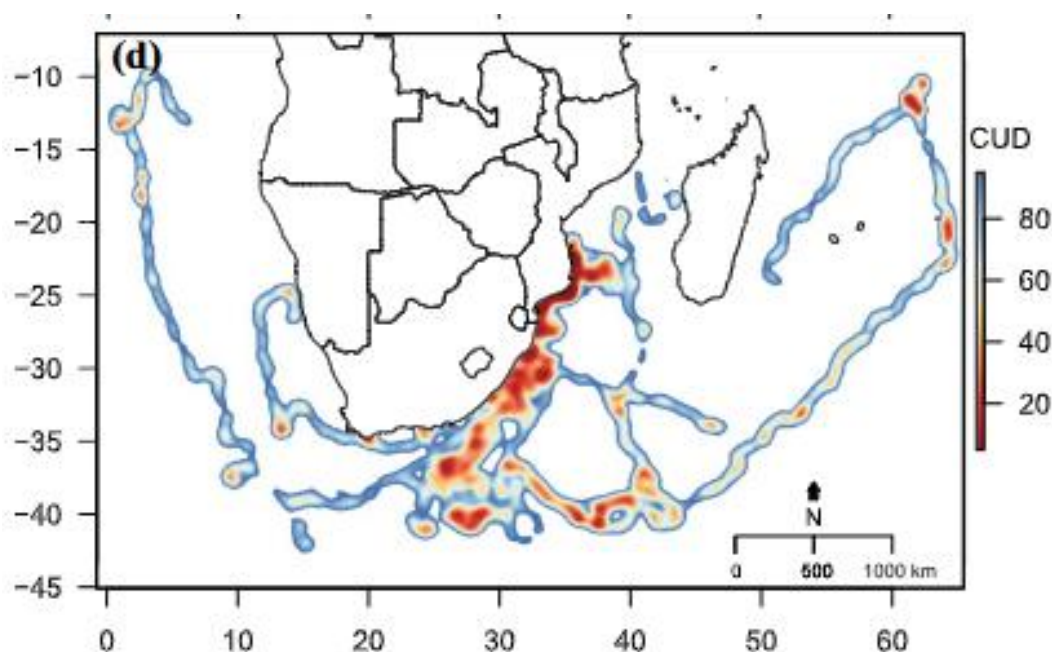


Figure 6-27: Migration corridors of leatherback turtles in the south-western Indian Ocean. Relative use (CUD, cumulative utilisation distribution) of corridors is shown through intensity of shading: light, low use; dark, high use

Source: Harris et al. (2018)

Although marine turtles are expected to occur within the Project area, their abundance is likely to be low and seasonal. Leatherback turtles are most likely to occur in the deeper offshore portions of Licence Block 11B/12B, reflecting their predominantly pelagic lifestyle and extensive use of oceanic waters. In contrast, loggerhead and green turtles are more closely associated with continental shelf and coastal habitats and may occur within the shallower waters intersected by the offshore pipeline corridor and shore crossing area. Juvenile loggerheads in particular are known to utilise coastal habitats and continental shelf



environments along the South African coast, while green turtles may forage in suitable coastal habitats during their movements through the region.

Marine turtles are among the most threatened marine vertebrates globally. Leatherback and loggerhead turtles, the species most likely to be encountered within the Project area, are considered conservation priorities throughout the southwest Indian Ocean. South Africa affords legal protection to all marine turtle species through national biodiversity legislation and is a signatory to various international agreements aimed at turtle conservation, including the Convention on Migratory Species (CMS).

Table 6-10: Global and regional conservation status of the turtles occurring off the South Coast of South Africa coastline, variation depends on the listing used.

Listing	Species		
	Leatherback	Loggerhead	Green
IUCN Red List:			
Species (date of assessment)	VU (2013)	VU (2017)	LC (2025)
Regional Management Unit (2017)	CR	NT	*
Sub-Regional/National (SA)			
NEMBA TOPS (2017)	CR	EN	EN
Hughes & Nel (2014)	EN	VU	NT

NT – Near Threatened, VU – Vulnerable, EN – Endangered, CR – Critically Endangered, DD – Data Deficient

* - Not yet assessed.

NEMBA TOPS: South African National Environmental Management: Biodiversity Act – List of Threatened or Protected Species (TOPS)

6.6.3.5 Seabirds

Approximately 60 seabird species have been recorded or are considered likely to occur along the South coast of South Africa. These include resident breeding species such as the African Penguin (*Spheniscus demersus*) and Cape Gannet (*Morus capensis*), migratory species such as the Damara Tern (*Sternula balaenarum*), and occasional vagrants occurring outside of their normal breeding or migratory ranges (Liversidge & Le Gras, 1981 and Ryan & Rose, 1989).

Fifteen seabird species are known to breed within the South Coast region (Table 6-11). Most breeding seabirds forage relatively close to shore, typically within 10-30 km of their colonies, although some species range considerably further offshore (Ludynia, et al., 2012). Cape Gannets (Figure 6-28, left), have been recorded foraging up to approximately 140 km offshore, while African Penguins (Figure 6-28, right) may range up to 60 km from breeding colonies in search of prey (Dundee, 2006; Ludynia, 2007; Ludynia, et al., 2012).





Figure 6-28: Cape Gannets *Morus capensis* (left) and African Penguins *Spheniscus demersus* (right) breed primarily on the offshore islands.

Source: J. Kemper, Martin Harvey (<https://www.worldwildlife.org/pages/improved-nesting-management-and-monitoring-for-african-penguins-in-south-africa>).

Important breeding sites occur along the South Coast between Cape Agulhas and Algoa Bay. These include Damara Tern breeding areas between Cape Agulhas and Cape Infanta, Cape Cormorant colonies on the southern Cape coastline, and important breeding sites for Kelp Gulls (*Larus dominicanus*) and other coastal seabirds (Marnewick, et al. 2015, Witteveen, 2015). African penguin colonies occur at Dyer Island to the west and at Cape Recife and several islands within Algoa Bay to the east, while a more recent colony has become established in the De Hoop Nature Reserve (SANCCOB, 2023). All breeding colonies are more than 100 km away from the Project area.

The annually updated report, “Threatened Seabird Habitats in the South African EEZ,” represents the *most current and reliable delineation* of Marine Important Bird Areas (MIBAs) within South Africa’s EEZ (BirdLife South Africa, 2025). This report compiles all available tracking data for threatened seabird species occurring within the South African EEZ and applies established analytical methods to identify core use areas and, where possible, distinguish patterns across different life-history stages. Much of the tracking information generated through this work has already informed national marine spatial planning processes, including incorporation into latest Version 1.2 of the National Coastal and Marine CBA Map. The underlying tracking database is updated on an ongoing basis to support future planning and conservation-priority assessments.

MIBAs were delineated separately for each species, colony, and breeding stage (hereafter referred to as “data groups”). None of these proposed MIBAs are found to overlaps with the marine Project area (Figure 6-43). Internationally recognized Important Bird Areas (IBAs) along the South Coast of South Africa are discussed further in Section 6.7.3.4.

Table 6-11: Breeding seabirds species present along the South Coast and their national and global IUCN classification

Common Name	Species	Global IUCN	Regional
*African Penguin	<i>Spheniscus demersus</i>	Critically Endangered	Endangered
*African Black Oystercatcher	<i>Haematopus moquini</i>	Least Concern	Least Concern
White-breasted Cormorant	<i>Phalacrocorax carbo</i>	Least Concern	Least Concern
*Cape Cormorant	<i>Phalacrocorax capensis</i>	Endangered	Endangered
*Bank Cormorant	<i>Phalacrocorax neglectus</i>	Endangered	Endangered



Common Name	Species	Global IUCN	Regional
*Crowned Cormorant	<i>Phalacrocorax coronatus</i>	Least Concern	Vulnerable
White Pelican	<i>Pelecanus onocrotalus</i>	Least Concern	Vulnerable
*Cape Gannet	<i>Morus capensis</i>	Endangered	Vulnerable
Kelp Gull	<i>Larus dominicanus</i>	Least Concern	Least Concern
Greyheaded Gull	<i>Larus cirrocephalus</i>	Least Concern	Least Concern
*Hartlaub's Gull	<i>Larus hartlaubii</i>	Least Concern	Vulnerable
Caspian Tern	<i>Hydroprogne caspia</i>	Least Concern	Vulnerable
*Greater Crested (Swift) Tern	<i>Sterna bergii</i>	Least Concern	Least Concern
Roseate Tern	<i>Sterna dougallii</i>	Least Concern	Vulnerable
*Damara Tern	<i>Sterna balaenarum</i>	Least Concern	Endangered

* denotes the species is endemic to southern Africa.

Differences between National and global classifications are the result of local population size, and the extent and duration of declines locally.

Source: CCA & CMS 2001; Sink et al. 2019; IUCN, 2022, Birdlife (2025).

In addition to coastal breeding species, the Agulhas Bank and adjacent offshore waters support diverse assemblages of pelagic seabirds. Many species associated with the Southern Ocean, including albatrosses, petrels and shearwaters, utilise the shelf edge and offshore waters of the South Coast, particularly during the non-breeding season (Figure 6-29). These species are attracted by the high productivity of the Agulhas Bank and associated concentrations of pelagic prey. Seabird abundance is typically greatest in offshore waters associated with the shelf break (approximately 200-500 m depth), where oceanographic processes enhance prey availability.

MMO surveys undertaken within the marine Project area recorded 14 seabird species comprising 1 384 individuals. The most abundant species observed were Cory's Shearwater (*Caloneactris borealis*), Cape Gannet (*Morus capensis*), White-chinned Petrel (*Procellaria aequinoctialis*) and Great-winged Petrel (*Pterodroma macroptera*) (BSL & CapMarine, 2023 as cited in WSP 2024) (Figure 6-30).

Additional seabird observations collected during offshore surveys in the vicinity of the marine Project area indicate regular utilisation of offshore waters by a variety of pelagic seabird species, including White-chinned Petrels, Cape Gannets, Indian Yellow-nosed Albatrosses, (*Thalassarche carteri*), Shy Albatrosses (*Thalassarche cauta*) and Wilson's Storm Petrel (*Oceanites oceanicus*) (P.A. Whittington (Nelson Mandela University), pers. comm., 2023 as cited in SLR 2025).



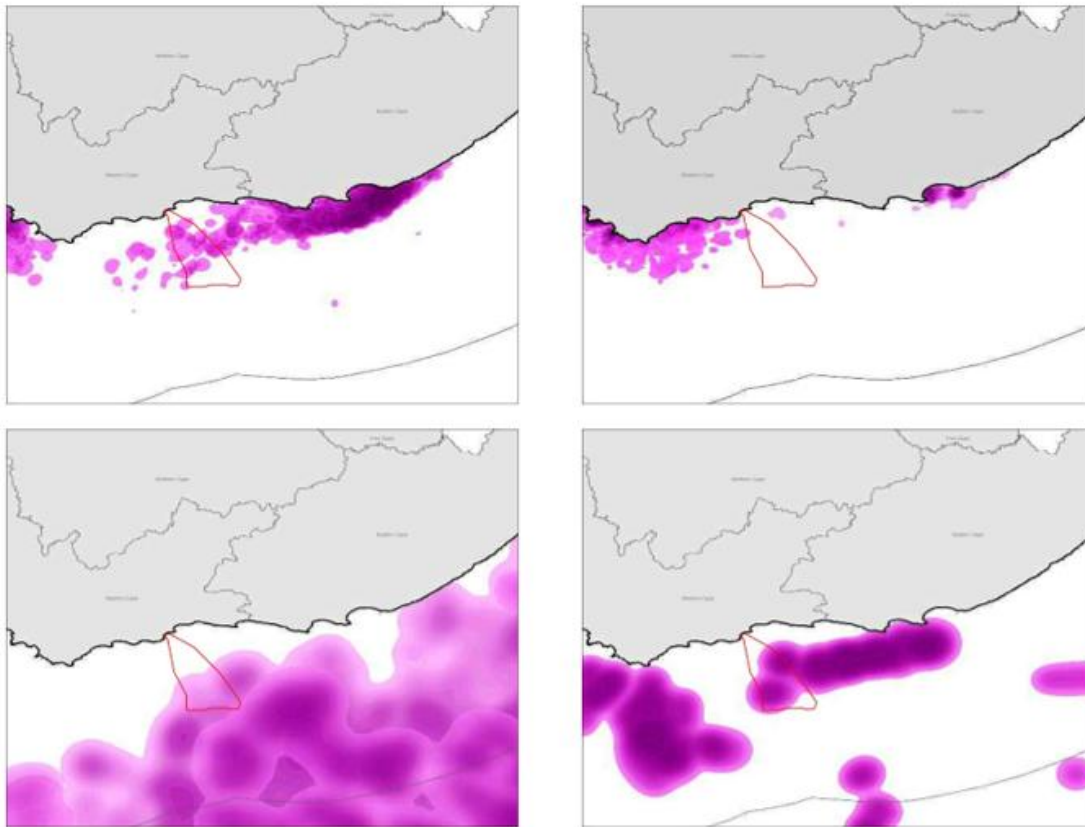


Figure 6-29: Marine Project Area (red polygon) in relation to aggregate core home ranges of Cape Gannet (top left) and African Penguin (top right) for different life-history stages and colonies. The foraging areas of Wandering Albatross (bottom left) and Atlantic Yellow-Nosed Albatross (bottom right) are shown in relation to the Licence Block

Note: For foraging areas, darker shades are areas of higher use, and where foraging areas from different colonies overlap.

Adapted from Harris et al. (2022)



Figure 6-30: Cory's shearwater (left) and Cape gannet (right) observed during survey activities



6.6.3.6 Cetaceans

The cetacean fauna of the South Coast comprises 35 whale and dolphin species that are known, or considered likely, to occur within the broader Project region based sighting, stranding and habitat projections (Table 6-12) (Findlay et al., 1992, Best, 2007, Weir, 2011, unpublished records held by Sea Search). These include both baleen whales (Mysticetes) and toothed whales⁴⁸ and dolphins (Odontocetes), representing a diverse range of coastal, shelf-edge and oceanic species.

The distribution of cetaceans along the South Coast is strongly influenced by water depth, oceanographic conditions and prey availability. Species assemblages can broadly be separated into those associated with the continental shelf habitats and those occurring in deep, oceanic waters. The continental slope and shelf-edge environments (200-2 000 m), which are well representing in the Project area, support particularly high cetacean diversity because they provide habitat for both shelf-associated and oceanic species (Findlay et al., 1992, Best, 2007). These productive areas are frequently utilised as feeding, migration and transit corridors.

Cetaceans expected to occur within the marine Project area include humpback whales (*Megaptera novaeangliae*), southern right whales (*Eubalaena australis*), Bryde's whales (*Balaenoptera brydei*), sperm whales (*Physeter macrocephalus*), long-finned pilot whales (*Globicephala melas*), common bottlenose dolphins (*Tursiops truncatus*), common dolphins (*Delphinus delphis*), Risso's dolphins (*Grampus griseus*) and striped dolphins (*Stenella coeruleoalba*). Additional baleen whales, dolphins and oceanic odontocetes may occur less frequently within offshore waters of the Agulhas Bank and along the continental shelf edge (CapMarine, 2020a; 2020b; Purdon, et al. 2020a).

Mysticetes (baleen whales) and odontocetes (toothed whales and dolphins) differ markedly in their ecology, behaviour and acoustic characteristics. Baleen whales are generally migratory species that undertake seasonal movements between feeding and breeding grounds, while toothed whales and dolphins exhibit a broader range of movement patterns, from resident coastal populations to wide-ranging oceanic species. Owing to these differences, the two groups are considered separately below.

The South African Red List assessment of cetaceans was updated in 2016 and represents the most recent regional conservation assessment. Of the 33 species assessed, the blue whale (*Balaenoptera musculus*) is listed as Critically Endangered; fin whale (*Balaenoptera physalus*) and sei whale (*Balaenoptera borealis*) are listed as Endangered; while sperm whale, inshore Bryde's whale and the B2 subpopulation of humpback whale are listed as Vulnerable. A large proportion of species remain classified as Data Deficient, highlighting the limited information available on cetacean distributions, abundance and population trends in southern African waters.

MMO sightings (Figure 6-34), indicate that a range of species occur near and/or within the marine Project area, particularly humpback whale and various dolphin species. It is important to highlight, however, that the spatial distribution of sightings reflects both cetacean occurrence and the distribution of MMO survey effort and that the extent of available data is dependent on the location of previous hydrocarbon exploration and appraisal activities, as well as environmental surveys that utilised MMOs (as per Section 6.2.2.3).

⁴⁸ 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).



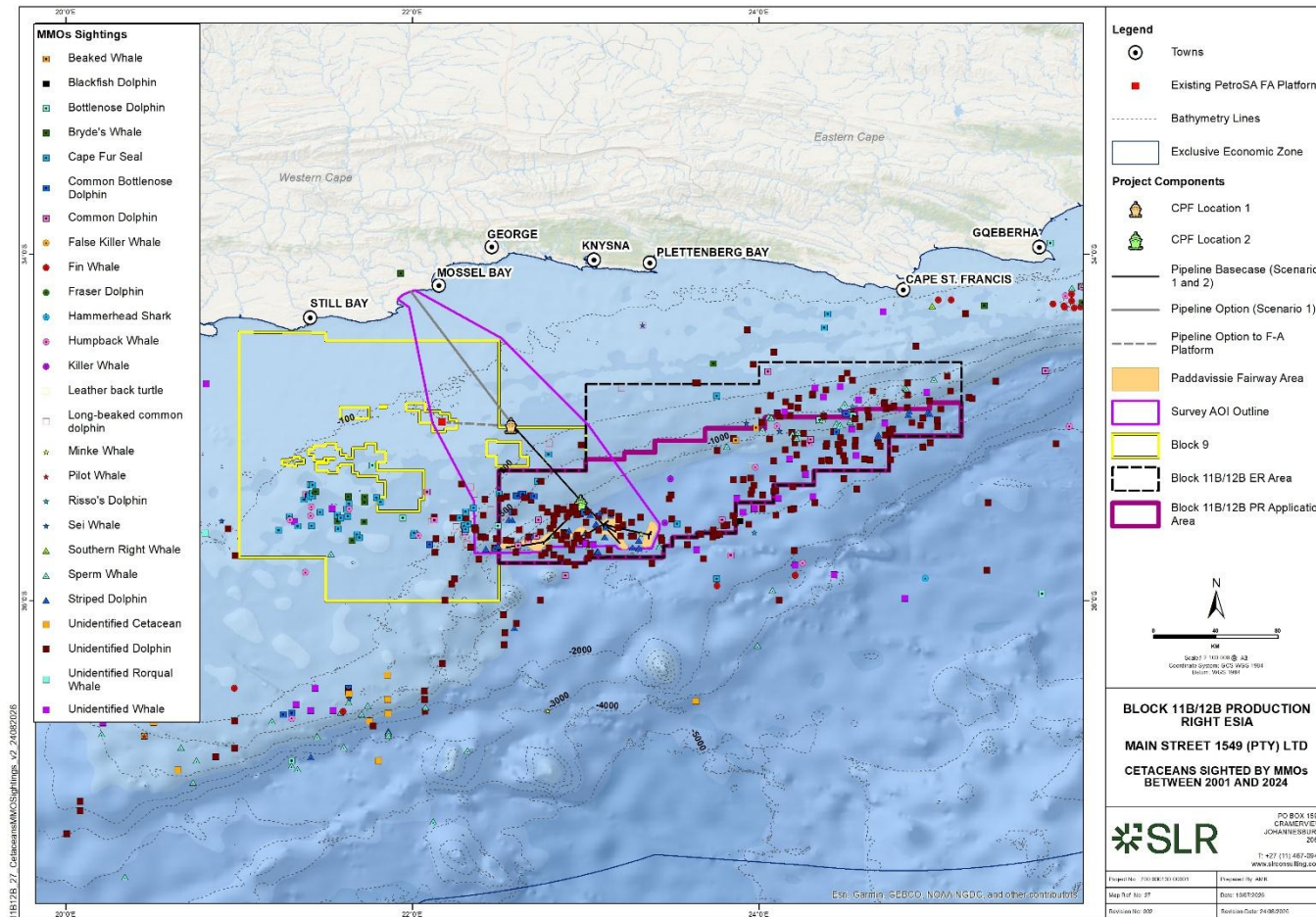


Figure 6-31: Marine Project area and associated infrastructure in relation to marine mammal observations recorded during previous exploration activities in the region, collated between 2001 and 2024

Source: SLR MMO database



Table 6-12: Cetacean occurrence off the South Coast of South Africa, their distribution, seasonality, hearing frequency, and associated South African and Global IUCN Red List conservation status

Common Name	Species	Hearing Frequency	Shelf (<200 m)	Offshore (>200 m)	Seasonality	RSA Regional Assessment	IUCN Global Assessment
Delphinids							
Dusky dolphin	<i>Lagenorhynchus obscurus</i>	HF	Yes (0- 800 m)	No	Year round	Least Concern	Least Concern
Heaviside's dolphin	<i>Cephalorhynchus heavisidii</i>	VHF	Yes (0-200 m)	No	Year round	Least Concern	Near Threatened
Common bottlenose dolphin	<i>Tursiops truncatus</i>	HF	Yes	Yes	Year round	Least Concern	Least Concern
Common dolphin	<i>Delphinus delphis</i>	HF	Yes	Yes	Year round	Least Concern	Least Concern
Indo-Pacific bottlenose dolphin	<i>Tursiops truncatus</i>	HF	Yes	No	Year round	Least Concern	Near Threatened
Indian Ocean humpback dolphin	<i>Sousa plumbea</i>	HF	Yes	No	Year round	Not Assessed	Endangered
Southern right whale dolphin	<i>Lissodelphis peronii</i>	HF	Yes	Yes	Year round	Least Concern	Least Concern
Striped dolphin	<i>Stenella coeruleoalba</i>	HF	No	Yes	Year round	Least Concern	Least Concern
Pantropical spotted dolphin	<i>Stenella attenuata</i>	HF	Edge	Yes	Year round	Least Concern	Least Concern
Long-finned pilot whale	<i>Globicephala melas</i>	HF	Edge	Yes	Year round	Least Concern	Least Concern
Short-finned pilot whale	<i>Globicephala macrorhynchus</i>	HF	Edge	Yes	Year round	Least Concern	Least Concern
Rough-toothed dolphin	<i>Steno bredanensis</i>	HF	No	Yes	Year round	Not Assessed	Least Concern
Killer whale	<i>Orcinus orca</i>	HF	Occasional	Yes	Year round	Least Concern	Data deficient
False killer whale	<i>Pseudorca crassidens</i>	HF	Occasional	Yes	Year round	Least Concern	Near Threatened
Pygmy killer whale	<i>Feresa attenuata</i>	HF	No	Yes	Year round	Least Concern	Least Concern
Risso's dolphin	<i>Grampus griseus</i>	HF	Yes (edge)	Yes	Year round	Data Deficient	Least Concern
Sperm whales							
Pygmy sperm whale	<i>Kogia breviceps</i>	VHF	Edge	Yes	Year round	Data Deficient	Least Concern
Dwarf sperm whale	<i>Kogia sima</i>	VHF	Edge	Yes	Year round	Data Deficient	Least Concern
Sperm whale	<i>Physeter macrocephalus</i>	HF	Edge	Yes	Year round	Vulnerable	Vulnerable
Beaked whales							
Cuvier's	<i>Ziphius cavirostris</i>	HF	No	Yes	Year round	Data Deficient	Least Concern



Common Name	Species	Hearing Frequency	Shelf (<200 m)	Offshore (>200 m)	Seasonality	RSA Regional Assessment	IUCN Global Assessment
Arnoux's	<i>Berardius arnuxii</i>	HF	No	Yes	Year round	Data Deficient	Least Concern
Southern bottlenose	<i>Hyperoodon planifrons</i>	HF	No	Yes	Year round	Least Concern	Least Concern
Layard's	<i>Mesoplodon layardii</i>	HF	No	Yes	Year round	Data Deficient	Least Concern
True's	<i>Mesoplodon mirus</i>	HF	No	Yes	Year round	Data Deficient	Least Concern
Gray's	<i>Mesoplodon grayi</i>	HF	No	Yes	Year round	Data Deficient	Least Concern
Blainville's	<i>Mesoplodon densirostris</i>	HF	No	Yes	Year round	Data Deficient	Least Concern
Baleen whales							
Antarctic Minke	<i>Balaenoptera bonaerensis</i>	LF	Yes	Yes	>Winter	Least Concern	Near Threatened
Dwarf minke	<i>B. acutorostrata</i>	LF	Yes	Yes	Year round	Least Concern	Least Concern
Fin whale	<i>B. physalus</i>	LF	Yes	Yes	MJJ & ON	Endangered	Vulnerable
Blue whale (Antarctic)	<i>B. musculus intermedia</i>	LF	No	Yes	Winter peak	Critically Endangered	Critically Endangered
Sei whale	<i>B. borealis</i>	LF	Yes	Yes	MJ & ASO	Endangered	Endangered
Bryde's (inshore)	<i>B. edeni (subsp.)</i>	LF	Yes	Edge	Year round	Vulnerable	Least Concern
Bryde's (offshore)	<i>B. edeni</i>	LF	Edge	Yes	Summer (JFM)	Data Deficient	Least Concern
Pygmy right	<i>Caperea marginata</i>	LF	Yes	Unknown	Year round	Least Concern	Least Concern
Humpback	<i>Megaptera novaeangliae</i>	LF	Yes	Yes	Year round (SONDJF)	Least Concern	Least Concern
Humpback B2 subpopulation	<i>Megaptera novaeangliae</i>	LF	Yes	Yes	Spring/Summer peak (ONDJF)	Vulnerable	Not Assessed
Southern right	<i>Eubalaena australis</i>	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, Sirenia (SI), Phocid carnivores in water (PCW) and other marine carnivores in water (OCW).

Note: Shelf = waters <200 m depth; Offshore = waters >200 m depth; Edge = species commonly associated with shelf-break habitats; Occasional = infrequent occurrence. Seasonality abbreviations denote months of peak occurrence (Jan-Dec), e.g. MJJ = May-July.

Source: Adapted from Child et al. (2016)



As such, higher sighting densities may reflect increased monitoring effort rather than higher cetacean abundance. Similarly, areas with few or no records may simply represent gaps in survey coverage.

Opportunistic MMO and PAM surveys undertaken during survey activities confirmed the occurrence of cetaceans within Licence Block 11B/12B. Between 28 November and 14 December 2022, thirteen cetacean sightings were recorded, comprising 212 striped dolphins (*Stenella coeruleoalba*), 82 long-beaked common dolphins (*Delphinus capensis*), six unidentified dolphins, four unidentified whales and two humpback whales (*Megaptera novaeangliae*). PAM monitoring recorded at least two sperm whales (*Physeter macrocephalus*), at least 40 unidentified delphinids and one additional odontocete detection (BSL & CapMarine, 2023 as cited in WSP 2024).

All whales and dolphins are protected under South African legislation, including the Marine Living Resources Act (Act No. 18 of 1998), which prohibits the harassment, capture or killing of cetaceans without authorisation. Vessels and aircraft may not intentionally approach within 300 m of whales without the relevant permits.

The most commonly encountered and ecologically relevant cetacean species for the marine Project area are briefly described below

Mysticete (Baleen) whales

Several mysticetes (baleen whales) are seasonal visitors to South African waters, undertaking long-distance migrations between high-latitude feeding grounds and lower-latitude breeding and calving areas. Several species occur along the South Coast and Agulhas Bank, where the continental shelf edge and adjacent offshore waters provide important migrations, transit and, in some cases feeding habitat. The species most likely to occur within the marine Project area include humpback whales, southern right whales, Bryde's whales, and less frequently sei whales.

Humpback whales

Humpback whales (Figure 6-32) are among the cetacean species most likely to be encountered within the Project area. Individuals occurring along the South Coast form part of the south-west Indian Ocean population and undertake seasonal migrations between Antarctic feeding grounds and tropical breeding areas further north (Rosenbaum et al., 2009; Barendse et al., 2010).

The South Coast forms an important component of the migration route used by this population. Northbound migration typically occurs between April and September, while southbound migration occurs between September and December. Unlike southern right whales, humpback whales utilise a broad range of habitats extending from nearshore waters across the continental shelf and shelf edge into deeper offshore waters migration (Best & Allison, 2010; Barendse, et al., 2010; Elwen, et al., 2014). Satellite telemetry studies have shown that individuals may follow both coastal and offshore migration routes and may undertake feeding movements within productive shelf-edge regions of the Agulhas Bank and southern Benguela ecosystem (Seakamela, et al., 2015).

Given the broad habitat preferences of humpback whales and the location of the marine Project area across nearshore, shelf-edge and offshore environments, the species is likely to occur throughout much of the marine Project area during migration periods, with peak occurrence expected between April and December.





Figure 6-32: The humpback whale *Megaptera novaeangliae*.

Source: K. Findlay

Bryde's whales

Two genetically and morphologically distinct populations of Bryde's whale (*Balaenoptera brydei*) occur in southern African waters (Best, 2001; Penry, 2010). The more widely distributed offshore population occurs primarily beyond the continental shelf and undertakes seasonal movements between offshore waters off West Africa and South Africa. Although individuals from this population may occasionally occur within the deeper offshore portions of the Project area, their distribution and abundance remain poorly understood.

The inshore population is more relevant to the Project area. Unlike most baleen whale species, the inshore South African population is largely non-migratory and occurs throughout the year on the continental shelf and Agulhas Bank, from Durban on the East Coast to at least St Helena Bay on the West Coast (Best, 2001; Penry, 2010). The inshore population is closely associated with productive shelf habitat and is known to utilise the Agulhas Bank waters extensively. Peak encounter rates generally occur during late Summer and Autumn when prey resources are abundant (Penry et al. 2011; Purdon et al. 2020a). Given the range of the species and the location of the marine Project area across both shelf and shelf-edge environments, Bryde's whales may occur within the area throughout the year.

Southern right whales

Southern right whales (*Eubalaena australis*) are among the most abundant baleen whales occurring in south African waters. The southern African population is estimated at approximately 6 100 individuals and continues to increase at ~6.5% per annum following recovery from historical whaling (Brandao, et al., 2017). Historically the population ranged from southern Mozambique to southern Angola and is gradually reoccupying portions of this former range as numbers recover (Banks et al., 2011; Roux et al., 2015; Whitt et al., 2023).

Southern right whales are primarily coastal animals and typically occur within a few kilometres of the coastline. Along the South Coast they are most frequently observed between June and November, when breeding, calving and socialising activities occur in sheltered coastal waters. Although the species is more strongly associated with nearshore habitats than with offshore environments, individuals moving between breeding and feeding areas may pass through portions of the Project area, particularly along the nearshore pipeline corridor and continental shelf environments.



Sei whales

Relatively little is known about the distribution and abundance of sei whales (*Balaenoptera borealis*) in southern African waters, with much of the available information derived from historical whaling records collected between 1958 and 1963 (Best & Lockyer, 2002; Best, 2007). Sei whales spend Summer months in high latitude feeding grounds and migrate through South African waters en route to breeding grounds further north (Best, 2007). Historical records indicate that species occurs primarily in offshore waters deeper than 200 m, with most catches recorded in waters exceeding 1 000 m (Best & Lockyer, 2002).

Given the predominantly offshore distribution of sei whales and the location of much of Licence Block 11B/12B along the continental slope and upper bathyal environment, individuals may occasionally be encountered within the Project area, particularly during Winter and Spring migration periods. However, contemporary information on abundance and distribution patterns in the South Coast region remains limited.

Odontocete (toothed) whales

Odontocetes are a varied group of cetaceans including the dolphins, porpoises, beaked whales and sperm whales. Species occurring within the broader marine 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.

Common dolphins

Two forms of common dolphins occur around southern Africa, a long-beaked and short-beaked form (Findlay, et al., 1992; Best, 2007), although they are currently considered part of a single global species (*Delphinus capensis*) (Cunha et al. 2015). Long-beaked common dolphins range widely across the shelf waters of South Africa, primarily on the South and East Coasts. They are most commonly spotted between St. Helena Bay on the West Coast and Richard's Bay in the east. In 1988/89 the population of long-beaked common dolphins between Gqeberha and Richard's Bay was estimated at 15 000–20 000 animals, although this is thought to be an underestimate (Cockcroft & Peddemors 1990, Peddemors 1999) and estimates of the population size and seasonality for the subregion are lacking. Both species have been encountered in Licence Block 11B/12B during seismic surveys (CCA Environmental 2005, CapMarine 2020a b, BSL & CapMarine 2023). Their predicted distribution indicates a high probability of occurrence in the marine Project area (Purdon et al. 2020a).

Far less is known about the short-beaked form, which is challenging to differentiate from the long-beaked form at sea. Group sizes are also typically large. Both forms are expected to occur within the broader Project area, with long-beaked common dolphins more frequently associated with shelf waters and short-beaked common dolphins generally occurring further offshore.

Striped dolphin

Striped dolphins (*Stenella coeruleoalba*) are widely distributed in temperate and tropical offshore waters and are commonly associated with shelf-edge and oceanic habitats. The species occurs regularly along the South Coast and offshore Agulhas Bank and is considered one of the odontocete species most likely to be encountered within the deeper offshore portions of the Project area. Striped dolphins comprised the most frequently observed cetacean species during survey activities, with 212 observations recorded (BSL & CapMarine, 2023 as cited in WSP 2024)





Figure 6-33: Common dolphins (left) and striped dolphin (right) observed during survey activities

Bottlenose dolphin

Two species of bottlenose dolphins occur around southern Africa. The common bottlenose dolphin (*Tursiops truncatus*) is widely distributed in shelf-edge and offshore waters, the Indo-Pacific bottlenose dolphin (*T. aduncus*) is primarily associated with nearshore coastal habitats along the South and East Coasts of the South Africa.

Seasonal movements of a genetically distinct ‘migratory stock’ of Indo-Pacific bottlenose dolphins along the South and East Coasts in association with the ‘sardine run’ have also been recorded (Natoli et al. 2008). Encounters in the marine Project area are likely, with the highest occurrence expected in nearshore shelf waters associated with the offshore pipeline corridor and landfall area.

Long- and short-finned pilot whales

Long- and short-finned pilot whales display a preference for temperate waters and are usually associated with the continental shelf or adjacent deep waters (Findlay, et al., 1992; Mate, et al., 2011; Weir, 2011; Seakamela, et al., 2022). The distinction between long-finned and short finned pilot whales is difficult to make at sea. Short-finned pilot whales are regarded as a more tropical species (Best, 2007), and most sightings within the Agulhas region are thought to be short-finned pilot whales, however, due to the low latitude and offshore nature of the project, it is likely that both could be encountered. Pilot whales have been recorded during seismic surveys undertaken in Licence Block 11B/12B (CapMarine, 2020b).

Risso’s dolphin

Risso’s dolphins (*Grampus griseus*) are widely distributed in tropical and temperate waters and are typically associated with shelf-edge habitats and areas of steep bathymetric relief. Along the South African coast, the species is frequently recorded along the Agulhas Bank shelf edge, where it is thought to forage primarily on cephalopods, and may therefore be encountered within the Project area.

Sperm whales

The majority of information about sperm whales in the southern African subregion stems from data collected during commercial whaling activities, i.e., pre 1985 (Best, 2007). Sperm whales feed at great depths during dives in excess of 30 minutes making them difficult to detect visually. The regular echolocation clicks made by the species when diving, however, make them relatively easy to detect acoustically using Passive Acoustic Monitoring (PAM). Sperm whales are the largest of the toothed whales and have a complex, structured social system with adult males behaving differently to younger males and female groups. They



occur in deep ocean waters, usually greater than 1 000 m depth, although they occasionally come into waters 500 m to 200 m deep on the shelf (Best, 2007; Shabangu & Andrew, 2020). They are relatively abundant globally (Whitehead 2002), although no estimates are available for the southern African subregion. Although animals occur year-round, seasonality of catches off the East Coast of South Africa suggests that medium and large sized males are more abundant in Winter (June to August) months, while female groups are more abundant in Summer (December to February) (Best, 2007; Shabangu & Andrew, 2020). All sightings were recorded in waters deeper than 780 m, and numbers peaked during April to June (Weir, 2011). Sperm whales along the South Coast are likely to be encountered in deeper waters (>500 m), predominantly in the winter months (Purdon et al. 2020a).

Dwarf and pygmy sperm whales

The genus *Kogia* contains two recognised species, the dwarf and pygmy sperm whales, both of which occur worldwide in pelagic and shelf edge waters, with few sighting records of live animals in their natural habitat (McAlpine, 2018). Both species are deep water specialists living primarily off the shelf. There is preliminary evidence of species level genetic differentiation between dwarf sperm whale populations in the Indian and Atlantic Oceans (Chivers, et al., 2004). Due to their small body size, cryptic behaviour and small school sizes, these whales are difficult to observe at sea, and morphological similarities make field identification to species level problematic. However, their narrow-band high frequency echolocation clicks make them detectable and identifiable (at least to the genus) using PAM equipment. The majority of what is known about kogiid whales in the southern African subregion results from studies of stranded specimens (Ross, 1979; Findlay, et al., 1992; Elwen, et al., 2013; Moura, et al., 2016). *Kogia* species most frequently occur in pelagic and shelf edge waters, and are thus likely to occur in the marine Project area at low levels; seasonality is unknown. Dwarf sperm whales are associated with warmer tropical and warm-temperate waters, being recorded from both the Benguela and Agulhas ecosystem (Best, 2007) in waters deeper than ~1 000 m.

Recent stranding records along the South and West Coasts suggest that kogiids occur regularly in regional waters and may represent resident or seasonally occurring populations, particularly during Autumn and Winter (Seakamela et al., 2020; 2021).

Beaked whale

Beaked whales are among the most specialised deep-diving odontocetes and are typically associated with slope and oceanic habitats exceeding 1 000 m depth (Best, 2007). The deeper offshore portions of Licence Block 11B/12B provide potentially suitable habitat for several beaked whale species, although information on their distribution and abundance along the South Coast remains limited. Several species have been recorded from southern African waters, primarily through stranding records and occasional offshore sightings (Findlay et al., 1992; Best, 2007).

Killer whales

Killer whales (*Orcinus orca*) have a circum-global distribution and occur at low densities throughout southern African waters. The species has been recorded from coastal, shelf-edge and oceanic environments and may occasionally occur within the Project area, although encounters are expected to be infrequent (Best, et al., 2010)

Other Delphinids

Several other species of dolphins that might occur in deeper waters at low levels include the pygmy killer whale, Fraser's dolphin, pan-tropical spotted dolphin and striped dolphin (Findlay, et al., 1992; Best, 2007).



6.6.3.7 Seals

The Cape fur seal (*Arctocephalus pusillus pusillus*) is the only resident seal species occurring along the South Coast, where it occupies breeding and non-breeding colonies on offshore islands, rocky headlands and reefs (Figure 6-34). Vagrant records of several sub-Antarctic species have also been documented, including southern elephant seals (*Mirounga leonina*), sub-Antarctic fur seal (*Arctocephalus tropicalis*), crabeater (*Lobodon carcinophagus*) and leopard seals (*Hydrurga leptonyx*), although these species occur only rarely in South African waters (David, 1989).

The South African Cape fur seal population was estimated at approximately 725 000 individuals in 2020 and comprises a substantial proportion of the southern African population (Seakamela, et al., 2022). Several colonies occur within the broader South Coast region, including at Seal Island in Mossel Bay (population size = ~4 000 individuals), the Robberg Peninsula in Plettenberg Bay (population size = ~5 000 individuals) and the Black Rocks (Bird Island group) in Algoa Bay (Pisces, 2019). The Seal Island colony in Mossel Bay is the closest breeding colony (~20 km east) to the marine Project area and is therefore the most relevant to the assessment.

Cape fur seals are highly mobile predators that forage extensively across continental shelf and shelf edge habitats. Individuals commonly undertake foraging trips extending well beyond the immediate vicinity of breeding colonies and may range more than 200 km offshore (Shaughnessy, 1979). Their diet varies spatially and seasonally but typically includes pelagic and demersal fishes such as horse mackerel, sardine, and hake, as well as squid and cuttlefish. Although Cape fur seals are primarily epipelagic foragers, they exhibit considerable flexibility in foraging behaviour and may utilise both pelagic and benthic feeding strategies depending on prey availability (Kirkman et al., 2015; Kirkman et al., 2019; Botha et al., 2023).

Tracking studies indicate that seals from South Coast colonies forage predominantly across the continental shelf and shelf edge, with portions of the broader marine Project area overlapping known foraging ranges (Figure 6-34) (Skern-Mauritzen et al., 2009; Harris et al., 2022). Consequently, Cape fur seals may occur throughout both the offshore development area and the nearshore pipeline corridor, particularly while undertaking foraging movements between colonies and feeding grounds.

The annual breeding cycle is highly seasonal, with pupping and breeding occurring between November and January. Breeding success is closely linked to prey availability, particularly bulls and lactating females that rely on productive feeding areas adjacent to breeding colonies (Oosthuizen, 1991).

The Cape fur seal population is regularly monitored in South Africa through coordinated census programmes and is currently considered stable, although regional shifts in colony size and distribution have been documented over recent decades (Kirkman, et al., 2007; Skern-Mauritzen, et al., 2009; Kirkman, et al., 2012). Given the proximity of several breeding colonies and the overlap between known foraging areas and the Project area, Cape fur seals are expected to occur regularly throughout the broader Project region.

In 2024, rabies was confirmed in Cape fur seals along the South African coastline, representing the first known occurrence of rabies becoming established in a marine mammal population. The outbreak has been associated with increased reports of abnormal and aggressive seal behaviour, particularly along the Western Cape coast. Although the long-term implications for population dynamics remain uncertain, the outbreak highlights an emerging disease risk affecting Cape fur seals in South Africa. Rabies has not been reported in other marine mammal species occurring in the region.



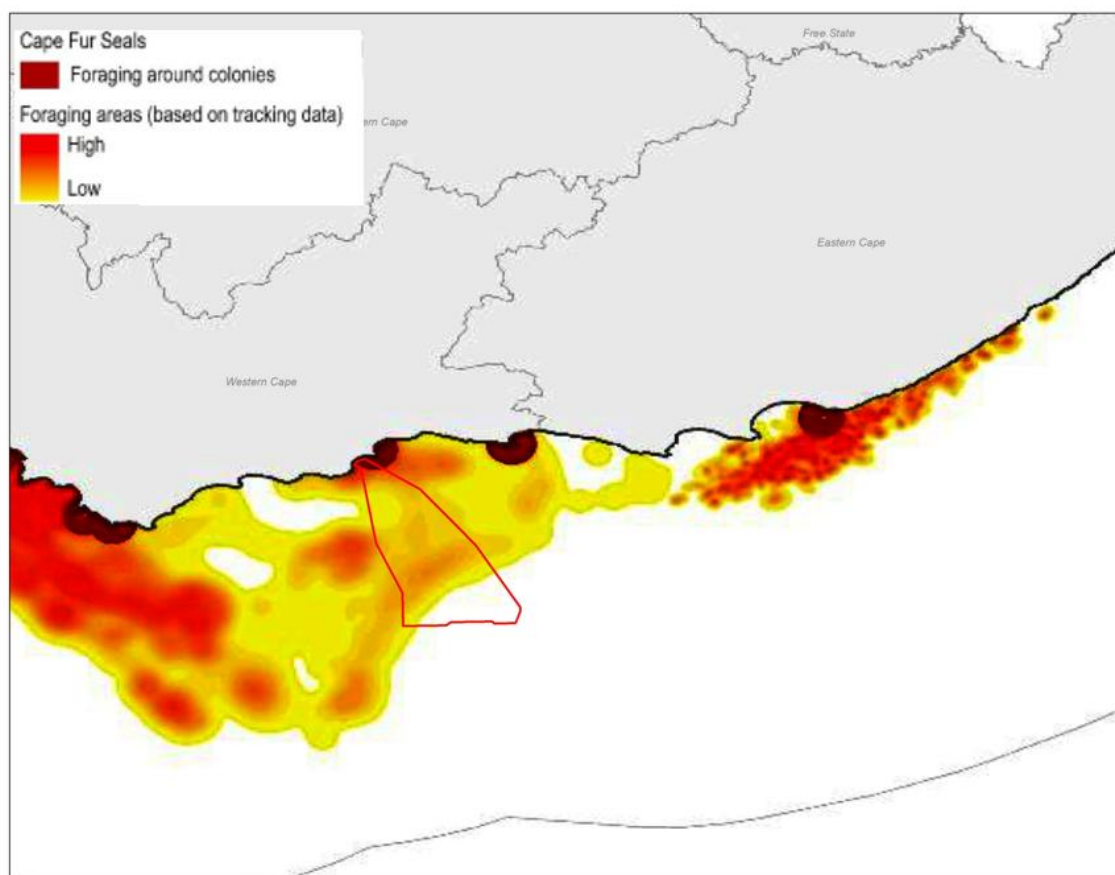


Figure 6-34: Marine Project area (red polygon) in relation to Cape Fur seal foraging ranges on the West and South Coast of South Africa Darker shades of red indicate areas of higher use

Note that gaps in foraging areas, are more an artefact of incomplete coverage than areas of avoidance or absence.

Source: Harris et al. (2022)

6.6.4 Ecological Network Conceptual Model

Figure 6-35 provides a simplified conceptual model for of the South Coast marine ecosystem and the ecological linkages between the nearshore and offshore receiving environments. The model illustrates the primary ecological pathways, trophic relationships and feedback mechanisms that support ecosystem functioning across the Project area.

Primary productivity within the region is driven largely by nutrient enrichment associated with upwelling processes, the Agulhas Bank cold-water ridge and interactions between shelf waters and the Agulhas Current. These processes cause phytoplankton growth, forming the foundation of the marine food web. Phytoplankton support zooplankton and ichthyoplankton communities, which in turn sustain pelagic fishes and cephalopods that provide prey for seabirds, marine mammals, sharks, turtles and larger predatory fishes. The high productivity of the Agulhas Bank and adjacent shelf-edge regions is therefore a key driver of ecosystem functioning and biodiversity.

Organic material derived from plankton production, faecal matter and naturally occurring mortality is transferred from surface waters to the seabed as particulate organic matter. This process supports benthic ecosystems comprising meiofauna, infauna, epifauna and associated demersal fishes and cephalopods. Microbial decomposition and nutrient



remineralisation recycle nutrients back into the water column, thereby linking benthic and pelagic environments through the microbial loop and supporting continued primary production. In highly productive areas, the accumulation and decomposition of organic matter may also contribute to localised oxygen depletion and the formation of hydrogen sulphide under anaerobic conditions.

Structurally complex habitats such as reefs, hard-substrate areas, coral communities and other VMEs contribute significantly to biodiversity and ecosystem resilience. These habitats provide feeding, breeding, nursery and refuge areas for a variety of benthic and pelagic organisms. In deeper offshore environments, reef systems, coral habitats and topographically complex features such as ridges and seamounts may locally enhance primary and secondary production, supporting diverse assemblages of invertebrates, fishes and higher predators.

The ecosystem also provides important services including fisheries production, long-term carbon sequestration and nutrient cycling. Natural environmental variability, together with anthropogenic pressures such as fishing, shipping and offshore development, can influence ecological processes and species interactions across multiple trophic levels. Disturbances affecting lower trophic levels may propagate through the food web and influence higher trophic level species, while changes in the abundance or behaviour of predators can alter ecosystem dynamics through top-down controls.

Understanding these ecological linkages is important when evaluating potential impacts. Conceptual and numerical frameworks such as the Population Consequences of Disturbance (PCoD) and Population Consequences of Acoustic Disturbance (PCAD) models have been developed to assess how behavioural responses to disturbance may influence individual fitness, population dynamics and ecosystem processes over time (Villegas-Amtmann et al., 2015; Costa et al., 2016; Ellison et al., 2016; Bröker, 2019). Similarly, ecosystem-based management and integrated ecosystem assessment approaches provide mechanisms for evaluating cumulative effects across multiple ecosystem components and trophic levels (Levin et al., 2009; Holsman et al., 2017; Spooner et al., 2021).

The conceptual model therefore provides an ecosystem-level framework for understanding the interactions between the biological communities described in the preceding sections and for assessing how potential project-related pressures may influence ecological processes within the South Coast marine environment.



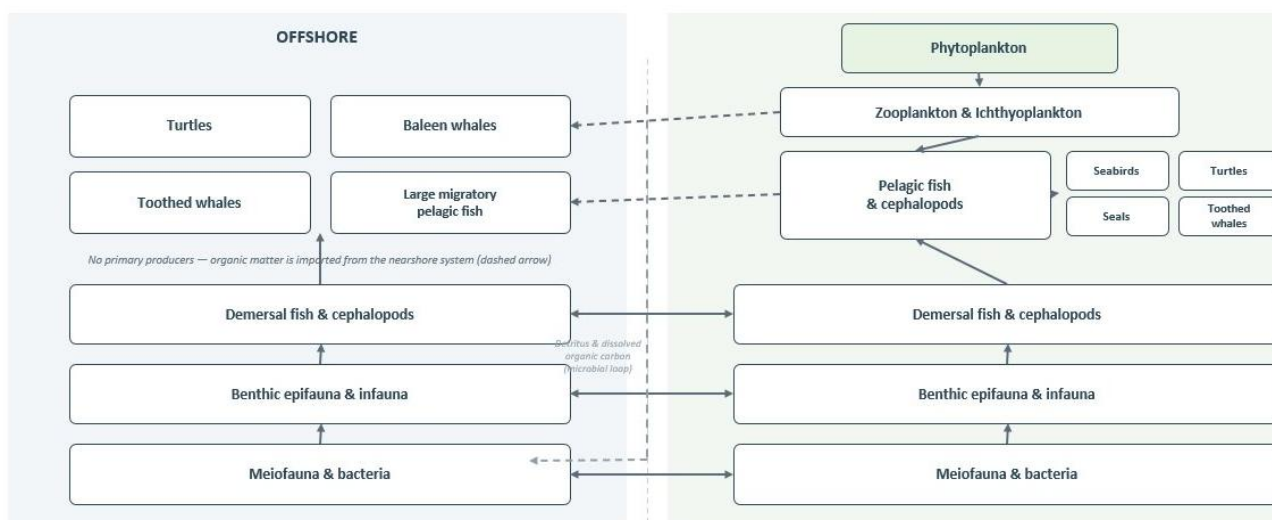


Figure 6-35: Simplified network diagram indicating the interaction between the key ecosystem components

Source: Adapted from Pisces (2022)

Summary of key biological characteristics in the study area

The marine Project area spans a broad environmental gradient from the nearshore coastal habitats of the South Coast to the shelf-edge and deep offshore waters of Licence Block 11B/12B. Consequently, it supports a diverse range of coastal, benthic, demersal and pelagic communities characteristic of the Agulhas Bank and Southwest Indian Upper Bathyal ecosystem types.

Nearshore habitats comprise sandy beaches, rocky and mixed shores, and subtidal reef systems that support diverse assemblages of invertebrates, macroalgae, fish and coastal seabirds. Offshore, seabed habitats range from unconsolidated sediments to reef systems, hard-substrate outcrops, coral habitats and shelf-edge features. Benthic communities are strongly influenced by depth and substrate type, with soft-sediment habitats supporting diverse infaunal and epifaunal assemblages, while reef habitats support sponges, corals, bryozoans and other suspension feeders. Environmental survey and sampling activities within the marine Project area confirmed locations of high benthic biodiversity and distinct shelf and bathyal communities.

Environmental surveys recorded ecologically important coral communities, including cold-water coral reefs, stylasterid lace corals, soft corals and other habitat-forming taxa associated with shelf-edge and upper bathyal environments at certain locations within the marine Project area. In addition, several VME indicator species and habitats were identified at certain sites, particularly within the western and south-western portions of Licence Block 11B/12B.

Pelagic ecosystems are sustained by phytoplankton production driven by regional oceanographic processes, supporting zooplankton, ichthyoplankton, pelagic fishes, cephalopods and higher trophic levels. The Agulhas Bank is an important spawning and nursery area for numerous fish and squid species. Higher trophic level fauna include seabirds, marine turtles, Cape fur seals, sharks, dolphins and whales. Collectively, these communities form a highly connected marine ecosystem in which ecological processes link nearshore, shelf, shelf-edge and offshore environments, underpinning regional biodiversity, fisheries productivity and ecosystem functioning.



6.7 Conservation and Sensitive Areas

Several allocated conservation and sensitive areas exist on the South Coast in proximity to the Project area. These are discussed below.

6.7.1 Marine Protected Areas

A Marine Protected Area (MPA) is an area of ocean and/or coastline specifically protected for the benefit of people and the environment. It is stated in the Protected Areas Act, 2003 (Act 57 of 2003) that “*no person may conduct commercial prospecting or mining, exploration, production or related activities in a protected environment without the written permission of the Minister and the Cabinet member responsible for minerals and energy affairs*”. Therefore, these areas provide some refuge from human induced impacts for marine species and ecosystems.

A network of 20 MPAs was gazetted on 23 May 2019, thereby increasing the ocean protection within the South African EEZ to 5%, with a total of 41 MPAs within South Africa's EEZ. These areas provide some protection to 87% of the different marine ecosystem types found in South African waters, ensuring that the MPA network is representative of the country's important diversity (South African National Biodiversity Institute 2019).

The marine Project Area does not overlap with any coastal MPAs. The Stilbaai MPA is located closest to the marine Project area (~44 km east of the survey AOI) (Figure 6-36). Similarly, **the marine Project area does not overlap with any offshore MPAs.** The Southwest Indian Seamounts MPA is located closest to the marine Project area (~19 km south of the Project Area) (Figure 6-36).

The approved MPAs within the broad marine Project area are shown in Figure 6-36 and summarised below. The summary information presented below has been compiled and adapted from the Marine Protected Areas South Africa website (<https://www.marineprotectedareas.org.za/explore>),

Coastal MPAs

Several coastal MPAs are located along the South Coast of South Africa including:

- **De Hoop MPA** covers approximately 289 km² along the southern Cape coast between Witsand and Skipskop and was proclaimed in 1985. Extending approximately 5.6 km offshore along a rugged 48 km coastline, the MPA protects a diverse range of coastal and marine habitats. The MPA also supports a rich diversity of marine fauna, including shoaling fish, rays, turtles, sunfish, bottlenose dolphins, humpback dolphins, Bryde's whales, southern right whales and humpback whales. Seasonal aggregations of juvenile hammerhead sharks, common dolphins, Cape gannets, anchovies and sardines further highlight the ecological significance of the area. Rocky intertidal and subtidal habitats support diverse invertebrate communities and provide important refuge for species such as galjoen, blacktail, white musselcracker and spotted gully sharks. As a fully protected no-take MPA, De Hoop plays a critical role in conserving marine biodiversity, protecting key fish populations, and maintaining the ecological integrity of the southern Cape coastline.
- **Stilbaai MPA** covers approximately 31.9 km² along a 14 km stretch of coastline, including the Goukou Estuary and extending up to 4.7 km offshore. Proclaimed in 2008, the MPA was established to support the recovery of reef and linefish populations. The protected area encompasses a variety of coastal, estuarine and offshore habitats that support a diverse range of marine species, including southern right whales, ragged-tooth sharks, reef fish, pansy shells and other marine invertebrates. The MPA is also notable for supporting migratory eel species, such as



the African mottled eel and longfin eel, which undertake extensive oceanic migrations between southern African estuaries and spawning grounds in the western Indian Ocean.

- **Goukamma MPA** covers approximately 34 km² along a 14 km stretch of the Garden Route coastline and extends 1.8 km offshore. Proclaimed in 1990, the MPA protects a diverse range of habitats, including rocky shores, sandy beaches, subtidal reefs, the Goukamma Estuary, coastal dune systems and dune forest habitats. These habitats support a rich assemblage of warm-temperate marine species, including many that are endemic to South Africa's South Coast. The MPA provides important protection for oyster beds, estuarine habitats and reef ecosystems, while also supporting species such as African Black Oystercatchers, bottlenose and humpback dolphins, southern right whales, humpback whales and Cape clawless otters. More than 160 species of seaweed have been recorded within the protected area, highlighting its high biodiversity value.
- **Robberg MPA** was proclaimed in 1990 to protect the diverse coastal and marine habitats surrounding the iconic Robberg Peninsula (Cape Seal). The MPA supports a variety of rocky, mixed and sandy shore ecosystems, as well as inshore and offshore reef habitats that provide refuge for numerous endemic fish species. The productive marine environment is home to a wide range of wildlife, including Cape fur seals, whales, dolphins, sharks and seabirds, making it an important biodiversity conservation area along the Garden Route coast.
- **Tsitsikama MPA** as first proclaimed in 1964, making it the oldest MPA in Africa. Located along approximately 60 km of coastline between Groot River East and Groot River West, the MPA protects extensive intertidal and subtidal habitats, supporting diverse marine communities and a high proportion of species endemic to the warm-temperate Agulhas Ecoregion. The area provides important refuge for a range of marine life, including algae, invertebrates and overexploited linefish species such as roman, dageraad and red steenbras, which are protected within the no-take reserve.
- **Sardinia Bay MPA** was established in 2000 to protect a range of coastal and marine habitats along the coastline west of Gqeberha (formerly Port Elizabeth). Covering approximately 12.9 km² and extending 1.8 km offshore, the MPA includes rocky and sandy shores, as well as offshore subtidal reef systems that support unique marine communities. The MPA provides important protection for heavily exploited species such as abalone and musselcracker and is managed as a no-take area where all fishing and harvesting activities are prohibited.

Offshore MPAs

Five offshore MPAs are located in proximity to the broader Project area, and are briefly described below.

- **Agulhas Muds MPA** protects a unique area of shallow mud habitat on the Agulhas Bank, one of South Africa's most threatened marine ecosystem types. Proclaimed in 2019, the MPA was established to conserve these critically endangered seabed habitats, which have historically been affected by reduced freshwater inputs and long-term trawling activities. The protected area contains relatively intact mud ecosystems that support a variety of benthic organisms. The muddy seabed provides habitat for a diverse assemblage of invertebrates, including mud prawns and other seabed-dwelling species. The MPA also protects habitat used by commercially important fish species, including Agulhas sole, and contributes to the sustainable management of fisheries resources in the region.



- **Agulhas Bank Complex MPA** was established to conserve a range of ecologically important offshore habitats and species associated with the productive waters of the Agulhas Bank. Covering approximately 4 300 km², the MPA includes the renowned Alghard Banks, where volcanic pinnacles rise from depths of around 80 m to within 14 m of the surface. These underwater features support diverse marine communities, including extensive kelp forests, cold-water coral habitats, and important reef ecosystems. The MPA supports several marine species including yellowtail, geelbek, red stumpnose, stingrays, turtles and blue marlin, and protects important spawning aggregations of the endangered red steenbras, one of the world's largest seabream species.
- **Southwest Indian Seamount MPA** was proclaimed in 2019 to protect a deep-water habitats and vulnerable marine species in the southwest Indian Ocean. Covering approximately 7 500 km², the MPA consists of two separate areas and includes habitats ranging from the rocky shelf edge to deep slope and abyssal plain environments. The shallower section contains largely undisturbed shelf-edge habitats that support cold-water coral gardens and reef-building coral structures. The MPA protects ecosystems across a wide depth range. The area also protects a range of threatened and migratory species, including mako sharks, which utilise parts of the area as nursery habitat, as well as important foraging grounds for several threatened albatross species.
- **Agulhas Front MPA** was proclaimed in 2019 to conserve unique deep-ocean ecosystems and open-water habitats located far offshore in the southwest Indian Ocean. Covering approximately 6 200 km², the MPA protects a range of deep-sea environments, including lower slope habitats and vast abyssal plain ecosystems. The area encompasses the Agulhas Plateau. The MPA provides protection for a variety of poorly understood deep-sea habitats and species, while safeguarding an important Ecologically and Biologically Significant Area (EBSA). The area is recognised as a key foraging ground for the Critically Endangered leatherback turtle and supports important ecological processes associated with tuna, seabirds and other migratory marine species.
- **Port Elizabeth Corals MPA** protects a variety of vulnerable seabed features, including deep-water coral habitats and species such as the giant mushroom coral. These complex coral ecosystems create important refuge and nursery areas for juvenile fish. The area is especially important for kingklip, which forms large seasonal spawning aggregations in the region.

6.7.2 Ramsar Sites

A Ramsar site is a wetland designated to be of international importance under the Ramsar Convention, also known as "The Convention on Wetlands", an intergovernmental environmental treaty established by UNESCO in 1971. The convention entered into force in South Africa on 21 December 1975. South Africa currently has 27 sites designated as Ramsar Sites, covering 5 711 km². The Ramsar sites along the South Coast and in proximity to the marine Project area include:

- Agulhas Plain;
- De Mond State Forest;
- De Hoop Vlei; and
- Wilderness Lakes.

The closest Ramsar site, Wilderness Lakes, is located approximately 55 km northwest of the offshore Project area. Remaining Ramsar sites are located more than 100 km away from the marine Project area (Figure 6-37).



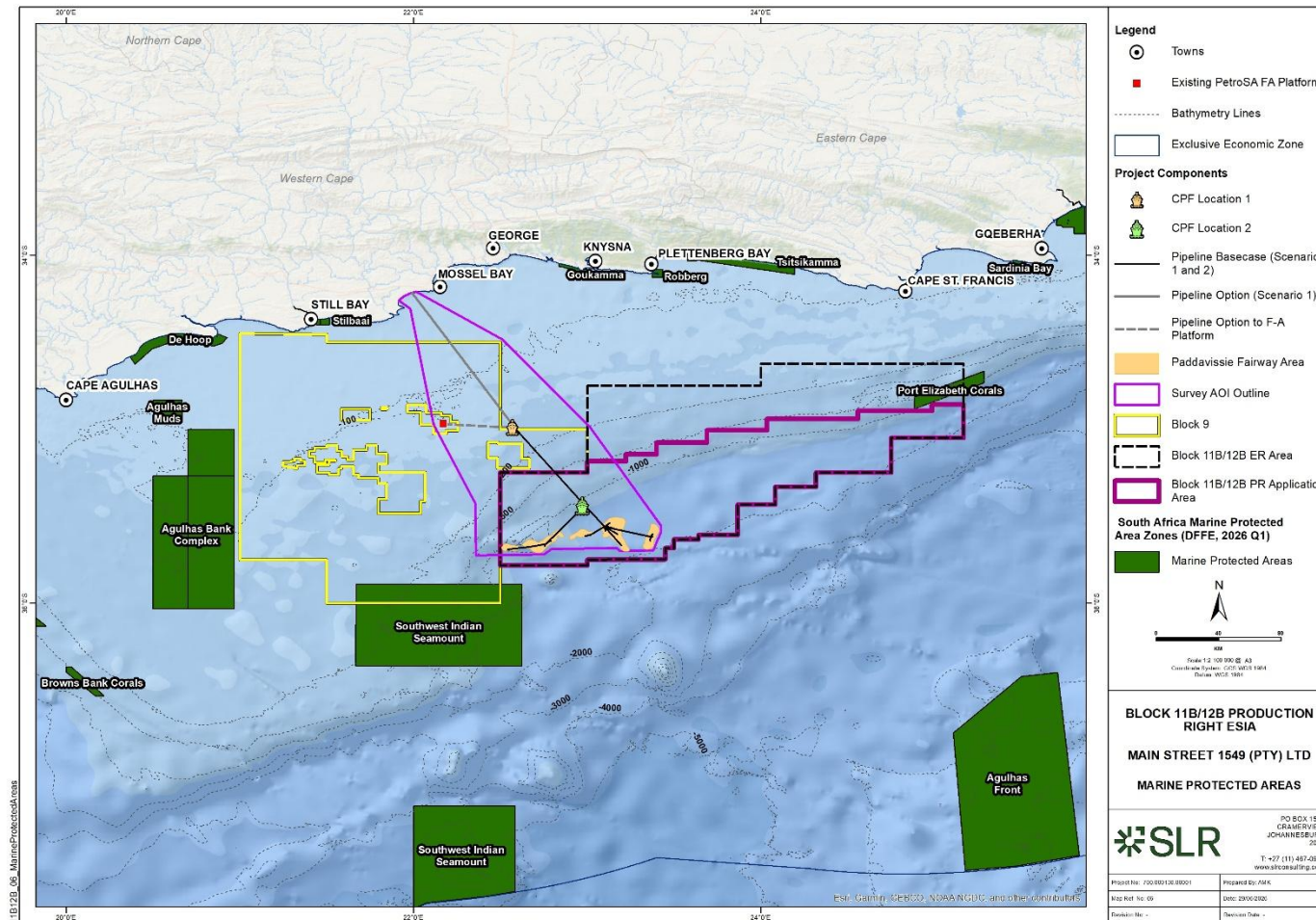


Figure 6-36: Marine Project area and associated infrastructure in relation to Marine Protected Areas (MPAs)

Source: DFFE 2024 Q3 Data



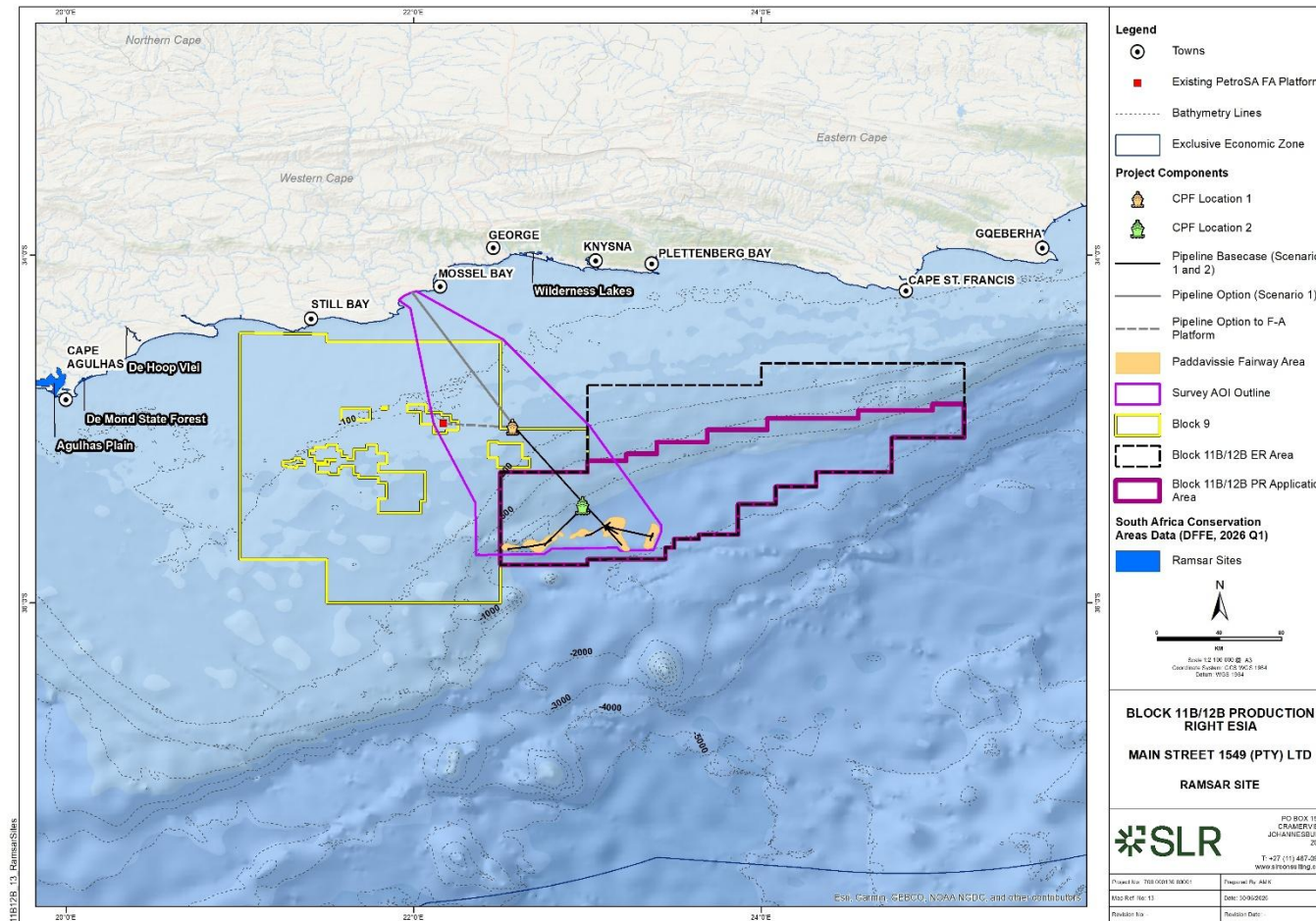


Figure 6-37: Marine Project area and associated infrastructure in relation to RAMSAR sites along the South Coast of South Africa
Source: SACAD – DFFE (2024).



6.7.3 Biodiversity and Conservation Planning Areas

6.7.3.1 SANBI Ecosystem Threat Status

The Ecosystem Threat Status developed through the National Biodiversity Assessment (NBA) provides an indication of the degree to which ecosystem types have been degraded or transformed and the extent to which they retain their ecological integrity, structure, function and biodiversity (Sink et al., 2019; Harris et al., 2022 (Sink, et al., 2026b). Ecosystem types are classified as Critically Endangered, Endangered, Vulnerable, Near Threatened or Least Concern, based on the proportion of the ecosystem remaining in good ecological condition relative to defined biodiversity thresholds.

Although the expansion of MPAs and the identification of Ecologically or Biologically Significant Marine Areas (EBSAs) have improved marine conservation outcomes in South Africa, several offshore and shelf-edge ecosystem types remain poorly or moderately protected, highlighting the need for additional conservation efforts and measures to secure representative habitats and biodiversity features (Holness, et al., 2014; Sink, et al., 2026b) (Figure 6-38).

Within the marine Project area, benthic ecosystem types exhibit a range of threat statuses from Least Concern to Critically Endangered (see Figure 6-38). Most offshore ecosystem types are classified as Least Concern or Near Threatened; however, the nearshore environment intersected by the pipeline corridor includes some ecosystem types classified as Endangered and Critically Endangered (Sink, et al., 2026b).

Pelagic ecosystem types occurring within the marine Project area are classified as either Vulnerable or Least Concern (Figure 6-39). The Vulnerable classification reflects the ecological significance of the Agulhas Bank pelagic ecosystem, which supports important spawning, nursery and feeding habitats for a wide range of pelagic fish, seabirds, marine mammals and other higher trophic level species (Sink et al., 2019; Harris et al., 2022).



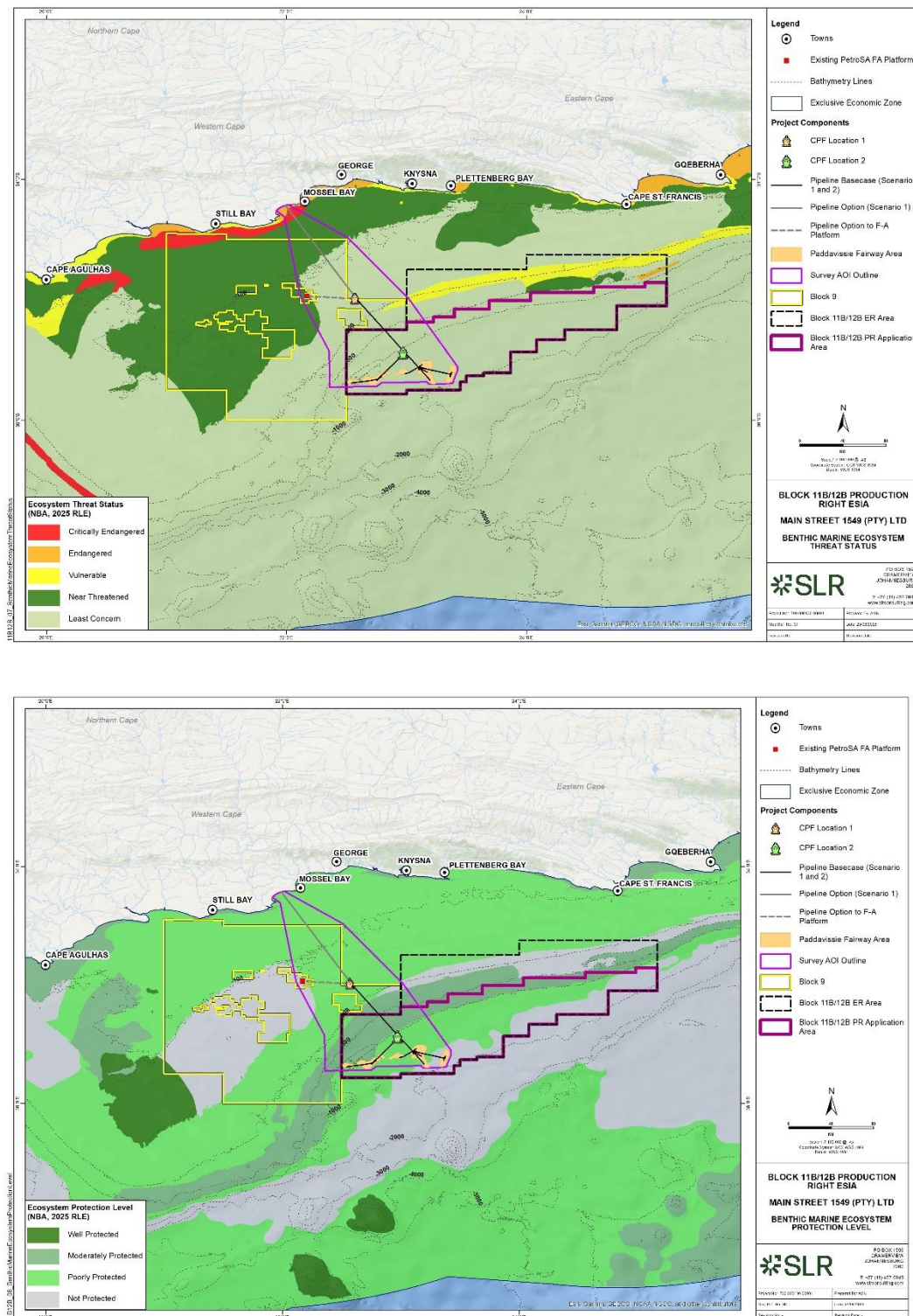


Figure 6-38: Marine Project area and associated infrastructure in relation to threat status (top) and protection levels (bottom) of benthic ecosystem types
Source: Adapted Sink et al. (2026b)



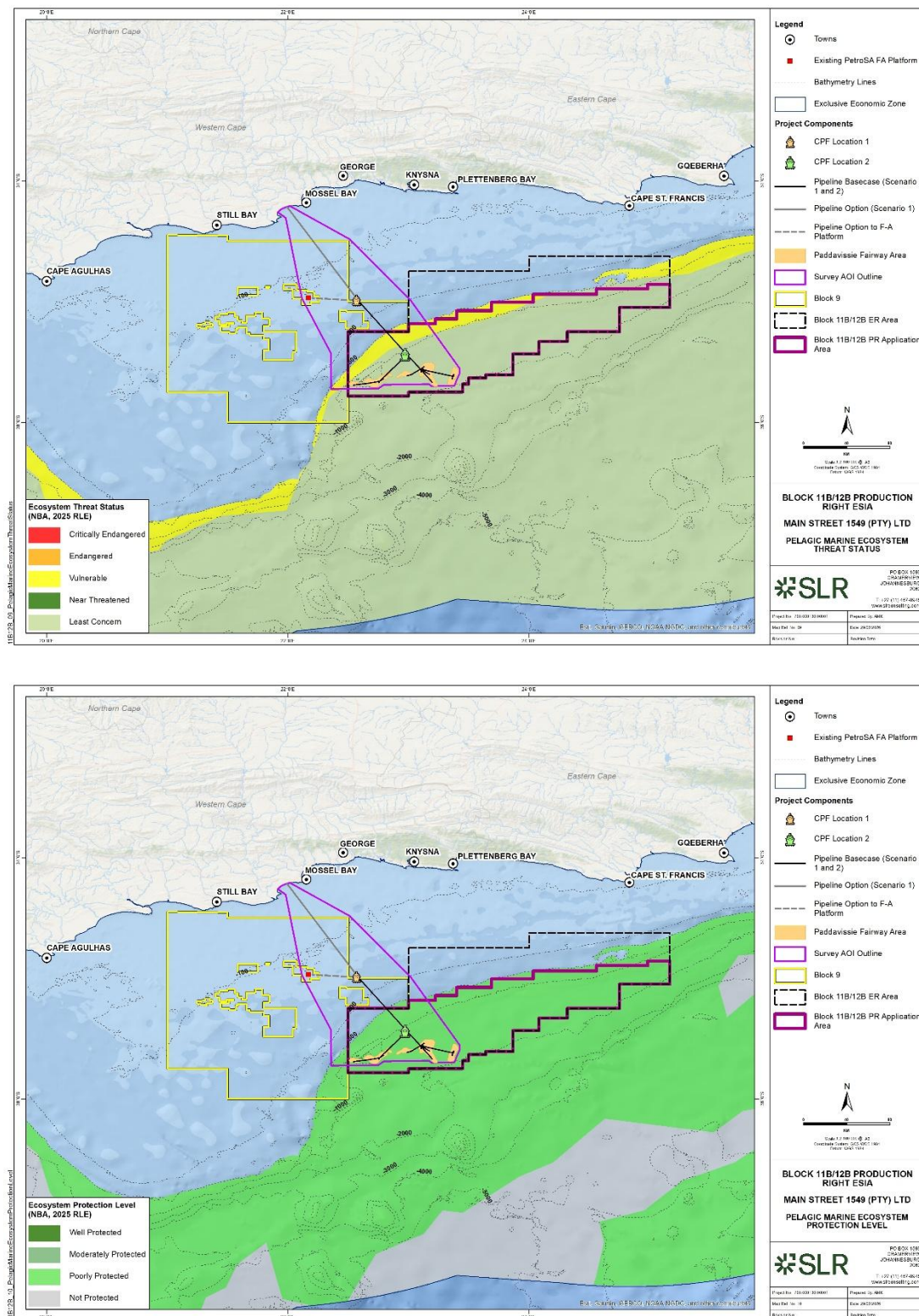


Figure 6-39: Marine Project area and associated infrastructure in relation to threat status (top) and protection levels (bottom) of pelagic ecosystem types
Source: Adapted Sink et al. (2026b)



6.7.3.2 Ecologically or Biologically Significant Marine Areas

EBSAs represent areas of ecological and/or biological importance and have been defined by the Convention on Biological Diversity (CBD) as “geographically or oceanographically discrete areas that provide important services to one or more species/populations of an ecosystem or to the ecosystem as a whole, compared to other surrounding areas or areas of similar ecological characteristics or otherwise meet the [EBSA] criteria”.

As part of a regional Marine Spatial Management and Governance Programme (MARISMA 2014-2020), the Benguela Current Commission (BCC) and its member states identified a number of EBSAs both spanning the border between Namibia, Mozambique and South Africa and along the South African West, South and East Coasts, with the intention of implementing improved conservation and protection measures within these sites. The principal objective of the EBSAs is identification of features of higher ecological value that may require enhanced conservation and management measures. The EBSAs are delineated to minimise conflict and avoid negative impacts with industries.

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. The impact management and conservation zones within the EBSAs are under review and currently constitute a subset of the biodiversity priority areas map (see Section 6.7.3.2) where “EBSA conservation zones” equate to Critical Biodiversity Areas (CBAs), and “EBSA impact management zones” equate to Ecological Support Area (ESAs). The relevant sea-use guidelines accompanying the CBA areas would apply.

South Africa currently has 12 EBSAs identified solely within its jurisdiction with a further three having been proposed⁴⁹. It also shares eight transboundary EBSAs with other countries (Namibia (3) and Mozambique (2) and/or high seas (3)). The EBSAs in proximity to the marine Project area on the South Coast are shown in Figure 6-40 and are briefly described below (EBSA Portal, 2026).

- The **Algoa Bay to Amathole EBSA** encompasses a diverse and ecologically important marine region along South Africa’s south-eastern coastline. The area is characterised by complex oceanographic processes associated with the Agulhas Current, including the formation of eddies, current meanders and shelf-edge interactions that drive high biological productivity and support important ecological connectivity. The EBSA provides key spawning, nursery and migration habitats for a range of demersal and pelagic fish species and supports important feeding and breeding areas for top predators, including sharks, seabirds and marine turtles. Algoa Bay contains the easternmost breeding colony of the Endangered African Penguin and the largest Cape Gannet colony in southern Africa. The EBSA also supports migratory pathways for leatherback, loggerhead and green turtles. The area contains a range of sensitive habitats and biodiversity features, including submarine canyons, deep reefs, cold-water coral communities, and a number of existing coastal MPAs. The EBSA lies east/southeast (~233 km) of the marine Project area.
- The **Tsitsikamma-Robberg EBSA** occurs along the southern Cape coast between Tsitsikamma and Robberg, extending from the shoreline primarily across the inner and middle continental shelf to the 100 m isobath, with limited extension onto the outer shelf. The EBSA encompasses the Tsitsikamma, Robberg and Goukamma MPAs, portions of the Garden Route Biosphere Reserve, and includes the marine influence of several estuaries, including the Knysna Estuary. The area supports a

⁴⁹ EBSA Portal - Institute for Coastal and Marine Research (mandela.ac.za); MARISMA



diverse range of coastal, estuarine, reef and shelf habitats and contains several “Critically Endangered” and “Endangered” ecosystem types. The EBSA provides important habitat for numerous threatened species, including an Endangered endemic seahorse and several Critically Endangered fish species, and supports key spawning, nursery and feeding areas for marine fauna. The EBSA lies northeast (~50 km) of the marine Project area.

- The **Kingklip Corals EBSA** is located along the shelf edge and upper slope approximately 100 km offshore of Knysna, encompassing Secret Reef, Kingklip Koppies and Kingklip Ridge within water depths ranging from approximately 150 m to 800 m. The EBSA was identified to protect a series of ecologically significant seabed features, including recently discovered biogenic coral reef structures, rocky ridges and coral mounds that support fragile and sensitive benthic communities. These habitats contain vulnerable species such as stony corals, lace corals, bryozoans, molluscs. Dense concentrations of plankton and hake have also been recorded in the water column above portions of the ridge system. While portions of the area remain in good ecological condition, only the eastern section currently falls within the Port Elizabeth Corals MPA and benefits from formal protection. The western portion of this EBSA (< 100 km²) falls within the survey AOI yet falls outside of the PR Application area.
- The **Agulhas Bank Nursery Area EBSA** encompasses a broad continental shelf area that functions as an important spawning, nursery and feeding ground for numerous marine species. The area supports high biological productivity, and large benthic copepod communities that provide an important food source for fish and other marine organisms. The EBSA includes a variety of shelf, shelf-edge and offshore habitats, including “Critically Endangered” mud habitats. Sections of the marine Project area, in waters shallower than 100 m, overlap with this EBSA. Deeper Project components (> 100 m) fall outside of this EBSA.
- The **Shackleton Seamount Complex EBSA** occurs along the outer margin of the Agulhas Bank at the transition between the Agulhas and Southern Benguela ecoregions, encompassing a highly dynamic offshore environment characterized by elevated productivity and diverse pelagic and benthic habitats. The EBSA is recognised as an important spawning area for sardine, anchovy, horse mackerel and hake, and plays a key role in the retention and transport of eggs and larvae between spawning and nursery habitats on the Agulhas Bank. The EBSA contains a variety of offshore habitat types and geological features, including the Mallory, Shackleton and Natal Seamounts, which contribute to the area's high habitat diversity and biodiversity value. Although limited scientific surveys have been undertaken in parts of the area, many of the shelf-edge and seamount habitats remain poorly explored, highlighting their importance for future marine biodiversity research to better understand their broader ecological role. This EBSA is located approximately 8 km north of the marine Project area.
- The **Mallory Escarpment and Trough EBSA** is located along the outer margin of the Agulhas Bank, where the Agulhas and Southern Benguela ecoregions converge. The area is characterised by high biological productivity, complex oceanographic processes and a diverse range of pelagic and benthic habitats. The EBSA serves as a key spawning area for commercially important fish species, including sardine, anchovy, horse mackerel and hake, and plays an important role in the retention and transport of eggs and larvae. The area also encompasses the Mallory Escarpment and trough segment of the Agulhas-Falkland Fracture Zone, a unique seabed feature that supports high habitat diversity and contributes to the ecological significance of the EBSA. Despite its recognised biodiversity value, the area remains poorly studied



and has been identified as a priority for future ecological research. This EBSA is located approximately 110 km southwest of the offshore marine Project area.

- The **Browns Bank Complex EBSA** is located along the outer continental shelf and shelf edge of South Africa's West coast and encompasses a range of ecologically important benthic and pelagic habitats. The area includes reef-building cold-water corals, untrawled hard-ground habitats and a variety of vulnerable seabed ecosystems. The EBSA functions as an important spawning area for both demersal and pelagic fish species. Shelf-edge upwelling and the convergence of the Agulhas and Southern Benguela ecoregions contribute to elevated productivity and support a diverse range of marine species. The area is also important for threatened seabirds, overlapping with marine Important Bird Areas (Atlantic Southeast IBA). This EBSA is located approximately 155 km southwest of the offshore marine Project area.
- The **Cape Point to Cape Agulhas (also known as Seas of Good Hope) EBSA** encompasses coastal waters, extending around Cape Point and Cape Agulhas, from the shoreline across the inner continental shelf. The EBSA includes several ecologically important features, including False Bay, Walker Bay, Dyer Island and Geyser Rock, and supports a diverse range of coastal, inshore and shelf habitats, including several threatened ecosystem types. The area provides important breeding, foraging and migratory habitat for numerous marine predators, including sharks, whales and seabirds. Located at the confluence of the Benguela and Agulhas Current systems, the area represents an important oceanographic transition zone between the Atlantic and Indian Oceans and supports high levels of biodiversity and ecological connectivity. This EBSA is located over 165 km west of the offshore marine Project area.

6.7.3.3 Biodiversity Priority Areas

Biodiversity Priority Areas

ESAs and CBAs have been identified by the marine science community in the National Coastal and Marine Spatial Biodiversity Plan⁵⁰, along with accompanying recommended sea-use guidelines. The CBA Map presents a spatial plan for the marine environment, designed to inform planning and decision-making in support of sustainable development. The recommended sea-use guidelines enhance the use of the CBA Map in a range of planning and decision-making processes by indicating the compatibility of various activities with the different biodiversity priority areas so that the broad management objective of each can be maintained.

⁵⁰ The latest version of National Coastal and Marine Spatial Biodiversity Plan (v1.2 was released in April 2022) (Harris *et al.* 2022). The Plan is intended to be used by managers and decision-makers in those national government departments whose activities occur in the coastal and marine space, e.g., environment, fishing, transport (shipping), petroleum, mining, and others. It is relevant for the Marine Spatial Planning Working Group where many of these departments are participating in developing South Africa's emerging marine spatial plans. It is also intended for use by relevant managers and decision-makers in the coastal provinces and coastal municipalities, EIA practitioners, organisations working in the coast and ocean, civil society, and the private sector.





CBAs are split into CBA 1 and CBA 2, indicating irreplaceable/ near irreplaceable sites which are required to meet biodiversity targets and 'best design sites' for which alternative areas can be used, respectively. Given that some CBAs are not in natural or near-natural ecological condition, but still have very high biodiversity importance and are needed to meet biodiversity feature targets, CBA 1 and CBA 2 are further split into two types based on their ecological condition. 'CBA Natural' sites have natural / near-natural ecological condition, with the management objective of maintaining the sites in their natural / near natural state; and 'CBA Restore' sites have moderately modified or poorer ecological condition, with the management objective to improve ecological condition and, in the long-term, restore these sites to a natural/near-natural state, or as close to that state as possible.

ESAs include all portions of EBSAs, and a 5-km buffer area around all MPAs, where these areas are not already CBAs or MPAs, with the exception of the eastern edge of Robben Island MPA in Table Bay where a 1.5-km buffer area was applied (Harris, 2022). 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 6-42).

SANBI is currently reviewing and refining the National Coastal and Marine Spatial Biodiversity Plan and associated biodiversity priority area datasets as new environmental data and improved ecosystem mapping become available. These updates are intended to strengthen the delineation of CBAs, and other marine biodiversity priority areas by incorporating additional data on marine ecosystems, species distributions and ecological processes. Notwithstanding these ongoing updates and revisions, data availability in deeper offshore environments remains comparatively limited relative to coastal and shelf areas, and further research and monitoring are expected to continue improving the understanding and spatial representation of biodiversity priority areas in offshore waters.

The marine Project area and associated infrastructure overlaps with areas mapped as, Critical Biodiversity Area Natural, Critical Biodiversity Area Restore and Ecological Support Area (ESA) (Figure 6-42)⁵¹.

South African draft Marine Sector Plans

As part of South Africa's MSP process, ten draft Marine Sector Plans were released for public comment in March 2023. These plans outline the long-term development objectives and spatial priorities of each marine sector from a national perspective, covering a 20-year horizon. They define each sector's spatial claims and interests and serve as proposals to be further negotiated across sectors during the development of Marine Area Plans.

The draft Marine Biodiversity Sector Plan, revised in July 2024, introduces an integrated framework of spatial biodiversity priority areas, categorised as 'Strict Biodiversity Conservation Zones' and 'Biodiversity Impact Management Zones', each with recommended management objectives. The proposed zones are largely based on the CBAs identified the National Coastal and Marine Spatial Biodiversity Plan (Figure 6-20). Strict Biodiversity Conservation Zones consists of three sub-categories: MPAs, Biodiversity Conservation Areas (Natural), and Biodiversity Conservation Areas (Modified). The management objectives of Biodiversity Conservation Areas (Natural) are aligned with 'CBA Natural', while for Biodiversity Conservation Areas (Modified), the objective is to prevent further impacts to the biodiversity features for which the area was identified as important, and avoid further deterioration in overall ecological condition, ideally improving the state of key biodiversity features and ecological condition, if possible. For Biodiversity Impact Management Zones,

⁵¹ The referenced map indicates Natural and Restore CBA's which encompass both CBA 1 and CBA 2 areas.



the objective is to manage cumulative impacts on biodiversity in order to keep the area in at least a functional state.

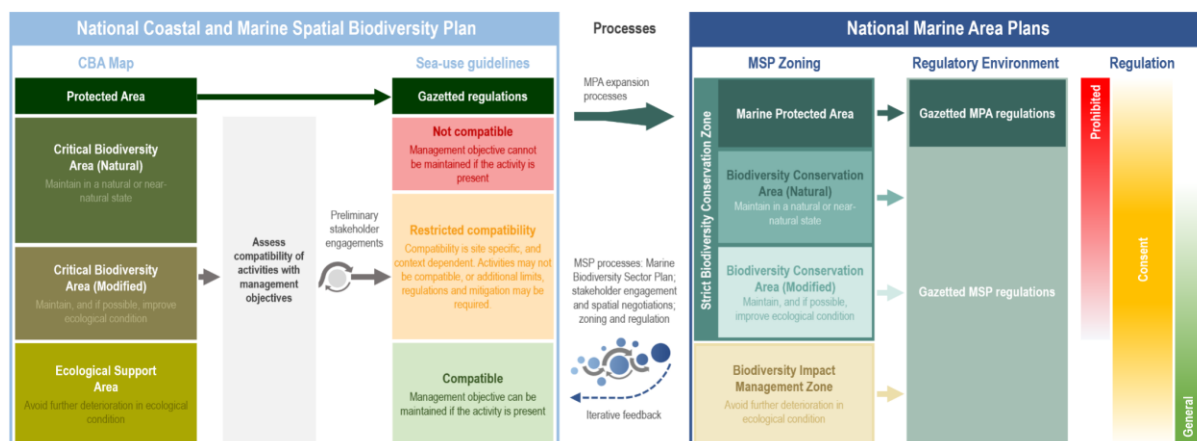


Figure 6-41: Schematic illustrating how the National Coastal and Marine Spatial Biodiversity Plan (NCMSBP) informs the MSP process.

Source: Draft Marine Biodiversity Sector Plan (2024).

The recommended sea-use guidelines in the draft Marine Sector Plan have been updated from those included in the National Coastal and Marine Spatial Biodiversity Plan (discussed above). Petroleum exploration activities (invasive and non-invasive) have been listed as “not compatible” in both Natural and Modified Biodiversity Conservation Areas, and as having “restricted compatibility” in Biodiversity Impact Management Zones. The update reflects stakeholder concerns that allowing petroleum exploration activities in areas where production is prohibited would be inconsistent. As such, the proposed compatibility of exploration activities in the draft Marine Biodiversity Sector Plan has been aligned with the impacts typically associated with petroleum production.

A Decision Support Tool⁵² for MSP activities in terms of the Marine Spatial Planning Act (Act no. 16 of 2018) has been produced, which provides the proposed delineation of biodiversity priority areas.

Since all Marine Sector Plans represent each sector’s proposal, which will be subject to cross-sectoral negotiation and multi-stakeholder engagement as part of the overall MSP process. To this end the NCMSBP states that “*the sea-use guidelines presented... build on the proposed management recommendations from preliminary stakeholder engagement through the EBSA process. They still require further engagement with stakeholders to refine what is propose. The MSP process is required to include robust stakeholder engagement and negotiations among sectors, which is likely where most of these discussions will take place, but we welcome additional preliminary engagements with sectors who feel that their ocean-based activities are not adequately represented in the guidelines.*”. As such, it remains uncertain when or if the proposed zonation and management measures as they are listed in the Draft Marine Biodiversity Sector Plan will be formally adopted.

⁵² <https://ocims.environment.gov.za/msp/>



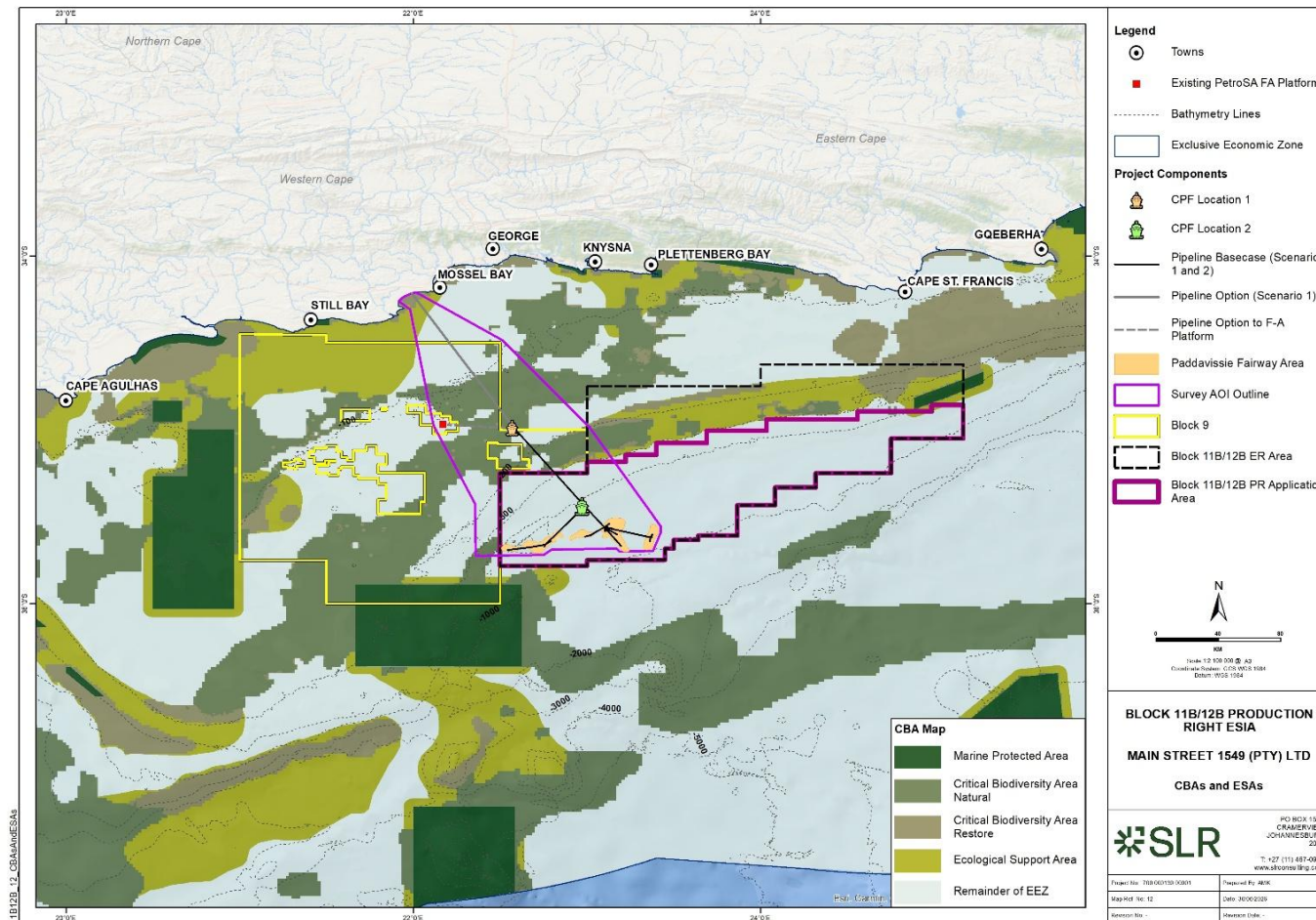


Figure 6-42: Marine Project area and associated infrastructure in relation to Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs)

Source: Harris et al. (2022).



6.7.3.4 Important Bird Areas

Several coastal Important Bird Areas (IBAs) are located along the South Coast of South Africa, as designated by BirdLife International. The Project area, lies offshore and to the east/west of these coastal IBAs (Figure 6-43).

Previously published proposed marine IBAs are currently under revision and are therefore not considered an up-to-date representation of priority at-sea areas for key seabird species. BirdLife South Africa is in the process of developing marine KBAs for important seabird populations; however, these assessments remain under review (A. McInnes, BirdLife South Africa *pers. comm.*).

6.7.3.5 Important Marine Mammal Areas

Important Marine Mammal Areas (IMMAs) were introduced by the IUCN Marine Mammal Protected Areas Task Force in 2016 to support marine mammal and marine biodiversity conservation. Complementing other marine spatial assessment tools, including the EBSAs and Key Biodiversity Areas (KBAs), IMMAs are identified on the basis of four main scientific criteria, namely species or population vulnerability, distribution and abundance, key life cycle activities and special attributes. Designed to capture critical aspects of marine mammal biology, ecology and population structure, they are devised through a biocentric expert process that is independent of any political and socio-economic pressure or concern. IMMAs are not prescriptive but comprise an advisory, expert-based classification of areas that merit monitoring and place-based protection for marine mammals and broader biodiversity.

Three IMMAs have been identified in South Africa. Waters less than 500 m deep in the marine Project area intersects the Southern Coastal and Shelf Waters IMMA, while regions of the marine Project area shallower than 100 m fall within the Southeast Africa Coastal Migration Corridor and Cape Coastal Waters IMMA (see Figure 6-44) (Purdon et al., 2020). These IMMAs are briefly described below:

- The **Southern Coastal and Shelf Waters IMMA** encompasses a highly productive marine region along South Africa's southern coastline and includes important coastal and continental shelf habitats. The area is strongly influenced by the annual sardine run, a major ecological event that supports high concentrations of marine predators, including common dolphins, Indo-Pacific bottlenose dolphins, Cape fur seals and killer whales. The IMMA provides important year-round feeding and reproductive habitat for the Indian Ocean humpback dolphin in shallow nearshore waters and supports important habitat for the inshore population of Bryde's whales across the continental shelf.
- The **Cape Coastal Waters IMMA** encompasses nearshore waters along South Africa's southern Cape coast and serves as one of the world's most important calving and nursery areas for southern right whales. The area supports annual aggregations of adults and cow-calf pairs between June and November, with the highest densities occurring in shallow coastal waters between Cape Agulhas and St Sebastian Bay. The IMMA provides critical breeding, calving and nursing habitat, with mother-calf pairs showing a preference for sheltered, shallow-water environments protected from ocean swell and prevailing winds



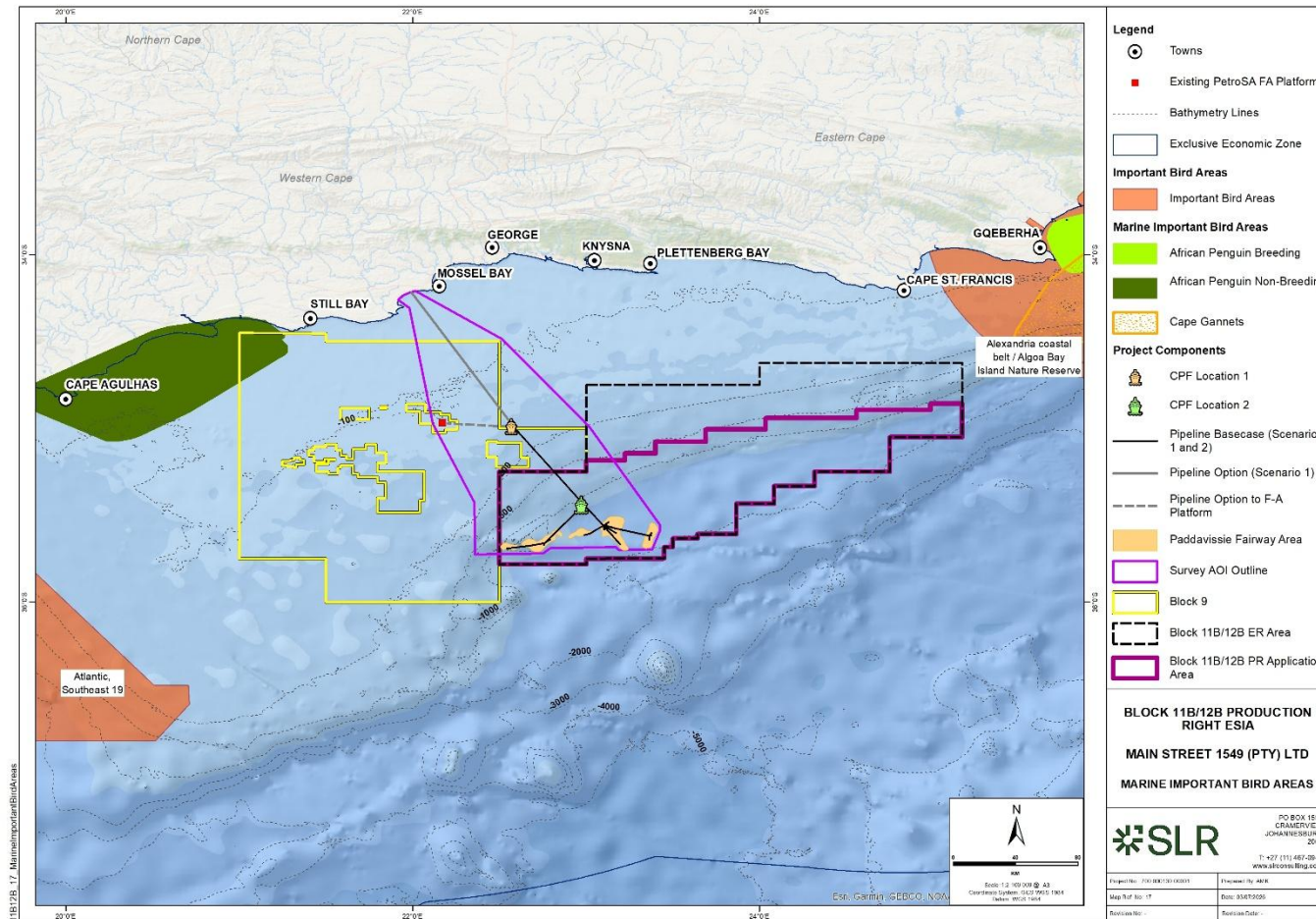


Figure 6-43: Marine Project area and associated infrastructure in relation to Important Bird Areas (IBAs) and proposed Marine Important Bird Areas (MIBAs)

Source: <https://maps.birdlife.org/marineIBAs/> and Birdlife South Africa (2025)



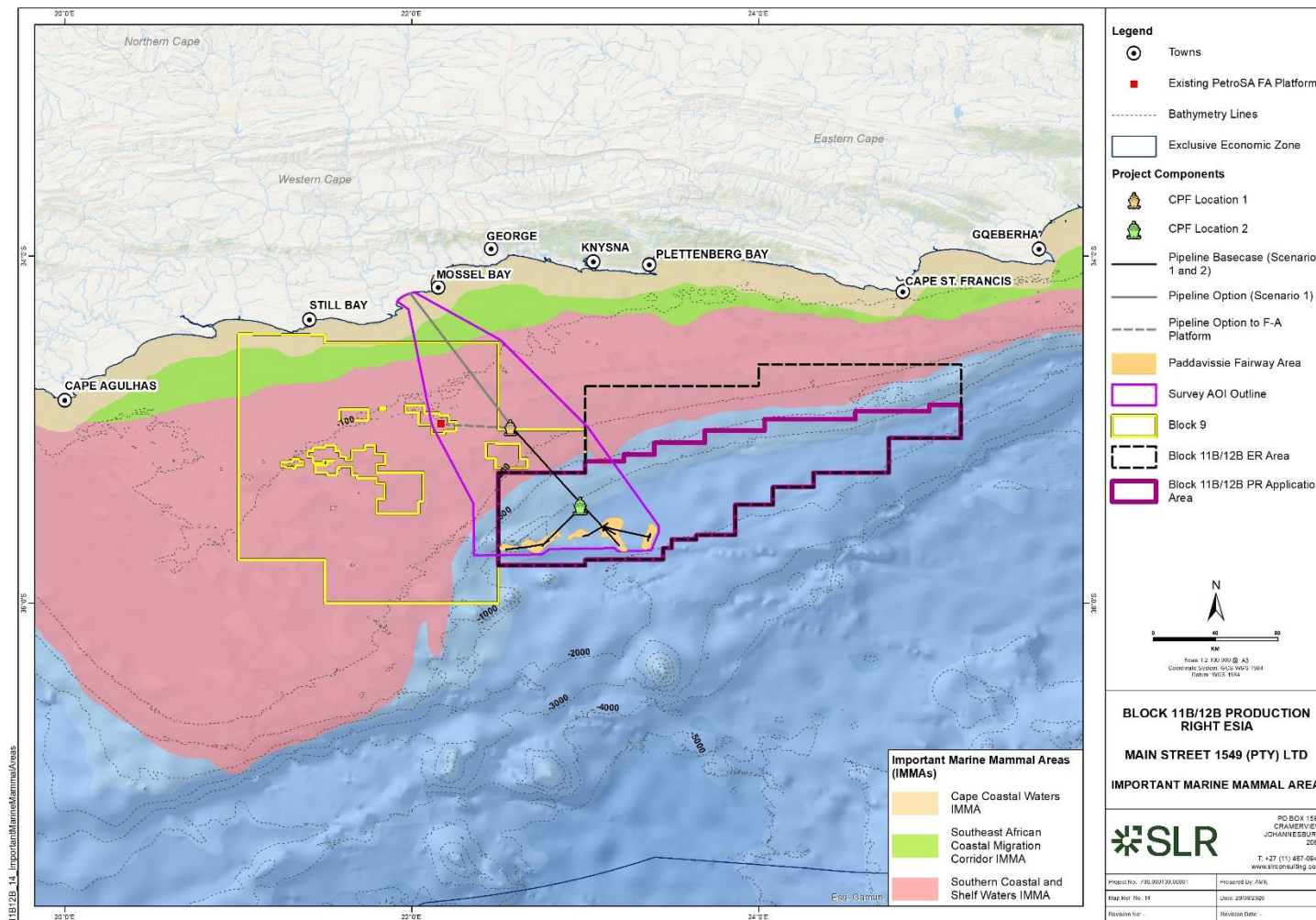


Figure 6-44: Important Marine Mammal Areas (IMMAs) in the area surrounding the survey areas

Source: Marine Mammal Protected Area Task Force 2023 (<https://www.marinemammalhabitat.org/portfolio-item/southern-coastal-shelf-waters-south-africa/>)



6.8 Human Environment and Marine Resource Use

This section provides an overview of the wider regional context, notably the municipal areas located along the south coast of South Africa along the section broadly associated with the project area.

6.8.1 Cultural Heritage Resources

6.8.1.1 Intangible Cultural Heritage

Heritage is perceived to be a complex legacy and indicator of global human creativity and biological diversity. Defined as both tangible and intangible by UNESCO, heritage is said to be expressed in monuments, sites and artifacts (tangible heritage), as well as ritual, beliefs, epics, songs and cultural manifestations (intangible heritage). Since the association of culture with biodiversity and its conservation, heritage, an aspect of culture, is now perceived to be critical to sustainable development (Boswell, 2023).

South Africa has a diverse and rich intangible cultural heritage. The South African population holds a diversity of beliefs which inform daily and social interaction. The role of culture in South Africa remains a powerful force. Colonisation and modernisation have not erased cultural practices or beliefs (Boswell, 2023).

It is noted that for any site that is coastal or where people make use of the sea, there is need to consider cultural tangible and intangible heritages, since these terraqueous (territorial and watery) territories which refer to and includes sites of spiritual significance. The waters noted by community members encountered in the marine Project Area describe these areas as 'living' waters. Coastal and oceanic intangible cultural heritage is holistic. It includes a variety of waterways that ultimately lead to the sea. These include streams, rivers, pools, lakes and estuaries. These waterways are believed to play a critical role in spiritual and health management in indigenous (First Nations and Nguni) groups specifically. Specific beliefs concerning 'living' waters include, but are not limited to, the following (Boswell, 2023):

- Waters contain the ancestral spirits of the cultural communities.
- Waters offer a spiritual domain to which people in the present realm can travel to (intentionally or otherwise) and from which they can return if the correct ritual activities are performed to ensure safe return.
- Waters can be portals to a parallel universe, or mirror universe and that humans in our dimension cultivate relations with beings from this mirror universe.
- Waterways such as streams, rivers and pools may contain a community's specific ancestral spirits.
- Ancestral spirits in the ocean reside on the seafloor.
- Markers such as reeds, whirlpools or disturbances in the water that indicate the place and presence of ancestral or water spirits.

Extensive research was undertaken for the Block 11B/12B Production Right ESIA in 2022/2023. The focus of the supplementary study conducted in 2023 (which is applicable to the Block 11B/12B survey ESIA) was on the following (Boswell, 2023):

- Xhosa and indigenous and autochthonous ancestral beliefs and ritual practices regarding coastal and deep ocean significance. This includes Khoi-San (indigenous peoples) and small-scale fishers' cultural relations with the sea and coast.
- ICH of settler groups (English/Portuguese/other European descendants) and coastal ICH indicated by Afrikaans speaking peoples.
- Gender and generational dimensions of ICH at the coast in the selected sites.



- The key findings of the study can be summarised as follows:
 - There is a greater holism between land and sea in the South Cape Coast;
 - There are cultural worlds apparent in the lives of small-scale fishers and their families;
 - The receptors of cultural heritage are symbiotic;
 - A racial dynamic in the South Cape Coast coastal communities makes it difficult for local communities to access the ocean and other related cultural sites, even though apartheid legislation is no longer in place;
 - In the Western Cape, there is a specific Coastal By-Law (2020) to enforce public access to the coast; and
 - There is a tension between contested heritage understandings of the sea and socio-economic reality in the region.

6.8.1.2 Palaeontology

Licence Block 11B/12B and Block 9 are located on the Palaeo-Agulhas Plain and underlain by sedimentary and volcanic rocks of the Bredasdorp Group.

The mostly calcareous, shallow marine and aeolian sediments of the Bredasdorp Group have the potential to be highly fossiliferous, with the formation representing at least four past ecosystems: marine, estuarine, aeolian and terrestrial vlei, pan or spring sediments.

The marine sediments can preserve molluscs, brachiopods, crustaceans (barnacles, crabs, prawns, ostracods), echinoids, polychaete worm tubes, shark teeth, and fish teeth and bones of whales, dolphins, seals and sea birds. Estuarine and vlei, pan and spring sediments preserve the remains of large land mammals and other terrestrial fauna, while aeolianites (cemented sand dunes) can preserve land snails, tortoises, moles, ostrich eggshells and scattered mammal bones. Marine fossils in the Bredasdorp Group sediments would be difficult to distinguish from modern marine taxa, but land fauna would be recognisable (Bamford, 2023).

Based on the geology of the area and the known palaeontological record, it can be assumed that the offshore sandstones, shales and sands have the same palaeosensitivity as the known onshore sediments, and that they would contain the same fossils. The offshore sediments have not been sampled and it is unknown if they contain fossils, but it is likely (Bamford, 2023).

6.8.1.3 Maritime Archaeological Heritage

Maritime Heritage of the Region

The recorded maritime history of the South African South Coast dates from the first transit of these waters by Bartolomeu Dias in 1488. The Cape Route was, for centuries thereafter, the only viable maritime way of reaching the East, was heavily used (Knox-Johnston, 1989). Most of the earliest traffic around the South Coast was simply passing by, en route to or from other destinations, and ships only tended to call in at the numerous bays along the coast in emergencies – to take on food or water or to make repairs (see, for example, Storar, 1988).

From the late 17th and into the 18th century, the borders of the Dutch settlement at the Cape started to expand inland and along the South Coast. The lack of roads within the small colony meant that the easiest means of transporting goods and people to and from the Cape was by ship and small coastal settlements and harbours were established at places like Mossel Bay (1734) (which was first used by Dias in 1488), Algoa Bay (1797) and Knysna (1817) (Tapson, 1961; Inggs, 1986; Ingpen, 1979; Axelson 1987; Scheffler, 1990).



Much of this maritime traffic – both international and local— tended to stay close to the coast rather than sailing large and out into deeper offshore waters, within which Licence Block 11B/12B is located. As a result, the bulk of the maritime casualties recorded in the shipwreck database maintained by TerraMare Archaeology and SAHRA's MUCH database are located on or close to the coastline.

Figure 6-45 provides an indication of the density of wrecks along the stretch of coastline between Still Bay and Cape Recife. These wrecks range in date from the 17th to the 21st century.

According to the available records, there are no historical wrecks within Licence Block 11B/12B, however research by TerraMare Archaeology and information received from SAHRA suggests that the wreck of the *Kiani Satu*, which sank in 2013, may be located within the Project Development Area/Survey AOI. Another modern wreck, the Taiwanese fishing vessel *Shin Huie*, which sank in July 1983 approximately 138 km south-east of Mossel Bay lies roughly 22 km north of the PR Application area and outside of the marine Project area. Given their age, neither of these wrecks currently falls under the jurisdiction of the National Heritage Resources Act (NHRA).

The only other recorded wrecks in the vicinity of the marine Project area are the *Sabor*, a World War II casualty of the German U-boat offensive off the South Coast and the *Texanita*, a Liberian registered oil tanker. Further wrecks are located to the east and west of the nearshore/coastal regions of the marine Project area, along the coastline (Figure 6-45).

The *Sabor* was one of many victims of a German campaign between 1941 and 1943 to disrupt Allied shipping around the Cape. Initially conducted by armed German commerce raiders, but later by packs of U-boats (and some Italian and Japanese submarines), this campaign was responsible for the loss of an estimated 782 395 tons of Allied shipping (Turner *et al*, 1961).

The *Sabor* was a steam merchant ship of 5 212 tons built in 1920 in Hull and owned by the Royal Mail Lines Ltd of London. She was travelling, unescorted from Port Said in Egypt to Rio de Janeiro in Brazil, via the Cape, carrying a cargo of salt ballast and 63 bags of mail. She was torpedoed by U-506 southeast of Mossel Bay at 03h09 on 7 March 1943 and eventually sank after a coup de grace from the U-boat at 05h32. Seven crew members were lost during the attack but the master, 41 crew members and nine gunners were picked up by the South African Airforce Force crash launch R-8 and landed at Mossel Bay (<https://uboaat.net/allies/merchants/ship/2725.html>).

The position given for the sinking of the *Sabor* in the log of U-506 places the wreck approximately 70 km north of Licence Block 11B/12B, south of Buffels Bay (<https://uboaat.net/allies/merchants/ship/2725.html>). However, a position supplied by the South African Navy in a database of wreck they maintain, places the loss 3.7 km to the south-west. This discrepancy in positions is not material, however, since the *Sabor* is located well outside of Licence Block 11B/12B.

The *Texanita*, an approximately 100 000 tons, sank after a collision at sea with another tanker, the *Oswego-Guardian* on 21 August 1972. The two vessels collided in thick fog and oil vapours in the *Texanita*'s empty tanks ignited, creating an explosion that tore the ship apart. It sank in four minutes with the loss of 47 of its 50 crew. At the time, the accident was the biggest tanker collision on record (https://en.wikipedia.org/wiki/Oswego-Guardian-Texanita_collision).

Lastly, it must be stated that although unlikely, the possibility does exist for the remains of currently unknown and unrecorded wrecks to be present in the marine Project area. The historical records contain many references to vessels that were lost without trace between their points of departure and arrival. Where survivors of such events were subsequently



rescued, the loss was recorded, but in many cases, vessels simply never arrived at their destination and could thus lie anywhere along their intended route.

The potential for the occurrence of such unrecorded wrecks was illustrated in 2008 when a 16th century Portuguese wreck, since identified as the *Bom Jesus*, was unexpectedly found during the diamond mining south of Oranjemund in Namibia (see Alves 2011).

Submerged Pre-colonial Archaeology

A largely unexplored aspect of South Africa's maritime and underwater cultural heritage are pre-colonial terrestrial archaeological sites and paleo-landscapes, now inundated by the sea. There have been three major global sea level fluctuations in the last 900 000 years, with the most drastic fall occurring at the height of the last glaciation, between circa 20 000 and 17 000 years ago, when the sea was more than 120 m lower than it is today (WSP Group Africa (Pty) Ltd, 2023e).

The resultant exposure of parts of the continental shelf as dry land added a large coastal plain to the South African land mass, something that was particularly pronounced on the broad Agulhas Bank off the Southern Cape coast. This area, now sometimes referred to as the Palaeo-Agulhas-Plain was quickly populated by terrestrial flora and fauna and by our human ancestors who were dependent on these resources. As a result, for periods numbering in the tens of thousands of years on at least three occasions during the last 900 000 years, our ancestors inhabited areas of what is now the seafloor around the South African coast.

This means that a large part of the archaeological record of South Africa's later Early, Middle and early Late Stone Age is located on the now submerged plain, of which the Agulhas Plain in which Licence Blocks 11B/12B are situated is the most pronounced and extensive.



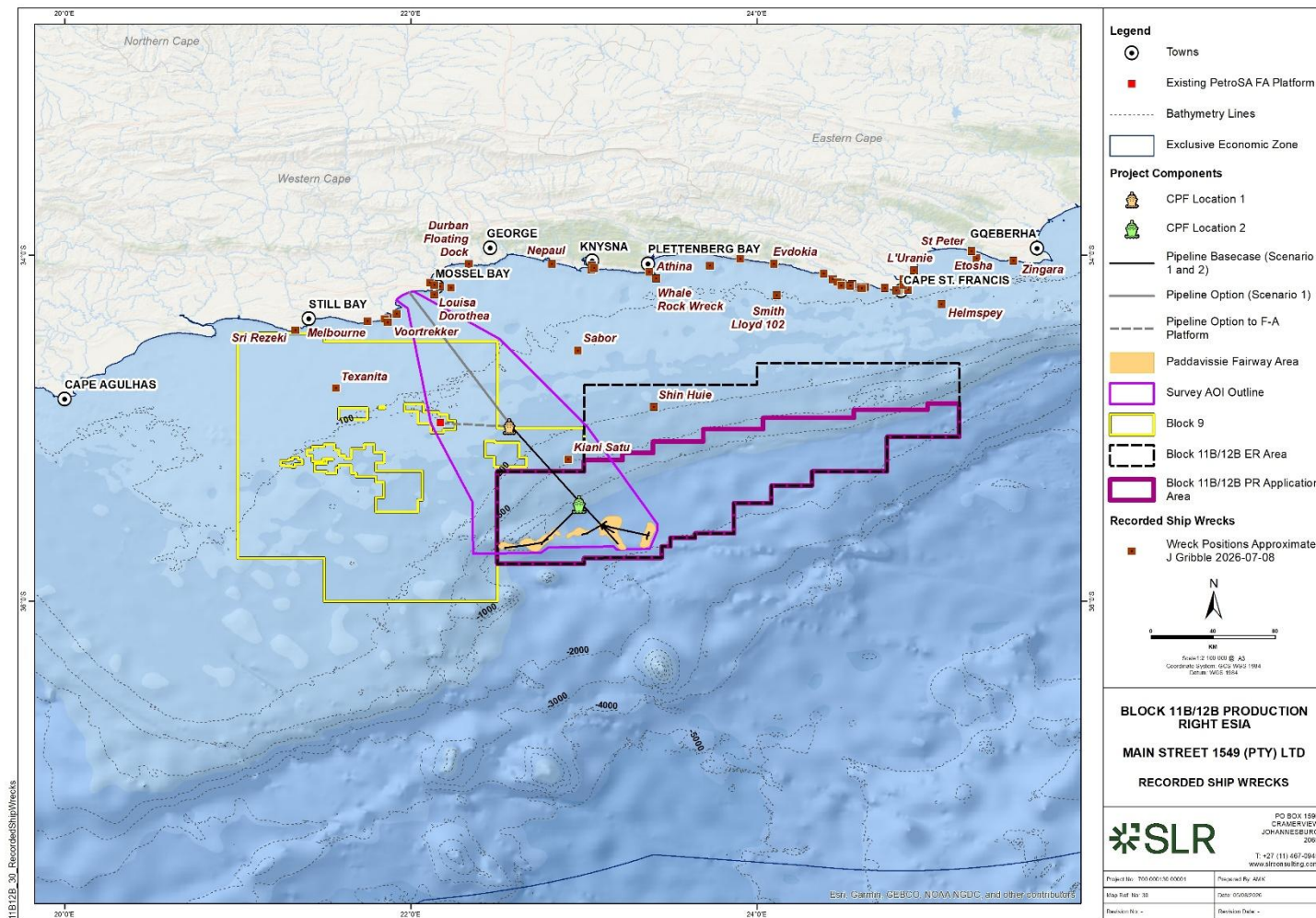


Figure 6-45: Marine Project area in relation to recorded shipwrecks between Still Bay in the west and Cape Recife in the east



6.8.2 Fishing Sectors

In South Africa, DFFE manages and monitors approximately 22 different commercial fisheries sectors. DFFE plays a critical role in managing and conserving the country's marine environment, including the allocation of fishing rights, setting sustainable Total Allowable Catch (TAC) and Total Allowable Effort (TAE), and developing flexible Operational Management Procedures (OMPs) that can accommodate changes in fish populations.

All fishing activities, as well as the processing, sale, and trade of marine resources in South Africa, are subject to regulation under the Marine Living Resources Act of 1998. This act provides the legal framework for the conservation and management of marine resources and ensures their sustainable use, whilst also protecting the marine ecosystem from the negative impacts of human activities. The DFFE is responsible for monitoring and controlling these activities to prevent damage to the marine environment and ensure the sustainability of South Africa's fishing industry.

The fishing sectors that operate in the vicinity of the marine Project area are described in the sections below.

6.8.2.1 Demersal Trawl

The demersal trawl fishery is South Africa's most valuable fishing sector in terms of revenue, generating approximately half of the total value of the country's commercial fisheries. The fishery targets shallow-water hake (*Merluccius capensis*) and deep-water hake (*M. paradoxus*), which together constitute South Africa's most important commercial fishery resource. The fishery is divided into an offshore sector, which targets both hake species but predominantly deep-water hake, and an inshore sector, which targets shallow-water hake and Agulhas sole (*Austroglossus pectoralis*) (Table 6-13). Valuable bycatch species include monkfish (*Lophius vomerinus*), kingklip (*Genypterus capensis*), panga (*Pterogymnus lanarius*) and snoek (*Thyrsites atun*), with monkfish, kingklip and snoek contributing significantly to the economic value of landings. The combined value of catches landed by the inshore and offshore demersal trawl sectors exceeds R 5.2 billion per annum (DFFE, 2025).

Otter trawling is the primary method used in the South African hake fishery. This technique involves towing a trawl net along the seabed, with a pair trawl doors (otter boards) maintaining the horizontal opening of the net (Figure 6-46). Trawling generally occurs on relatively flat, low-relief seabed habitats with sandy substrates that reduce the risk of gear damage or fouling.

DFFE manages hake resources through a global Total Allowable Catch (TAC) that applies collectively across all hake directed sectors (DFFE, 2021b). More than 80% of the TAC is allocated to the offshore demersal trawl sector, with the balance distributed among the inshore trawl fishery, demersal longline and hake handline fisheries. A small portion is also reserved to account for incidental hake bycatch in the horse mackerel mid-water trawl fishery (see Section 6.8.2.2). For 2026, the hake TAC was set at 152 472 tonnes comprising 143 599 tonnes for the offshore sector and 8 873 tonnes for the inshore sector.

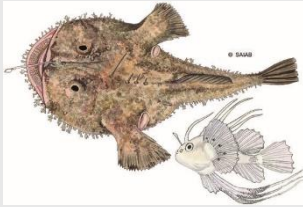
Precautionary Upper Catch Limits (PUCL) are also applied to important bycatch species including monkfish and kingklip (Minnaar, 2025; DFFE, 2025; DFFE, 2026a; DFFE, 2026b).

The South African hake trawl fishery has maintained Marine Stewardship Council (MSC) certification since 2004. One of the key measures supporting this certification is the Hake Trawl Ring Fence, introduced to confine fishing effort to historically trawled grounds and prevent further expansion of the trawl footprint. Offshore demersal trawling is therefore restricted to a defined area encompassing established fishing grounds along the shelf edge. In addition, vessels operating east of 20°E are prohibited from trawling in waters shallower



than 110 m or within 20 nm of the coast, whichever distance is greater (DFFE, 2026a; DFFE, 2026b).

Table 6-13: Key target and bycatch (grey shading) species of the demersal trawl fishery

Target and bycatch species	Reference image
Deepwater hake (<i>Merluccius paradoxus</i>)	
Shallow water hake (<i>Merluccius capensis</i>)	
Agulhas sole (<i>Austroglossus pectoralis</i>)	
Monkfish (<i>Lophius vomerinus</i>)	
Kingklip (<i>Genypterus capensis</i>)	
Snoek (<i>Thyrstites atun</i>)	

Source: WWF-SASSI

The offshore demersal trawl grounds form an almost-continuous band along the shelf edge of the South and West Coasts, between water depths of 200 m and 1 000 m. Most fishing effort is concentrated on the West Coast, although substantial fishing activity also occurs on the Agulhas Bank and along the South Coast shelf edge. Trawlers generally operate parallel to bathymetric contours in order to maintain consistent fishing depths and frequently target aggregations associated with seabed features such as canyons and seamounts.

In contrast, the inshore trawl fishery is restricted to the South Coast between Cape Agulhas and the Great Kei River (Walmsley et al. 2007, Japp et al. 2018). Sole-directed fishing occurs primarily in nearshore waters between approximately 50 m and 80 m depth, particularly between Struisbaai and Mossel Bay, while hake is targeted further offshore in depths of approximately 100 m to 200 m, especially within the traditional fishing grounds known as the *Blues* on the Agulhas Bank. Along the South Coast, shallow-water hake comprise approximately 70% of total hake catches.

The offshore demersal trawl fleet consists of 61 vessels, including both wetfish and freezer trawlers (SADSTIA *pers. comm.*). Wetfish vessels range from 24 m to 56 m in length and preserve catches on ice before returning them to shore-based processors, whereas freezer vessels range from 30 m to 90 m in length and process and freeze catches at sea. Freezer vessels may remain at sea for up to a month at a time, whereas wetfish vessels generally undertake trips of approximately one week. The fleet operate from major harbours such as Mossel Bay and Gqeberha on the South Coast, and Saldanha Bay and Cape Town on the West Coast.



The inshore trawl sector comprises approximately 26 vessels operating mainly from Mossel Bay and Gqeberha (*SADSTIA pers. comm.*). These vessels are generally smaller and less powerful than those operating in the offshore sector, typically ranging between 14 m and 36 m in length.

Over recent decades, total hake catches have generally fluctuated around 150 000 tonnes per annum, with the offshore fishery accounting for the majority of landings (Durholtz, 2022). In comparison, landings by the inshore trawl sector have remained relatively stable at approximately 8 000 tonnes per annum.

Figure 6-47 show the hake trawl ring fence and the spatial distribution of annual average hake demersal trawl catch, normalised to the 80th percentile of catch values, in relation to the marine Project area. **The offshore trawl fishing grounds extend into the inshore portion of Licence Block 11B/12B but do not overlap with the proposed offshore infrastructure within the Paddavisie Fairway or CPF locations. Inshore trawl fishing grounds overlap with portions of the proposed dry gas export pipeline corridor (Scenario 1) and survey AOI.** As described in Section 5.0, the pipeline design incorporates installation and protection measures that will ensure that the pipeline remains safely overtrawable within established fishing grounds.

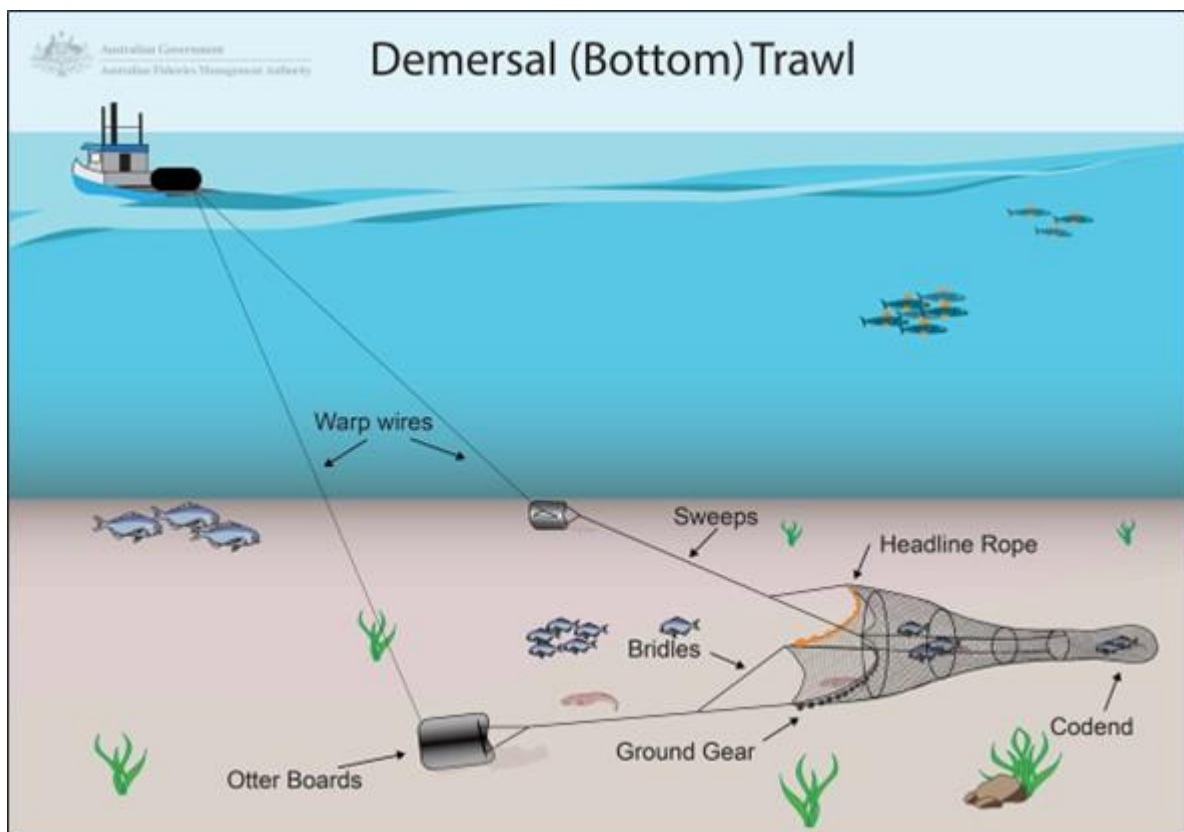


Figure 6-46: Trawl gear typically used by demersal trawlers targeting hake

Source: www.afma.gov.au/fisheries-management/methods-and-gear

Hake supports South Africa's largest fishing industry and is targeted by four commercial fishing sectors. The broader hake value chain is estimated to support approximately 30 000 jobs nationally (DFFE, 2025). The offshore demersal trawl sector directly employs approximately 6 600 people in harvesting, processing, management, administrative, and support functions, while the inshore trawl sector supports a further 4 500 jobs (Felet, et al.,



2020; Rees, et al., 2023). Collectively, these sectors make a substantial contribution to employment, food security and economic development in South Africa's coastal regions.

6.8.2.2 Mid-water Trawl

The mid-water trawl fishery targets adult Cape horse mackerel (*Trachurus trachurus capensis*), a semi-pelagic shoaling fish distributed on the continental shelf from southern Angola to the Wild Coast of South Africa. In South African waters, adult horse mackerel are currently most abundant off the South Coast, particularly aggregating on the Agulhas Bank (DFFE, 2025). The species undertakes a pronounced diel vertical migration, moving higher into the water column at night to feed on plankton. The fishery targets adult horse mackerel during these vertical movements through the water column.

Mid-water trawling involves towing a large trawl net through the water column to target pelagic and semi-pelagic species. The nets are generally larger than those used in demersal trawling and are designed to fish off the seabed, although occasional seabed contact may occur. Under the Marine Living Resources Act (No. 18 of 1998) (MLRA), mid-water trawl is defined as any net which can be towed at any depth between the seabed and the surface without continuously touching the bottom.

The sector comprises 34 rights holders and an allocated TAC of 27 670 tonnes, which has remained unchanged since 2023. The fleet consists of dual rights holders who opportunistically target horse mackerel using hake trawlers fitted with mid-water gear, as well as a single dedicated large midwater trawler, the FV *Desert Diamond*. The *Desert Diamond*, which commenced operations in 1997, is the largest South African registered commercial fishing vessel and lands approximately 75% of the total horse mackerel catch through a series of joint-venture arrangements (DFFE, 2025).

Dual rights holders typically switch from demersal to mid-water trawling when horse mackerel abundance is sufficiently high during hake fishing operations. The catches taken by these vessels constitute a relatively small proportion of the overall horse mackerel TAC. The *Desert Diamond* primarily operates in waters deeper than 110 m, or more than 20 nm offshore east of Cape Point, although these are not exclusive restrictions. Dual-rights vessels generally operate on or adjacent to traditional hake fishing grounds in water depths of approximately 100 m to 400 m, with occasional trawls recorded in depths up to 650 m (see Section 6.8.2.1).

Historically, the fishery has been concentrated on the Agulhas Bank and along the shelf edge of the South and East Coasts, where commercially viable aggregations of horse mackerel occur. Prior to 2017, fishing effort was largely restricted to waters east of 20°E. Although experimental fishing west of 20°E has been permitted since 2017, the majority of catches continue to be reported from the South and East Coasts (DFFE, 2025).



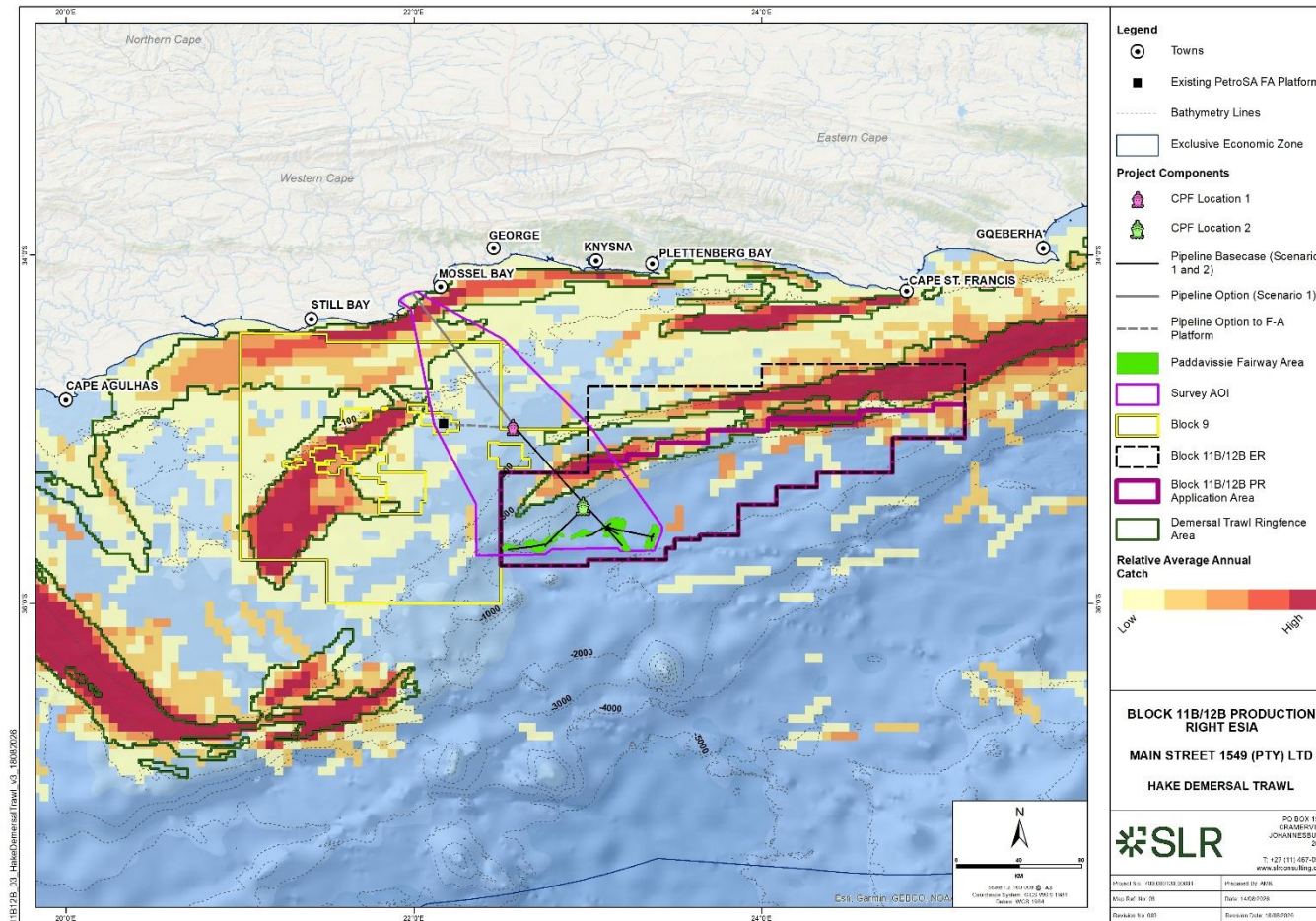


Figure 6-47: Relative annual average hake demersal trawl catch (2016-2023), normalised to the 80th percentile of catch values in relation to the marine Project area. Higher values indicate areas of relatively greater catch intensity. The hake trawl ring-fence is shown.



The towed gear may extend up to 1 km behind the vessel and comprises trawl warps, net and codend (see Figure 6-48). Once deployed, the net is typically towed for several hours at speeds of approximately 4.8 to 6.8 knots, predominantly parallel with the shelf break.

Figure 6-49 shows the distribution of mid-water trawl fishing intensity in relation to the marine Project area. Mid-water trawl fishing grounds overlap portions of the proposed survey AOI and section of the pipeline corridor, primarily along the shelf edge to the east of the development area. There is no overlap between the mapped mid-water trawl fishing grounds and the proposed offshore production infrastructure within Licence Block 11B/12B. Although parts of the survey area and pipeline corridor intersect the broader mid-water trawl footprint of the fishery, the overlap is generally confined to areas of lower to moderate fishing intensity, while the highest fishing effort remains concentrated outside the Project area along established fishing grounds on the Agulhas Bank and shelf edge further east. **The available fishing intensity data indicate that the core mid-water trawl grounds are located beyond the main offshore Project components, with only limited interaction anticipated within the areas of overlap.**

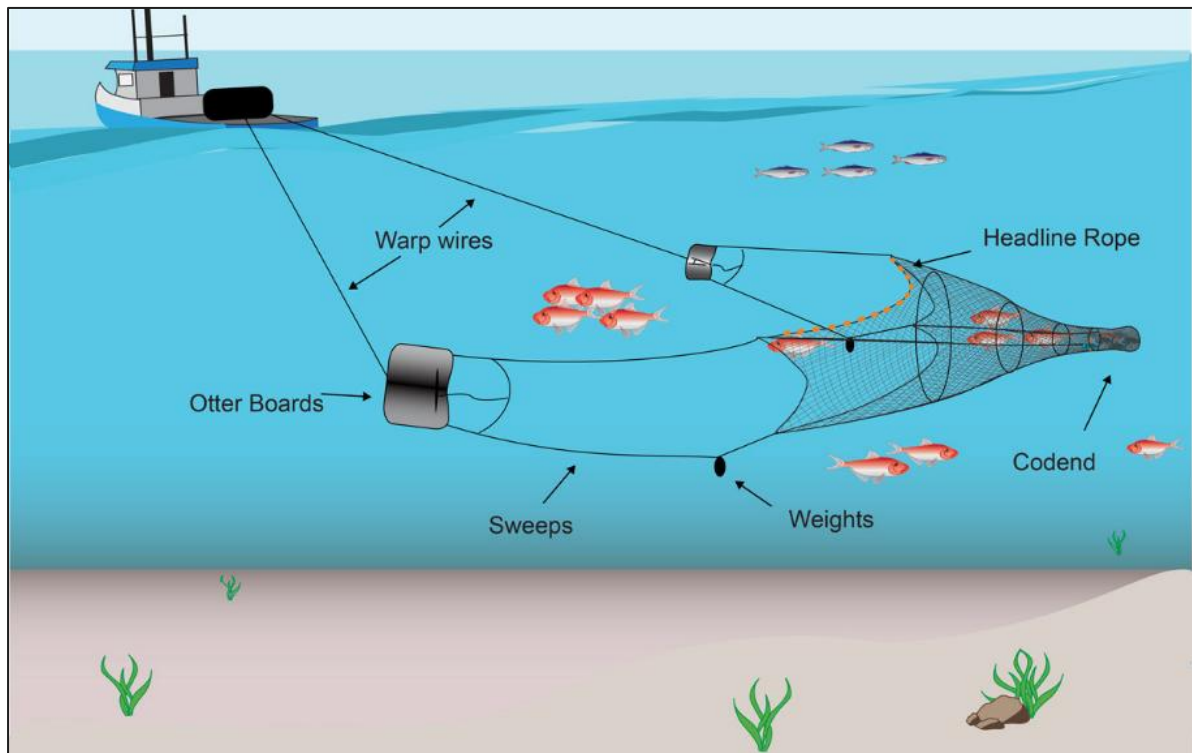


Figure 6-48: Typical configuration of mid-water trawl gear

Source: www.afma.gov.au/fisheries-management/methods-and-gear/trawling



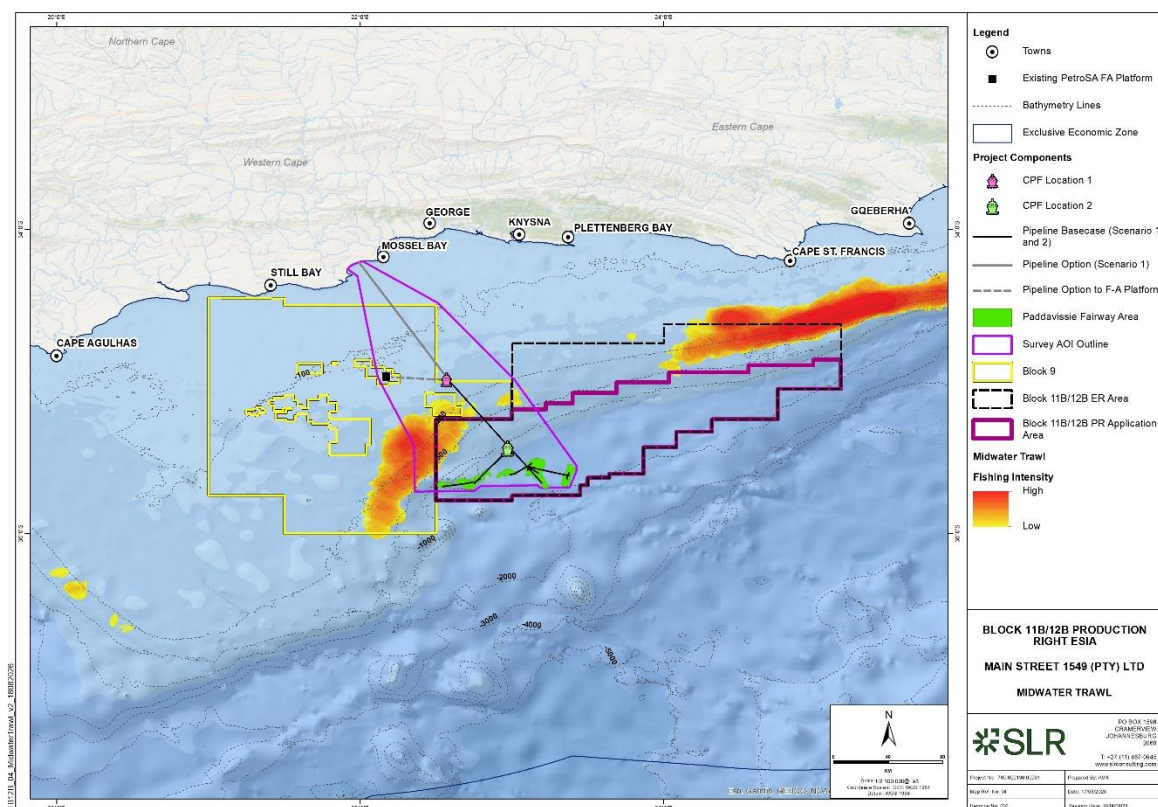


Figure 6-49: Midwater trawl fishing intensity derived from 2008 to 2016 trawl effort data (hours trawled), expressed as a relative fishing-intensity surface normalised to the 80th percentile of effort values, in relation to the marine Project Area

Source: Harris et al (2019)

6.8.2.3 Hake Demersal Longline

The demersal longline fishery targets bottom dwelling species, primarily shallow-water hake (*M. capensis*) and deep-water hake (*M. paradoxus*). Kingklip (*Genypterus capensis*) is an important retained bycatch species, contributing approximately 3-5% of the catch by mass (DFFE 2025). At least 17 additional bycatch species are caught, including chondrichthyans and teleosts, although most are released alive where possible or discarded.

Fishing occurs along the South and West Coasts, largely overlapping with the demersal trawling grounds. However, unlike the demersal trawl fisheries, the demersal longline fishery can operate over hard (reef and/or high profile) grounds that are inaccessible to trawlers and is not subject to the MSC ringfence restrictions that apply to the trawl fishery (Norman et al. 2018). As with the offshore demersal trawl fishery, vessels are prohibited from operating in waters shallower than 110 m, or within 20 nm of the coast east of 20°E (DFFE, 2026c). An area offshore of Gqeberha, known as the “kingklip box”, is closed annually from September to November to protect spawning aggregations of kingklip.

The hake longline fishery typically accounts for 5-6% of annual hake catches and receives a comparatively small proportion of the overall hake TAC. Most catches in recent years have been made on the West Coast, where deep-water hake dominate catches, while approximately 70% of catches on the South Coast comprise shallow-water hake (DFFE, 2021b; 2025).



The fishery currently comprises 109 right holders, which collectively operate between 40 and 50 vessels. The sector was allocated 9 904 tons of the global hake TAC for 2025. Vessels are typically 10-20 m wooden or fibreglass decked vessels operating as wetfish vessels, with catches stored on ice and trips lasting approximately 6-8. Vessels operate from all major harbours, including Cape Town, Hout Bay, Mossel Bay and Gqeberha, while secondary points of deployment include Plettenberg Bay, Cape St Francis, Gansbaai, Hermanus, Saldanha Bay and St Helena Bay.

The fishery employs a Spanish double-longline system, consisting of upper and lower longlines suspended between anchor lines connected to surface floats (Figure 6-50). Longlines are typically 10-30 km in length and carry approximately 6 900 to 15 600 baited hooks at regular intervals (1 to 1.5 m). Gear is generally deployed at depths of 200-400 m, set at night at speeds of five to nine knots and left to soak for up to eight hours before retrieval. Recovery is undertaken using a line hauler at approximately one knot, and may require six to ten hours to complete

Figure 6-51 shows the spatial distribution of demersal longline fishing intensity on the South Coast in relation to the marine Project area. The principal demersal longline fishing grounds are concentrated along the shelf edge and overlap the eastern portion of the survey AOI and sections of the proposed pipeline corridor. The highest relative catch intensities occur along this shelf-edge fishing band, whereas the proposed offshore production infrastructure within the Paddavissie Fairway lies south of the main fishing grounds and does not overlap areas of elevated demersal longline activity. **The overlap is therefore limited primarily to the survey area and export pipeline corridor, with no overlap between the core demersal longline fishing grounds and the proposed offshore production facilities.**

The hake longline fishery provides between 1 500 and 2 000 jobs (DFFE 2021). Due to the relatively small quotas allocated to the sector, many vessels switch to other fisheries particularly the tuna pole and pelagic longline fisheries, after three to seven months of hake fishing each year (DFFE 2021).

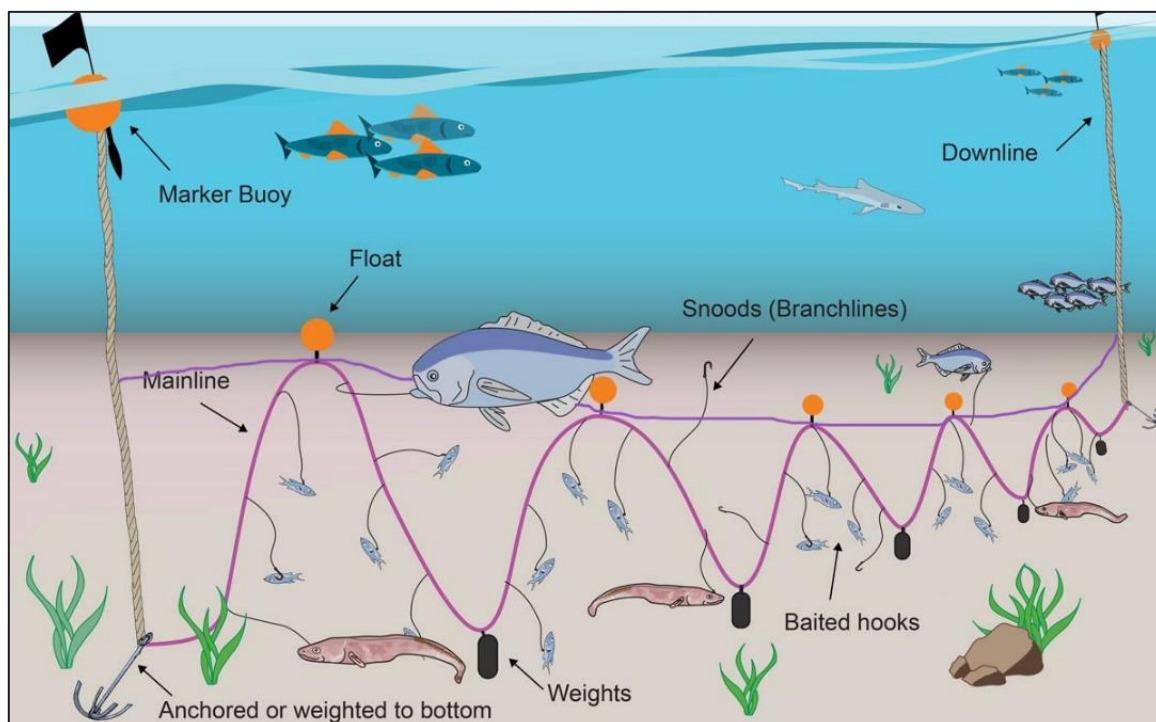


Figure 6-50: Typical configuration of demersal (bottom-set) hake longline gear
Source: <http://www.afma.gov.au/portfolio-item/longlining>



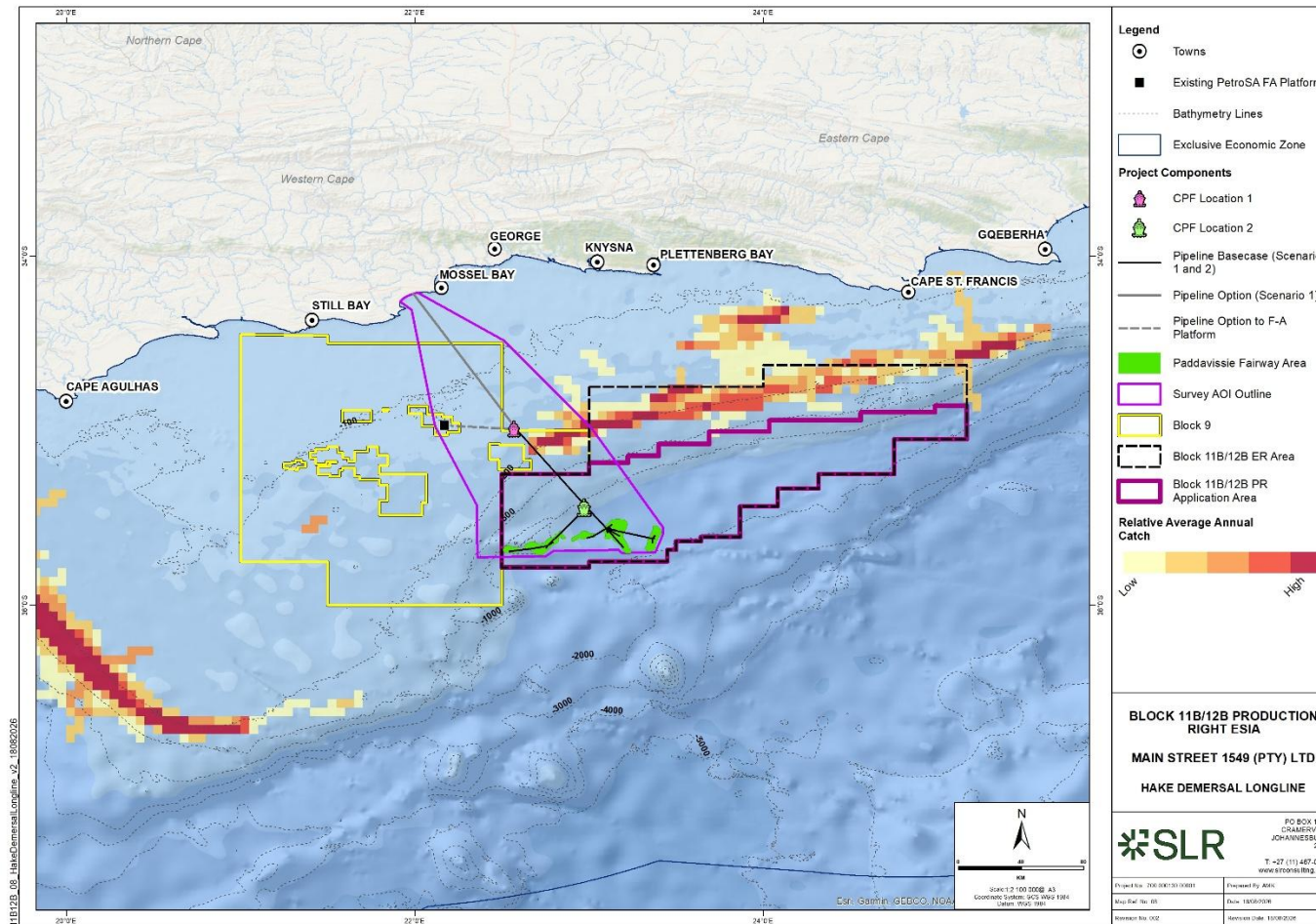


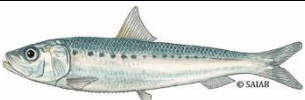
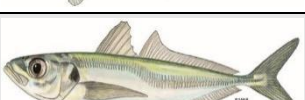
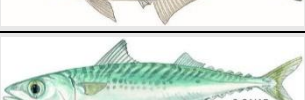
Figure 6-51: Relative annual average hake demersal longline catch (2016-2024), normalised to the 80th percentile of catch values in relation to the marine Project area. Higher values indicate areas of relatively greater catch intensity



6.8.2.4 Small Pelagic Purse-seine

The small pelagic purse seine fishery is South Africa's largest fishery by landed volume and the second most valuable fishery after the trawl sector, with an estimated annual value of approximately R5.5 billion (DFFE, 2021a). The primary target species are sardine (*Sardinops sagax*) and anchovy (*Engraulis encrasicolus*), which historically account for approximately 80% of total catches, although this proportion has declined in recent years. The fishery also targets round herring (redeye) (*Etrumeus whiteheadi*) while chub mackerel (*Scomber japonicus*) and horse mackerel (*Trachurus capensis*) are commonly retained as bycatch (Table 6-14). These species occupy a low trophic level within the ecosystem and constitute important prey resources for numerous commercially and ecologically important predators, including hake, snoek, tuna, seabirds and marine mammals (Norman et al. 2018).

Table 6-14: Key target and bycatch (grey shading) species of the small pelagic purse-seine fishery

Target and bycatch species	Reference image
Anchovy (<i>Engraulis capensis</i>)	
Sardine (<i>Sardinops sagax</i>)	
Red-eye round herring (<i>Etrumeus whiteheadi</i>)	
Horse mackerel (<i>Trachurus trachurus capensis</i>)	
Chub mackerel (<i>Scromber japonicus</i>)	

Source: WWF-SASSI

The abundance and distribution of small pelagic fish are characterised by large natural fluctuations driven by environmental variability, particularly changes in oceanographic conditions associated with coastal upwelling. Long-term changes in the relative abundance of sardine and anchovy have been documented both locally and internationally occurring over decadal and centennial timescales (van der Lingen, 2021).

The total combined catch of anchovy, sardine and round herring landed by the pelagic fishery decreased by 45%, from 396 000 tonnes in 2016 to just 217 000 tonnes in 2019, primarily owing to a substantial decline in anchovy catches. Anchovy catches subsequently recovered in 2020 to approximately 285 000 tonnes, resulting in total small pelagic catches exceeding the long-term average. However, despite relatively high TACs, anchovy catches again remained low between 2021 and 2024. The average combined catch between 2020 and 2024 (285 000 tonnes) was approximately 46 000 tonnes lower than the long-term average annual catch of 331 000 tonnes recorded from 1949 to 2024 (Figure 6-52) (DFFE, 2025).

Current assessments indicate the sardine stock is in an optimal state, with the biomass estimates in early 2024 being almost double those estimated in 2022, although recruitment



remains below the long-term average. Anchovy and round herring stocks are also considered to be in an optimal condition, despite anchovy biomass remaining substantially lower than the peak levels observed during the early 2000s (van der Lingen, 2021; DFFE, 2023a; 2025).

The small pelagic purse seine fleet is composed predominantly of glass-reinforced plastic (GRP) and steel-hulled vessels, although a limited number of wooden vessels remain in operation. Vessel lengths typically range from approximately 15 m to 39 m. The fleet comprises approximately 100 vessels, ranging from 11 m to 48 m in length. Most of the fleet operates on the South-West and West Coasts, specifically in St Helena Bay, Laaiplek, Saldanha Bay, and Hout Bay, with fewer vessels operating on the South Coast from the harbours of Mossel Bay, and Gqeberha. The ports of deployment align with the locations of canning factories and fish reduction plants along the coast.

The geographical distribution and intensity of purse-seine fishing effort are strongly influenced by the seasonal distribution and abundance of target species and therefore vary considerably between years. Fishing is concentrated on the West and South-West Coasts, operating primarily from St Helena Bay, Laaiplek, Saldanha Bay and Hout Bay, with a smaller component of the fleet operating from Gansbaai, Mossel Bay and Gqeberha on the South Coast. These ports correspond closely with the locations of fish-processing facilities, including canneries and fish-meal plants.

The sardine-directed fleet concentrates effort in a broad area extending from Lambert's Bay southwards past Saldanha Bay and Cape Town to Cape Point, and eastwards along the coast to Mossel Bay and Gqeberha. The anchovy-directed fishery operates predominantly on the South-West Coast, between Lambert's Bay and Kleinbaai (near Gansbaai), with fishing activity generally peaking between March and September.

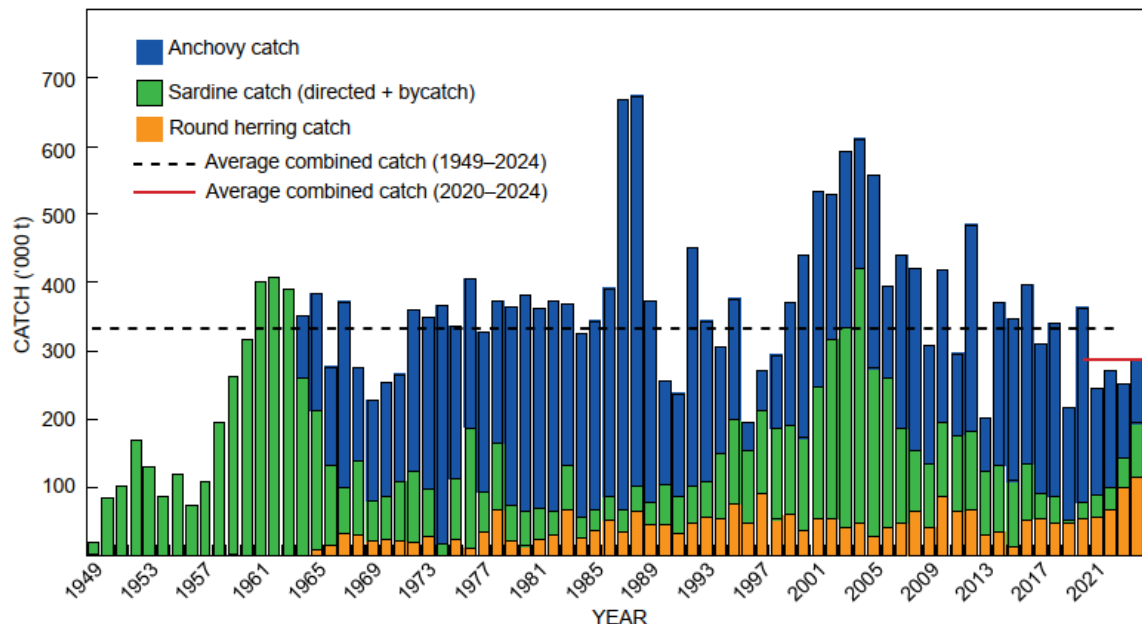


Figure 6-52: The annual combined catches of anchovy, sardine and round herring by the small pelagic fishery from 1949 to 2024. Also shown is the long-term average combined annual catch (black dashed line) and for the past five years (2020-2024; red solid line)

Source: DFFE (2025)



Round herring is a non-quota species managed through a Precautionary Catch Limit (PCL), is targeted when available and has increased in commercial importance in recent years owing to lower anchovy and sardine catches. The PCL increased from 50 000 tonnes in 2019 to 120 000 tonnes in 2024. Fishing for round herring occurs throughout the year, with increased effort during winter and a short seasonal break from mid-December to mid-January. The species may be targeted further offshore than sardine and anchovy, although fishing generally occurs within approximately 100 km of the coast (DFFE, 2025).

Purse-seining involves surrounding a shoal of fish with a large wall of netting and then closing the bottom of the net using a pursing line. Once a surface shoal has been located, the vessel steams around the school while deploying the net, often with assistance from a smaller vessel. Nets typically extend to depths of between 60 and 90 m (Figure 6-54). Following deploying, the vessel is unable to manoeuvre until the gear has been fully retrieved, a process that may take up to 1.5 hours. Fishing is generally undertaken overnight, with catches landed the following day.

The small pelagic purse-seine fleet is composed predominantly of Glass-Reinforced Plastic (GRP) and steel-hulled vessels, with a limited number of wooden vessels remaining in operation. Vessel lengths typically range from approximately 15 m to 39 m. Although the fishery comprises approximately 100 rights holders, substantially fewer vessels are active in the fishery in any given year.

Figure 6-53 shows the spatial distribution of small pelagic purse-seine fishing intensity on the South Coast in relation to the marine Project area. Established purse-seine fishing grounds are concentrated in nearshore waters along the South Coast and do not overlap the proposed offshore infrastructure within the Paddavissie Fairway. **Limited overlap occurs only along the inshore western portion of the survey AOI and a short section of the dry gas export pipeline corridor (Scenario 1), where fishing intensity is generally low relative to the core fishing grounds located closer to the coast**

The small pelagic sector provides employment for approximately 5 800 people, the majority of whom are employed on a full-time basis. Employment is distributed across both the West and South Coasts and supports a substantial fish-processing industry linked to canning and fish-meal production. Sea-going personnel employed in the small pelagic fishery are among the highest-paid workers in South Africa's fishing industry (DFFE, 2021a).



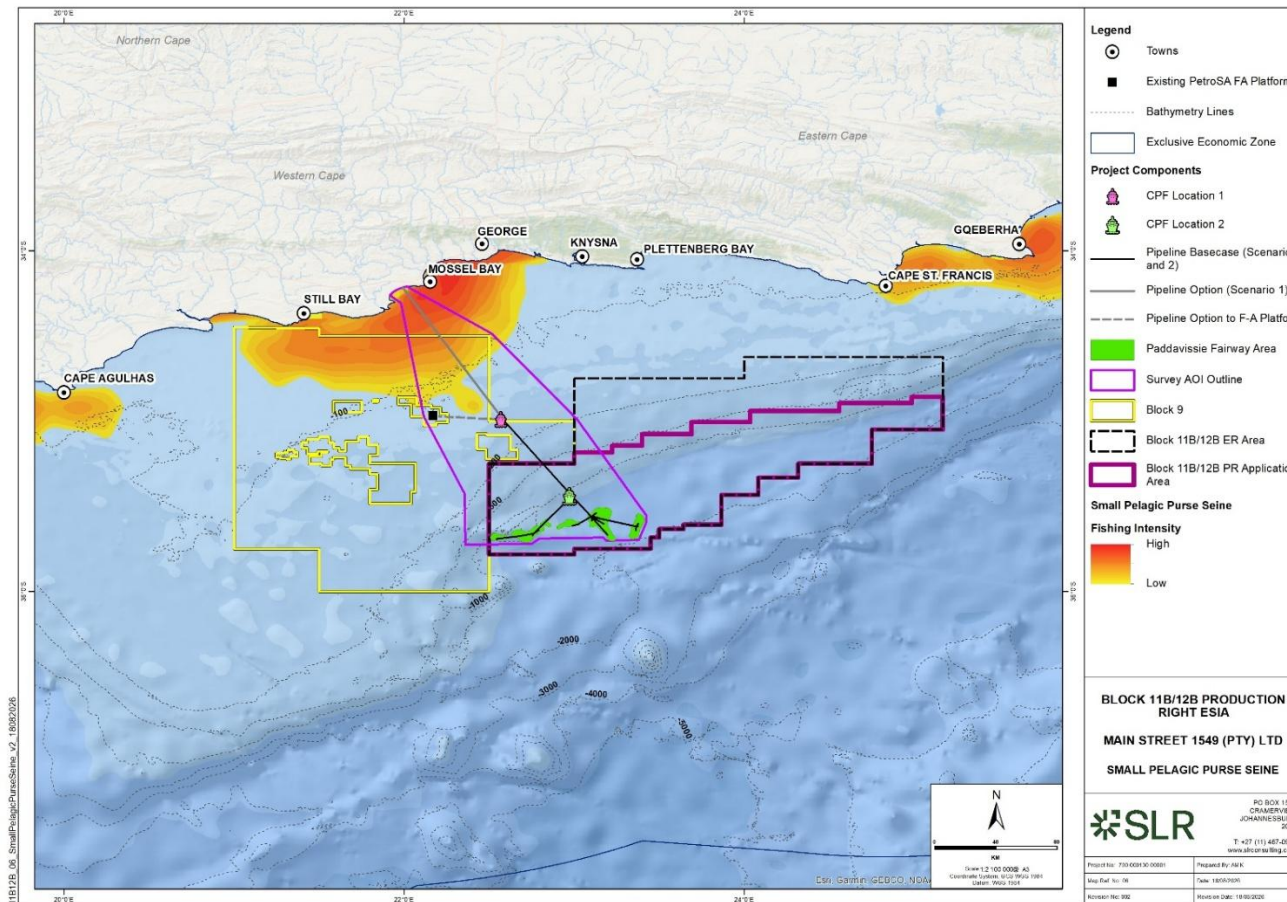


Figure 6-53: Purse-seine fishing intensity derived from annual average catch data between 2000 and 2016, expressed as a relative fishing-intensity surface, in relation to the marine Project Area

Source: Harris et al (2019)



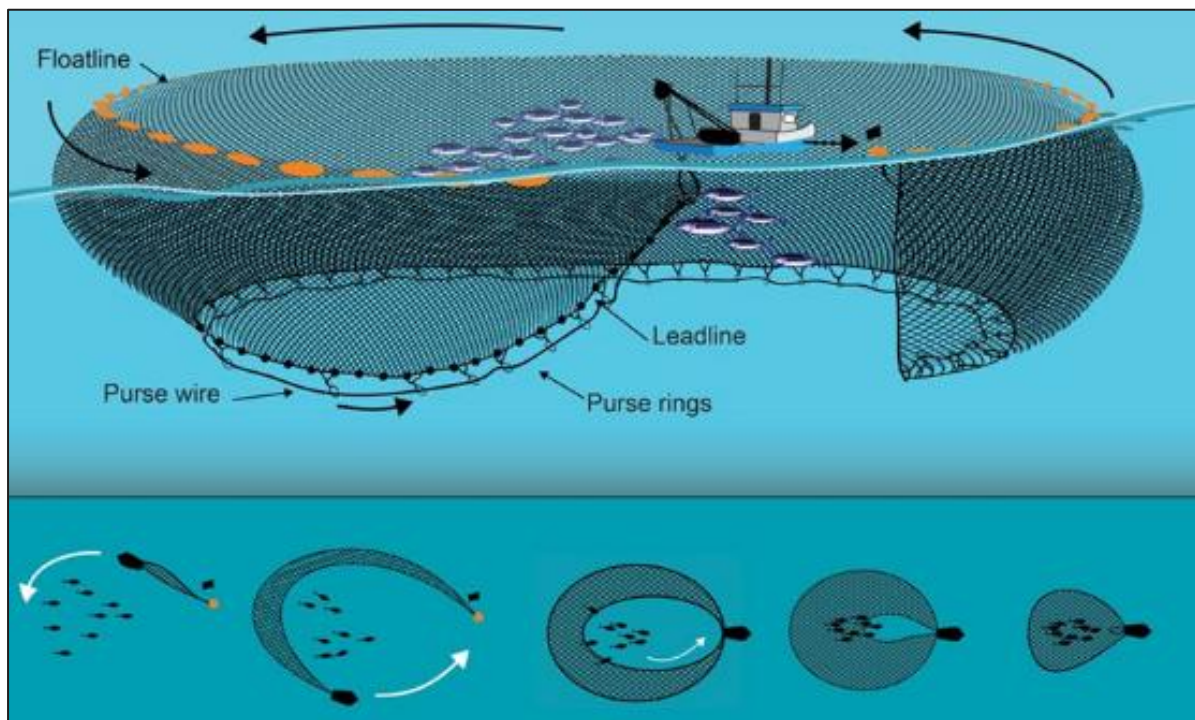


Figure 6-54: Typical configuration and deployment of a small pelagic purse seine targeting anchovy and sardine as used in South African waters

Source: <http://www.afma.gov.au/portfolio-item/purse-seine>

6.8.2.5 Large Pelagic Longline

The South African pelagic longline sector primarily targets highly migratory pelagic predators, primarily, yellowfin tuna (*Thunnus albacares*), bigeye tuna (*T. obesus*) and swordfish (*Xiphias gladius*). Southern bluefin tuna (*T. maccoyii*) is also caught under South Africa's allocation from the Commission for the Conservation of Southern Bluefin Tuna (CCSBT). Important bycatch species include albacore tuna (*T. alalunga*), blue shark (*Prionace glauca*) and shortfin mako shark (*Isurus oxyrinchus*), with some pelagic shark species retained subject to species-specific management measures and catch limits (Table 6-15). The target species are highly migratory, with populations spanning the EEZs and adjacent high seas of multiple countries.

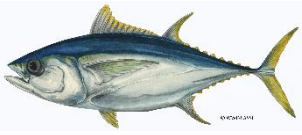
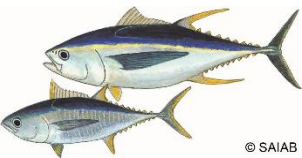
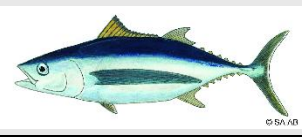
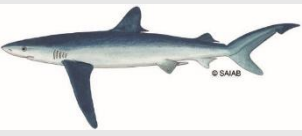
Pelagic longlining involves setting drifting lines that may extend for tens of kilometres and carry hundreds to thousands of baited hooks suspended within the upper water column. Lines are weighted and marked with floats and radio buoys, with gear typically set at night to reduce seabird interactions. Once deployed, longlines drift with prevailing currents and may move considerable distances during the soak period before retrieval.

Because these stocks are shared internationally, South Africa participates in their management through three Regional Fisheries Management Organisations (RFMOs): the International Commission for the Conservation of Atlantic Tuna (ICCAT), the Indian Ocean Tuna Commission (IOCT) and the Commission for the Conservation of Southern Bluefin Tuna (CCSBT). Through these RFMOs, South Africa contributes fisheries-dependent and fisheries-independent data, including catch, effort, biological sampling and compliance information, which inform stock assessments, harvest control strategies and conservation measures. These organisations are responsible for the management of commercially important tuna, billfish, and certain pelagic shark species throughout the Atlantic and Indian Oceans and, in the case of southern bluefin tuna, across its global range.



Catch and effort data from the large pelagic longline fishery in South African waters from 2000 to 2022 are shown in Figure 6-55 and Figure 6-56, respectively. In 2005, 50 long-term rights were issued to South African vessels, formalising a fishery that had previously been dominated by foreign-flagged vessels. The marked decline in catch and effort observed in 2006 reflects the cessation of foreign fishing operations in South African waters (DFFE, 2012). Foreign participation subsequently resumed through joint venture arrangements with South African right holders. In 2011, the separate pelagic shark fishery was incorporated into the tuna and swordfish fishery, with pelagic sharks thereafter managed as bycatch species. Although pelagic sharks have continued to comprise a substantial component of catches, strict catch limits and management measures apply (Figure 6-55).

Table 6-15: Key target and bycatch (grey shading) species of the large pelagic longline fishery

Target and bycatch species	Reference image
Bigeye tuna (<i>Thunnus obesus</i>)	
Yellowfin tuna (<i>Thunnus albacares</i>)	
Swordfish (<i>Xiphias gladius</i>)	
Southern bluefin tuna (<i>Thunnus maccoyii</i>)	
Albacore tuna (<i>Thunnus alalunga</i>)	
Shortfin mako shark (<i>Isurus oxyrinchus</i>)	
Blue shark (<i>Prionace glauca</i>)	

Source: WWF-SASSI

In 2017, 60 new long-term commercial fishing rights were allocated for a 15-year period. At that time, 34 South African registered vessels and three chartered foreign vessels were



authorised to participate in the fishery (Norman, et al., 2018). However, the profile of the fishery has since shifted towards predominantly domestic participation, and by 2023 the fishery comprised 23 active South African vessels, and no foreign-flagged vessels (DFFE, 2025).

Large pelagic longline vessels typically range from approximately 20 m to 32 m in length and undertake trips lasting from several days to several weeks, depending on vessel size and fishing location. Although the domestic fleet historically operated mainly from Durban and Richards Bay, most vessels are now based in Cape Town and Hout Bay. Fishing occurs throughout the South African EEZ and adjacent high seas, mostly in waters deeper than 500 m and often concentrated along the continental shelf edge. Historically, foreign-flagged vessels operated mainly on the South and East Coasts, whereas South African vessels have traditionally focussed effort on the West Coast and offshore areas north of Durban (Jordaan, et al., 2018).

Figure 6-57 shows the spatial distribution of large pelagic longline fishing intensity on the South Coast in relation to the marine Project area. Pelagic longline fishing activity overlaps portions of the survey AOI and the eastern extent of the Project area, with the highest fishing intensities occurring along a broad northeast-southwest band extending across the shelf edge and offshore waters east of the development area. **The proposed offshore infrastructure within the Paddavissie Fairway is situated predominantly outside the areas of highest fishing intensity, although lower-intensity pelagic longline activity occurs within and adjacent to parts of the development footprint.**

The South African large pelagic longline fishery makes an important contribution to the country's fishing economy and supports employment directly through harvesting activities, and indirectly through processing, marketing and distribution. The fishery is strongly export-orientated, with more than 90% of landed catch destined for international markets (FishSA, 2019). In 2017, the fishery landed approximately 2 600 tonnes of product with an estimated wholesale value of approximately R 155 million, accounting for around 1.6% of the total wholesale value of South African fisheries. Owing to the high market value of tuna and swordfish species and the continued under-utilisation of portions of some allocated quotas, the sector is widely regarded as having significant development potential relative to other South African fisheries (The South African Fishing Industry Handbook and Buyers' Guide 2019).



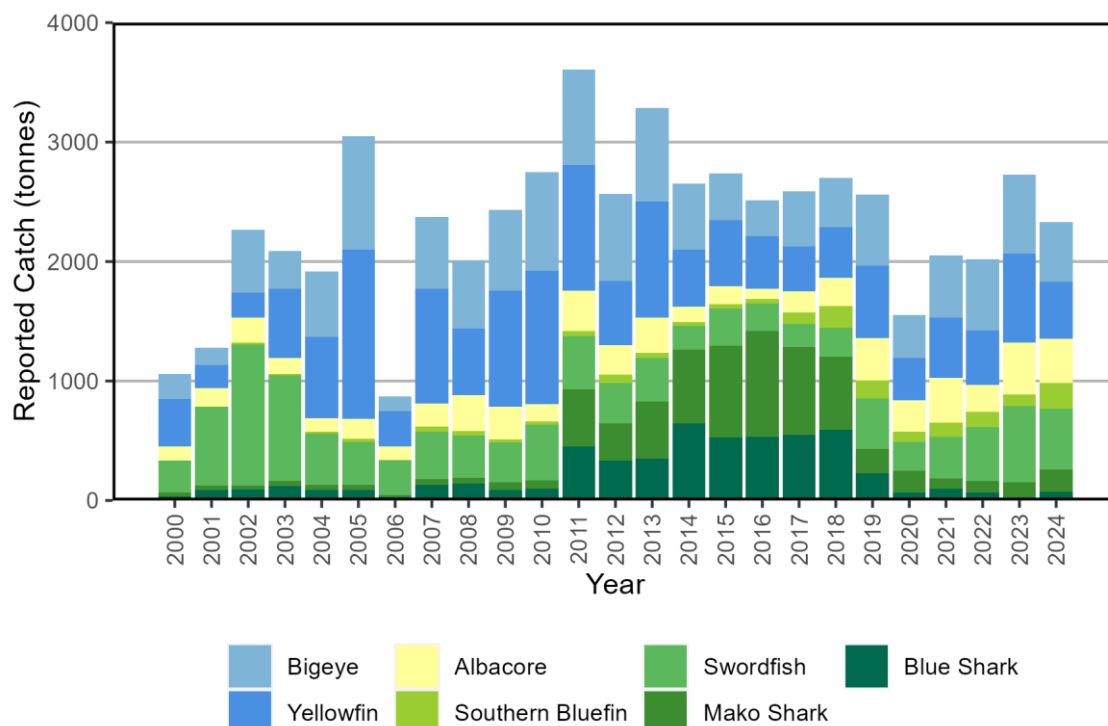


Figure 6-55: Interannual variation of catch landed by the large pelagic longline sector in South African waters for seven main species (2000 - 2024).

Source: DFFE, 2025

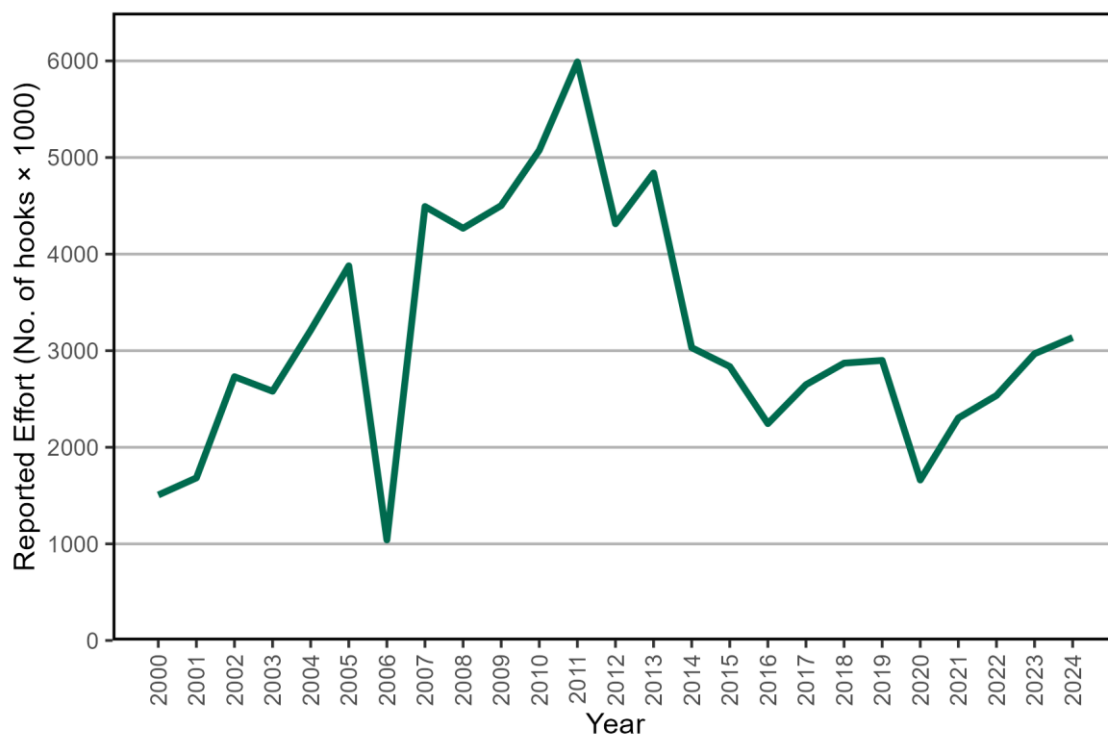


Figure 6-56: Interannual variation of effort (number of hooks set) by the large pelagic longline sector in South African waters (2000 - 2024).

Source: DFFE, 2025



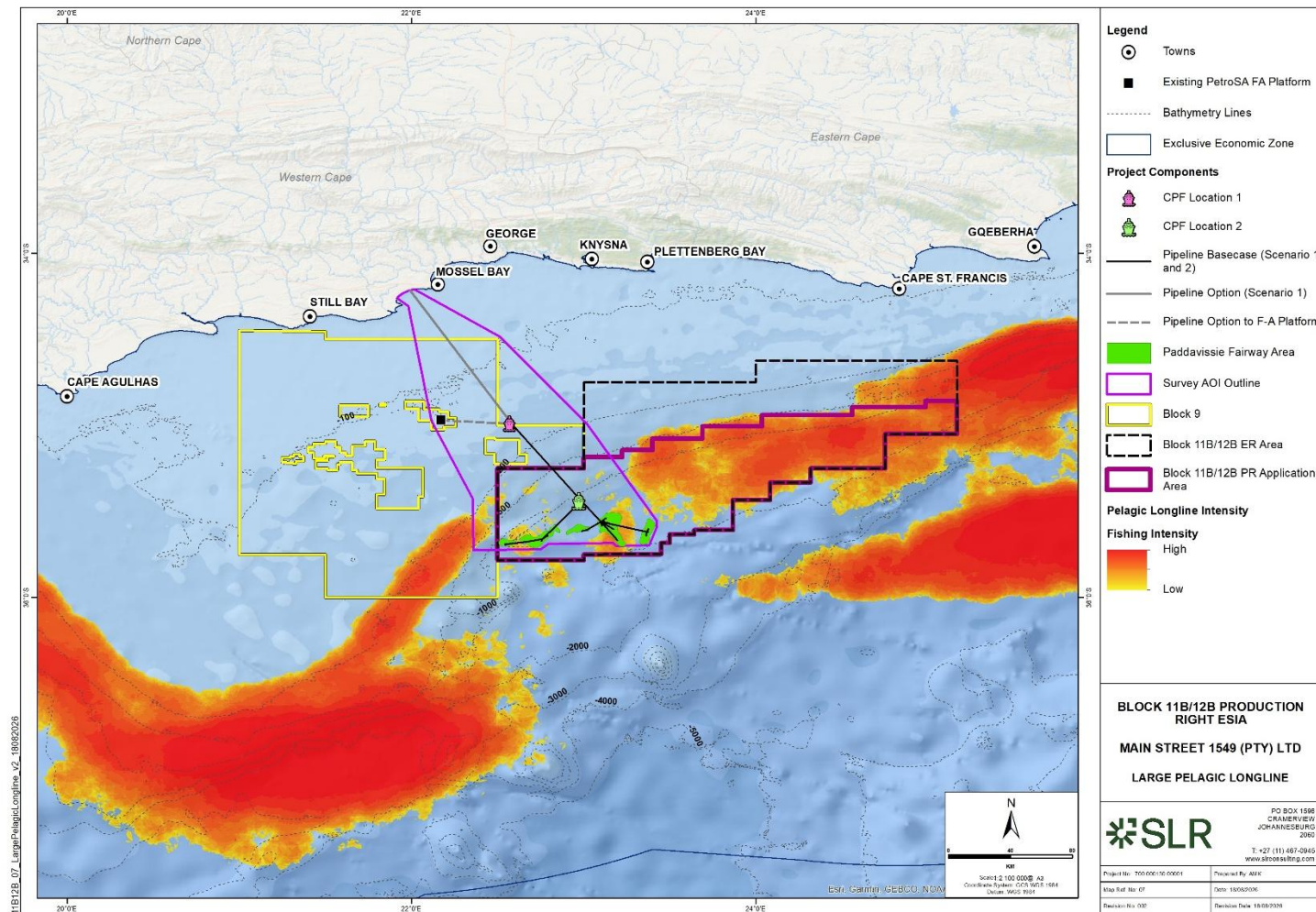


Figure 6-57: Pelagic longline fishing intensity derived from fishing effort data (hooks per square kilometre) between 2000 and 2016, expressed as a relative fishing-intensity surface, in relation to the marine Project Area

Source: Harris et al (2019)



6.8.2.6 Traditional/Commercial Linefish

Linefish in South Africa is defined as the capture of fish with hook and line methods, excluding longlines. The traditional commercial linefish fishery is one of South Africa's oldest fisheries and targets a diverse assemblage of species. Approximately 250 species are landed annually, although only around 20 species are considered commercially important (Lamberth & Joubert, 1999). The fishery is dominated by a relatively small number of species that collectively account for about 90% of total catches. Based on average catches between 2000 and 2023, the most important species include snoek (*Thyrsites atun*), geelbek (*Atractoscion aequidens*), yellowtail (*Seriola lalandi*), silver kob (*Argyrosomus inodorus*), dusky kob (*Argyrosomus japonicus*), carpenter (*Argyrozona argyrozona*), slinger (*Chrysoblephus puniceus*), hottentot (*Pachymetopon blochii*), and santer (*Cheimerius nufar*) (DFFE, 2025).

The traditional linefish fishery, also referred to as the commercial linefish fishery, is South Africa's third most important fishery in terms of tonnage landed and economic value. However, despite having the country's largest fishing fleet and employing approximately 27% of all fishers, the sector contributes only around 6% of the total value of South Africa's commercial marine fisheries (DFFE, 2020; DFFE, 2023a). The value of commercial linefish catches was estimated at approximately R 105.5 million in 2022 (Feike, 2023).

The fishery comprises a diverse fleet ranging from 6-8 m ski-boats capable of surf launching, to larger harbour-based deck vessels and a small number of freezer vessels exceeding 20 m in length that are capable of remaining at sea for more than two weeks. Commercial linefishing vessels typically deploy lines carrying no more than 10 baited hooks and operate primarily in coastal and shelf waters. Fishing effort is strongly influenced by weather and sea conditions, particularly for smaller ski-boats, which generally operate only during favourable conditions.

Fishing occurs throughout the year, although catches exhibit seasonal variation associated with the availability of target species. Most fishing activity is concentrated in nearshore waters, with vessels generally restricted to within 40 nautical miles of the coast and further constrained by marine protected areas and other fisheries management measures.

Linefishing effort increased substantially during the 20th century, peaking during the 1980s and 1990s. Improvements in vessel capability, navigational technology and fishing efficiency, combined with increasing fishing effort, resulted in widespread overexploitation of many linefish stocks. In response, the linefish resource was declared to be in a State of Emergency in 2000 and a suite of management measures were introduced, including effort restrictions, minimum size limits, bag limits, closed seasons and species-specific prohibitions.

A formal linefish management protocol based on measurable biological reference points was subsequently developed and continues to underpin management of the sector (DFFE, 2023a).

Many linefish species possess biological characteristics that make them particularly vulnerable to overexploitation, including slow growth, long lifespans, late maturity, sex change, estuarine dependence, residency and spawning aggregation behaviour. Historical stock assessments have indicated that numerous linefish species remain overexploited or depleted, although reductions in fishing effort since the early 2000s have resulted in measurable recovery of some species, including slinger, santer, hottentot and carpenter. Other important species, including silver kob, continue to experience significant fishing pressure (DFFE 2023a).

The commercial linefish sector is currently managed through a Total Allowable Effort (TAE) system based on boat and crew allocations. The fishery is divided into three management



zones: Zone A (Port Nolloth to Cape Infanta), Zone B (Cape Infanta to Port St Johns), Zone C (KwaZulu-Natal). Following the 2021/2022 Fishing Rights Allocation Process, the TAE was divided between the commercial and small-scale sectors (DFFE, 2023b). For the 2026/27 fishing season, the initial allocation provided for a TAE of 455 vessels, comprising 378 commercial vessels with 77 vessels allocated to the small-scale fisheries sector. Following appeals an additional 297 traditional linefish vessels operating under the Interim Relief framework were reinstated, substantially increasing participation of the small-scale sector.

A large proportion of South Africa's small-scale fishers target linefish species. In recent years, 109 small-scale fishing co-operatives were established and granted 15-year fishing rights in the Northern Cape, Western Cape, Eastern Cape and KwaZulu-Natal (DFFE, 2025). Many species included in the small-scale fishing basket are also primary target species of the commercial and recreational linefish sectors. The small-scale fishing sector is described in more detail in Section 6.8.2.9.

Figure 6-58 shows the spatial distribution and intensity of commercial linefish fishing effort in relation to the marine Project area. Linefishing activity is concentrated in nearshore waters and associated coastal fishing grounds along the South Coast. **The principal linefish grounds occur outside the offshore Project area, with no overlap between the mapped high-intensity fishing areas and the proposed offshore infrastructure within the Paddavissie Fairway. Limited overlap occurs only in the western portion of the survey AOI and sections of the nearshore pipeline corridor, where fishing intensity is generally low relative to established coastal fishing grounds.**

6.8.2.7 South Coast Rock Lobster

The South African longline trap fishery targets the endemic South Coast Rock Lobster (*Palinurus gilchristi*). The fishery commenced in 1974 following the discovery of a commercially exploitable stock near Gqeberha and subsequently expanded westwards and eastwards along the South Coast, including fishing grounds off Cape St Francis, Port Alfred and the Agulhas Bank (DAFF, 2013).

South Coast Rock Lobster is distributed primarily on rocky substrata in water depths of approximately 90-200 m between Cape Hangklip and the mouth of the Great Kei River, with the highest level of fishing effort occurring off Gqeberha and East London (Groeneveld & Branch, 2002; Sink, et al., 2019). Fishing grounds may extend up to 250 km offshore along the outer edge of the Agulhas Bank (DFFE, 2025).

The fishery operates throughout the year, with the fishing season extending from 1 October to 30 September of the following year. The resource is managed using a combination of TAC and TAE controls. Scientific recommendations are based on an Operational Management Procedure (OMP), first implemented in 2008 and subsequently revised in 2010, 2014 and 2019. The current management approach seeks to increase spawning biomass while limiting annual TAC fluctuations to a maximum of 5% (DFFE, 2025). Although the 2019 OMP remains the formal basis for management decisions, the assessment framework was reviewed during 2023, and updated stock assessments and projections were completed in 2025, although these have not yet been formally implemented through a revised OMP (Holloway, 2023; Holloway, 2025).

The fishery is capital-intensive, and utilises specialised trap-fishing gear deployed from large ocean-going vessels (DFFE, 2025). The fleet currently comprises nine rights-holder vessels operating primarily from Cape Town and Gqeberha (DFFE, 2022).



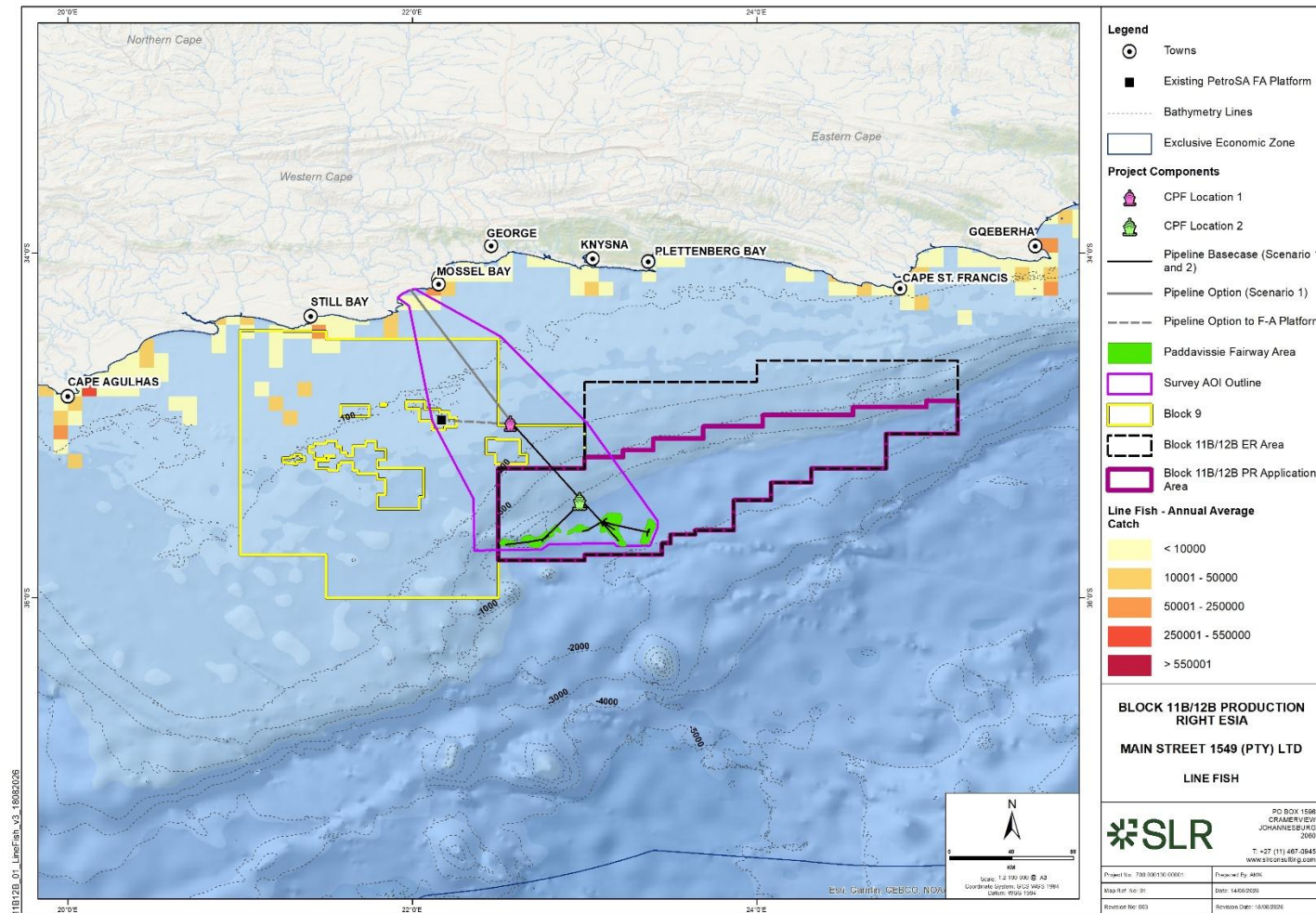


Figure 6-58: Annual average linefish catch in kg (2010-2023) in relation to the marine Project Area. Higher values indicate areas of relatively greater catch intensity



Vessels are generally steel-hulled vessels and range between 30 m and 60 m in length (Sauer, et al., 2003). Each vessel deploys between 2 000 and 6 000 barrel-shaped plastic traps attached to weighted longlines resting on the seabed. Traps are typically deployed in sets of 100–200 traps per line, with individual trap lines extending two to three nautical miles in length. Up to 12 trap lines may be deployed during a fishing day (Sink, et al., 2019). Each line is marked by surface buoys and traps remain submerged for periods ranging from 24 hours to several days before retrieval (Norman et al., 2018).

The fishery is labour-intensive, employing approximately 300 sea-going personnel and a further 100 land-based processing and administrative staff (DFFE, 2025) South Coast Rock Lobster is a high-value export product, with export revenues estimated at approximately R 320 million per annum (DFFE, 2023).

Figure 6-59 illustrates the spatial distribution of South Coast Rock Lobster fishing intensity in relation to the marine Project area. The principal fishing grounds are concentrated on the outer Agulhas Bank and shelf-edge habitats east of Mossel Bay, with additional fishing grounds occurring southwest of the Project area. Limited spatial overlap occurs between the western margin of the survey AOI and a small area of South Coast Rock Lobster fishing activity. The proposed offshore infrastructure within the Paddavissie Fairway does not overlap the mapped core fishing grounds, while only a short section of the potential dry gas export pipeline corridor (Scenario 1) intersects areas of low fishing intensity. **Overall, the overlap with the marine Project area represents a small proportion of the fishery footprint and occurs in areas of relatively low harvesting intensity compared with the core fishing grounds further east.**

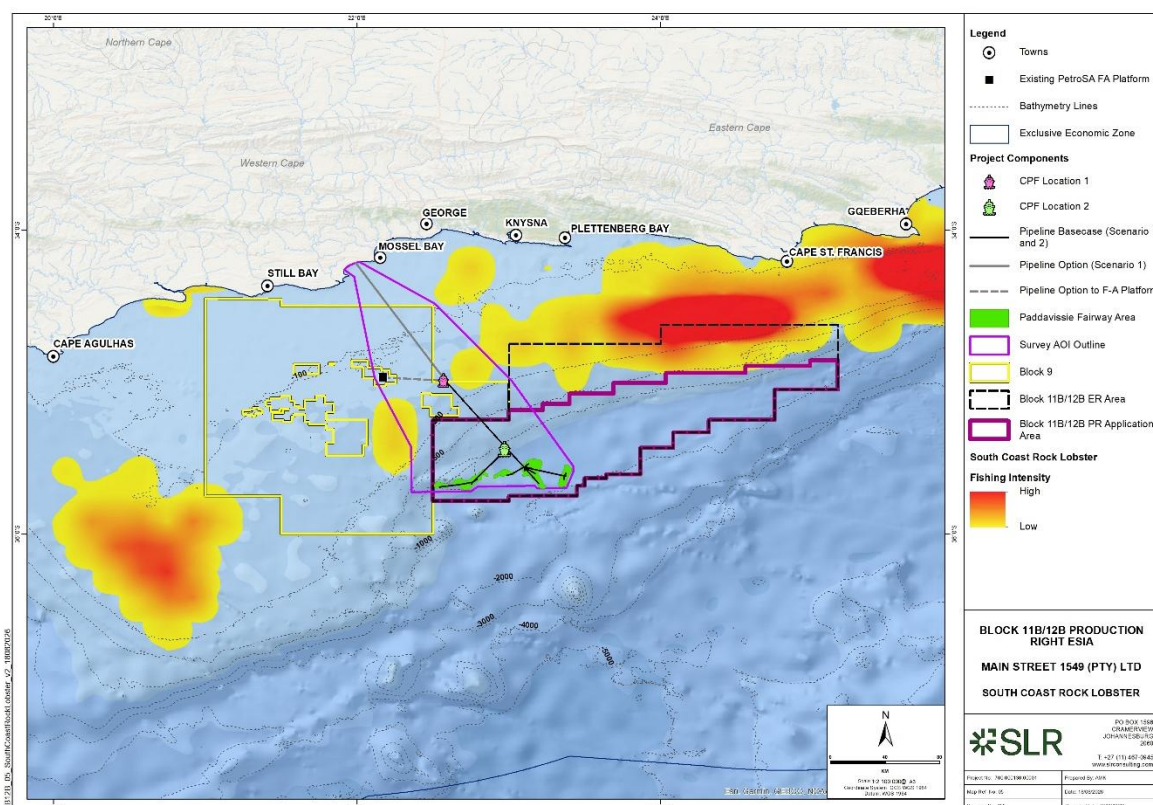


Figure 6-59: South Coast rock lobster fishing intensity derived from commercial harvesting data (2007-2016) and expressed as a relative fishing-intensity surface, in relation to the marine Project Area

Source: Harris et al (2019)



6.8.2.8 Chokka Squid Jig

The South African squid fishery targets Cape Hope squid (*Loligo reynaudii*), locally known as chokka, and is one of the country's most valuable commercial fisheries. A dedicated squid jig fishery was established in 1984, replacing a fishery in which squid had historically been caught primarily as bycatch in demersal trawl operations. The fishery routinely lands between 6 000 tonnes and 7 000 tonnes of squid annually, although catches in excess of 12 000 tonnes have been recorded during particularly productive years. In favourable years, the fishery has generated landed values exceeding R480 million.

Cape Hope squid is distributed along the southern African coastline from Namibia to the Wild Coast of the Eastern Cape. However, commercial fishing effort is concentrated along the South Coast between the Cape Point and Port Alfred, particularly between Plettenberg Bay and Gqeberha, where important spawning aggregations occur (DFFE, 2025). The fishery generally operates in water depths of 20-120 m, although most fishing effort occurs in shallower waters associated with squid spawning grounds. Squid spawning aggregations are known to be sensitive to environmental conditions, particularly water turbidity, suspended sediment concentrations and seabed characteristics.

Squid have a short life span of approximately two years and exhibit highly variable recruitment success. Consequently, stock abundance and annual catches fluctuate considerably between years, with the South African squid stock displaying some of the highest interannual variability of any commercially exploited marine resource in South Africa. Chokka squid catches have ranged from approximately 2 000 tonnes to more than 13 000 tonnes since the mid-1980s. Catch levels declined to near-record lows in 2013 before recovering and reaching record highs in 2018. More recently, relatively low catches were recorded between 2021 and 2023 (Figure 6-60).

Owing to the species' short lifespan and highly variable recruitment patterns, the fishery is managed through a TAE system rather than a TAC. Effort is measured in person-days and is currently set at 295 000 person-days per annum. Current management limits participation to 2 443 crew members, comprising 2 077 crew members allocated to the commercial sector and 366 crew members allocated to the small-scale sector. The fishery currently comprises approximately 109 rights holders and more than 130 active vessels.

Annual fishing effort is monitored to determine whether effort limits have been reached and to inform management interventions. In addition to effort controls, the fishery is managed through seasonal closures designed to protect spawning squid and counter increases in effective fishing effort resulting from technological advances. The 2025/26 fishing season extends from 1 May to 30 April of the following year and includes closed periods extending from 1 May to 1 July, 19 October to 23 November, and 31 March to 30 April, although the timing of the final closure may vary depending on fishing effort and stock status (DFFE, 2026d).

Fishing is undertaken using handlines equipped with squid jigs. The fleet ranges from small ski-boats to deck vessels of approximately 20 m in length, although larger deck vessels now dominate the fishery. Vessels are equipped with powerful lights that attract squid to the surface during night-time fishing operations and typically include blast-freezing facilities that allow squid to be processed and frozen shortly after capture. Crew typically fish multiple lines carrying several jigs, with squid individually caught, graded and frozen at sea. The majority of the catch is exported to international markets, primarily to southern Europe and Italy. In addition to the directed jig fishery, smaller quantities of chokka squid are landed annually as bycatch in the hake-directed demersal trawl fishery.



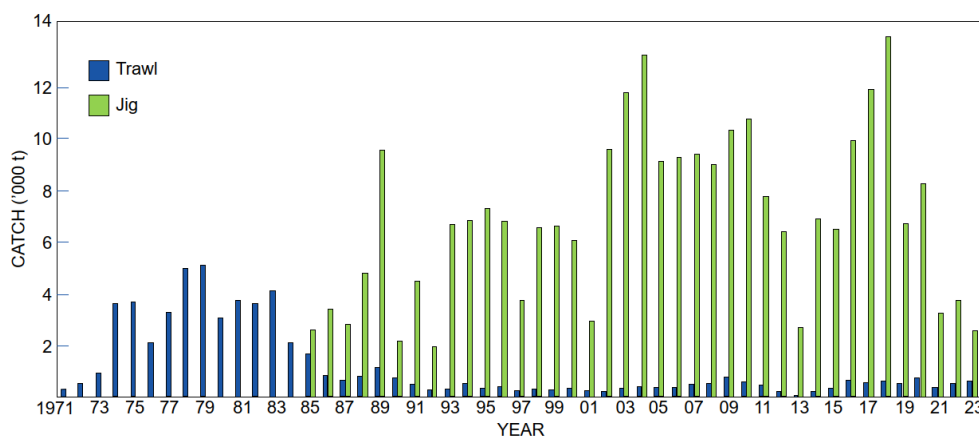


Figure 6-60: Annual catch (trawl- and jig-caught) squid off South Africa, 1971–2023

Source: DFFE (2025)

Figure 6-61 shows the spatial distribution of squid fishing activity in relation to the marine Project area. The principal squid fishing grounds are concentrated along the inshore and shelf-edge waters east of Mossel Bay. The survey AOI and proposed pipeline corridor overlaps the western extent of the squid fishing grounds, with overlap increasing towards the eastern portion of the survey area. In contrast, the proposed offshore infrastructure within the Paddavissie Fairway lies south of the mapped squid fishing grounds and does not overlap areas of notable squid fishing activity. **Overall, overlap with the marine Project area is limited to the survey AOI and pipeline corridors, with the core squid fishing grounds occurring further east along the South Coast.**

6.8.2.9 Small-scale Fisheries

Small-scale fisheries are an important source of food security, livelihoods and cultural identity for coastal communities throughout South Africa. Although the sector contributes less than 1% to South Africa's GDP, it plays a critical role in supporting livelihoods and food provision across approximately 136 coastal communities distributed along the country's 3 000 km (Clark, et al., 2002; Sowman, et al., 2014; Auld & Feris, 2022). Small-scale fisheries encompass a wide range of activities, including shore-based harvesting of intertidal invertebrates, estuarine and marine fishing, boat-based linefishing, squid harvesting, seaweed collection and other artisanal fishing activities. More than 30 species are targeted using a variety of low-technology and labour-intensive fishing methods.

The small-scale fisheries sector was formally recognised through amendments to the Marine Living Resources Act (MLRA) which came into effect in 2016 and provided a legal framework for recognising small-scale fishers and fishing communities (DFFE, 2023a). Under the MLRA, small-scale fishers are defined as members of recognised fishing communities who traditionally operate in nearshore waters, use low technology or passive fishing gear, undertake predominantly single-day fishing trips, and derive a significant portion of their livelihoods from fishing related activities. The policy is intended, in part, to redress historical exclusion of traditional fishing communities from access to marine resources and participation in the fishing economy.



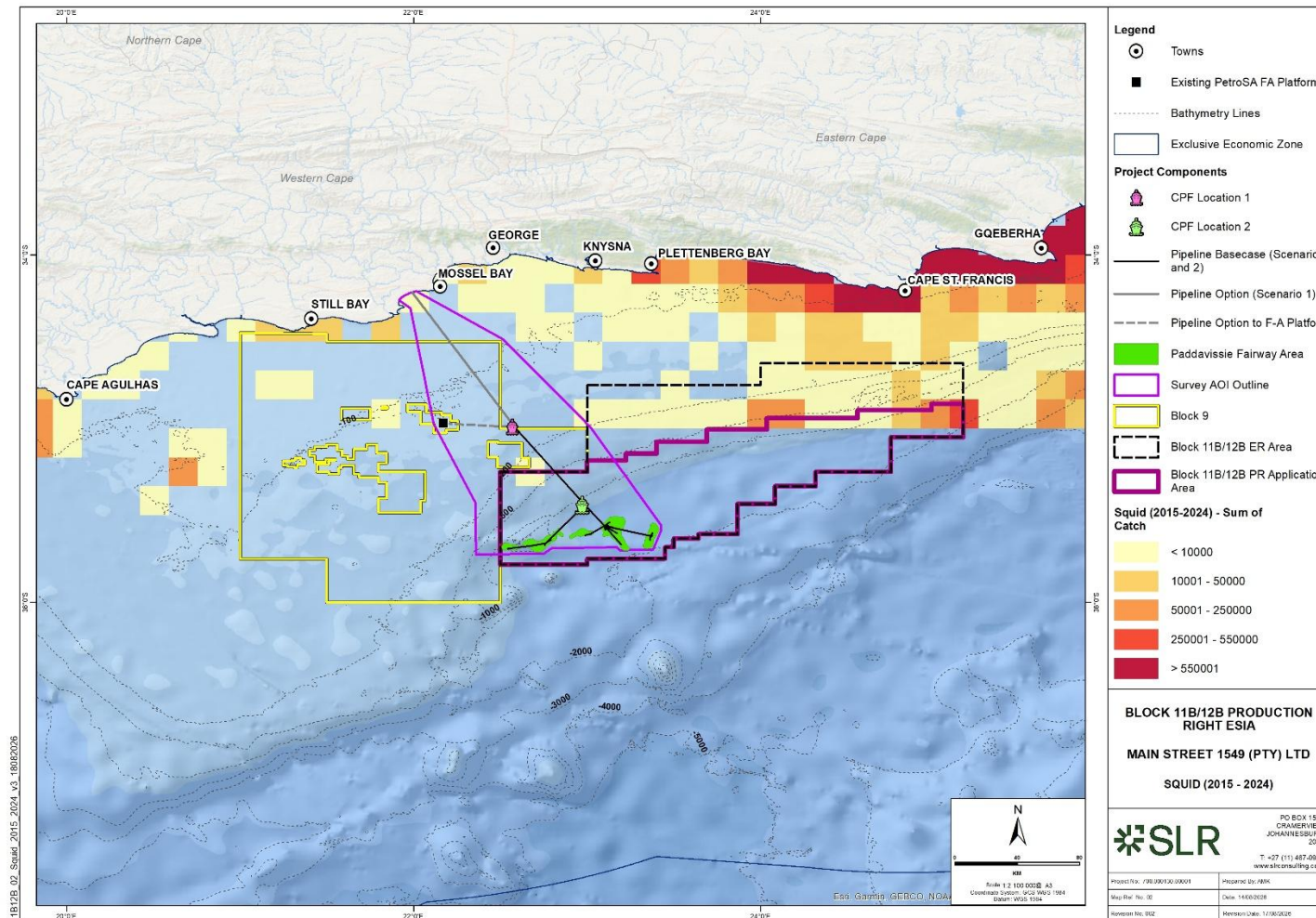


Figure 6-61: Annual average squid catch in kg (2015-2024) in relation to the marine Project Area. Higher values indicate areas of relatively greater catch intensity



The sector is managed through a community-based co-management system, with fishing rights allocated to recognised community co-operatives rather than individuals. Rights are granted through a multi-species "basket" approach, whereby co-operatives are allocated access to a range of resources occurring within their local area. These resources may include linefish, squid, hake handline, seaweed, South Coast Rock Lobster, abalone ranching, oysters and other coastal resources. Five basket management areas have been established nationally, spanning the South African coastline from the Namibian border to the Mozambican border.

There are an estimated 25 000 and 30 000 small-scale fishers operating along the South African coastline. Historically, approximately 85% of small-scale fishers targeted linefish resources (Clark et al., 2002). In the Eastern Cape, 73 small-scale fishing co-operatives were granted 15-year fishing rights in 2020, while a further 62 co-operatives received rights in the Western Cape (DFFE, 2025). The majority of species requested by these co-operatives were linefish species, many of which require access to small vessels and nearshore fishing grounds.

Small-scale fishers operating along the South Coast are primarily engaged in linefishing, squid fishing, shellfish harvesting and the collection of other nearshore resources. The South Coast communities closest to the marine Project area comprise both marine fishers (58%) and estuarine fishers (42%), targeting a range of finfish and intertidal invertebrate resources. The majority of fishing activity is concentrated in the nearshore environment and along the shoreline.

Allocations to the small-scale sector are generally derived from existing commercial sector TACs and TAEs. For example, the sector currently receives a portion of the traditional linefish TAE (see Section 6.8.2.6) and approximately 15% of the squid fishery allocation (see Section 6.8.2.8), with the possibility of this increasing to 25% in future. Similarly, the 2023 small-scale hake handline allocation amounted to 2 081 tonnes, equivalent to approximately 1.5% of the overall hake TAC (see Sections 6.8.2.1 and 6.8.2.3). No dedicated allocation currently exists for the South Coast Rock Lobster fishery (see Section 6.8.2.7). Consequently, the spatial footprint and management of many small-scale fisheries are closely linked to the corresponding commercial fisheries.

Most small-scale fishing operations are undertaken using small vessels operating close to the shore. Vessels typically fall within SAMSA Class C to E categories and are generally restricted operating within 15 nm (approximately 28 km) of the coastline unless appropriately certified for offshore operations. As a result, the majority of small-scale fishing effort is concentrated in nearshore waters that are substantially closer to the coast than Licence Block 11B/12B and the Paddavissie Fairway, both of which are located approximately 150 km offshore.

Information obtained from several South Coast small-scale fishing cooperatives indicates that most members operate from the shoreline or within nearshore waters, targeting linefish, squid, shellfish and intertidal resources (Table 6-16). Only a small proportion (approximately 20%) of fishers reported accessing more offshore fishing grounds, generally through co-operative arrangements or by operating as crew aboard commercial linefish or squid vessels. These fishers primarily target linefish and squid resources and generally utilise the same fishing grounds as the established commercial sectors.



Table 6-16: Self-reported small-scale fishery co-operative data

Co-operative Name	Number of Associated Fishers	Target Species	Approach / Notes
King Clipper Fishing Primary Co-operative Limited	34	Lunga, kingklip, crayfish	Shore-based individual fishing operations based at Liphithini in Mbizana Eastern Cape. (do not currently target offshore grounds because they lack vessels).
Flatrock Cwebeni Fishing Primary Co-operative Limited	45	Mullet, shad	Shore-based net and rod fishing.
Kusile Magcaki Fishing Primary Co-operative Limited	30	Shad, crayfish, yellowtail, 'galika', baas, blacktail	Shore-based rod fishing (based at Mpande and Emagadeni in Endluzula)
Eden Fishing D'almeida Co-operative	30	Sardines, oysters, yellowtail	Have not started fishing as awaiting permits (based in Plettenberg Bay, Knysna, Mossel Bay and Stillbaai).
Vukuzenzele Fishing Primary Co-operative Limited: Based in Willowvale	17	Hake, crayfish, shad, mullet	Shore-based rod fishing (permit from January 2024).
Chebe Khulani Fishing Primary Co-operative Limited	17	Linefish (under an exemption), crayfish (awaiting a decision)	Offshore handline fishing around Hermanus, Struisbaai and Gansbaai.
Sonyamezela Fishing Primary Co-operative Limited	60	Cob, snoek	Shore-based rod fishing (based at Qendani Lodge). They do not have boats.
Kei-Mor Fishing Primary Co-operative Limited	16	Linefish, squid, 'scrab', lobsters, muscles, oysters, octopus, mullet	Predominantly shore-based or near-shore fishing, and occasionally offshore with rented boat and skipper.
Mitchells Plein Fishing Forum	20	Crayfish, yellowtail, snoek, roman	Near shore and offshore with rented vessels.

Source: Block 11B/12B Production Right ESIA public participation process (WSP, 2024) as cited in SLR (2025).

Figure 6-62 illustrates the distribution of recognised small-scale fishing communities in relation to the marine Project area. Given that most small-scale fishing activity occurs close to shore, there is unlikely to be any direct interaction between the majority of small-scale fishers and the offshore components of the Project, including Licence Block 11B/12B and the Paddavissie Fairway. However, the landfall area, nearshore sections of the survey AOI and the proposed dry gas export pipeline corridor occur closer to the areas accessed by some small-scale fishers. These fishers primarily target linefish and squid resources and generally utilise the same fishing grounds as the commercial linefish and squid fisheries described in Sections 6.8.2.6 and 6.8.2.8. Consequently, any overlap between small-scale fishing activities and the Project is most likely to occur within the nearshore portions of the survey area and pipeline corridor rather than the offshore infrastructure footprint.



6.8.2.10 Aquaculture and Mariculture

Aquaculture incorporates the breeding, trading or rearing of aquatic organisms in a controlled or selected aquatic environment for recreational, commercial or subsistence purposes (DFFE, 2018). The sector is generally divided into freshwater aquaculture and marine aquaculture (mariculture). Mariculture species farmed in South Africa include dusky kob, abalone, Pacific oyster, Mediterranean mussel, black mussel and seaweed, among others.

Although relatively small by global standards, South Africa's aquaculture sector plays an increasingly important role in seafood production, rural development and employment creation. The sector contributes less than 1% of South Africa's total fish production and less than 0.2% of national GDP (DFFE 2018). To support Operation Phakisa and broader national development objectives, a Strategic Environmental Assessment undertaken in 2019 identified eight Aquaculture Development Zones (ADZs) intended to facilitate future sector growth.

In November 2023, the Draft Aquaculture Development Bill, was released for public comment to provide a dedicated legislative framework for the promotion and regulation of aquaculture in South Africa. As of September 2026, the Bill has not yet been enacted, with further revisions reportedly underway.

South Africa currently supports approximately 39 aquaculture farms, some producing multiple products. Abalone is the primary product of 20 operations, while 14 farms cultivate mussels, 12 produce oysters, and five rear finfish species including dusky kob, yellowtail, and salmonids. Shellfish production includes indigenous species such as abalone, black mussel and oysters, as well as introduced species such as brown mussel, Mediterranean mussel, and Pacific oyster. The marine aquaculture industry produced 6 134 tonnes in 2022, with the majority of production occurring in the Western Cape.

Abalone farming represents the most valuable component of South Africa's mariculture sector. South Africa is recognised internationally as a major producer and exporter of farmed abalone (*Haliotis midae*), the only abalone species currently cultured commercially in the country. In addition to conventional land-based farming operations, abalone ranching initiatives have been developed along portions of the South African coastline and are regarded as a potentially important contributor to local economic development and employment opportunities.

The nearest existing and proposed mariculture developments occur within coastal waters and are located well inshore of Licence Block 11B/12B and the associated Production Right Application Area. The Algoa Bay ADZ, which received environmental authorisation in 2020, is the closest designated aquaculture development zone and is situated approximately 250 km east of the marine Project area. The nearest mariculture activities on the South Coast occur in coastal waters near Mossel Bay and other sheltered embayments along the Western and Eastern Cape coastlines.



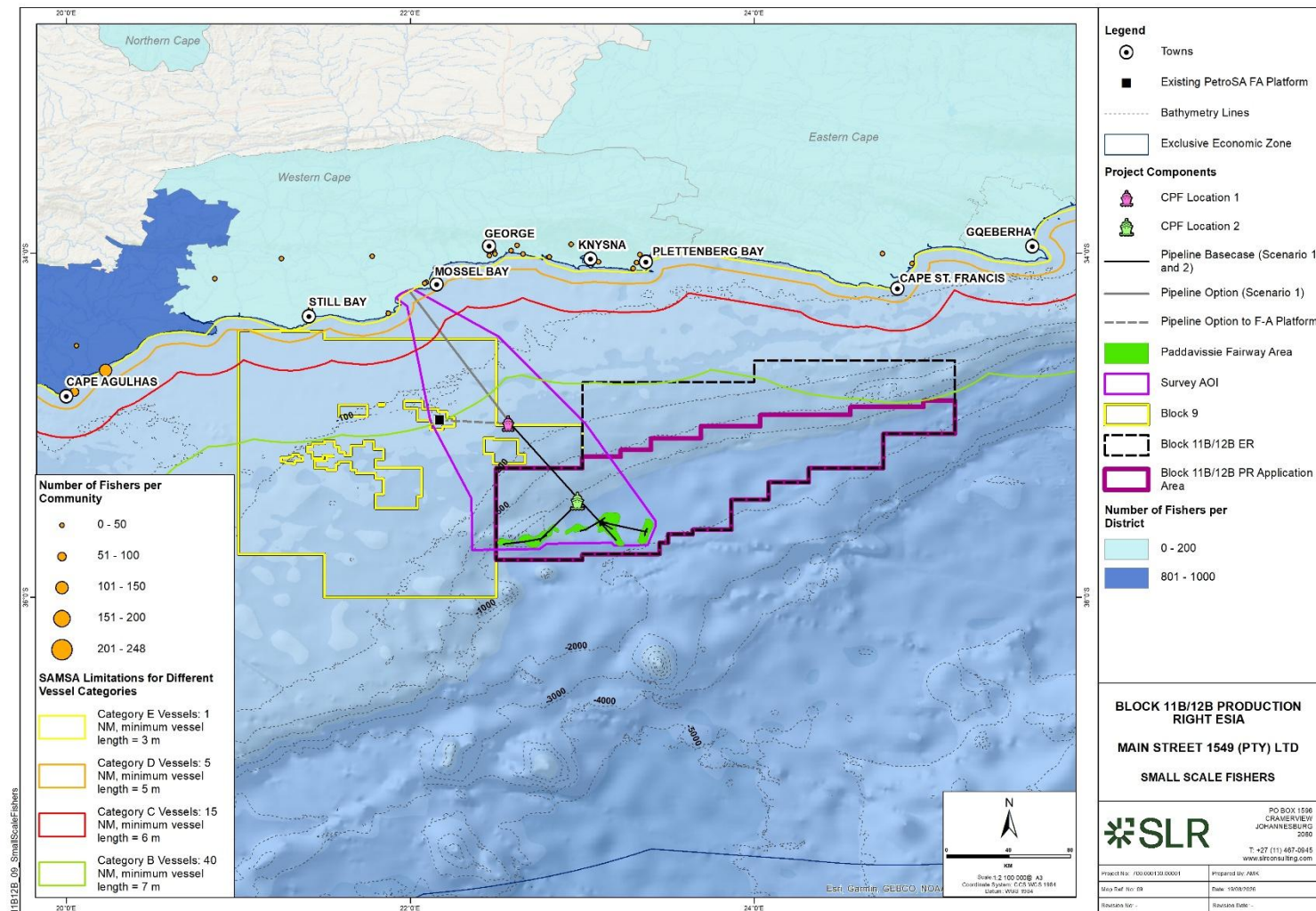


Figure 6-62: Marine Project area and associated infrastructure in relation to Small Scale Fishers



6.8.2.11 Recreational Fishers

Recreational fishing, defined under the MLRA as fishing done for leisure or sport and not for sale, barter, earnings or gain. Recreational fisheries include shore and boat-based linefishing, rock lobster harvesting, spearfishing, squid fishing, and the collection of intertidal resources such as mussels, oysters and other invertebrates. Recreational fishers access many of the same resources targeted by commercial and small-scale fishers and are managed through a permit system, with catches subject to bag limits, size limits, seasonal closures and other resource-specific regulations.

Recreational linefishing occurs along the entire South African coastline and represents one of the country's most widely practised outdoor recreational activities. Between 1994 and 1997, the first national survey of South Africa's recreational shore-angling fishery was undertaken to assess participation and management requirements (Brouwer, et al., 1997; Mann, et al., 2003). Recreational fishing in South Africa is estimated to involve approximately 1.32 million fishers, around half of whom engage in marine fishing activities, primarily targeting linefish and rock lobster (Saayman, et al., 2017).

Offshore recreational fishing activity is constrained by vessel certification requirements administered by SAMSA. Recreational and pleasure vessels are generally limited to operating within prescribed distances from the coast depending on vessel category, ranging from Category E vessels restricted to a distance of 1 nm from shore and 15 nm from an approved launch site, Category C vessels restricted to 15 nm from shore, Category B vessels limited to day or night passages within 40 nm from shore, and Category A vessels that are suitable for offshore ocean-going operations (Figure 6-62). Most recreational vessels are Category C certified, while a smaller number of charter vessels operate under Category B certification. Consequently, most recreational fishing activity is concentrated in nearshore waters and well inshore of Licence Block 11B/12B.

Recreational fishing activity occurs at numerous locations along the South Coast, particularly in coastal waters and from shore-based access points. Given the offshore location of Licence Block 11B/12B and the Paddavissie Fairway, interactions with recreational fishers are unlikely in these areas. However, recreational fishers may occur within nearshore portions of the marine Project area, particularly in relation to the nearshore survey AOI and the proposed dry gas export pipeline corridor. Any interactions are expected to be temporary, localised and intermittent. Because much recreational fishing occurs from the shoreline or within a few kilometres of the coast, activities resulting in disruption of coastal access or nearshore fishing areas could have implications for recreational fishing users.

6.8.2.12 Illegal, Unreported and Unregulated Fishing

Illegal, Unreported and Unregulated (IUU) fishing remains a significant challenge in South Africa, particularly for high-value coastal resources such as abalone and West Coast rock lobster. However, most documented IUU activity occurs in nearshore and coastal waters, where access to targeted resources is easier and enforcement is more challenging.

In 1977, South Africa declared its EEZ, extending 200 nm offshore. Following implementation of the United Nations Convention on the Law of the Sea (UNCLOS) on 16 November 1994, South Africa enacted the Maritime Zones Act, 1994 (No. 15 of 1994), which formalised the country's sovereign rights and responsibilities within its EEZ.

Fishing activities within the EEZ are subject to a comprehensive regulatory framework administered by DFFE. Compliance and enforcement are supported through Offshore Environmental Protection Vessels, vessel monitoring systems (VMS), aerial surveillance and cooperation with the South African Navy and South African Police Service. Foreign fishing



vessels operating legally within South African waters are required to obtain the necessary authorisations and are subject to vessel tracking and reporting requirements.

Offshore commercial fisheries, including the hake trawl, pelagic longline and tuna fisheries, operate throughout much of the South African EEZ and provide an additional level of surveillance through the reporting of suspicious vessel activity. Vessel movements may also be monitored using Automatic Identification System (AIS) data and independent vessel-tracking platforms such as Global Fishing Watch⁵³.

6.8.2.13 Fisheries Research

South Africa maintains a long-established fisheries research and monitoring programme to support the sustainable management of marine living resources. Research undertaken by DFFE includes demersal trawl surveys, pelagic acoustic surveys, fisheries-dependent monitoring programmes, biological sampling and stock assessment modelling for key commercial species.

DFFE conducts regular demersal trawl surveys to assess the abundance and distribution of hake, horse mackerel, squid and other demersal species and to provide information required for stock assessments and the determination of annual TACs. South Coast demersal surveys east of 20°E have been undertaken annually during autumn since 1985, primarily in Autumn. Although Spring surveys have occasionally been conducted, logistical and budgetary constraints have limited their frequency.

Surveys are typically undertaken using a stratified random sampling design, with trawl stations selected across predetermined depth strata extending from the coast to approximately the 1 000 m isobath. Occasional sampling is undertaken in waters deeper than 1 000 m. These surveys provide long-term datasets that underpin the management of several important commercial fisheries.

Small pelagic fish stocks are assessed through biannual acoustic surveys typically conducted between May and June, and again between October and December. Survey vessels follow pre-determined transects running perpendicular to the coastline and bathymetric contours, extending from the shore to approximately the 200 m isobath. Survey coverage extends from the Orange River on the West Coast to Port Alfred on the South Coast.

In addition to trawl and acoustic surveys, DFFE supports fisheries-dependent monitoring and biological sampling programmes that contribute to stock assessments and fisheries management (DFFE, 2025). Given the offshore location of the marine Project area, there is potential for occasional spatial overlap between project activities and fisheries research operations, particularly research surveys conducted on the Agulhas Bank and along the shelf edge. However, such overlap would be temporary and localised and would not be expected to materially affect the ability of DFFE to undertake fisheries research or monitoring programmes.

⁵³ <https://globalfishingwatch.org/>



Summary of fisheries in the study area

The marine Project area overlaps portions of the operating grounds of several commercial fisheries, including the large pelagic longline, mid-water trawl, demersal hake longline, demersal trawl, squid jig and South Coast rock lobster fisheries. However, overlap is generally limited to the nearshore marine Project area. The principal exception is the large pelagic longline fishery, whose operating footprint extends into portions of Licence Block 11B/12B. Most commercial fishing effort on the South Coast is concentrated on the Agulhas Bank, continental shelf and shelf edge, resulting in little or no overlap between the majority of fishing grounds and the offshore Project components located within the Paddavissie Fairway and around the proposed CPF locations. Small-scale, recreational, aquaculture and mariculture activities are largely confined to coastal and nearshore waters and are therefore unlikely to interact directly with the offshore components of the Project. Consequently, the greatest potential for interaction between the Project and fisheries is expected to occur within the survey AOI and nearshore pipeline corridor, where overlap with established fishing grounds is most evident.

6.8.3 Key Coastal Economic Activities

6.8.3.1 Fishing Activities

The South Coast supports a diversity of commercial, small-scale and recreational fisheries that are an essential source of employment, income and food for coastal communities. Fisheries are discussed in Section 6.8.2.

6.8.3.2 Coastal Tourism and Recreational Activities

The swift recovery of tourism in the Garden Route after the COVID-19 pandemic speaks to the region's popularity as a tourism destination. In the first half of 2022, passengers through George Airport grew by 49% from the same period in 2021 and reached a 94% recovery rate compared to 2019 (WESGRO, 2022). In April 2022, passenger arrivals through George Airport exceeded pre-COVID levels, increasing from 32 939 arrivals in April 2019 to 35 606 arrivals in the same month of 2022, constituting a recovery rate of 109% (WESGRO, 2022).

Visitor surveys conducted via local tourism offices in George and Wilderness confirmed that the most significant proportion of Garden Route and Klein Karoo region travellers originated from the domestic market (79.3%), particularly within the Western Cape (50.7%). Over the period, the overseas market accounted for 20.7% of visitors, led by the USA, France, Germany and the United Kingdom. Three-quarters of visitors travelled to the region for a holiday, and visiting beaches ranked as the top tourism activity. The main reason for travel to the Garden Route and the Klein Karoo was tourism, with 73.4% of respondents travelling to the region for leisure activities and holidays.

Mobile location data insights emphasised the popularity of Knysna as a holiday destination, with the Knysna Waterfront frequently visited by international, domestic and local tourists. According to mobile location data, Knysna Heads ranked second across all tourist segments in the Garden Route and the Klein Karoo, with around 2 hours of average dwell time (WESGRO, 2022). According to mobile location data, more than half of domestic tourists and nearly two-thirds of international tourists surveyed stayed overnight in Mossel Bay in the first half of 2022. Repeat visitors accounted for 45% of domestic and 25% of the international categories. Thesen Island in Knysna was also a popular destination (WESGRO, 2022).

Coastal sporting, leisure and tourism activities are popular across the coastline.



6.8.3.3 Cruise Vessel Tourism

According to WESGRO (2023), Cape Town and the Western Cape achieved a record-breaking cruise tourism season dominated by high-spend source markets including the USA, Germany, and the UK. In total, the 2022/2023 season welcomed 75 ships with 41 turnaround visits which is double the number of ship calls when compared to the last complete season in 2019/2020, which saw 39 ship visits with an estimated 42 000 arriving passengers.

Mossel Bay is a popular cruise destination. Mossel Bay has become an increasingly popular cruise destination on South Africa's Garden Route. Following a record 2022/23 cruise season, during which 13 cruise vessels and approximately 9 270 passengers visited the port, cruise tourism has continued to grow. During the 2024/25 cruise season, the Port of Mossel Bay received 21 cruise vessel calls and welcomed more than 13 000 passengers, representing a substantial increase in visitor numbers and vessel arrivals. A further 23 cruise calls were scheduled for the 2025/26 season, reflecting the port's growing importance as a cruise tourism destination in South Africa⁵⁴.

The Transnet National Ports Authority has indicated that growing tourism is one of their key strategic objectives for the region and the port is positioning itself as an ideal cruise gateway to a unique Garden Route experience.

6.8.3.4 Maritime Traffic

South Africa occupies a strategic position along one of the world's busiest east-west shipping routes, making its coastline an important corridor for international maritime traffic. Recent port statistics indicate that 9 342 vessels called at South Africa's eight commercial ports during 2025, reflecting a recovery in port activity following the COVID-19 period. Cape Town was the country's second busiest port, receiving approximately 2 235 vessel calls, while the ports of Gqeberha and Ngqura continued to serve as key cargo and container hubs on the South Coast. Mossel Bay remains an important regional port supporting the offshore energy, fishing and growing cruise tourism sectors (Capeetc, 2026).

In 2024, Gqeberha Harbour recorded 874 vessel calls, while 257 vessels called at Mossel Bay. In addition, the South Coast EEZ forms part of a major international shipping corridor linking Atlantic and Indian Ocean trade routes (Hutson, T, 2025). A peer-reviewed analysis of satellite Automatic Identification System (AIS) data from the Agulhas Current region found that more than 150 merchant vessels per day transited the shipping lane offshore of Gqeberha, after excluding fishing vessels and stationary vessels from the analysis (le Goff, et al., 2021). Cargo volumes handled through South African ports have also shown signs of recovery. Transnet reported year-on-year increases in container, bulk and break-bulk cargo volumes during 2024/25, reflecting improved port performance and ongoing infrastructure investment (FTW, 2024).

Along the South Coast, maritime activity is concentrated around the ports of Cape Town, Mossel Bay, Gqeberha and Ngqura, which support commercial shipping, fishing, offshore oil and gas activities, cruise tourism, ship repair and maintenance services. Cape Town remains a major maritime services hub and recorded continued growth in vessel traffic and cargo throughput, while Mossel Bay has experienced increasing cruise vessel visits and investment in port infrastructure to support marine tourism.

⁵⁴ [Mossel Bay \(South Africa\) inaugurates new cruise reception facility | Cruise News | CruiseMapper](#)



6.9 Offshore Marine and Coastal Infrastructure and Activities

6.9.1 Petroleum Exploration and Production

Several oil and gas exploration and production areas exist along the South African coast, including the Orange River Mouth (Orange Basin) offshore the West Coast; the South coast (including Bredasdorp, the Outeniqua, the Gamtoos and Algoa Basins) and another two off the East coast (Durban and Zululand Basins). Within these basins, various licence blocks have been allocated to national and multinational oil and gas companies. Drilling has been conducted in some of the blocks and in others it is still proposed, but the timing of these is unknown.

The Bredasdorp Basin on the Agulhas Bank has been the focus of most oil and gas exploration and drilling activity since 1980, with the development of the Oribi, Oryx and Sable oil fields and F-O gas fields, approximately 120 km south-west of Mossel Bay. Block 9 is located the north-west of Licence Block 11B/12B, with sections of the marine Project area overlapping with this block (www.petroleumagencysa.com). In the entire South African offshore area, there are approximately 358 exploration, appraisal and production wells that have already been drilled; most (56%) of these have been drilled off the South Coast on the Agulhas Bank in relatively shallow waters (less than 250 m water depth) (www.petroleumagencysa.com) (Figure 6-63).

6.9.2 Prospecting and Mining of other Minerals

Glauconite pellets (an iron and magnesium rich clay mineral) and pelletal phosphorite occur on the seafloor over large areas of the continental shelf on the West and South Coasts of South Africa. An application to prospect for marine phosphate in the Outeniqua West Licence Area, offshore Mossel Bay, was submitted in June 2013 (Morant, 2013). However, it is understood that there has been no further development in this regard (Vidima and von Blottnitz, 2016 and Biccard et al., 2018).

In 2012 and 2014, three prospecting rights for marine phosphate were granted for three prospecting areas located off the West and South-West Coasts. Diamond Field International was granted prospecting rights within the Outeniqua Basin offshore Mossel Bay (Figure 6-64). **The inshore sections and associated infrastructure of the marine Project area, outside of the Paddavissie Fairway partially overlaps with these phosphate prospecting areas.**

6.9.3 Submarine Cables

A submarine telecommunications cable system called “SAT3/SAFE” (South Atlantic Telecommunications cable No.3 / South Africa Far East) lies across the Atlantic and the Indian Ocean. It passes well to the south of the Project area. A safety zone of one nautical mile extends on either side of the telecommunication cable, in which no anchoring is permitted (WSP Group Africa (Pty) Ltd, 2023e). The SAT3 cable connects Portugal (Sesimbra) with South Africa (at Melkbosstrand) with intermediate landing points along the north African West Coast. From Melkbosstrand the cable system extends via the SAFE sub-system to Malaysia (Penang) and has intermediate landing points at Mtunzini South Africa, Saint Paul Reunion, Bale Jacot Mauritius and Cochin India [(www.safe-sat3.co.za)].

A ESIA Process was undertaken in May 2021 for a newly proposed submarine fibre optic cable system called “2AFRICA”. The submarine cable is anticipated to follow a similar route as SAT3/SAFE on the West Coast of South Africa. The 37 000 km-long 2Africa cable will have around 21 landing points in 16 African countries and will carry three times the total network capacity of all the submarine cables currently serving the continent. **No existing or planned submarine cables are located within the marine Project area.**



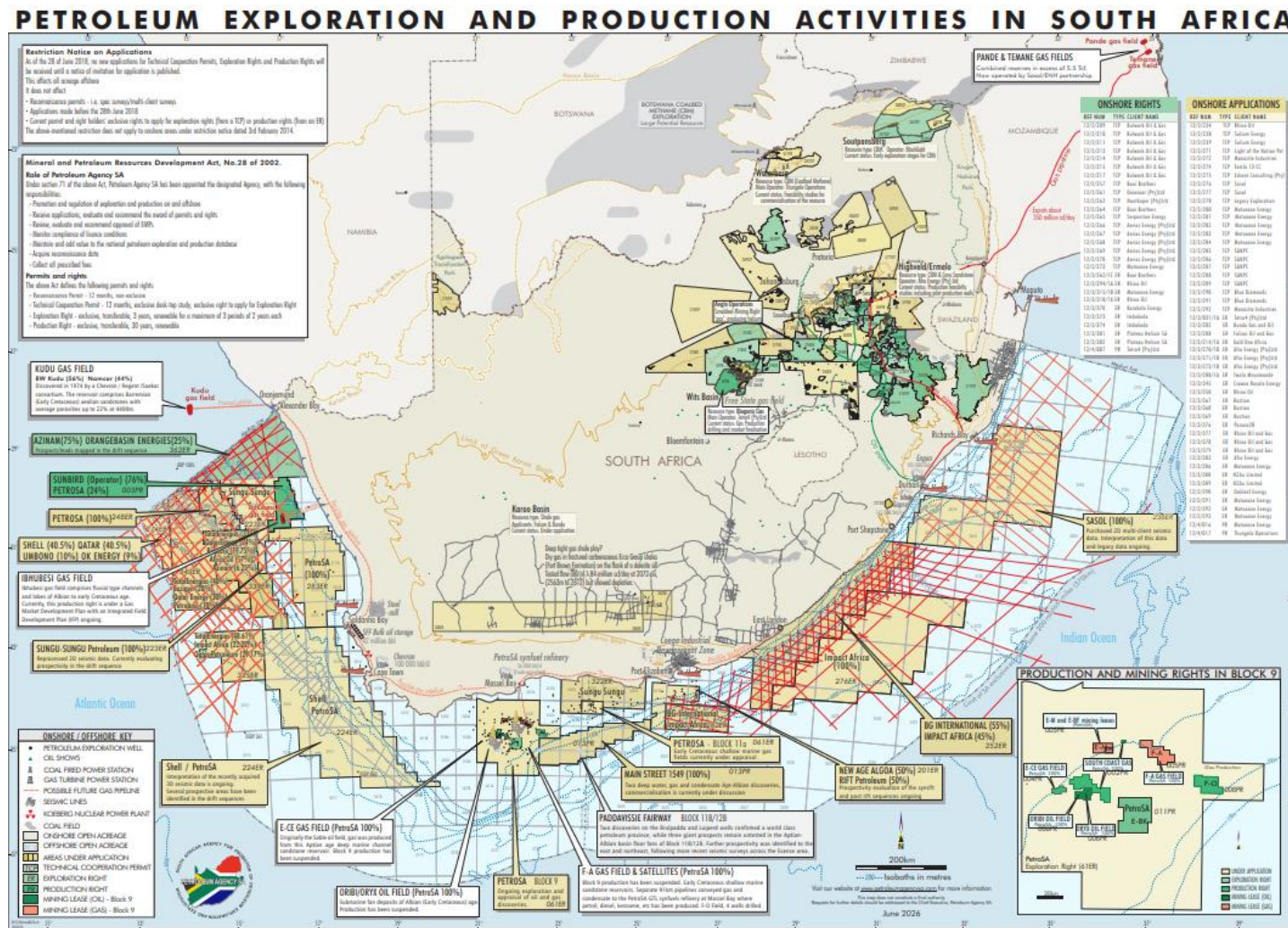


Figure 6-63: Petroleum Exploration and Production Activities in South Africa as of January 2026

Source: <https://www.petroleumagencyssa.com/wp-content/uploads/2026/06/Hubmap0626-1.pdf>



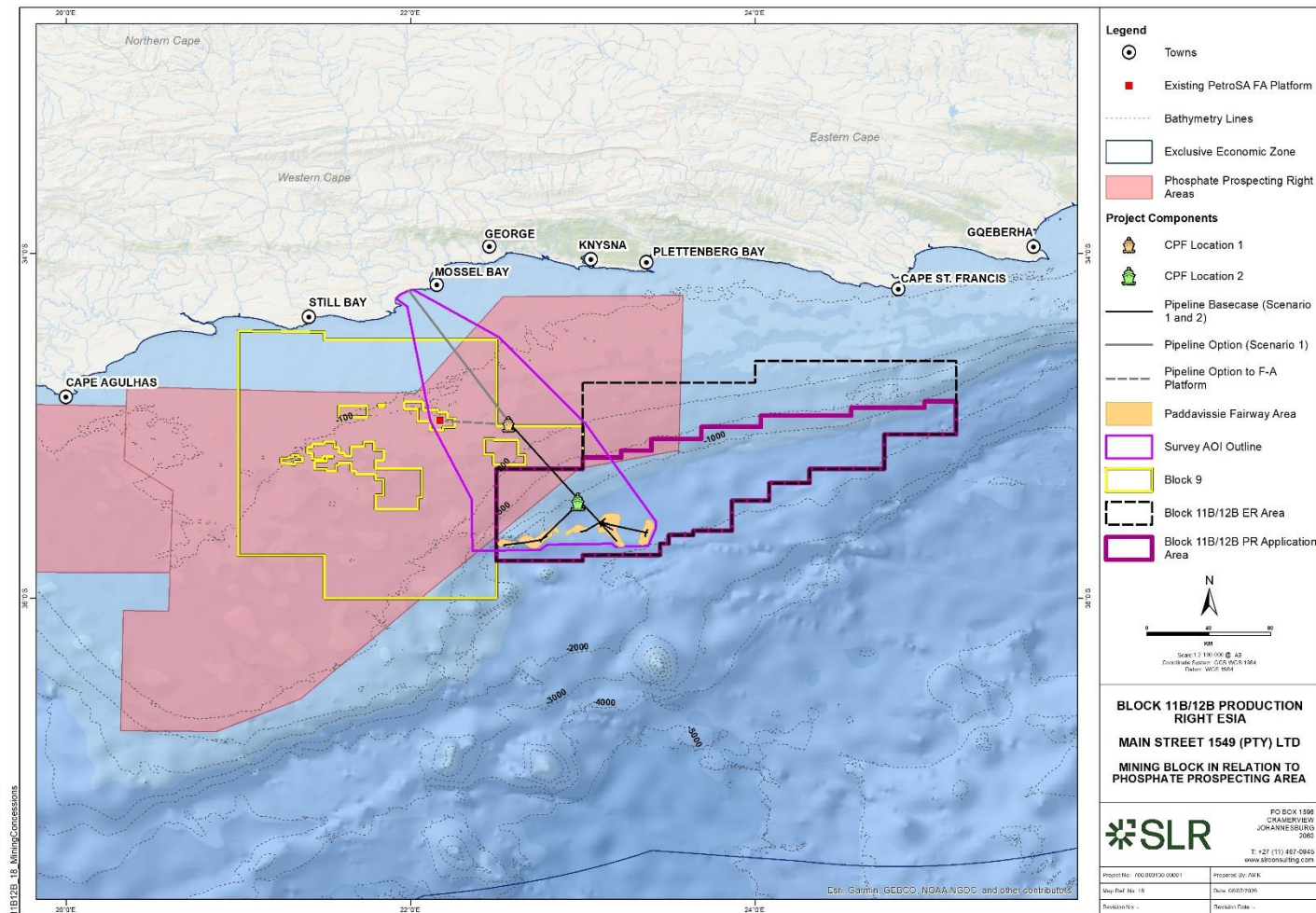


Figure 6-64: Marine Project area in relation to phosphate prospecting areas



6.9.4 Port Infrastructure

For the Project, support and specialised vessels will very likely operate from the Port of Mossel Bay. Onshore supply base may be located at the ports of Cape Town, Mossel Bay and/or Gqeberha. Further detail on these ports is provided below.

6.9.4.1 Port of Cape Town

The port of Cape Town is a hub for ships in the southern Atlantic. Cape Town is the second largest port in South Africa and one of eight commercial seaports. The port also plays a crucial role in supporting local commercial fisheries, including several commercial fishing rights holders. In addition, the Port of Cape Town also contains the Victoria and Alfred Waterfront, a major international tourism and recreational destination. Custom clearance is also in place. The security department provides customs clearance within the port (National Ports Authority, 2018a, pp. 3, 5, 2018c, p. 4; Africa— Ports & Ships, 2021c). Commodities accommodated within the Port of Cape Town include liquid, dry, break bulk, containers, and roll-on roll-off (vehicles).

6.9.4.2 Port of Mossel Bay

Port of Mossel Bay is located about 400 km east of Cape Town. It is a medium-sized port, the smallest commercial harbour along the South African coast, directly adjacent to Mossel Bay's CBD. The port can accommodate vessels up to 189 metres in length, with a draught not exceeding 6.5 metres. The allowable deadweight is 52 318 tonnes. The catenary buoy caters for vessels up to 32 000 DWT, length of 2,904m and a draught of 12m (National Ports Authority, 2018e; Africa— Ports & Ships, 2021a; MarineTraffic, 2021).

The port mainly caters for the import and export of petroleum products. Mossel Bay is the only port in South Africa with two offshore berths within the port's limits and can accommodate passengers and project ships.

6.9.4.3 Port of Gqeberha

The Port of Gqeberha (Port Elizabeth) is a multi-cargo port located on the western perimeter of Algoa Bay. The port is some 384 nautical miles (442 miles) southwest of Durban and 423 (487) east of Cape Town. The port offers multifunctional use for handling containerised cargo, bulk manganese, liquid bulk, and automotive cargo. The port also supports commercial fishing, including commercial operators of the demersal trawl, pelagic trawl, lobster, and squid industries. Berthing for commercial and recreational fishing (small craft) is provided in the harbour.

The harbour plays a limited role in tourism and recreation, with facilities such as boat charters, clubs, and restaurants. The port offers container (one of only five South African ports), breakbulk, tanker, and bulk terminals. Cruise ship facilities are provided at berths 8 and 9. A Ro-Ro terminal is available. The port supports commercial fishing, including commercial operators. The port does not offer major ship repair services. However, a slipway is available to repair vessels up to 1 200 tonnes (National Ports Authority, 2018b; Africa— Ports & Ships, 2021b).



7.0 Receiving Environment - Terrestrial

This section has largely been compiled using the specialist Site Sensitivity Verification Reports (SSVRs) compiled during August 2025 and July 2026 by The Biodiversity Company (TBC).

7.1 Onshore Area of Influence

The direct area of influence is described as the onshore Project area, which includes the pipeline routes and corridors as per the layout in Section 5.0, as well as the associated construction areas.

The indirect area of influence includes the areas outside of the direct area of influence (Project footprint) where the project activities will take place. This area includes all areas where the effects of the project activities are experienced and include the following:

- Port of Mossel Bay and/or alternatively Gqeberha or Cape Town, as the ports of call for supplies, waste management and limited accommodation for staff; and
- Vehicle traffic routes between Mossel Bay and the onshore pipeline route.

7.2 Geographic and Planning Context

7.2.1 Site Location and Regional Setting

The onshore Project area is situated approximately 20-35 km west of the Mossel Bay urban centre along the South Coast of the Western Cape Province within the Mossel Bay Local Municipality and Garden Route District Municipality (Figure 7-1).

7.2.2 Land Use

Land use within the onshore Project area is dominated by:

- Dryland agriculture (wheat, canola and pasture cultivation);
- Livestock grazing;
- Sand quarrying;
- Conservation areas and private nature reserves (e.g. Nautilus Bay Coastal Nature Reserve);
- Coastal residential estates (e.g. Springerbaai Coastal Eco Estate and Nautilus Bay);
- Ecotourism-related activities; and
- Associated rural infrastructure.

Figure 7-2 presents the land cover classification for the onshore Project area. The inland portions of the onshore Project area have been extensively transformed by agriculture, particularly on the fertile shale-derived soils. However, remnants of indigenous vegetation remain within drainage lines, steeper slopes, wetlands, dune systems and conservation areas.



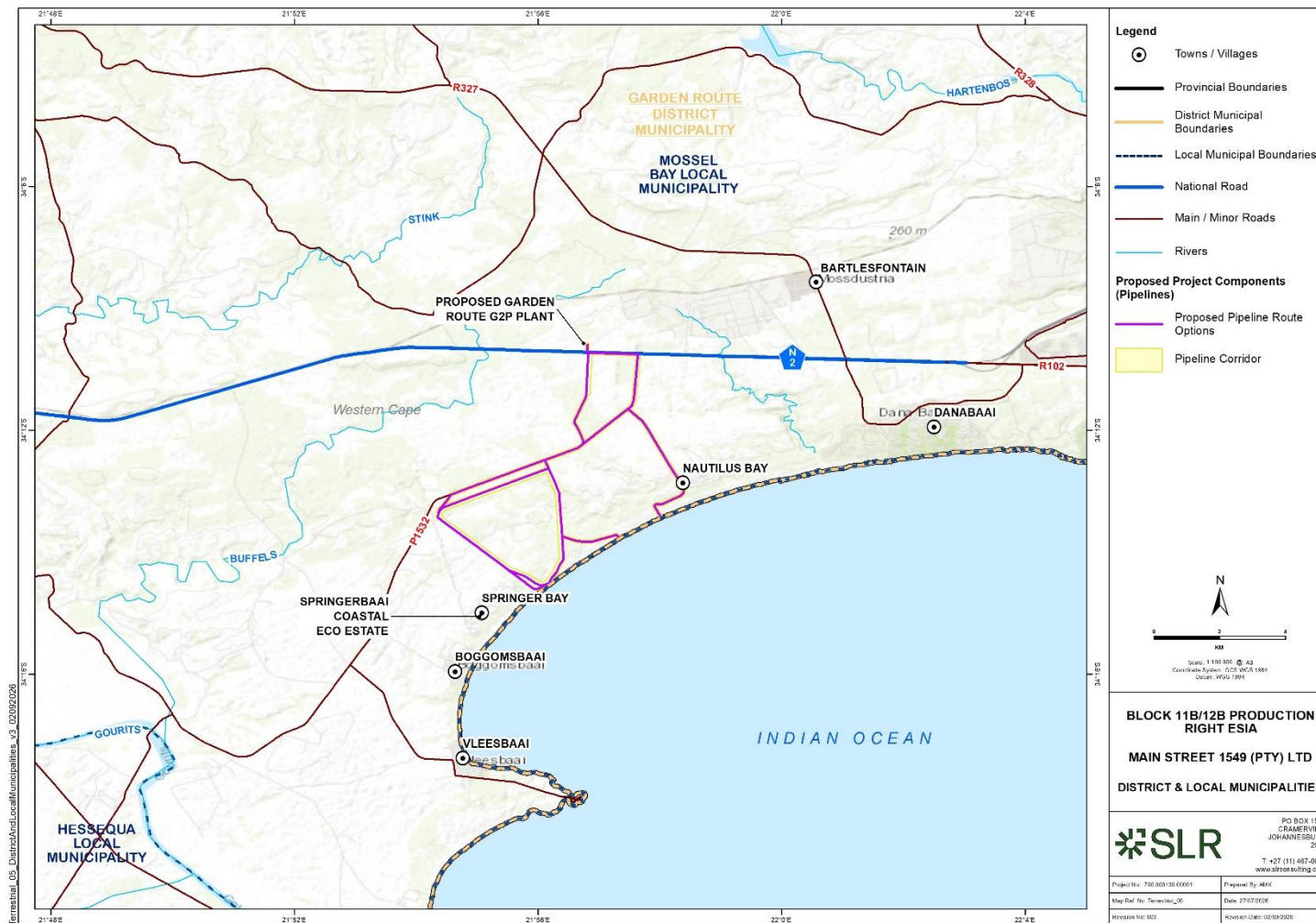


Figure 7-1: District and Local Municipalities of the onshore Project area



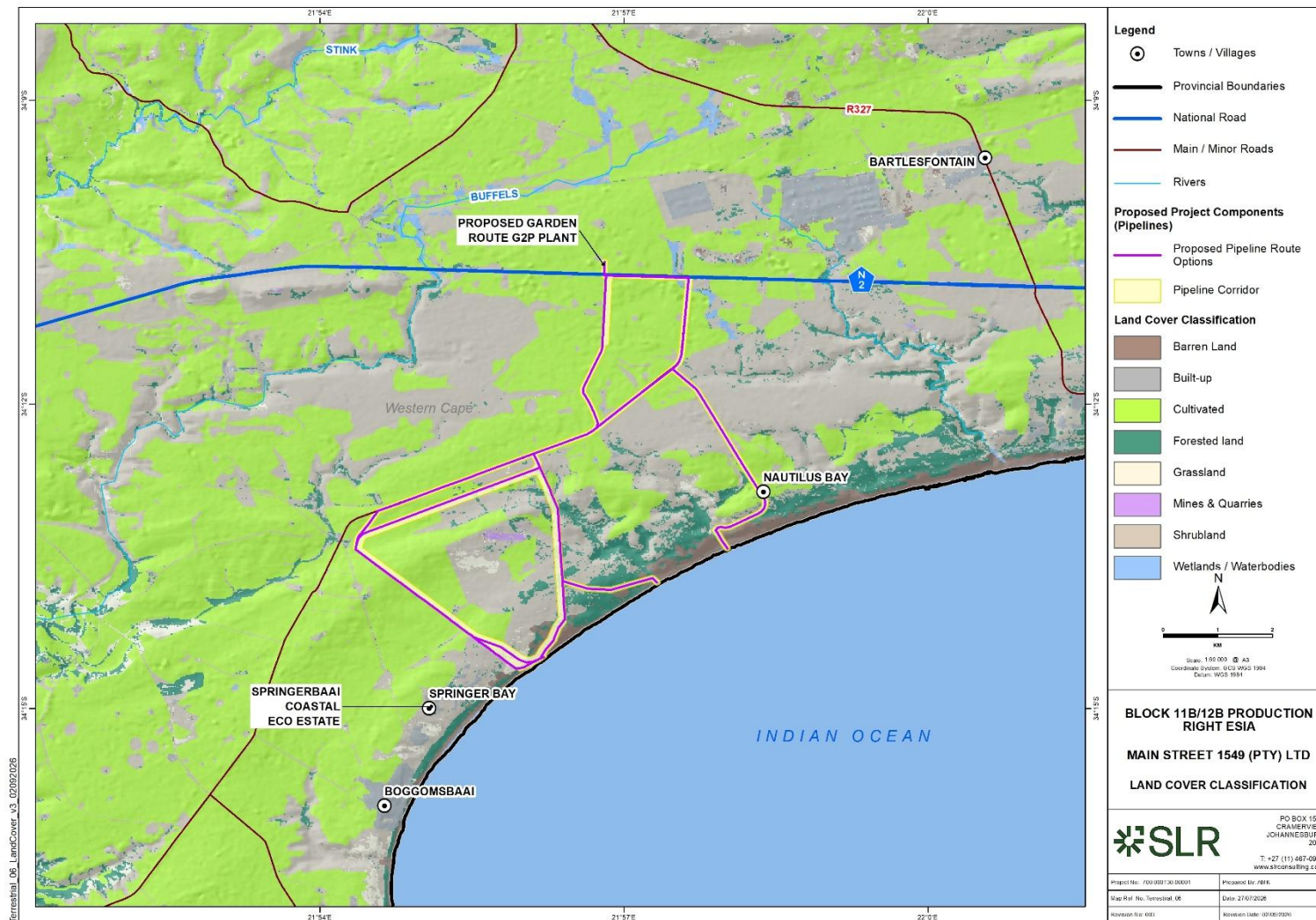


Figure 7-2: Onshore Project area land cover classification



7.2.3 Environmental and Planning Frameworks

A number of national and provincial environmental planning and biodiversity information systems are relevant to the assessment of the proposed onshore gas pipeline. These frameworks identify areas of biodiversity importance, ecological sensitivity and conservation priority and provide an important spatial context for informing project planning, route refinement and the ESIA process. The information presented below is intended to identify potential environmental constraints and sensitivities within and surrounding the proposed pipeline corridor and to inform the consideration of alternatives and the application of the mitigation hierarchy.

7.2.3.1 Western Cape Biodiversity Spatial Plan

The Western Cape Biodiversity Spatial Plan (WCBSP) identifies areas that are important for maintaining biodiversity patterns, ecological processes and ecosystem functioning across the Western Cape. Portions of the proposed onshore pipeline corridor and/or surrounding study area may overlap with or occur in proximity to the following biodiversity features:

- Critical Biodiversity Areas (CBAs);
- Ecological Support Areas (ESAs);
- Important freshwater features;
- Ecological corridors; and
- Priority conservation areas.

CBAs are terrestrial and aquatic areas that are considered important for achieving biodiversity conservation targets and maintaining viable populations of indigenous species. ESAs support the ecological functioning and long-term persistence of CBAs and other areas of biodiversity importance and may include ecological corridors, buffer areas and areas important for maintaining ecological processes.

The presence of these features does not necessarily preclude development. However, it indicates that potential effects on biodiversity, ecological connectivity and ecosystem functioning should be carefully assessed and that the pipeline route and associated infrastructure should, where practicable, avoid or minimise disturbance to sensitive areas.

7.2.3.2 SANBI Biodiversity Information and National Screening Tool

The National Web-Based Environmental Screening Tool and biodiversity information provided by the South African National Biodiversity Institute (SANBI) identify environmental sensitivities that are relevant to the proposed development:

- Threatened ecosystems;
- Freshwater Ecosystem Priority Areas (FEPAs);
- Wetlands and drainage systems;
- Species of Conservation Concern; and
- Ecological corridors.

The screening results provide an initial indication of potential environmental sensitivities and inform the identification of specialist assessment requirements. These datasets are primarily intended to support the early identification of environmental constraints and should be interpreted together with site-specific ecological investigations, specialist assessments and verified information on the final pipeline alignment.



7.2.3.3 Conservation Significance and Threatened Ecosystems

The broader Mossel Bay coastal region supports diversity of terrestrial and coastal ecosystems, including vegetation types of elevated conservation concern. Habitat types that may occur within the broader study area include:

- Albertinia Sand Fynbos;
- Mossel Bay Shale Renosterveld;
- Hartenbos Dune Thicket; and
- Cape Seashore Vegetation.

The conservation significance of these ecosystems reflects, among other factors, their degree of transformation, remaining extent, ecological condition and importance for supporting indigenous biodiversity. The occurrence of threatened ecosystems within the broader region highlights the need to avoid or minimise the loss and fragmentation of intact indigenous vegetation and to maintain ecological connectivity where feasible. Consequently, development within the area requires careful consideration of biodiversity conservation objectives and ecosystem integrity.

7.3 Physical Environment

7.3.1 Topography and Landscape Character

The landscape character along the proposed pipeline routes is predominantly rural, consisting of cultivated wheat, canola and pasture fields interspersed with remnant natural vegetation communities (some of which have been substantially affected by invasive alien vegetation) and drainage features. The area forms part of the Herbertsdale-Gouritsmond agricultural region, which is recognised for its productive agricultural land and forms part of the Protected Agricultural Area (PAA). Extensive portions of the onshore Project area are actively farmed under both dryland and irrigation-based agricultural systems.

Topographically, the area comprises generally gently undulating to moderately rolling terrain, with localised depressions, drainage lines, valley-bottom wetlands and coastal dune systems (refer to Figure 7-3). The coastal portion of the onshore Project area includes beach and dune environments (with some fairly steep dunes leading onto the beach), while inland areas are characterised by cultivated plains dissected by watercourses and ephemeral drainage features. Several natural wetlands, depressions and valley-bottom systems occur within the broader landscape and contribute to landscape heterogeneity and ecological functioning.

The landscape is further influenced by existing linear infrastructure, including roads, railways, sand mine and PetroSA gas pipeline servitudes (pipeline is buried). Existing infrastructure corridors have resulted in varying levels of historical disturbance in parts of the onshore Project area, particularly where route alternatives are aligned with existing utility corridors. Nevertheless, large portions of the corridor options continue to retain a predominantly rural and agricultural character, with ecological and scenery associated with the surrounding fynbos and coastal landscapes.



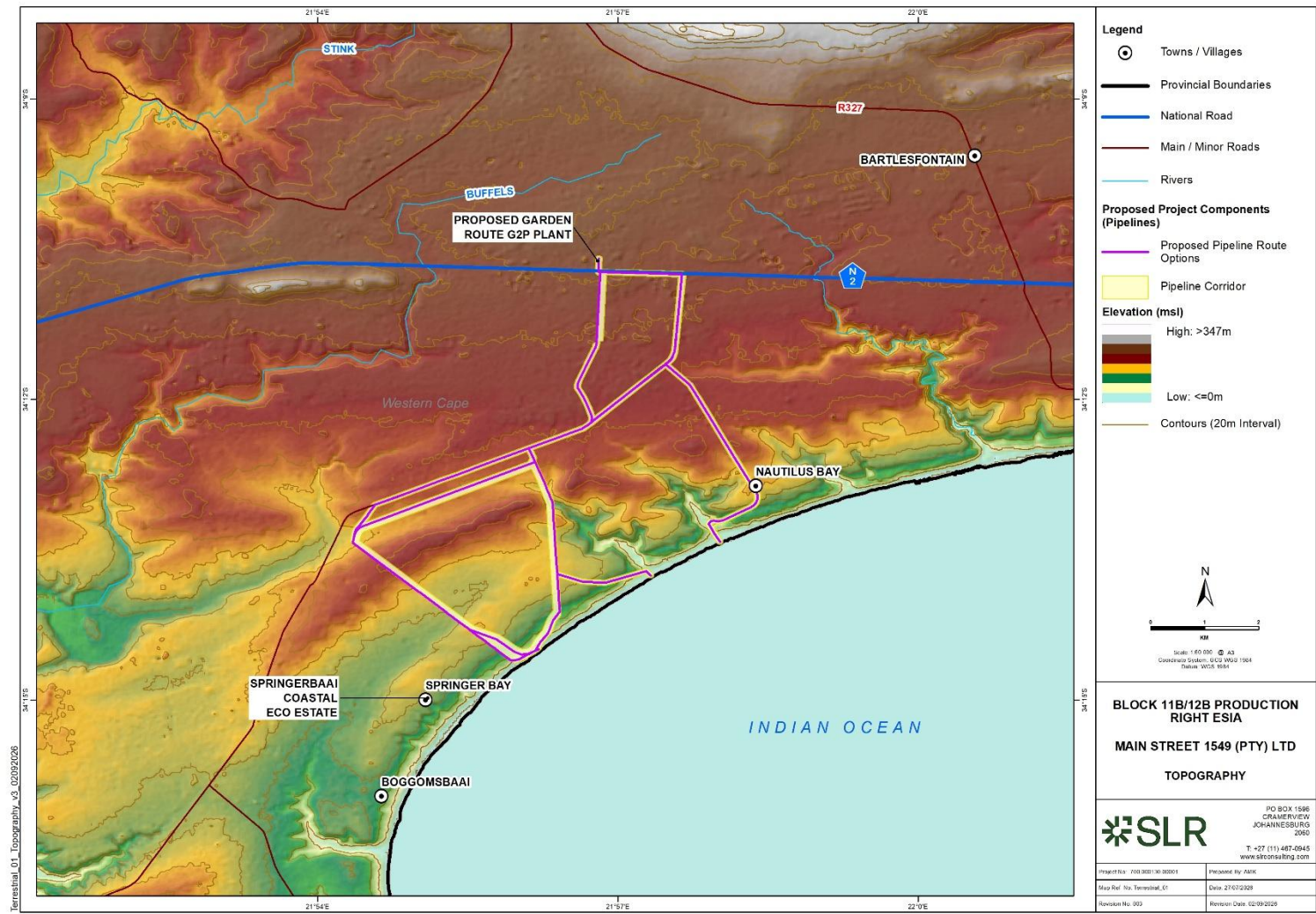


Figure 7-3: Onshore Project area topography



7.3.2 Geology and Soils

The onshore Project area is primarily underlain by geological formations associated with the Bredasdorp Group and the Nordouw Subgroup (refer to Figure 7-4).

Field investigations identified 12 representative soil forms within the onshore Project area, namely the Carolina, Ermelo, Mispah, Glenrosa, Katspruit, Namib, Clovelly, Kroonstad, Sepane, Swartland, Grabouw and Johannesburg soil forms (refer to Figure 7-5) (TBC, 2026a). The Mispah soil form is the most widespread across the study area and occurs extensively within both natural veld and agricultural landscapes. These soils are generally shallow and are often associated with lithic horizons and restrictive substrata. Although they possess limitations, such as reduced permeability and low nutrient-holding capacity, they can support agricultural production where appropriate management practices are implemented.

The Carolina soil forms are of particular agricultural significance as they are associated with active wheat and canola cultivation. Carolina soils generally exhibit good drainage and permeability characteristics. These soils contribute to the high agricultural sensitivity assigned to portions of the onshore Project area.

Hydromorphic soils represented by the Katspruit and Kroonstad soil forms occur in association with wetlands and drainage lines. These soils display evidence of prolonged saturation, including mottling and bleached horizons, indicating their importance in maintaining wetland ecological processes and hydrological functioning. Disturbance of these soils through trenching and construction activities may alter subsurface water movement and wetland integrity.

Coastal areas are dominated by Namib soil forms associated with beach and dune systems. These soils are generally characterised by sandy textures, limited nutrient reserves, low water-holding capacity and, in places, the presence of hardened carbonate horizons.

7.3.3 Climate and Meteorological Conditions

This section has been compiled using the Climate Change Impact Assessment Report by Promethium Carbon (Promethium Carbon, 2025).

The onshore Project area falls within the temperate coastal climatic zone of the southern Cape, where climatic conditions are strongly moderated by proximity to the Indian Ocean and the influence of the Agulhas Current. The Mossel Bay region experiences a relatively mild climate throughout the year, with moderate seasonal variation compared to inland areas of South Africa. Mean annual temperatures are ~17°C, with average summer temperatures around ~21°C and winter temperatures around 13°C.

The region receives moderate annual rainfall of ~530 mm per annum. Rainfall is relatively well distributed throughout the year, with peaks typically occurring during autumn and spring. Despite the generally moderate rainfall regime, the area periodically experiences high-intensity rainfall events associated with frontal systems and cut-off low-pressure systems, which can generate flash flooding, elevated runoff and localised erosion. On average, approximately three days per year experience rainfall exceeding 20 mm.

Climate projections indicate that the Western Cape and Garden Route region will experience continued warming over coming decades. Temperatures within the Mossel Bay area are projected to increase by ~1.5°C to 2.0°C by mid-century under various emissions scenarios. Although the coastal setting moderates extreme heat, a gradual increase in the frequency of exceptionally warm days is anticipated.



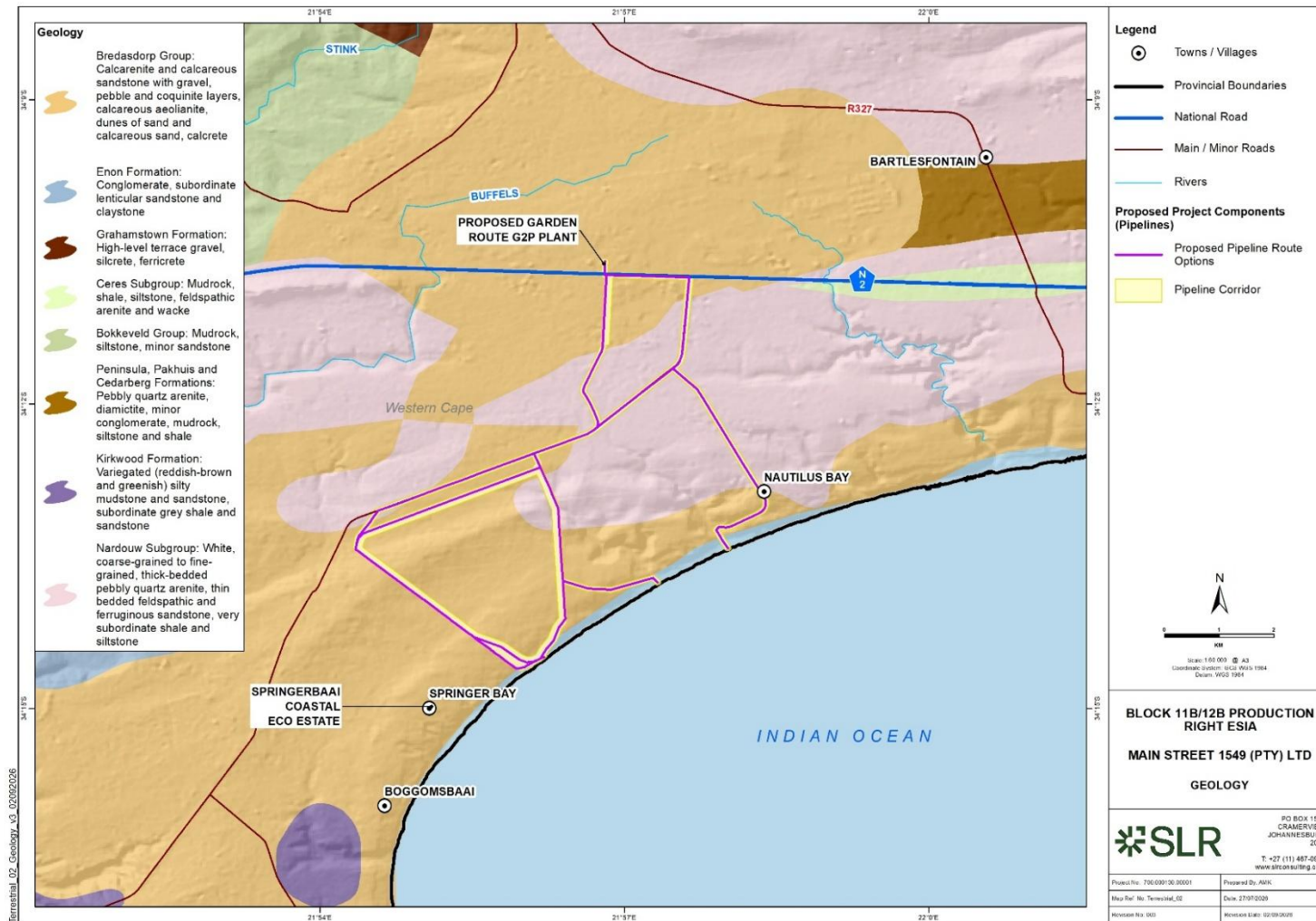


Figure 7-4: Onshore Project area geology



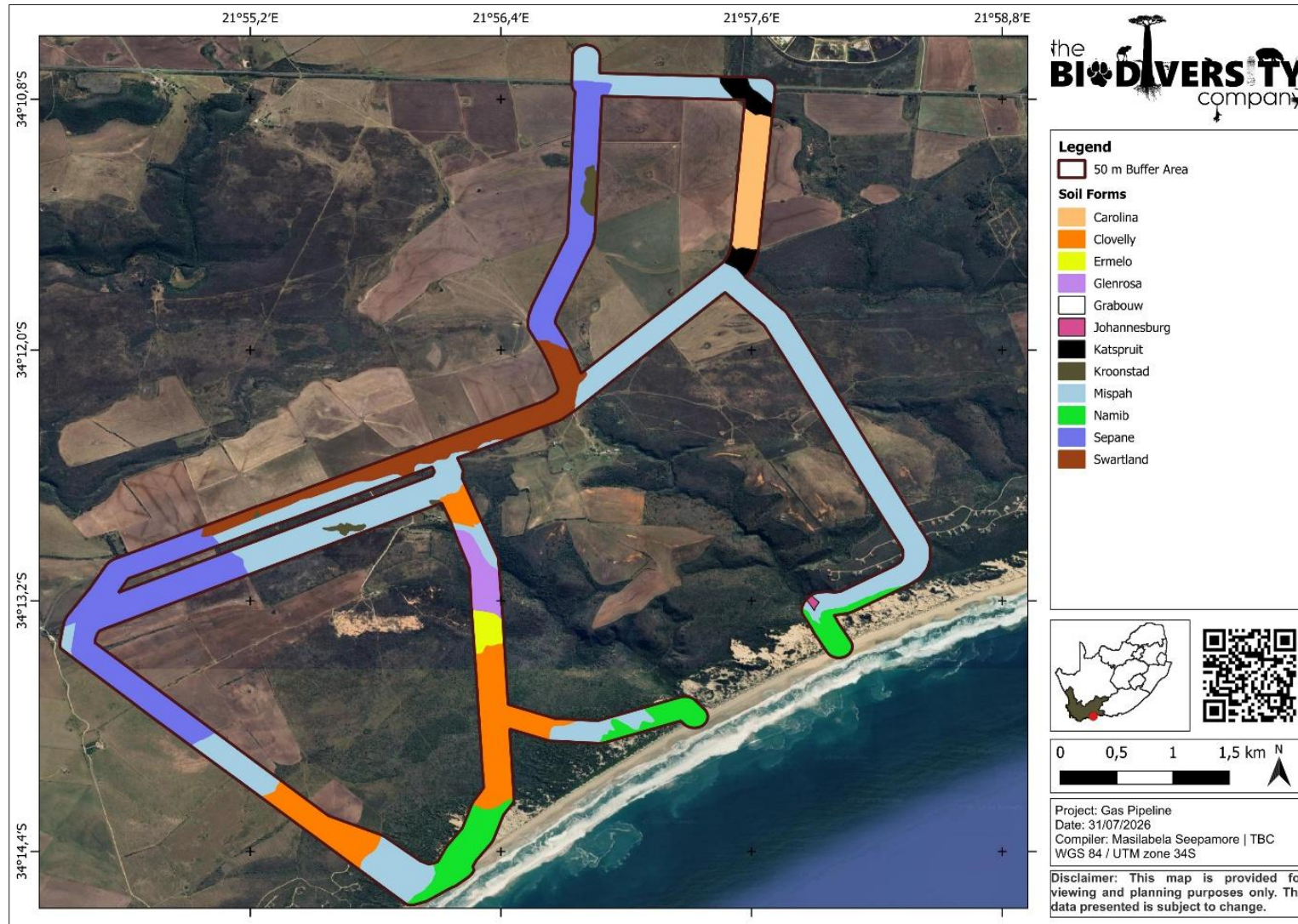


Figure 7-5: Onshore project area soils delineation



Projected changes in precipitation are less certain; however, climate models suggest increased rainfall variability, potential reductions in annual rainfall under higher-emissions scenarios, and an increase in the intensity of storm events. Recent climate studies indicate that climate change has increased the severity of some cut-off low-pressure storm systems affecting the southern Cape, thereby elevating risks associated with flooding, erosion and infrastructure damage.

Water availability represents an important environmental consideration within the region. The Mossel Bay area is already classified as experiencing high to extremely high levels of water stress, and future climate change is expected to increase pressure on available water resources through rising demand, changing rainfall patterns and periodic drought conditions.

7.3.4 Key Sensitivities and Constraints (Physical Environment)

The principal physical environmental sensitivities and constraints within the onshore Project area are associated with productive agricultural soils, wetlands and drainage features, hydromorphic and poorly drained soils, coastal dune and beach systems, and areas potentially susceptible to erosion, flooding or altered surface-water drainage. These features vary across the proposed pipeline route alternatives and will require consideration during route refinement, detailed design and the development of construction and rehabilitation measures.

Areas of high agricultural sensitivity are associated primarily with actively cultivated land and soils that support wheat, canola and pasture production, including Carolina and Valsrivier soil forms. The proposed pipeline may result in temporary disturbance to agricultural land during construction, including the removal and stockpiling of topsoil, excavation of the pipeline trench and temporary disruption to farming activities. Where avoidance is not practicable, construction activities should be managed to minimise the loss, mixing and compaction of productive soils and to facilitate the reinstatement of agricultural land following construction.

Wetlands, valley-bottom systems, drainage lines and associated hydromorphic soils represent important hydrological and ecological sensitivities. Pipeline construction in or near these features may affect local drainage patterns, subsurface water movement, wetland integrity and soil stability. Watercourse and wetland crossings should, therefore, be avoided where practicable or designed to minimise disturbance, with appropriate construction methods, erosion-control measures and rehabilitation requirements informed by the findings of the relevant specialist assessments.

The coastal portion of the onshore Project area includes beach and dune environments characterised by sandy soils, dynamic coastal processes and, in places, steep dune slopes. These areas may be susceptible to wind and water / wave erosion, slope instability and disturbance of coastal vegetation. Pipeline routing and construction within these environments will require careful consideration of the sensitivity of dune systems, the potential for erosion and the need to maintain coastal processes and landscape character.

The gently undulating to moderately rolling topography is generally favourable for pipeline construction; however, localised slopes, depressions and drainage features may present constraints relating to erosion, stormwater management and construction access. High-intensity rainfall events may increase runoff and erosion risks, particularly where soils are exposed during construction. Appropriate stormwater management, erosion-control measures and progressive rehabilitation will therefore be required.

Climate change may further influence the long-term vulnerability of the pipeline and associated infrastructure through increasing temperatures, changing rainfall patterns, more variable water availability and potentially more intense storm events. These considerations



should be incorporated into the detailed engineering design and climate-resilience measures for the proposed development.

Overall, the physical environment does not necessarily preclude the development of the proposed pipeline; however, the identified sensitivities will require appropriate avoidance, route optimisation, engineering design and mitigation measures.

7.4 Terrestrial Biodiversity (Flora and Fauna)

The following sections describe terrestrial biodiversity environment for the onshore portion of the project which includes the pipelines and corridors. The section is compiled using the Terrestrial Biodiversity SSVR by The Biodiversity Company (TBC, 2026b)

7.4.1 Regional Biodiversity

The onshore Project area is situated within the Cape Floristic Region, a globally recognised biodiversity hotspot characterised by exceptional levels of plant species richness, endemism and habitat heterogeneity. The onshore Project area occurs within the Mossel Bay and Albertinia coastal landscape of the Greater Cape Floristic Region and supports a mosaic of fynbos, thicket, strandveld, coastal dune and wetland habitats. The landscape has been substantially transformed by agriculture, grazing, urban expansion, transport infrastructure, sand mining and historical development; however, remnants of natural vegetation persist, although some has been affected by invasive alien vegetation, and continue to provide important ecological functions and biodiversity areas of retained natural habitat.

The DFFE Environmental Screening Tool identifies the terrestrial biodiversity sensitivity of the onshore project area as predominantly Very High, owing to the presence of CBAs, ESAs, National Protected Area Expansion Strategy (NPAES)⁵⁵ areas, FEPA sub-catchments and threatened ecosystems (including Albertinia Sand Fynbos, Hartenbos Dune Thicket and Mossel Bay Shale Renosterveld). The sections that follow indicate the disputed sensitivity of the different habitats as part of the site sensitivity verification.

7.4.2 Vegetation Types and Habitats

Based on the SANBI National Vegetation Map (2018) and field verification, 10 terrestrial habitat types occur within the onshore Project area (see Figure 7-6 and Figure 7-7). These habitat types are described below along with their sensitivities disputed or validated against the National Screening Tool.

7.4.2.1 Hartenbos Dune Thicket

Hartenbos Dune Thicket forms part of a threatened ecosystem and is part of the Albany Thicket Biome, which occurs on stabilised coastal dunes. The habitat is characterised by dense thicket vegetation, shrubs and small trees. Most patches in the onshore Project area remain in fairly good condition despite pressures from residential development, public access and invasive alien species. This vegetation type supports the protected tree *Sideroxylon inerme* (white milkwood) and multiple conservation-important plant species. The Animal and Plant Themes were rated High and validated as High, while the Terrestrial Theme rating of Very High was disputed to High.

⁵⁵ The NPAES classification indicates land considered strategically important for expanding the national protected-area network and improving the representation and persistence of ecosystems. NPAES status does not, on its own, indicate that land has been formally declared as a protected area, but it increases its strategic conservation importance.



7.4.2.2 Disturbed Hartenbos Dune Thicket

This habitat retains the characteristic species composition of Hartenbos Dune Thicket but has been degraded by road-related edge effects, habitat fragmentation, vegetation encroachment and invasion by alien species such as *Acacia cyclops*. Despite these disturbances, it remains part of a threatened ecosystem and still provides ecological connectivity and potential habitat for fauna and flora SCC, making its conservation and rehabilitation important. The Animal and Plant Themes were rated High, while the Terrestrial Theme was rated Very High. These ratings were all disputed to Low.

7.4.2.3 Albertinia Sand Fynbos

Albertinia Sand Fynbos forms part of a threatened ecosystem. Within the onshore Project area, it generally occurs as small, isolated remnants surrounded by transformed agricultural land. Although fragmented and disturbed by surrounding land uses, these remnants still retain conservation value and may support species of conservation concern. Rehabilitation potential remains good despite ongoing disturbance. The Animal and Plant Themes were rated High and validated as High, while the Terrestrial Theme rating of Very High was disputed to High.

7.4.2.4 Disturbed Albertinia Sand Fynbos

This habitat represents previously disturbed Albertinia Sand Fynbos, with signs of historical clearing for agricultural activities. Although altered, the area is recovering naturally and remains dominated by indigenous vegetation. As part of a threatened ecosystem, it still offers suitable habitat for species of conservation concern and functions as a movement corridor for fauna, highlighting the value of maintaining and restoring remaining natural vegetation. The Animal and Plant Themes were rated High, while the Terrestrial Theme was rated Very High. These ratings were all disputed to Low.

7.4.2.5 Canca Limestone Fynbos

Canca Limestone Fynbos occurs in a semi-natural condition and remains representative of this distinctive vegetation type despite localised disturbance, fragmentation and invasive species impacts. The habitat supports a diverse indigenous plant community and is of elevated conservation importance due to the confirmed presence of the Vulnerable plant species *Leucospermum praecox*. Additional flora SCC are considered likely to occur within this habitat. The Animal and Plant Themes were rated High, while the Terrestrial Theme was rated Very High; the Plant rating was validated as High, whereas the Animal and Terrestrial ratings were disputed to Medium.

7.4.2.6 Southwestern Strandveld

Southwestern Strandveld forms part of a threatened ecosystem, which occurs on coastal sandy substrates and moving dune systems. The habitat in the onshore Project area remains largely intact with only limited disturbance from nearby residential developments and alien plant invasion. Ecological condition is generally good. The Animal and Plant Themes were rated High and validated as High, while the Terrestrial Theme rating of Very High was disputed to High.

7.4.2.7 Cape Seashore Vegetation

Cape Seashore Vegetation is associated with dune systems and beach margins. It remains largely intact in the onshore Project area and is influenced primarily by recreational use and residential development pressures. It provides important dune stabilisation and coastal ecological functions. The Animal and Plant Themes were rated High, while the Terrestrial



Theme was rated Very High; the specialist rated all three themes as Medium, disputing the Animal and Terrestrial ratings while validating the habitat's Plant Theme sensitivity.

7.4.2.8 Modified Areas

Modified areas or habitats include cultivated lands, grazing areas, residential properties, disturbed servitudes and other transformed areas that have largely lost their original ecological character and support little indigenous vegetation. Ecological functioning and biodiversity value are generally low. The Animal and Plant Themes were rated High, while the Terrestrial Theme was rated Very High. These ratings were all disputed to Very Low.

7.4.2.9 Disturbed Areas

Disturbed Areas comprise degraded remnants of natural vegetation affected by historical and ongoing land uses such as grazing, previous clearing, road infrastructure and invasive alien plants. While ecological integrity has been reduced, many areas still contain indigenous vegetation and retain the potential to support flora SCC and provide movement corridors for fauna across an otherwise fragmented landscape. The Animal and Plant Themes were rated High, while the Terrestrial Theme was rated Very High. These ratings were all disputed to Low.

7.4.2.10 Water Resources

Wetlands, seep systems, valley-bottom features, depressions and farm dams occur throughout portions of the onshore Project area. These habitats are intrinsically sensitive and support important hydrological and ecological functions, as well as habitat for aquatic and semi-aquatic species, and water for agricultural purposes. The Animal and Plant Themes were rated High, while the Terrestrial Theme was rated Very High; the specialist rated all three themes as Low to Medium. The Animal and Plant ratings were partly validated and partly disputed, while the Terrestrial rating was disputed, because the features are inherently sensitive and provide important ecosystem services but are subject to ongoing disturbance from surrounding land uses.

7.4.3 Vegetation Species of Conservation Concern

Several species of conservation concern (SCC) were recorded during field surveys. At least 13 SCC plant species have been confirmed.

The DFFE Screening Tool indicates medium sensitivity for plant species and identifies numerous SCCs potentially occurring within the onshore Project area, including *Leucospermum muirii* (Muir's Pincushion), *Leucospermum praecox* (Early Pincushion), *Nanobubon hypogaeum*, *Wahlenbergia polyantha*, *Agathosma muirii* (Muir's Buchu), *Agathosma riversdalensis* (Riversdale Buchu), *Euchaetis albertiniana*, *Lobostemon belliformis*, *Thamnochortus muirii*, and several other endemic southern Cape taxa.

One (1) flora SCC (*Leucospermum praecox*) was recorded, along with two (2) counts of a nationally protected tree under the National Forests Act, 1998 (No. 84 of 1998), *Sideroxylon inerme* (White Milkwood) within Hartenbos Dune Thicket and Albertinia Sand Fynbos habitat. This species thus may require a licence from the relevant forestry authority for cutting, disturbance, damage or removal of individual trees.



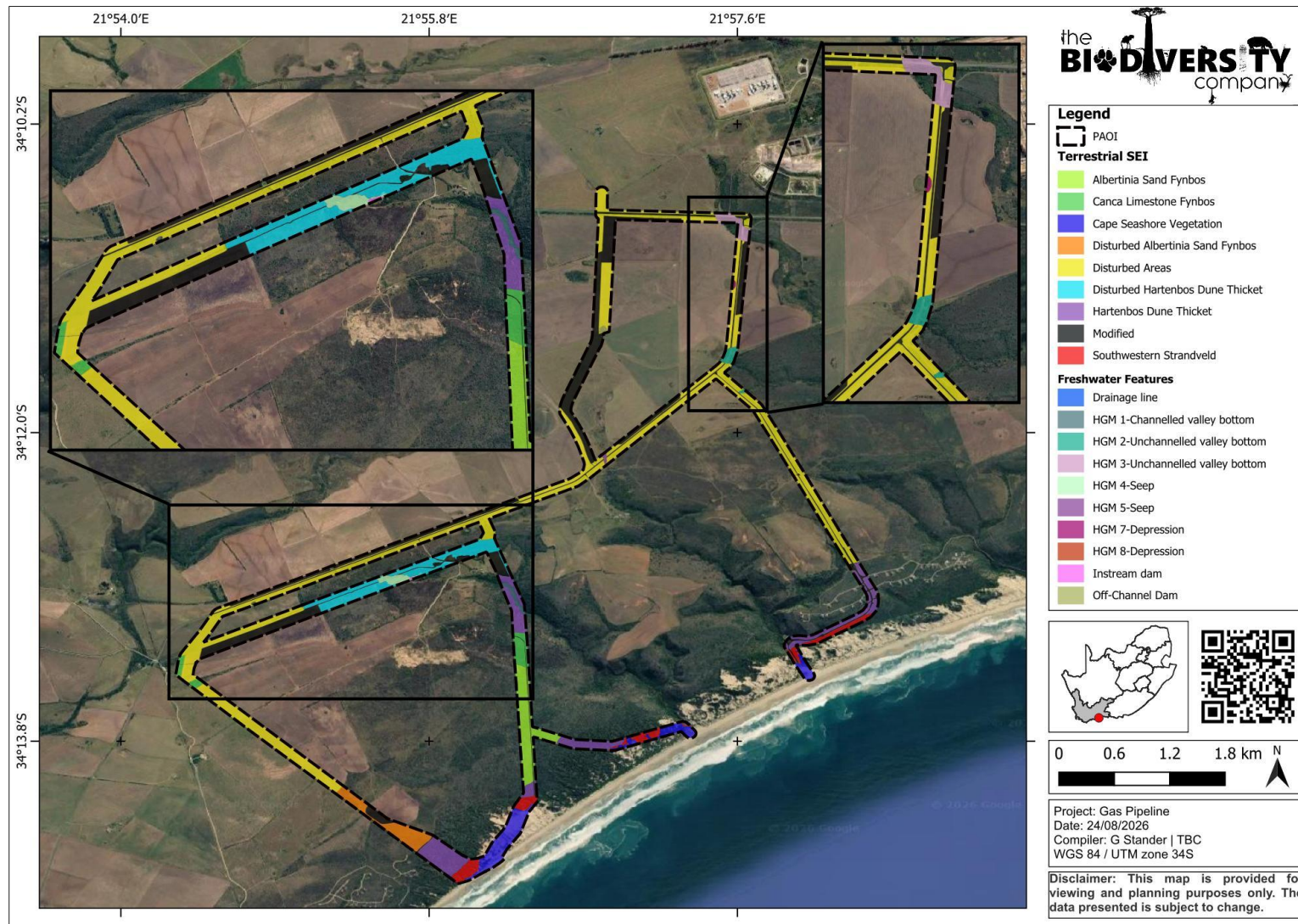


Figure 7-6: Habitats identified in the onshore project area



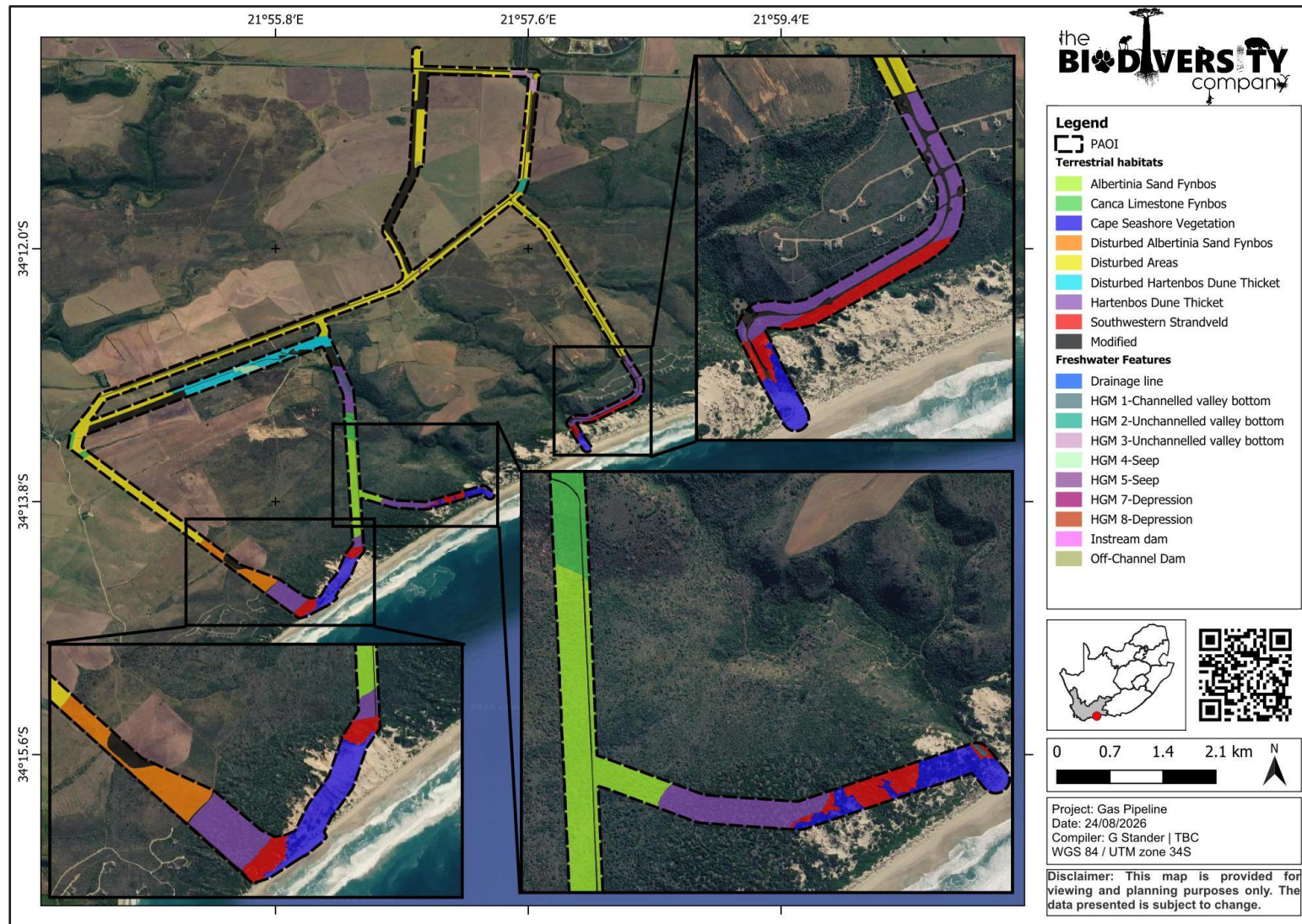


Figure 7-7: Habitats identified in the onshore project area (continued)



7.4.4 Fauna

7.4.4.1 Mammals

The natural vegetation habitats (and remnants) and water resources provide habitat and movement corridors for a range of indigenous small mammals and meso-mammals (medium-sized) typical of the southern Cape coastal region. These habitats facilitate foraging, shelter and dispersal between larger natural vegetation remnants fragmented by agriculture and infrastructure. While no mammal SCCs were specifically identified during field surveys, suitable habitat remains available within intact fynbos, thicket and wetland areas.

7.4.4.2 Avifauna (Birds)

The area is considered sensitive for avifauna, and the DFFE Screening Tool identifies several threatened bird species with potential occurrence, and whether they were observed during the site visit, including:

- Black Harrier (*Circus maurus*) - observed;
- Denham's Bustard (*Neotis denhami*) – not observed;
- Martial Eagle (*Polemaetus bellicosus*) – not observed;
- Southern Black Korhaan (*Afrotis afra*) – not observed;
- African Marsh Harrier (*Circus ranivorus*) – not observed;
- Crowned Eagle (*Stephanoaetus coronatus*) – not observed; and
- Caspian Tern (*Hydroprogne caspia*) – not observed.

In addition, several other SCC were observed during the field survey (Figure 7-8).

Natural habitats along the pipeline corridor alternatives provide foraging and movement habitat for these species, particularly open fynbos, renosterveld remnants, wetlands and coastal habitats.

7.4.4.3 Invertebrates

Invertebrate diversity within the Cape Floristic Region is generally high. The Screening Tool identified several invertebrate SCCs with potential occurrence, including:

- *Aloeides thyra orientis* (Brenton copper butterfly);
- *Lepidochrysops littoralis* (Coastal blue butterfly); and
- *Aneuryphymus montanus* (Yellow-winged agile grasshopper).

The intact fynbos, renosterveld and coastal habitats provide suitable habitat for endemic pollinators, butterflies, grasshoppers and other conservation-important invertebrates. However it must be noted that this was not covered by the scope of the SSVRs.





Figure 7-8: Photographs of Species of Conservation Concern observed during field survey: Top left – Blue Crane, Top middle – Secretary bird, Top right – Yellow-billed Duck, Middle – Agulhas Long-billed Lark, Bottom left – Black-winged Kite, Bottom right

Source: TBC (2026)

7.4.5 Habitat Types and Ecological Processes

7.4.5.1 Habitat Connectivity and Corridors

The natural habitats within the onshore Project area serve as important ecological linkages within an otherwise fragmented agricultural landscape. Fynbos, thicket, strandveld and wetland habitats collectively function as movement corridors for fauna and facilitate gene flow between habitat patches. These natural habitats provide valuable foraging and movement corridors and remain functionally connected despite surrounding land transformation.

Wetlands and drainage features further contribute to ecological connectivity by linking terrestrial and aquatic ecosystems across the landscape.

7.4.6 Biodiversity Priority Areas

CBAs and ESAs within the onshore Project area are depicted in Figure 7-9 and are described below.

7.4.6.1 Critical Biodiversity Areas (CBAs)

The corridor intersects terrestrial CBA 1 (natural) and CBA 2 (degraded or restorable) identified in provincial and national biodiversity planning datasets. These CBAs are required to maintain biodiversity pattern and ecological processes and contribute to the persistence of threatened ecosystems and species. The DFFE Screening Tool identifies terrestrial CBAs as a major driver of the site's Very High terrestrial biodiversity sensitivity. The corridor also intersects aquatic CBAs associated with wetland features and freshwater ecosystems.



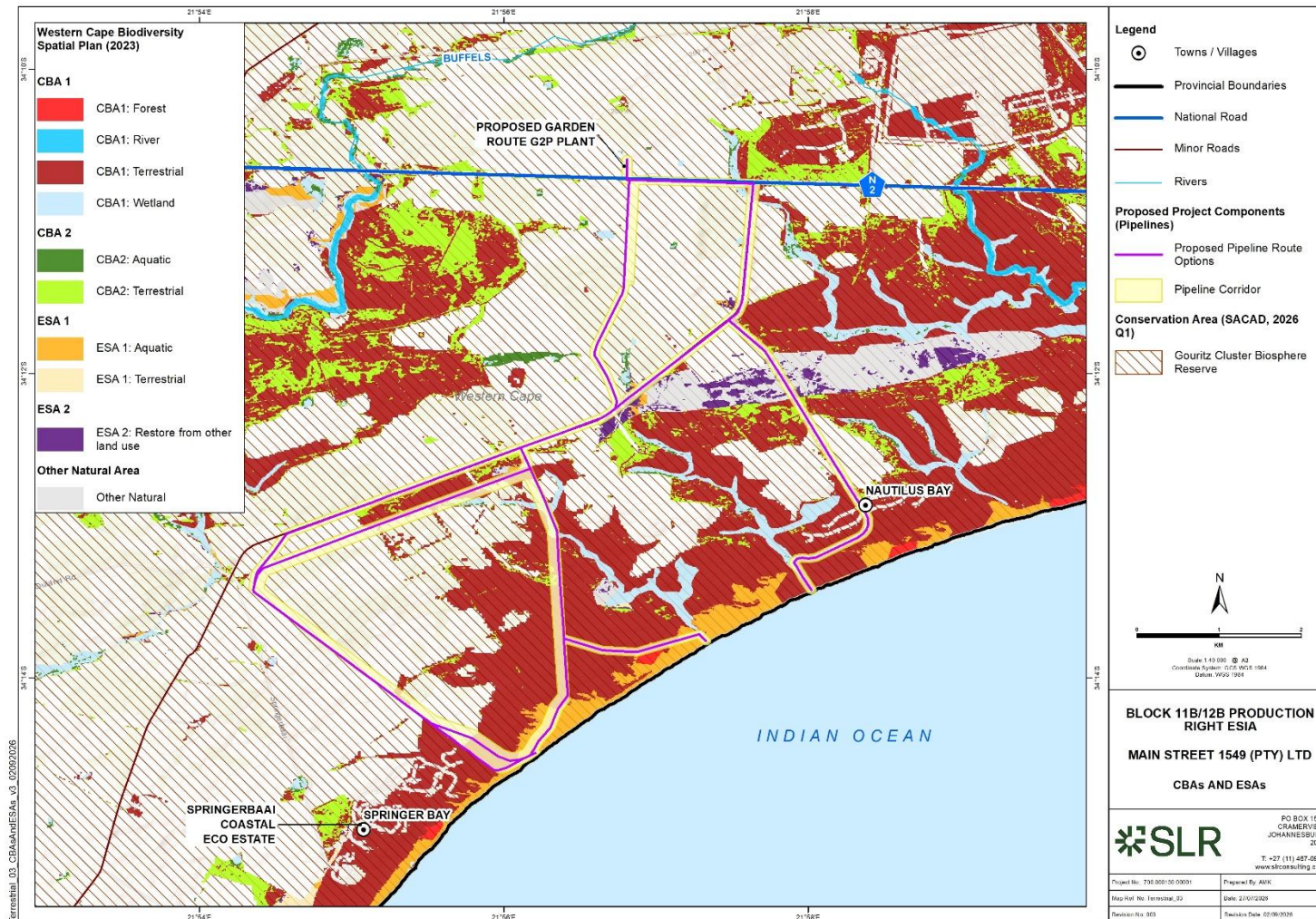


Figure 7-9: CBAs and ESAs in the onshore Project area



7.4.6.2 Ecological Support Areas (ESAs)

The onshore Project area intersects ESA 1 (natural) and ESA 2 (degraded or restorable) areas, including terrestrial and aquatic ESAs. These areas play a critical supporting role in maintaining ecological functioning and connectivity between biodiversity priority areas. ESA 2 areas specifically represent ecosystems requiring restoration from previous land-use impacts to maintain ecological functionality.

7.4.7 Key Sensitivities and Receptors (Terrestrial Biodiversity)

The principal terrestrial biodiversity sensitivities and ecological receptors within the onshore Project include:

- Relatively intact remnants of Mossel Bay Shale Renosterveld (classified as Critically Endangered).
- Remnants of Albertinia Sand Fynbos, Swellendam Silcrete Fynbos and Hartenbos Dune Thicket (all classified as Endangered).
- Intact or relatively intact remnants of North Langeberg Sandstone Fynbos, Southwestern Strandveld and Cape Seashore Vegetation, which, although classified as Least Concern, retain important site-specific biodiversity, habitat and ecological connectivity value.
- Confirmed occurrence and potential habitat for numerous plant SCCs and regional endemics, particularly within relatively intact fynbos, renosterveld and thicket habitats.
- The nationally protected tree, *Sideroxylon inerme* (white milkwood), which occurs within Hartenbos Dune Thicket habitat.
- Wetlands, seeps, depressions and valley-bottom systems, including associated hydromorphic soils and aquatic biodiversity priority areas (aquatic CBAs and FEPA sub-catchments).
- Natural habitat linkages and ecological corridors that facilitate the movement and dispersal of fauna within a fragmented agricultural landscape.
- Suitable habitat for threatened and conservation-important bird and invertebrate species, as well as indigenous mammals, reptiles and amphibians.
- Terrestrial and aquatic CBAs and ESAs
- Areas identified as priorities under NPAES and FEPA.

The principal biodiversity risks associated with pipeline construction relate to vegetation clearance and disturbance of indigenous vegetation, direct loss or degradation of sensitive habitat, disturbance or loss of SCCs and protected trees, fragmentation or disruption of ecological corridors and linkages and potential effects on wetlands, drainage features and associated ecological processes. Construction activities may also result in soil disturbance, erosion, the spread of invasive alien plant species, disturbance to fauna, and temporary reductions in habitat availability and ecological connectivity.

Given the linear nature of the proposed development and the potential for portions of the pipeline to be constructed within or adjacent to existing infrastructure corridors, opportunities exist to reduce biodiversity impacts through careful route selection and the application of the



mitigation hierarchy. Route refinement⁵⁶ should, where practicable, prioritise previously and/or potentially future disturbed, modified or transformed areas and existing servitudes, while avoiding or minimising disturbance to Critically Endangered and Endangered ecosystems, intact natural habitat, wetlands and drainage features, protected trees, confirmed SCC populations and high-value biodiversity priority areas.

Where avoidance is not practicable, site-specific mitigation measures should be implemented to minimise disturbance, retain ecological connectivity, manage invasive alien species and facilitate the effective rehabilitation of temporarily disturbed areas following construction.

7.5 Freshwater Ecosystems

This section was compiled using the Aquatic Biodiversity SSVR by TBC (TBC, 2026c). The freshwater environment comprises a network of natural wetlands, drainage features, ephemeral watercourses, seep systems (refer to Figure 7-11) and artificial impoundments embedded within coastal vegetation, agricultural land and low-density development (e.g. farm dams). Site verification identified six natural hydrogeomorphic wetland units, together with instream and off-channel dams

At a broader planning level, portions of the area are associated with rivers and wetlands, ESA aquatic features and a FEPA sub-catchment. These systems are, therefore, important both as individual aquatic habitats and as components of the regional freshwater network.

7.5.1 Surface Water Systems

The surface-water environment is characterised by relatively small wetland and drainage systems rather than major perennial rivers. During site verification, six natural wetland units were delineated (refer to Figure 7-10) comprising:

- two channelled valley-bottom wetlands (HGM 1 & 4);
- two unchanneled valley-bottom wetlands (HGM 2 & 5); and
- two depression wetlands (HGM 3 & 6).

Several instream and off-channel dams were also identified. Site verification data was complimented with desktop information on seep wetlands, rivers and other valley-bottom and depression systems within the wider assessment area. Channelled valley-bottom wetlands occur in topographic lows where runoff is concentrated into a discernible channel. Unchanneled valley-bottom wetlands occupy broader valley floors in which water is conveyed more diffusely through wetland vegetation and saturated soils. Depression wetlands occur in localised basins that receive and retain runoff, at least seasonally. Instream dams interrupt natural drainage features, whereas off-channel dams are artificial impoundments located outside natural channels.

The DFFE Screening Tool classifies the broader aquatic biodiversity theme as Very High sensitivity due to CBA wetlands, ESA 1 aquatic areas, seeps, channelled valley-bottom wetlands, depressions and a FEPA sub-catchment in the onshore Project area. Site verification refined this broad desktop classification by distinguishing natural wetlands and instream dams from artificial features and terrestrial areas lacking wetland indicators and confirmed the sensitivity to be high.

⁵⁶ Route refinement will be undertaken during the pre-construction stage, once detailed planning and site-specific information are available. Where practicable, the refined route should prioritise areas that are already disturbed or are expected to be disturbed independently of the project, such as property boundaries where firebreaks must be established and maintained, planned farm roads and existing servitudes.



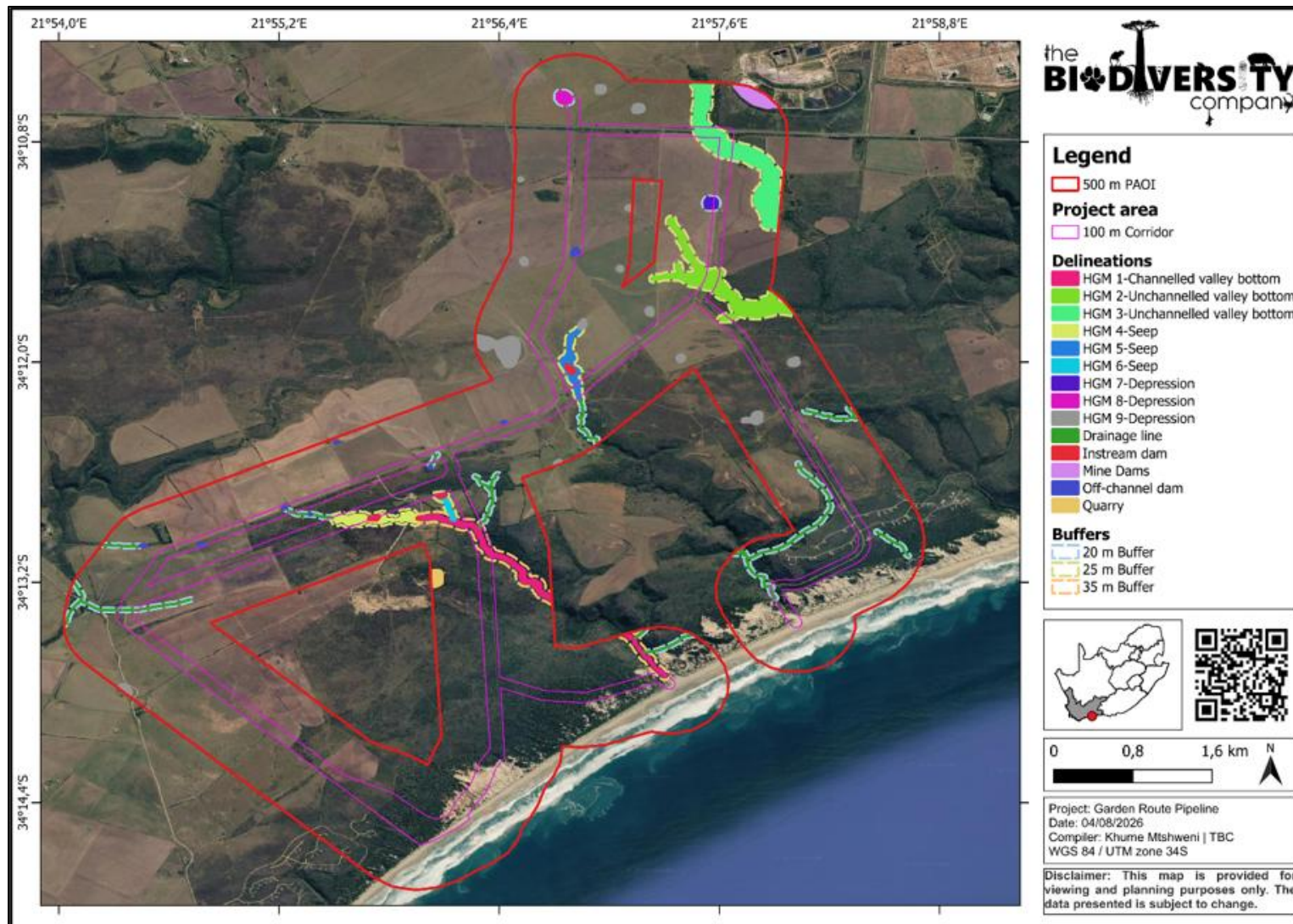


Figure 7-10: Watercourse features in the onshore project area



7.5.2 Hydrology and Flow Regimes

The hydrological regime is driven principally by rainfall-generated runoff, local topography, soil permeability and seasonal saturation. Mossel Bay receives rainfall throughout the year, with seasonal peaks generally occurring in autumn and spring. Although total annual rainfall is moderate, short-duration, high-intensity events can produce rapid runoff and localised flash-flow conditions in small catchments draining towards the coast. Further detail on climate is presented in Section 7.3.3.

The wetlands are expected to display predominantly seasonal or intermittent flow and inundation patterns. Channelled valley-bottom wetlands convey concentrated flows along defined drainage pathways, while unchannelled valley-bottom wetlands spread surface and shallow subsurface flows across wider valley floors. Depression wetlands retain runoff within localised basins and may remain inundated or saturated after rainfall, depending on their soils, catchment inputs, evaporation and groundwater interaction.

Hydrological conditions have been modified locally by agriculture (cultivation), linear infrastructure (roads), drainage alteration and dam construction. Instream dams intercept flows and sediment, increase local residence times and potentially reduce or alter downstream discharges. Agricultural practices may also increase surface runoff where soils are compacted or vegetation cover is reduced. Hydromorphic Katspruit and Iswepe soils recorded along watercourses show bleached horizons and mottling associated with prolonged saturation, corroborating the occurrence of seasonally wet areas and shallow subsurface-flow pathways. Further detail on soils is presented in Section 7.3.2.

Climate variability is relevant to the future hydrological regime. Regional projections indicate increasing rainfall variability and a potential increase in the intensity of severe rainfall events, even where long-term annual rainfall remains relatively stable or declines slightly. Longer dry periods may alternate with intense storms, increasing both seasonal water stress and the risk of erosion, flash flooding and damage to drainage crossings. Further detail on climate change³ implications is presented in Section 7.3.3.



Figure 7-11: Surface water features in the onshore Project area



7.5.3 Aquatic Ecology

The freshwater ecosystems within the onshore Project area comprise a mosaic of channelled and unchannelled valley-bottom wetlands, depression wetlands, seep systems and artificial impoundments. These systems support hydrophytic plants (i.e. plants adapted to grow in water or prolonged or seasonal soil saturation) and provide habitat for wetland-dependent fauna such as aquatic and semi-aquatic invertebrates, amphibians and birds.

The ecological value of the wetlands extends beyond faunal habitat they provide. Valley-bottom systems provide longitudinal connectivity along drainage lines, while seep systems sustain shallow subsurface flows and maintain soil moisture conditions that support specialised wetland vegetation. Depression wetlands add habitat diversity (heterogeneity) by providing temporary or seasonal ponding areas that are important for amphibian breeding and aquatic invertebrate communities. Although artificial impoundments are anthropogenic, they provide supplementary habitat and refuge for freshwater-dependent species where natural wetlands are limited.

Collectively, these freshwater features contribute to landscape-scale ecological connectivity within an otherwise fragmented environment characterised by cultivation, roads, fences and dispersed rural development. Their ecological significance is reinforced by the occurrence of mapped CBA and ESA aquatic features and a FEPA sub-catchment in the wider Project area, indicating that the freshwater network performs an important ecological support function at a regional scale.

7.5.4 Key Sensitivities and Buffers (Freshwater)

(e.g. wetlands, floodplains, high ecological importance rivers)

The freshwater specialist identified natural wetlands and associated buffer areas as the principal freshwater constraints within the onshore Project area. Based on field verification and ecological sensitivity assessment, the following sensitivity classes were assigned:

- High sensitivity: Natural wetlands (including channelled valley-bottom, unchannelled valley-bottom and depression wetlands), seep systems and instream dams;
- Moderate sensitivity: The recommended 32 m buffers surrounding verified natural wetlands;
- Low sensitivity: Artificial wetlands, off-channel dams and other modified aquatic features; and
- Low sensitivity: terrestrial areas where no hydromorphic soils, hydrophytic vegetation or wetland hydrology were identified.

Natural wetlands and seep systems are particularly sensitive because they perform important hydrological functions, including attenuating flood flows, maintaining groundwater–surface water interactions, improving water quality through sediment and nutrient retention, and providing habitat connectivity for freshwater-dependent flora and fauna. These systems are also susceptible to disturbance from excavation, altered drainage patterns, sedimentation, erosion and contamination during construction.

Development should preferentially be located within verified Low-sensitivity terrestrial areas wherever practicable. Where interaction with freshwater features cannot be avoided, detailed design and construction measures should be implemented to minimise impacts on hydrology, water quality and ecological function.

The following freshwater constraints should inform route refinement and detailed design:



- Avoid natural wetlands, seep systems and their associated 32 m buffers wherever practicable, particularly where alternative alignments can utilise transformed land or existing disturbed corridors.
- Minimise both the number and width of unavoidable watercourse crossings and, where required, located crossings at narrow, stable and previously disturbed sections of the drainage feature.
- Avoid locating construction camps, laydown areas, spoil stockpiles, refuelling points, concrete batching areas and other temporary works within wetlands or their buffers.
- Maintain existing surface and shallow subsurface flow pathways across all crossings ensuring that excavations or buried infrastructure do not function as a permanent drain or barriers to groundwater movement.
- Implement erosion and sediment control measures during construction, especially on approaches to valley bottoms and following intense rainfall.
- Rehabilitate disturbed wetland and buffer areas as soon as practicable following construction through appropriate soil replacement, re-establishment of natural surface profiles, revegetation with indigenous vegetation and post-construction monitoring.

7.6 Conservation and Protected Areas

The onshore Project area forms part of a conservation-significant coastal landscape within the Cape Floristic Region and the Gouritz Cluster Biosphere Reserve (see Figure 7-9). Although much of the inland landscape has been transformed by agriculture (cultivation), grazing, residential development and infrastructure, the area retains important remnants of fynbos, renosterveld, dune thicket, strandveld, seashore vegetation and wetland habitat. These remnants support threatened ecosystems, SCC and ecological linkages between the coast and inland habitats.

The DFFE Screening Tool classifies the terrestrial and aquatic biodiversity themes across parts of the onshore project area as Very High sensitivity because of terrestrial and aquatic CBAs, ESAs, natural wetlands, FEPA sub-catchments, MPAES priorities and threatened ecosystems. Within the onshore project area, there are also modified and disturbed areas that have been transformed by anthropogenic activities such as agriculture, grazing, urban expansion, transport infrastructure, sand mining and historical development.

7.6.1 Protected Areas

No national park or provincial nature reserves occur within the immediate onshore Project area in the reviewed information. The nearest national park is the Garden Route National Park ~ 80 km away.

7.6.2 Conservation and Stewardship Areas

7.6.2.1 Gouritz Cluster Biosphere Reserve

The onshore Project area falls within the Gouritz Cluster Biosphere Reserve (Figure 7-9), a UNESCO-designated biosphere reserve extending across a large portion of the southern Cape. The biosphere reserve extends across ~3.2 million ha encompasses a diverse range of terrestrial, freshwater and marine ecosystems.



Biosphere reserves are intended to demonstrate how biodiversity conservation and sustainable development can be integrated through a landscape-scale approach. The Gouritz Cluster Biosphere Reserve does not prohibit development, including infrastructure such as a gas pipeline. The Gouritz Cluster Biosphere Reserve is managed according to three complementary functions: (i) the conservation of ecosystems, species and genetic diversity; (ii) the promotion of environmentally sustainable and socially beneficial development; and (iii) the support of research, environmental education, monitoring and capacity building. The reserve facilitates landscape-scale conservation initiatives through ecological corridor establishment, restoration of degraded ecosystems, rehabilitation of rivers, wetlands and thicket vegetation, invasive alien plant management, biodiversity stewardship programmes and support to landowners for integrated fire, wildlife and natural resource management.

The Biosphere Reserve comprises core areas, buffer zones and a transition area. Core areas consist primarily of formally protected areas managed for long-term biodiversity conservation, while buffer zones provide additional protection through compatible land uses. The transition area, which includes much of the settled and agricultural landscape, accommodates sustainable economic activities provided these are undertaken in a manner that maintains ecosystem functioning, ecological connectivity and the natural character of the landscape. The onshore Project area falls within buffer and transition zones.

7.6.2.2 Gouritz Cluster–Mossel Bay Key Biodiversity Area

The broader landscape is included in the internationally recognised Gouritz Cluster–Mossel Bay Key Biodiversity Area (refer to Figure 7-12). This area covers ~1 795 km² and includes terrestrial, freshwater and marine biodiversity features. It supports globally significant biodiversity, including threatened and geographically restricted plants, birds, fish, amphibians and invertebrates. However, only ~0.5% of the area was reported as being covered by protected areas, indicating that much of its biodiversity occurs outside formally protected land.

The Gouritz Cluster–Mossel Bay Key Biodiversity Area supports numerous conservation-important taxa, including Knysna Warbler, Mossel Bay Pincushion, Hairless Conebush, Small-scale Redfin and several highly range-restricted plant species. The area's designation is not equivalent to a statutory protected-area declaration, but it confirms the biodiversity significance of the regional landscape.



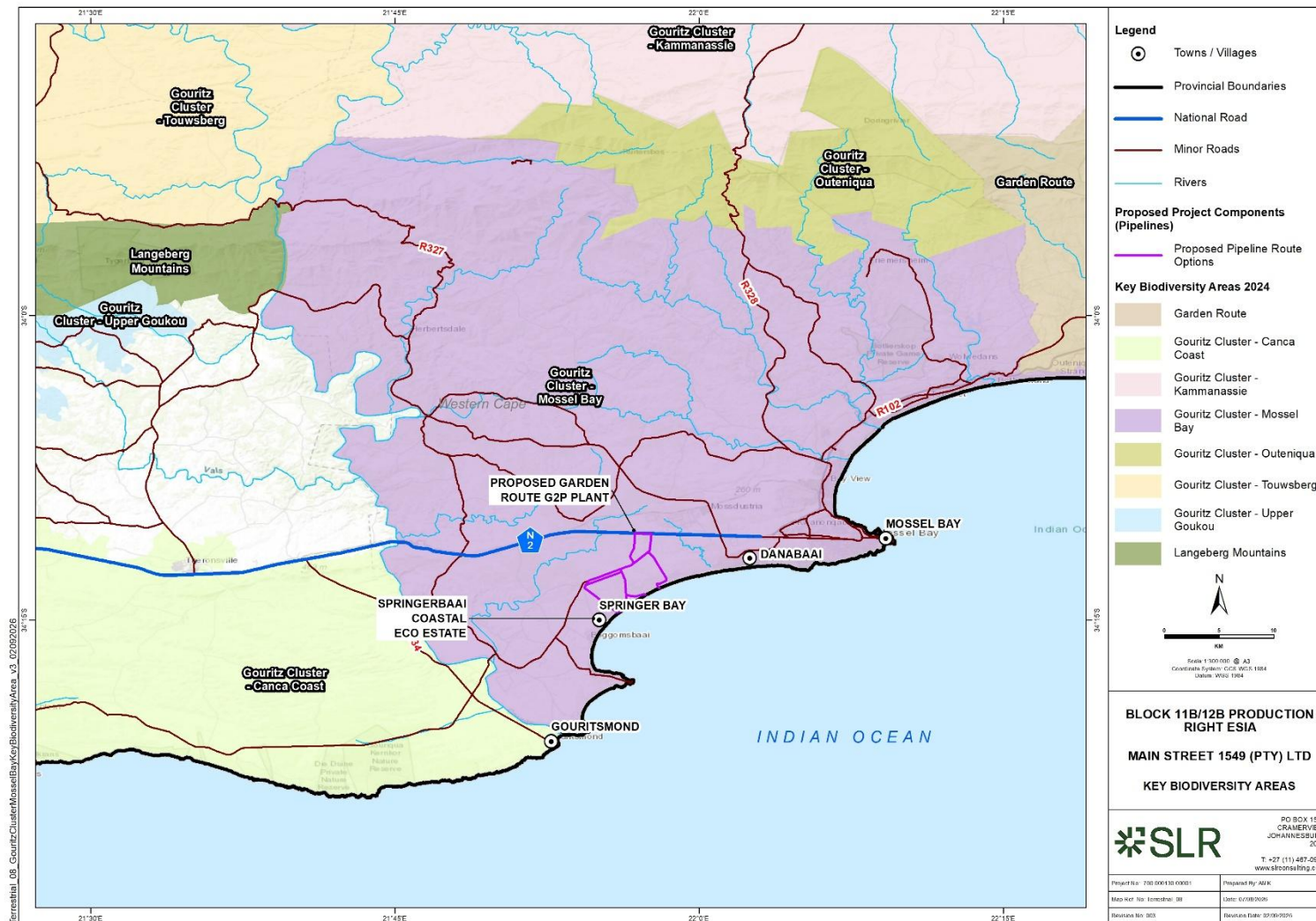


Figure 7-12: Key Biodiversity Areas in relation to the onshore project area



7.6.3 Biodiversity Priority Areas

The 2023 Western Cape Biodiversity Spatial Plan identifies biodiversity priority areas required to safeguard representative ecosystems, species, ecological processes and ecosystem services. The main relevant categories are:

- CBA 1: Areas in a natural that are required to meet biodiversity targets for species, ecosystems or ecological processes and infrastructure;
- CBA 2: Areas in a degraded or secondary condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure;
- ESA 1: Areas that are not essential for meeting biodiversity targets but play an important role in supporting the functioning of CBAs and protected areas;
- ESA 2: Areas not essential for meeting biodiversity targets but have an important role in supporting the functioning of CBAs and protected areas. These are substantially modified areas where restoration is required to recover an identified ecological-support function; and
- Other Natural Areas: Areas (natural or near-natural habitat) that have not been identified as a priority in the systematic biodiversity plan but retain most of their natural character and perform a range of biodiversity and ecological infrastructure functions. They are still an important part of the natural ecosystem.

The DFFE Screening Tool confirms the occurrence of terrestrial CBAs, CBA 2 areas, ESA 1 terrestrial areas and ESA 2 restoration areas within the broader pipeline study area. It also identifies aquatic CBAs, ESA 1 aquatic areas and a FEPA sub-catchment. These features are among the principal reasons for the Very High terrestrial and aquatic biodiversity theme sensitivities assigned to portions of the area.

Terrestrial CBAs and ESAs are associated with remnants of threatened vegetation and ecological corridors within an agricultural and increasingly developed landscape. Relevant natural habitats include:

- Critically Endangered Mossel Bay Shale Renosterveld;
- Endangered Albertinia Sand Fynbos;
- Endangered Hartenbos Dune Thicket;
- Swellendam Silcrete Fynbos;
- North Langeberg Sandstone Fynbos;
- Southwestern Strandveld;
- Cape Seashore Vegetation; and
- Natural wetlands and associated riparian or valley-bottom habitat.

Natural remnants within CBAs are important for maintaining viable populations of threatened and endemic species and for meeting ecosystem representation targets. The loss of even relatively small remnants can be significant where ecosystems have already been extensively transformed or fragmented. CBA 1 areas should, therefore, be maintained in a natural or near-natural state, and incompatible habitat loss should be avoided. CBA 2 areas should be rehabilitated or maintained in the best achievable ecological condition.

ESAs support ecological processes such as fauna movement, plant dispersal, wetland and river functioning, climate-change adaptation and connectivity between larger natural areas.



ESA1 areas should retain ecological functionality, while ESA 2 areas should, where feasible, be restored rather than subjected to further irreversible transformation.

Considering the land-use compatibility guidelines contained in the Western Cape Biodiversity Spatial Plan, linear infrastructure such as pipelines has a “restricted” compatibility rating for CBA 1, CBA 2, ESA 1, ESA 2 and Other Natural Areas. This indicates that such infrastructure has the potential to compromise the biodiversity objective of these areas and should only be considered where there is a demonstrable need, reasonable alternatives have been assessed, impacts are avoided and minimised as far as practicable, and appropriate mitigation and rehabilitation measures are implemented to maintain ecological function. In the case of the onshore project area, traversing these areas is unavoidable to connect the required infrastructure, and the impact assessment will therefore focus on route optimisation, impact avoidance where feasible, impact minimisation, and the implementation of rehabilitation measures to reduce residual impacts and maintain ecological functioning.

In practice, this means the following conditions are generally expected to be met:

- Demonstrate need and site selection by showing that the alignment has considered alternatives and avoids CBA 1 and other sensitive biodiversity features where reasonably practicable.
- Avoid sensitive features such as threatened ecosystems, wetlands, riparian areas, ecological corridors, and habitats of threatened species wherever possible.
- Minimise the development footprint, for example by co-locating the pipeline within existing or deemed to be disturbed corridors (i.e. firebreak, roads, existing servitudes or other infrastructure) where feasible.
- Limit habitat fragmentation and maintain ecological connectivity across the landscape.
- Implement appropriate mitigation and reinstatement of indigenous vegetation, erosion control and alien invasive species management during rehabilitation.
- Obtain specialist ecological input, as part of the ESIA, demonstrating that residual impacts are acceptable and that biodiversity objectives can largely be maintained.
- Comply with EA conditions and other applicable legislation.

7.6.4 Conservation-orientated Estates

In addition to formally recognised conservation areas and biodiversity priority areas, the broader Project area includes several privately managed conservation-oriented estates and stewardship initiatives. These developments integrate low-density residential land uses with the conservation of indigenous vegetation, coastal habitats and ecological processes, thereby contributing to landscape connectivity, biodiversity conservation and the maintenance of the scenic character of the southern Cape coastline. Although these areas do not constitute statutory protected areas, they form an important component of the regional conservation network and demonstrate a long-standing commitment to balancing development with environmental stewardship.

Notable examples in the vicinity of the onshore Project area include:

- Nautilus Bay Coastal Nature Reserve: The locally managed conservation property of Nautilus Bay Coastal Nature Reserve, a private low-density coastal development and conservation area west of Mossel Bay. It covers approximately 600 ha, provides access to about 9 km of relatively undeveloped coastline, and includes approximately 400 ha of fynbos traversed by walking trails. The reserve supports coastal dunes, indigenous vegetation and associated fauna and



contributes to the maintenance of a relatively continuous natural coastal landscape.

- **Springerbaai Coastal Eco Estate:** This Estate is a privately managed low-density coastal conservation development covering ~438 ha. Approximately 264 ha of the estate supports intact indigenous vegetation, including Gouritz Valley Bushveld, Hartenbos Dune Thicket and associated coastal habitats, while former cultivated areas have been rehabilitated to open grassland that supports free-roaming game.
- **Fransmanshoek Conservancy:** This Fransmanshoek Conservancy is a locally managed private conservation area situated approximately 35 km west of Mossel Bay. The conservancy encompasses a network of privately owned properties extending from Springerbaai Eco Estate eastwards to the Cape Vacca area, protecting approximately 18.5 km of largely undeveloped coastline together with adjacent inland fynbos and coastal habitats. The conservancy forms part of the Gouritz Ecological Corridor, facilitating landscape-scale ecological connectivity and supporting the conservation, rehabilitation and management of coastal vegetation, dune systems and associated fauna. Through alien vegetation control, erosion management, environmental monitoring and stewardship initiatives, the conservancy contributes significantly to maintaining the ecological integrity and wilderness character of the southern Cape coastline.

7.6.5 Conservation Sensitivity Overview

The onshore Project area is located within a region of high conservation importance, reflected by its inclusion within the Gouritz Cluster Biosphere Reserve, the Gouritz Cluster–Mossel Bay Key Biodiversity Area, and a landscape containing numerous CBAs, ESAs, threatened ecosystems and freshwater ecosystems. While the Project area does not occur within a formally protected area or the Cape Floral Region Protected Areas World Heritage Site, these regional conservation designations emphasise the importance of maintaining biodiversity, ecological connectivity and ecosystem functioning across the broader landscape.

The biodiversity priority areas identified within the study area are intended to maintain representative ecosystems, ecological corridors, threatened species habitat and ecological infrastructure. The Western Cape Biodiversity Spatial Plan assigns a “restricted” land-use compatibility rating to linear pipeline infrastructure within CBAs, ESAs and Other Natural Areas, recognising that such developments have the potential to compromise biodiversity objectives unless carefully planned and implemented.

The presence of conservation-oriented estates and stewardship initiatives, including Nautilus Bay Coastal Nature Reserve, Springerbaai Coastal Eco Estate and the Fransmanshoek Conservancy, further highlights the conservation value of the surrounding landscape and the long-standing commitment to protecting indigenous coastal ecosystems. Although these areas are not formally protected under NEM:PA, they contribute significantly to maintaining landscape connectivity, biodiversity and the scenic character of the southern Cape coastline.

Accordingly, route refinement should seek to avoid or minimise encroachment into biodiversity priority areas and sensitive habitats wherever practicable, utilise existing disturbed corridors where feasible, minimise the development footprint, and ensure that disturbed areas are rehabilitated to restore ecological function.

7.7 Cultural Heritage, Archaeology and Palaeontology

The Mossel Bay coastal landscape has a long and complex history of human occupation extending from the Early Stone Age (ESA) through the Middle and Later Stone Ages (MSA



and LSA), the period of Khoe pastoralism (i.e. traditional livestock-herding way of life practiced by the Khoe (Khoekhoe) people), and subsequent colonial and industrial development. Archaeological evidence from the wider region includes stone artefacts, occupation deposits, shell middens, caves and rock shelters, burials, historical farmsteads, transport infrastructure and shipwrecks. The area is particularly important for understanding early modern human behaviour, as demonstrated by the internationally significant archaeological sequence preserved at the Pinnacle Point Site Complex and other sites along the Mossel Bay coast.

Previous disturbance has reduced archaeological integrity in parts of the onshore Project area. However, undisturbed coastal sediments, dunes, rocky shoreline environments, historic farm werfs and areas containing deep or soft soils retain the potential to preserve archaeological deposits, shell middens, unmarked graves and fossils.

The DFFE Screening Tool identified the development area as having Very High sensitivity for cultural heritage and archaeology and High sensitivity for palaeontology. The SSVR disputes the cultural-heritage and palaeontological ratings and confirms the following Project-specific sensitivities:

- Cultural landscape: Medium sensitivity;
- Archaeology: Very High sensitivity, driven principally by the concentration of archaeological sites along the coastline; and
- Palaeontology: Low overall sensitivity, notwithstanding local geological units that may have moderate or higher fossil potential.

7.7.1 Archaeological Resources

The archaeological record of the Mossel Bay region extends across several periods of occupation. ESA material may include hammerstones, cores, flakes, hand axes, cleavers and other stone tools. MSA sites may contain stone artefacts together with cultural and food remains, particularly where deposits occur in caves or rock shelters. LSA and pastoralist sites may include stone tools, pottery, animal remains, occupation deposits, shell middens and human burials. Colonial-period resources may include farmsteads, ruins, agricultural structures, roads, railway infrastructure, cemeteries and isolated graves. Pre-colonial burials, generally of LSA or more recent age, may occur wherever suitable soft sediments are present, including within or near former occupation sites and shell middens.

The 2026 field survey found that Stone Age material is sparse inland and is frequently most visible in disturbed contexts, including jeep tracks and boundary lines. Sandy soils and dense vegetation may conceal additional material. Large portions of the inland study area comprise tilled agricultural fields, while other sections follow existing road reserves, cutlines or previously disturbed infrastructure corridors. The likelihood of encountering significant, intact archaeological resources within these disturbed inland contexts is therefore relatively low.

Higher concentrations of archaeological material occur along the coastline, particularly where erosion has exposed compact red palaeosols beneath younger dune sands. These resources include quartzite and silcrete artefact scatters, possible activity areas and shell middens containing varying combinations of limpet and mussel shells, lithic artefacts, charcoal and faunal remains. Although no human remains were encountered during the 2026 survey, Holocene shell middens elsewhere in South Africa have been found in association with human burials. Buried archaeological resources and unmarked graves could therefore be present within the coastal dunes and other soft sediments.

Previously recorded coastal sites confirm the archaeological sensitivity of the area. The Nautilus Bay sites NB1 to NB22 (Figure 7-13) include Stone Age artefact scatters, shell



middens, a burial, historical buildings and farm werfs. Several are recorded as Grade IIIB heritage resources. The NABA1 and NABA2 shell middens, located near the Option 3 corridor, contain dense shell assemblages together with charcoal, ash, lithic material and faunal remains. NABA1 is approximately 20 m from the Option 3 corridor and NABA2 approximately 40 m away. Under the current corridor layout, direct impacts on these two sites are not anticipated.

Conservation-worthy resources identified in these areas occur outside the proposed inland pipeline corridors. No direct impact is anticipated, provided that the mapped no-development buffers are maintained and any future route adjustments avoid the identified resources. Conservation-worthy inland resources (refer to Figure 7-14) include the following:

- OBS 3, OBS 8, OBS 9 and OBS 11: Historical agricultural structures recommended for Grade IIIC protection. A 50 m no-development buffer is required around each site.
- OBS 4: A formalised burial site containing at least seven graves, including historical graves and two older graves without headstones. The site lies approximately 400 m south of the Option 1 and Option 2 corridors. A 50 m no-development buffer is required.
- OBS 16 – Doornfontein/Klipfontein werf: A historical werf with associated graves, recommended as a Grade IIIA resource. It is approximately 150 m south of the Option 1 corridor and approximately 100 m west of the Option 2 corridor. The current corridors avoid its localised protective buffer, and no direct impact is anticipated.

These findings supersede the earlier characterisation of the relevant historic werf as “Duinzicht” and the earlier reference to a two-grave cemetery. The current assessment identifies the relevant werf as Doornfontein/Klipfontein, OBS 16, while the newly surveyed burial site is OBS 4, containing at least seven graves.

Other historical sites identified during a separate assessment include farm cottages and the Patrysfontein farmhouse. The closest of those separately assessed resources is Site 012, a Grade IIIC farm cottage approximately 2 km east of Options 1, 2 and 3. These resources are not expected to be directly affected by the proposed pipeline corridors.



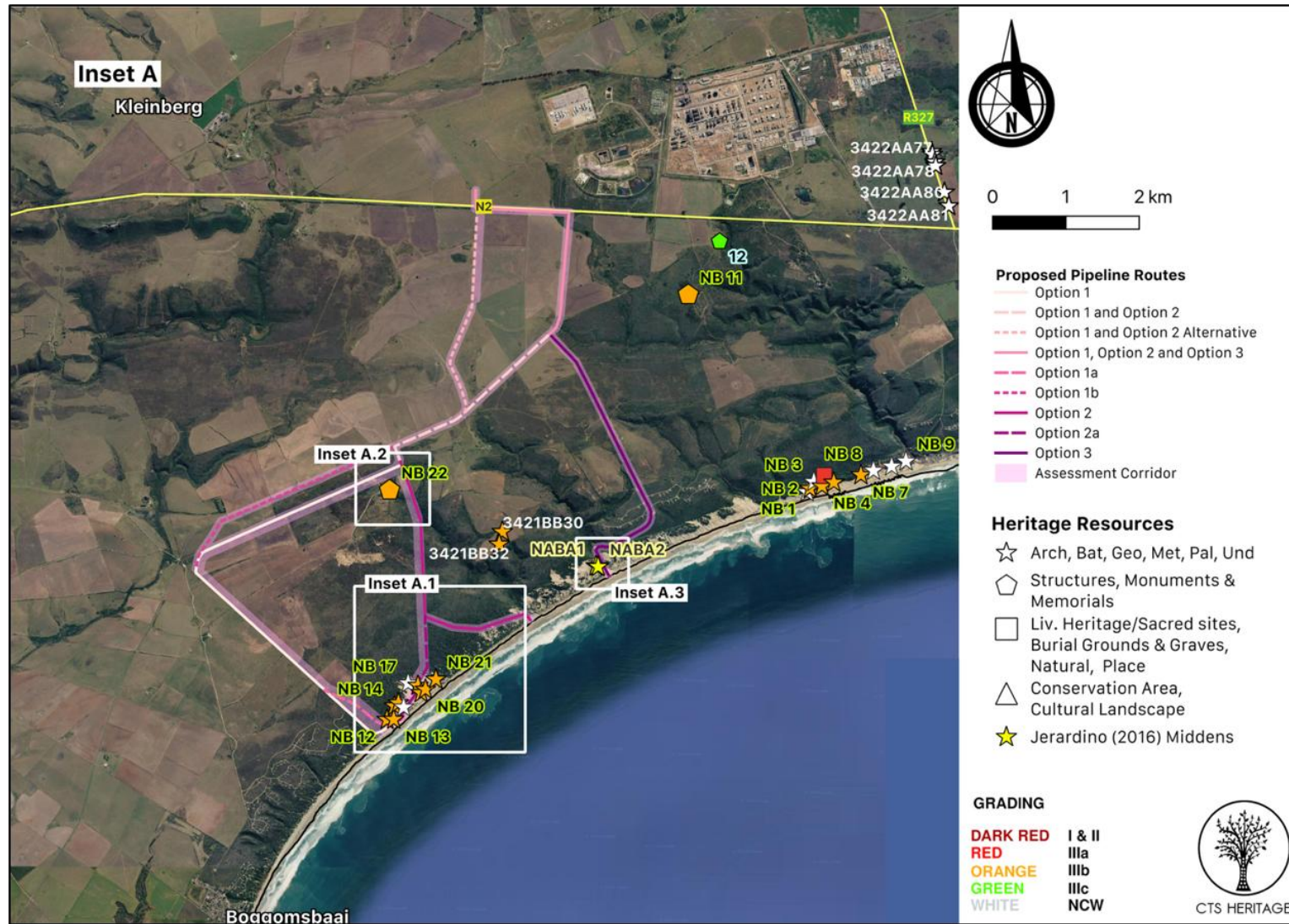


Figure 7-13: Heritage Resources Previously identified in and near the onshore project area



The coastal landfall areas associated with Option 1, Option 1a and Option 2a are substantially more constrained. Nine conservation-worthy sites recorded during the 2026 survey occur within these corridors:

- Option 1: OBS 28;
- Option 1a: OBS 30; and
- Option 2a: OBS 31, OBS 32, OBS 33, OBS 46, OBS 47, OBS 48 and OBS 49.

The affected sites include shell middens, MSA lithic scatters, possible occupation or activity areas, and deposits retaining potentially intact archaeological stratigraphy. OBS 32 is interpreted as a possible Stone Age activity or campsite area on a palaeosol, while OBS 46 comprises particularly dense limpet-shell deposits. All nine sites have been recommended for Grade IIIC protection.

Three previously recorded Grade IIIB sites also occur within the coastal corridors:

- NB12 and NB13: Within the Option 1a corridor; and
- NB18: Within the Option 2a corridor.

A further five Grade IIIB sites recorded by Kaplan occur close to Option 2a:

- NB14 – approximately 46 m from the corridor;
- NB15 – approximately 18 m from the corridor;
- NB19 – approximately 25 m from the corridor;
- NB20 – approximately 65 m from the corridor; and
- NB21 – approximately 130 m from the corridor.

OBS 38, a Grade IIIC shell midden, occurs approximately 20 m from Option 2. No direct impact on OBS 38 is anticipated under the current alignment. Nevertheless, its proximity to the corridor further demonstrates the density of archaeological material within the coastal zone.

The proposed onshore project area is approximately 10 km west of the Pinnacle Point Site Complex, which forms part of the UNESCO-listed Emergence of Modern Human Behaviour: The Pleistocene Occupation Sites of South Africa. The complex preserves globally important evidence of MSA occupation, coastal-resource exploitation, ochre use and technological innovation. Owing to the separation distance, the heritage SSVR considered direct effects on the Outstanding Universal Value of the World Heritage Site unlikely. Nevertheless, the presence of this internationally significant archaeological resource reinforces the exceptional heritage value of the broader southern Cape coastal landscape and its sensitivity to archaeological disturbance.

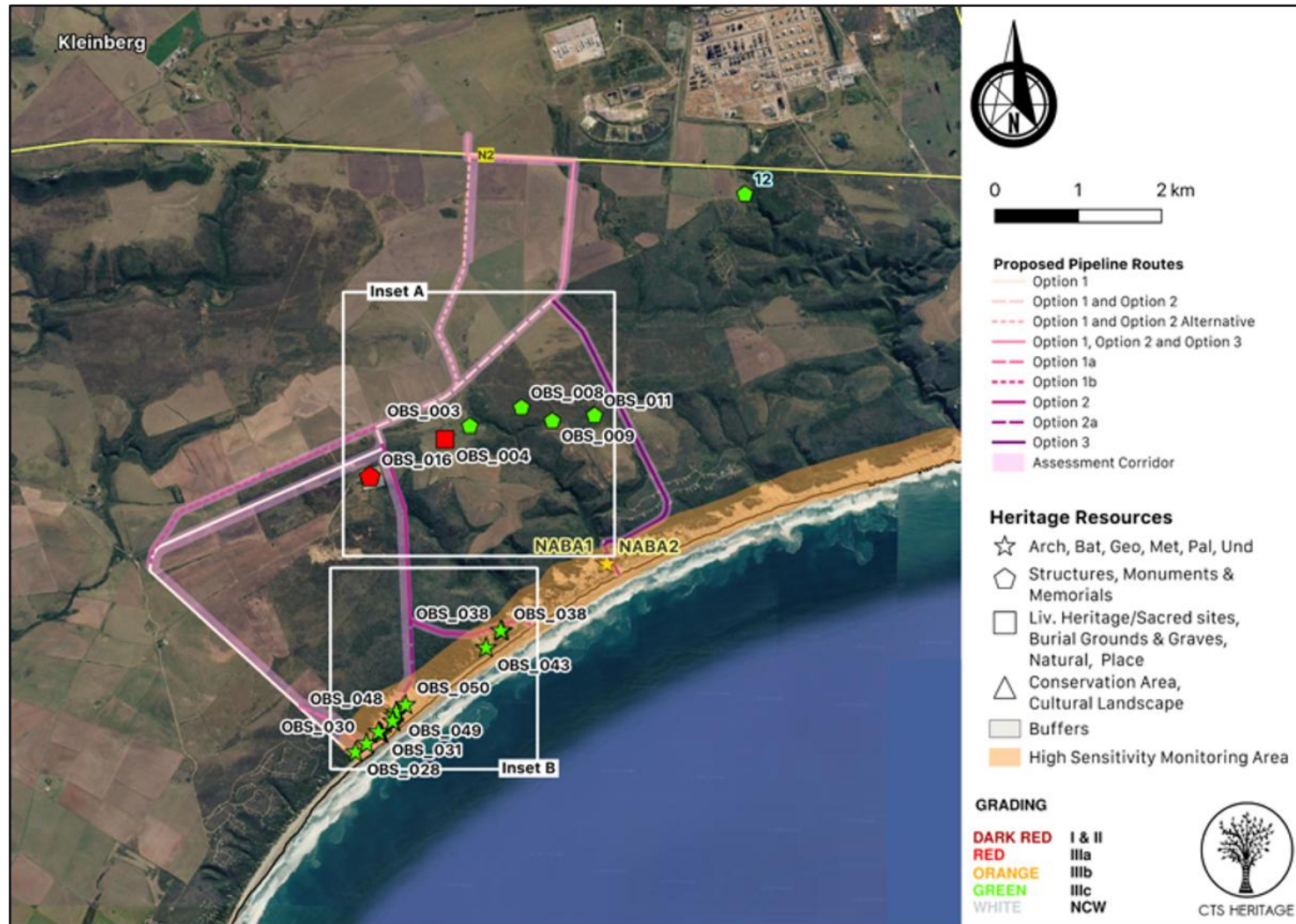


Figure 7-14: Map of all conservation-worthy sites noted during heritage specialist fieldwork



7.7.2 Palaeontological Sensitivity

Palaeontological sensitivity varies substantially across the study area according to the underlying geological formation. The SAHRIS Palaeosensitivity Map indicates that much of the onshore Project area is underlain by formations of Low or Insignificant palaeontological sensitivity, although portions of the pipeline intersect formations mapped as Moderate, High or Very High palaeontological sensitivity (refer to Figure 7-15).

The geological units identified within the wider Project area include formations of the Table Mountain Group and Nardouw Subgroup, together with the Bokkeveld Group, Grahamstown Formation, Wankoe Formation, Quaternary Strandveld Formation, Enon-type deposits, marine and estuarine terrace gravels, calcareous sands, loams and sandy loams.

The relevant palaeontological characteristics are summarised below:

- Skurweberg Formation: This formation has Low palaeontological sensitivity. It has not yielded body fossils, although trace fossils such as burrows and arthropod trackways may occur in finer-grained intervals. Fossil preservation is limited by the resistant quartzitic lithology, deformation, jointing and deep weathering.
- Baviaanskloof Formation: This formation has substantial scientific importance because it may preserve Devonian marine invertebrates and some of South Africa's earliest terrestrial plant remains. Although mapped sensitivity varies between datasets, the specialist review describes the formation as having Very High intrinsic palaeontological sensitivity.
- Rietvlei Formation: This formation is mapped as having High palaeontological sensitivity in the SAHRIS Palaeosensitivity Map.
- Wankoe Formation: This Plio-Pleistocene unit comprises ancient calcretised dune deposits. It is mapped as having unknown sensitivity in SAHRIS and Moderate sensitivity in portions of the DFFE Screening Tool output. Fossil material is not expected to be abundant, although isolated remains may occur.
- De Hoopvlei Formation: This marine conglomeratic unit may preserve oyster shells, shell moulds and other marine fossil material. Comparable high-elevation outcrops have been assigned Moderate sensitivity.
- Strandveld Formation: These coastal dune deposits may contain terrestrial gastropods, shell material, calcified roots and stems, and evidence of human activity. The SAHRIS mapping identifies its sensitivity as unknown rather than confirming it as Very High.
- Enon Formation: Coarse fluvial and alluvial conglomerates and sandstones are generally unfavourable for fossil preservation, although isolated silicified or charcoallified wood and rare bone fragments may occur. The specialist review regards the formation within the Project area as having Moderate sensitivity.
- Quaternary and other Cenozoic deposits: Alluvium, loam and sandy loam generally have Low sensitivity, although isolated trace fossils, plant impressions or terrestrial vertebrate remains may occur.

No significant in-situ fossil material is anticipated across most of the onshore project area. However, the sensitivity of individual excavations will depend on their precise location, depth, extent and the geological unit encountered.



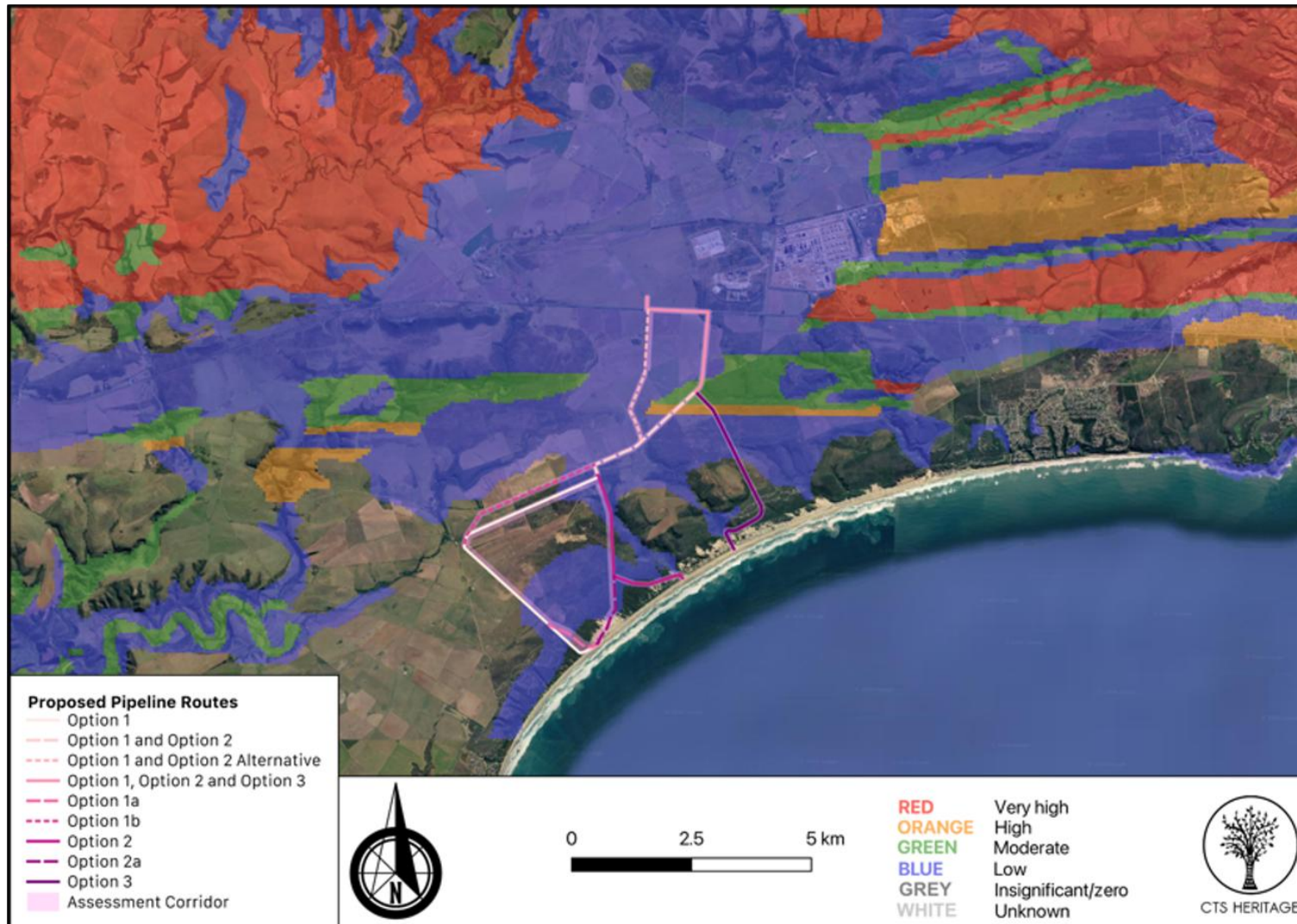


Figure 7-15: SAHRIS Palaeosensitivity Map indicating fossil sensitivity in the onshore project area



7.7.3 Intangible Cultural Heritage

The wider Mossel Bay landscape has intangible heritage associations derived from indigenous occupation, pastoralism, maritime exploration, colonial settlement, farming and the continuing cultural use of the coast. Before and during colonial settlement, the Garden Route was occupied by Khoer herders and San hunter-gatherers whose livelihoods, movement patterns and cultural practices were closely connected to coastal resources, grazing land, freshwater sources, forests and seasonal mobility. Archaeological evidence from shell middens, caves, occupation deposits and artefact scatters provides tangible expression of these longer-term cultural relationships.

Mossel Bay also has strong associations with early maritime contact. Bartolomeu Dias (a Portuguese navigator and explorer) landed on the coast in 1488, while Vasco da Gama (also Portuguese explorer) visited in 1497 and reportedly traded cattle with local Khoer people. Historical names for Mossel Bay, including Angra dos Vaqueiros, Aguada de São Brás and Golfo dos Vaqueiros, reflect its associations with indigenous herders, freshwater replenishment and European maritime navigation. These events form part of the broader historical identity and collective memory of the Mossel Bay region.

The agricultural landscape has additional intangible associations with family farming histories, farm names, movement routes, traditional land use and burial practices. Historic farm werfs such as Duinzicht and Patrysfontein may have social significance extending beyond their surviving buildings through their relationships with former residents, descendants, farm workers and neighbouring communities. Family cemeteries and isolated graves are especially sensitive because they may remain places of remembrance and customary practice.

As noted in Section 7.6.2.1, the onshore Project area also falls within the Gouritz Cluster Biosphere Reserve, a landscape recognised for the interconnected relationship between people, biodiversity and land use. Its location within the broader biosphere landscape gives regional context to the area's combined natural and cultural values.

The broader cultural landscape is assigned Medium sensitivity, principally because of its agricultural and settler history.

7.7.4 Key Sensitivities and Heritage Constraints

The principal heritage sensitivities and constraints are as follows:

- Very High archaeological sensitivity in the coastal zone: The coastline contains a high density of shell middens, MSA and LSA artefact scatters, possible activity areas and potentially intact deposits associated with coastal dunes and exposed red palaeosols.
- Resources within Option 1: OBS 28 occurs within the corridor.
- Resources within Option 1a: OBS 30 and Grade IIIB sites NB12 and NB13 occur within the corridor.
- Resources within Option 2a: OBS 31, OBS 32, OBS 33, OBS 46, OBS 47, OBS 48, OBS 49 and Grade IIIB site NB18 occur within the corridor. Other Grade IIIB sites lie between approximately 18 m and 130 m from the corridor. Option 2a is therefore particularly constrained from an archaeological perspective.
- Sites close to Options 2 and 3: OBS 38 lies approximately 20 m from Option 2, while NABA1 and NABA2 lie approximately 20 m and 40 m, respectively, from Option 3.



- Coastal Monitoring Brief: All ground-disturbing construction within the mapped sensitive coastal zone must be archaeologically monitored, irrespective of the selected corridor.
- Historical werfs and structures: OBS 3, OBS 8, OBS 9 and OBS 11 require 50 m no-development buffers. OBS 16, the Doornfontein/Klipfontein werf and associated graves, requires the mapped localised buffer.
- Burial grounds: OBS 4, containing at least seven graves, requires a 50 m no-development buffer. Known and possible unmarked graves must not be disturbed without the necessary statutory processes and approvals.
- Pinnacle Point World Heritage context: The proposed onshore development is approximately 10 km west of the Pinnacle Point Site Complex. Direct effects on the World Heritage property are not anticipated, but its proximity reinforces the exceptional archaeological significance of the surrounding coastal landscape.
- Variable palaeontological sensitivity: Most of the development footprint has Low fossil sensitivity, but the Baviaanskloof, Rietvlei, De Hoopvlei, Wankoe and Enon formations may require closer consideration where intersected by deeper excavations.

Previously disturbed inland corridors: Tilled fields, roads, cutlines and existing infrastructure servitudes have generally reduced archaeological integrity. The inland corridors are consequently considered acceptable, provided that existing buffers are maintained during final design and any future alignment changes. Overall, the coastal portion of the study area represents the highest archaeological constraint owing to the potential occurrence of shell middens, occupation sites, artefact scatters, human burials and other heritage resources associated with prehistoric and historic occupation of the southern Cape coastline. Inland heritage sensitivity is generally lower where landscapes have been transformed by agriculture and existing infrastructure, although isolated archaeological resources, historic farmsteads, graves and palaeontological sensitive geological formations remain important constraints. Collectively, these heritage resources contribute to the cultural significance of the wider landscape and require careful consideration during route selection, detailed design and construction planning.

To minimise potential impacts on heritage resources, the final pipeline alignment should avoid known archaeological sites, graves, cemeteries, historic structures older than 60 years and areas of High or Very High palaeontological sensitivity wherever practicable. Route refinement should preferentially utilise existing disturbed corridors where these provide a lower-risk alternative and do not introduce additional environmental impacts.

Furthermore, construction activities must be subject to archaeological, fossil and burial Chance Finds Procedures.

7.8 Socio-Economic Environment

The following section provides a socio-economic overview of the regional (secondary) study area and the local (primary) study area. Where necessary, data is also provided on a national scale to put findings into context.

7.8.1 Secondary Study Area

The onshore Project area is located within Mossel Bay Local Municipality (LM) which lies within the sparsely populated Garden Route District Municipality (GRDM) in the Western Cape Province (refer to Figure 7-1). The GRDM is made up of seven local municipalities and shares a border with the Eastern Cape and Northern Cape Provinces. The district covers an area of approximately 23 331 km² and represents about 18% of Western Cape's total land



area. GRDM benefits from its strategic location along the key national corridors, including the N2 linking Cape Town and Durban (Garden Route District Municipality, 2022). For the purpose of this study the GRDM is considered the secondary study area, where indirect or unanticipated impacts may occur.

7.8.2 Primary Study Area

The primary study area is the area where it is anticipated most of the direct socio-economic impacts are likely to occur. Given the location of the onshore Project area, for the purposes of this socio-economic baseline the primary study areas have been defined as the Mossel Bay LM and the George LM. Given the locality of the onshore Project area within the local municipality there is a specific focus on the coastal towns of Mossel Bay, Herbertsdale, Wilderness and Victoria Bay. This is the area where it is anticipated that the most direct social impacts may occur, potentially including negative social impacts associated with the presence of construction workers, the influx of job seekers and increased pressure on existing services and infrastructure.

7.8.2.1 George Local Municipality

George LM is one of the seven local municipalities making up GRDM. The municipality accounts for 35% population of the GRDM and is the economic and administrative centre of the district. The land area covers 22% of the GRDM and 4% of the province. There are two main coastal towns within the municipality, namely Wilderness and Victoria Bay, with Wilderness being the largest. The onshore Project area is located ~90 km west from both towns (George LM, 2025).

7.8.2.2 Mossel Bay Local Municipality

Mossel Bay LM is one of the seven local municipalities making up GRDM. The municipality accounts for 16% population of the GRDM. The land area covers 9% of the GRDM and 1% of the province. The two main towns within the municipality are Mossel Bay and Herbertsdale, with Mossel Bay being the largest, with the onshore Project area located approximately 30 km west of Mossel Bay (Mossel Bay LM, 2026).

7.8.3 Demographic Profile

The GRDM is the third largest district in the Western Cape Province and accounts for 11% of the provincial population (GRDM, 2025). Between 2011 and 2022, the population of GRDM increased by 46% from 574 265 to 838 457 people equating to an annual increase of 3.5% per annum. During the same period the provincial population increased by 27.7% from 5 822 734 in 2011 to 7 433 020 in 2022 equating to an annual increase of 2.2%, indicating a higher level of growth within the GRDM than the province as a whole (StatsSA, 2022).

The population of George LM increased by 52.3% from 193 672 people in 2011 to 294 929 people in 2022, representing an annual growth rate of 3.9%. Similarly, the population of Mossel Bay increased from 89 430 in 2011 to 140 075 in 2022, equating to a 4.2% growth annually. The annual population growth in both local municipalities was higher than that experienced within the district municipality and the Western Cape Province. The population breakdown for each local municipality and the district is provided in Figure 7-16.



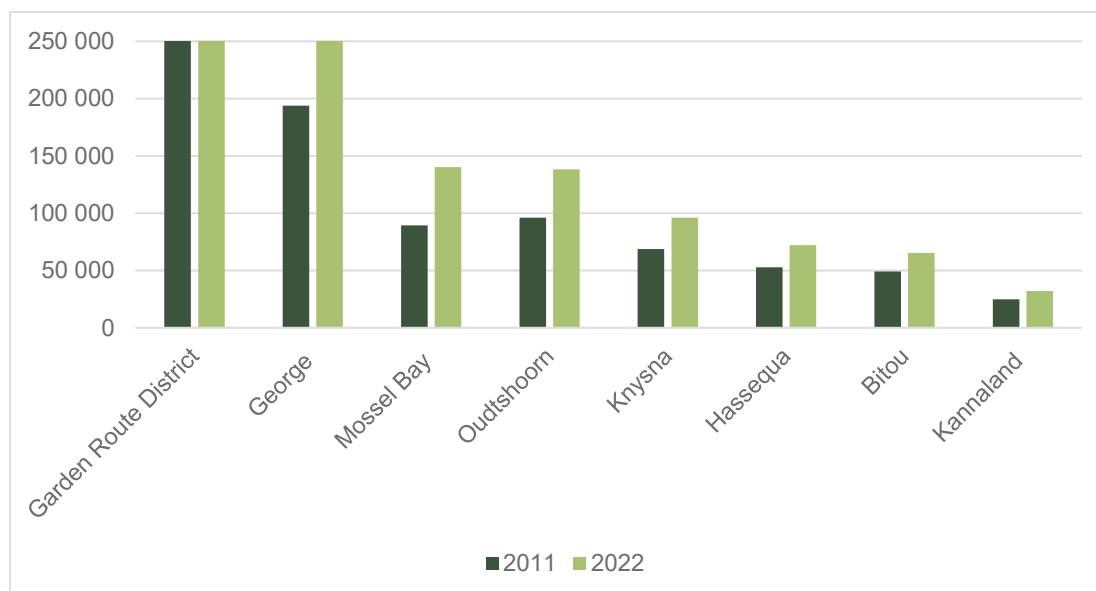


Figure 7-16: Garden Route District Municipality and its Local Municipalities: 2011 and 2022

Source: (StatsSA, 2022)

The age structure within the George LM and Mossel Bay LM is similar. Both local municipalities have a relatively young population, with 22.9% of the population in the George LM and 18% in the Mossel Bay under the age of 15. The proportion of the population aged between 15 and 34 is higher within George LM, accounting for 33.8% whereas Mossel Bay has a lower proportion of 22.6% in the same age bracket. The LMs have a similar portion of the population aged between 35 and 64, with 39.4% in George LM and 38.1% in Mossel Bay LM. George LM has a lower proportion of the population aged over 65 (8.2%) compared to Mossel Bay (15.4%) (StatsSA, 2022).

The sex composition of the population is broadly similar across the two municipalities. In George LM, males and females constitute 49.2% and 50.8% of the population, respectively. Similarly, in Mossel Bay LM, males account for 48.3% of the population, while females comprise 51.7% (StatsSA, 2022). These figures indicate a slight predominance of females in both local municipalities. The age and sex breakdown for both local municipalities are presented in Figure 7-17 (George LM) and Figure 7-18 (Mossel Bay LM).



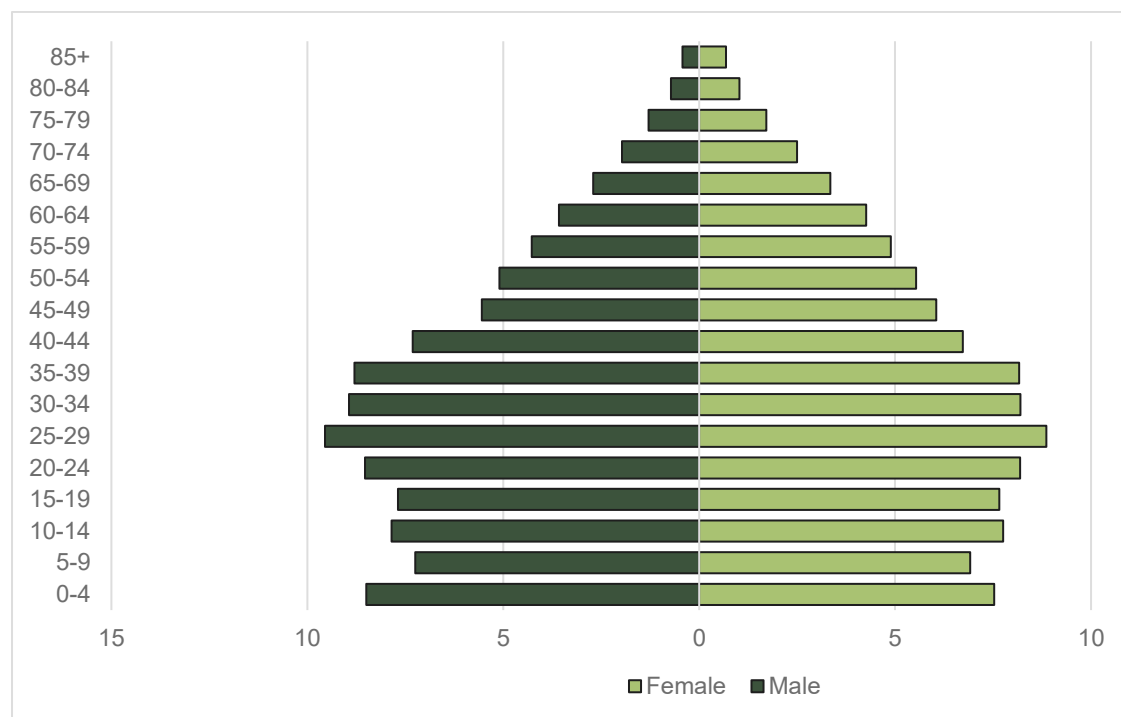


Figure 7-17: Age and sex breakdown of George LM

Source: (StatsSA, 2022)

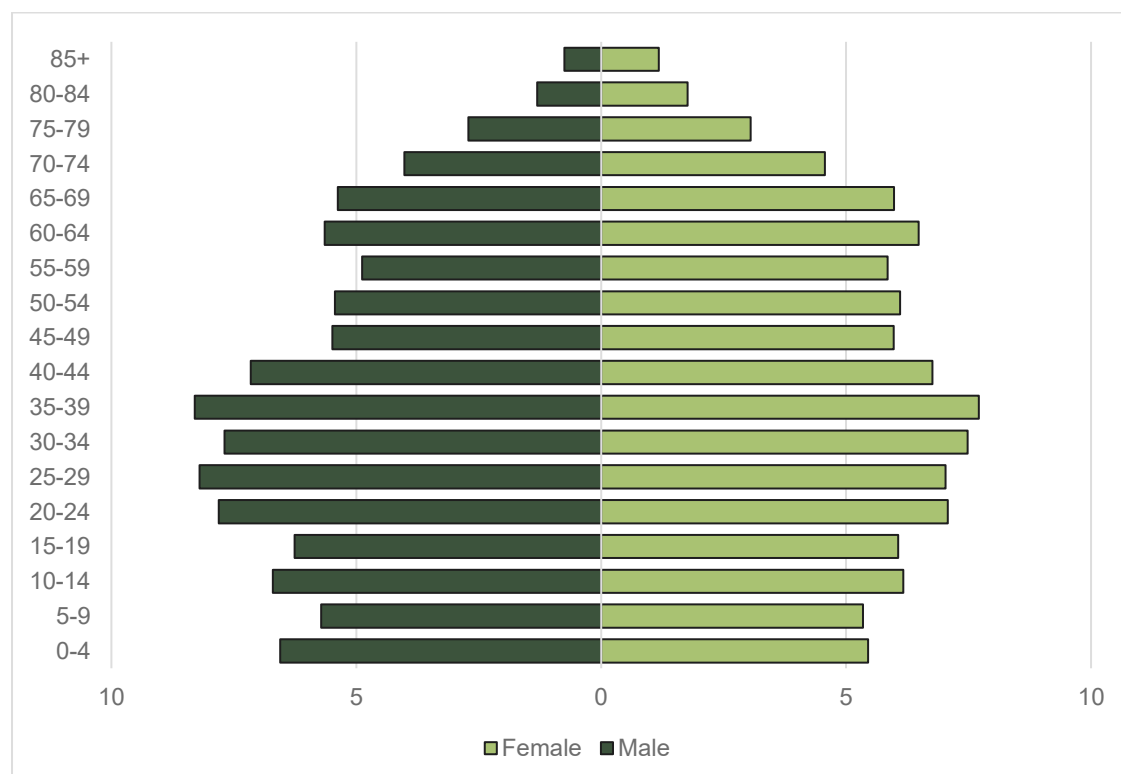


Figure 7-18: Age and sex breakdown Mossel Bay LM

Source: (StatsSA, 2022)

The population density in George LM is estimated at 46.3 people / km², which is higher than that of the GRDM, which has a population density of 29.1 people / km², and lower than the



population density for the Western Cape Province as a whole (57.4 people / km²). The population density with the Mossel Bay LM is higher than that of the George LM and GRDM with 53.0 people / km², but is similar to the provincial average. As a means of comparison, the population density for the for the country as a whole is approximately 54 people / km², highlighting the high density of settlement and urban nature of the study areas and the Western Cape province as a whole (MERO, 2025).

The population in the George LM comprises of 44.4% Coloureds, 35.0% Black Africans and 18.4% Whites. Comparatively, in Mossel Bay LM, the Coloured population accounting for 34.5%, followed by the White population with 34.1% and Black African with 27.4%. The racial composition for George LM is similar to the GRDM and the Western Cape Province, but Mossel Bay LM is different where the White population are the second largest population group followed by the Black African group. The racial composition across the study area is illustrated in Table 7-1.

Table 7-1: Racial composition in the George LM, Mossel Bay LM, GRDM and Province⁵⁷

Population Group	George LM	Mossel Bay LM	GRDM	Western Cape Province
Black African	35.0%	29.4%	27.8%	38.8%
Coloured	44.4%	34.5%	49.7%	42.1%
White	18.4%	34.1%	19.6%	16.5%
Indian/ Asian	0.4%	0.3%	0.3%	1.1%
Other	1.8%	1.7%	2.5%	1.6%

Source: (StatsSA, 2022)

7.8.4 Education

Education levels in the George LM are marginally better than those in the GRDM and Western Cape Province with 36.9% of the population having completed a matric compared with 35.5% in the DM and 33.4% in the Western Cape Province. Within the Mossel Bay LM education levels are slightly lower at 30.7% of the population having completed matric. A notably higher proportion (6.6%) reported having no formal education in the Mossel Bay LM, compared with 2.4% in the George LM and GRDM as well as 2.3% in the Western Cape (StatsSA, 2022).

The percentage of the population over the age of 20 with tertiary education was similar in the George LM (13.9%) to the GRDM as a whole (13.7%). However, in the Mossel Bay LM, the population reported to have some form of tertiary education was notably lower at 7.1%. Throughout the study area levels were reported to be lower than the provincial average of 17.6% (Stats SA, 2022)

A breakdown of the highest level of education for the population over the age of 20 is provided in Figure 7-19.

⁵⁷ Note: Percentages may not add up to 100 due to rounding off.



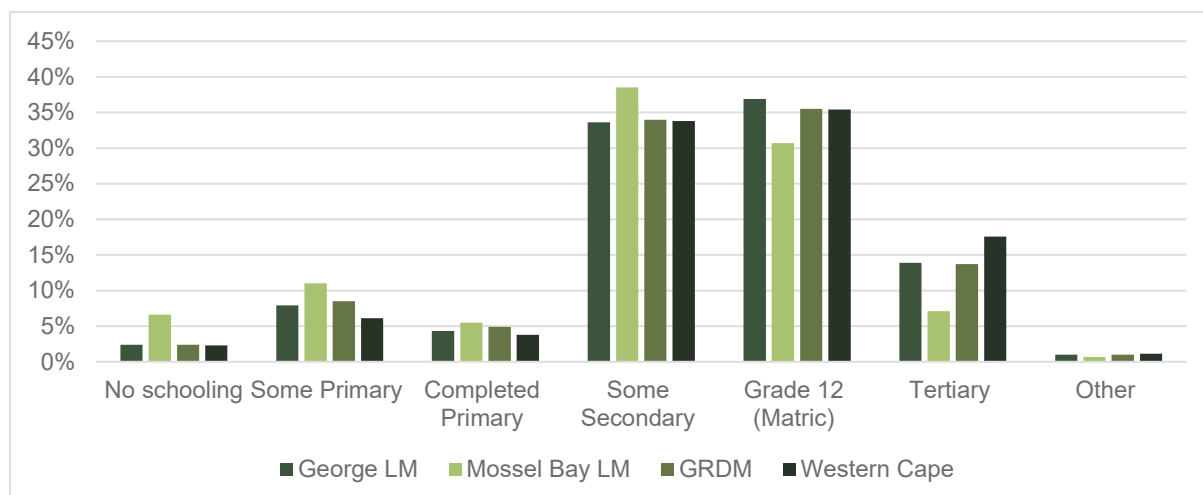


Figure 7-19: Highest level of education population over the age of 20

Source: (StatsSA, 2022)

7.8.5 Livelihoods

7.8.5.1 Household income

Household income in George LM and Mossel Bay LM is distributed across a wide range of income brackets, although a relatively large proportion of households fall within the lower-income categories. In 2011, the average annual household income in both George LM and Mossel Bay LM was approximately R28 900. This was substantially lower than the GRDM average of R57 300, while the provincial average was broadly comparable to that of the two local municipalities (StatsSA, 2011).

At the time of the 2011 Census, 14.2% of households in the Western Cape reported having no income. By comparison, the proportion of households reporting no income was lower in the GRDM and George LM, at 12.3% and 11.1% respectively, but higher in Mossel Bay LM at 17.4% (StatsSA, 2011).

Although these figures are based on the 2011 Census and are, therefore, likely to have changed in nominal terms, they remain useful as an indication of the underlying income profile of the area. Given the reported decline in Human Development Index (HDI) levels over time and only limited improvements in poverty levels, it is likely that relatively low household income levels have remained a key socio-economic characteristic of the study area in real terms. A breakdown in household income levels is provided in Table 7-2.

Table 7-2: Annual household income distribution⁵⁸

Administrative Area	None	Under R 4 800	R 4 801 – R 9 600	R 9 601 – R 19 200	R 19 201 – R 38 400	R 38 401 – R 76 800	R 76 801 – R 153 600	Over R 153 601	Over R 307 201
George LM	11.1%	2.6%	4.4%	12.2%	19.4%	14.3%	12.7%	16.3%	7.5%
Mossel Bay LM	17.4%	3.8%	4.1%	12.5%	17.3%	14.4%	11.2%	14.6%	4.1%
GRDM	12.3%	2.1%	4.2%	14.3%	15.5%	19.7%	14.6%	18.1%	8.2%

⁵⁸ Note: Percentages may not add up to 100 due to rounding off.



Administrative Area	None	Under R 4 800	R 4 801 – R 9 600	R 9 601 – R 19 600	R 19 601 – R 38 200	R 38 201 – R 76 400	R 76 401 – R 153 800	Over R 153 801	Over R 307 601
Western Cape	14.2%	2.0%	3.7%	11.4%	18.7%	16.3%	13.0%	16.8%	3.3%

Source: (StatsSA, 2011).

7.8.5.2 Income inequality

The Gini coefficient, a measure of income inequality from 0 (perfect income equality) to 1 (perfect income inequality), was reported to be 0.548 within the George LM and 0.551 within the Mossel Bay LM in 2024 (i.e. high levels of income inequality). This is largely similar to that of the GRDM and lower than Western Cape Province, where it was reported to be 0.545 and 0.595, respectively. Throughout the study area, these figures indicate elevated levels of income inequality throughout the study area, with the World Bank defining a Gini coefficient above 0.4 as indicating high levels of inequality (Haddad, et al., 2024). It should, however, be noted that the Gini coefficient has declined consistently between 2014 and 2024, indicating improvements in income equality within the Goerge LM, Mossel Bay LM, GRDM and the Western Cape. (MERO, 2025). An indication of trends in the Gini coefficient between 2014 and 2024 is provided in Figure 7-20.

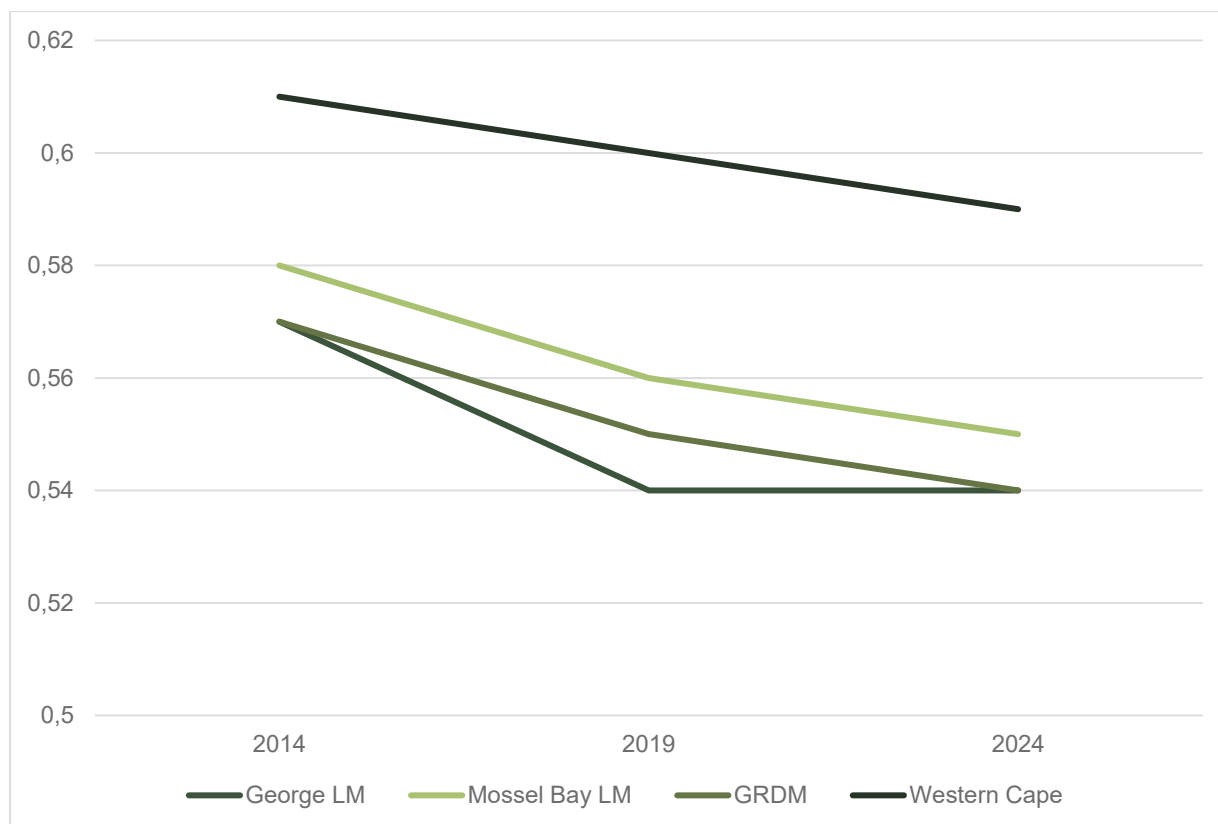


Figure 7-20: Gini coefficient 2014-2024

Source: (MERO, 2025)



7.8.6 Infrastructure and Services

7.8.6.1 Housing

In 2011, 83.9% of households in the George LM and 85.9% of households in the Mossel Bay LM resided in formal dwellings (StatsSA, 2023). In 2022, the proportion of the households residing in formal dwelling increased in both the George LM and Mossel Bay LM to 87.3% and 92.5% respectively, a trend that was also observed in the GRDM and Western Cape Province. During the same period, there was also a decline in the proportion of households reported to be residing in informal dwellings, with a decrease from 14.5% to 11.6% in the George LM and 12.3% to 5.8% in the Mossel Bay LM (StatsSA, 2023). A breakdown of different dwelling types is provided in Table 7-3.

Table 7-3: Access to formal housing⁵⁹

Administrative Area	2011				2022			
	Formal	Trad.	Informal	Other	Formal	Trad.	Informal	Other
George LM	83.9%	0.6%	14.5%	1.0%	87.3%	0.9%	11.6%	0.2%
Mossel Bay LM	85.9%	0.6%	12.3%	1.2%	92.5%	1.5%	5.8%	0.3%
GRDM	83.8%	0.7%	14.4%	1.2%	89.0%	1.2%	9.6%	0.2%
Western Cape Province	80.4%	0.5%	18.2%	1.0%	88.0%	0.7%	11.1%	0.3%

Source: (StatsSA, 2023).

7.8.6.2 Electricity

Within the George LM, 95.5% of households, and within the Mossel Bay LM, 98.2% of households, had access to electricity for lighting in 2022. This represented an improvement within both municipalities since 2011, when 91.0% of households in George LM and 93.8% of households in Mossel Bay LM reported having electricity for lighting (StatsSA, 2023).

Overall access was marginally lower for George LM and better for the Mossel Bay LM than that of the GRDM and Western Cape Province as a whole, where in 2022, 95.9% and 96.5% of households respectively reported access to electricity for lighting (StatsSA, 2023). The different sources of energy used for lighting in 2022 are provided in Table 7-4.

Table 7-4: Source of electricity for lighting⁶⁰

Administrative Area	Elec from mains	Gas	Paraffin	Candles	Other source of elec ⁶¹ .	None
George LM	95.5%	0.2%	1.2%	2.0%	0.8%	0.3%
Mossel Bay LM	98.2%	0.2%	0.3%	0.6%	0.6%	0.1%
GRDM	95.9%	0.2%	0.7%	1.9%	1.0%	0.3%
Western Cape Province	96.5%	0.4%	1.1%	1.4%	0.5%	0.1%

Source: (StatsSA, 2023)

⁵⁹ Note: percentages may not add up to 100 due to rounding off.

⁶⁰ Note: percentages may not add up to 100 due to rounding off.

⁶¹ Other sources of electricity include generators, solar, etc.



7.8.6.3 Water

Access to piped water inside a dwelling or yard was better within the George LM (94.3%) and Mossel Bay LM (95.1%) than in the GRDM (93.7%) and the Western Cape Province (80.2%). The proportion of the population reporting no access to piped water was 0.5% in the George LM and 0.6% of the population in the Mossel Bay LM, compared to 0.6% in the GRDM and 0.9% in the Western Cape Province (StatsSA, 2023). The different levels of access are provided in Table 7-5.

Table 7-5: Access to piped water⁶²

Administrative Area	Inside dwelling	Inside yard	Community standpipe	No access
George LM	81.3%	13.0%	5.2%	0.5%
Mossel Bay LM	90.2%	4.9%	4.3%	0.6%
GRDM	85.0%	8.7%	5.7%	0.6%
Western Cape Province	85.5%	7.6%	6.0%	0.9%

Source: (StatsSA, 2023).

7.8.6.4 Sanitation

In 2022, the George LM and Mossel Bay LM experienced significant improvement in access to waterborne sewerage. The percentage of households with access to flush toilets in George LM increased to 95.4%, up from 88.0% in 2011, whereas Mossel Bay LM saw an increase 97.1% up from 90.9% in 2011. Currently, only 0.7% of the George LM population rely on pit latrines and 0.5% lack any sanitation facilities. In Mossel Bay LM, only 0.4% rely on pit latrines and 0.9% lack sanitation facilities (StatsSA, 2023).

Overall, access to waterborne sewerage was marginally better than the GRDM (93.7%) and the Western Cape Province (93.9%). A breakdown of sanitation access levels is provided in Table 7-6.

Table 7-6: Access to sanitation⁶³

Administrative Area	Flush Toilet	Chemical Toilet	Pit Latrine	Bucket Toilet	Other	None
George LM	95.4%	1.9%	0.7%	1.2%	0.3%	0.5%
Mossel Bay LM	97.1%	0.2%	0.4%	0.4%	0.9%	0.9%
GRDM	93.7%	1.3%	1.2%	2.4%	0.6%	0.9%
Western Cape Province	93.9%	1.2%	0.4%	3.1%	0.3%	1.2%

Source: (StatsSA, 2023).

⁶² Note: percentages may not add up to 100 due to rounding off.

⁶³ Note: percentages may not add up to 100 due to rounding off.



7.8.6.5 Refuse Removal

In 2022, 88.3% of households in George LM reported weekly waste removal by local authorities, a slight increase from 88.1% in 2011. The percentage of households with access to weekly refuse removal in the Mossel Bay LM declined marginally from 92.6% in 2011 to 92.5% in 2022. Access to formal refuse removal in George LM is similar to the GRDM (88.8%) and Western Cape Province (88.7%), whereas the Mossel Bay LM has better access than that of the district and provincial average. As with other services there has been a general improvement in access to refuse removal between 2011 and 2022. A breakdown of access to refuse removal is provided Table 7-7.

Table 7-7: Access to refuse removal⁶⁴

Administrative Area	Removed weekly	Removed less often	Communal refuse dump/container	Own refuse dump	None	Other
George LM	88.3%	1.4%	6.6%	1.9%	1.5%	0.3%
Mossel Bay LM	92.5%	0.7%	3.6%	2.1%	0.9%	0.1%
GRDM	88.8%	1.0%	6.1%	2.8%	1.0%	0.3%
Western Cape Province	88.7%	1.3%	6.6%	1.8%	1.2%	0.2%

Source: (StatsSA, 2023).

7.8.7 Economic Activities

The coastal environment in the GRDM supports tourism, recreation, fishing, maritime activity and associated hospitality and service industries. The GRDM IDP identifies the coastline, pristine beaches and relatively unspoilt environment as key competitive advantages, with specific opportunities linked to the ocean economy and tourism (GRDM, 2025). Coastal and marine-based activities are, therefore, important not only as direct economic activities, but also because they support accommodation, restaurants, transport, retail, recreational services and broader destination marketing.

Tourism remains one of the most important coastal economic activities in the GRDM. Visitor surveys undertaken through the George and Wilderness tourism offices indicated that 79.3% of visitors were domestic tourists, while 20.7% were from overseas markets. Approximately three-quarters of visitors travelled to the region for holiday purposes, with beach visits recorded as the most popular activity (Wesgro, 2022).

The coastline within the George LM plays an important role in the local tourism economy. George LM identifies Wilderness, Herolds Bay and Victoria Bay as full Blue Flag beaches⁶⁵, with Leentjiesklip retaining pilot Blue Flag status for the 2025/26 season (George LM, 2025). These beaches support a range of coastal recreational activities, including swimming, surfing, walking, fishing, paddling, paragliding viewing points and whale watching. Victoria Bay is particularly associated with surfing, while Wilderness and Herolds Bay are important family and leisure beach destinations. Leentjiesklip and Gwaing River Mouth are also used for recreational fishing, subject to the required permits (George LM, 2025).

⁶⁴ Note: percentages may not add up to 100 due to rounding off.

⁶⁵ A Blue Flag beach is an international eco-tourism award given to beaches that meet strict standards for excellence in cleanliness, safety, and environmental management.



Similarity, Mossel Bay LM is an important coastal tourism and maritime node within the district. The municipality is marketed as the gateway to the Garden Route and as an adventure tourism destination, with coastal attractions including beaches, the harbour waterfront, Seal Island, boat-based whale watching, shark cage diving, ocean safaris, sailing, recreational boating and fishing (Mossel Bay Tourism, 2024). Cruise tourism is an increasingly important activity for Mossel Bay, with the number of cruise vessels calling at the port increasing on an annual basis, with the development of a dedicated cruise reception facility allowing for higher passenger volumes and strengthen Mossel Bay's role in the regional cruise tourism market (Wesgro, 2025).

Fishing remains an important coastal livelihood and recreational activity in the district. In George LM, recreational fishing is associated with areas such as Gwaing River Mouth, Kaaimans and Leentjiesklip, subject to permitting requirements (George LM, 2025). In Mossel Bay LM, recreational fishing, boating and other harbour-based leisure activities are supported by the port and harbour environment, while deep-sea fishing and ocean-based recreational activities form part of the broader marine tourism offering (Wesgro, 2025) and (Mossel Bay Tourism, 2024). Commercial and small-scale fishing are dealt with in Section 6.8.

Overall, the coastal economy of the GRDM is multi-dimensional. Tourism is the dominant coastal economic activity, supported by beaches, scenic coastal landscapes, marine wildlife, adventure tourism, accommodation and hospitality services. Mossel Bay has a particularly important maritime and cruise tourism function, linked to the Port of Mossel Bay and its growing role as a cruise gateway to the Garden Route. George LM's coastal economy is more strongly associated with beach tourism, surfing, recreation and nature-based tourism, particularly around Wilderness, Victoria Bay and Herolds Bay. Fishing, both commercial and recreational, remains an important activity, although it is dependent on sustainable resource management and equitable access to coastal infrastructure.

7.8.8 Community Health, Safety and Wellbeing

The Goerge LM is serviced by one regional hospital, one district hospital, four mobile clinics and ten fixed primary health care facilities. In 2023, the George LM had 17 Antiretroviral Therapy (ART) sites, 17 tuberculosis (TB) clinics. In 2025, the LM had eight provincial ambulances available for emergency health services, translating to 0.27 ambulances per 10,000 residents (George LM, 2025). In contrast, the Mossel Bay LM is serviced by one district hospital, five fixed clinics and 11 mobile health care facilities (Mossel Bay LM, 2026).

According to the Human Sciences Research Council's (HSRC) 2022 survey, HIV prevalence in the Western Cape was estimated at 7.1% (HSRC, 2024). The number of patients registered for ART in George LM increased from 11 562 in 2024 to 11 921 in 2025, whereas Mossel Bay LM reported a slight increase from 5 977 to 5 987 during the same period (MERO, 2025).

Additionally, the number of patients registered for TB treatment decreased in both local municipalities between 2024 and 2025. In George LM, TB registrations declined from 1 952 to 1 941 patients, while Mossel Bay LM recorded a decrease from 857 to 852 patients during the same period. While the GRDM has established healthcare infrastructure and mobile services to improve access, challenges remain. Underserved areas, limited health services, and socioeconomic barriers continue to affect equitable healthcare access (MERO, 2025).

7.8.9 Vulnerable Groups

A number of vulnerable groups occur within the primary and secondary study areas and may be disproportionately affected by changes associated with the Project. Vulnerability is influenced by factors such as income, employment status, age, health, access to services, reliance on natural resources and geographic location.



The study area is characterised by relatively high levels of income inequality, moderate levels of unemployment and the presence of lower-income communities. Households with low and irregular incomes are generally more vulnerable to economic disruptions, increases in living costs, and competition for employment opportunities. The relatively high proportion of households within the lower income brackets in both George LM and Mossel Bay LM suggests that employment opportunities associated with the Project may be viewed positively; however, unmet expectations regarding recruitment could also create social tension.

Youth represent an important vulnerable group within the study area. Approximately one-third of the population in George LM and over one-fifth of the population in Mossel Bay LM fall within the 15–34-year age category. This demographic may experience challenges associated with unemployment and limited economic opportunities and is therefore likely to have high expectations regarding Project-related employment and skills development opportunities.

Women, particularly female-headed households, may face increased socio-economic vulnerability due to limited access to employment opportunities, income disparities and caregiving responsibilities. While the population profile indicates a slight predominance of females within both municipalities, women may be disproportionately affected by changes in household income, community safety concerns and increased demand on social services.

Older persons constitute a significant proportion of the population, particularly within Mossel Bay LM where individuals aged 65 years and older account for approximately 15.4% of the population. This group may be more sensitive to community health and safety risks, disruptions to healthcare access, increased traffic volumes and changes in community cohesion.

People living with chronic illnesses, including those receiving ART and TB treatment, may also be vulnerable to disruptions in healthcare access and other indirect social impacts. Although the district benefits from relatively good healthcare infrastructure, access challenges remain in some rural and remote areas.

Rural households and residents of smaller settlements, including Herbertsdale and surrounding farming communities, may be particularly sensitive to changes affecting local livelihoods, access routes, service delivery and the quality of the rural environment. Agricultural workers and households dependent on farming-related employment may be vulnerable to disturbances affecting agricultural activities and associated value chains.

In addition, natural resource users, including small-scale fishers, recreational fishers and tourism operators whose livelihoods are linked to coastal and marine resources, constitute a potentially vulnerable group. Although the onshore Project area is located inland from the main coastal tourism centres, any perceived or actual impacts on the natural environment may affect livelihoods that rely on the region's environmental quality and tourism appeal.

7.8.10 Key Sensitivities and Social Receptors

The primary social receptors associated with the Project are concentrated within Mossel Bay LM and George LM, particularly within the coastal settlements of Mossel Bay, Herbertsdale, Wilderness and Victoria Bay, as well as rural properties and agricultural areas located closer to the onshore Project area.

The most sensitive receptors include:

- Residential communities and settlements, particularly Mossel Bay, Herbertsdale, Wilderness, Victoria Bay, KwaNonqaba, Zolani and Thembalethu, where changes in traffic volumes, community safety, noise, visual amenity and pressure on local services may be experienced during construction.



- Rural residential properties and farmsteads located near the proposed onshore infrastructure and pipeline corridors, which may be sensitive to temporary disruptions, access restrictions, noise and construction-related activities.
- Agricultural land and farming operations, which represent an important land use in the vicinity of the onshore Project area. Livestock farming, crop production and associated agricultural supply chains contribute to local livelihoods and may be sensitive to disturbances affecting land access, infrastructure or biosecurity.
- Eco-estates, lifestyle estates and tourism-oriented residential developments, which form an increasingly important component of the local economy. These developments rely heavily on environmental quality, scenic landscapes, tranquillity and a strong nature-based identity, making them sensitive to perceived impacts on visual amenity and sense of place.
- Tourism and recreation destinations, including Mossel Bay, Wilderness, Victoria Bay and other Garden Route attractions, which depend on the region's environmental reputation, scenic landscapes and recreational opportunities. Tourism businesses may be sensitive to impacts that affect visitor perceptions of the area.
- Coastal and marine users, including recreational fishers, boating operators, tourism operators and other ocean-economy stakeholders whose activities are linked to the broader coastal environment.
- Community infrastructure and services, including healthcare facilities, roads, emergency services and municipal services that could experience temporary increases in demand associated with construction activities and workforce movements.
- Vulnerable population groups, including lower-income households, unemployed youth, the elderly and people dependent on public services and social support systems.

The dominant economic activities within and surrounding the onshore Project area are agriculture, rural residential land uses and eco-estate developments, while the wider study area is strongly influenced by tourism, recreation and marine-based economic activities. Consequently, the key socio-economic sensitivities relate to the protection of rural livelihoods, maintenance of environmental quality and landscape character, community health and safety, preservation of tourism value, and management of stakeholder expectations regarding local employment and economic opportunities.

Overall, the most sensitive social receptors are likely to be rural landowners and agricultural operators located closest to the onshore infrastructure, eco-estate and tourism-related developments reliant on environmental amenity, nearby communities potentially affected by construction activities, and vulnerable groups with limited capacity to absorb adverse social or economic change.

7.8.11 Existing Land Uses

7.8.11.1 Rural agriculture

Agriculture is the dominant inland land use within the onshore Project area. The landscape comprises commercial farms used for dryland wheat and canola cultivation, planted pasture and livestock grazing, together with limited irrigated cultivation. Agricultural properties are interspersed with farmsteads, farm roads, fences, dams and associated infrastructure. Site verification confirmed active wheat, canola and pasture production, including fields supported by irrigation infrastructure.



The onshore Project area falls within the Herbertsdale-Gouritsmond Protected Agricultural Area and the DFFE Screening Tool classifies substantial portions as High or Very High agricultural sensitivity. Active cropping land has elevated land-use value because of its contribution to food production and the agricultural economy. Site verification has confirmed the area to be of High agricultural sensitivity to active crop fields and lower sensitivity to natural veld, disturbed land and less productive coastal soils.

The agricultural landscape is relatively fragmented by existing servitudes and infrastructure but remains a functioning production area.

7.8.11.2 Natural open space and conservation-oriented land

Natural and semi-natural open space occurs along the shoreline, within dune systems, on undeveloped slopes, around wetlands and within remnants that were not historically converted to agriculture. These areas support coastal vegetation, fynbos, renosterveld, dune thicket, strandveld and freshwater habitats. The ecological baseline identifies intact and degraded occurrences of threatened ecosystems, including Critically Endangered Mossel Bay Shale Renosterveld and Endangered Albertinia Sand Fynbos and Hartenbos Dune Thicket.

The study area also falls within the Gouritz Cluster Biosphere Reserve and the Gouritz Cluster-Mossel Bay Key Biodiversity Area. These designations do not prohibit development in the same manner as a formally declared protected area, but they reinforce the regional conservation importance of maintaining natural habitat, landscape connectivity and compatible land management. Furthermore, the Western Cape Biodiversity Spatial Plan assigns a “restricted” land-use compatibility rating to linear pipeline infrastructure within CBAs, ESAs and Other Natural Areas, recognising that such developments have the potential to compromise biodiversity objectives unless carefully planned and implemented.

7.8.11.3 Residential and tourism-related land uses

Residential development is concentrated within the coastal estates and dispersed rural properties. The coastal estates (e.g. Nautilus Bay and Springerbaai) are characterised by low development densities, large open-space components, controlled access, walking trails and conservation-oriented design controls. Their land-use character differs materially from conventional suburban development because views, tranquillity, natural vegetation and access to the coastline form integral components of the residential amenity.

Tourism and recreation are linked to beaches, scenic coastal landscapes, walking trails, wildlife viewing and nature-based residential estates. The broader Mossel Bay economy is partly dependent on tourism, property investment and the amenity value of its coastline. The district IDP identifies Mossel Bay as a regional economic hub combining industrial, harbour, tourism and service functions.

7.8.11.4 Utility, waste-management and industrial land uses

The inland and eastern portions of the broader Project area have an established utility and industrial character influenced by PetroSA infrastructure, the Gourikwa power facility (Eskom), substations, transmission lines, pipelines, municipal waste-related land and associated access roads. The proposed Garden Route GtP facility site on Farm 419 is vacant land with a “utility” zoning, with rezoning to Industrial Zone II anticipated for the proposed Garden Route GtP facility. The associated gas pipeline corridors primarily cross land used for agriculture and open space.

The proposed Garden Route GtP facility is situated west of the existing District Municipality waste site and near the developing Garden Route Regional Waste Management Facility (see Section 7.8.12 for these proposed developments). Construction of Phase 1 of the



regional facility recommenced in February 2026 and includes waste cells, leachate and contaminated-water dams, offices, a workshop, weighbridge, roads and supporting infrastructure. Completion is scheduled for February 2027, while planning for a further domestic-waste cell, hazardous-waste cell and associated Phase 2 infrastructure was already underway.

The combination of waste management, electricity generation, transmission infrastructure and existing PetroSA assets gives parts of the inland area an established infrastructure and industrial character.

7.8.11.5 Transport and service infrastructure

The wider Mossel Bay area is served by the N2 national road, regional and local roads, private estate roads, farm roads and historical railway infrastructure. The N2, which the proposed gas pipeline would need to cross, is the principal regional mobility corridor linking Mossel Bay with Cape Town, George and the eastern Garden Route. The Mossel Bay SDF identifies the road network, existing infrastructure capacity and the urban edge as important determinants of spatial growth and land-use suitability.

Existing utility infrastructure includes gas pipelines and servitudes, high-voltage transmission infrastructure, substations, local electricity distribution lines, water-related infrastructure and telecommunications. These facilities create both opportunities for infrastructure co-location and constraints associated with safety clearances, access, maintenance and servitude-holder requirements.

7.8.12 Planned Developments

7.8.12.1 Garden Route Gas-to-Power Project

The principal proposed development relevant to this baseline is the Garden Route GtP Project, comprising a combined-cycle gas-fired power facility of up to 3 000 MW on Farm 419, together with gas and water pipelines, fuel-receiving and possible storage infrastructure, access roads, an on-site substation and transmission connections to the Gourikwa and Proteus substations. The project may require rezoning of the power-generation site from Utility Zone to Industrial Zone II. Gas from the proposed Black 11B/12B development project would be exported to shore via new offshore and onshore pipelines, supplying a proposed GtP facility and potentially other off-takers.

7.8.12.2 Regional Waste Management Facility

The GRDM Regional Waste Management Facility is a significant planned and partially constructed land use in the vicinity of the proposed GtP facility site. Phase 1 includes engineered disposal cells and associated environmental-control and operational infrastructure. Phase 2 is expected to include an additional domestic-waste cell, a hazardous-waste cell and related facilities.

This development will reinforce the utility and waste-management function of the inland area. It may also create cumulative traffic, air-quality, odour, stormwater, visual, emergency-response and infrastructure-capacity considerations when assessed alongside the proposed gas-to-power facility and associated construction activities.

7.8.12.3 Mossdustria expansion and related industrial development

An EA process has previously been initiated for the proposed extension of Mossdustria and associated development on Erf 6 Mossdustria and the remainder of Portion 8 of Farm Rietvalley 22. The proposal included ~20 ha of industrial development, 33 ha for alternative-energy production, 4.2 ha of conservation land, 1.2 ha of business development and a



motorsport-related development area. While its implementation status needs to be confirmed, it represents a foreseeable intensification of industrial and energy-related land use within the wider Mossel Bay development area.

7.8.12.4 Residential and service-driven growth

The Mossel Bay population increased by approximately 50 000 between 2011 and 2022, driving demand for residential development and associated services. Municipal planning, therefore, places emphasis on accommodating growth within suitable areas, avoiding unmanaged urban sprawl, protecting environmental and agricultural resources and aligning development with infrastructure capacity.

The 2025/2026 Mossel Bay IDP identifies continuing investment in water storage, sewer collectors, electricity networks, access roads, public spaces and other municipal infrastructure across Mossel Bay. Relevant projects include increased water-storage capacity for development along the Louis Fourie corridor, sewer upgrades near Pinnacle Point, access-road works at Sonskynvallei and water and electricity upgrades elsewhere in the municipal area.

The upgrading of Louis Fourie Road illustrates the scale of growth-related infrastructure investment in Mossel Bay. This approximately R540 million project includes dual-carriageway construction, intersection upgrades, changes to N2 ramps, a new bridge and pedestrian and local-road improvements, with completion targeted for August 2026 (<https://www.westerncape.gov.za/infrastructure/article/progress-update-louis-fourie-road-mossel-bay>). Although outside the immediate pipeline corridor, it reflects the wider pressure on the transport network and the municipality's investment response to continued urban and economic growth.

7.8.12.5 Energy and infrastructure development

The Mossel Bay SDF identifies Mossdustria and Voorbaai, together with the Mossel Bay central business area and Louis Fourie corridor, as significant commercial and industrial employment areas. The proposed Garden Route GtP project would reinforce the broader strategic role of the Mossdustria-PetroSA-Gourikwa area as a utility, industrial and energy cluster.

The DFFE Screening Tool also confirms that the onshore Project area intersects the Strategic Gas Pipeline Corridor Phase 2: Mossel Bay to Coega, which identifies the broader corridor as strategically relevant to national gas infrastructure planning. The presence of this strategic corridor does not constitute project approval and does not override site-specific environmental and land-use constraints.

7.8.13 Servitudes and Infrastructure Corridors

Existing liquid hydrocarbons pipeline servitude extend inland from Nautilus Bay towards PetroSA Gas-to-Liquid facility. The existing servitude is approximately 3 m wide and traverses properties including Farm 298, Driefontein 243, Klipfontein 344 and other agricultural properties. This existing corridor is one of the proposed gas pipeline alignment alternatives.

The proposed Garden Route GtP project also includes proposed or potential water and seawater-pipeline corridors as well as.

High-voltage electricity infrastructure is a prominent feature of the onshore Project area. The Garden Route GtP project will require power infrastructure, though this will form part of a separate ESIA undertaken by Savannah Environmental. Existing and proposed transmission servitudes impose restrictions on building, tall vegetation, material storage and activities that could interfere with electrical safety or maintenance access.



Road and rail corridors also influence route selection. Existing transport corridors offer opportunities to place infrastructure in previously disturbed areas, but are subject to building lines, crossing approvals, access control, geotechnical constraints and road or railway authority requirements. Coastal pipeline routes are likely to also intersect private estate roads, public beach-access routes and recreational pathways.

7.8.14 Key Land Use Conflicts and Constraints

Regional and municipal planning frameworks identify Mossel Bay as a key economic, industrial and service centre within the Garden Route, with important roles in energy production, petrochemicals, manufacturing, tourism, agriculture, fishing and logistics. The wider Southern Cape coastal corridor, including Mossel Bay and George, is recognised as a strategic growth and tourism region where development must be balanced with infrastructure capacity, environmental constraints and the protection of agricultural and biodiversity resources.

Within the onshore Project area, land use is characterised by a combination of commercial agriculture, natural open space, conservation-oriented residential estates, tourism-related development and existing utility infrastructure associated with PetroSA, Eskom and municipal services. Of particular relevance are the Protected Agricultural Area surrounding Herbertsdale-Gouritsmond, the Gouritz Cluster Biosphere Reserve, threatened terrestrial ecosystems, coastal residential estates such as Nautilus Bay and Springerbaai, and the existing pipeline and electricity-servitude network that traverses the area.

The area is also experiencing ongoing infrastructure and land-use change, including the proposed Garden Route Gas-to-Power Project, the Regional Waste Management Facility, industrial development associated with the Mossdustria area, municipal infrastructure upgrades and continued residential and tourism growth. Consequently, the key planning considerations for the Project relate to the protection of productive agricultural land, avoidance of biodiversity-sensitive areas, compatibility with conservation-oriented residential and tourism land uses, and integration with existing and planned infrastructure corridors.



8.0 Environmental and Socio-Economic Screening of Key Impacts

This chapter provides a high-level screening of the interaction between the Project activities and the receiving environment, as well as an activity-specific Aspects and Impacts Register to ensure that all environmental and social aspects of the proposed Project activities and associated impacts are identified. Key possible impacts were identified by the ESIA project team on this basis. These potential impacts will be reviewed by I&APs during the Scoping Phase public participation process and endorsed by DMPP in their acceptance of the FSR. Specialists will also be required to confirm these, as well as identify any others, and assess the significance thereof.

This chapter also presents those impacts considered to be insignificant and the rationale for which they were screened out during the Scoping Phase (and will thus not be assessed in detail) (see Section 8.3).

8.1 Environmental and Socio-Economic Interaction Matrix

Potential impacts have been identified by examining the possible interactions of all Project activities and associated aspects (described in Section 5.0) with the broad physical characteristics of the Project area of influence (described in Section 6.0 and Section 7.0), through which potential impacts on biological and social receptors (or features) in the area of influence could arise. The identified possible interactions are shown in the environmental and social interaction matrix in Table 8-1 (offshore / marine project activities) and Table 8-2 (onshore / terrestrial project activities). Shaded cells indicate where a Project activity may interact with a certain physical characteristic and, in turn, biological or socio-economic receptor. Interactions are broadly grouped into minor interactions and potentially significant interactions (which need to be confirmed by specialist assessments).

Key considerations informing the potential interactions included the offshore location of the proposed development of the Paddavissie Fairway in Block 11B/12B (~160 km offshore at its closest point), the development of up to 19 wells and associated subsea infrastructure, and the long-term nature of production activities (approximately 20–30 years). The Project comprises two potential development scenarios: (1) offshore processing with gas export to shore via a pipeline to a proposed gas receiving facility (e.g. the currently proposed GtP facility, which is excluded from the ESIA scope⁶⁶), and (2) offshore processing and liquefaction using an FLNG facility with LNG and condensate exported offshore (see Section 5.2.1). Development activities include offshore and onshore surveys, drilling and installation over an estimated six-year period, operation of offshore production and export infrastructure, pipeline installation (including HDD shore crossing works), and eventual decommissioning and partial removal of infrastructure.

During normal operations, the biological receptors that may be most affected by proposed offshore and onshore activities include benthic communities, fish, seabirds and marine mammals, as well as terrestrial fauna and flora within the coastal zone and onshore development footprint (although other receptors are also considered). Socio-economic receptors (or activities or resources) that may be most affected by proposed activities include fishing (small-scale and commercial), income / livelihoods, maritime shipping, cultural heritage (tangible and intangible), and public health and safety. Consideration is also given to potential cumulative impacts and GHG emissions associated with the long-term offshore production, processing, export and associated support operations.

⁶⁶ The GtP facility is being proposed by another applicant and is thus the subject of a separate EA application and ESIA process being undertaken by Savannah Environmental.



Potential interactions with receptors in the event of **unplanned events** associated with potential activity risks, such as minor hydrocarbon spills, well blow-out, or loss of hydrocarbons from the CPF, will also be considered to ensure a comprehensive assessment. These unplanned events are not proposed as part of normal operations and are unlikely to occur, and measures are out in place to actively prevent them in line with Good Industry Practice and Best Available Techniques (BAT). Despite the very low probability of these unplanned events occurring, potential impacts will be assessed assuming a reasonable (credible conservative case) unplanned event occurs.

8.2 Aspects and Impacts Register

The project-specific Aspects and Impacts Register (Table 8-3) identifies potential impacts⁶⁷ for each proposed activity and associated aspect⁶⁸ based on the interactions identified in Table 8-1 (offshore / marine activities) and Table 8-2 (onshore/terrestrial activities). This systematic approach allowed for the planning of the scope of the specialist studies.

⁶⁷An "impact" is any change to the environment, whether adverse or beneficial, wholly or partially resulting from the organisation's activities, products or services.

⁶⁸An "aspect" is the element of an organisation's activities, products or services that can interact with the environment.



Table 8-1: Environmental and Social Interaction Matrix - Marine / Offshore Activities

See legend at the end of the table.

Proposed Activities	Aspects associated with activities that can cause impacts	Physical characteristics potentially affected, which may affect sensitive receptors								Potentially affected sensitive receptors in the receiving environment														
										Biological receptors / resources							Socio-economic receptors / resources							
		Seabed characteristics	Water quality and turbidity	Underwater noise	Underwater light	Air emissions	Atmospheric noise	Atmospheric light	Benthic communities	Plankton	Fish	Seabirds	Turtles	Marine mammals	Nearshore/coastal habitats and communities	Protected /designated sensitive areas	Fishing	Commercial shipping	Livelihoods / Income	Maritime / cultural heritage	Visual / sense of place	Services availability	Public health and safety	Climate change effects
1. Normal Operations																								
Surveys																								
Establish port of call, employment of staff & procurement	Procurement of facilities and services																							
	Employment of staff & rotation of staff																							
Operation of survey vessels, including transit of to and from survey area	Vessel presence & implementation of safety zone																							
	Underwater noise from survey operations																							
	Underwater noise from vessel transit																							
	Vessel air emissions																							
	Vessel lighting																							
	Routine discharges to sea																							
	Discharge of ballast water																							
Survey activities, including bathymetry & sonar surveys; seafloor sampling; metocean survey; and ROV surveys	Seabed disturbance (e.g. seabed sampling & ROV)																							
	Underwater noise from survey equipment (e.g. bathymetry and sonar)																							



Proposed Activities	Aspects associated with activities that can cause impacts	Physical characteristics potentially affected, which may affect sensitive receptors							Potentially affected sensitive receptors in the receiving environment															
									Biological receptors / resources						Socio-economic receptors / resources									
		Seabed characteristics	Water quality and turbidity	Underwater noise	Underwater light	Air emissions	Atmospheric noise	Atmospheric light	Benthic communities	Plankton	Fish	Seabirds	Turtles	Marine mammals	Nearshore/coastal habitats and communities	Protected /designated sensitive areas	Fishing	Commercial shipping	Livelihoods / Income	Maritime / cultural heritage	Visual / sense of place	Services availability	Public health and safety	Climate change effects
Drilling and installation																								
Establishment onshore logistics base, employment of staff & procurement	Procurement of facilities and services																							
	Employment of staff & rotation of staff																							
Operation of drilling unit & support / supply / installation / construction vessels, including transit to & from site	Presence & implementation of safety zones																							
	Underwater noise from manoeuvring & positioning																							
	Underwater noise from transit to & from site																							
	Air emissions from drilling unit & Project vessels																							
	Lighting from drilling units & Project vessels																							
	Routine discharges to sea from drilling units & Project vessels																							
	Waste generation for disposal onshore																							
Well drilling and installation of well infrastructure	Underwater noise from drilling																							
	Seabed disturbance																							
	Discharge of drill cuttings, mud & residual cement																							
Vertical seismic profiling	Underwater noise from VSP operations																							
Well flow testing	Non-routine flaring of hydrocarbons																							
Transit of helicopters	Atmospheric & underwater noise from helicopters																							
	Air emissions from helicopters																							
Installation and commissioning of CPF	Disturbance of seabed during installation of anchors																							
	Discharge at sea surface of various substances during commissioning																							
	Presence & implementation of safety zone																							
	Anti-fouling paint used on the CPF hull																							



Proposed Activities	Aspects associated with activities that can cause impacts	Physical characteristics potentially affected, which may affect sensitive receptors							Potentially affected sensitive receptors in the receiving environment															
									Biological receptors / resources							Socio-economic receptors / resources								
		Seabed characteristics	Water quality and turbidity	Underwater noise	Underwater light	Air emissions	Atmospheric noise	Atmospheric light	Benthic communities	Plankton	Fish	Seabirds	Turtles	Marine mammals	Nearshore/coastal habitats and communities	Protected /designated sensitive areas	Fishing	Commercial shipping	Livelihoods / Income	Maritime / cultural heritage	Visual / sense of place	Services availability	Public health and safety	Climate change effects
Installation and commissioning of subsea infrastructure, including shore crossing (HDD)	Seabed disturbance																							
	Discharge near seabed & sea surface of various substances used for pipeline commissioning																							
	Presence & implementation of safety zone																							
Production and Operation																								
Operation of production field	Procurement of goods and services																							
	Employment of staff																							
	Contribution to state income (sale of gas and condensate)																							
Operation of support vessels, CPF and shuttle tanker(s)	Presence & implementation of safety zones																							
	Underwater noise from manoeuvring & positioning																							
	Presence of mooring chains																							
	Air emissions from CPF, shuttle tanker(s) & vessels																							
	Lighting from CPF, shuttle tanker(s) & vessels																							
	Discharges to sea from CPF, shuttle tanker(s) & vessels																							
	Abstraction of sea water																							
	Non-routine flaring of gas																							
	Waste generation for disposal onshore																							
Presence of subsea infrastructure	Presence & implementation of safety zones																							
	Infrastructure on seabed																							
Transit of helicopters	Atmospheric & underwater noise from helicopters																							
	Air emissions from helicopters																							
Transit of vessels	Underwater noise from vessels																							
	Air emissions from vessels																							



Proposed Activities	Aspects associated with activities that can cause impacts	Physical characteristics potentially affected, which may affect sensitive receptors							Potentially affected sensitive receptors in the receiving environment															
									Biological receptors / resources							Socio-economic receptors / resources								
		Seabed characteristics	Water quality and turbidity	Underwater noise	Underwater light	Air emissions	Atmospheric noise	Atmospheric light	Benthic communities	Plankton	Fish	Seabirds	Turtles	Marine mammals	Nearshore/coastal habitats and communities	Protected /designated sensitive areas	Fishing	Commercial shipping	Livelihoods / Income	Maritime / cultural heritage	Visual / sense of place	Services availability	Public health and safety	Climate change effects
	Lighting from vessels																							
	Increased vessel traffic																							
Decommissioning																								
Shutdown of onshore logistics base & demobilisation of staff	Retrenchment of staff																							
	End of procurement																							
Operation of vessels involved in decommissioning	Procurement of facilities & services																							
	Employment of staff																							
	Presence & implementation of safety zones																							
	Underwater noise from manoeuvring & positioning																							
	Air emissions from Project vessels																							
	Lighting from Project vessels																							
	Routine discharges to sea from Project vessels																							
	Waste generation for disposal onshore																							
Transit of helicopters	Atmospheric & underwater noise from helicopters																							
	Air emissions from helicopters																							
Transit of vessels	Underwater noise from vessels																							
	Air emissions from vessels																							
	Lighting from vessels																							
	Increased vessel traffic																							
Decommissioning of CPF and subsea infrastructure including wells	Seabed disturbance during removal																							
	Infrastructure left on seabed																							
	Discharge of residual plugging cement to seabed																							
	Hazardous waste generation																							



Proposed Activities	Aspects associated with activities that can cause impacts	Physical characteristics potentially affected, which may affect sensitive receptors							Potentially affected sensitive receptors in the receiving environment															
									Biological receptors / resources							Socio-economic receptors / resources								
		Seabed characteristics	Water quality and turbidity	Underwater noise	Underwater light	Air emissions	Atmospheric noise	Atmospheric light	Benthic communities	Plankton	Fish	Seabirds	Turtles	Marine mammals	Nearshore/coastal habitats and communities	Protected /designated sensitive areas	Fishing	Commercial shipping	Livelihoods / Income	Maritime / cultural heritage	Visual / sense of place	Services availability	Public health and safety	Climate change effects
2. Unplanned Events																								
Operation and transit of drilling unit & Project vessels	Loss of equipment at sea																							
Well drilling and installation of well infrastructure	Loss of well control / Blow-out																							
Well plugging and abandonment	Hydrocarbon leak from plugged well																							
Operation of the subsea infrastructure	Gas pipeline leak																							
	Multiphase pipeline leak																							
Operation of CPF	Loss of condensate from CPF																							
Transshipment / bunkering of hydrocarbons	Hydrocarbon spill																							
Legend																								
	No significant interaction		Interaction of aspects with key physical characteristics in the area of influence					Potential minor interactions screened out as described in Section 8.3					Potentially significant negative interaction to be assessed in the ESIA					Potentially significant positive interaction to be assessed in the ESIA						



Table 8-2: Environmental and Social Interaction Matrix – Terrestrial / Onshore Activities

See legend at the end of the table.

	Aspects associated with activities that can cause impacts	Physical characteristics potentially affected, which may affect sensitive receptors						Biological receptors / resources				Socio-economic receptors / resources						
		Soils	Surface / Ground water	Land capability	Air emissions	Atmospheric noise	Atmospheric light	Vegetation	Terrestrial Fauna	Avifauna	Protected /designated sensitive areas	Land use	Livelihoods / Income	Cultural heritage	Visual / sense of place	Services availability	Public health and safety	Climate change effects
1. Normal Operations																		
Route and Site Surveys																		
Onshore route survey activities	Disturbance of vegetation & soil																	
	Increased traffic & human activity on site																	
	Atmospheric noise from survey activities																	
	Air emissions from survey vehicles and activities																	
Onshore pipeline construction and installation																		
Mobilisation and establishment of construction camps / laydown areas, employment of staff & procurement	Procurement of facilities and services																	
	Employment of staff																	
	Waste generation, incl. spills																	
	Site preparation, including removal & disturbance of vegetation and soil																	
	Increased traffic & operation of machinery on site																	
	Increased human activity & presence of construction workers																	
	Site lighting (night lighting)																	
Installation / construction and commissioning of onshore pipeline, including shore crossing	Site preparation, including removal & disturbance of vegetation & soil																	
	Increased traffic & human activity on site																	
	Atmospheric noise from construction vehicles and activities																	
	Air emissions from construction vehicles and activities																	
	Lighting from construction vehicles and activities																	
	Waste generation, incl. spills																	
Production and Operation																		
Maintenance of onshore pipeline	Procurement of goods and services																	
	Employment of staff																	
	Maintenance of servitude																	
	Increased vehicle traffic																	



	Aspects associated with activities that can cause impacts	Physical characteristics potentially affected, which may affect sensitive receptors						Biological receptors / resources				Socio-economic receptors / resources						
		Soils	Surface / Ground water	Land capability	Air emissions	Atmospheric noise	Atmospheric light	Vegetation	Terrestrial Fauna	Avifauna	Protected /designated sensitive areas	Land use	Livelihoods / Income	Cultural heritage	Visual / sense of place	Services availability	Public health and safety	Climate change effects
	Atmospheric noise from vehicles																	
	Air emissions from vehicles																	
Sale of gas	Transportation and transfer of gas																	
Decommissioning																		
Decommissioning of onshore pipeline & establishment of construction camp	Procurement of facilities & services																	
	Employment of staff																	
	Waste generation, incl. spills																	
	Increased traffic and operation of machinery on site																	
	Increased human activity & presence of construction workers																	
	Site lighting (night lighting)																	
2. Unplanned Events																		
Transfer of gas onshore to end user	Loss of containment – explosion, fire																	
Legend																		
	No significant interaction																	
	Interaction of aspects with key physical characteristics in the area of influence																	
	Potential minor interactions screened out as described in Section 8.3																	
	Potentially significant negative interaction to be assessed in the ESIA																	
	Potentially significant positive interaction to be assessed in the ESIA																	



Table 8-3: Aspects and Impacts Register – Onshore & Offshore Activities

Proposed Activities	Aspects associated with activities that can cause impacts	Potential impact	Proposed Specialist Study
1. Normal Operations			
Surveys			
Establishment of port of call, employment of staff & procurement	Procurement of facilities and services	Income from local procurement and spending	Socio-economic
		State income from taxes and levies	Socio-economic
		Availability of services (port services)	Minor – Screened out
	Employment of staff & rotation of staff	Income and skills training for workers	Socio-economic
		Deterioration of shore-based community health and safety	Socio-economic
Operation of survey vessels to survey area, including transit of to and from survey area	Vessel presence & implementation of safety zone	Physical injury or mortality of marine fauna due to vessel collision	Minor-Screened out
		Displacement of fishing vessels	Fisheries
		Loss of income from any disruption of fisheries	Socio-economic
		Displacement of shipping vessels	Socio-economic
		Alteration of sense of place due to survey activities and additional vessels	Minor – Screened out
	Underwater noise from vessel movement	Behavioural disturbance of marine fauna	Minor – Screened out
		Injury to marine fauna	Minor – Screened out
		Changes in catch due to behavioural change in fish	Minor – Screened out
		Loss of income from any disruption of fisheries	Minor – Screened out
	Vessel air emissions	Health impacts from atmospheric pollution	Minor – Screened out
		Contribution to GHG emissions	Climate change
	Vessel lighting	Behavioural disturbance of marine fauna	Marine ecology
	Routine discharges to sea from Project vessels	Ecological effects	Minor – Screened out
		Deterioration of cultural heritage links to the sea	Minor – Screened out
	Discharge of ballast water	Alteration of ecological composition due to introduction of invasive aliens	Minor – Screened out
		Deterioration of cultural heritage links to the sea	Cultural heritage
Onshore route survey activities	Disturbance of vegetation & soil	Loss of vegetation and faunal habitat	Minor – Screened out
		Displacement or disturbance of fauna and avifauna	Minor – Screened out
		Soil degradation and increased soil erosion potential	Minor – Screened out
		Increased sedimentation and reduced surface water quality	Minor – Screened out
		Alteration of site characteristics (topography and drainage patterns)	Minor – Screened out
		Reduced local air quality (dust) affecting nearby receptors	Minor – Screened out



Proposed Activities	Aspects associated with activities that can cause impacts	Potential impact	Proposed Specialist Study
	Increased traffic & human activity on site	Damage to or destruction of archaeological / palaeontological resources	Minor – Screened out
		Localised congestion and potential nuisance to neighbours / residents	Minor – Screened out
		Disturbance to and / or mortality of fauna (road mortality risk)	Minor – Screened out
		Increased road safety risk to road users and local communities	Minor – Screened out
		Pressure on local resources or services	Minor – Screened out
	Atmospheric noise from survey activities	Disturbance to nearby residents	Minor – Screened out
		Displacement or disturbance of fauna and avifauna	Minor – Screened out
	Air emissions from survey vehicles & activities	Reduced local air quality (dust and exhaust emissions) affecting nearby receptors	Minor – Screened out
		Contribution to GHG emissions	Minor – Screened out
Survey activities, including bathymetry and sonar surveys; seafloor sampling; metocean survey; and ROV surveys	Seabed disturbance (e.g. seabed sampling & ROV)	Smothering and disturbance of benthic fauna (sampling footprint)	Marine ecology
		Deterioration of cultural heritage links to the sea	Cultural heritage
		Disturbance of archaeological and palaeontological material / resources	Maritime heritage
	Underwater noise from surveys equipment	Behavioural disturbance of marine fauna	Marine ecology
		Injury to marine fauna	Marine ecology
		Changes in catch due to behavioural change in fish	Fisheries
		Loss of income from any disruption of fisheries	Socio-economic
Drilling and Installation			
Establishment of onshore logistics base, employment of staff & procurement	Procurement of facilities and services	Income from local procurement and spending	Socio-economic
		State income from taxes and levies	Socio-economic
		Availability of services (e.g. port services, accommodation, transportation)	Minor – Screened out
	Employment of staff & rotation of staff	Income and skills training for workers	Socio-economic
		Deterioration of shore-based community health and safety	Socio-economic
Establishment of construction camps (onshore pipeline)	Site preparation, including removal and disturbance of vegetation and soil	Loss of vegetation and faunal habitat	Terrestrial & Aquatic Biodiversity
		Displacement or disturbance of fauna and avifauna	Terrestrial & Aquatic Biodiversity
		Soil degradation and increased soil erosion potential	Terrestrial & Aquatic Biodiversity
		Increased sedimentation and reduced surface water quality	Terrestrial & Aquatic Biodiversity
		Alteration of site characteristics (topography and drainage patterns)	Terrestrial & Aquatic Biodiversity
		Reduced local air quality (dust) affecting nearby receptors	Air Quality
		Damage to or destruction of archaeological / palaeontological resources	Heritage and Palaeontological
		Localised congestion and potential nuisance to neighbours / residents	Minor – Screened out



Proposed Activities	Aspects associated with activities that can cause impacts	Potential impact	Proposed Specialist Study
	Increased vehicle traffic & human activity on site	Disturbance to and / or mortality of fauna (road mortality risk)	Terrestrial & Aquatic Biodiversity
		Increased road safety risk to road users and local communities	Minor – Screened out
		Pressure on local resources or services	Minor – Screened out
		Reduced local air quality affecting nearby receptors	Air Quality
		Contribution to GHG emissions	Climate Change
	Increased human activity and presence of construction workers	Mortality of fauna (road mortality risk & poaching)	Terrestrial & Aquatic Biodiversity
		Altered sense of place / change to cultural landscape	Socio-Economic
		Health and safety risk from construction-related accidents and presence of construction staff	Socio-Economic
	Atmospheric noise from construction vehicles & activities	Disturbance to nearby residents	Socio-Economic
		Displacement or disturbance of fauna and avifauna	Terrestrial & Aquatic Biodiversity
	Air emissions from construction vehicles & activities	Reduced local air quality (dust and exhaust emissions) affecting nearby receptors	Air Quality
		Contribution to GHG emissions	Climate Change
	Lighting from construction vehicles & activities	Disturbance to nearby residents	Socio-Economic
		Displacement or disturbance of fauna and avifauna	Terrestrial & Aquatic Biodiversity
	Waste generation for disposal onshore, incl. onshore spills	Availability of services	Minor – Screened out
		Pollution of ground and surface water	Terrestrial & Aquatic Biodiversity
		Soil contamination	Terrestrial & Aquatic Biodiversity
Operation of drilling unit & support / supply / installation / construction vessels, including transit to & from site	Vessel presence & Implementation of safety zones	Physical injury or mortality of marine fauna due to vessel collision	Minor – Screened out
		Displacement of fishing vessels	Fisheries
		Loss of income from any disruption of fisheries	Socio-economic
		Displacement of shipping vessels	Socio-economic
		Alteration of sense of place due to construction (drilling & installation) activities and additional vessels	Minor – Screened out
	Underwater noise from manoeuvring & positioning	Behavioural disturbance of marine fauna	Marine ecology
		Physical and/or physiological injury to marine fauna	Marine ecology
		Changes in catch availability due to behavioural change in fish	Fisheries
		Loss of income from any disruption of fisheries	Socio-economic
	Underwater noise from vessel transit to & from site	Behavioural disturbance of marine fauna	Minor – Screened out
		Physical and/or physiological injury to marine fauna	Minor – Screened out



Proposed Activities	Aspects associated with activities that can cause impacts	Potential impact	Proposed Specialist Study
		Changes in catch availability due to behavioural change in fish	Minor – Screened out
		Loss of income from any disruption of fisheries	Minor – Screened out
	Increased vessel traffic	Physical injury or mortality of marine fauna due to vessel collisions	Minor -Screened out
		Disruption to shipping industry	Minor – Screened out
		Disruption to fishing industry	Minor – Screened out
	Air emissions from drilling unit & Project vessels	Contribution to GHG emissions	Climate change
		Health impacts from atmospheric pollution	Air quality
	Lighting from drilling unit & Project vessels	Behavioural disturbance of marine fauna	Marine ecology
	Routine discharges to sea from drilling unit and Project vessels	Ecological effects from pollutants in water column from routine discharges	Minor – Screened out
		Deterioration of cultural heritage links to the sea	Minor-Screened out
		Alteration of ecological composition due to introduction of invasive aliens from ballast water discharge	Minor – Screened out
	Waste generation for disposal onshore	Availability of services	Minor – Screened out
Well drilling and installation of well infrastructure	Underwater noise from drilling	Behavioural disturbance of marine fauna	Marine ecology
		Physical and/or physiological injury to marine fauna	Marine ecology
		Changes in catch availability due to behavioural change in fish	Fisheries
		Loss of income from any disruption of fisheries	Socio-economic
	Seabed disturbance	Smothering and disturbance of benthic fauna	Marine ecology
		Deterioration of cultural heritage links to the sea	Cultural heritage
		Disturbance of archaeological material	Maritime heritage
	Discharge of drill cuttings, mud & residual cement	Smothering and disturbance of benthic fauna	Marine ecology
		Ecological effects from pollutants in water column	Marine ecology
		Ecological effects from release of radioactive materials	Minor – Screened out
		Deterioration of cultural heritage links to the sea	Cultural heritage
		Changes in catch availability due to behavioural change in fish	Fisheries
		Loss of income from any disruption of fisheries	Socio-economic
Vertical seismic profiling	Underwater noise from VSP operations	Behavioural disturbance of marine fauna	Marine ecology
		Physical and/or physiological injury to marine fauna	Marine ecology
		Changes in catch availability due to behavioural change in fish	Fisheries



Proposed Activities	Aspects associated with activities that can cause impacts	Potential impact	Proposed Specialist Study
Well flow testing	Non-routine flaring of hydrocarbons	Loss of income from any disruption of fisheries	Socio-economic
		Contribution to GHG emissions	Climate change
		Health impacts from atmospheric pollution	Air quality
		Ecological effects due to hydrocarbon 'drop out'	Marine ecology
		Behavioural disturbance of marine fauna due to flare lighting	Marine ecology
Transit of helicopters	Atmospheric & underwater noise from helicopters	Behavioural disturbance of marine fauna	Marine ecology
		Sense of place/disturbance of coastal towns near helicopter base	Minor - Screened out
	Air emissions from helicopters	Health effects from atmospheric pollution	Minor – Screened out
		Contribution to GHG emissions	Climate change
Installation and commissioning of CPF	Disturbance of seabed during installation of anchors	Smothering and disturbance of benthic fauna	Marine ecology
		Deterioration of cultural heritage links to the sea	Cultural heritage
		Disturbance of archaeological and palaeontological material / resources	Maritime heritage
	Underwater noise from potential pile driving of on-shelf CPF anchors	Behavioural disturbance of marine fauna	Marine ecology
		Physical and/or physiological injury to marine fauna	Marine ecology
	Discharge at sea surface of various substances during commissioning	Ecological effects from pollutants in water column	Marine ecology
		Deterioration of cultural heritage links to the sea	Cultural heritage
		Changes in catch availability due to behavioural change in fish	Fisheries
		Loss of income from any disruption of fisheries	Socio-economic
	Presence & implementation of safety zones	Displacement of fishing vessels	Fisheries
		Loss of income from any disruption of fisheries	Socio-economic
		Displacement of shipping vessels	Socio-economic
	Anti-fouling paint used on the CPF hull	Ecological effects from pollutants in water column	Minor – Screened out
Installation / construction and commissioning of subsea infrastructure, including shore crossing (HDD)	Seabed disturbance	Smothering and disturbance of benthic fauna	Marine ecology
		Deterioration of cultural heritage links to the sea	Cultural heritage
		Disturbance of archaeological and palaeontological material / resources	Maritime heritage
	Discharge near seabed & sea surface of various substances used during pipeline commissioning	Ecological effects from pollutants in water column	Marine ecology
		Deterioration of cultural heritage links to the sea	Cultural heritage
		Changes in catch availability due to behavioural change in fish	Fisheries
		Loss of income from any disruption of fisheries	Socio-economic



Proposed Activities	Aspects associated with activities that can cause impacts	Potential impact	Proposed Specialist Study
	Presence & implementation of safety zones	Displacement of fishing vessels	Fisheries
		Loss of income from any disruption of fisheries	Socio-economic
		Displacement of shipping vessels	Socio-economic
Installation / construction and commissioning of onshore pipeline, including shore crossing	Site preparation, including removal & disturbance of vegetation and soil	Loss of vegetation and faunal habitat	Terrestrial & Aquatic Biodiversity
		Displacement or disturbance of fauna and avifauna	Terrestrial & Aquatic Biodiversity
		Increased susceptibility to invasive alien plant establishment	Terrestrial & Aquatic Biodiversity
		Habitat fragmentation and disruption of ecological processes	Terrestrial & Aquatic Biodiversity
		Soil degradation and increased soil erosion potential	Terrestrial & Aquatic Biodiversity
		Increased sedimentation and reduced surface water quality	Terrestrial & Aquatic Biodiversity
		Alteration of site characteristics (topography and drainage patterns)	Terrestrial & Aquatic Biodiversity
		Altered sense of place / change to cultural landscape	Socio-Economic
		Reduced local air quality (dust) affecting nearby receptors	Air Quality
		Damage to or destruction of archaeological / palaeontological resources	Heritage and Palaeontological
	Increased vehicle traffic & human activity on site	Mortality of fauna (road mortality risk & poaching)	Terrestrial & Aquatic Biodiversity
		Altered sense of place / change to cultural landscape	Socio-Economic
		Health and safety risk from construction-related accidents and presence of construction staff	Socio-Economic
	Atmospheric noise from construction vehicles & activities	Disturbance to nearby residents	Socio-Economic
		Displacement or disturbance of fauna and avifauna	Terrestrial & Aquatic Biodiversity
	Air emissions from construction vehicles & activities	Reduced local air quality (dust and exhaust emissions) affecting nearby receptors	Air Quality
		Contribution to GHG emissions	Climate Change
	Lighting from construction vehicles & activities	Disturbance to nearby residents	Socio-Economic
		Displacement or disturbance of fauna and avifauna	Terrestrial & Aquatic Biodiversity
	Waste generation, incl. spills	Pollution of ground and surface water	Terrestrial & Aquatic Biodiversity
		Soil contamination	Terrestrial & Aquatic Biodiversity



Proposed Activities	Aspects associated with activities that can cause impacts	Potential impact	Proposed Specialist Study
Production and Operation			
Operation of production field	Procurement of goods and services	Income from local procurement and spending	Socio-economic
		State income from taxes and levies	Socio-economic
		Availability of services	Minor – Screened out
	Employment of staff	Income and skills training for workers	Socio-economic
		Deterioration of shore-based community health and safety during staff rotations	Socio-economic
	Contribution to state income (sale of gas and condensate)	Increased Gross Domestic Product (GDP)	Socio-economic
Operation of support vessels, CPF and shuttle tanker(s)	Vessel presence & implementation of safety zones	Physical injury or mortality of marine fauna due to vessel collision	Minor – Screened out
		Displacement of fishing vessels and disruption of industry	Fisheries
		Loss of income from any disruption of fisheries	Socio-economic
		Displacement of shipping vessels and disruption of industry	Socio-economic
		Alteration of sense of place due to support activities and additional vessels	Minor – Screened out
	Underwater noise from manoeuvring & positioning	Behavioural disturbance of marine fauna	Marine ecology
		Physical and/or physiological injury to marine fauna	Marine ecology
		Changes in catch availability due to behavioural change in fish	Fisheries
		Loss of income from any disruption of fisheries	Socio-economic
	Presence of mooring chains	Physical injury of marine fauna (entanglement)	Marine ecology
		Modification of benthic habitat through additional hard substrate	Marine ecology
	Air emissions from CPF, shuttle tanker(s) and vessels	Contribution to GHG emissions and increased carbon concentration in atmosphere	Climate change
		Health effects from atmospheric pollution	Air quality
	Lighting from CPF, shuttle tanker(s) & vessels	Behavioural disturbance of marine fauna	Marine ecology
	Discharges to sea from CPF, shuttle tanker(s) & vessels	Ecological effects from pollutants in water column from routine discharges	Minor – Screened out
		Ecological effects from discharge of produced water	Marine ecology
		Deterioration of cultural heritage links to the sea due to potential pollution from all discharges	Cultural heritage
		Alteration of ecological composition due to introduction of invasive aliens from ballast water discharge	Minor – Screened out
	Abstraction of sea water	Physical and/or physiological injury to marine fauna	Marine ecology
	Non-routine flaring of gas	Contribution to GHG emissions and increased carbon concentration in atmosphere	Climate change



Proposed Activities	Aspects associated with activities that can cause impacts	Potential impact	Proposed Specialist Study
	Waste generation for disposal onshore	Availability of services	Minor – Screened out
Presence of subsea infrastructure	Presence & implementation of safety zones	Displacement of fishing vessels	Fisheries
		Loss of income from any disruption of fisheries	Socio-economic
		Displacement of shipping vessels	Socio-economic
	Infrastructure on seabed	Modification of benthic habitat through additional hard substrate	Marine ecology
		Deterioration of cultural heritage links to the sea	Cultural heritage
Transit of helicopters	Atmospheric and underwater noise from helicopters	Behavioural disturbance of marine fauna	Marine ecology
		Sense of place/disturbance of coastal towns near helicopter base	Minor - Screened out
	Air emissions from helicopters	Health effects from atmospheric pollution	Minor – Screened out
		Contribution to GHG emissions	Climate change
Transit of vessels	Underwater noise from vessels	Behavioural disturbance of marine fauna	Minor – Screened out
		Physical and/or physiological injury to marine fauna	Minor – Screened out
		Changes in catch availability due to behavioural change in fish	Minor – Screened out
	Air emissions from vessels	Health effects from atmospheric pollution	Minor – Screened out
		Contribution to GHG emissions	Climate change
	Lighting from vessels	Behavioural disturbance of marine fauna	Minor – Screened out
	Increased vessel traffic	Physical injury or mortality of marine fauna due to vessel collisions	Minor -Screened out
		Disruption to shipping industry	Minor – Screened out
		Disruption to fishing industry	Minor – Screened out
Maintenance of onshore pipeline	Maintenance of servitude	Loss of arable land	Soils & Agriculture capability
		Loss of indigenous habitats including flora species	Terrestrial Biodiversity
		Degradation of terrestrial and aquatic habitats	Terrestrial & Aquatic Biodiversity
		Encroachment of alien invasive species in disturbed areas	Terrestrial Biodiversity and Soils & Agriculture capability
	Atmospheric noise from vehicles	Disturbance to nearby residents	Socio-Economic
		Disturbance to fauna and avifauna	Minor -Screened out
	Air emissions from vehicles	Health effects from atmospheric pollution	Minor- Screened out
		Contribution to GHG emissions	Climate change
	Increased vehicle traffic	Mortality of fauna (road mortality risk)	Minor – Screened out
		Altered sense of place / change to cultural landscape	Minor – Screened out



Proposed Activities	Aspects associated with activities that can cause impacts	Potential impact	Proposed Specialist Study
		Health and safety risk from construction-related accidents	Minor – Screened out
Decommissioning			
Shutdown of onshore logistics base & demobilisation of staff	Retrenchment of staff	Job losses for workers	Socio-economic
	End of procurement	Loss of income from local procurement and spending	Socio-economic
		Loss of state income from taxes and levies	Socio-economic
Operation of vessels involved in decommissioning, including transit to & from site	Procurement of facilities & services	Income from local procurement and spending	Socio-economic
		State income from taxes and levies	Socio-economic
		Availability of services (e.g. port services, accommodation, transportation)	Minor – Screened out
	Employment of staff	Income and skills training for workers	Socio-economic
	Presence & implementation of safety zones	Physical injury or mortality of marine fauna due to vessel collision	Minor – Screened out
		Displacement of fishing vessels and disruption of industry	Fisheries
		Loss of income from any disruption of fisheries	Socio-economic
		Displacement of shipping vessels and disruption of industry	Socio-economic
	Underwater noise from manoeuvring & positioning during activities	Behavioural disturbance of marine fauna	Marine ecology
		Physical and/or physiological injury to marine fauna	Marine ecology
		Changes in catch availability due to behavioural change in fish	Fisheries
		Loss of income from any disruption of fisheries	Socio-Economic
	Underwater noise from vessel transit to & from site	Behavioural disturbance of marine fauna	Minor – Screened out
		Physical and/or physiological injury to marine fauna	Minor – Screened out
		Changes in catch availability due to behavioural change in fish	Minor – Screened out
		Loss of income from any disruption of fisheries	Minor – Screened out
	Increased vessel traffic	Displacement of shipping vessels and disruption of industry	Socio-economic
	Air emissions from Project vessels	Contribution to GHG emissions and increased carbon concentration in atmosphere	Climate change
		Health impacts from atmospheric pollution	Minor – Screened out
	Lighting from Project vessels	Behavioural disturbance of marine fauna	Marine ecology
	Routine discharges to sea from Project vessels	Ecological effects from pollutants in water column from routine discharges	Minor – Screened out
		Deterioration of cultural heritage links to the sea due to potential pollution	Minor -Screened out
		Alteration of ecological composition due to introduction of invasive aliens from ballast water discharge	Minor – Screened out



Proposed Activities	Aspects associated with activities that can cause impacts	Potential impact	Proposed Specialist Study
		Deterioration of cultural heritage links to the sea	Minor-Screened out
	Discharge of ballast water	Ecological effects	Minor – Screened out
		Deterioration of cultural heritage links to the sea	Cultural heritage
	Waste generation for disposal onshore	Availability of services (port services)	Minor – Screened out
Transit of helicopters	Atmospheric & underwater noise from helicopters	Behavioural disturbance of marine fauna	Marine ecology
		Sense of place/disturbance of coastal towns near helicopter base	Minor - Screened out
	Air emissions from helicopters	Health effects from atmospheric pollution	Minor – Screened out
		Contribution to GHG emissions	Climate change
Decommissioning of CPF and subsea infrastructure including wells	Seabed disturbance during removal	Smothering and disturbance of benthic fauna	Marine ecology
		Deterioration of cultural heritage links to the sea	Cultural heritage
	Infrastructure left on seabed (including plugged wells)	Modification of benthic habitat through additional hard substrate	Marine ecology
		Deterioration of cultural heritage links to the sea	Cultural heritage
		Displacement of fishing vessels	Fisheries
		Loss of income from any disruption of fisheries	Minor – Screened out
	Waste generation for disposal onshore	Availability of services	Minor -Screened out
Decommissioning of onshore pipeline & establishment of construction camp	Increased traffic and operation of machinery on site	Mortality of fauna (road mortality risk & poaching)	Terrestrial & Aquatic Biodiversity
		Altered sense of place / change to cultural landscape	Socio-Economic
	Atmospheric noise from vehicles & activities	Disturbance to nearby residents	Socio-Economic
		Displacement or disturbance of fauna and avifauna	Terrestrial & Aquatic Biodiversity
	Air emissions from vehicles & activities	Reduced local air quality (dust and exhaust emissions) affecting nearby receptors	Air Quality
		Contribution to GHG emissions	Climate Change
	Waste generation, incl. spills	Pollution of ground and surface water	Terrestrial & Aquatic Biodiversity
		Soil contamination	Terrestrial & Aquatic Biodiversity
		Availability of services	Minor -Screened out



Proposed Activities	Aspects associated with activities that can cause impacts	Potential impact	Proposed Specialist Study
2. Unplanned Events			
Operation and transit of drilling unit & Project vessels	Loss of equipment	Entanglement of fishing gear	Minor – Screened out
		Loss of income from any disruption of fisheries	Minor – Screened out
		Seafloor disturbance / damage to infrastructure on the seafloor	Minor – Screened out
		Deterioration of cultural heritage links to the sea	Minor – Screened out
Well drilling and installation of well infrastructure	Loss of well control / blow-out	Ecological effects from pollutants in water column	Marine ecology
		Displacement of fishing vessels and target species from polluted areas	Fisheries
		Loss of income from any disruption of fisheries	Socio-economic
		Displacement of shipping vessels from polluted areas	Socio-economic
		Ecological effects from pollutants on the shore	Marine ecology
		Reduction of income from coastal livelihoods and recreation	Socio-economic
		Deterioration of cultural heritage links to the sea	Cultural heritage
		Alteration of sense of place	Socio-economic
		Health impacts from atmospheric pollution	Air quality
		Contribution to GHG emissions	Climate change
Well plugging and abandonment	Hydrocarbon leak from plugged well	Ecological effects from pollutants in water column	Screened out
		Displacement of fishing vessels and target species from polluted areas	Screened out
		Loss of income from any disruption of fisheries	Screened out
		Displacement of shipping vessels from polluted areas	Screened out
		Ecological effects from pollutants on the shore	Screened out
		Reduction of income from coastal livelihoods and recreation	Screened out
		Deterioration of cultural heritage links to the sea	Screened out
		Contribution to GHG emissions	Screened out
Transfer of gas in subsea pipeline	Gas pipeline leak	Ecological effects from pollutants in water column	Marine ecology
		Displacement of target species from polluted areas	Fisheries
		Loss of income from any disruption of fisheries	Socio-economic
		Deterioration of cultural heritage links to the sea	Cultural heritage
		Contribution to GHG emissions	Climate change
		Health impacts from atmospheric pollution	Air quality



Proposed Activities	Aspects associated with activities that can cause impacts	Potential impact	Proposed Specialist Study
Transfer of gas and condensate in subsea pipeline	Multiphase pipeline leak	Ecological effects from pollutants in water column	Marine ecology
		Displacement of target species from polluted areas	Fisheries
		Loss of income from any disruption of fisheries	Socio-economic
		Deterioration of cultural heritage links to the sea	Cultural heritage
		Contribution to GHG emissions	Climate change
		Health impacts from atmospheric pollution	Air quality
Operation of CPF	Loss of condensate from CPF	Ecological effects from pollutants in water column	Marine ecology
		Displacement of target species from polluted areas	Fisheries
		Loss of income from any disruption of fisheries	Socio-economic
		Deterioration of cultural heritage links to the sea	Cultural heritage
		Contribution to GHG emissions	Climate change
		Health impacts from atmospheric pollution	Air quality
Transshipment / bunkering of hydrocarbons	Hydrocarbon spill	Ecological effects from pollutants in water column	Marine ecology
		Displacement of fishing vessels and target species from polluted areas	Fisheries
		Loss of income from any disruption of fisheries	Socio-economic
		Displacement of shipping vessels from polluted areas	Socio-economic
		Ecological effects from pollutants on the shore	Marine ecology
		Reduction of income from coastal livelihoods and recreation	Socio-economic
		Deterioration of cultural heritage links to the sea	Cultural heritage
		Alteration of sense of place	Socio-economic
		Health impacts from atmospheric pollution	Air quality
Transfer of gas onshore to end user	Loss of containment – explosion, fire	Contribution to GHG emissions	Climate change
		Health and safety risk	Qualitative Risk & Socio-Economic



8.3 Summary of Key Potential Impacts for Assessment

A summary of key potential impacts related to normal operations and / or those likely to be of public concern is summarised in Sections 8.3.1 to 8.3.2, as well as in Table 8-4 below, together with preliminary mitigation measures.

Table 8-4 essentially inverts Table 8-3 and summarises all identified impacts and the respective projects aspects that can cause impacts (for the normal operations) per specialist discipline. This allows for the holistic assessment of impacts on each receptor from all project aspects that will interact with the receptor during the course of project implementation.

There is currently insufficient information available for the assessment of impacts and identify appropriate mitigation at the Scoping Phase. Thus, these will be formally assessed by the specialists during the Impact Assessment Phase based on the technical modelling studies and their expertise using the Impact Assessment methodology presented in Section 9.3.

A preliminary, high-level list of possible mitigation measures to avoid, reduce, restore, and compensate/ offset the potential impact identified is provided in Table 8-4. This section provides preliminary mitigation measures and has NOT been informed by specialist input. Mitigation measures will be refined / amended during the Impact Assessment Phase with specialist input. Final mitigations recommended to avoid or minimise potential impact will be included in the EMP.

For unplanned events impacts are assessed per event (and not per receptor), as each event is unlikely to occur, and as such these events would not all impact on receptors concurrently. These unplanned events (including leaks and hydrocarbon spills) are also summarised in Sections 8.3.1 to 8.3.2 and will also be assessed by specialists.



Table 8-4: Summary of Identified Impacts related to Normal Operations and Preliminary Mitigation / Project Controls

No.	Potential impact	Aspects potentially resulting in impact	Preliminary Mitigation Measures / Project Controls	Report section
1	Marine Ecology			
1.1	Behavioural disturbance of marine fauna	- Underwater noise from surveys equipment - Vessel lighting - Underwater noise from manoeuvring & positioning - Underwater noise from drilling - Underwater noise from VSP operations - Atmospheric & underwater noise from helicopters	- Vessel operations: - Control vessel transit speed between the Project site and port. - VSP operations: - Pre-survey start watch by Marine Mammal Observer, including Passive Acoustic Monitoring. - Implement 'soft start' to VSP activities for slow ramp up of power output. "Soft-start" procedures. - Shut-downs for animals in mitigation zone. - Helicopter operations: - Minimum flying heights and flight paths to avoid sensitive habitats. - Comply fully with aviation and authority guidelines and rules.	Section 8.3.1.1
1.2	Smothering and disturbance of benthic fauna	- Seabed disturbance - Discharge of drill cuttings, mud and residual cement	- Seabed survey prior to drilling and installation, to identify objects, seafloor inconsistencies or structural features (e.g. colony forming corals, rocky outcrops) - Monitor discharges	
1.3	Physical and/or physiological injury to marine fauna	- Vessel presence & implementation of safety zone - Underwater noise from surveys equipment - Underwater noise from manoeuvring & positioning - Underwater noise from drilling - Underwater noise from VSP operations - Presence of mooring chains - Abstraction of sea water	- Refer to VSP operations above. - Enforce vessel operational speed limits - Keep constant watch by vessel captain from all vessels for cetaceans and turtles in path of the vessel - Fit seawater intakes on CPF with grid system to prevent entrainment of small fish and turtle hatchlings	



No.	Potential impact	Aspects potentially resulting in impact	Preliminary Mitigation Measures / Project Controls	Report section
1.4	Ecological effects from pollutants in water column	- Discharge of drill cuttings, mud & residual cement - Discharge at sea surface and seabed of various substances during commissioning - Discharges to sea from CPF, shuttle tanker(s) & vessels - Non-routine flaring of hydrocarbons	- Drilling discharges: - Usage of low-toxicity drilling fluids and cement. - Monitor discharges. - Discharge cuttings at greater than ~10 m below surface. - Flaring: - Optimise well test programme to reduce flaring as much as possible. - Use a high-efficiency burner when flaring to maximise combustion of the hydrocarbons. - Produced water: - Onboard treatment of hydrocarbon component to <30 mg/l or ship to shore. - Monitor produced water discharge (oil concentration) and cooling water (temperature).	
1.5	Modification of benthic habitat through additional hard substrate	Infrastructure on seabed	N/A	
2	Fisheries			
2.1	Displacement of fishing vessels	- Vessel presence & implementation of safety zone - Infrastructure left on seabed (including plugged wells)	- Stakeholder engagement and notification. - Navigational warning. - Fisheries Liaison Officer during survey activities. - Survey and accurately charted wellheads and subsea infrastructure (i.e. infrastructure on seabed) with the SANHO. - Grievance management. - Manage vessel lighting to ensure safe operations.	Section 8.3.2.2
2.2	Changes in catch due to behavioural change in fish	- Underwater noise from surveys equipment - Underwater noise from manoeuvring & positioning - Underwater noise from drilling - Underwater noise from VSP operations - Discharge of drill cuttings, mud & residual cement - Discharge at sea surface and seabed of various substances during commissioning		



No.	Potential impact	Aspects potentially resulting in impact	Preliminary Mitigation Measures / Project Controls	Report section
		Discharges to sea from CPF, shuttle tanker(s) & vessels		
3	Terrestrial & Aquatic Biodiversity and Soils & Agriculture capability			
3.1	Loss of vegetation and faunal habitat	Site preparation, including removal and disturbance of vegetation and soil	- Implement no-go areas and / or buffers to avoid sensitive areas. - Limit site clearance to the minimum required for development. - Demarcate areas to be cleared. - Plant search and rescue. - Stockpile topsoil. - Rehabilitation. - Effective stormwater management. - Erosion management and control. - Alien vegetation management and monitoring. - Minimise emissions (dust, light, noise). - Training of employees.	Sections 8.3.1.2 and 8.3.1.3
3.2	Displacement or disturbance of fauna and avifauna			
3.3	Soil degradation and increased soil erosion potential			
3.4	Increased sedimentation and reduced surface water quality			
3.5	Alteration of site characteristics (topography and drainage patterns)			
3.6	Increased susceptibility to invasive alien plant establishment			
3.7	Habitat fragmentation and disruption of ecological processes	Increased vehicle traffic & human activity on site as well as presence of construction workers	- Effective equipment and vehicle maintenance. - Education and training of employees.	
3.8	Disturbance to and / or mortality of fauna (road mortality risk)			
3.9	Mortality of fauna (road mortality risk & poaching)			



No.	Potential impact	Aspects potentially resulting in impact	Preliminary Mitigation Measures / Project Controls	Report section	
3.10	Displacement or disturbance of fauna and avifauna	• Atmospheric noise from construction vehicles & activities • Lighting from construction vehicles & activities	• Minimise emissions (dust, light, noise).		
3.11	Pollution of ground and surface water	• Waste generation for disposal onshore, incl. onshore spills	• Equipment and vehicle maintenance. • Emergency plans in case of any spillages. • Effective waste management. • Effective stormwater management. • Training of employees to prevent pollution.		
3.12	Soil contamination				
3.13	Loss of arable land	• Maintenance of servitude	• Implement no-go areas and / or buffers to avoid sensitive areas. • Limit site clearance the minimum required for development. • Alien vegetation management and monitoring. • Rehabilitation.		
3.14	Loss of indigenous habitats including flora species				
3.15	Degradation of terrestrial and aquatic habitats				
3.16	Encroachment of alien invasive species in disturbed areas				
4	Socio-economic				
4.1	Income from local procurement and spending	• Procurement of facilities, goods and services	• Appointment of local service providers as far as possible. • Operator's local content policy. • Manage community expectations. • Stakeholder engagement.		Section 8.3.2.1
4.2	State income from taxes and levies				
4.3	Income and skills training for workers	• Employment of staff & rotation of staff	• Implement Code of Conduct policy.		
4.4	Deterioration of shore-based community health and safety				



No.	Potential impact	Aspects potentially resulting in impact	Preliminary Mitigation Measures / Project Controls	Report section
4.5	Increased Gross Domestic Product (GDP)	Contribution to state income (sale of gas and condensate)	N/A	
4.6	Loss of income from any disruption of fisheries	- Vessel presence & implementation of safety zone - Underwater noise from surveys equipment - Underwater noise from manoeuvring & positioning - Underwater noise from drilling - Underwater noise from VSP operations - Discharge of drill cuttings, mud & residual cement - Discharge at sea surface and seabed of various substances during commissioning - Discharges to sea from CPF, shuttle tanker(s) & vessels	See mitigations related to impacts to fisheries above.	
4.7	Altered sense of place / change to cultural landscape	- Increased human activity and presence of construction workers - Increased vehicle traffic & human activity on site	- Limit site clearance to the minimum required for development. - Use downward-directed, shielded lighting fixtures.	
4.8	Health and safety risk from construction-related accidents and presence of construction staff	Increased human activity and presence of construction workers	- Implement Code of Conduct policy. - Implement a Health and Safety Policy. - Establish a complaints or grievance register.	
4.9	Disturbance to nearby residents	- Atmospheric noise from construction and/or operational vehicles & activities - Lighting from construction vehicles & activities	- Stakeholder engagement and notification of construction schedule and activities - Minimise emissions (dust, light, noise). - Establish a complaints or grievance register.	
4.10	Displacement of shipping vessels	Vessel presence & Implementation of safety zones	- Stakeholder engagement and notification. - Navigational warning.	



No.	Potential impact	Aspects potentially resulting in impact	Preliminary Mitigation Measures / Project Controls	Report section
			• Manage vessel lighting to ensure safe operations.	
4.11	Loss of income from local procurement and spending	• End of procurement	• Comply with labour law requirements.	
4.12	Loss of state income from taxes and levies			
5	Other Socio-economic			
5.4	Contribution to GHG emissions	• Vessel air emissions • Increased vehicle traffic & human activity on site • Air emissions from construction vehicles & activities • Air emissions from drilling unit & Project vessels • Air emissions from CPF, shuttle tanker(s) and vessels • Air emissions from helicopters	• Optimise vessel and vehicle movement, support / survey vessel routes and the logistics (number of trips required to and from the onshore logistics base) in order to lower fuel consumption. • Optimise well test programme to reduce flaring as much as possible. • Optimise equipment performance and minimising fuel consumption. • Use a high-efficiency burner when flaring to maximise combustion of the hydrocarbons.	Section 8.3.2.5
5.2	Reduced local air quality (dust and exhaust emissions) affecting nearby receptors	• Site preparation, including removal and disturbance of vegetation and soil • Air emissions from construction vehicles & activities • Increased vehicle traffic & human activity on site	• Minimise emissions (dust, light, noise). • Optimise vehicle movement and the logistics in order to lower fuel consumption, emissions and traffic.	
5.3	Health impacts from atmospheric pollution	• Air emissions from drilling unit & Project vessels • Non-routine flaring of hydrocarbons • Air emissions from vehicles & activities	• Optimise equipment performance and minimising fuel consumption. • Optimise vessel and vehicle movement, support / survey vessel routes and the logistics (number of trips required to and from the onshore logistics base) in order to lower fuel consumption.	



No.	Potential impact	Aspects potentially resulting in impact	Preliminary Mitigation Measures / Project Controls	Report section
			Optimise well test programme to reduce flaring as much as possible.	
5.4	Deterioration of cultural heritage links to the sea	- Routine discharges to sea from Project vessels - Seabed disturbance - Discharges to sea from drilling unit and Project vessels - Discharge of drill cuttings, mud & residual cement - Discharge at sea surface and seabed of various substances during commissioning - Discharges to sea from CPF, shuttle tanker(s) & vessels - Discharge of ballast water	- Stakeholder engagement and notification. - Implement, where necessary, a ritual event/s. - Grievance management.	Section 8.3.2.4
5.5	Damage to or destruction of archaeological / palaeontological resources and materials	- Site preparation, including removal and disturbance of vegetation and soil - Seabed disturbance	Implement a Chance Find Procedure	Section 8.3.2.3



8.3.1 Impacts on the Biophysical Environment

8.3.1.1 Potential Impacts on Marine and Coastal Ecology

One of the potentially more significant impacts associated with the field development and production activities relates to the physical disturbance and / or smothering of vulnerable or sensitive hardground benthic communities during drilling and subsea infrastructure installation. In addition to the smothering impact, benthic and pelagic fauna may also suffer indirect toxicity and bioaccumulation effects due to the various discharges, including drilling discharges (cuttings and drilling fluids), commissioning effluent and produced water.

Underwater noise generated by the Project vessels, drilling and infrastructure installation (non-impulsive noise), as well as VSP operations (impulsive noise), could further impact marine fauna in number of different ways, including physiological injury (permanent or temporary), disturbance and / or behavioural changes. Operational lighting, as well as the intense lighting from non-routine flaring, would increase ambient lighting in offshore areas at night, which may also disturb and disorientate marine fauna in the area.

Helicopters operations between the drilling unit or CPF and the onshore helicopter base may fly over or in close proximity to sensitive coastal receptors, such as key faunal breeding/feeding areas, and bird or seal colonies. Although exposure will be limited and be of a temporary nature while the helicopter passes overhead (site specific), indiscriminate or direct low altitude flying over seabird and seal colonies or breeding cetaceans could impact fauna behaviour and breeding success.

Further to the potential impacts related to normal operations, various unplanned events will be assessed. A low-probability (i.e. highly unlikely), but potential high-consequence scenario from offshore drilling operations, is a major spill of crude oil and/or natural gas occurring either from a loss of well control or well blow-out, which could severely impact the offshore and coastal environments. Other spill events will also be considered, including pipeline leak, loss of condensate from CPF and loss of condensate during transshipment operations.

How issue will be addressed in the ESIA:

A Marine Ecology Impact Assessment will be commissioned to assess the potential impacts on the marine and coastal environment during normal operations and upset conditions (small accidental spills, blow-out and faunal strikes). This study will not only consider the potential impacts on the various faunal groups and sensitive marine areas, but will also consider potential ecosystem-wide effects of the proposed development and production activities. The terms of reference for this assessment are presented in Section 9.2.2.2.

Outputs from the technical modelling studies (see Section 9.2) will be used to assess the potential impacts related to the discharge of drill cuttings / muds, commissioning effluent and produce water, increased underwater noise (zones of impact related to non-impulsive and impulsive noise), and various spill scenarios on the marine ecosystem and biota.

8.3.1.2 Potential Impacts on Terrestrial Ecosystems

Site clearance will result in the loss of vegetation within the proposed development footprint, with vegetation expected to re-establish following rehabilitation. Vegetation clearing activities are also likely disturb terrestrial fauna (including avifauna), resulting in the loss and modification of fauna habitat and potentially causing habitat fragmentation. Habitat fragmentation may reduce ecological connectivity across the landscape and restrict the movement of species between habitat patches, which can in turn affect breeding, foraging and migration patterns. Disturbance associated with construction activities, including noise, vibration, increased human presence and vehicle movement, may further displace sensitive species from the area.



The Project could also result in a number of indirect impacts on terrestrial ecosystems. For example, vegetation disturbance during construction may facilitate the introduction and spread of alien invasive plant species through soil disturbance, vehicle movement and the importation of materials. The establishment of invasive species may alter species composition, reduce native biodiversity, and change vegetation structure and ecosystem functioning in surrounding areas. If not properly managed, these changes could extend beyond the immediate development footprint and affect adjacent natural habitats.

How issue will be addressed in the ESIA:

A Terrestrial as well as Aquatic Biodiversity Impact Assessment will be undertaken to determine the potential impacts of the Project on terrestrial fauna (including avifauna), flora and aquatic ecosystems where relevant. The assessment will characterise baseline ecological conditions, identify sensitive habitats and species of conservation concern, evaluate potential direct, indirect and cumulative impacts associated with the Project, and recommend appropriate mitigation and management measures to avoid or minimise impacts where possible. The terms of reference for this assessment are presented in Sections 9.2.2.4 to 9.2.2.6.

8.3.1.3 Potential Impacts on Aquatic Ecosystems

The Project could have an impact on freshwater systems on site either through direct disturbance or indirect changes to hydrological processes and water quality. Direct impacts may occur where the pipeline and associated construction infrastructure (e.g. construction camps and laydown areas) are located within or in close proximity to wetlands, drainage lines or other watercourses. Such activities may result in the physical modification, infilling or loss of freshwater habitat and associated riparian or wetland vegetation.

Indirect impacts may arise from changes to surface water flow patterns caused by site levelling, compaction of soils, the creation of impermeable surfaces or the installation of drainage infrastructure. These changes may alter natural runoff patterns, potentially leading to increased flow velocities, erosion of channels or reduced infiltration in surrounding areas. Construction activities may also increase the risk of sedimentation of nearby watercourses due to soil disturbance and exposed surfaces, particularly during rainfall events.

In addition, freshwater systems could be affected by the accidental spills or leaks, including fuels, oils, chemicals or other hazardous materials. Such spills or leaks could degrade water quality and adversely affect aquatic habitats and organisms. These impacts may extend beyond the immediate development footprint if pollutants or sediments are transported downstream through drainage systems.

How issue will be addressed in the ESIA:

Aquatic ecosystems will be assessed as part of the Aquatic Biodiversity Impact Assessment. This assessment will identify and characterise wetlands, drainage lines and other watercourses within and adjacent to the Project area, evaluate their ecological condition and sensitivity, and assess the potential direct and indirect impacts associated with the proposed development. Appropriate mitigation and management measures will be recommended to avoid or minimise impacts to freshwater systems where possible.

In addition, it will be determined whether a WUL in terms of the National Water Act, 1998 is required for the Project, particularly in relation to activities that may alter the bed, banks, or flow of a watercourse, or that may result in the impeding or diverting of flow. The terms of reference for the Terrestrial and Aquatic Biodiversity Impact Assessment are presented in Sections 9.2.2.4 and 9.2.2.5.



8.3.2 Impacts on the Socio-Economic Environment

8.3.2.1 Potential Impacts on Employment, Livelihoods and Economy

The Project would result in some temporary socio-economic impacts and benefits during construction and the longer-term during production associated with the procurement of local goods and services, employment of some local staff and contractors and State income from taxes and levies.

Positive socio-economic impacts may include:

- **Government revenue:** Economic activity associated with the Project will contribute to government revenues through the payment of taxes and statutory contributions. This includes personal income taxes paid by employees, as well as taxes associated with procurement and business activities within the Project's supply chain. The sale / export of gas and condensate will also contribute to foreign exchange earnings for South Africa, as revenues from international markets are received in foreign currency.
- **Employment and Local Expenditure:** The Project has the potential to contribute positively to the local, regional and national economy through employment creation and procurement of goods and services. During all Project phases, a workforce will be required comprising a range of skill levels, which may create both direct and indirect employment opportunities. Income earned by employees will in turn support household livelihoods and stimulate economic activity in surrounding communities through increased spending.

In addition to employment opportunities, the Project is expected to procure a range of goods and services required for construction, operation and maintenance. This may include materials, equipment, transport services, maintenance services and other operational inputs. Procurement from local and regional suppliers may stimulate business opportunities and contribute to broader economic development in the area.

These activities may contribute positively to local economic development through increased income generation, improved household livelihoods and enhanced business opportunities for local enterprises. However, the scale and distribution of these benefits will depend on factors such as the availability of local skills, procurement strategies and the extent to which local businesses are able to participate in the Project supply chain.

Possible socio-economic impacts may include:

- Reduction in income and livelihood related to disruption of commercial fisheries (including small-scale).
- Impact on local tourism, recreation and recreational fishing, and commercial shipping. The implementation of the safe operational zone around Project vessels will effectively exclude vessels from these areas. Thus, their presence presents a potential risk of interference with commercial, recreational and fishing boats and other marine recreational activities.
- Hydrocarbon spills (unplanned event) can also result in several socio-economic impacts, including:
 - Alteration of the coastline in terms of aesthetic and landscape appeal (sense of place).
 - Alteration of the coastline that supports a variety of commercial and private recreational and tourism activities.



- Reduction in recreational activities, and small-scale and commercial fishing in the region, including all forms of near-shore and offshore fishing (e.g., exclusion areas for fishing, non-consumption due to toxicity, decline in recruitment of fish stocks).
- Reduction in income for secondary and tertiary sectors that support tourism, recreational, fishing, and other coastal economies.
- Pressure on national, regional, and local public services and facilities as part of any shoreline responses.
- National, regional, and local collapse in public trust and increase in conflict related to environmental and social impacts from major spills.
- Impacts on national GDP and economic growth.

How the potential impacts will be addressed in the ESIA:

A Socio-Economic Impact Assessment will be commissioned to, *inter alia*, provide an overview of the social context of the Project area of influence and determine the potential socio-economic impacts and benefits associated with the proposed development and production activities, including unplanned events. This assessment will draw on information provided by the related technical modelling and specialist studies. The terms of reference for the Socio-Economic Impact Assessment are presented in Section 9.2.2.10.

A separate Economic Impact Assessment will be undertaken, as part of the larger Socio-Economic assessment, which aims to measure the impact on economic activity likely to occur due to the specified (defined) activities and associated expenditure in the economy during normal operations and an unplanned event or hydrocarbon spill scenario. These impacts encompass direct impacts (generated by the Project within the industry in which it operates), indirect impacts (generated by activities downstream and upstream of affected industries), and induced impacts (additional consumption enabled by wages from direct/indirect activities). The assessment seeks to quantify the impact on the flow of economic goods and services, and will also draw on information provided by the related technical modelling studies. The terms of reference for the Economic Impact Assessment are presented in Section 9.2.2.10.

8.3.2.2 Potential Impacts on Commercial and Small-Scale Fisheries

The implementation of the 500 m safety zone around the drilling unit, installation vessels and CPF will effectively exclude fishing from a relatively small area around these Project vessels. The exclusion will be temporarily during drilling (~7 months per three well campaign) and subsea infrastructure installation. Furthermore, fishing activity will be excluded from safety exclusion and/or restriction zones to be implemented around the moored CPF. Pipelines will be over-trawlable in established trawling areas.

Considering the historical fishing effort and catch of all fisheries operating off the South Coast of South Africa. Most fishing activity is concentrated close to shore, along the continental shelf, or within established fishing grounds. Small-scale fisheries also typically operate closer to shore (generally within ~15 km of the coastline), whereas the nearest processing facility and field are located more than 95 km offshore.

In relation to the Project, overlap with commercial fishing activities is generally limited. Offshore infrastructure within Licence Block 11B/12B and the PR area of interest (Paddavissie Fairway) lies largely outside the main fishing grounds of most fisheries, overlapping with the large pelagic longline fishery only. No other sectors (including small-scale fishing) have historically shown to have operated in the Paddavissie Fairway and PR Area of interest or use fishing gear aimed at the seafloor (e.g. trawling) which will be impacted by subsea infrastructure.



The nearshore survey area and the proposed export pipeline show some overlap with the fishing grounds of the demersal trawl, mid-water trawl, demersal longline, purse seine, South Coast rock lobster, linefish and squid (chokka) fisheries (see Section 6.8.2)

In addition to the potential exclusion impact, the discharge plume from drilling, installation and production and discharges, and elevated underwater noise levels from Project activities could result in behavioural changes causing fish to be displaced from known fishing grounds, potentially resulting in reduced catch and/or increased fishing effort. The fishing sectors potentially impacted by the sediment plume and increased underwater noise would depend on the extent of behavioural disturbance, which would need to be determined through the technical modelling studies.

Lastly, the potential impacts of an unlikely hydrocarbon spill on fishing will be assessed in the ESIA. Hydrocarbons spilled in the marine environment will have an immediate detrimental effect on water quality, with the toxic effects potentially resulting in mortality of marine fauna or affecting faunal health. A hydrocarbon spill can also result in several indirect impacts on fishing, including:

- Exclusion of fisheries from polluted areas and displacement of targeted species from normal feeding / fishing areas, both of which could potentially result in a loss of catch and / or increased fishing effort;
- Mortality of animals (including eggs and larvae) leading to reduced recruitment and loss of stock (e.g., mariculture); and
- Gear damage due to oil contamination.

How issue will be addressed in the ESIA:

A Fisheries Impact Assessment will be commissioned to determine the fishing effort and catch of all fisheries operating within the Project's area of influence and to assess the impact of the proposed Project on these sectors, with input from the technical modelling studies 9.2.1. The terms of reference for the fisheries impact assessment are presented in Section 9.2.2.3. Outputs from the technical modelling studies will be used to inform the fisheries assessment (see Section 9.2.2.3).

The assessment will be informed by a noise modelling study (see Section 9.2.1.4), which will describe the likely background noise levels and determine underwater noise transmission loss with distance from the survey sound sources.

8.3.2.3 Potential Impacts on Tangible Cultural Heritage

Construction and installation of the Project have the potential to disturb, damage or destroy cultural heritage resources that may occur within the development footprint. These resources may include archaeological sites (such as stone tools, artefact scatters, historical structures, burial sites or shipwrecks), palaeontological material (such as fossil-bearing geological formations) and other sites or features of cultural, historical, or spiritual significance to local communities.

Onshore site preparation activities, including vegetation clearing, earthworks, excavation, grading and the installation of infrastructure such as the pipeline and associated road, may expose or inadvertently damage such resources. In some cases, heritage or palaeontological resources may not be visible on the surface and may only be encountered once construction activities commence. If not properly identified and managed, these resources could be permanently lost.

Offshore drilling and subsea infrastructure installation could also disturb archaeological material (namely shipwrecks). Although no wrecks are known to occur or have been identified within the Block 11B/12B, wrecks may occur within the larger Project area,



including along the pipeline route to shore (Scenario 1). Although the likelihood of disturbing a shipwreck is very low, this risk is further reduced through the use of survey campaign data to inform the final placement of wells and associated infrastructure. If a wreck or shipping remains is detected, it could contribute to archaeological knowledge.

How issue will be addressed in the ESIA:

An Onshore Heritage (archaeology) and Palaeontology Impact Assessment will be commissioned to identify and map any onshore sites of archaeological, palaeontological or cultural significance that may occur within or near the development footprint. The study will involve a review of available heritage and palaeontological records, field surveys of the site and an assessment of the sensitivity of the area in terms of heritage resources. The assessment will then evaluate the potential impacts on identified heritage resources and recommend appropriate mitigation and management measures where necessary.

In support of the onshore study, a Maritime Heritage Impact Assessment will be commissioned to evaluate the potential impacts on offshore heritage resources.

The terms of reference for the Onshore Heritage (archaeology) and Palaeontology Impact Assessment as well as Maritime Heritage Impact Assessment are presented in 9.2.2.7 and 9.2.2.8, respectively.

8.3.2.4 Potential Impacts on Intangible Cultural Heritage

Intangible cultural heritage relates primarily to ritual and spiritual valuations and relations with the elements (wind, water, fire), ritual practices (ancestral veneration) and beliefs (natural-spiritual beliefs in the water sourcing / bearing deities).

South Africans have a very long relationship with the sea, which is described as 'living' waters and is believed to play a critical role in spiritual and health management in indigenous groups specifically, as well as their reliance on the sea and coastline for subsistence. Any impact on these 'living' waters, such as the disturbance of the seabed and / or pollution of the water column, can affect peoples' spiritual connectivity with those elements, which in turn may affect peoples' customs, sense of place, well-being or ritual practices.

How issue will be addressed in the ESIA:

An Intangible Cultural Heritage Impact Assessment will be commissioned to determine intangible cultural heritage resources and cultural, spiritual and religious uses of the sea and coast within the Project's area of influence. The assessment will assess the potential impacts on indigenous people's rights and their religious and ritual connections to the coast and sea during normal drilling operations and upset conditions (hydrocarbon spill). This assessment will draw on information provided by the related technical modelling and specialist studies. The terms of reference for the cultural heritage impact assessment are presented in Section 9.2.2.9.

8.3.2.5 Potential Impacts on Greenhouse Gas Emissions and Air Quality

Project activities will generate air emissions primarily from the combustion of liquid fuels used in mobile and stationary equipment. The release of gaseous pollutants (principally nitrogen oxides, sulphur oxides, carbon monoxide, particulate matter and non-methane volatile organic compounds) from project related activities has the potential to impact local air quality close to the emissions source, which may in turn have negative effects on human health (e.g., respiratory effects). In addition, some of the gaseous pollutants (mainly carbon dioxide, methane and nitrous oxide) contribute to global GHG emissions, which are the primary driver of changes in the global climate system (increased temperatures, changing weather patterns and sea level rise).



During the construction phase, mobile sources include all Project vessels, vehicles and helicopters used to transport equipment, materials and personnel to and from the site, as well as the vessels, vehicles and machinery used for drilling, installation and construction activities. Stationary sources may include, for example, non-routine flaring on the drilling unit and diesel generator sets used to provide electricity for temporary onshore construction facilities such as the construction camp.

During the operational phase, mobile sources include support vessels, shuttle tankers and helicopter operations, while stationary sources include power generation on the CPF using a portion of the produced gas. There is also the potential for fugitive emissions (e.g. methane) associated with the transfer of gas to shore and the transfer of condensate from the FPSO to shuttle tankers.

In addition to fuel combustion, carbon emissions may also arise from land-use change associated with the development of the Project, although the pipeline will be buried and the area rehabilitated after construction. Site clearance activities will involve the removal of above- and below-ground biomass, including vegetation, deadwood and litter, as well as disturbance of soils. These activities may result in the release of carbon stored in vegetation and soils into the atmosphere, contributing to the Project's overall GHG footprint during the construction phase.

Further to the potential emissions related to normal operations, there would also be fugitive emissions in the unlikely event of a well blow-out, a pipeline leak or limited process related leaks during production operations. Natural gas (predominantly methane) could be released during a well blow-out, in addition to the combustion emissions related to any response efforts (vessels and helicopters).

How the issues will be addressed in the ESIA:

An Air Quality Impact Assessment will be undertaken to establish an emissions inventory of key emission sources and determine the ground-level impacts of emissions from various sources / activities using dispersion modelling. On completion of the dispersion modelling, the impact of particulate and gaseous emissions on the receiving environment will be assessed through comparison of calculated ambient concentrations with national standards and international guidelines, as applicable. This assessment will also establish an emissions inventory of an unplanned event and assess the potential impact thereof. The terms of reference for this study are presented in Section 9.2.2.11.

Further to the above, a Climate Change Risk Assessment will be commissioned for this Project. The aim of this study will be to quantify the Project's direct and indirect GHG emissions during normal operations and an unplanned event and assess (i) the potential climate-related risk on the Project, (ii) the potential implications of climate change for project-affected communities and natural ecosystems, and (iii) the potential of the Project's calculated direct and indirect GHG emissions. The terms of reference for this study are presented in Section 9.2.2.12.

8.3.2.6 Onshore Safety Risks

The Project will include the offshore production, handling, processing and transportation of natural gas and associated condensate from Block 11B/12B and potential export pipeline to transfer the gas to shore (Scenario 1). Natural gas is considered a hazardous substance and, therefore, presents potential safety risks if not appropriately managed.

Natural gas consists primarily of methane, which is a highly flammable gas that can form explosive mixtures with air under certain conditions. Methane is colourless and odourless in its natural state and can ignite if released in the presence of an ignition source. Depending on reservoir composition, the produced gas stream may also contain smaller quantities of other hydrocarbons and impurities, including condensate, carbon dioxide (CO₂) and



potentially hydrogen sulphide (H₂S). Hydrogen sulphide, where present, is particularly hazardous due to its acute toxicity and corrosive properties.

The main hazards associated with the onshore gas pipeline relates to the potential loss of containment during pipeline transfer operations. In the unlikely event of an accidental onshore release of gas, potential consequences may include fires, explosions, thermal radiation effects, flash fires, vapour cloud explosions and exposure to asphyxiant or toxic gases. These hazards may affect workers on site and, depending on the scale and nature of the incident, could potentially extend beyond the site boundary if not appropriately controlled. The loss of containment events may also result in marine pollution associated with condensate and/or gas releases, which is dealt with in Sections 8.3.1.1, 8.3.2.2, 8.3.2.4 and 8.3.2.5.

Given the hazardous nature of piped natural gas, the Project design will incorporate appropriate engineering controls, safety systems and operational procedures to minimise the likelihood of accidental releases and to mitigate potential consequences should such events occur. This typically includes the application of internationally recognised pipeline design standards, appropriate separation distances, leak detection systems, ventilation, emergency shutdown systems and fire protection measures.

How issue will be addressed in the ESIA:

Offshore oil and gas production and transport via pipelines is a mature global industry with well-established engineering standards, operational procedures and international best practices for the safe production, processing and transportation of hydrocarbons. Modern facilities incorporate multiple layers of protection, including process control systems, safety instrumented systems and emergency response measures designed to prevent incidents and minimise risks.

A Quantitative Risk Assessment (QRA) will be undertaken, which will identify potential accident scenarios associated with the onshore transfer of natural gas, evaluate the likelihood and potential consequences of such events and calculate the potential individual and societal risks associated with accidental releases. The assessment will also consider potential impacts on workers, neighbouring land uses and surrounding communities, where relevant.

The inventory of natural gas in the pipeline is expected to be sufficiently large to classify the development as a MHI in terms of applicable occupational health and safety legislation. As such, a formal MHI Risk Assessment will be required prior to construction. This assessment will be based on the final design and will incorporate detailed modelling of potential hazard scenarios, together with the identification and evaluation of mitigation and risk reduction measures.

The findings of the QRA will inform the pipeline design, including safety distances, hazard mitigation measures and emergency planning requirements. The assessment will also identify additional risk reduction measures where necessary to ensure that risks are reduced to acceptable levels in accordance with applicable regulatory requirements and international best practice.

The Terms of Reference for the Quantitative Risk Assessment are presented in Section 9.2.1.5.

8.4 Minor Screened Out Impacts

A number of potential impacts identified during the screening described in Sections 8.1 and 8.2 are deemed to be **minor and not significant** in the larger Project context. This includes impacts that are commonplace in the marine and onshore environment, where existing legal requirements impose adequate management requirements, and/or where impacts are of a negligible intensity in relation to receiving environment before implantation of mitigation.



These impacts have thus been screened out as discussed below and will not be formally assessed in the ESIA.

8.4.1 Normal Operations

8.4.1.1 Potential ecological and social impacts related to onshore route and corridor survey operations

The proposed onshore survey programme comprises predominantly of non-intrusive or minimally invasive survey techniques, including topographical surveys, drone-based surveys, ground penetrating radar, magnetometer surveys, electromagnetic surveys, multi-channel analysis of surface waves and electrical resistivity tomography. These activities are generally short-term taking place over a period of 6 months, localised and reversible in nature, requiring limited ground disturbance and involving relatively small teams and equipment. Potential ecological effects are, therefore, expected to be limited to temporary disturbance of vegetation and fauna arising from personnel movements, survey vehicles, equipment deployment and short-duration noise generation. Similarly, social impacts are expected to be minor and temporary, comprising brief increases in local traffic (see Section 8.4.1.14) and temporary visual or noise disturbance to nearby land users. No permanent habitat loss, fragmentation, alteration of land use or displacement is anticipated as a result of these survey activities.

The more invasive survey methods, namely trial pits, coring and cone penetration testing (CPT) will result in localised ground disturbance; however, the scale of disturbance is limited, temporary and confined to discrete sampling locations along the onshore pipeline corridor. Trial pits will be backfilled and rehabilitated following completion, while boreholes and CPT locations occupy a very small surface footprint relative to the broader Project area and receiving environment. Any associated impacts on soils, vegetation, surface drainage, land use and community are, therefore, expected to be highly localised and readily managed through the implementation of standard good-practice mitigation measures.

The following management measures must be implemented and will be included in the ESMP:

- Implement no-go areas and / or buffers to avoid sensitive areas.
- Landowner engagement and notification.
- Minimise emissions (dust, light, noise).
- Education and training of employees.
- Establish a complaints or grievance register.
- Rehabilitation of disturbed areas.

8.4.1.2 Availability of Services Supplying the Proposed Activities

The Operator is not proposing to construct new permanent onshore logistic facilities as part of this project. The Project will, as far as practicable, make use of existing port facilities, industrial areas, storage facilities and supply services that are commercially available within South Africa, or imported where required.

Temporary onshore facilities may be required during onshore construction activities, including construction and laydown areas (see Section 5.5.6.4). During the operations phase, onshore logistics support may require the use of existing port-based or industrial land and facilities, either through existing operators or lease/sublease arrangements.

South Africa has existing ports and facilities (including Saldanha, Cape Town, Mossel Bay, Port of Gqeberha, Port of Ngqura) and service providers which service the maritime and oil



and gas industry. The proposed operations are largely similar to existing operations serviced by South African ports and service providers.

As offshore activities and associated demand for services increases, it is expected that more service providers will enter the market or existing service providers will expand their operations (subject to obtaining the necessary EAs and other permits for their activities where required). Providers of non-specialised goods or services (e.g., accommodation, land-based transportation and general engineering works) may be able to expand faster than providers of fixed facilities (e.g., berthing space) or specialised goods and services (e.g., drilling muds and aerial transportation). However, there is no indication of supply shortages materially affecting offshore activities to date, or that the volume of existing good and services cannot be expanded to meet increased market demand over time.

It is understood that none of the required logistics / support operations or goods are of such a nature, frequency, duration or volume that they would place undue pressure on local infrastructure or resources, and that they would consequently not materially affect supply to other current users. This is, therefore, not assessed as a negative impact of the Project in this ESIA.

The services of an appropriately licenced waste contractor will be used to collect and transport any wastes generated during all Project phases (including survey campaign, installation, operations and decommissioning activities) brought onshore for recycling, treatment or disposal. The recycling, treatment and/or disposal of waste onshore will be fully traceable to ensure it is disposed at appropriately licenced waste facilities.

The following management measures must be implemented and will be included in the ESMP:

- Ensure all subsidiary plans, including a Waste Management Plan, are in place prior to project implementation.

8.4.1.3 Ecological Effects due to Routine Discharges to Sea from Vessels

Routine discharges from Project vessels considered in this section include grey and black water⁶⁹, waste food, bilge water, deck drainage, brine generated from onboard desalination, sewage, food wastes, and detergents from deck cleaning. The discharge of such substances can in principle have several impacts, including physiological effects on marine fauna from pollutants contained in the discharge, and attracting marine fauna and associated predator species to the vessel.

Such discharges are common to all ocean-going vessels and are regulated by national law and international conventions, such as MARPOL 73/78. Discharge volumes are directly proportional to the size of the vessel and crew. While vessels (e.g. support vessels and shuttle tankers) are mobile and comparable in size to other offshore vessels, the drilling unit and CPF have larger crew complements, with the drilling units remaining largely within the Paddavissie Fairway area for extended periods, while the CPF will remain moored (anchored) throughout production phase.

The concentration of vessels, and associated crew, will be relatively high in the Paddavissie Fairway and offshore Project area during certain construction and installation periods extending over a number of months at a time. However, the Paddavissie Fairway area is situated in the open ocean, dominated by the Agulhas current, at a considerable distance from the coastline (~160 km from shore at its closest point). As such, discharges are expected to disperse rapidly to undetectable concentrations, and are unlikely to have a

⁶⁹ Grey water is domestic wastewater generated from activities such as showers, sinks, washing, etc., excluding water from toilets which is classified as black water.



material impact on water quality in the Project area or more sensitive coastal receptors, provided that standard discharge mitigation is implemented.

An increase in vessel traffic is also expected along the pipeline route and near the CPF location (either in deep water near the wells or in shallower water on the continental shelf). While discharges from activities in the nearshore survey area may have a greater likelihood of reaching the coast, the vessels involved in survey and pipelay operations are highly specialised and operate in accordance with established international discharge management standards. Any such discharges are, therefore, expected to be effectively controlled, disperse quickly, and not result in detectable changes to water quality or impacts on sensitive coastal receptors. Overall, these discharges are not considered to be more significant than those from the numerous other vessels routinely operating in offshore and coastal waters.

Note: The ecological impacts of production-related effluents from the CPF, such as produced water, will be modelled and assessed (Section 9.2.1.2).

The following management measures must be implemented and will be included in the ESMP:

- Compile and implement a Waste Management Plan that complies with MARPOL 73/78 standards. Notably, prohibit the discharge of oily water (> 15 ppm) as outlined in MARPOL 73/78 regulations.
- Use a low-toxicity biodegradable detergent for the cleaning of the deck and any spillages.
- Use drip trays to collect run-off from equipment that is not contained within a bunded area and route contents to the closed drainage system.
- Prohibit operational discharges when transiting through Marine Protected Areas (MPAs).
- Monitor and audit appropriate implementation of the Waste Management Plan and MARPOL 73/78 standards.

8.4.1.4 Alteration of the Sense of Place due to Offshore/Marine Project activities (survey, construction and/or support) and Vessel Presence

The temporary presence of Project vessels in offshore waters is unlikely to be visible to coastal residents, visitors, or recreational water users, who generally remain well inshore of the Project Area. Potential disturbance to sense of place would therefore be limited to nearshore survey and/or construction activities.

Commercial vessels, such as freight ships, regularly operate across extensive offshore areas and are not considered sensitive to changes in sense of place associated with a specific offshore location. Project vessels will be limited in number and their presence will be consistent with existing marine traffic in the area. As a result, they are not expected to significantly alter the character or sense of place of the offshore environment, nearshore areas, or working port settings.

Accordingly, given the distance of drilling activities and most construction and installation vessels from the shoreline, together with the temporary nature of the operations, the presence of Project vessels is not expected to result in a material impact on sense of place.



8.4.1.5 Deterioration of Cultural Heritage Links to the Sea due to Routine Discharges to Sea from Vessels

Routine discharges considered in this section include those detailed in Section 8.4.1.3 (i.e. grey and black water, waste food, bilge water, deck drainage, brine and sewage). These discharges have the potential to result in minor, localised effects, such as temporary changes in water quality.

However, such discharges are common to all ocean-going vessels and are regulated by national law and international conventions (e.g. MARPOL 73/78). Vessels undertaking the proposed activities are specialised international vessels expected to comply fully with these standards and implement best-practice discharge management measures.

From a cultural heritage perspective, these routine discharges will not result in any perceptible change to the receiving environment. The drilling and majority of installation and construction activities will occur far offshore, beyond the visual and experiential range of coastal users and communities. While potential discharges in the nearshore survey and pipelay area could reach the coast; discharges are however expected to disperse rapidly to undetectable concentrations and are unlikely to have an impact on more sensitive coastal receptors or water quality. Furthermore, the limited number of vessels and their temporary presence further reduce the potential for any long-term effects. Accordingly, routine discharges are considered to contribute negligible additional impact relative to existing maritime activity and are not expected to materially affect cultural heritage links to the sea. Considering the management measures outlined in Section 8.4.1.3 these impacts are therefore assessed as minor and are screened out for further detailed assessment.

It should be noted that the cultural heritage impacts of drilling-related discharges and production-related effluents from the CPF, such as produced water, will be modelled and assessed in the ESIA (Section 9.2.1.1 and 9.2.1.2).

8.4.1.6 Introduction of Invasive Aliens due to Ballast Water Discharge

Ballast water is routinely used by offshore vessels to maintain safe operations. In this process, ballast water may be pumped into or out of the ballast water tanks of the vessel during a journey. Ballast water taken onboard will contain small marine organisms, some of which can survive the ballast water tanks. The discharge of ballast water in areas that are different from those where it was taken onboard can thus result in the release of marine organisms that are alien to the region where they are released. If these organisms are able to survive and proliferate in the new environment where they are released, they could then compete with native species and change the composition of the native ecosystem.

Such discharges are common to ocean-going vessels and are regulated by international conventions, such as the International Convention for the Control and Management of Ships' Ballast Water and Sediments (see Section 2.4). The Convention requires that all ships using ballast water exchange will do so at least 50 nm ($\pm$ 93 km) from the nearest land and wherever possible 200 nm ($\pm$ 370 km) from the nearest land in waters at least 200 m deep when arriving from a different marine region, to minimise the chances of fauna carried in the ballast water surviving.

For the proposed survey, construction and installation, production and decommissioning activities, ballast water from different regions will likely be discharged once off (upon arrival in the project region) by the Project vessels. These vessels are expected to remain in the broader Project area for the duration of their engagement on the project. Shuttle tankers are expected to arrive from ecologically different regions and could thus discharge ballast water with potentially alien organisms more frequently. Two alternative locations are proposed for the CPF, one on the continental shelf and the other near the well field. Both these locations are located beyond the minimum discharge distance ($\sim$ 93 km).



The majority of the Project area is located more than 50 nm ($\pm$ 93 km) offshore, which is offshore of the minimum discharge distance requirement of the Convention. The survey area and pipeline route do, however, extend closer to the coast than the minimum discharge distance. However, these vessels will approach the nearshore area from offshore and, like all other vessels calling at South African ports, are required to undertake ballast water exchange offshore. As such, ballast water should be exchanged, where possible *en route* to the project area.

Although a number of vessels will be engaged in the drilling, installation, commissioning and production phases, the overall number of such additional vessels and, notably, new arrivals is relatively low compared to overall shipping traffic off the South African south and east coasts. Ballast water discharge from Project vessels is not considered to pose a materially higher risk than that from a multitude of other vessels traversing South African waters daily on the major commercial shipping routes and/or calling at South African ports. Project vessels are highly specialised international vessels that are expected to fully implement standard international discharge management measures.

The following management measures must be implemented and will be included in the ESMP:

- Compile and implement a Ballast Water Management Plan that complies with the International Convention for the Control and Management of Ships' Ballast Water and Sediments standards (Regulation D2).
- Treat ballast water using approved Ballast Water Treatment System (BWTS) under MARPOL Regulation D2 (Ballast Water Management Convention) and adhere to any port protocols. As per Regulation D2, ensure discharged water contains:
 - < 10 viable organisms per m³ with a minimum dimension $\geq$ 50 μ m.
 - < 10 viable organisms per ml with dimensions between 10 μ m and <50 μ m.
 - *Vibrio cholerae* (O1 and O139): <1 colony-forming units (cfu) per 100 mL or <1 cfu per gram of zooplankton.
 - *Escherichia coli*: <250 cfu per 100 mL.
 - *Intestinal Enterococci*: <100 cfu per 100 mL.

8.4.1.7 Displacement of Shipping Vessels during Survey and Installation Activities

International shipping routes run along the mid to outer edge of the continental shelf offshore South Africa. North- and south-bound cargo vessels usually remain over the mid-shelf (100 m isobath), while tankers and bulk carriers usually remain further offshore. The latter do, however, move closer inshore to escape extremely rough conditions that develop within the Agulhas Current. Important commercial harbours include Cape Town, Mossel Bay and Port Elizabeth, while small fishing harbours and slipways are located at Struis Bay, Arniston, Stilbaai, Plettenberg Bay and Cape St Francis. Thus, the marine Project area lies in an area with high intensity shipping traffic, with the main routes occurring within the inshore / shallower sections (see Section 6.8.3.4).

Conducting the Project surveys requires that the position of the survey vessels and the equipment be accurately known. Bathymetry and sonar surveys require accurate navigation of the sound source over pre-determined survey transects, and seabed sampling requires the vessel to hold its position during the process. This, and the fact that the survey equipment needs to be towed in a set configuration behind the survey vessel, means that the survey operation has little manoeuvrability while operating. Similarly, the drilling unit and construction / installation vessels will also be required to hold their positions during operations.



Under the Convention on the International Regulations for Preventing Collisions at Sea (COLREGS, 1972, Part B, Section II, Rule 18), a vessel that is engaged in surveying or engaged in underwater operations, including pipelaying and towing, is defined as a “vessel restricted in its ability to manoeuvre”, which requires that power-driven and sailing vessels give way to a vessel restricted in her ability to manoeuvre. Vessels engaged in fishing are required to, so far as possible, keep out of the way of the operations and observe the operational safety zone.

Furthermore, under the Marine Traffic Act, 1981 (No. 2 of 1981), a survey vessel or vessel used for the purpose of exploiting the seabed, and their equipment, fall under the definition of an “offshore installation” and as such are protected by a 500 m safety exclusion zone. Unauthorised vessels may not enter the safety exclusion zone. These temporary exclusion zone will be described in a Notice to Mariners as a navigational warning.

The overall extent of these temporary safety exclusion zones is very small compared to the extent of the offshore environment. Any alterations to other vessels’ routes, if required at all, can be initiated early and will be minimal and not result in material changes in required vessel fuel or transit time.

Survey and construction / installation vessels will be required to utilise, and possibly traverse, these main shipping routes depending on the survey transects and final infrastructure layout / alignment, as well as mobilization and demobilization transit routes. Project vessels would, however, adhere to maritime traffic safety protocols and vessels travelling to the port will follow charted navigational channels and standard harbour and safety controls. Thus, the risk of collisions and accidents as it is assumed to be low.

The following management measures must be implemented:

- Request, in writing, the South African Navy Hydrographic Office (SANHO), issue a navigational warning as appropriate.
- Notify key stakeholders (including the fishing and shipping industry), at least three weeks prior to mobilisation of the survey vessel, drilling unit and construction / installation vessels.
- Use standard communication (constant bridge watch and radio contact) and navigation systems (lighting and signalling systems) on the Project vessels.

8.4.1.8 Sediment and Benthic Habitat Disturbance from ROV Operations

ROV surveys will be conducted to obtain high-resolution visual and video documentation of the seafloor and existing subsea infrastructure. These vehicles can operate at significant depths and are capable of navigating complex underwater terrains. ROV surveys are essential for identifying any ecological sensitivities, potential hazards and the precise locations for well drilling and installing subsea equipment, as well as the final clearance survey after drilling. They also allow for real-time monitoring and adjustments during the planning and execution of drilling and construction activities.

Although the standard operating procedure is not to settle or rest the ROV on the seabed, the ROVs thrusters may stir up the soft or silty sediments when operating very close to the seabed. This resuspension of fine sediments will result in localised increase in turbidity and could temporarily disturb seabed communities. However, sub-lethal or lethal responses would generally occur only at sediment concentrations well beyond those anticipated as a result of ROV thrusters. Any turbidity effects would be transient as sediments would redeposit after the ROV has departed the area. Any impacts would thus persist over the very short-term (hours) only.



The following management measures must be implemented:

- Ensure the ROV does not land or rest on the seabed as part of normal operations.

8.4.1.9 Alteration of the Sense of Place / Disturbance of Coastal Towns due to Helicopter and CPF Operations

Sense of place impacts from the Project could arise at coastal towns within flight path due to increased aircraft traffic. The increased use of helicopters to transport crew to and from the Project vessels (e.g. drilling unit, CPF, FLNG, etc.) adds to an existing presence of such aircrafts, and economic activity, at existing bases off the South Coast (e.g. George airport) and within the flight path to offshore Project areas.

These activities, assuming adherence to the Civil Aviation Act, 2016 (No. 6 of 2016) and associated regulations, are not expected to materially affect the sense of place; thus, sense of place impacts are expected to be limited.

The CPF will be located at one of two locations, either in deep water near the wells or in shallower water on the continental shelf, more than 95 km offshore. For an observer at the coast at a height of 30 m and 100 m above sea level, the horizon is at a distance of 19.6 km and 36 km, respectively. Thus, activities at the CPF will not be visible to any sensitive visual receptors from the coast.

The following management measures must be implemented and will be included in the ESMP:

- Implement a public information and disclosure programme covering all project activities to ensure that the public are informed of Project-related activities.
- Pre-plan flights to avoid extensive low altitude (<762 m or 2 500 ft) flights parallel to the shore.
- Comply fully with aviation and authority guidelines and rules.

8.4.1.10 Human Health Effects due to Air Emissions from Helicopter Operations

Helicopters will be used to transfer personnel from shore to the offshore Project vessels (e.g. drilling unit, CPF, FLNG, etc.) on a regular basis, as well as in medical emergencies. During such transits, including take-off and landing at a coastal location (George airport), the helicopters will emit air pollutants associated with burning of Jet-A1 (i.e. jet fuel). Such emissions are common to all aircraft and transient in relation to any one area.

Air emissions associated with project helicopters are not considered to pose a higher risk than other aircraft operating in the region. Helicopters transferring personnel for the project will adhere to the Civil Aviation Act, 2016 (No. 6 of 2016) and associated regulations.

Emissions from helicopters will be included in the air emissions and greenhouse gas inventory compiled for the Air Quality Impact Assessment and Climate Change Risk Assessment (see Section 9.2.2.11 and 9.2.2.12, respectively), however, the impact to human health is considered negligible.

The following management measures must be implemented and will be included in the ESMP:

- Plan operations efficiently. Optimise flights (number of trips required to and from shore) in order to lower fuel consumption.



8.4.1.11 Ecological, Human Health and Fishing Impacts from Vessel Transit

Vessels conducting various activities for this Project (e.g. survey, drilling, installation, transportation of supplies to and from the offshore Project area, and transportation of produced condensate and possibly LNG) will arrive in the offshore Project area, most likely from Mossel Bay, Cape Town or Gqeberha, or internationally for the drilling unit and shuttle tankers, and leave after completing their tasks. During such transit to and from the offshore project area, the vessels emit noise (associated with propellers), air pollutants (associated with fuel consumption), light (associated with deck and position lights) and routine discharges (discussed in Section 8.4.1.3).

Such emissions are common to all ocean-going vessels, including fishing boats, cargo ships and passenger / cruise ships, and are transient in relation to any one area.

The impacts associated with Project vessels during transit to and from the offshore Project area are not considered to pose a higher risk than those from a multitude of other vessels traversing South African waters daily on the major commercial shipping routes and fishing areas. Vessels implementing works for this Project are generally specialised vessels from reputable contractors that are expected to fully implement international best practice to manage such effects.

Considering the existing shipping activity within and around Licence Block 11B/12B, ambient underwater noise levels are already elevated above natural background conditions, typically ranging from approximately 90 to 130 dB re 1 μ Pa across the frequency band of 10 Hz to 10 kHz. This indicates that the receiving environment is subject to persistent, low-frequency anthropogenic noise associated with routine vessel traffic, to which marine fauna are likely habituated. In this context, the additional noise contribution from Project-related vessel presence and movement, including propeller noise during operations, is expected to be negligible in magnitude, spatial extent, and duration relative to the prevailing acoustic environment. Note that underwater noise from vessels in transit is not considered to be of sufficient amplitude to cause direct physical injury to marine life, even at close range. As such, the incremental increase in underwater noise from vessel activity, both during transit and movement within the project area, is not anticipated to result in measurable or significant impacts on marine receptors.

The following management measures must be implemented and will be included in the ESMP:

- Routine discharges: Refer to Section 8.4.1.3.
- Lighting:
 - Reduce the lighting on the project vessels, drilling unit and CPF, to a minimum compatible with safe operations whenever and wherever possible.
 - Position light sources, if possible and consistent with safe working practices, in places where emissions to the surrounding environment can be minimised.
- Emissions:
 - Implement a maintenance plan to ensure all diesel motors and generators receive adequate maintenance to minimise soot and unburnt diesel released to the atmosphere.
 - Plan operations efficiently. Optimise drilling unit / vessel positioning, movement and the logistics (number of trips required to and from the onshore logistics base) in order to lower fuel consumption.
 - Ensure no incineration of waste occurs within the port / harbour limits (as per MARPOL Annex VI) or without authorization (as per NEM:ICMA Section 70)



- Notification:
 - Notify key stakeholders (including the fishing industry), at least three weeks prior to mobilisation of the drilling unit, construction / installation vessels and CPF, respectively, in the offshore Project area and transshipment operations (i.e. transfer of produced fluids from CPF to shuttle tanker).
 - Request, in writing, SANHO issue a navigational warning as appropriate.

8.4.1.12 Release of Radioactive Material

The target resources are not expected to be naturally radioactive. Thus, drill cuttings are not expected to be radioactive.

During drilling, wireline logging and LWD involve the use of sealed radioactive sources in tools, which are kept in specially designed secured (locked) storage containers. Contractors with the necessary accreditation and certification will handle radioactive sources and they will comply with necessary regulations for the transport, storage, and handling of radioactive devices. The testing does not generate radioactive wastes.

During production, solids may be produced from the reservoir (mainly sand) and classified as Naturally Occurring Radioactive Material (NORM). This material will be, depending on the radioactivity level, appropriately stored and disposed of onshore via the National Radioactive Waste Disposal Institute (NRWDI).

The following management measures must be implemented and will be included in the ESMP:

- Store and dispose of any radioactive waste generated during production, dependent on radioactivity level, via the NRWDI.

8.4.1.13 Ecological Impacts from Anti-Fouling Paint used on CPF Hull

Antifouling paints are commonly used to prevent the accumulation of marine organisms on submerged surfaces, such as ship hulls. While antifouling paints are essential for operational efficiency and safety the biocides used in these coatings leach into the surrounding water, potentially harming non-target marine organisms and disrupting ecosystems. These effects are particularly pronounced in semi-enclosed or low-flushing environments such as harbours and marinas, where contaminants can accumulate in sediments.

In the context of this project, these potential risks are substantially mitigated through compliance with international best practice and regulatory frameworks. The CPF will be coated with an antifouling system that complies with the IMO International Convention on the Control of Harmful Anti-Fouling Systems on Ships (AFS Convention), which prohibits the use of harmful organotin compounds and regulates other substances. This has significantly reduced the environmental risks historically associated with antifouling coatings.

Considering compliance with AFS regulations and the offshore nature of the Project area, the accumulation of biocides, and any subsequent potential acute or chronic toxicity impacts, is expected to be negligible. Leached biocides are anticipated to disperse and dilute rapidly within the open offshore environment.

Consequently, the overall magnitude of impact related to anti-fouling paint is considered negligible, supporting the screening out of antifouling-related impacts as minor. It should, however, be noted that residual MEG and corrosion inhibitors discharged together with the produced water will be modelled and assessed (see Section 9.2.1.2).

The following management measures must be implemented and will be included in the ESMP:

- Use of anti-fouling paint in compliance with AFS Convention.



8.4.1.14 Ecological, Human Health and Sense of Place Impacts from Increased Vehicle Traffic

Construction-related vehicles undertaking onshore pipeline installation and associated activities are expected to access the Project area primarily from Mossel Bay via the N2 national highway, departing upon completion of their tasks.

A temporary increase in traffic volumes is anticipated over the onshore construction period (~9 to 12 months). This construction-related traffic will lead to an increase in traffic on local, regional and national roads. During this phase, traffic will mainly consist of construction vehicles, as well as delivery vehicles transporting construction materials, components and equipment, and vehicles transporting workers. Most construction related vehicles (e.g. excavators, haul trucks) will be stored on site within construction camps.

The impacts associated with these construction vehicles travelling to and from the onshore project area are not expected to be greater than those from the many other vehicles already using regional and national roads in and around the Project area. Access to the site will be via the N2 national highway, which is designed to accommodate high traffic volumes, including heavy and large vehicles, as well as regional roads.

Vehicle movements to and from the onshore Project area will also generate typical operational emissions, including noise (from engines), air pollutants (from fuel combustion), and artificial light (from vehicle and work lighting, should operations take place at night). These emissions are characteristic of standard vehicle operations and are transient, both spatially and temporally, affecting any given area for limited durations. Similar emissions are commonly associated with routine construction, freight transport, and general road usage within the region. Emissions related to onshore construction related activities (e.g. dust) will be considered qualitatively in the Air Quality Impact Assessment (see Section 9.2.2.11).

The following management measures must be implemented and will be included in the ESMP:

- Lighting:
 - Reduce the lighting on the vehicles, to a minimum compatible with safe operations whenever and wherever possible.
 - Position light sources, if possible and consistent with safe working practices, in places where emissions to the surrounding environment can be minimised.
- Emissions:
 - Implement a maintenance plan to ensure all diesel motors and generators receive adequate maintenance to minimise soot and unburnt diesel released to the atmosphere.
 - Plan operations efficiently. Optimise vehicle transit and logistics in order to lower fuel consumption.
 - Monitor dust levels and implement dust management measures.
- Notification:
 - Notify key stakeholders (including relevant landowners), at least three weeks prior to the start of onshore construction activities.
- Traffic Management:
 - Implement a traffic management plan during onshore construction period/activities.
 - Should abnormal loads be delivered to Project site, delivery to be completed under approved transport permits and with appropriate traffic management measures in place, in coordination with local authorities.



8.4.2 Unplanned Events

8.4.2.1 Impacts from Vessel Collisions with Marine Fauna

The physical presence of the Project vessels and increased vessel traffic between the offshore Project area and supply ports could increase the likelihood of animal-vessel collisions. Ship strikes have been documented from many regions and for numerous species of whales, with large baleen whales being particularly susceptible to collision. Any increase in vessel traffic through areas used as calving grounds or through which these species migrate will increase the risk of collision between a whale and a vessel. Basking turtles are particularly slow to react to approaching objects and may not be able to move rapidly away from approaching vessel.

The potential for collision between adult turtles / cetaceans and a Project vessel, is highly dependent on the abundance and behaviour of turtles and cetaceans in the offshore Project area at the time of the activities and vessel speed.

Collisions between turtles or cetaceans and vessels are not limited to project vessels, and given the slow speed of survey and construction / installation vessels during operations/when active, vessel strikes whilst operating are unlikely, but may occur during the transit of vessels to or from the offshore Project area. The overall likelihood and number incidents are expected to be very small for the Project activities in the context of the ocean environment and busy shipping traffic off the South Coast.

The following management measures must be implemented:

- Keep a constant watch from all vessels (Vessel Captain and crew) for cetaceans and turtles in the path of the vessel. Alter course of vessels in transit and avoid animals when necessary.
- Ensure support, supply and installation and construction vessel transit speed between the Project area and supply port is a maximum of 12 knots (22 km/hr) during routine operations, except within 25 km of the coast where it is reduced further to 10 knots (18 km/hr) as well as when sensitive marine fauna is present in the vicinity. Report any collisions with large whales to the International Whaling Commission (IWC) database, which has been shown to be a valuable tool for identifying the species most affected, vessels involved in collisions, and correlations between vessel speed and collision risk (Jensen & Silber, 2004).

8.4.2.2 Accidental Loss of Equipment at Sea

It is conceivable that some equipment may be lost overboard during vessel manoeuvring and/or installation and production activities. This could result in potential disturbance and damage to seabed habitats and associated fauna where equipment that is lost settles on the seabed, and/or injury or mortality to pelagic and neritic marine fauna due to collision with or entanglement in equipment drifting on the water surface or in the water column. Equipment on the seafloor could also provide a localised area of hard substrate for colonisation by benthic organisms.

Loss of equipment during transit is in principle common to all ocean-going vessels, and it is not expected that the risk of equipment loss is considerably higher, or more consequential, for the Project-related vessels that will operate as part of this Project.

During surveys, drilling and construction / installation, Project vessels will purposefully lower various types of equipment overboard for placement or activities on the seabed. The risk of accidental loss of equipment is in principle higher during such activities. Given the highly specialised and costly nature of most equipment used during these activities, and the fact that specialized vessels are contracted and crews are specifically trained in their operations, it is expected that all reasonable measures will be taken to prevent equipment loss. The



overall number of incidences and, therefore, effect of lost equipment is expected to be very limited, particularly when considered within the broader context of the marine environment, busy shipping traffic and other equipment that is purposefully placed on the seabed. Metocean monitoring equipment, such as the Acoustic Doppler Current Profiler, is designed to leave its mooring behind.

The following management measures must be implemented:

- Ensure containers are sealed / covered during transport and loads are lifted using the correct lifting procedure and within the maximum lifting capacity of crane system.
- Minimise the lifting path between vessels.
- Ensure that procedures include measures to minimise risk of loss of equipment and mitigations should loss occur.
- Maintain an inventory of all equipment (moveable) and undertake frequent checks to ensure items are stored and secured safely on board each vessel.
- Attempt to retrieve lost equipment.
- Undertake a post drilling ROV survey to scan seafloor for any dropped equipment near each well.
- Notify SANHO of any hazards left on the seabed or floating in the water column, with the dates of abandonment/loss and locations and request that they send out a Notice to Mariners with this information.

8.4.2.3 Hydrocarbon Leak from Plugged Well

The risk of a leak from permanently abandoned well is very low. Well plugging and abandonment are undertaken to ensure safe closure of non-producing offshore wells. Wells are sealed, plugged, tested for integrity and abandoned according to international best industry practices. The ultimate goal of these measures is to provide permanent containment of any remaining formation fluids and to prevent migration from the reservoir to the seabed, i.e. isolate any hydrocarbon bearing formations.

The principal technique applied to prevent cross flow between hydrocarbon bearing formations is plugging of the well with cement, thus creating an impermeable barrier between two zones. Depending on the formations encountered, a well may be plugged at multiple locations. In line with industry recommended practices, prior to leaving the location of an abandoned well, all installed barriers will be tested and verified for integrity by a number of methods.

Given that the wells will be permanently plugged and abandoned at the end the production, when the reservoir has largely been depleted, pressures and quantities in the reservoir would be lower than at present and, therefore, a leak from an abandoned production well is highly unlikely. Further information on plugging and abandonment will be detailed in the Conceptual Decommissioning and Closure Strategy (see Section 9.2.2.13).

Although a leak from an abandoned well is unlikely, it could result in the release of large quantities oil or gas. The quantities released are, however, likely to less than in the case of a well blow-out, which will be modelled and assessed in the ESIA (see Section 9.2.1.3).



9.0 Plan of Study for Impact Assessment

The Plan of Study for Impact Assessment is submitted in accordance with the requirements set out in Appendix 2(h) of the EIA Regulations 2014 (as amended), which sets out the proposed approach to the environmental and social impact assessment of the application. The contents for the Plan of Study for the ESIA, and where they are addressed in the Scoping Report, are shown in Table 9-1.

Table 9-1: Plan of study requirements as per Appendix 2 (h) in the EIA Regulations 2014

Plan of Study Requirements	Scoping Report Section
(i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity;	Section 5.8
(ii) a description of the aspects to be assessed as part of the environmental impact assessment process;	Section 7.0
(iii) aspects to be assessed by specialists;	Sections 9.1 and 9.2
(iv) a description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists;	Section 9.3
(v) a description of the proposed method of assessing duration and significance;	Sections 9.3.1
(vi) an indication of the stages at which the competent authority will be consulted;	Sections 2.2.1 and 3.4
(vii) particulars of the public participation process that will be conducted during the environmental impact assessment process;	Section 3.5
(viii) a description of the tasks that will be undertaken as part of the environmental impact assessment process;	Section 9.1
(ix) identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.	Section 9.3.3

9.1 Description of the Tasks Planned for the Assessment Phase

This plan provides an overview of the Impact Assessment Phase and public consultation process, highlighting the tasks and activities, further detail is provided in Sections 3.4.2 and 3.5, respectively. An outline of the planned specialist investigations is included in Section 9.2 below.

The specialist findings, mitigations, recommendations and other relevant information will be integrated into an ESIA Report, in compliance with Appendix 3 of the EIA Regulations 2014 (as amended). The ESIA Report will include an Environmental Management Programme (EMPr) compiled in terms of Appendix 4 of the EIA Regulations 2014 as amended. The EMPr will provide recommendations on how to establish, operate, maintain and close the Project throughout all relevant phases of the project activities. The aim of the EMPr will be to ensure that the Project activities are managed to avoid or reduce potential negative environmental and social impacts and enhance potential positive environmental and social impacts. The EMPr will detail the impact management objectives, outcomes and actions as required, the responsibility for implementation and the schedule and timeframe.



Requirements for monitoring of environmental and social aspects, as well as compliance monitoring and reporting, will also be detailed.

Future consultations that will be undertaken during the Impact Assessment Phase is summarised in Section 3.5.3.

9.2 Technical and Specialist Studies

The terms of reference for the technical modelling and specialist studies are presented in Section 9.2.1 and 9.2.2 below. These terms of reference have been designed to address all the issues that have been identified during the Scoping Phase (see Section 7.0).

The technical modelling studies (including drilling and liquid effluent discharges, oil spill and underwater noise) will not assess any potential impacts as such but rather provide supporting information for use in the other specialist studies, which will review and interpret data relevant to identifying and assessing environmental and social impacts that might occur as a result of the proposed survey, development and production activities in their particular field of expertise.

The specialist studies will provide baseline information and identify and assess impacts (refer to Section 7.0) according to predefined impact assessment criteria (see Section 9.3). Specialists will apply the mitigation hierarchy by identifying and recommending actions in sequential order of priority by first seeking to avoid impacts and where avoidance is not possible suggest ways in which negative impacts could be mitigated and benefits could be enhanced.

The results of the technical modelling and specialist studies will be integrated into the draft ESIA Report.

9.2.1 Technical Modelling Studies

9.2.1.1 Drilling Discharges Modelling

The specific terms of reference for the drilling discharges study are as follows:

- Provide a description of the metocean conditions, such as winds and ocean currents in Licence Block 11B/12B and the AOI.
- Model the transport, dispersion and bottom deposition of drill cuttings and associated mud discharged during drilling operations over four seasons using the CHEMMAP⁷⁰ and MUDMAP⁷¹ model (or similar). Modelling scenarios are presented in Table 9-2.
- Modelling parameters to include aspects such as type and quantity of drilling fluids used and constituents, depth of discharge and volume of cuttings.
- Present results in relation to the drilling location and include the assumptions, modelling parameters and any limitations of the modelling exercise. Modelling outputs are presented in Table 9-2.

⁷⁰ CHEMMAP is a chemical spill modelling system used to simulate the transport, fate, and environmental impacts of hazardous substances released into aquatic environments (marine or freshwater) and the atmosphere.

⁷¹ MUDMAP is a three-dimensional numerical model developed to simulate the release, transport, and fate of drill cuttings and drilling fluid discharges from offshore drilling operations. Using inputs such as ambient ocean currents, discharge characteristics, and physical properties of the discharged materials, MUDMAP simulates the transport and fate of drill cuttings and the solids fraction of drilling fluids, estimating both water column concentrations and seabed accumulation of discharged materials.



Further details on the relevant parameters and assumptions used in the drilling discharges modelling study will be provided in the Impact Assessment Phase.

Table 9-2: Drilling discharge modelling scenarios

No.	Scenario	Key assumptions / considerations
D1	<u>Drilling phase:</u> Sediment deposition footprint	- Model one well location within Paddavissie Fairway as a representative conservative location taking cognisance of the following criteria: - Proposed well locations within reservoir; - Distance from coast; - Proximity to protected / sensitive areas (including MPAs, CBAs and EBSAs); and - Metocean dataset. - Perform simulations over four seasons, including: - Season 1: December to February; - Season 2: March to May; - Season 3: June to August; and - Season 4: September to November. - The following thresholds will be applied: - The threshold of toxicity of chemicals is dependent on each component (cuttings, particulate matter and chemicals) (Predicted No Effect Concentration (PNEC) of each component); - The threshold for changes in grain size changes (PNEC) is dependant on the median seabed grain size; and - The threshold of deposition thickness is 6.5 mm (PNEC). Modelling Outputs: - Sediment stressors associated significant risk⁷² (above 5%) and Environmental Impact Factor (EIF⁷³). For the selected drill location, the results are to be presented for the following stressors: - Burial of organisms (sediment thickness); and - Toxicity of all chemicals (total concentration).
D2	<u>Drilling phase:</u> Water column plume	- Model one well location (refer to Scenario D1). - Perform simulations over four seasons (refer to Scenario D1). - The threshold of toxicity of chemicals is dependent on each component (cuttings, particulate matter and chemicals) (PNEC of each component). Modelling Outputs: - Water column stressors (total concentration) associated risk and EIF for the selected drill location. The results are related to the following stressors: - Toxicity of all chemicals; and - Turbidity (physical effects of suspended matter).

9.2.1.2 Liquid Effluent Discharges Modelling

The specific terms of reference for the liquid effluent discharges study are as follows:

- Provide a description of the metocean conditions, such as winds and ocean currents in Licence Block 11B/12B and the AOI.

⁷² In this study, risk is defined as an environmental assessment calculated by using the relationship between environmental exposure (Predicted Environmental Concentration - PEC) and sensitivity (Predicted No Effect Concentration - PNEC) to various stressors. Essentially, if a simulated stressor concentration (PEC) exceeds its environmental sensitivity threshold (PNEC), it represents a risk.

⁷³ In this study, EIF can be described as an integrated measure of the overall probability of damage caused by different stressors. It is an important result to identify how each stressor contributes to the risk.



- Model both the discharge of produced water and pipeline commissioning effluent (Table 9-3) over four seasons using the CORMIX⁷⁴ and CHEMMAP model:
- Produced water: Model a single representative conservative scenario considering a release of produced water from the CPF at the on-shelf location.
- Commissioning effluent: Model one or two representative scenarios (i.e. Scenario E2, off-shelf at seabed and Scenario E3, on-shelf at surface) considering the release of commissioning effluent during pipeline commissioning. The number of scenarios will be based on a screening analysis to determine the representative conservative scenario(s).
- Present results in relation to the release location(s) and include the assumptions, modelling parameters and any limitations of the modelling exercise. Modelling outputs are presented in Table 9-3.

Further details on the relevant parameters and assumptions used in the liquid effluents discharges modelling study will be provided in the Impact Assessment Phase.

Table 9-3: Liquid effluent discharge modelling scenarios

No.	Scenario	Key assumptions / considerations
E1	<u>Production phase:</u> Discharge of produced water in the water column	• Model the discharge of produced water from the on-shelf CPF location (i.e. shallow water location). • Release will be at surface through a 6" pipe orientated vertically downwards. • Perform simulations over four seasons, including: ◦ Season 1: December to February; ◦ Season 2: March to May; ◦ Season 3: June to August; and ◦ Season 4: September to November. • Different thresholds will used for each component depending on the indicative produced water composition (i.e. each component has a specific PNEC). Modelling Outputs: • Dilution of the effluent on the water column (total concentration). • Associated risk and EIF.
E2	<u>Installation phase:</u> Discharge of commissioning effluent (Luiperd Manifold)	• Model a release volume related to the commissioning of a pipe off the shelf at the Luiperd Manifold (i.e. deeper location). • Release will be near the seabed (~2 – 5 m off seabed), through a 10" horizontally orientated pipe. • Perform simulations over four seasons (refer to scenario E1). • Different thresholds will used for each component depending on the indicative commissioning fluid composition (i.e. each component has a specific PNEC). Modelling Outputs: • As per Scenario E2.
E3	<u>Installation phase:</u> Discharge of commissioning effluent (on-shelf CPF location)	• Model a release volume related to the commissioning of a pipe at the on-shelf CPF location (i.e. shallower location). • Release will be at the sea surface through a 12" pipe orientated vertically downwards. • Perform simulations over four seasons (refer to scenario E1). • Different thresholds will used for each component depending on the indicative commissioning fluid composition (i.e. each component has a specific PNEC).

⁷⁴ CORMIX is a United States Environmental Protection Agency (US EPA) supported model for point source discharges.



No.	Scenario	Key assumptions / considerations
		Modelling Outputs: As per Scenario E2.

9.2.1.3 Hydrocarbon Spill Modelling

The specific terms of reference for the oil spill modelling study are as follows:

- Provide a description of the metocean conditions, such as winds and ocean currents in Licence Block 11B/12B and beyond the AOI.
- Model the trajectory and fate of the spill scenarios (see Table 9-4) using the OILMAPDeep / TAMOC⁷⁵ and OILMAP / SIMAP⁷⁶ modelling tools.
- Present results in relation to the Project area and coast, and include the assumptions, modelling parameters and any limitations of the modelling exercise. Modelling outputs are presented in Table 9-4.

Further details on the relevant parameters and assumptions used in the hydrocarbon spill modelling study will be provided in the Impact Assessment Phase.

Table 9-4: Hydrocarbon spill modelling scenarios

No.	Scenario	Key assumptions / considerations
HS1	<u>Drilling phase:</u> Well blow-out	- Model a release of gas and unstabilised condensate from a well within Paddavissie Fairway using a representative condensate type and conservative location taking cognisance of the following: - Proposed well locations within reservoir; - Distance from coast; - Proximity to protected / sensitive areas (including MPAs, CBAs and EBSAs); and - Metocean dataset. - The duration of spill will be based on the estimated time to cap the well (20 days). - Perform simulations over four seasons without response, including: - Season 1: December to February; - Season 2: March to May; - Season 3: June to August; and - Season 4: September to November. - The following thresholds will be applied: - Surface: 1 µm thickness. Fingas (2021)(as cited in National Academies of Sciences, Engineering, and Medicine, 2022 (Oil in the Sea IV) found that this thickness threshold is typically associated with silver sheen. This is more conservative than the 10 µm, which corresponds to the thickness that would impart a lethal dose to an intersecting wildlife individual, as defined by French McCay 2009. - Water column: 10 ppb. Effects on aquatic organisms are mostly related to concentrations of dissolved oil components in the water. According to French McCay (2024), a threshold of 10 ppb was chosen to represent dissolved oil in the water column, this threshold is set conservatively to protect aquatic biota from acute effects, considering the potential short-term exposures resulting from oil spills in ocean waters.

⁷⁵ Near-field modelling for liquid oil/condensate blowouts will be performed using Tetra Techs' OILMAPDeep model, while TAMOC (Texas A&M Oil Spill Calculator) will be used for dry-gas subsea releases.

⁷⁶ Far-field modelling of liquid oil spills will be conducted using Tetra Techs' OILMAP / SIMAP framework.



No.	Scenario	Key assumptions / considerations
		- Shoreline oiling: 10 g/m². This is based on the literature reviews and analyses described in French-McCay et al. (2016) and French-McCay et al. (2018). Effects on socio-economic resource uses may occur (e.g., recreation, tourism) above the shoreline threshold, such that this level of contamination may trigger the need for shoreline clean-up on amenity beaches. Modelling Outputs: - Stochastic Simulations: - Probability of oil on the sea surface. - Probability of oil in the water column. - Minimum arrival time at surface. - Minimum arrival time at onshore. - Deterministic Simulations: - Quantify the “conservative” scenarios based on selected criteria - to be confirmed after stochastic simulations (e.g. maximum coastline affected, maximum water-column extent, maximum surface extent).
HS2	<u>Production phase:</u> Multiphase pipeline leak	- Model a release of gas and unstabilised condensate from a full-bore rupture of 18” (internal diameter) pipeline at the representative conservative location (on-shelf at CPF riser base on the seabed), taking cognisance of the criteria in Scenario HS1. - Perform simulations over four seasons (refer to Scenario HS1) without response. - Thresholds: As per Scenario HS1. Modelling Outputs: - As per Scenario HS1.
HS3	<u>Production phase:</u> Gas pipeline leak	- Model a release of dry gas along the gas export pipeline at a shallow water on-shelf location ~42 km offshore at the possible / likely point where the offshore pipeline transitions to the concrete coated and buried section extending to the shore. - Perform simulations over four seasons (refer to Scenario HS1) without response. - Thresholds: As per Scenario HS1. Modelling Outputs: - As per Scenario HS1.
HS4	<u>Production phase:</u> Loss of condensate from CPF (see note 1)	- Model an instantaneous loss of stabilised condensate from a CPF condensate tank at the sea surface using a representative worst-case conservative location (i.e. on-shelf CPF location). - Perform simulations over four seasons (refer to Scenario HS1) without response. - Thresholds: As per Scenario HS1. Modelling Outputs: - As per Scenario HS1.
HS5	<u>Production phase:</u> Loss of condensate during transshipment operations from CPF to DPST (see note 2)	- Model a loss of stabilised condensate during transfer operations at the sea surface from CPF to DPST using a representative “conservative” location (i.e. on-shelf CPF location). - Perform simulations over four seasons (refer to Scenario HS1) without response. - Thresholds: As per Scenario HS1. Modelling Outputs: - As per Scenario HS1.



No.	Scenario	Key assumptions / considerations
Notes:		
1.	Scenario HS4 also covers a loss of marine diesel from the CPF storage tank, as the condensate scenario is the most conservative scenario based on the anticipated spill volumes, oil characteristics and weathering behaviours.	
2.	Scenario HS5 also covers a loss of marine diesel during bunkering operations, as the condensate scenario is the most conservative scenario based on the anticipated spill volumes, oil characteristics and weathering behaviours.	

9.2.1.4 Underwater Noise Modelling

The specific terms of reference for the underwater noise modelling study are as follows:

- Identify significant sources of underwater noise in relation to operation activities and quantify the typical noise characteristics of these sources (such as the source level, the frequency content and the temporal characteristics, etc.).
- Investigate the baseline underwater noise environment based on a review of available baseline/ambient noise data for the area of interest, or relevant metocean data (e.g., current, wind, etc.) when the noise measurement data are not available.
- Establish noise exposure assessment criteria for the identified marine fauna species to be assessed, based on applicable guidelines or regulatory requirements.
- Undertake detailed marine noise modelling predictions, for the modelling scenarios presented in Table 9-5 and outlined below:
 - VSP airgun array source levels will be modelled using the Gundalf Designer software package, including the far-field signatures, directivities and beam patterns;
 - Drilling, installation and production operations source levels for the proposed Project vessels will be derived using empirical formula based on the generic/representative specifications of the vessels.
 - Broadband noise propagation transmission loss will be modelled using the fluid parabolic equation modelling algorithm RAMGeo at one-third octave band central frequencies;
 - The received levels, as a function of range, depth and frequency, will then be obtained via combination of source spectral levels and transmission loss modelling results; and
 - Cumulative sound exposure level (SEL_{cum}) modelling prediction will be performed considering relevant cumulative operational characteristics (such as exposure duration, VSP operations, etc.), in line with the “Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area” (ACCOBAMS) guidelines.
 - Post-processing and analysis of the above modelling results will be undertaken to derive relevant zones of impact for injury and behaviour.

Table 9-5: Underwater noise modelling scenarios

No.	Scenario	Key assumptions / considerations
U1	<u>Bathymetric Surveys:</u> Cumulative underwater noise during bathymetric surveys	• Present modelling results from the modelling undertaken from the Surveys ESIA (SLR 2025; WSP 2025). • Model one additional modelling location in the nearshore area (~ 10 m deep), along the base case pipeline route, using sound source levels as modelled by WSP (2025). Modelling Outputs: • Predicted source noise emissions for bathymetric survey activities. • Maximum sound transmission loss for sound source, including horizontal range and cross sections.



No.	Scenario	Key assumptions / considerations
		Relevant zones of impact to the physiological (i.e., hearing impairment), physical (hearing damage), and behavioural responses of marine mammals, fish, and turtles when exposed to continuous exposure to resulting underwater noise.
U2	<u>Drilling Phase:</u> Cumulative vessel noise during initial well drilling at Paddavissie Fairway (non-impulsive noise) <i>Maximum concentration of vessels before start of SPS and SURF installation</i>	- Modelling to consider well drilling activities taking cognisance of the indicative drilling strategy, locations and schedule (which will determine the representative conservative location). - Modelling to consider a total of four vessels, each using dynamic positioning (DP), working in close proximity to one another: - One drill unit; - One Anchor Handline Tug (AHT); - One supply vessels; and - One support vessel (on standby within the larger field). Modelling Outputs: - Predicted source noise emissions for the combination of offshore vessels using DP. - Maximum sound transmission loss for combined DP sources, including horizontal range and cross sections. - Relevant zones of impact to the physiological (i.e., hearing impairment), physical (hearing damage), and behavioural responses of marine mammals, fish, and turtles when exposed to continuous exposure to offshore vessels. .
U3	<u>Drilling Phase:</u> Noise from VSP of a well at Paddavissie Fairway (impulsive noise)	- Modelling to consider VSP noise for one well using a representative conservative location considering proximity to protected / sensitive areas. (Note: VSP will only be conducted at a few selected well sites). - Modelling will consider a 6-airgun, 1 200 CUI (G-Gun) source array. Modelling Outputs: - Source levels of VSP, including notional signature, far-field signature, power spectral density and beam patterns. - Maximum sound transmission loss for a single VSP pulse from a well, including horizontal range and cross sections. - Relevant zones of impact to the physiological (i.e., hearing impairment), physical (hearing damage), and behavioural responses of marine mammals, fish, and turtles when exposed to: - Immediate exposure to a single VSP pulse; and - Cumulative exposure to multiple VSP pulses.
U4	<u>Drilling and Installation Phase:</u> Cumulative vessel noise during concurrent well drilling and installation of subsea equipment at Paddavissie Fairway and development area (non-impulsive noise)	- Modelling to consider installation of subsea equipment and facilities on the seabed while concurrent drilling of wells continues. - Scenario considers total of 9 vessels, each using DP and working throughout the Paddavissie field and development area: - Four vessels as per Scenario U2; - Three subsea installation vessels (including pipelay, umbilical lay and heavy construction vessel); - One pipe carrier vessel; and - One supply vessel for the subsea installation vessels. Modelling Outputs: - Refer to Scenario U2.



No.	Scenario	Key assumptions / considerations
	<i>Maximum concentration of vessels during entire Project</i>	
U5	<u>Drilling and Installation Phase:</u> Cumulative underwater noise from pile driving (impulsive noise)	- Modelling to consider pile driving of CPF mooring systems at the on-shelf CPF location. - Scenario considers potential hammer source and the widest potential pile diameter. Modelling Outputs: - Refer to Scenario U2.
U6	<u>Production Phase:</u> Cumulative vessel noise during transfer of produced hydrocarbon from CPF to DPST (non-impulsive noise) <i>Maximum concentration of vessels at CPF during production period</i>	- Modelling to consider the ~1 day / 24-hour period when the DPST is at the CPF to load LNG from the FLNG facility and stabilised condensate from the FSO vessel. - Scenario considers the concurrent transfer from the FLNG and FSO vessels (Scenario 2) and includes up to eight vessels: - One FLNG vessel; - One FSO vessel; - Two DPST vessel; and - Two support vessel (to supervise exclusion zone and assist). - Two AHTs (to support positioning) - Outside of the loading period, only a support vessel and the FLNG and FSO are at the CPF site. The support vessel will use a combination of drift, repositioning and DP for positioning, as required at the time. - Use of an FPSO vessel (Scenario 1) will result in fewer (approximately half) vessel operating during offloading. Modelling Outputs: - Refer to Scenario U2.

9.2.1.5 Quantitative Risk Assessment

Under the Occupation Health and Safety Act, 1993, the pipeline is likely be classified a MHI establishment and will require a risk assessment in terms of the MHI Regulations, 2023 (see Table 2-4). The terms of reference for the Quantitative Risk Assessment (QRA) include:

- Apply a screening-level QRA approach, appropriate to the ESIA stage, using preliminary design information (including processing units, inventories, routing, and transport conditions for all alternatives), storage inventories, and processing assumptions to estimate risk profiles and determine acceptability.
- Develop credible accident scenarios (including spills, fires and explosions) based on SANS 1461 requirements and relevant international methodologies;
 - Estimate the probability of identified scenarios using generic failure rate data for relevant components (e.g. tanks, pipelines, valves, pumps and fittings).
 - Assess potential consequences of identified scenarios, including thermal radiation, explosion impacts, toxic dispersion, and potential domino effects, taking into account local meteorological conditions (wind speed and direction).
- Utilise appropriate modelling tools (e.g. RISKCURVES) to model consequence and risk estimates.
- Determine key risk metrics, including 1% fatality contours and Maximum Individual Risk, for scenarios with potential off-site impacts.



- Identify and rank risks to inform potential risk reduction and mitigation measures.
- Document the methodology, assumptions, results, and limitations in a report aligned with SANS 1461 and ESIA requirements.

9.2.2 Specialist Studies

9.2.2.1 General Terms of Reference for the Specialist Studies

The following general terms of reference will apply to the specialist studies:

- Describe the receiving environment and baseline conditions that exist in the study area (area of influence) and identify any sensitive areas that will need special consideration.
- Review and confirm the key impacts identified for assessment (see Sections 7.0) and Scoping Comments and Responses Report to ensure that all relevant issues and concerns relevant to fields of expertise are addressed.
- Comply with DFFE guidelines, as well as any other relevant guidelines, on specialist study requirements for ESIA's.
- Comply with the relevant specialist assessment and minimum report content requirements listed in the gazetted Specialist Protocols (GN R320 of 20 March 2020) and in Government Notice No. 1150 of 30 October 2020, or where no protocol has been prescribed, comply with the provisions of Appendix 6 of the EIA Regulations, 2014.
- Identify and assess potential impacts of the proposed project activities and infrastructure, including any associated cumulative impacts⁷⁷ (e.g. proposed Garden Route GtP Project).
- Describe the legal, permit, policy and planning requirements.
- Identify areas where issues could combine or interact with issues likely to be covered by other specialists, resulting in aggravated or enhanced impacts.
- Indicate the reliability of information utilised in the assessment of impacts, as well as any constraints to which the assessment is subject (e.g., any areas of insufficient information or uncertainty).
- Where necessary consider the precautionary principle in the assessment of impacts.
- Identify management and mitigation actions using the Mitigation Hierarchy by recommending actions in order of sequential priority. Avoid first, then reduce/minimise, then rectify and then lastly offset (see Section 9.3.3).
- Identify alternatives that could avoid or minimise impacts.
- Determine significance thresholds for limits of acceptable change.

⁷⁷ Impacts that in combination with other impacts from the same project or other existing or planned (but reasonably foreseeable) projects affect the same environmental or social resources and/or receptors as the Project. They may be of two types:

- Additive - impacts that may result from the combined or incremental effects of future planned activities (i.e. those developments currently in planning and not included as part of the existing baseline conditions); or
- In-combination - impacts where individual project-related impacts are likely to affect the same environmental or socioeconomic feature (e.g., a combined effect of noise and drill cutting on a receptor acting together in space and time could result in increased effects greater than the individual effects in isolation).



- Where applicable, specialists shall use the assessment method for impact prediction and assigning significance (see Section 9.3).

9.2.2.2 Marine Ecology Impact Assessment

The terms of reference for the Marine Ecology Impact Assessment are as follows:

- Provide a description of the benthic and pelagic ecosystems within and around Licence Block 11B/12B and the AOI, identifying sensitive habitats, key species and ecological drivers. Baseline information will draw from published literature, existing environmental datasets, previous ESIA studies, MMO records, and relevant oceanographic data. Uncertainties or data limitations will be explicitly identified.
- Summarise the occurrence, seasonal patterns, and migratory behaviour of marine mammals, seabirds, turtles, pelagic and benthic invertebrates, and planktonic communities, with clear indication of IUCN, national threat status, and/or conservation significance.
- Present the spatial extent of nearby MPAs, EBSAs, CBAs, KBAs, and any other priority ecological zones. Include relevant management/mitigation recommendations or management zones relevant to the project area.
- Identify, describe and assess the significance of potential impacts of the proposed development (offshore and pipeline up to the high-water mark (HWM) of the sea) across its lifecycle (drilling, installation, operations, decommissioning). The assessment will consider both normal operations and unplanned events (emergency situations) and will be informed by technical modelling studies commissioned as part of the overall ESIA (see Section 9.2.1).
- Recommend practical, implementable measures following the mitigation hierarchy (avoid-minimise-restore-offset, where applicable), as well as recommended monitoring requirements (see Section 9.3.3).

9.2.2.3 Fisheries Impact Assessment

The terms of reference for the Fisheries Impact Assessment are as follows:

- Provide a description of the commercial, recreational and small-scale fisheries operating within and around Licence Block 11B/12B and the AOI, identifying key target species, bycatch species and fisheries-relevant ecosystem drivers. Baseline information will draw from national fisheries catch and effort logbook data provided by the DFFE, published literature, previous ESIA studies, Fisheries Liaison Officer (FLO) records and relevant oceanographic data. Uncertainties or data limitations will be explicitly identified.
- Summarise the occurrence, seasonal patterns, migratory behaviour and life-history strategies of pelagic and demersal fish species.
- Present the spatial extent of active fishing grounds in relation to the project's footprint and undertake a spatial and temporal assessment of recent and historical fishing catch and effort in the project area.
- Identify, describe and assess the significance of potential impacts of the proposed development across its lifecycle (drilling, installation, operations, decommissioning). The assessment will consider both normal operations and unplanned events (emergency situations) and will be informed by technical modelling studies commissioned as part of the overall ESIA (see Section 9.2.1).



- Recommend practical, implementable measures following the mitigation hierarchy (avoid-minimise-restore-offset, where applicable), as well as recommended monitoring requirements (see Section 9.3.3).

9.2.2.4 Terrestrial Biodiversity Impact Assessment

The terms of reference for the terrestrial biodiversity impact assessment are as follows:

- Undertake a site sensitivity verification of the proposed onshore pipeline route alternatives in accordance with the procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of Sections 24(5)(a) and (h) and 44 of the NEMA, 1998.
- Identify, map (vegetation and conservation value / sensitivity map) and describe the flora present that would be affected by the establishment of the shore crossing, pipeline route based on a field survey and available literature.
- Identify any species of special concern viz. species with conservation status, endemic to the areas or threatened species that exist or may exist at these locations.
- Provide a conservation importance rating of the vegetation in the areas (in local, regional and national terms).
- Provide a broad description of the existing environment in terms of its fauna (including avifauna) based on a field survey and available literature.
- Identify and describe sensitive faunal habitats along the proposed pipeline routes from the shore crossing to the onshore facility.
- Investigate ecological / biodiversity processes that could be affected by the Project and consider current CBAs, ESAs, protected areas and important biodiversity corridors.
- Assess the significance of the loss of vegetation/habitat and impact on ecological / biodiversity processes as a result of the implementation of the proposed project activities (normal operations).
- Identify practicable mitigation measures to reduce any negative impacts on terrestrial ecology (including species and techniques that could potentially be used for rehabilitation purposes) and indicate how these could be implemented in the construction and management of the proposed project.
- Provide guidance for the requirement of a permit in terms of the NEM:BA, 2004 to remove or destroy threatened or protected species.

9.2.2.5 Aquatic Biodiversity Impact Assessment

The terms of reference for the Aquatic Biodiversity Impact Assessment are as follows:

- Undertake a site sensitivity verification of the onshore pipeline route alternatives in accordance with the procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of Sections 24(5)(a) and (h) and 44 of the NEMA, 1998, as identified by the national web-based environmental screening tool.
- Identify, map, and describe the freshwater systems, both natural and man-made, that could be affected by the proposed shore crossings and pipeline routes based on a field survey and available literature.
- Describe the ecological condition, sensitivity, ecological important and conservation value of all identified freshwater systems.



- Investigate ecological / biodiversity processes that could be affected (positively and/or negatively) by the proposed project.
- Identify and assess the significance of potential impacts associated with the proposed project (normal operations) on the freshwater systems.
- Identify practicable mitigation measures to reduce impacts on the aquatic fauna and flora during construction and operation.
- Complete a risk assessment in accordance with the requirements of the DWS General Authorisation in terms of Section 39 of the NWA for water uses as defined in Section 21(c) or Section 21(i) (see Section 2.2.1.11).
- Provide guidance for the requirement of any licences or permits from the DWS.

9.2.2.6 Soils and Agriculture Impact Assessment

The terms of reference for the Soils and Agricultural Impact Assessment are as follows:

- Undertake a site sensitivity verification of the onshore pipeline route alternatives in accordance with the procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of Sections 24(5)(a) and (h) and 44 of the NEMA, 1998, as identified by the national web-based environmental screening tool.
- Assess land capability and agricultural potential based on soil, terrain and climatic characteristics.
- Classify land capability according to the standard eight-class system (Classes I–VIII), including grouping into broader capability categories and identifying associated use limitations and risks.
- Determine land potential classes through integration of land capability and regional climatic suitability.
- Classify land use into relevant categories, including cultivation, grazing, natural areas, mining, urban areas, and water bodies.
- Identify and map current land use within the study area using aerial imagery, followed by ground-truthing during field surveys.
- Identify and assess the significance of potential impacts associated with the proposed project (normal operations) on land capability and land uses.
- Identify practicable mitigation measures to reduce impacts during construction and operation.

9.2.2.7 Onshore Heritage and Palaeontology Impact Assessment (Tangible)

The terms of reference for the onshore Heritage and Palaeontology Impact Assessment are as follows:

- Comply with the relevant requirements of Section 38 of the NHRA.
- Describe the archaeology, palaeontology and cultural heritage of the shore crossings, pipeline route alternatives and identify and map any sites of archaeology, palaeontology or cultural significance that may be impacted by the Project.
- Assess the sensitivity and conservation significance of any sites of archaeological, palaeontology or cultural heritage significance affected by the Project.
- Identify and assess the significance of the potential impacts (normal operations) of the proposed project on archaeological, palaeontology and cultural heritage.



- Identify practicable mitigation measures to avoid and / or reduce negative impacts on the archaeological / palaeontology resources and indicate how these can be incorporated into the construction and management of the proposed project.

9.2.2.8 Underwater (Maritime) Heritage Impact Assessment (Tangible)

The terms of reference for the Maritime Heritage Impact Assessment are as follows:

- Undertake a desktop review of the potential presence of maritime archaeological resources within Licence Block 11B/12B and associated pipeline route alternatives, including historical shipwrecks and related material, submerged prehistoric archaeological sites, and palaeontological features.
- Evaluate the significance of identified or potential heritage resources in accordance with the NHRA and applicable guidelines (e.g. SAHRA Minimum Standards and Heritage Impact Assessment Guidelines).
- Identify, describe and assess the significant of potential impacts to marine heritage resources, including shipwrecks (historic and modern), palaeontological resources, and any other archaeological material that may occur on or within the seabed, arising from project activities. The assessment will consider both normal operations and unplanned events (emergency situations) and will be informed by technical modelling studies commissioned as part of the overall ESIA (see Section 9.2.1).
- Recommend practical, implementable measures following the mitigation hierarchy (avoid-minimise-restore-offset, where applicable), as well as recommend a “Chance Finds Procedure” to be implemented during construction and installation activities to manage any previously unrecorded heritage resources encountered.

9.2.2.9 Intangible Cultural Heritage Impact Assessment

The specific terms of reference for the Intangible Cultural Heritage (ICH) Impact Assessment are as follows:

- Utilise primary and secondary data, and anthropological research, in selected key communities within the indirect area of influence to describe, discuss and analyse the receiving environment and baseline conditions in the area, as these pertain to issues of culture, spiritual and religious uses of the sea and coast.
- Utilise both primary and secondary data and resources to assess the potential intangible cultural heritage impacts of both normal operations and unplanned events on the heritages of indigenous, autochthonous and recently settled peoples, their spiritual and religious uses of / connections to the sea and coast and their cultural valuation of these assets. Include:
 - Indigenous and autochthonous ancestral beliefs and ritual practices regarding coastal and deep ocean significance. This includes Khoisan cultural relations with the sea and coast;
 - ICH of settler groups (English / Portuguese / other European descendants) and coastal ICH indicated by Afrikaans speaking peoples; and
 - Gender and generational dimensions of ICH at the coast in the selected sites.
- Identify practicable mitigation measures to reduce potential negative impacts on aspects of culture and spiritual/religious uses of the sea and coast and /or enhance potential benefits.

9.2.2.10 Socio-Economic Impact Assessment

The terms of reference for the socio-economic impact assessment are as follows:



- Compile a socio-economic baseline for the Project's indirect area of influence. This should consider the extent of potential Project linkages with the local population and nearby communities, as well as related potential impacts affecting these.
- Identify and assess the potential socio-economic impacts and benefits associated with the proposed production and development activities (normal operations) and unplanned events, including direct, indirect and induced impacts on e.g.:
 - Income and job creation;
 - State revenue;
 - Induced economic activity;
 - Community health; and
 - Community conflict regarding project desirability.
- Quantify potential benefits (for normal operations) and impacts (for normal operations and unplanned events) of the project on the wider economy and specific relevant sectors.
- Provide practical and reasonable mitigation measures to reduce predicted negative socio-economic impacts, as well as sustainable recommendations for the enhancement of potential benefits.

9.2.2.11 Air Quality Impact Assessment

The specific terms of reference for the Air Quality Impact Assessment are as follows:

- Conduct a desktop review of available information to contextualise the study area, including the analysis of available ambient air quality monitoring data (e.g. South African Air Quality Information System, SAAQIS) and the identification of possible sensitive receptors and proximate pollution sources within the likely area of impact.
- Establish an emissions inventory from key emission sources, including fuel combustion, fugitive losses, evaporative emissions, etc. The pollutants of focus will include sulphur dioxide (SO₂), oxides of nitrogen (NO_x), carbon monoxide (CO), non-methane volatile organic compounds (NMVOC) and particulate matter (PM).
- Undertake dispersion modelling using the CALPUFF⁷⁸ and/or SCREEN3⁷⁹ Modelling System, to determine surface-level impacts of emissions from the proposed project activities (see Table 9-6).
- Describe and assess air quality impacts of particulate and gaseous emissions of normal operations and unplanned events (e.g. well blow-out and gas pipeline leak) on the receiving environment through comparison of calculated ambient concentrations with national standards and international guidelines, as applicable.
- Identify and recommend practicable air quality monitoring and mitigation measures to avoid and/or reduce any negative impacts.

⁷⁸ CALPUFF is an advanced non-steady-state meteorological and air quality modelling system. The model has been listed by the U.S. Environmental Protection Agency as an alternative model for assessing long range transport of pollutants and for certain near-field applications involving complex meteorological conditions (<https://calpuff.org/>).

⁷⁹ SCREEN3 is a screening-level Gaussian dispersion model developed by the U.S. EPA to estimate worst-case short-term air quality impacts from single emission sources.



Table 9-6: Air quality modelling scenarios

No.	Scenario	Key assumptions / considerations	Model
A1	<u>Installation phase:</u> Emissions during offshore installation and construction activities	- Considers applicable emission sources during offshore construction and installation activities including; - Fuel combustion by vessels; - Drilling vessel power generation; - Degassing of drilling fluid; and - Well clean up flaring. Modelling Outputs: - Predicted pollutant concentrations for SO₂, NO_x, CO, PM₁₀, PM_{2.5} and NMVOC. - Short-term (i.e. 1-hour, 8-hour and 24-hour) averages for comparison with health-based ambient standards/guidelines.	CALPUFF
A2	<u>Production phase:</u> Emissions related to offshore production and operational activities	- Considers applicable emission sources during offshore production activities including; - CPF power generation; - Treatment and processing; - Storage and loading; - Flaring; - Fugitive leaks; and - Conventional tanker exhaust. Modelling Outputs: - As per Scenario A1 as well as averages long-term (i.e. annual) averages for comparison with health-based ambient standards/guidelines.	CALPUFF
A3	<u>Drilling / Production phase:</u> Emergency (non-routine) flaring	- Considered air emissions related to unplanned, emergency (non-routine) flaring during drilling / production activities. Modelling Outputs: - As per Scenario A1.	CALPUFF
A4	<u>Drilling / Production phase:</u> Well blow-out	- Considers surface evaporation and dispersion from an accidental well blow-out. - Scenario will be based on spill modelling data (see Scenario HS1 in Table 9-4). Modelling Outputs: - Predicted pollutant concentrations from an unplanned well blow-out. - NMVOC, speciated for benzene (where possible); and - Short-term (i.e. 1-hour, 8-hour and 24-hour) averages for comparison with health-based ambient standards/guidelines.	CALPUFF
A5	<u>Production phase:</u> Gas pipeline leak	- Considers surface evaporation and dispersion from an accidental gas pipeline leak. - Scenario will be based on spill modelling data (see Scenario HS3 in Table 9-4). Modelling Outputs: - As per Scenario A4.	SCREEN3



9.2.2.12 Climate Change Risk Assessment

The specific terms of reference for the Climate Change Risk Assessment are as follows:

- Undertake a desktop review of relevant local and international legislation, policies, and plans to understand the legislative and policy context within which the Project would be developed (see Section 2.3.3).
- Undertake a desktop review of the latest climate data to identify the observed and projected changes in climate which could adversely affect the Project in the future. This review will be limited to the Climate Insights data obtained from ClimSystems, which provides site-specific climate data for a range of metrics, including extreme wind speed, extreme precipitation, heatwave days, mean sea level rise, sea water temperature and wave height, and credible online sources (e.g., scholarly sources, government and intergovernmental sources and industry organisations).
- Quantify the Project's direct (Scope 1) and indirect (Scope 2) GHG emissions in accordance with the DFFE Methodological Guidelines over the full lifecycle of the project (i.e., construction, operational, and decommissioning phases). The quantification will be based on information provided by Main Street, relevant industry guidelines and credible online sources. The quantification will be limited to the material sources of GHG emissions.
- Quantify the indirect (Scope 3) emissions from the use or refinement of the sold products (i.e., dry gas, LNG, condensate). The other Scope 3 categories have been excluded on the basis that they are likely to be insignificant relative to the GHG emissions arising from production and use of sold products.
- Quantify the potential GHG emissions from three unplanned events, namely a well blow-out scenario (Scenario HS1; Table 9-4), multiphase pipeline leak (Scenario HS2; Table 9-4) and dry gas pipeline leak (Scenario HS3; Table 9-4). The impact of these emissions will not be formerly assessed.
- Calculate the contribution of the project's direct (Scope 1) and indirect (Scope 2) GHG emissions to South Africa's GHG emissions trajectory contained in the NDC. The impact of this contribution will not be formerly assessed.
- Calculate the contribution of the Project's direct (Scope 1), indirect (Scope 2), and selected other indirect (Scope 3) GHG emissions to global atmospheric concentrations. The impact significant of this contribution will not be formerly assessed.
- Undertake a qualitative assessment of:
 - The climate-related impacts (physical and transitional) on the Project.
 - The impact of the Project on communities that are already impacted by climate change, priority ecosystem services which may be exacerbated by climate change, and sites of demonstrated importance to climate change adaptation for either species or ecosystems (if any).
 - The impact of the Project's calculated direct (Scope 1) and indirect (Scope 2) GHG emissions.

The impacts will be assessed in accordance with the impact assessment methodology outlined in the DRAFT National Guideline.

- Identify appropriate, high-level measures to mitigate the climate-related impacts and the Project's GHG emissions.



9.2.2.13 Conceptual Closure and Decommissioning Strategy

The closure component will be aligned with the Financial Provisioning Regulations 2015 (GN R1147), as amended, published under NEMA. Since the minimum requirements were developed for surface and underground mining, certain aspects of the reporting will be revised to align with oil and gas operations, most notably:

- The Annual Rehabilitation Plan (Appendix 3 of GN R1147) is not applicable and will be excluded;
- The Environmental Risk Assessment Report (Appendix 5 of GN R1147) is geared towards quantifying and costing for the pumping and treatment of extraneous water in a mining context and will be excluded; and
- The latent and residual risks will be addressed in the Closure Environmental Risk Assessment (ERA) and Closure Plan.

This study will inform the other specialist studies, including marine ecology, fisheries, social, economic studies, cultural heritage and climate change. The specific terms of reference for the Conceptual Closure and Decommissioning Strategy are as follows:

- Compile a Closure ERA:
 - Compile a Closure ERA focusing on strategic environmental, socio-economic, technical, regulatory compliance, reputational, and financial considerations, and document the findings in a formal ERA template.
 - Assess the significance of risks before and after mitigation, with a focus on identifying potential residual and post-closure risks that may require ongoing management following infrastructure dismantling, removal, and plugging and abandonment activities.
- Compile a Conceptual Closure Plan aligned with GN R1147:
 - Develop obligations register to ensure that all applicable legislative requirements, relevant International Industry Good Practice (IIGP), subscribed international standards, and internal company standards are identified, described, and addressed.
- Develop a Closure Cost Estimate in alignment with GN R1147:
 - Prepare cost estimates based on International Industry Good Practice (IIGP), including applicable standards developed by Main Street and the Association for the Advancement of Cost Engineering (AACE) International Cost Estimate Classification System.
 - Consider additional industry best-practice methodologies, including the Plugging and Abandonment Methodology and Cost Evaluation (TSB Offshore and ICF Incorporated, 2016).
 - Apply relevant AACE International recommended practices and classification systems for cost estimation, targeting a Class 4 estimate with an expected accuracy range of Low: -15% to -60% and High: +30% to +120%.

9.3 Proposed Method for Assessing Impact Significance

This section sets out the approach and method for the assessment of impacts for the Project and defines the terminology applied and the steps used to evaluate impact significance. The method impact assessment method has been developed by SLR and in compliance with the requirements of the EIA Regulations 2014, as amended.



9.3.1 Approach to Impact Assessment

The identification and assessment of environmental and social impacts is a multi-faceted process, using a combination of quantitative and qualitative descriptions and evaluations. It involves applying scientific measurements and professional judgement to determine the significance of environmental and social impacts associated with a proposed Project. Impacts are identified throughout the ESIA process by independent environmental and social assessment practitioners, from specialist studies and public participation, and refined using available baseline information, modelling data and project design information.

For potentially significant impacts or those of stakeholder concern, the impact identification and evaluation process involves the following main steps:

Step 1: Define the Area of Influence

The area of influence of the Project is defined as a basis for defining the boundaries for baseline data gathering by taking into consideration the spatial extent of potential direct and indirect impacts of the project. Direct impacts of the Project are typically located within a smaller area around the Project activities (i.e. in the direct area of influence), while indirect impacts typically extend across a wider area and often relate to the socio-economic sphere of influence of the Project. The area of influence will possibly be reassessed in the Impact Assessment Phase based on the hydrocarbon spill modelling results.

Step 2: Identification of Potential Impacts

Potential impacts (both positive and negative) of a Project are identified through a process of examining the potential for interactions between Project activities and environmental and social receptors (or features). This requires consideration of the range of Project activities across different phases of the Project (planning, operation and decommissioning) and the potential for interactions on each of the environmental receptors, features or aspects occurring in the project area of influence. The results are then presented in an 'environmental and social interaction matrix' format (see Table 8-1 and Table 8-2). For each project activity, the degree of interaction is rated through colour coding the level and type of interaction in the matrix. This matrix approach to impact identification is designed to highlight where interactions may occur as a way of focussing the impact assessment.

Step 3: Compile Impacts – Aspects Register

An impacts-aspects register (see Table 8-3) is typically prepared during the Scoping Phase as a basis for further elaborating the potential impacts identified through the initial impact identification stage. For each of the Project activities, different aspects associated with the activity and their potential impacts are tabulated. This systematic approach provides a basis for planning the scope of specialist studies to ensure the correct information is obtained to conduct a detailed assessment of the project impacts. It also enables identification of the linkages between different specialist scopes and overlapping impacts, and where there are interdependencies on data and reporting to enable an integrated impact assessment. For instance, social specialists are typically reliant on other specialists for inputs such as water quality, air quality or noise effects and this needs to be factored into work scopes and scheduling. The presentation of an Impacts-Aspects Register further provides stakeholders with a degree of confidence that the specialists and environmental assessment practitioners have adequately identified potential impacts at an early stage.

Step 4: Impact Evaluation

Evaluation of impact significance follows a stepwise process as set out below.



- Part A (Table 9-7) provides the definition for determining impact consequence (combining intensity, extent, and duration) and impact significance (combining consequence and probability).
- Impact consequence and significance are determined from Part B (Table 9-8) and Part C (Table 9-9), respectively.
- The interpretation of the impact significance is given in Part D (Table 9-10).

This methodology is utilised to assess both the incremental and cumulative project related impacts.

Table 9-7: Criteria and definitions for determining consequence and significance

PART A: DEFINITIONS AND CRITERIA		
Definition of SIGNIFICANCE		Significance = consequence x probability
Definition of CONSEQUENCE		Consequence is a function of intensity, extent, and duration
Criteria for ranking of the INTENSITY of environmental impacts	VL	• Negligible change (severity), disturbance, or nuisance with very minor consequences or deterioration. • Targets, limits, and thresholds of concern never exceeded. • Species or habitats with negligible importance.
	L	• Minor (Slight) change (severity), disturbance, or nuisance with minor consequences or deterioration. • Targets, limits, and thresholds of concern rarely exceeded. • Habitats and ecosystems which are degraded and modified.
	M	• Moderate change (severity), disturbance, or discomfort with real but not substantial consequences. • Targets, limits, and thresholds of concern may occasionally be exceeded. • Habitats or ecosystems with important functional value in maintaining biotic integrity.
	H	• Prominent change (severity), disturbance, or degradation with real and substantial consequences. • May result in illness or injury. • Targets, limits, and thresholds of concern regularly exceeded. • Habitats or ecosystems which are important for meeting national/provincial conservation targets.
	VH	• Severe change (severity), disturbance, or degradation with severe consequences. • May result in severe illness, injury, or death. • Targets, limits, and thresholds of concern are continually exceeded. • Habitats or ecosystems of high importance for maintaining the persistence of species or habitats that meet critical habitat thresholds.
	VL+	• Negligible change or improvement. • Almost no benefits. • Change not measurable/will remain in the current range.
	L+	• Minor change or improvement. • Minor benefits. • Change not measurable/will remain in the current range.



PART A: DEFINITIONS AND CRITERIA		
	M+	- Moderate change or improvement. - Real but not substantial benefits. - Will be within or marginally better than the current conditions.
	H+	- Prominent change or improvement. - Real and substantial benefits. - Will be better than current conditions.
	VH+	- Substantial, large-scale change or improvement. - Considerable and widespread benefit. - Will be much better than the current conditions.
Criteria for ranking the DURATION of impacts	Very Short term	Very short, always less than a year or may be intermittent (less than 1 year). Quickly reversible.
	Short term	Short term occurs for more than 1 but less than 5 years. Reversible over time.
	Medium term	Medium-term, 5 to 10 years.
	Long term	Long term, between 10 and 20 years. Likely to cease at the end of the operational life of the activity or because of natural processes or by human intervention.
	Permanent	Very long, permanent, +20 years. Irreversible. Beyond closure or where recovery is not possible either by natural processes or by human intervention.
Criteria for ranking the EXTENT of impacts	Within/near site	The impact is limited to the immediate footprint of the activity and the nearby vicinity.
	Local	The impact goes beyond the site footprint but is confined to a localised area / project surroundings / remains within a habitat or vegetation type or local (municipal) administrative boundary.
	Regional	The impact goes well beyond the site footprint and is regional but remains within an ecosystem or regional (district/province) administrative boundary.
	Inter-regional	The impact affects several regions, e.g. several ecosystems or regional administrative units.
	National/International	The impact extends to a national scale and/or beyond.

Table 9-8: Determining consequence

PART B: DETERMINING CONSEQUENCE – APPLIES TO POTENTIAL POSITIVE OR ADVERSE IMPACTS						
		EXTENT				
		Within/near site	Local	Regional	Inter-regional	National/International
INTENSITY = VL						
DURATION	Very short term	Very Low	Very Low	Very Low	Low	Low
	Short term	Very Low	Very Low	Low	Low	Medium
	Medium term	Very Low	Low	Low	Medium	Medium
	Long term	Low	Low	Medium	Medium	Medium
	Very long term / permanent	Low	Medium	Medium	Medium	High



PART B: DETERMINING CONSEQUENCE – APPLIES TO POTENTIAL POSITIVE OR ADVERSE IMPACTS						
INTENSITY = L						
DURATION	Very short term	Very Low	Very Low	Low	Low	Medium
	Short term	Very Low	Low	Low	Medium	Medium
	Medium term	Low	Low	Medium	Medium	Medium
	Long term	Low	Medium	Medium	Medium	High
	Very long term / permanent	Medium	Medium	Medium	High	High
INTENSITY = M						
DURATION	Very short term	Very Low	Low	Low	Medium	Medium
	Short term	Low	Low	Medium	Medium	Medium
	Medium term	Low	Medium	Medium	Medium	High
	Long term	Medium	Medium	Medium	High	High
	Very long term / permanent	Medium	Medium	High	High	High
INTENSITY = H						
DURATION	Very short term	Low	Low	Medium	Medium	Medium
	Short term	Low	Medium	Medium	Medium	High
	Medium term	Medium	Medium	Medium	High	High
	Long term	Medium	Medium	High	High	High
	Very long term / permanent	Medium	High	High	High	Very High
INTENSITY = VH						
DURATION	Very short term	Low	Medium	Medium	Medium	High
	Short term	Medium	Medium	Medium	High	High
	Medium term	Medium	Medium	High	High	High
	Long term	Medium	High	High	High	Very High
	Very long term / permanent	High	High	High	Very High	Very High

Table 9-9: Determining significance

PART C: DETERMINING SIGNIFICANCE - APPLIES TO POSITIVE OR ADVERSE IMPACTS						
		CONSEQUENCE				
		Very Low	Low	Medium	High	Very High
PROBABILITY (of exposure to impacts)	Unlikely	Insignificant	Insignificant	Very Low	Low	Medium
	Conceivable	Insignificant	Very Low	Low	Medium	High
	Possible/ frequent	Insignificant	Very Low	Low	Medium	High
	Probable/ likely	Very Low	Low	Medium	High	Very High
	Highly likely/ definite/ continuous	Very Low	Low	Medium	High	Very High



Criteria for ranking the PROBABILITY of impacts	Unlikely	Where the possibility of the impact to occur is very low or not expected to occur, i.e. $\leq 5\%$ chance of occurring.
	Conceivable	Where the impact could occur but there is little evidence to suggest that it would happen. >5 to $\leq 35\%$ chance of occurring.
	Possible/frequent	Where there is a reasonable probability that the impact would occur, i.e. >35 to $\leq 65\%$ chance of occurring.
	Probable/likely	Where there is high probability that the impact would occur and is not continuous i.e. >65 but $\leq 95\%$ chance of occurring.
	Highly Likely/Definite/Continuous	Where an impact is certain to occur, >95 to 100% chance of occurring.

Table 9-10: Interpretation of significance

PART D: INTERPRETATION OF SIGNIFICANCE		
Significance		Decision guideline
Insignificant		- Predicted impacts on resources or receptors of very low or low sensitivity and are indistinguishable from natural background variations, and <u>no mitigation or monitoring is required beyond routine good practice.</u> - No meaningful adverse residual impact⁸⁰ remains, and <u>no further action is typically required beyond routine good practice.</u>
Very Low	Very Low +	Beneficial or adverse impacts will not influence the project decision. - Minor, short-lived effects on receptors; change is negligible and within accepted standards or norms. <u>No specific mitigation measures are required beyond standard controls; however, monitoring may be applied to verify expected performance.</u> - The residual impact is considered acceptable and reversible within a short-term, <u>and no further action is typically required beyond routine good practice.</u>
Low	Low +	Beneficial or adverse impacts are unlikely to influence the project decision on their own. - Minor adverse changes may occur but remain within the range of normal variation or below compliance thresholds. Reversible within project lifetime or through normal recovery processes. In cases of adverse impacts, <u>limited mitigation may be necessary.</u> Residual impact remains low and acceptable, <u>subject to standard monitoring or compliance verification.</u>
Medium	Medium +	- These beneficial or adverse impacts may influence decision-making, but are not a key deciding factor on their own. - Moderate adverse change; may exceed natural variation or regulatory thresholds at times. Reversible in the medium term with intervention. <u>Mitigation is required</u> and must demonstrate

⁸⁰ A residual impact is the level of impact that remains after the implementation of all reasonable and practicable mitigation measures, including avoidance, minimisation, restoration and standard operational controls. This represents the final predicted significance rating of an impact following mitigation and informs the appropriate management response.



PART D: INTERPRETATION OF SIGNIFICANCE			
Significance		Decision guideline	
		"as low as reasonably practicable", even if residual remains Medium. Residual impacts <u>require ongoing monitoring and adaptive management</u>.	
High	High +	- These beneficial or adverse impacts are important and will influence the project decision. Adverse change exceeds accepted limits or represents long-term effects to sensitive receptors. Natural recovery is unlikely in the short term; active rehabilitation or design modification is required. In the event of adverse impacts, <u>substantial mitigation measures are required</u>. - High residual impacts warrant scrutiny in decision-making, must be reduced to an acceptable level to proceed, and may trigger the need for compensation, offsets and project redesign, and will require long-term monitoring and reporting to the authority/lenders.	
Very High	Very High +	- Represents a key factor in decision-making. Adverse impact far exceeds legal or lender thresholds, is irreversible or permanent, or affects critical/sensitive receptors. An adverse impact would be considered a <u>potential fatal flaw</u> unless it is mitigated to a lower significance. Residual impact must be reduced below a critical threshold to proceed. If not, the project must be fundamentally redesigned, relocated, or discontinued. Offset or compensation only considered after full application of mitigation hierarchy.	

9.3.2 Additional Assessment Criteria

Additional criteria that are taken into consideration in the impact assessment process to further describe the impact and support the interpretation of significance in the impact assessment process include the:

- Nature and type of impact;
- Probability (Likelihood) of the impact occurring (which is taken into account mainly for unplanned events);
- Degree to which impacts may cause irreplaceable loss of resources;
- Degree to which impacts can be avoided;
- Degree to which impacts can be reversed;
- Degree to which the impacts can be mitigated; and
- Extent to which cumulative impacts may arise from interaction or combination from other planned activities or projects.

Definitions for these supporting criteria are indicated in Table 9-11 below



Table 9-11: Categorisation and description of additional assessment criteria

Criteria	Rating	Description
Criteria for IMPACT NATURE	POSITIVE	An impact that is considered to represent an improvement to the baseline conditions or introduces a positive change to a receptor.
	NEGATIVE	An impact that is considered to represent an adverse change from the baseline conditions or receptor or introduces a new adverse effect.
	NEUTRAL	An impact that has no or negligible effect on the receptor.
Criteria for IMPACT TYPE	DIRECT	Impacts that result from a direct interaction between a proposed project activity and the receiving environment (e.g., effluent discharge and receiving water quality). Sometimes referred to as primary impacts.
	INDIRECT	Impacts that are not a direct result of a proposed project, often produced away from or as a result of a complex impact pathway. Sometimes referred to as secondary impacts.
	INDUCED	A type of indirect impact resulting from factors or activities caused by the presence of the Project, but which are not always planned or expected (e.g., human in-migration along new access or for jobs creating increased demand on resources).
	RESIDUAL	The impacts that remain after implementation of the Project and all associated mitigation, and other environmental and social management measures.
Criteria for DEGREE TO WHICH AN IMPACT CAN BE REVERSED	FULLY REVERSIBLE	Where the impact can be completely reversed.
	PARTIALLY REVERSIBLE	Where the impact can be partially reversed and is temporary.
	IRREVERSIBLE	Where the impact cannot be reversed and is permanent.
Criteria for DEGREE OF IRREPLACEABLE RESOURCE LOSS	NONE	It will not cause irreplaceable loss.
	LOW	Where the activity results in a marginal effect on an irreplaceable resource.
	MEDIUM	Where an impact results in a moderate loss, fragmentation or damage to an irreplaceable receptor or resource.
	HIGH	Where the activity results in an extensive or high proportion of loss, fragmentation or damage to an irreplaceable receptor or resource.
Criteria for DEGREE TO WHICH IMPACT CAN BE AVOIDED	HIGH	The impact can be avoided through the implementation of preventative mitigation measures.
	MEDIUM	The impact cannot be avoided, but mitigation measures can reduce the significance.
	LOW	The impact cannot be avoided but can be mitigated to acceptable levels through rehabilitation and restoration.
	NONE	The impact cannot be avoided, and consideration should be given to compensation and offsets.



Criteria	Rating	Description
Criteria for the DEGREE TO WHICH IMPACT CAN BE MITIGATED	HIGH	Mitigation can be easily applied or is considered standard operating practice for the activity and will reduce the impact significance rating.
	MEDIUM	Mitigation is feasible and will may reduce the impact significance rating.
	LOW	Some mitigation is possible but will have a marginal effect in reducing the impact significance rating.
	NONE	No mitigation is possible, or mitigation, even if applied, would not change the impact.
Criteria for POTENTIAL FOR CUMULATIVE IMPACTS	UNLIKELY	There is a low likelihood of cumulative impacts arising.
	POSSIBLE	Cumulative impacts with other activities or Projects may arise.
	LIKELY	Cumulative impacts with other activities or Projects, either through interaction or in combination, can be expected.

9.3.3 Application of the Mitigation Hierarchy

A key component of this ESIA process is to explore practical ways of avoiding or reducing potentially significant impacts of the proposed Project. These are commonly referred to as mitigation measures and are incorporated into the “Project” as part of the EMPr. Mitigation is aimed at preventing, minimising or managing significant negative impacts to as low as reasonably practicable and optimising and maximising any potential benefits of the proposed project. The mitigation measures are established through the consideration of legal requirements, best practice industry standards and specialist input from the ESIA team.

The mitigation hierarchy, as specified in IFC Performance Standard 1, which is widely regarded as a best practice approach to managing risks, is based on a hierarchy of decisions and measures, as presented in Figure 9-1 and described in Table 9-12. This is aimed at ensuring that wherever possible potential impacts are mitigated at source rather than mitigated through restoration after the impact has occurred. Any remaining significant residual impacts are then highlighted, and additional actions are proposed.

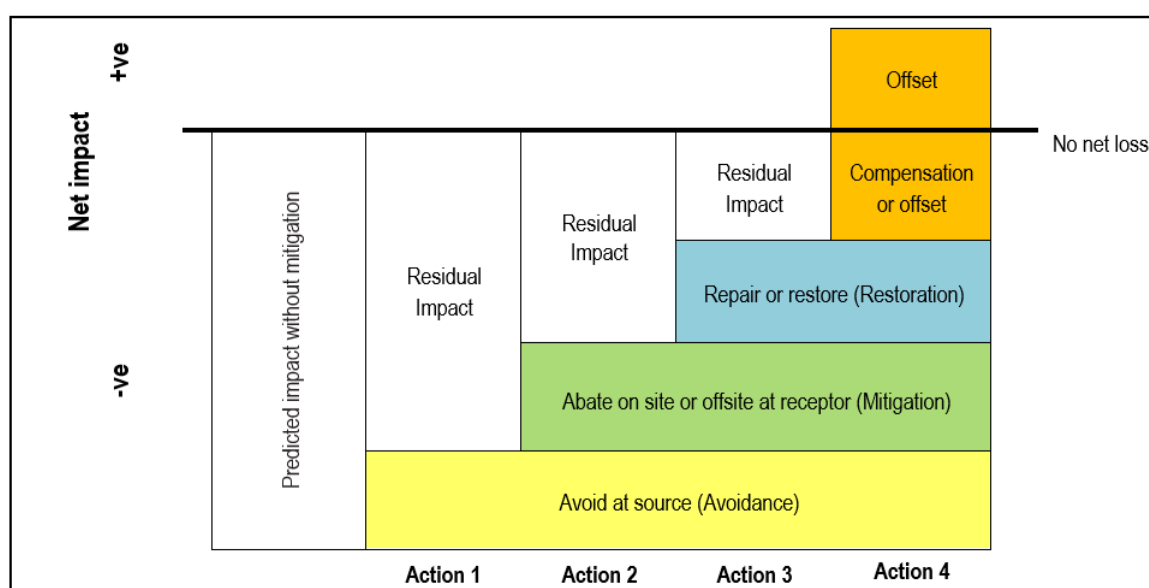


Figure 9-1: Mitigation hierarchy

Adapted from: www.thebiodiversityconsultancy.com



Table 9-12: Sequential application of the mitigation hierarchy

Avoid at Source	Avoiding or reducing at source is essentially 'designing' the Project so that a feature causing an impact is designed out (e.g., a waste stream is eliminated, implementation of buffers, re-siting or re-alignment of project infrastructure, etc.).
Abate on Site	This involves adding something to the basic design or procedures to abate the impact (often called 'end-of-pipe') or altered (e.g., reduced waste volume) and is referred to as minimisation pollution controls fall within this category.
Abate Offsite/at Receptor	If an impact cannot be abated on-site, then measures can be implemented off-site – an example disposing of waste generated on-board Project vessels at a proper waste facility onshore. Measures may also be taken to protect the receptor.
Repair or Restore	Some impacts involve unavoidable damage to a resource, e.g., vegetation clearance and shoreline pollution arising from an oil spill. Repair essentially involves restoration and reinstatement type measures, such as clean-up of the shoreline and rehabilitation.
Compensate or Offset	Where other mitigation approaches are not possible or fully effective, then compensation, in some measure, for loss, damage and general intrusion might be appropriate. An example could be compensation for loss of earnings if fisheries were to be permanently impacted by a Project activity or an offset for the loss of critical habitat.



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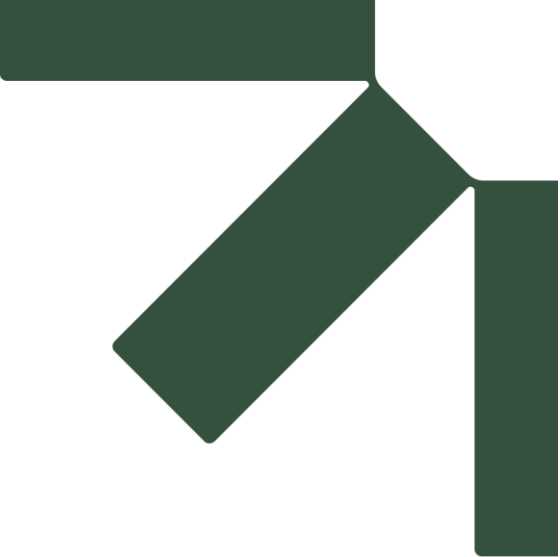
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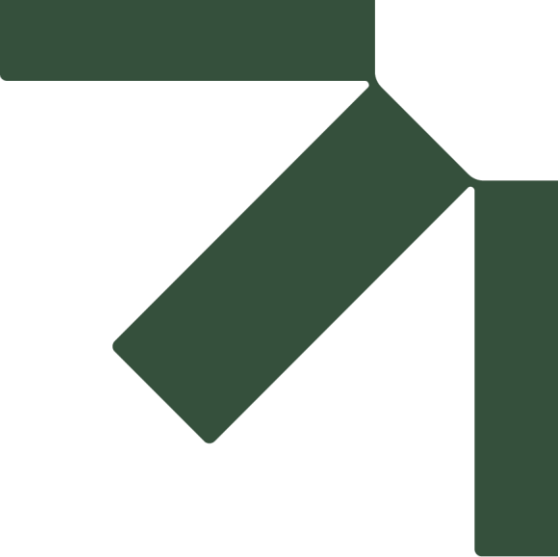
Appendix A Curricula Vitae of the SLR ESIA Project Team

**Environmental and Social Impact Assessment for Field
Development in Block 11B/12B and associated production
activities, South Africa**

Draft Scoping Report

SLR Project No.: 700.000130.00001

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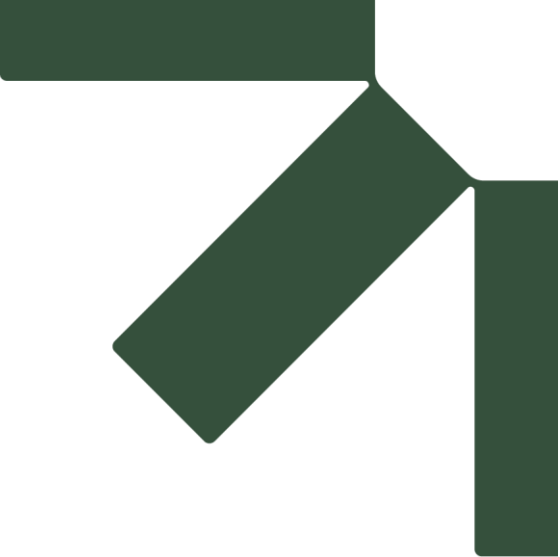
Appendix B DFFE Screening Tool Report

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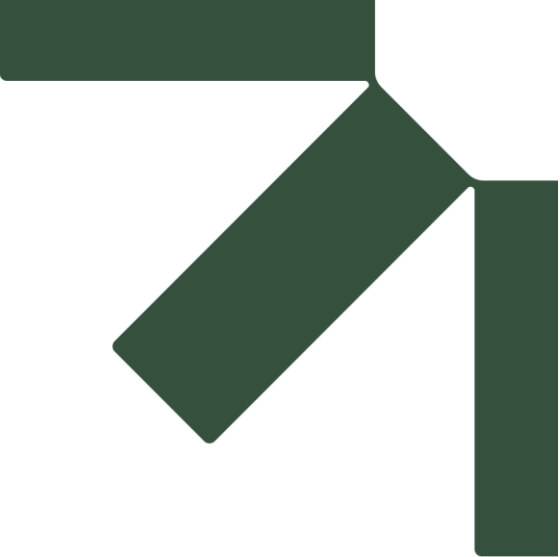
Appendix C EAP Declaration Undertaking

**Environmental and Social Impact Assessment for Field
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activities, South Africa**

Draft Scoping Report

SLR Project No.: 700.000130.00001

14 September 2026



Appendix D Public Participation Process Documents

**Environmental and Social Impact Assessment for Field
Development in Block 11B/12B and associated production
activities, South Africa**

Draft Scoping Report

SLR Project No.: 700.000130.00001

14 September 2026

D.1 Stakeholder Database

D.2 Site Notices

D.3 Non-Technical Summary

D.4 Stakeholder Notification

D.5 Advertisements



Appendix E Aquatic Biodiversity Theme SSVR

**Environmental and Social Impact Assessment for Field
Development in Block 11B/12B and associated production
activities, South Africa**

Draft Scoping Report

SLR Project No.: 700.000130.00001

14 September 2026



Appendix F Terrestrial Biodiversity, Plant and Animal Theme SSVR

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14 September 2026



Appendix G Archaeological, Palaeontological and Cultural Theme SSVR

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14 September 2026



Appendix H Agricultural Theme SSVR

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