



**SCOPING AND ENVIRONMENTAL IMPACT
ASSESSMENT FOR PROPOSED OFFSHORE
EXPLORATION ACTIVITIES IN LICENCE
BLOCKS 3617 AND 3717 OFF THE SOUTH-
WEST COAST OF SOUTH AFRICA**

SCOPING REPORT

Prepared for:
Petroleum Agency of South Africa

On behalf of:
Rhino Oil & Gas Exploration South Africa (Pty) Ltd

Prepared by:
CCA Environmental (Pty) Ltd





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Prepared for:
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On behalf of:
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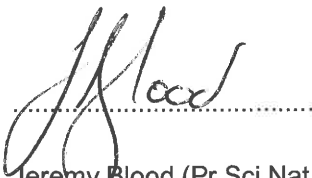


PROJECT INFORMATION

TITLE	Scoping and Environmental Impact Assessment for proposed offshore exploration activities in Licence Blocks 3617 and 3717 off the South-West Coast of South Africa: Scoping Report
APPLICANT	Rhino Oil & Gas Exploration South Africa (Pty) Ltd
ENVIRONMENTAL CONSULTANT	CCA Environmental (Pty) Ltd
REPORT REFERENCE	RO01OS/Scoping/Rev.0
REPORT DATE	11 September 2015

REPORT COMPILED BY: Jeremy Blood

Nicholas Arnott

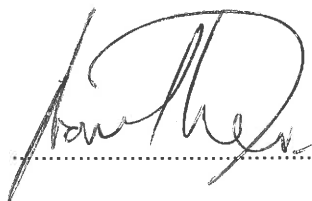


Jeremy Blood (Pr.Sci.Nat.; CEAPSA)
Associate



Nicholas Arnott
Senior Environmental Consultant

REPORT REVIEWED BY: Jonathan Crowther



Jonathan Crowther (Pr.Sci.Nat.; CEAPSA)
Managing Director

EXPERTISE OF ENVIRONMENTAL ASSESSMENT PRACTITIONER

NAME	Jonathan Crowther
RESPONSIBILITY ON PROJECT	Project leader and quality control
DEGREE	B.Sc. Hons (Geol.), M.Sc. (Env. Sci.)
PROFESSIONAL REGISTRATION	Pr.Sci.Nat., CEAPSA
EXPERIENCE IN YEARS	27
EXPERIENCE	Jonathan Crowther has been involved in environmental consulting since 1988 and is currently the Managing Director of CCA Environmental (Pty) Ltd. He has expertise in a wide range of environmental disciplines, including Environmental Impact Assessments (EIA), Environmental Management Plans/Programmes, Environmental Planning & Review, Environmental Auditing & Monitoring, Environmental Control Officer services, and Public Consultation & Facilitation. He has project managed a number of offshore oil and gas EIAs for various exploration and production activities in South Africa and Namibia. He also has extensive experience in projects related to roads, property developments and landfill sites.

NAME	Jeremy Blood
RESPONSIBILITY ON PROJECT	Project management, report writing and specialist study review
DEGREE	B.Sc. Hons (Bot.), M.Sc. (Cons. Ecol.)
PROFESSIONAL REGISTRATION	Pr.Sci.Nat., CEAPSA
EXPERIENCE IN YEARS	16
EXPERIENCE	Jeremy Blood has been working as an environmental assessment practitioner since 1999 and has project managed a number of large-scale projects covering a range of environmental disciplines, including Environmental Impact Assessments, Environmental Management Plans/Programmes, Environmental Auditing & Monitoring and Environmental Control Officer related work in South Africa, Namibia, Mozambique and Kenya. He has expertise in a wide range of projects relating to mining (oil/gas, heavy mineral mining and borrowpits), housing/industrial developments and infrastructure projects (e.g. roads, railway line, power lines and pipelines).

NAME	Nicholas Arnott
RESPONSIBILITY ON PROJECT	Project consultant and report writing.
DEGREE	B.Sc. Hons (Earth and Geographical Science)
PROFESSIONAL REGISTRATION	-
EXPERIENCE IN YEARS	9
EXPERIENCE	Nicholas Arnott has worked as an environmental assessment practitioner since 2006 and has been involved in a number of projects covering a range of environmental disciplines, including Basic Assessments, Environmental Impact Assessments and Environmental Management Programmes. He has gained experience in a wide range of projects relating to mining, infrastructure projects (e.g. roads), housing and industrial developments.

EXECUTIVE SUMMARY

1. INTRODUCTION

1.1 OPPORTUNITY TO COMMENT

This Executive Summary provides a comprehensive synopsis of the Scoping Report prepared as part of the Scoping and Environmental Impact Assessment (S&EIA) process being undertaken for the proposal by Rhino Oil & Gas Exploration South Africa (Pty) Ltd (hereafter referred to as "Rhino") to undertake offshore exploration activities in Licence Blocks 3617 and 3717 off the South-West Coast of South Africa.

The Scoping Report has been distributed for a 30-day comment period from **11 September 2015 to 1 October 2015** in order to provide Interested and Affected Parties (I&APs) with an opportunity to comment on any aspect of the proposed project and the findings of the scoping process. Copies of the full report have been made available on the CCA Environmental (Pty) Ltd (CCA) website (www.ccaenvironmental.co.za) and at the Cape Town Central Library (Drill Hall, Darling Street, Cape Town).

Any comments should be forwarded to CCA at the address, telephone/fax numbers or e-mail address shown below. For comments to be included in the updated Scoping Report, comments should reach CCA by **no later than 1 October 2015**.

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1.2 PROJECT BACKGROUND

In April 2015, Rhino lodged an application for an Exploration Right with Petroleum Agency of South Africa (PASA)¹ in terms of Section 79 of the Mineral and Petroleum Resources Development Act, 2002 (No. 28 of 2002) (MPRDA), as amended. PASA accepted the application on 22 May 2015.

The exploration licence area is approximately 13 279 km² in extent. The eastern border of the exploration licence area is located between approximately 190 km and 385 km off the South-West Coast of South Africa in water depths greater than 3 500 m (see Figure 1).

The proposed exploration programme in Blocks 3617 and 3717 would commence with the acquisition and collation of existing data. Thereafter, multi-beam bathymetry and two- / three-dimensional (2D/3D) seismic surveys would be conducted to identify potential target areas for future exploration.

¹ PASA is the designated agency, in terms of Section 70 of the MPRDA, responsible for the regulation and administration of exploration and production applications and activities.

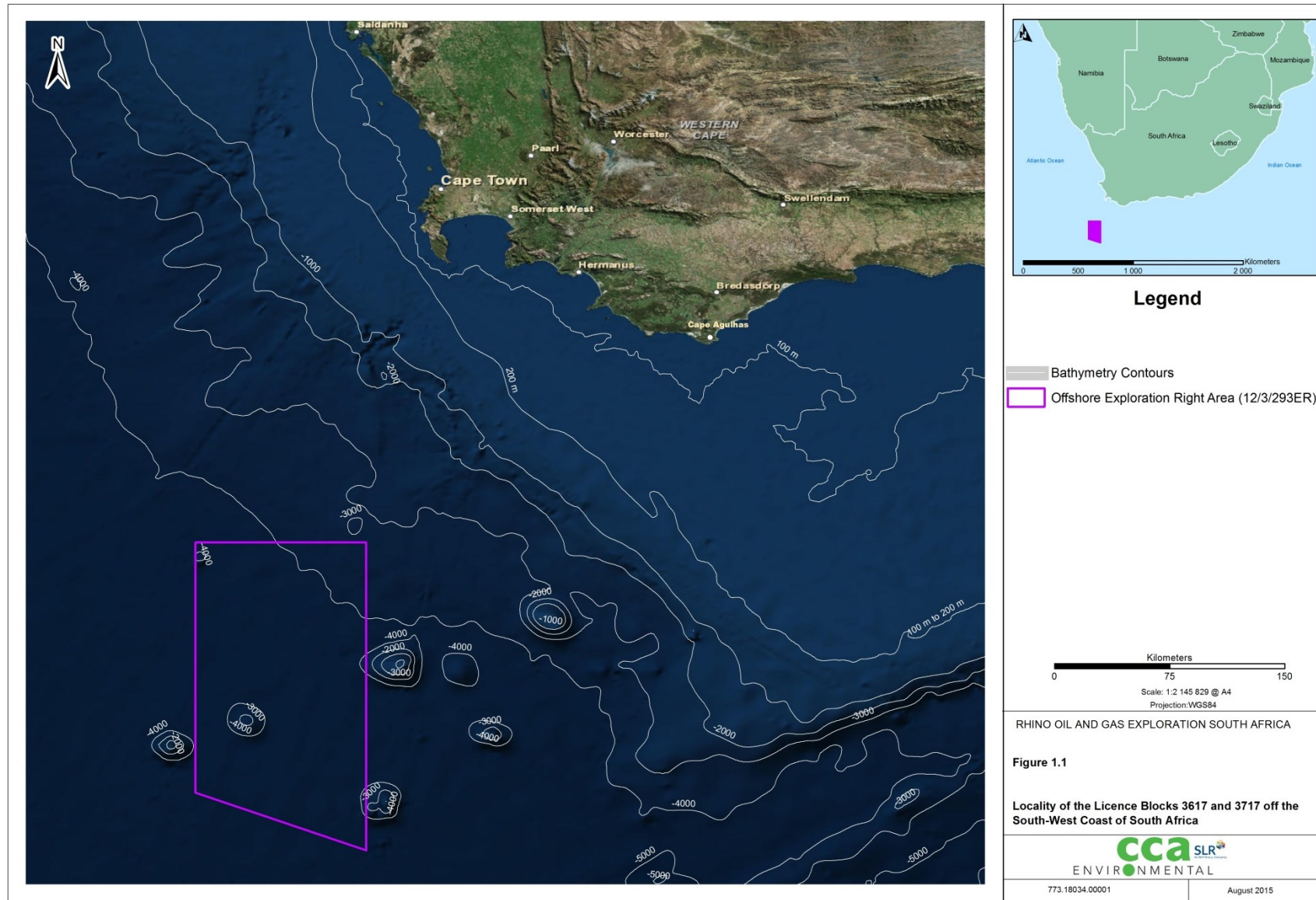


Figure 1.1: Locality of the Licence Blocks 3617 and 3717 off the South-West Coast of South Africa.

1.3 AUTHORISATION REQUIREMENTS

The proposed exploration programme requires authorisation in terms of both the MPRDA and the National Environmental Management Act, 1998 (No. 107 of 1998) (NEMA), as amended. These two regulatory processes are summarised below and presented in more detail in Chapter 2.

In terms of the MPRDA an Exploration Right must be issued prior to the commencement of any exploration activities. A requirement for obtaining an Exploration Right is that an applicant must comply with Chapter 5 of NEMA with regards to consultation and reporting.

In terms of the Environmental Impact Assessment (EIA) Regulations 2014, promulgated in terms of Chapter 5 of NEMA, an application for an Exploration Right requires Environmental Authorisation from the competent authority, the Minister of Mineral Resources (or delegated authority), to carry out the proposed exploration programme. In order for PASA to consider an application for Environmental Authorisation and make a recommendation to the Minister of Mineral Resources, a S&EIA process must be undertaken.

CCA has been appointed by Rhino to undertake the S&EIA process to meet the relevant requirements of the MPRDA, NEMA and Regulations thereto.

2. S&EIA PROCESS

2.1 SCOPING PHASE

2.1.1 Pre-application public participation process

The pre-application public participation process involved an open, participatory approach to ensure that I&APs were notified of the proposed project and provided a reasonable opportunity to register on the project database and provide initial comments. Steps undertaken during this phase are summarised below:

- A meeting was held with PASA on 31 July 2015. The purpose of the meeting was to discuss the legislative requirements and the approach to the S&EIA process to ensure agreement and compliance.
- A preliminary I&AP database of authorities, Non-Governmental Organisations, Community-based Organisations and other key stakeholders was compiled using other databases of previous studies undertaken in the South-West Coast offshore region. Additional I&APs were added to the database based on responses to the advertisements and notification letter, and attendees at the Information-sharing Meeting;
- A notification letter / email and Background Information Document (BID) were distributed for a 30-day registration and comment period from 5 August 2015 to 7 September 2015, which made provision for the two public holidays in August 2015;
- Advertisements announcing the proposed project, the availability of the BID, I&AP registration / comment period and Information-sharing Meeting were placed in regional (Cape Times and Die Burger) and local (Weslander, Hermanus Times and Suidernuus) newspapers; and
- An Information-sharing Meeting was held in Cape Town (Two Oceans Aquarium) on 20 August 2015.

A total of nineteen written submissions were received during the pre-application public participation process. These relate to registration on the project database and the impact of exploration activities on marine fauna and the fishing industry.

The key issues identified by the project team, with I&AP input, are summarised in Section 5. All comments received (including written correspondence and those raised at the information-sharing meeting) have been collated, and responded to, into a Comments and Responses Report.

2.1.2 Project registration

An “Application Form for Environmental Authorisation” was submitted to PASA on 31 August 2015. The application was acknowledged by PASA on 1 September 2015 (PASA reference number: 12/3/293).

2.1.3 Compilation and review of Scoping Report

This Scoping Report has been prepared in compliance with Appendix 2 of the EIA Regulations 2014 and has been informed by comments received during the pre-application public participation process. This report aims to present all information in a clear and understandable format suitable for easy interpretation by I&APs and authorities and provides an opportunity for I&APs to comment on the proposed project and findings of the scoping process to date (see Section 1.1 for details of the comment period).

2.1.4 Completion of the Scoping Phase

The following steps are envisaged for the remainder of the Scoping Phase:

- After closure of the comment period, the Scoping Report will be updated to incorporate the comments received. All comments received during the review of this Scoping Report will be assimilated and responded to in an updated Comments and Responses Report; and
- The updated Scoping Report will be submitted to PASA for acceptance.

If the Scoping Report is accepted, the project will proceed onto the EIA Phase.

2.2 EIA PHASE

2.2.1 Specialist studies

Two specialist studies will be undertaken to address the key issues that require further investigation and detailed assessment, namely: (1) the impact on marine fauna, and (2) the impact on fishing. The specialist studies will involve the gathering of data relevant to identifying and assessing environmental impacts that may occur as a result of the proposed project. These impacts will then be assessed according to pre-defined rating scales. Specialists will also recommend appropriate mitigation or optimisation measures to minimise potential impacts or enhance potential benefits, respectively.

2.2.2 Integration and Assessment

The specialist information and other relevant information will be integrated into an Environmental Impact Report (EIR), which will include an Environmental Management Programme (EMP). The EIR will be released for a 30-day comment period and all I&APs on the project database will be notified when the EIR is available for comment.

After closure of the comment period, all comments received on the draft report will be incorporated and responded to in a Comments and Responses Report. The draft report will then be updated, to which the Comments and Responses Report will be appended, and submitted to PASA for consideration and decision-making by the Minister of Mineral Resources.

The decision taken by the Minister of Mineral Resources will be advertised and distributed to all I&APs on the project database as part of the statutory appeal period.

3. PROJECT DESCRIPTION

The proposed exploration programme in Licence Blocks 3617 and 3717 would commence with acquisition and collation of existing data. Thereafter multi-beam bathymetry and 2D/3D seismic surveys would be conducted to identify potential target areas for future exploration (see Figure 2 and 3). The proposed activities associated with the exploration programme are described further below.

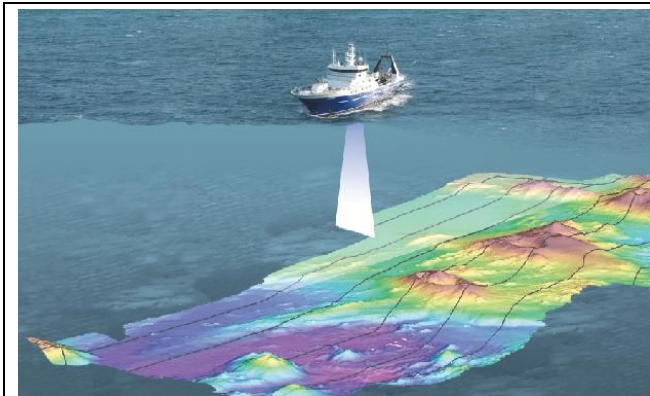


Figure 2: Illustration of a vessel using multi-beam depth/echo sounders.

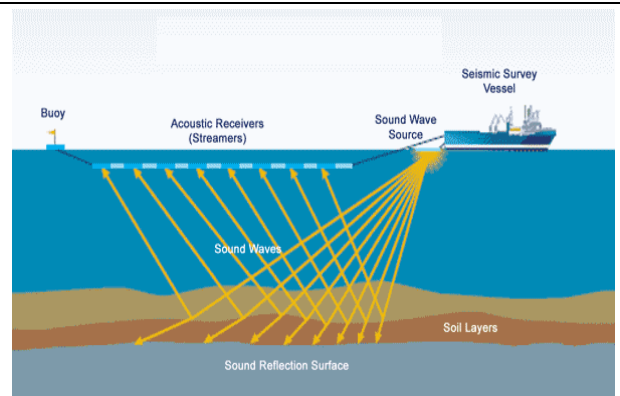


Figure 3: Principles of offshore seismic acquisition surveys.

3.1 MULTI-BEAM BATHYMETRY

3.1.1 Introduction

There are a number of different sonar surveying tools for investigating the structure of the ocean bed sediment layers (including multi-beam echo/depth sounders, depth sounders, side scan sonar and bottom profilers). The operator proposes to undertake a multi-beam bathymetry survey to produce a digital terrain model of the seafloor (Figure 2).

3.1.2 Methodology

The survey vessel would be equipped with a multi-beam echo sounder to obtain swath bathymetry and a sub-bottom profiler to image the seabed and the near surface geology within the proposed exploration licence area. The multi-beam system provides depth sounding information on either side of the vessel's track across a swath width of approximately two times the water depth.

The multi-beam echo sounder emits a fan of acoustic beams from a transducer at frequencies ranging from 10 kHz to 200 kHz and typically produces sound levels in the order of 207 db re 1 μ Pa at 1m. The sub-bottom profiler emits an acoustic pulse from a transducer at frequencies ranging from 3 kHz to 40 kHz and typically produces sound levels in the order of 206 db re 1 μ Pa at 1m.

3.1.3 Extent and duration

The multi-beam bathymetry survey would be undertaken over the majority of the proposed exploration licence area. It is anticipated that data acquisition would take in the order of 15 to 20 productive days to complete at a vessel speed of 4 knots.

3.2 SEISMIC SURVEYS

3.2.1 Introduction

Seismic surveys are carried out during oil and gas exploration activities in order to investigate subsea geological formations. During seismic surveys, high-level, low frequency acoustics are directed towards the seabed from near-surface sound sources towed by a seismic vessel. Signals reflected from geological interfaces below the seafloor are recorded by multiple receivers (or hydrophones) towed in a single or multiple streamer (see Figure 3). Analyses of the returned signals allow for interpretation of subsea geological formations.

Seismic surveys are undertaken to collect either 2D or 3D data. For this investigation Rhino is proposing to undertake acquisition of a 2D seismic survey. However, if it is determined by subsequent analysis of existing data, that acquisition of a seismic dataset utilising 3D seismic techniques might be a more advantageous approach for data collection, then a 3D seismic survey might be substituted for the 2D survey or may be undertaken in addition to the 2D seismic survey.

3.2.2 Survey methodology and airgun array

The seismic survey would involve a towed airgun array, which provides the seismic source energy for the profiling process, and a seismic wave detector system, usually known as a hydrophone streamer. The anticipated airgun and hydrophone array would be dependent on whether a 2D or 3D seismic survey is undertaken. The sound source or airgun array (one for 2D and two for 3D) would be situated some 80 m to 150 m behind the vessel at a depth of 5 m to 25 m below the surface. A 2D survey typically involves a single streamer, whereas 3D surveys use multiple streamers (up to 12 streamers spaced 100 m apart). The array can be up to 12 000 m long. The streamer/s would be towed at a depth of between 6 m and 30 m and would not be visible, except for the tail-buoy at the far end of the cable.

A single airgun could typically produce sound levels in the order of 220-230 dB re 1 mPa @ 1m, while arrays produce sounds typically in the region of 250 dB re 1 mPa @ 1m. The majority of energy produced is in the 0 to 120 Hz bandwidth, although energy at much higher frequencies is also recorded. High-resolution surveys and shallow penetration surveys require relatively high frequencies of 100-1000 Hz, while the optimum wavelength for deep seismic work is in the 10-80 Hz range.

3.2.3 Extent, duration and timing

It is anticipated that the proposed 2D seismic survey would be at a minimum 200 km in total length comprising a number of low density spaced survey lines covering the majority of the proposed exploration licence area (see Figure 4).

Although survey commencement would ultimately depend on a permit award date, availability of seismic contractors and other factors, it is anticipated that the survey would be undertaken during the summer of 2016/2017 and would take in the order of 15 to 20 productive days to complete. The summer period has

specifically been selected in order to avoid the main cetacean migration / breeding period from June to December, as well as ensuring optimal sea state and weather conditions.

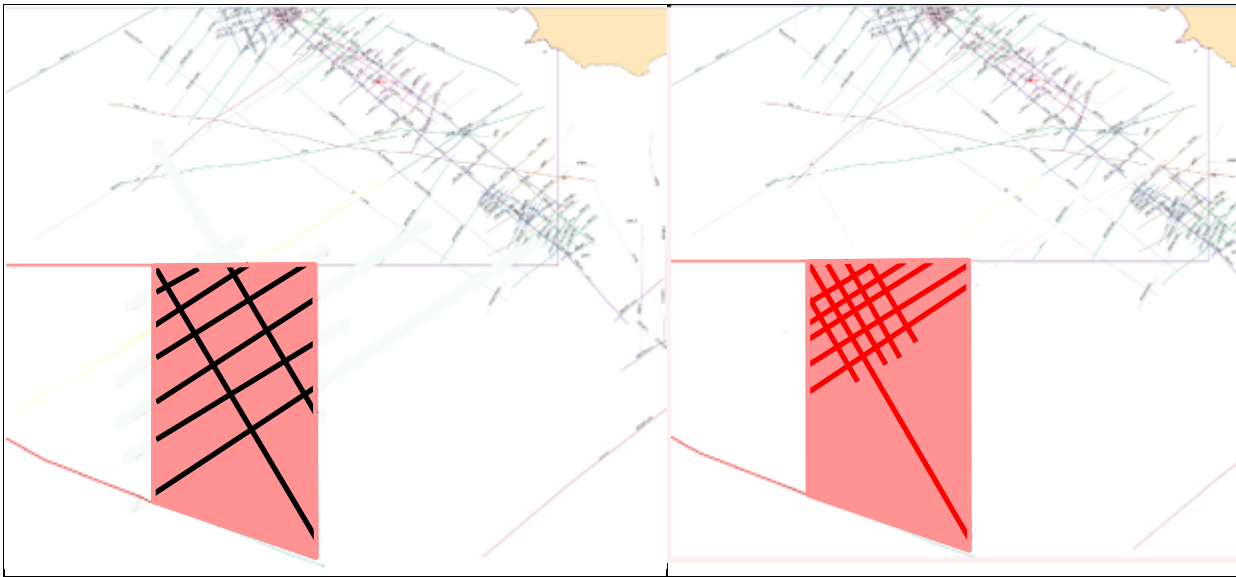


Figure 4: Indicative alternatives for the multi-beam bathymetry and seismic survey lines in the offshore exploration licence area.

3.3 EXCLUSION ZONES

Under the Convention on the International Regulations for Preventing Collisions at Sea (COLREGS, 1972, Part B, Rule 18), survey vessels that are engaged in surveying or towing operations are defined as “vessel restricted in its ability to manoeuvre” which requires that power-driven and sailing vessels give way to a vessel restricted in its ability to manoeuvre. Vessels engaged in fishing shall, so far as possible, keep out of the way of the seismic survey operation. Furthermore, under the Marine Traffic Act, 1981 (No. 2 of 1981), a vessel (including array of airguns and hydrophones) 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 zone. It is an offence for an unauthorised vessel to enter the safety zone. In addition to a statutory 500 m safety zone, a seismic contractor would typically request a safe operational limit (that is greater than the 500 m safety zone) that it would like other vessels to stay beyond.

At least a 500 m exclusion zone would need to be enforced around all survey vessels (including its array of airguns and hydrophones) at all times. A chase boat with appropriate radar and communications would be used during the seismic survey to warn vessels that are in danger of breaching the exclusion zone.

3.4 SUPPORT SERVICES

A support vessel may be required to perform logistics support to the seismic vessel.

Bunkering of the survey vessels is expected to be undertaken at port of operation (Cape Town or Saldanha) or at sea during the survey. Standard operating procedures for refuelling would be adhered to at all times.

4. DESCRIPTION OF THE AFFECTED ENVIRONMENT

4.1 PHYSICAL ENVIRONMENT

Licence Blocks 3616 and 3717 lie within the southern zone of the Benguela Current region, which is characterised by the cool Benguela upwelling system.

Wind and weather patterns along the South-West Coast are primarily due to the South Atlantic high-pressure cell and the eastward movement of mid-latitude cyclones, south of the subcontinent. The majority of swells are generated by mid-latitude cyclones and originate from the south-west. Wave height decreases with both distance north along the West Coast and with distance offshore. Tides along the South-West Coast are subject to a simple semi-diurnal tidal regime.

The continental shelf along the West to South-West Coast is generally both wide and deep, although large variations in both depth and width occur. The shelf maintains a general north-north-west trend north of Cape Point, being narrowest in the south between Cape Columbine and Cape Point (40 km), widening to the north of Cape Columbine and widening south of Cape Point due to the presence of the Agulhas Bank.

The most important current is the Benguela current, which constitutes a broad, shallow and slow north-west flow along the west of the South African Coast between the cool coastal upwelled waters and warmer Central Atlantic surface waters further offshore. The current is driven by the moderate to strong south to south-east winds which are characteristic of the region and is most prevalent at the surface, although it does follow the major seafloor topographic features. Current velocities in continental shelf areas generally range between 10–30 cm/s.

The Benguela region is one of the world's major coastal upwelling systems. Upwelling is characterised by pulsed input of cold, nutrient rich water into the euphotic zone, and in the Benguela region results from the wind-driven offshore movement of surface waters. The surface waters are replaced by cold nutrient-rich water that upwells from depth. Once upwelled, this water warms and stabilises, and moves offshore where a thermocline usually develops. Nutrient rich upwelled water enhances primary production, and the West Coast region consequently supports substantial pelagic fisheries.

4.2 BIOLOGICAL OCEANOGRAPHY

South Africa is divided into nine bioregions. Licence Blocks 3616 and 3717 are located in one of these, namely the Atlantic Offshore bioregion.

Communities within marine habitats are largely ubiquitous throughout the southern African South-West Coast region, being particular only to substrate type or depth zone. These biological communities consist of many hundreds of species, often displaying considerable temporal and spatial variability (even at small scales). The deep-water marine ecosystems comprise a limited range of habitats, namely unconsolidated seabed sediments and the water column.

An important geological feature within the vicinity of Licence Blocks 3616 and 3717 is the Protea Seamount. Features such as banks and seamounts, which protrude into the water column, are subject to, and interact with, the water currents surrounding them. The effects of such seabed features on the surrounding water masses can include the upwelling of relatively cool, nutrient-rich water into nutrient-poor surface water thereby resulting in higher productivity, which can in turn strongly influence the distribution of organisms on and around seamounts. Evidence of enrichment of bottom-associated communities and high abundances of demersal fishes has been regularly reported over such seabed features.

Species diversity, abundance and biomass of benthic invertebrate macrofauna increases from the shore to 80 m depth. Further offshore to 120 m depth, the midshelf is a particularly rich benthic habitat, which acts as an important source of food for carnivores, such as cephalopods, mantis shrimp and demersal fish species. Outside of this rich zone biomass declines.

Deep water corals (depths >150 m) establish themselves below the thermocline where there is a continuous and regular supply of concentrated particulate organic matter, caused by the flow of a relatively strong current over special topographical formations which cause eddies to form. Substantial shelf areas in the productive Benguela region should thus potentially be capable of supporting rich, cold water, benthic, filter-feeding communities.

As many as 110 species of bony and cartilaginous fish have been identified in the demersal communities on the continental shelf of the South-West Coast. Changes in fish communities occur with increasing depth, with the most substantial change in species composition occurring in the shelf break region between 300 m and 400 m depth. The shelf community (<380 m) is dominated by Cape hake. Small pelagic fish species, including the sardine/pilchard, anchovy, chub mackerel, horse mackerel and round herring, typically occur in mixed shoals of various sizes within the 200 m contour. The exploration licence area does not overlap with the spawning areas for commercially important species.

Three species of turtles, the green, leatherback and loggerhead, are found along the South-West Coast. However, only the Leatherback turtle (Critically Endangered) is likely to be encountered within the exploration licence area, but their abundance is expected to be low.

There are a total of 49 species of seabirds occurring within the southern Benguela area, of which 14 are residents species, 25 are migrants from the southern ocean and 10 are visitors from the northern hemisphere. The area between Cape Point and the Orange River supports 38% and 33% of the overall population of pelagic seabirds in winter and summer, respectively. Most of the species in the region reach highest densities offshore of the shelf break (200 to 500 m depth) with highest population levels during their non-breeding season (winter). The availability of breeding sites is an extremely important determinant in the distribution of resident seabirds. Although breeding areas are distributed along the whole coast, islands are especially important. Most of the breeding seabird species forage at sea with most birds being found relatively close inshore (10-30 km). Cape Gannets, however, are known to forage up to 140 km offshore, and African Penguins have also been recorded as far as 60 km offshore.

The marine mammals occurring off the South-West Coast include seals and cetaceans (whales and dolphins). The marine mammal fauna of the South-West Coast comprises 24 species of cetaceans known or likely to occur in the offshore environment (>200 m depth) and four seal species, of which the Cape fur seal is the most common. The majority of baleen whales migrate to the southern African subcontinent to breed during winter months. The main winter concentration areas for Humpback whales include Angola and the Gulf of Guinea on the West Coast of Africa, and Mozambique, Madagascar, Kenya and Tanzania on the East Coast. On the West Coast the migration route for humpback whales follows the edge of the continental shelf with a small proportion of the migration coming close inshore. On the East Coast, the northern migration reaches the coast in the vicinity of Knysna. Most reach southern African waters around April, continuing through to September/October when the southern migration begins and continues through to December. Southern Right whales arrive in coastal waters off the southern African West Coast in June, building up to a maximum in September/October and departing again in December. High abundances of both Southern Right and Humpback whales along the southern portions of the West Coast during spring and summer, however, suggest localised resident populations year round. Humpback whales are considered likely to be one of the most frequently encountered baleen whales in the exploration licence area, while Southern right whales could possibly pass through the exploration licence area.

4.3 HUMAN UTILISATION

There are seven commercial fisheries active on the South-West Coast of South Africa, including demersal trawl, demersal long-line (hake- and shark-directed), large pelagic long-line, small pelagic purse seine, tuna pole, traditional line fishery, and West Coast rock lobster fishery. With the exception of the large pelagic long-line fishery, all other fishing effort is generally directed inshore of the 1 000 m bathycontour.

The majority of shipping traffic is located on the outer edge of the continental shelf (between 12 and 24 nm offshore) with traffic inshore of the continental shelf along the South-West Coast largely comprising fishing vessels. Therefore, vessel traffic is not expected to pass through the exploration licence area.

Exploration for oil and gas is currently undertaken in a number of adjacent licence blocks off the West and South coasts. There is no current development or production from the South African West Coast offshore.

A number of proposed prospecting areas for glauconite and phosphorite / phosphate are located off the South-West Coast, all of which are located inshore of the exploration licence area. Prospecting areas 251 and 257 have not yet been approved and the prospecting rights Agrimin1, Agrimin2 and SOM1 have expired.

No seafloor telecommunications cables pass through the exploration licence area and disused explosives dumping grounds are located within Licence Block 3616 and 3717. The majority of known wrecks along the South-West Coast are located in relatively shallow water close inshore (within the 100 m isobath).

Numerous conservation areas and a Marine Protected Area (MPA) exist along the coastline of the South-Western Cape. Through systematic biodiversity planning to identify a potential offshore MPA network, a number of priority areas have been identified off the South African coastline for the protection of benthic and pelagic habitats. Licence Blocks 3616 and 3717 overlaps with the proposed Southeast Atlantic protection area.

5. KEY PROJECT ISSUES

Key issues to be addressed in the EIA Phase are summarised below.

Potential impact on marine fauna:

- Normal discharges to the marine environment from a variety of sources, including deck drainage, machinery space drainage, sewage and galley wastes from survey and support vessels;
- Localised disturbance of marine fauna due to noise and lighting from survey and support vessels; and
- Potential impacts of seismic and multi-beam bathymetry noise / pulses on marine fauna. Potential impacts could include physiological injury, behavioural avoidance of the survey area, masking of environmental sounds and communication, and indirect impacts due to effects on prey.

Potential impact on fishing:

- Decreased fishing effort and / or loss of catch due to:
 - > Disruption to fishing operations;
 - > Loss of access to fishing grounds in the proposed survey area over the survey period; and
 - > Fish avoidance (flight response) of the seismic survey area and changes in feeding behaviour.
- Possible loss of income due to the decreased fishing effort and / or loss of catch.

Potential impact on other marine mining and exploration operations:

- Disruption of activities as a result of the imposition of a statutory safety zone around the survey vessel.

Potential impact on marine transport routes:

- Interference with shipping routes as a result of the imposition of a statutory safety zone around the survey vessel.

Potential socio-economic impacts:

- Creation of limited employment opportunities; and
- Generation of limited direct revenues associated with operational activities such as refuelling, vessel repair, etc.

Specialist studies will be undertaken to address those issues that require further investigation and detailed assessment. The remainder of the issues will be assessed based on experience gained from the environmental assessment of similar operations elsewhere in the region and information from the generic EMP prepared for seismic survey in South Africa and desktop analysis. Additional input from a specialist is not deemed necessary.

6. SPECIALIST STUDIES

As noted earlier, two specialist studies have been identified for the EIA phase, namely: (1) the impact on marine fauna, and (2) the impact on fishing. The specific terms of reference for these studies are present below.

6.1 MARINE FAUNA

The specific terms of reference for the marine faunal assessment are as follows:

- Provide a general description of the local marine fauna (including cetaceans, seals, turtles, seabirds, fish, invertebrates and plankton species) within the proposed exploration licence area and greater South-West Coast. The description to be based on, *inter alia*, a review of existing information and data from the international scientific literature, the Generic EMP prepared for seismic surveys in South Africa, information sourced from the internet, as well as Marine Mammal Observer (MMO) close-out reports prepared for previous surveys undertaken off the coast of South Africa;
- Identify, describe and assess the significance of potential impacts of the proposed exploration activities on the local marine fauna, including but not limited to:
 - > physiological injury;
 - > behavioural avoidance of the survey area;
 - > masking of environmental sounds and communication; and
 - > indirect impacts due to effects on prey.
- Identify practicable mitigation measures to avoid/reduce any negative impacts and indicate how these could be implemented in the start-up and management of the proposed project.

6.2 FISHERIES

The specific terms of reference for the fisheries assessment are as follows:

- Provide a general description of the fishing activities expected in the proposed exploration licence area and along the greater South-West Coast;
- Undertake a spatial and temporal assessment of expected fishing effort and catch in the proposed exploration licence area for each sector identified;
- Assess the risk of impact of the exploration activities on the different fishing sectors;

- Assess the impact of the proposed exclusion zones around the survey vessels and potential disturbance of fish on the fishing activities based on the estimated percentage loss of catch and effort; and
- Make recommendations for mitigation measures that could be implemented to minimise or eliminate negative impacts on and enhance any benefits to the fishing industry.

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LIST OF ACRONYMS, ABBREVIATIONS AND UNITS

2D	Two Dimensional
3D	Three Dimensional
ACE	African Coast to Europe
BID	Background Information Document
CCA	CCA Environmental (Pty) Ltd
CITES	Convention on International Trade in Endangered Species
cm	centimetres
cm/s	centimetres per second
CMS	Convention on Migratory Species
CO	Carbon monoxide
CO ₂	Carbon dioxide
COLREGS	Convention on the International Regulations for Preventing Collisions at Sea
DAFF	Department of Agriculture, Forestry and Fisheries
db	decibels
DEA	Department of Environmental Affairs
DMR	Department of Mineral Resources
E	East
EAP	Environmental Assessment Practitioner
EASSy	Eastern Africa Submarine Cable System
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMP	Environmental Management Programme
g/m ²	grams per square metre
g/m ³	grams per cubic metre
GN	Government Notice
HSE	Health, Safety and Environmental
HWS	high water spring
I&APs	Interested & Affected Parties
IEM	Integrated Environmental Management
IEP	Integrated Energy Plan
IUCN	International Union for Conservation of Nature
km	kilometres
km ²	Square kilometres
m	Metres
m ²	Square metres
m ³	Cubic metre
MARPOL	International Convention for the Prevention of Pollution from Ships, 1973/1978
mg/l	Milligrams per litre
mm	Millimetres
MPA	Marine Protected Area
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (No. 28 of 2002)
mR/hr	Milliroentgens per hour
m/s	Metres per second
N	North
NDP	National Development Plan
NEMA	National Environmental Management Act, 1998 (No. 107 of 1998)
NEM:PAA	National Environmental Management: Protected Areas Act, 2003 (No. 57 of 2003)
NEM:WA	National Environmental Management: Waste Act, 2008 (No. 59 of 2008)
NNW	North-north-west
NO ₂	Nitrogen dioxide
NW	North-west
PASA	Petroleum Agency South Africa
PIM	Particulate Inorganic Matter
POM	Particulate Organic Matter
RSA	Republic of South Africa
S	South
S&EIA	Scoping and Environmental Impact Assessment
SAFE	South Africa Far East
SAHRA	South African Heritage Resources Agency
SAN	South African Navy

SAT3	South Atlantic Telecommunications cable no.3
SO ₂	Sulphur dioxide
SSW	South-south-west
SW	South-west
t	Tons
TAC	Total Allowable Catch
TSPM	Total Suspended Particulate Matter
UNCLOS	United Nations Convention on Law of the Sea, 1982
VMEs	Vulnerable Marine Ecosystems
VOS	Voluntary Observing Ships
W	West
WACS	West Africa Cable System
WASC	West African Submarine Cable
WSW	West-south-west
µg	Micrograms
µm	Micrometre
µg/l	Micrograms per litre
µPa	Micro Pascal
°C	Degrees Centigrade
%	Percent
‰	Parts per thousand
<	Less than
>	Greater than