

PROPOSED 3D SEISMIC SURVEY IN LICENCE BLOCKS 2912 AND 2913B, ORANGE BASIN, NAMIBIA

Final Scoping Report

Licence Blocks 2912 / 2913B, Orange Basin, Namibia

Prepared for: Total E and P Namibia B.V.



SLR



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EXECUTIVE SUMMARY

1 INTRODUCTION

1.1 PURPOSE OF THIS REPORT

This Executive Summary provides a synopsis of the Final Scoping Report (FSR) prepared as part of the Environmental Impact Assessment (EIA) process that is being undertaken for a proposed three-dimensional (3D) seismic survey in Licence Blocks 2912 and 2913B, Orange Basin, off the coast of southern Namibia (see Figure 1).

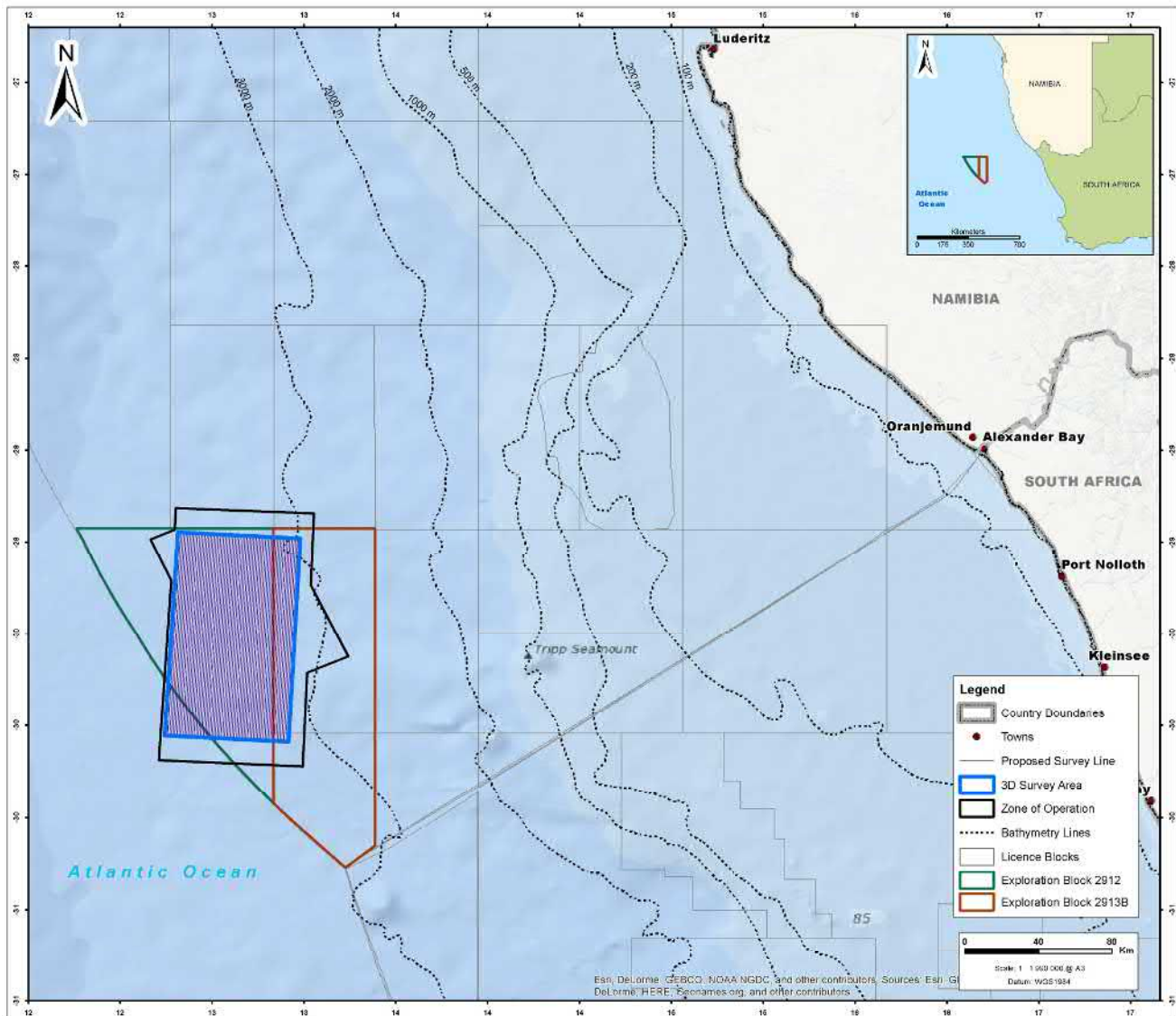


Figure 1: Locality of Blocks 2912 and 2913B and the proposed survey area off the coast of southern Namibia

The compilation of the FSR has been informed by comments received following the distribution of the Draft Scoping Report (DSR) and issues raised during focus group meetings. All significant changes to the DSR are underlined and in a different font (Times New Roman) to the rest of the text.

This report is submitted to the the Ministry of Mines and Energy (MME): Directorate of Petroleum Affairs for review, who will then forward it to the Ministry of Environment, Forestry and Tourism (MEFT): Department of Environmental Affairs (DEA) for a decision.

1.2 PROJECT BACKGROUND

Total E and P Namibia B.V. (“TEPNA”) is the holder of two Exploration Licences for Blocks 2912 and 2913B. Blocks 2912 and 2913B are located in the deepwater Orange Basin off the coast of southern Namibia (see Figure 1). Block 2912 is located the furthest offshore (290 km at its closest point) in water depths of 3 300 m to 3 800 m. Block 2913B is immediately to the east (240 km offshore at its closest point) in water depths ranging from approximately 2 600 m to 3 300 m.

To meet the obligations of the Exploration Licence for Block 2912, TEPNA is planning to undertake a 3D seismic survey within this licence block, as well as Block 2913B, to investigate subsea geological formations. During seismic surveys, high-level, low frequency sounds 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 towed receivers (or hydrophones). Analyses of the returned signals allow for interpretation of subsea geological formations.

The proposed project triggers several listed activities in terms of the EIA Regulations 2012, and as such requires an Environmental Clearance Certificate (ECC). SLR Environmental Consulting (Namibia) (Pty) Ltd (“SLR”) has been appointed by TEPNA as the Independent Environmental Assessment Practitioner to undertake a full Scoping and EIA process for the proposed project.

2 EIA PROCESS

The EIA process consists of two phases (namely Scoping and Impact Assessment) and a series of steps to ensure compliance with the EIA Regulations 2012 (see Figure 2). The EIA is currently in the Scoping Phase.

The purpose of the Scoping Phase is to communicate the scope of the proposed project to Interested and Affected Parties (I&APs), to consider project alternatives, to identify the environmental and social aspects, and potential impacts for further investigation and assessment, and to develop the terms of reference for specialist studies to be conducted in the Impact Assessment Phase. The Scoping Phase involves a process of:

- Notifying I&APs of the proposed project and the steps in the EIA process;
- Creating an opportunity for I&APs to interact with the EIA project team; and
- Providing adequate information for I&APs to comment on in order to ensure that all key environmental and social issues are identified.
 - The DSR was distributed for a 30-day review and comment period from 8 May to 8 June 2020. All written submissions received during the DSR review and comment period (five in total) have been collated, and responded to, in a Comments and Responses Report (see Appendix 2.7 of the FSR).
 - Four focus group meetings were held during the DSR review and comment period. The purpose of these meetings was to provide an overview of the project proposal and EIA process, and provided stakeholders the opportunity to raise any issues or concerns. Minutes of these meetings are presented in Appendix 2.5 of the FSR. All issues raised during these meetings have also been collated, and responded to, in the Comments and Responses Report.

The full stakeholder engagement process undertaken is detailed in Chapter 4 of the DSR.

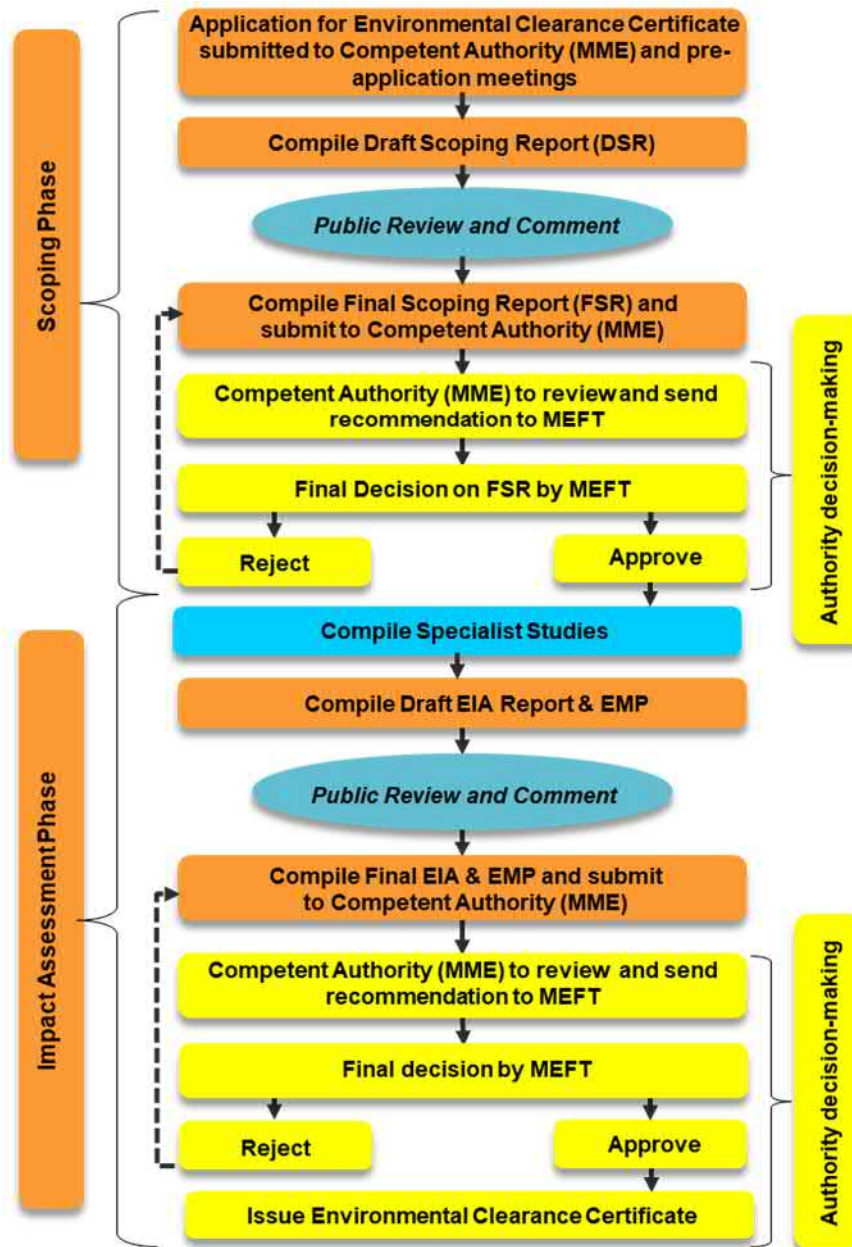


Figure 2 EIA Process

3 PROPOSED PROJECT DESCRIPTION

3.1 SEISMIC SURVEYS

Marine seismic acquisition is a geophysical technique using acoustic energy and seismology to map the geological structures of the seabed. This technique makes it possible to identify possible structures in the underground rocks, favourable to the possible discovery of hydrocarbons. The key principles of a seismic survey are showing in Figure 3.

During seismic surveys, high-level, low frequency sounds are directed towards the seabed from near-surface sound sources towed by a seismic vessel. The acoustic signal emitted into the water column penetrates the seabed, then is reflected by the rock formations in the basement. The reflected signals are recorded by multiple receivers (or hydrophones) towed in a single or multiple streamer configuration. Analyses of the returned signals allow for interpretation of subsea geological formations.

A seismic acquisition campaign can be carried out in two or three dimensions (2D or 3D). For this project, TEPNA is proposing to undertake a 3D seismic survey.

3.2 PROJECT SCOPE AND ACTIVITIES

The proposed 3D seismic survey and operational areas are 6 474 km² and 9 797 km² in extent, respectively (see Figure 1). It is anticipated that the duration of survey acquisition will be in the order of 100 days, excluding any survey-related downtime, operating 24 hours/day and 7 days/week. This EIA will consider the implications of surveying for a period of up to four months (i.e. 120 days) to take account of any downtime. TEPNA proposes to commence with the 3D seismic survey in December 2020 / January 2021, subject to obtaining an ECC.

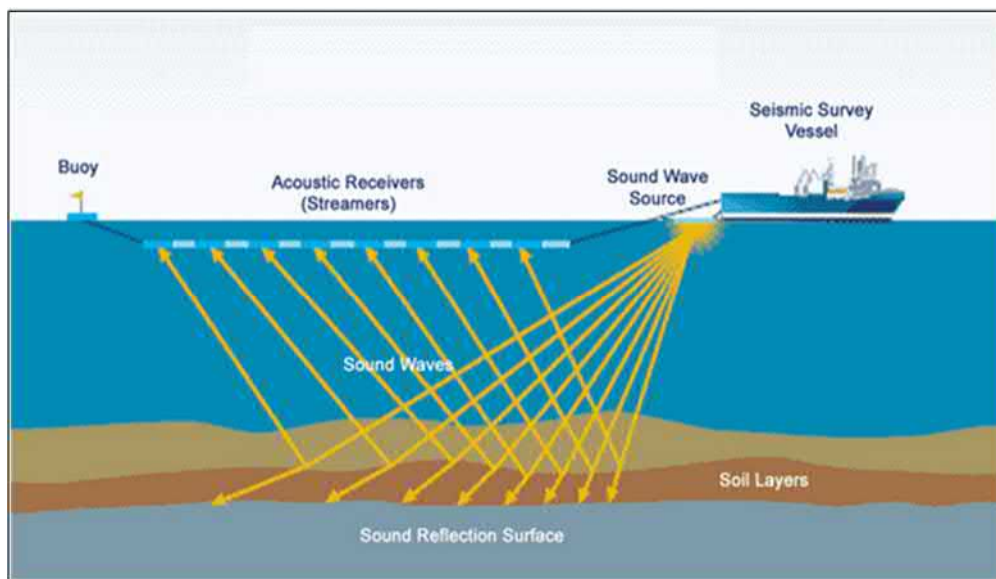


Figure 3 Principles of Offshore Seismic Acquisition Surveys
Source: <https://www.tes.com/>

3.3 TECHNICAL CHARACTERISTICS OF THE SEISMIC ACQUISITION

The main technical characteristics of the proposed seismic survey are summarised in Table 1 below.

3.4 MAIN PROJECT COMPONENTS FOR SEISMIC SURVEYING

The main project components include the following:

- Seismic survey vessels: There will be a single survey vessel equipped with seismic sources and streamers. Under the Convention on the International Regulations for Preventing Collisions at Sea (COLREGS, 1972, Part B, Section II, Rule 18), a seismic survey 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 seismic operation. It is also considered to be an “offshore installation” in terms of the Petroleum (Exploration and Production) Act, 1991 (No. 2 of 1991), and as such it is protected by a 500 m exclusion zone.
- Support and escort vessels: Two additional vessels will be commissioned for the survey; one support vessel and one escort vessel (or “chase boat”). The support vessel will be required to perform logistics support

(including crew changes, supply of equipment, fuel, food and water) to the survey vessel. The escort vessel will patrol the area during the seismic survey to ensure that other vessels adhere to the safe operational limits.

- Helicopter: Helicopters may also be used to transfer personnel to and from the survey vessel and Lüderitz or a suitable location nearby.
- Onshore logistics base: The onshore logistics base will be located in either the Port of Lüderitz or the Port of Walvis Bay. The preferred alternative is Lüderitz due to proximity to the survey area.

Table 1: Characteristics of Seismic Acquisition Operations (Indicative)

Airgun	
Type of Energy Source	Pressurized air
No. of airgun arrays	2 to 3
No. of active airguns	Approximately 36 per array (note: only one active array for each shot point)
Spacings between airgun arrays	50 m to 60m
Towing depth of the airgun	Approximately 8 m
Source volume	Max 4 000 cubic inches each
Operational pressure	2 000 psi
Shot interval	18.75 m interval between consecutive shot-points
Hydrophone Streamer	
Types of streamer	Solid - Polymer or gel
Number of streamers	10 to 14
Length of streamers	8 600 to 8 800 m including 250 m source layback
Spacings between streamers	100 m to 180 m
Max spread	1 100 m to 1 620 m
Depth of streamers	8 to 25 m

4 DESCRIPTION OF THE RECEIVING ENVIRONMENT

4.1 GEOPHYSICAL CHARACTERISTICS

The continental shelf off southern Namibia is variable in width. Off the Orange River the shelf is wide (230 km) narrowing to the north and reaching its narrowest point (90 km) off Chameis Bay, before widening again to 130 km off Lüderitz. In the south, the Orange Bank (Shelf or Cone), offshore of the Orange River, comprise three low mounds rising to about 160 m on the outer shelf. North of Chameis Bay, the shelf becomes a stepped feature, with a low step having an elevation between roughly 400 - 450 m below mean sea level. Tripp Seamount, which rises from the seabed at approximately 1 000 m to a depth of 150 m, is located approximately 85 km to the east of Block 2913B.

The baseline survey undertaken in Block 2913B identified that the seabed is characterised by homogeneous poorly to very poorly sorted fine to medium silts (muddy sands), which comprised between 81.5% and 94.4% of the sediments. The remaining sediment is a coarser component (>500 µm) comprising predominantly relic biogenic materials from foraminifera. Gravels were absent. The Total Organic Carbon (TOC) content of the sediments is comparatively low, suggesting that the carbon flux from near surface productivity is not strong. This would be expected from sediments in areas far offshore of the highly productive coastal upwelling.

4.2 BIOPHYSICAL CHARACTERISTICS

The climate of the Namibian coastline is classified as hyper-arid with typically low, unpredictable winter rains and strong predominantly south-easterly winds. Winds are one of the main physical drivers of the nearshore Benguela Region, both on an oceanic scale, generating the heavy and consistent south-westerly swells that impact this coast, and locally, contributing to the northward-flowing longshore currents, and being the prime mover of sediments in the terrestrial environment. Average annual precipitation ranges from 16.4 mm at Lüderitz to 51.5 mm at Oranjemund. Coastal fog is a regular occurrence, which may affect helicopter operations between the survey vessel and the Lüderitz airport.

The Namibian coastline is strongly influenced by the Benguela Current system. It is characterised by coastal upwelling of cold nutrient-rich water and is an important centre of plankton production, which supports a global reservoir of biodiversity and biomass of sea life.

The wave regime along the southern African West Coast shows no strong seasonal variation with virtually all swells throughout the year coming from the south-west to south direction. In winter there is a slight increase in swell from south-west to south direction.

4.3 BIOLOGICAL CHARACTERISTICS

Biogeographically, the study area falls into the cold temperate Namaqua Bioregion, which extends from Sylvia Hill, north of Lüderitz in Namibia to Cape Columbine. The portion of the project area that extends beyond the shelf break onto the continental slope and into abyssal depths falls into the Atlantic Offshore Bioregion. The coastal, wind-induced upwelling characterising the Namibian coastline, is the principle physical process that shapes the marine ecology of the central Benguela region. The Benguela system is characterised by the presence of cold surface water, high biological productivity, and highly variable physical, chemical and biological conditions.

The seabed communities in the licence area lie within the Namaqua sub-photic and continental slope biozones. Benthic habitats along the 500 m depth contour have been assigned a threat status of “Vulnerable”, with those further inshore to the 100 m depth contour considered “Endangered”, but further offshore in Blocks 2912 and 2913B, the benthic habitat type is considered ‘Least Threatened’ (see Figure 4). Substantial shelf areas in the productive Benguela region could potentially be capable of supporting rich, cold water, benthic, filter-feeding communities. Such communities would also be expected with topographic features such Tripp Seamount some 85 km to the east of Block 2913B.

As the preferred spawning grounds of numerous commercially exploited fish species are located off central and southern Namibia (see Figure 5), their eggs and larvae form an important contribution to the ichthyoplankton in the region. Phytoplankton, zooplankton and ichthyoplankton abundances in the licence blocks are thus expected to be low.

Due to the cold temperate nature of the region, the fish fauna off the Namibian coast is characterised by a relatively low diversity of species compared with warmer oceans. However, the upwelling nature of the region results in huge biomasses of specific species that supports a commercially important fishery.

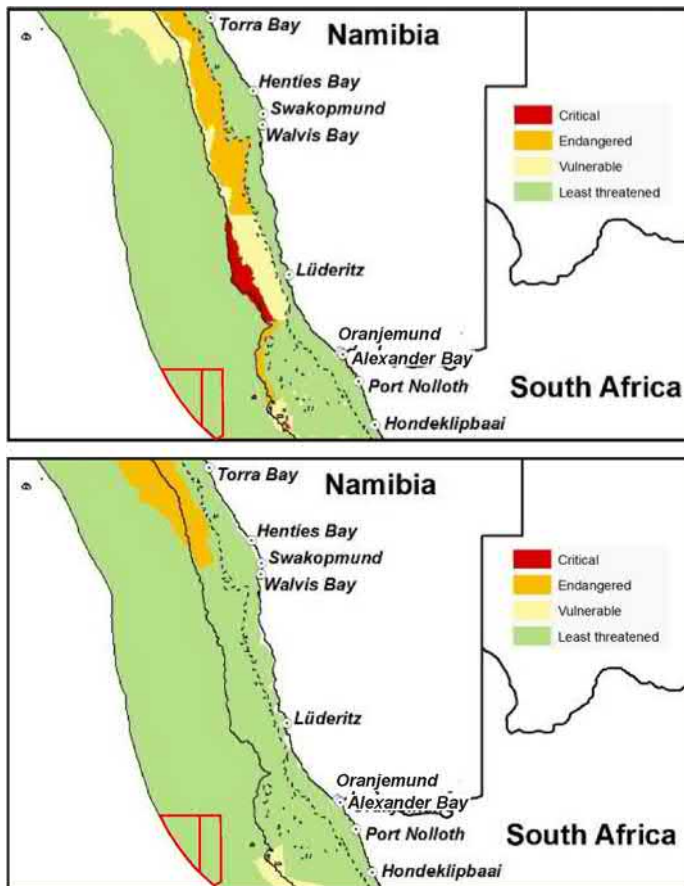


Figure 4: Blocks 2912 and 2913B in relation to ecosystem threat status – Top: Benthic; Bottom: Pelagic

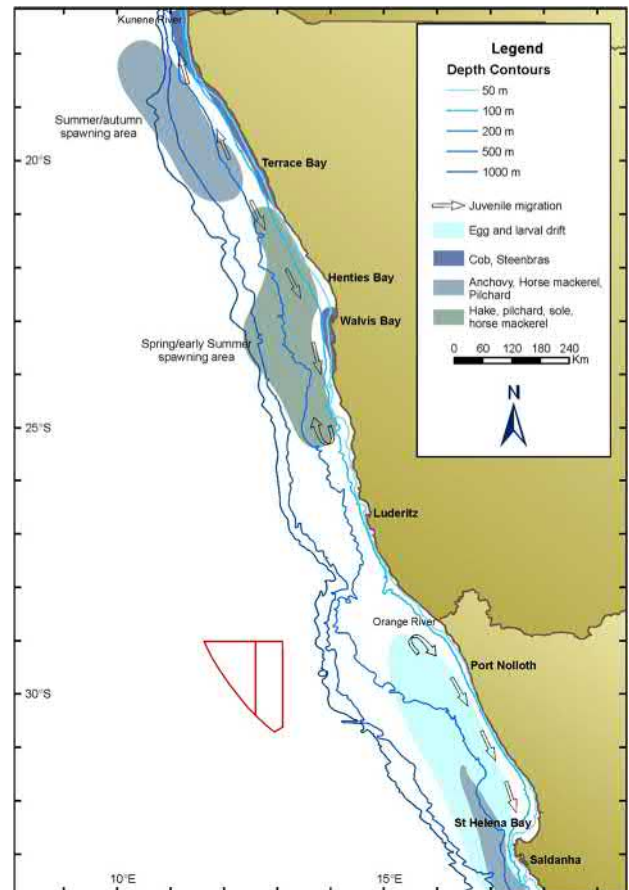


Figure 5: Blocks 2912 and 2913B in relation to major fish spawning areas

The Namibian coastline sustains large populations of breeding and foraging seabird and shorebird species. Most of the seabird species breeding in Namibia feed 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. As the licence blocks are approximately 240 km offshore at its closest point, encounters with pelagic seabirds is most likely.

Five species of turtles occur off Namibia. However, only the leatherback and loggerhead turtles are likely to be encountered within the survey area, but their abundance is expected to be low.

Thirty-three species of whales and dolphins are known or likely to occur in Namibian waters. The distribution of cetaceans in Namibian waters can largely be split into those associated with the continental shelf and those that occur in deep, oceanic water. Importantly, species from both environments may be found in the continental slope (200 to 2 000 m) making this the most species-rich area for cetaceans.

The Cape fur seal is the only seal species that has breeding colonies along the Namibian coast. The colonies closest to Blocks 2912 and 2913B are at Van Reenen Bay and Baker's Bay approximately 280 km inshore and to the northeast of the north-eastern corner of the Blocks, in the Tsau//Khaeb-Sperrgebiet National Park.

4.4 CONSERVATION AREAS AND MARINE PROTECTED AREAS

Inshore of Blocks 2912 and 2913B, the coastline of Namibia is part of a continuum of protected areas that stretch along the entire Namibian coastline from Southern Angola into Namaqualand in South Africa. Recently proclaimed as the Namib-Skeleton Coast National Park, it incorporates four terrestrial Management Areas, namely the Skeleton Coast National Park, the Dorob National Park, the Namib-Naukluft National Park and the Tsau//Khaeb-Sperrgebiet National Park.

All three of the designated coastal Ramsar sites in Namibia (including Walvis Bay Wetland, Sandwich Harbour and Orange River Mouth) fall within the broader project area. Blocks 2912 and 2913B lie offshore of a proposed marine Important Bird Area (IBA).

The Namibian Islands' Marine Protected Area lies inshore and north-eastwards of the licence blocks, with the closest point (southern boundary of the NIMPA) being over 225 km away (see Figure 6).

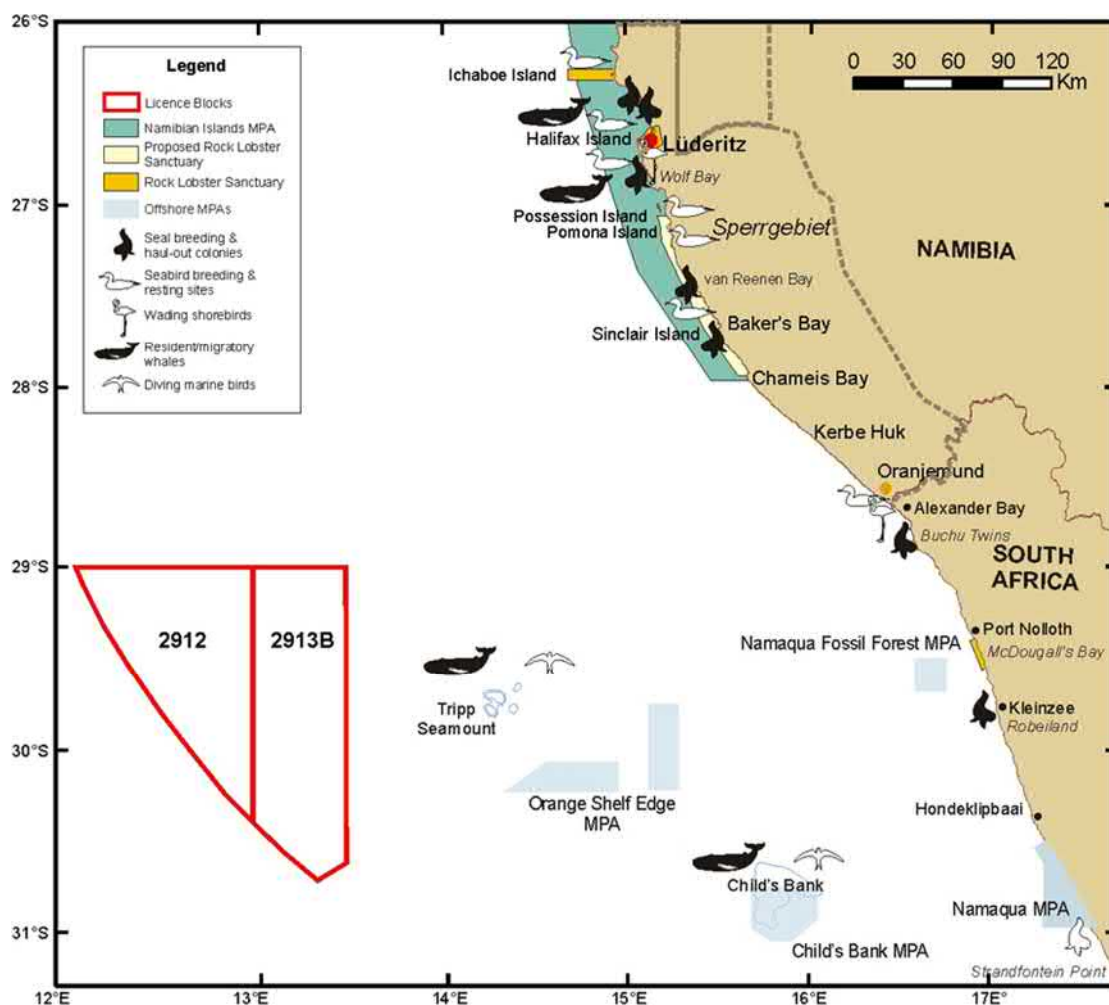


Figure 6 Blocks 2912 and 2913B in relation to Biodiversity Sensitivities

Source: Pisces

Blocks 2912 and 2913B do not overlap with any Ecologically or Biologically Significant Areas (EBSA), which have been identified as being of high priority for place-based conservation measures under the Convention of Biological Diversity (see Figure 7).

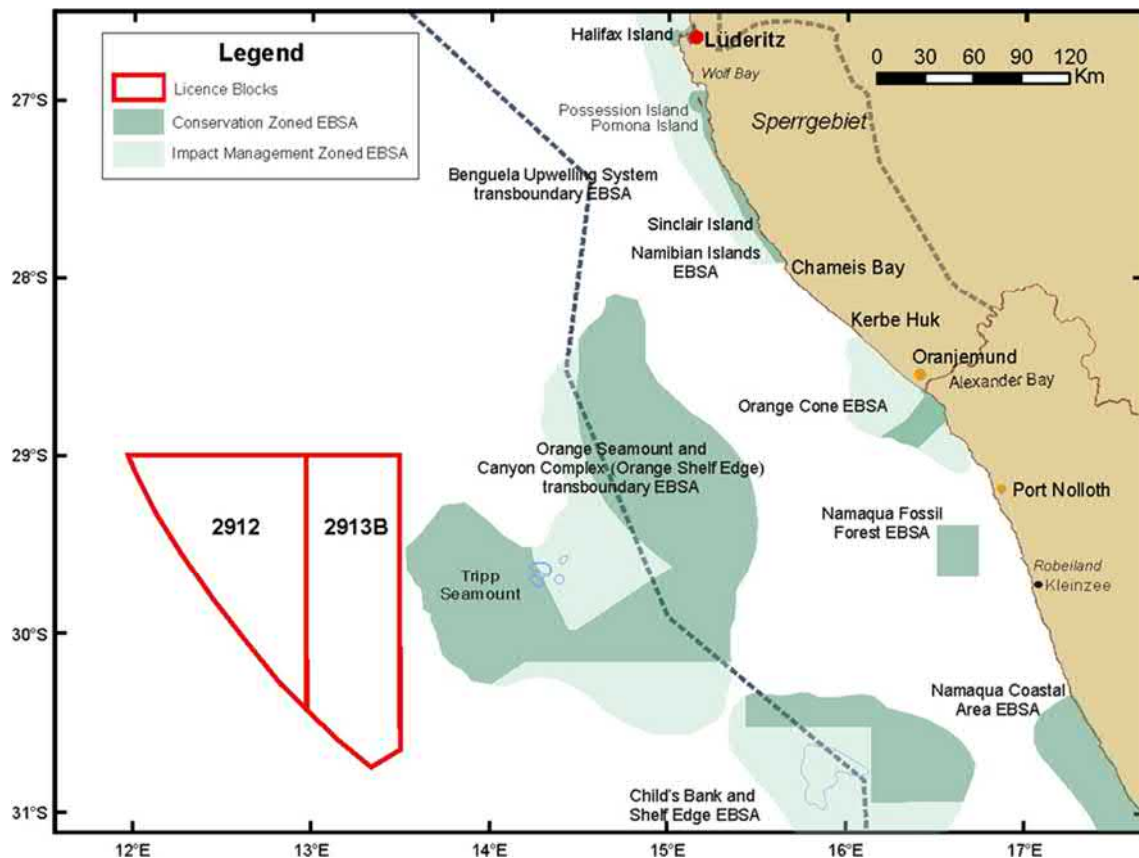


Figure 7 Blocks 2912 and 2913B in relation to EBSAs

Source: Pisces

4.5 SOCIO-ECONOMIC ENVIRONMENT

4.5.1 Fishing

Information on the spatial distribution and catch effort of the commercial fishing sectors that operate off the coast of Namibia include are given below. Of these fisheries, only two sectors (large pelagic longline and tuna pole) overlap with the licence blocks (see Figures 8 and 9).

- Large pelagic longline: Fishing effort is widespread predominantly along the shelf break between the 500 m and 2 000 m isobaths. Thus, grounds used by the pelagic longline fishery coincide with the licence area (see Figure 8).
- Tuna pole: Aggregations of tuna are known to occur near Tripp Seamount (approximately 85 km east of the licence blocks) and the highest effort levels are recorded in this area. Fishing activity within the licence blocks is low; on average 0.1% (7 poles per year) of the overall effort expended by the sector was recorded within the licence blocks (see Figure 9).
- Demersal trawl: This fishery operates between depths of 200 m and 850 m. The demersal trawl grounds are situated 75 km eastward of the licence blocks. There is no overlap however with the licence blocks.
- Mid-water trawl: Fishing occurs mainly between the 200 m and 500 m isobaths towards the shelf break. Although the main commercial fishing grounds are situated approximately 400 km northward of the licence blocks, incidental fishing has been recorded 170 km north east of the licence blocks. There is no overlap of fishing activity with the licence blocks.
- Deep-water trawl: This fishery is currently closed.

- **Small pelagic purse-seine:** Fishing activity is localised around ports and inshore of the 200 m isobaths. The fishing grounds targeted by the purse-seine fleet are largely located off and to the north of Walvis Bay. The main commercial fishing grounds are situated at least 480 km northward of the licence area, and the closest fishing activity recorded 100 km east of the licence area is incidental. There is no overlap of fishing activity with the licence block.
- **Demersal longline:** Demersal long-lining is expected to occur in similar areas used by the hake-directed trawling. Fishing grounds are situated 50 km eastward of the licence blocks and there is no overlap.
- **Traditional line-fish:** This fishery is limited in extent to around the Port of Walvis Bay and does not operate much further than 12 nm offshore due to the operational range of vessels operating within this fishery, which is inshore and 250 km north-east of the licence blocks in the vicinity of Lüderitz.
- **Deep-sea crab:** Fishing grounds are located at least 780 km to the north of the licence blocks and there is, therefore, no spatial overlap of the licence blocks with the sector.
- **Rock lobster:** Fishing grounds for this sector are situated well inshore of the licence blocks.

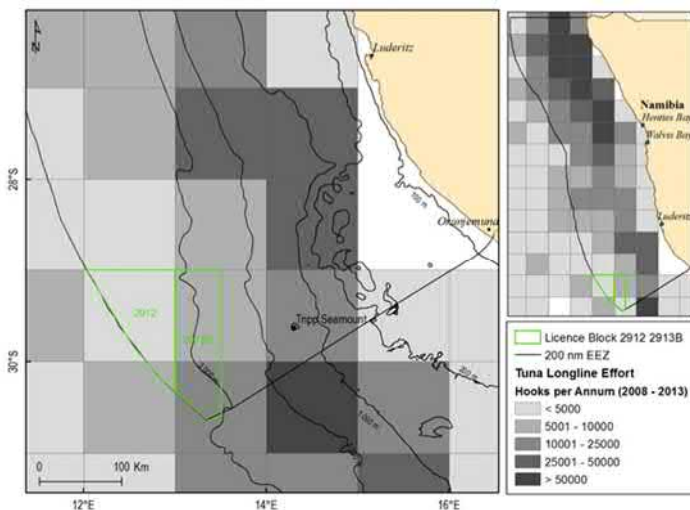


Figure 8 Pelagic Longline Effort (2008 – 2013)

Source: CapMarine

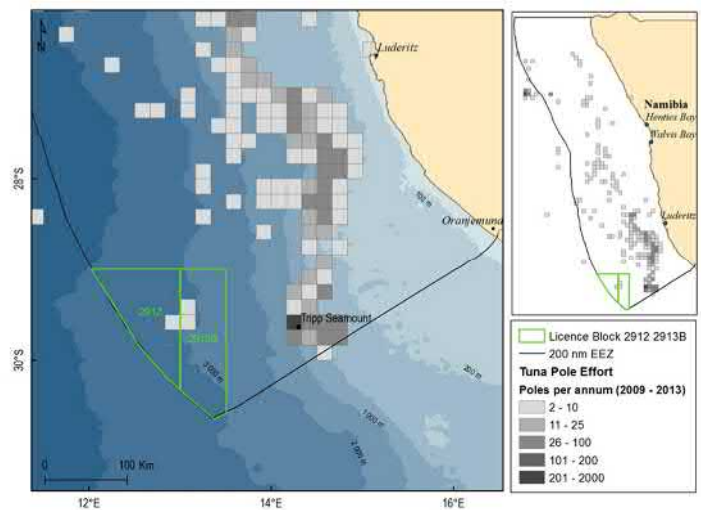


Figure 9 Tuna Pole Effort (2008 – 2013)

Source: CapMarine

4.5.2 Shipping

Most international shipping traffic is located on the outer edge of the continental shelf. Traffic inshore of the continental shelf along the West Coast largely comprises fishing and mining vessels, especially off the coast of Oranjemund, which is inshore of the licence area. The licence blocks are located on the western boundary of the main traffic routes that pass around southern Africa.

4.5.3 Oil and Gas Exploration and Mining

A previous 2D seismic survey has been undertaken over the licence blocks. This survey was undertaken by TGS (previously Spectrum) over the area (mainly Block 2912) in 2019. This data (1 097 km) was purchased and analysed by TEPNA. Based on the analysis of this data, TEPNA is currently planning to drill an exploration well in Block 2913B in mid-2020. The ECC for well drilling was issued in 2019.

Marine diamond mining is currently limited to the southern half of the Namibian offshore, well inshore of the licence blocks.

5 ENVIRONMENTAL AND SOCIO-ECONOMIC SCREENING AND KEY IMPACTS

5.1 ENVIRONMENTAL AND SOCIAL INTERACTION MATRIX

The environmental and social interaction matrix prepared for the proposed project is presented in Table 2. The Matrix provides a list of the project activities and allows for easy checking of interaction against components of the receiving environment.

5.2 KEY ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACTS

The significant issues identified during scoping that will be assessed by specific specialists are described below. The terms of reference for the four specialist studies (namely noise modelling, marine fauna, commercial fishing and social) are presented in Chapter 9 of the DSR.

5.2.1 Effect on Marine Ecology and Fauna

The proposed project could result in the following potential effects on marine ecology and fauna:

- Localised reduction in air quality due to emissions from the combustion of diesel fuel for vessel engines, aviation fuel for aircrafts and helicopters, as well as the incineration of wastes;
- Localised reduction in water quality due to normal discharges, as per MARPOL requirements, to the marine environment from a variety of sources, including deck drainage, machinery space drainage, sewage and galley wastes from the survey vessels;
- Introduction of alien invasive marine species through ballast water discharge;
- Seismic noise could have the following impacts on marine fauna:
 - > physiological injury (e.g. Permanent hearing Threshold Shift - PTS and Temporary hearing Threshold Shift -TTS) and mortality;
 - > disturbance and / or behavioural changes;
 - > masking of environmental sounds and communication;
 - > disturbance to spawning and recruitment; and
 - > effects on predators-prey relationships.
- Possible effects of seismic noise on seabed and seamounts communities, as well as protected areas;
- Localised disturbance of and / or behavioural changes to marine fauna due to noise and lighting from the survey vessels and helicopter operations; and
- Localised and regional effect on water quality, marine fauna, benthic communities and oiling of seabirds due to accidental oil spills during normal operations (e.g. bunkering at sea), as well as the unlikely event of a vessel collision or dropped objects/lost of equipment.

How issue will be addressed in the EIA:

A marine fauna impact assessment will be commissioned to assess the potential impacts on marine fauna. In order to assess the potential noise impact on marine fauna from seismic activities, input will be obtained from a noise specialist. This input will aim to, *inter alia*, describe the likely background noise levels, determine noise transmission loss with distance from the survey area, and zones of impact relating to PTS, TTS and behaviour.

5.2.2 Effect on Commercial Fisheries

The proposed project could potentially affect commercial fishing activities (see Figure 5 and Figure 6), as a result

of the proposed 500 m exclusion zone around the survey vessel, seismic noise, and accidental oil spills during bunkering or the unlikely event of a vessel collision. Potential issues include:

- Disturbance / behavioural changes to fish;
- Displacement of fishing activities;
- Loss-of-access to fishing grounds;
- Increased fishing effort; and
- Loss of catch.

How issue will be addressed in the EIA:

A commercial fisheries impact assessment will be commissioned to, *inter alia*, determine the fishing effort and catch of all fisheries operating off the coast of Namibia in relation to the licence blocks and the survey area.

The commercial fisheries assessment, as will be undertaken for the marine fauna impact assessment, will use the findings of the noise assessment to assess the potential impact on commercial fish from seismic activities.

5.2.3 Effect on the Socio-Economic Environment

The proposed project could have localised direct and in-direct economic and social costs and benefits. Potential issues include:

- Loss of employment and income related to the disruption of commercial fisheries (as described above): Any substantive impact on commercial fishing would have a knock-on effect for individuals who rely on fishing for employment and wage income. This is particularly pertinent for households in Walvis Bay and Lüderitz, as both towns support substantial populations that are employed in the commercial fisheries sector. In addition, both towns will have both secondary and tertiary industries that provide services to the fisheries sector, therefore they considered sensitive to any disruption to local commercial fishing.
- Promoting local employment and local business development: The exploration activities will have limited positive spin-offs related to providing local employment and local business development opportunities due to the highly technical nature of seismic surveys and the requirement for specialised services. Lüderitz or Walvis Bay will likely see limited benefits related to local services that will be required for the seismic vessels such as crew accommodation, meals, basic goods and refuelling.
- Use of local services and facilities: The provision of services as well as berthing during crew changes may result in the use of local services and both private and public facilities. There may be increased pressure on such services and facilities if they do not have sufficient capacity to support the exploration activities.
- Collisions with Recreational Fishing and Pleasure Vessels (Public Health and Safety): Although seismic activities will be undertaken approximately 250 km from the Namibian coastline, support vessels will dock at either Walvis Bay or Lüderitz for refuelling, restocking, repairs and crew changes. The movement of the support vessels between the licence blocks and the two port towns may result in some limited interaction with recreational fishing boats, pleasure crafts and other marine recreational activities during the approach of the seismic vessels to the two ports. This could result in vessel strikes or accidents, which is deemed a public health and safety risk.

How issue will be addressed in the EIA:

A social impact assessment will be commissioned to assess the social and economic impacts and benefits associated with the proposed project.

Table 2: Environmental and Social Interaction Matrix

Project Phase	Project Activities	Resource / Receptors	Sensitive receptors in the receiving environment															
			Physical			Biological							Socio-economic					
			Water Column (including Water Quality, Noise and Turbidity)	Atmosphere (including Air Quality, Noise and Lighting)	Seabed Sediment and Profile	Fish and Plankton Communities	Benthic Habitats and Communities	Sea and shore birds	Turtles and Marine Mammals	Seabed Features and Seamounts	Nearshore Habitats and Communities	Protected Area (Offshore and Coastal)	Fishing	Maritime Heritage	Marine Traffic / Navigation	Public Health and Safety	Infrastructure and Services	Settlements, Tourism and Recreation
Planned Activities (Normal Operation)																		
Seismic Surveying	Mobilisation	Transit of survey vessels to survey area, including routine discharge to sea																
		Discharge of ballast water																
	Operation	Operation of survey vessels, including routine discharge to sea																
		Seismic acquisition, including the deployment of seismic equipment (sources and streamers) and acquisition operations																
		Provision of services from local service providers (e.g. catering and refuelling)																
		Berthing during crew changes																
	Demobilisation	Operation of helicopters																
Survey vessels leave survey area and transit to port or next destination																		
Unplanned Activities (Emergency Event)																		
All	Vessel accident																	
Operation	Dropped objects / lost equipment																	
	Hydrocarbon spills during bunkering (minor)																	
Colour key:																		
	No interaction		Minor negative interaction		Moderate / major negative interaction		Positive interaction											

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ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Definition
2D	Two-dimensional
3D	Three-dimensional
ACE	African Coast to Europe
ALARP	As Low As Reasonably Practicable
BOD	Biological Oxygen Demand
CITES	Convention on International Trade in Endangered Species
CLC	International Convention on Civil Liability for Oil Pollution Damage, 1969
CMS	Convention on Migratory Species
COLREGS	Convention on the International Regulations for Preventing Collisions at Sea, 1972
DEA	Directorate of Environmental Affairs
DSR	Draft Scoping Report
EBSA	Ecologically or Biologically Significant Area
ECC	Environmental Clearance Certificate
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FSR	Final Scoping Report
GIIP	Good International Industry Practice
GIS	Geographical Information System
GN	Government Notice
HRIA	Human Rights Impact Assessment
HSE	Health, Safety and Environment
I&APs	Interested and Affected Parties
IBA	Important Bird Area
ICCAT	International Commission for the Conservation of Atlantic Tunas
IFC	International Finance Corporation
IMO	International Maritime Organisation
IUCN	International Union for Conservation of Nature
LUCORC	Lüderitz Upwelling Cell / Orange River Cone
MARPOL 73/78	International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978
MEFT	Ministry of Environment, Forestry and Tourism

Acronym / Abbreviation	Definition
MFMR	Ministry of Fisheries and Marine Resources
MGO	Marine Gas Oil
ML	Mining Licence
MME	Ministry of Mines and Energy
MOC	Management Of Change
MPA	Marine Protected Area
MWT	Ministry of Works and Transport
MTI	Ministry of Trade and Industry
NAMCOR	National Petroleum Corporation of Namibia
NAMPORT	Namibian Ports Authority
NDP	Namibian Dolphin Project
NDP5	Fifth National Development Plan 2017/18 – 2021/22
NIMPA	Namibian Islands' Marine Protected Area
OMZ	Oxygen Minimum Zone
OPRC Convention	International Convention on Oil Pollution Preparedness, Response and Co-operation, 1990
OSRL	Oil Spill Response Limited
PTS	Permanent hearing Threshold Shift
QMAs	Quota Management Areas
ROV	Remotely Operated Vehicle
SACW	South Atlantic Central Water
SBS	Social Baseline Study
SIA	Social Impact Assessment
SME	Small and Medium Enterprise
SPL	Sound Pressure Level
SLR	SLR Environmental Consulting (Namibia) (Pty) Ltd
TAC	Total Allowable Catch
TEPNA	Total E and P Namibia B.V.
TTS	Temporary hearing Threshold Shift
UN	United Nations
UNCLOS	United Nations Law of the Sea Convention, 1982
VMEs	Vulnerable Marine Ecosystems
VOCs	Volatile Organic Compounds
WACS	West Africa Cable System

ACRONYMS AND ABBREVIATIONS

Unit	Definition
cm	centimetres
cm/s	centimetres per second
dB	Decibel
g/m ²	Grams per square metre
g/m ³	Grams per cubic metre
Hz	Hertz
kHz	Kilohertz
km	Kilometre
km ²	Square kilometres
kts	Knots
m	Metres
m ²	Square metres
m ³	Cubic metre
mg/l	Milligrams per litre
mm	Millimetres
m/s	Metres per second
mT	Metric tons
nm	Nautical mile (1 nm = 1.852 km)
psi	Per square inch
t	Tons
µg	Micrograms
µm	Micrometre
µg/l	Micrograms per litre
µPa	Micro Pascal
°C	Degrees Centigrade
%	Percent
‰	Parts per thousand
<	Less than
>	Greater than
"	Inch

GENERAL TERMINOLOGY

Terms	Definition
Activity	An “activity” is defined as a distinct process or risk undertaken by an organisation for which a responsibility can be assigned. Activities also include facilities or pieces of infrastructure that are possessed by an organisation.
Area of Influence	<p>The area of influence is a spatially defined area within which potential impacts associated with a project are expected to occur. It is defined taking into account:</p> <ul style="list-style-type: none"> the physical extent of the proposed project activities, defined by the limits of landscape or seascape to be acquired or used temporarily or permanently for the Project; and the nature of the baseline environment, the sources of predicted impacts and the extent to which the impact is likely to occur beyond the Project boundary (e.g. air or water contamination). <p>The area of influence is separated into the direct area of influence within which direct impacts of the project would occur (including support activities such as vessel movements). The indirect area of influence typically covers a wider area to include potential indirect social impacts (e.g. employment or economic benefits at a district or regional scale), and biophysical impacts (e.g. unplanned events such as oil spill).</p>
Aspect	An environmental or social ‘aspect’ is an element of an organisation’s activities, products and services which can interact with the natural and social environment. The interaction of an aspect with the natural and social environment may result in an impact.
Baseline	A description of the physical, biological and social environment based on data and information from the pre-project conditions that provides a reference against which any future changes associated with a project can be assessed, and which provides information for subsequent monitoring of biodiversity performance. The baseline should identify and describe the attributes of the physical, biological, socio-economic and cultural receiving environment both in the immediate and wider area around a project site.
Cumulative Impact	<p>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:</p> <ul style="list-style-type: none"> 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).
Effect	Effect is a change in a variable or parameter caused or influenced by a project activity, but where no judgement or evaluation is made about the consequence of this change on a receptor. Effects are typically related to abiotic or physico-chemical changes (e.g. change in water quality, air quality or noise) (see ‘Impact’ below)
Embedded or Project Controls	The physical or procedural measures that are built into the design or operation of a project and required by law or standard for good international industry practice and which serves to mitigate potential consequences on the environment (e.g. application of MARPOL standards; installation of air quality scrubbers on smoke stacks). These measures are typically incorporated into the project description and should not be considered additional mitigation measures in the evaluation of post-mitigation impact significance.
Footprint	The area directly affected by a project usually through physical disturbance such as land clearance and placement of infrastructure and which falls within the direct area of influence of the project.

Terms	Definition
Impact	Impact is a change resulting from an aspect acting on a natural or environmental receptor (e.g. impact of air quality change on nearby settlement or impact of water quality change on instream biota etc.). Impacts are evaluated in an ESIA process using an agreed impact assessment methodology taking into account aspects such as receptor sensitivity, intensity, extent and duration. Impacts can be direct, indirect, induced, or cumulative.
Magnitude (or Consequence)	A rating assigned to an impact to reflect the 'size' of the impact on the specific resource, based on intensity, extent and duration.
Mitigation Hierarchy	A process of sequentially prioritising the application of measures to avoid, mitigate, restore and offset impacts to minimise impacts to as low as reasonably possible (ALARP).
Planned Impact	An impact that is expected as a result of a Project's planned activity (e.g. generation of drill cuttings during drilling), i.e. impacts related to normal operations. Planned impacts would include a standard or normal occurrence that may arise during routine project activities (including small uncontrolled discharges during normal operations), as opposed to an unplanned event (such as well blow out, tanker collision, dam break etc.).
Pre-Mitigation	The assessment of impact significance before mitigation has been applied but which includes the implementation of embedded control measures.
Project	The Project includes all the infrastructure components and activities which form part of the development, including all related and ancillary facilities or infrastructure (e.g. power and water supply, roads, waste services etc.) without which the Project cannot proceed. It also includes any other developments or activities which follow as a necessary consequence of the project.
Residual impact	The assessment of impact significance after additional technically feasible and agreed mitigation has been applied in accordance with the mitigation hierarchy (including the implementation of embedded control measures).
Receptor	Receptors are environmental components, people and cultural heritage assets that may be affected (adversely or beneficially) by the proposed project. They can be categorised into three types: <ul style="list-style-type: none"> • Physical marine environment (i.e. non-living (abiotic) environmental components, e.g. water and air quality, marine sediments, geology, noise, etc.); • Biological environment (i.e. terrestrial, coastal and marine habitats, flora and fauna, protected areas, etc.). • Socio-economic (i.e. local economy, people, settlements, livelihoods (e.g. resource users), and cultural heritage, etc.).
Scoping	Scoping is the process of defining the range of issues and alternatives to be considered and the approach to be followed in an environmental and social impact assessment (ESIA) process. It is typically designed to focus the ESIA on significant issues including those perceived as important by stakeholders.
Sensitivity	A term used to denote the importance or value or vulnerability of a receptor to an impact. Sensitivity ratings are defined specific to different receptor types.
Screening	Screening is a process to determine whether a proposed activity requires an environmental assessment, as well as the type and level of assessment required and is typically undertaken prior to commissioning an ESIA process. The term may also be used as a high-level assessment of potential impacts that may arise, for example, through the use of an activity- impact interaction matrix.
Unplanned Impact	Impacts that result from an unplanned or non-routine event and which are not reasonably foreseeable or expected during the Project. The probability or likelihood of occurrence is described when assessing unplanned impacts but is not used to influence the significance rating. Unplanned events include a fuel/oil spill during drilling operations but does not include routine spills during normal operations.

1 INTRODUCTION

This chapter describes the purpose of this report, provides a brief description of the project background, and describes the structure of the report.

1.1 PURPOSE OF THIS REPORT

This Final Scoping Report (FSR) has been compiled as part of the Environmental Impact Assessment (EIA) process that is being undertaken for a proposed three-dimensional (3D) seismic survey in Licence Blocks 2912 and 2913B, Orange Basin, off the coast of southern Namibia.

This report provides:

- An introduction to the proposed project;
- The legal and policy framework;
- The EIA approach and methodology;
- Details of the public consultation process;
- The need for the proposed project;
- A description of the proposed project activities and alternatives being considered;
- A description of the key characteristics of the receiving (baseline) environment;
- The key issues that will be further investigated and assessed in the Impact Assessment Phase; and
- The Terms of Reference for the next phase of the EIA process.

The compilation of this report has been informed by comments received following the distribution of the Draft Scoping Report (DSR) and issues raised during focus group meetings. It should be noted that all significant changes to the DSR are underlined and in a different font (Times New Roman) to the rest of the text.

This report is submitted to the Ministry of Mines and Energy (MME): Directorate of Petroleum Affairs for consideration and review. In terms of Section 32 of the Environmental Management Act, 2007 (No. 7 of 2007), MME is then required to make a recommendation on the acceptance or rejection of the report to Ministry of Environment, Forestry and Tourism (MEFT): Directorate of Environmental Affairs (DEA), who will make the final decision.

1.2 PROJECT BACKGROUND AND LOCATION

Total E and P Namibia B.V. ("TEPNA") is the holder of two Exploration Licences for Blocks 2912 and 2913B. Blocks 2912 and 2913B are located in the deep-water Orange Basin off the coast of southern Namibia (see Figure 1-1). Block 2912 is located the furthest offshore (290 km at its closest point) in water depths of 3 300 m to 3 800 m. Block 2913B is immediately to the east (240 km offshore at its closest point) in water depths ranging from approximately 2 600 m to 3 300 m.

To meet the obligations of the Exploration Licence for Block 2912, TEPNA is planning to undertake a 3D seismic survey within this licence block, as well as Block 2913B, to investigate subsea geological formations. During seismic surveys, high-level, low frequency sounds 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 towed receivers (or hydrophones). Analyses of the returned signals enables interpretation of subsea geological formations.

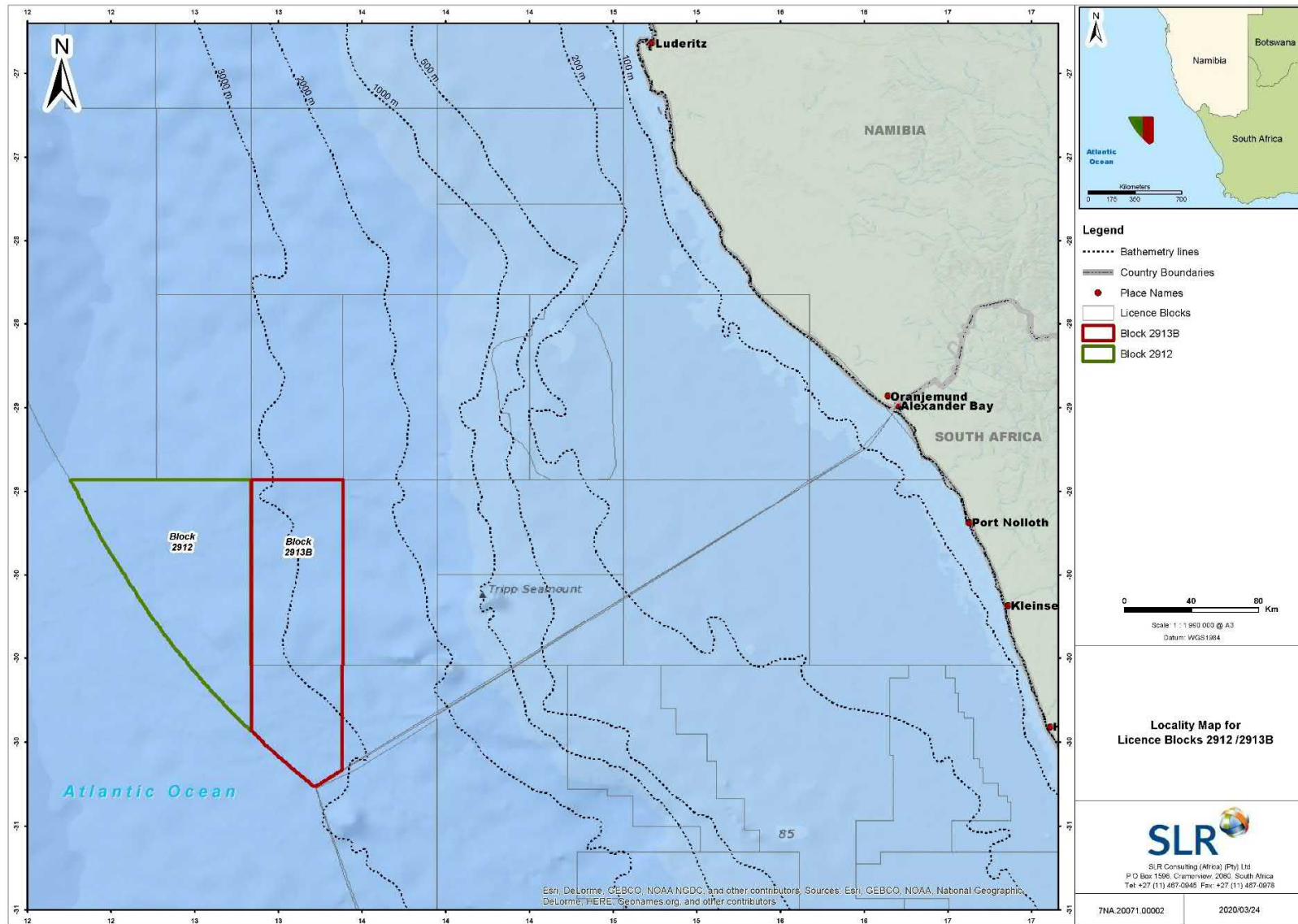


FIGURE 1-1: LICENCE BLOCKS 2912 AND 2913B OFF THE COAST OF NAMIBIA

The proposed project triggers several listed activities in terms of the EIA Regulations 2012, and as such requires an Environmental Clearance Certificate (ECC). SLR Environmental Consulting (Namibia) (Pty) Ltd (“SLR”) has been appointed by TEPNA as the Independent Environmental Assessment Practitioner to undertake a full Scoping and EIA process for the proposed project.

1.3 STRUCTURE OF THIS REPORT

This report has been prepared in compliance with Section 8 of the EIA Regulations 2012 (see Table 3-2). 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 FINAL SCOPING REPORT

Section	Contents
Executive Summary	Provides a synopsis of the Final Scoping Report.
Chapter 1	Introduction Describes the purpose of this report, provides a brief description of the project background, and describes the structure of the report.
Chapter 2	Legislative and Policy Requirements Summarises the Namibian administrative framework and describes the relevant Namibian legislation and international conventions / treaties applicable to the proposed project.
Chapter 3	EIA Approach and Methodology Presents the EIA Project Team, EIA assumptions and limitations, and outlines the approach and methodology to the EIA.
Chapter 4	Public Consultation Process Presents public consultation process undertaken during the Scoping Phase and that proposed for the Impact Assessment Phase.
Chapter 5	Need and Desirability Describes the need and desirability for the proposed project.
Chapter 6	Project Description Presents a description of the proposed project and associated project alternatives.
Chapter 7	Description of the Receiving Environment Describes the existing physical, biological, socio-economic and cultural environment that could potentially be affected by the proposed exploration activities.
Chapter 8	Environmental and Socio-Economic Screening and Key Impacts Provides a high-level screening of the interaction between the project activities and the receiving environment, as well as presents a project-specific Aspects and Impacts Register. The key impacts identified by the EIA project team are also presented.
Chapter 9	Terms of Reference for the Detailed Assessment Sets out the plan of study for detailed assessment for the EIA and Environmental and Social Management Plan (ESMP).
Chapter 10	References Provides a list of the references used in compiling this report.

Section	Contents
Appendices	Appendix 1: Curricula Vitae of the EIA Project Team Appendix 2: Public Participation Process: Appendix 2.1: I&AP Database Appendix 2.2: Advertisements Appendix 2.3: Site Notices Appendix 2.4: I&AP Notification Letters <u>Appendix 2.5: Minutes of Focus Group Meetings</u> <u>Appendix 2.6: I&AP correspondence received during DSR comment and review period</u> <u>Appendix 2.7: Comments and Responses Report</u>

2 LEGAL AND POLICY FRAMEWORK

The Namibian administrative framework, the relevant Namibian legislation, and international conventions / treaties applicable to the proposed project are described in this chapter.

2.1 NAMIBIAN INSTITUTIONAL AND ADMINISTRATIVE STRUCTURE

2.1.1 Ministry of Environment, Forestry and Tourism (MEFT)

MEFT is the custodian of Namibia's natural environment and its mission is to "*promote biodiversity conservation in the Namibian environment through the sustainable utilisation of natural resources and tourism development for the maximum social and economic benefit of its citizens*". MEFT develops, administers and enforces environmental legislation and policy.

The Ministry comprises six directorates; one of which is the **Directorate of Environmental Affairs (DEA)**. DEA gives effect to Article 95L of the Constitution by promoting environmental sustainability. The Environmental Commissioner serves as head of the DEA. The DEA administers the EIA process undertaken in terms of the Environmental Management Act, 2007 and the EIA Regulations 2012 and will be responsible for issuing a decision on the EIA based on the recommendation from MME. If approved, the DEA will issue an ECC.

2.1.2 Ministry of Mines and Energy (MME)

The MME is responsible for promoting and regulating the development and use of Namibia's natural resources. The Ministry comprises seven directorates; one of which is the **Directorate of Petroleum Affairs**.

The Directorate of Petroleum Affairs regulates the petroleum industry. It issues licences for petroleum exploration and production and can approve or reject licence applications based on the outcome of EIA reports.

MEFT requires that applications for ECCs for oil and gas exploration projects must be submitted to MME as the Competent Authority, with responsibility assigned to the Petroleum Commissioner. On conclusion of the EIA process, MME will make a recommendation on the application to MEFT, who in turn is required to make the final decision on the application.

2.1.3 Ministry of Works and Transport (MWT)

MWT is responsible for infrastructure development and setting transport policy and regulation. MWT comprises the four departments, one of which is the Department of Transport.

The **Directorate of Maritime Affairs** falls under the Department of Transport. This Directorate is responsible for ensuring the safety of life and property at sea; the prevention and combat of pollution of the marine environment by ships; and promotion of Namibia's maritime interests.

2.1.4 Namibian Ports Authority (Namport)

Namport is a public entity that reports to MWT. The National Ports Authority Act, 1994 (No. 2 of 1994) gives Namport the responsibility of protecting the environment within harbour areas. Namport manages both the Port of Walvis Bay and the Port of Lüderitz.

2.1.5 Ministry of Fisheries and Marine Resources (MFMR)

MFMR is responsible for the management and development of fisheries and aquaculture in Namibia. The Ministry is comprised of four directorates; two of which are the **Directorate of Resource Management** and **Directorate of Operations**.

The Directorate of Resource Management is responsible for scientific research and providing advice on the state of commercially important marine fish stocks and recommending catch quotas. It is also responsible for managing and regulating species fish size limits, dates of closed fishing seasons, declaring areas closed to fishing and determining fishing gear use.

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

2.2 LAWS AND POLICIES APPLICABLE TO OIL AND GAS EXPLORATION

2.2.1 Introduction

The Republic of Namibia has five tiers of law, which includes:

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

The Constitution of the Republic of Namibia (1990) sets of founding principles to which Namibia is governed. Article 95 (L) of the Constitution commits the state to promote sustainable development by “*maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefit of all Namibians both present and future...*”.

The key policy and legislative requirements and guiding principles underpinning the EIA process are outlined here.

2.2.2 Policy and Legal Framework for EIA

2.2.2.1 Environmental Assessment Policy for Sustainable Development and Environmental Conservation, 1995

Namibia’s Environmental Assessment Policy was published in 1995 and promotes sustainable development and economic growth while protecting the environment in the long-term. The government recognises that EIA (termed Environmental Assessment in Policy) is a key tool to further the implementation of a sound Environmental Policy that strives to achieve Integrated Environmental Management. EIAs ensure the consequences of development projects are considered and incorporated into the planning process. Marine petroleum exploration is listed as an activity that requires an EIA. This EIA aims to fulfil the requirements of this Policy.

2.2.2.2 Environmental Management Act, 2007

The Environmental Management Act, 2007 (No. 7 of 2007) was promulgated in December 2007 and came into effect on 6 February 2012. The main objectives of this Act are to ensure that:

- Significant effects of activities on the environment are considered carefully and timeously;
- There are opportunities for timeous participation by Interested and Affected Parties (I&APs) throughout the assessment process; and
- Findings are considered before any decision is made in respect of activities.

Section 3(2) of the Act provides a set of principles which give effect to the provisions of the Constitution for integrated environmental management. Decision-makers must take these principles into account when deciding on a proposed project. This Act stipulates that no party, whether private or governmental, can conduct a listed activity without an ECC obtained from the Environmental Commissioner.

2.2.2.3 EIA Regulations 2012

The EIA Regulations 2012, promulgated on 6 February 2012 in terms of Section 56 of the Environmental Management Act, 2007 (GN No. 30) provides for the control of certain listed activities. These listed activities are provided in GN No. 29 and are prohibited until an ECC has been obtained from MEFT. Such ECCs, which may be granted subject to conditions, will only be considered once there has been compliance with the EIA Regulations 2012. GN No. 30 sets out the procedures and documentation that need to be complied with in undertaking an EIA process. Listed activities applicable to the proposed project are presented in Table 2-1.

TABLE 2-1: LIST OF APPLICABLE ACTIVITIES IN TERMS OF THE EIA REGULATIONS 2012

Activity	Comment
3. Mining and quarrying activities	
3.1 <i>The construction of facilities for any process or activities which requires a licence, right or other form of authorisation, and the renewal of a licence, right or other form of authorisation, in terms of the Minerals (Prospecting and Mining Act), 1992.</i>	The objective of the proposed seismic survey is to identify possible structures in the underground rocks, favourable to the possible discovery of hydrocarbons. Although the proposed seismic survey would not directly result in the extraction of any oil or gas, it could lead to that in the future. Refer to Section 6.4 for a description of seismic surveys.
3.2 <i>Other forms of mining or extraction of any natural resources whether regulated by law or not.</i>	
3.3 <i>Resource extraction, manipulation, conservation and related activities.</i>	
3.4 <i>The extraction or processing of gas from natural and non-natural resources, ...</i>	

2.2.3 Policy and Legal Framework for Oil and Gas Exploration

2.2.3.1 Petroleum (Exploration and Production) Act, 1991

The Petroleum (Exploration and Production) Act, 1991 (No. 2 of 1991) governs oil and gas exploration in Namibia.

Section 9 of this Act requires a licence is obtained from the MME before any reconnaissance, exploration or production operations for petroleum can be undertaken. Prior to the granting of an Exploration Licence, a Petroleum Agreement must be entered into between the Minister and the potential licence in terms of

Section 13 of the Act. The Petroleum Agreement prescribes that all companies must undertake EIAs for exploration activities.

2.2.3.2 Petroleum (Exploration and Production) Act Regulations (1999)

The Petroleum (Exploration and Production) Act Regulations (1999), promulgated under Section 76A of the Petroleum (Exploration and Production) Act, 1991, sets out the obligations of the operator to:

- take all such precautions as may be necessary to protect the environment and natural resources;
- make copies of these regulations available to people employed by or performing work for the operator (sub-contractors);
- provide funds and take measures to ensure the health, safety and welfare of employees and the protection of other persons, property, the environment and natural resources from hazards arising from petroleum activities;
- undertake EIA studies provided for in the Model Petroleum Agreement between the Minister and the operator;
- register the installation and ensure that it has a certificate of fitness;
- report the location of the installation to the Petroleum Commissioner and ensure that it is published in a “Notice to Mariners”;
- ensure the installation is properly marked (see International Regulations for Preventing Collisions at Sea as incorporated into the Merchant Shipping Act, 1951);
- equip the installation with the necessary equipment to record environmental data;
- ensure hazardous substances are properly transported, handled and stored;
- ensure an Emergency Preparedness Plan is in place and updated as necessary;
- establish an appropriate safety / exclusion zone and communicate it to the Petroleum Commissioner, and ensure it is published in the “Notice to Mariners”; and
- communicate any emergency to the Petroleum Commissioner immediately.

2.2.3.3 Minerals Policy of Namibia (2004)

The Policy sets out guiding principles for the development of the “mining” sector (which includes mining, energy and oil / gas), while at the same time operating within environmentally acceptable limits. One of the objectives of the Policy is ensuring compliance with national environmental policy and other relevant policies to develop a sustainable mining industry.

The Policy commits MME to ensuring:

- that the development of the mining industry proceeds on an environmentally sustainable basis;
- that mineral / resource development in proclaimed protected areas commences only when rehabilitation is guaranteed; investigating the establishment of financial mechanisms (environmental trust funds or bonds) for environmental rehabilitation and aftercare in other areas; and
- to developing national waste management standards and guidelines in consultation with the mining industry.

The provisions of this policy have been given effect through the enactment of the Petroleum (Exploration and Production) Act 2 of 1991 and Regulation’s.

MME is in the process of drafting a new National Minerals Policy, the “draft National Minerals Policy, 2018”. This Policy notes that minerals are valuable natural resources being the vital raw material for the core sectors of the economy, and that mining must be carried out in an environmentally sustainable manner.

2.2.4 Other Laws and Policies Relevant to Oil and Gas Exploration

Other legislation relevant to the proposed project are summarised in Table 2-2 below.

TABLE 2-2: APPLICABLE SECTORAL LAWS AND REGULATIONS

Sector	Law	Key Provisions
Petroleum	<i>Petroleum Products and Energy Act (No. 13 of 1990) and relevant regulations</i>	This Act provides for the application of environmental standards and the avoidance of environmental harm caused by the keeping, handling, conveying, using and disposing of petroleum products.
	<i>Petroleum Laws Amendment Act (No. 24 of 1998)</i>	This Act amends the Petroleum (Exploration and Production) Act, 1991 so as to, <i>inter alia</i> , make provision for the extension of the duration of exploration licences.
	<i>Petroleum (Taxation) Act (No. 3 of 1991)</i>	This Act provides for the levying and collection off a petroleum income tax and an additional profits tax in respect of certain income received by or accrued to or in favour of persons in connection with exploration operations, development operations or production operations carried out in Namibia in relation to petroleum.
Transport and Maritime	<i>Marine Traffic Act (No. 2 of 1981) (as amended by the Marine Traffic Amendment Act (No. 15 of 1991))</i>	This Act provides for the regulation of marine traffic within the Republic of Namibia.
	<i>The Merchant Shipping Act (No. 57 of 1951)</i>	This act regulates, <i>inter alia</i> , the nature and variety of goods to be shipped and the safety of ships and life at sea.
	<i>Namibian Ports Authority Act (No. 2 of 1994) and Port Regulations</i>	The Act provides for the establishment of the Namibian Ports Authority, which is charged with the management and control of ports and lighthouses in Namibia and the provision of facilities and services related thereto.
	<i>Civil Aviation Act (No. 6 of 2016) and associated regulations</i>	This Act consolidates the laws relating to civil aviation and civil aviation offences.
	<i>Road Traffic and Transport Act (No. 22 of 1999)</i>	This Act provides for the control of traffic on public roads, the licensing of drivers, the registration and licensing of vehicles, and the control and regulation of road transport across Namibia's borders.
	<i>Wreck and Salvage Act (No. 4 of 2004)</i>	This Act provides for the salvage of ships, aircraft and life and the protection of the marine environment.
	<i>Territorial Sea and Exclusive Economic Zone of Namibia Act (No. 3 of 1990)</i>	This act claims the various maritime zones to which Namibia is entitled under international law (in this case, UNCLOS).
	<i>The Territorial Sea and Exclusive Economic Zone of Namibia Amendment Act (No. 30 of 1991)</i>	This Act changes the extent of the territorial zone to 24 miles.

Sector	Law	Key Provisions
Pollution	<i>Atmospheric Pollution Prevention Ordinance (Ordinance 11 of 1976)</i>	This Act provides for the prevention of the pollution of the atmosphere.
	<i>Dumping at Sea Control Act (No. 73 of 1980)</i>	This Act provides for the control of dumping of substances in the sea within 12 nautical miles of the low water mark.
	<i>International Convention for the Prevention of Pollution from Ships Act (No. 2 of 1986)</i>	This Act provides for the application of the MARPOL 73/78.
	<i>International Convention relating to Intervention on the High Seas in cases of Oil Pollution Casualties Act (No. 64 of 1987)</i>	This Act provides for the application of the International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties.
	<i>Prevention and Combating of Pollution of Sea by Oil Act (No. 6 of 1981) and associated Regulations</i>	This Act provides for the prevention and combating of pollution of the sea by oil and determines liability in certain respects for loss and damage caused by the discharge of oil from ships, tankers and offshore installations. The provisions relating to offshore installations only apply to such installations as are situated within 50 nautical miles of the low water mark.
	<i>Marine Notice (No. 2 of 2012): Transfer of Oil Outside Harbours</i>	This notice sets out the requirements to transfer oil within Namibian waters.
Environmental/ Conservation	<i>Marine Resources Act (No. 27 of 2000) and Regulations relating to the Namibian Islands' Marine Protected Area (NIMPA)</i>	This Act provides for the conservation of the marine ecosystem and the responsible utilisation, conservation, protection and promotion of marine resources on a sustainable basis. The Regulations relating to the NIMPA provides with respect to the protection of resources of the Namibian Islands Marine Reserve. The Regulations delineate the protected areas, give coordinates of the All-encompassing buffer zone of the NIMPA, and places restrictions on various activities in the protected area and the buffer zone.
	<i>Nature Conservation Ordinance (No. 4 of 1975)</i>	This Ordinance consolidates and amends the laws relating to the conservation of nature; the establishment of game parks and nature reserves; and the control of problem animals.
	<i>Nature Conservation Amendment Act (No. 5 of 1996)</i>	This Act amends the Nature Conservation Ordinance, 1975, so as to insert and substitute certain definitions; to provide for a proper administrative, legal and procedural framework for tourism concessions in protected areas and other State land; to control the import and export of live game or animal, and to increase the penalties; and to provide for incidental matters.
	<i>National Heritage Act (No. 27 of 2004)</i>	This Act provides for, <i>inter alia</i> , the protection and conservation of places and objects of heritage significance.
	<i>Water Act (No. 54 of 1956)</i>	This Act provides for the control, conservation and use of water for domestic, agricultural, urban and industrial purposes and for the control of certain activities on or in water in certain areas.
	<i>Water Resources Management Act (No. 24 of 2004)</i>	This Act provides for the management, development, protection, conservation and use of water resources.

Sector	Law	Key Provisions
Hazardous Substances	<i>Hazardous Substances Ordinance (Ordinance 14 of 1974)</i>	These provide for the control of toxic substances which may cause injury, ill health or death of human beings.
	<i>The Hazardous Substances Ordinance 14 of 1974: Group I Hazardous Substances</i>	
Labour	<i>Labour Act (No. 11 of 2007)</i>	This Act sets out the fundamental rights of workers and basic conditions for work.
	<i>Regulations relating to the health and safety of employees at work (GN 156 of 1997)</i>	These Regulations establish health and safety regulations for the workplace.
	<i>Employee's Compensation Act (No. 30 of 1941), as amended</i>	This Act provides for employees' compensation.
Health	<i>Health Act (No. 21 of 1988)</i>	This Act only relevant in as much as workers must be protected from harm.

A summary of other policies, plans and guidelines applicable to the proposed project is provided in Table 2-3.

TABLE 2-3: APPLICABLE POLICIES AND PLANS

Policy	Key Provisions
<i>White Paper on the Energy Policy, 1998</i>	The White Paper on the Energy Policy (1998) is the overarching policy document which guides future policy and planning in the energy sector.
<i>Namibia Vision 2030</i>	This outlines the country's development programmes and strategies to achieve its national objectives. One of the major objectives of Vision 2030 is to "ensure the development of Namibia's 'natural capital' and its sustainable utilisation, for the benefit of the country's social, economic and ecological well-being".
<i>Fifth National Development Plan 2017/18 – 2021/22 (NDP5)</i>	Namibia's Fifth National Development Plan (2017/18 – 2021/22) provides the context for all development in Namibia, with the overarching aim of economic and social development.
Harambee Prosperity Plan (HPP)	In 2015, the Harambee Prosperity Plan (HPP) was compiled to complement Vision 2030 and NDP5. The five-year plan aims to achieve social advancement through economic and infrastructure development and effective governance. It promotes the need for the mining sector to develop or support Small and Medium Enterprise (SMEs) through the procurement supply chain and to provide housing for its employees.
<i>Strategic Plan, 2017/2018 – 2021/2022</i>	In order to achieve the objectives in Vision 2030, Harambee Prosperity Plan and NDP5, MME developed the Strategic Plan (2017/2018 – 2021/2022). This Plan provides the strategic direction of MME aimed at achieving its Mandate, Vision, Mission and Strategic Objectives. It aims to ensure the development of Namibia's natural capital and its sustainable utilisation for the benefit of the country's social, economic and ecological well-being. The HPP also includes elements from the Ministry of Trade and Industry's (MTI) industrialisation strategy, "Growth at Home", which promotes local value addition of raw materials before they are exported, building and promoting regional value chains and bilateral cooperation, nurturing infant industries, and the continuous reform of the business environment to become more competitive (MTI, 2015).
<i>Policy for Prospecting and Mining in Protected Areas and National Monuments, 1999</i>	The aim of this Policy is to promote sustainable development in Namibia by permitting prospecting and mining in the country's Protected Areas and National Monuments. It stipulates that government must ensure that short- to medium-term mining projects do not jeopardise the potential for long-term sustainable development.
<i>Policy for the Conservation of Biotic Diversity and Habitat Protection, 1994</i>	This Policy was drafted by MEFT to ensure adequate protection of all species and subspecies, of ecosystems and of natural life support processes.

Policy	Key Provisions
<i>National Policy on Prospecting and Mining in Protected Areas, 2018</i>	This Policy guides decision-making with regards to exploration and mining in protected areas. This policy has been developed to complement various regulations and policies relevant to prospecting and mining in order to ensure minimal negative impacts on the environment.
<i>National Waste Management Policy, 2010</i>	This Policy provides a framework for guidelines for safe and sustainable waste management practices, as well as the formulation of legislations on waste management for Namibia.
<i>National Biodiversity Strategy and Action Plan (NBSAP) 1 and 2</i>	The NBSAP is the key national level implementing instrument of the objectives of the United Nations Convention on Biological Diversity (see Table 2-4).
<i>National Agriculture Policy, 2015</i>	This Policy recognises the problems of bush encroachment, desertification and environmental degradation caused by the destruction of forest cover, soil erosion, overgrazing and bush encroachment.
<i>New Equitable Economic Empowerment Framework Policy, 2011</i>	The ultimate objective of this Policy is to create an equitable and socially just society in which the distribution of income becomes far more equitable than it is at present.
<i>National Environmental Health Policy, 2002</i>	This Policy provides a framework and guidelines to prevent and control environmental health hazards and risks that may adversely affect health and quality of life for all the people in Namibia.

2.3 INTERNATIONAL LAWS AND CONVENTIONS

Relevant international conventions and treaties which have been ratified by the Namibian Government and which have become law through promulgation of national legislation are listed in Table 2-4 below.

TABLE 2-4: RATIFIED INTERNATIONAL CONVENTIONS AND TREATIES

Conventions and Treaties	Summary of legislative provisions
Air and Atmosphere	
<i>Kyoto Protocol on the Framework Convention on Climate Change, 1997</i>	This Protocol was the key instrument on which the 1992 United National Framework Convention on Climate Change is based. It is the first legally binding global agreement setting out specific obligations for the reduction of the amount of greenhouse gases.
<i>Montreal Protocol on Substances that Deplete the Ozone Layer, 1987</i>	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.
<i>Paris Agreement (United Nations Framework Convention on Climate Change), 2016</i>	Namibia signed the Paris Agreement on 22 April 2016 and entered it into force on the 4 November 2016. This Agreement aims to strengthen the global response to the threat of climate change by limiting the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels. Parties aim to reach global peaking of greenhouse gas emissions as soon as possible, recognising that peaking will take longer for developing country Parties, and to undertake rapid reductions thereafter in accordance with best available science, so as to achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century.
<i>United Nations Framework Convention on Climate Change – UNFCCC, 1992</i>	The UNFCCC objective is to stabilise greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. The framework sets non-binding limits on greenhouse gas emissions for individual countries and contains no enforcement mechanisms.

Conventions and Treaties	Summary of legislative provisions
<i>Vienna Convention for the Protection of the Ozone Layer, 1985</i>	The Convention is the first global agreement that recognised that the ozone was a serious enough problem to warrant international regulation.
Chemicals and Waste	
<i>Convention on the control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel, 1989)</i>	This Convention designed to reduce the movements of hazardous waste between nations, and specifically to prevent transfer of hazardous waste from developed to less developed countries.
<i>Stockholm Convention on Persistent Organic Pollutants, 2001</i>	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	
<i>African Convention for the Conservation of Nature and Natural Resources (Algeria, 1968) and the revised version (Maputo, 2003)</i>	The objectives of this Convention are to enhance environmental protection, to foster the conservation and sustainable used of natural resources, and to harmonise and coordinate polices in these fields.
<i>Convention on the Conservation of Migratory Species of Wild Animals, also known as the Convention on Migratory Species (CMS) or the Bonn Convention, 1983</i>	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.
<i>Cartagena Protocol on Biosafety to the Convention on Biological Diversity, 2000</i>	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.
<i>United Nations Convention on Biological Diversity (UNCBD), 1992</i>	This Convention has three main goals including: the conservation of biological diversity (or biodiversity); the sustainable use of its components; and the fair and equitable sharing of benefits arising from genetic resources.
<i>Convention on International Trade of Wild Fauna and Flora Endangered Species, 197) (CITES)</i>	CITES is a multilateral treaty to protect endangered plants and animals.
<i>Convention on Wetlands of International Importance (Ramsar Convention, 1971)</i>	This Convention is an international treaty for the conservation and sustainable use of wetlands.
<i>International Convention for the Conservation of Atlantic Tunas (ICCAT)</i>	This Convention provides for the management and conservation of tuna and tuna-like species in the Atlantic Ocean and adjacent seas.
<i>Memorandum of Understanding (MoU) concerning Conservation Measures of Marine Turtles of the Atlantic Coast of Africa, 1999</i>	This MoU focuses on the protection of six marine turtle species that are estimated to have rapidly declined in numbers along the Atlantic Coast of Africa.
<i>United Nations Convention to Combat Desertification in those Countries Experiencing serious Drought and/or Desertification, Particularly in Africa, 1994</i>	This is a Convention to combat desertification and mitigate the effects of drought through national action programs that incorporate long-term strategies supported by international cooperation and partnership arrangements.
Marine Pollution	
<i>International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 (MARPOL 73/78)</i>	<p>MARPOL 73/78 was developed by the International Maritime Organization 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.</p> <ul style="list-style-type: none"> • 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

Conventions and Treaties	Summary of legislative provisions
	<p>packaged form</p> <ul style="list-style-type: none"> • Annex IV: Pollution by sewage from ships • Annex V: Pollution by garbage from ships • Annex VI: Prevention of air pollution from ships <p>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.</p>
<i>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)</i>	This Convention provides for a compensation fund for clean-up costs and environmental damage subject to certain conditions and ceilings.
<i>International Convention on Oil Pollution Preparedness, Response and Co-operation, 1990 (OPRC Convention)</i>	This Convention is an international maritime convention establishing measures for dealing with marine oil pollution incidents nationally and in co-operation with other countries.
<i>International Convention on the establishment of an International Fund for Compensation for Oil Pollution Damage (The Fund Convention), 1971</i>	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.
<i>Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 (London Convention) and 1996 Protocol</i>	The 1996 Protocol deals with the incineration and dumping of waste at sea, including the disposal of exploration platforms and dredged material.
<i>International Convention relating to Intervention on the High Seas in case of Oil Pollution Casualties, 1969</i>	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.
<i>Protocol on the Intervention on the High Seas in Cases of Marine Pollution by substances other than oil, 1973</i>	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.
<i>International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM), 2017</i>	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.
Marine Safety	
<i>Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREGS)</i>	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.
<i>International Convention for the Safety of Life at Sea, 1974 (SOLAS) with its protocol of 1978</i>	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.
<i>The International Convention on Load Lines, 1966 and its protocol of 1988</i>	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.
<i>International Convention on Standards of Training, Certification and Watch-keeping for Seafarers, 1978</i>	This Convention sets qualification standards for masters, officers and watch personnel on seagoing merchant ships.

Conventions and Treaties	Summary of legislative provisions
Marine Resources	
<i>Convention for Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central and Southern African Region (Abidjan Convention), 1984</i>	The objective of this Convention is to protect the marine environment, coastal zones and related internal waters falling within the jurisdiction of the States of the West and Central African region.
<i>Convention of the International Maritime Organisation (IMO), 1948</i>	This Conventions deals with the establishment of the IMO. The IMO is a specialist United Nations agency dealing with maritime issues, including development of all the marine pollution control conventions.
<i>United Nations Law of the Sea Convention, 1982, (UNCLOS)</i>	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 Exclusive Economic Zone (EEZ) and on the continental shelf.
Archaeology and Cultural Heritage	
<i>Convention concerning the Protection of the World Cultural and Natural Heritage (Paris, 1972)</i>	This Convention provides for the identification, protection and conservation of the cultural and natural heritage for future generations.
<i>United Nations Educational, Scientific and Cultural Organization (UNESCO) Convention on the Protection of the Underwater Cultural Heritage, 2001</i>	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.
Fishing	
<i>Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas, 1993</i>	This Agreement promotes compliance with international conservation and management measures by fishing vessels on the high seas.
<i>Convention on the Conservation and Management of Fishery Resources in the South-East Atlantic Ocean, 2001</i>	This Convention provides for the long-term conservation and sustainable use of the fishery resources in the South East Atlantic Ocean.

2.4 TEPNA PROJECT STANDARDS AND GENERAL SPECIFICATIONS

2.4.1 Project Standards for Seismic Surveys

The seismic survey will be undertaken in line with TEPNA's General Specification for Offshore seismic surveys (GS EP GPA 001). This specification specifies minimum vessel and marine operations requirements for offshore seismic surveys, including vessel suitability and acceptance, vessel mobilisation and offshore logistics (e.g. bunkering and transfer of personnel).

The survey will also comply with TEPNA's General Specification for Environment – Environmental Requirements for Project Design and Exploration and Production Activities (GS EP ENV 001). To reduce any potentially significant impacts of proposed future activities, mitigation measures shall be identified and selected according to the Best Available Techniques (BAT) concept and approved by Company. The Environmental Impact Assessment study (EIA) requirements, when available, shall be integrated in the design definition.

It deals with Environmental Footprint; Flaring and Air Emissions; Fuel Gas and Energy Use; Management of Liquid Effluents; Waste Management; Drill Fluids and Cuttings; Chemicals; Noise; Dust, Odours and Lighting; Spill Response Equipment; and Decommissioning of Installations.

2.4.2 General Specifications for EIAs

The current EIA is being conducted within the framework TEPNA's General Specifications for Environmental and Social Impact Assessments (ESIA), including:

- **General Specification for EIAs for Exploration and Production activities (i.e. GS EP ENV 120):** The purpose of this specification is to define the processes and requirements to be implemented for conducting an EIA. This specification outlines the minimum standard required by the Company to assess impacts on the environment. This specification is, however, adapted to each project in order to define a particular specification or Scope of Work.
The purpose of the EIA is to ensure that the environment is given full and proper consideration in the decision-making process with respect to potential activities having possible negative and positive consequences on the environment.
- **General Specification for Social Performance – Social Baseline Study (SBS) (i.e. GS EP SDV 101):** This specification defines the Company requirements for establishing a SBS. This specification is the basic standard required by the Company and sets out the study content, phases and expected results. Local laws and rules must be respected, and further specific conditions added, if necessary.
The overarching objective of an SBS is to describe, before any operational activity begins, the societal and human rights context of the licence area and/or the societal context of potential Project sites. A licence-wide SBS may be undertaken before oil and gas activities have been defined in order to understand the general societal context for future activities. Once the oil and gas project has been defined and potential Project sites identified, then a Project specific SBS is carried out which is included in the Project's Social Impact Assessment.
- **General Specification for Social Performance – Social Impact Assessment (SIA) (i.e. GS EP SDV 102):** This specification defines the Company guidelines for conducting a SIA. This specification is the basic standard required by the Company and sets out the study content, phases and expected results. Local laws and rules must be respected, and further specific conditions added, if necessary.
The SIA identifies the potential positive and negative social impacts of the Project, particular adverse human rights impacts, and describes the approach for Stakeholder Engagement including stakeholder mapping, disclosure on both EIA and SIA findings (potential impacts and mitigation measures).
- **General Specification for Sustainable Development – Human Rights Impact Assessment (HRIA) (i.e. GS EP SDV 103):** This specification defines the Company guidelines for conducting a HRIA. It is the basic standard required by the Company and sets out the content, phases and expected results.
The HRIA aims to (1) identify affected and potentially affected stakeholders with a particular focus on those vulnerable to Human Rights impacts, (2) engage meaningful with stakeholders, (3) evaluate the level of vulnerability of Project Affected Persons and Project Affected Communities to impacts, (4) identify and assess positive and negative Human Rights impacts resulting from the Company's activities, (5) propose measures to mitigate identified negative impacts and maximise potential positive impacts, and (6) propose indicators to track performance of impacts management measures.
- **General Specification for Environment and Social Performance – Geographical Information System (GIS) (i.e. GS EP ENV 501):** This specification defines the requirements to implement a GIS with data generated in the context of HSE activities.

3 EIA APPROACH AND METHODOLOGY

This chapter presents the EIA Project Team, EIA assumptions and limitations, and outlines the approach and methodology to the EIA process, which covers both Environment and Social aspects.

3.1 EIA PROJECT TEAM

The EIA project team and specialists appointed to undertake the EIA process are presented in Table 3-1. The curriculum vitae documentation for the SLR project team is attached in Appendix 1. SLR and specialist consultants have no vested interest in the proposed project other than fair payment for consulting services rendered as part of the EIA process.

TABLE 3-1: DETAILS OF THE EIA PROJECT TEAM AND SPECIALISTS

Company	Name	Qualifications	Experience (years)	Roles
EIA Project Team				
SLR Namibia / Africa	Andrew Bradbury	M.Sc. (Env Assessment & Mgt), Oxford Brookes University	27	Project Director - Report review and quality control
	Jonathan Crowther	MSc (Env. Sci.), University of Cape Town	32	Alternative Project Director
	Jeremy Blood	MSc (Cons. Ecol.), University of Stellenbosch	21	Project Manager - Management of EIA process, specialist study review and report compilation
	Werner Petrick	M. Env Mgt, Potchefstroom University; B. Eng, University of Pretoria	21	In-country Manager – Liaison with authorities, process review, public participation and report review
	Marco Mariano	Certificates for Autodesk Revit Structure, AutoCAD Civil 3D, and AutoCAD	13	GIS Management
	Bronwyn Gernet	-	19	GIS data management and mapping
Specialist Team				
SLR Consulting Australia	Binghui Li	PhD (Physics – Underwater Acoustics), Curtin University	17	Noise Assessment
	Dana Lewis	BE(Hons)/ME(Mechanical), University of Queensland	1.5	
Pisces Environmental Services	Andrea Pulfrich	PhD (Fisheries Biology), Christian-Albrechts University, Kiel, Germany	25	Marine Faunal Assessment
Capricorn Marine Environmental	Dave Japp	MSc (Ichthyology and Fisheries Science), Rhodes University	32	Commercial Fisheries Assessment
	Sarah Wilkinson	BSc (Hons) (Botany), University of Cape Town	17	

Company	Name	Qualifications	Experience (years)	Roles
Nomad Socio-Economic Management and Consulting	Greg Huggins	MSocSc (Anthropology), University of Cape Town	30	Social Assessment
	Marco Da Cunha	MSc (Geography and Environmental Management), University of Natal	16	

3.2 EIA ASSUMPTIONS AND LIMITATIONS

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

- SLR assumes that all relevant project information has been provided and that it was correct and valid at the time it was provided.
- The survey area identified is indicative and this EIA has considered this and the fact that the final survey layout may change slightly.
- Although TEPNA propose to commence with surveying in December 2020 / January 2021, this EIA will consider the implications of surveying at any time during the year.
- The indicative technical specifications provided (see Table 6-5) are based on generic industry information and previous seismic surveys and it is assumed that the technical specifications used in this EIA are roughly equivalent to that which will be used during the proposed seismic survey.
- This EIA will consider potential impacts on the biophysical and socio-economic environments that have been identified within the project's area of influence, which encompasses:
 - Activities and facilities that are directly owned, operated or managed by the Operator (including contractors) and are component of the project;
 - Unplanned events, which are unintended but may occur as a result of accidents or abnormal operating conditions; and
 - Indirect project impacts on biodiversity or ecosystem services upon which affected communities' livelihoods are dependent.

Thus, the focus is on impacts within Namibia and the licence area.

- No significant changes to the project description or surrounding environment between the completion of the EIA process and implementation of the proposed project that could substantially influence findings and recommendations with respect to mitigation and management will occur.
- TEPNA will operate the seismic survey in line with TEPNA's project specifications (see Section 2.4.1).

3.3 EIA OBJECTIVES

The EIA process has the following objectives:

- To provide the opportunity for I&APs to be involved in the EIA process (during both the Scoping and Impact Assessment phases).
- To identify all the potential key environmental, social and health issues and impacts that would result from the proposed project (during the Scoping Phase).
- To identify feasible alternatives related to the project proposal (during the Scoping Phase).
- To assess potential impacts of the proposed project and project alternatives during the different phases of project development.

- To define feasible mitigation or optimisation measures to minimise potential impacts or enhance potential benefits, respectively (during the Impact Assessment Phase).
- Through the above, to ensure informed, transparent and accountable decision-making by the relevant authorities, as well as the presentation of the results to the public.

3.4 EIA PROCESS

The Namibian EIA process consists of two phases: Scoping and Impact Assessment. A flowchart indicating the entire EIA process is presented in Figure 3-1.

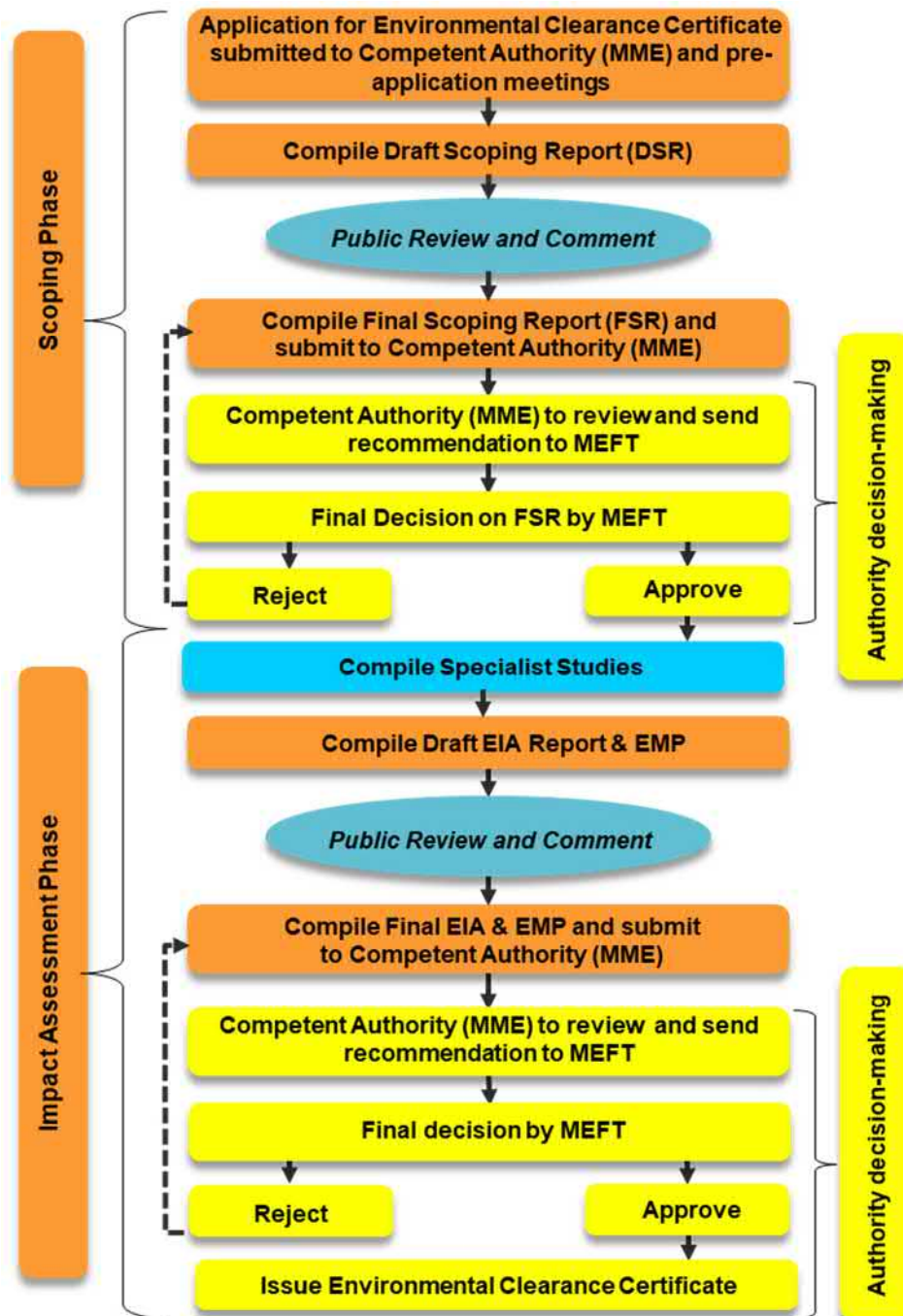


FIGURE 3-1: EIA PROCESS

3.4.1 Scoping Phase

The Scoping Phase communicates the scope of the proposed project to I&APs; considers project alternatives; identifies the environmental and social aspects, and potential impacts for further investigation and assessment; and develops the terms of reference for specialist studies to be conducted in the Impact Assessment Phase.

The Scoping Phase involves a process of:

- Notifying I&APs of the proposed project and the steps in the EIA process;
- Creating an opportunity for I&APs to interact with the EIA project team; and
- Providing information for I&APs to ensure that all key environmental and social issues are identified.

Key steps (excluding public consultation) of the Scoping Phase are summarised below. The public consultation process is summarised in Chapter 4.

3.4.1.1 Baseline Information Collection

SLR commissioned a marine ecologist, fisheries specialist and a social scientist to describe the receiving environment and the identification of issues and impacts as part of the preparation of the Scoping Report.

3.4.1.2 Compilation and Review of the DSR

The DSR was prepared in compliance with Section 8 of the EIA Regulations. For projects with sufficient information at the scoping stage, the Scoping Report can include an assessment of impacts and an Environmental and Social Management Plan (ESMP). However, for the current project, an assessment was not possible at this stage as specialist studies still have to be undertaken. It was also not possible to compile the ESMP at this stage, as management and mitigation measures, which will be contained in the ESMP, will be based on the findings and recommendations of the specialist studies. The specialist studies that will be undertaken and their terms of reference are presented in Chapter 9.

The DSR was informed by the specialist baseline input and a review of previous seismic EIAs undertaken off the coast of Namibia and the South African West Coast. It aimed to present all information in a clear and understandable format, suitable for easy interpretation by I&APs and authorities, and to provide an opportunity for I&APs to comment on the proposed project and findings of the Scoping Phase and impact assessment approach.

The DSR was distributed for a 30-day review and comment period from 8 May to 8 June 2020. The objective of the DSR review and comment period was to ensure that I&APs were notified about the proposed project, given a reasonable opportunity to register on the project database and given an opportunity to provide initial comments. Steps undertaken as part of the DSR review process are summarised in Chapter 4.

3.4.1.3 Compilation of the FSR

This FSR also complies with Section 8 of the EIA Regulations (see Table 3-2) and has been informed by comments received on the DSR (refer to Section 4.2.3) and issues raised during focus group meetings (see Section 4.2.2.6). All written submissions have been collated, and responded to, in a Comments and Responses Report (see Appendix 2.7).

The key issues that will be addressed and / or assessed in the next phase of the EIA are summarised in Section 8.3 of this report.

3.4.1.4 Completion of the Scoping Phase

As noted earlier, this report is submitted to MME for consideration and review. MME will then forward it and a recommendation to MEFT for a decision on the acceptance or rejection of the report.

If the FSR is accepted, the project will proceed onto the Impact Assessment Phase (see Section 3.4.2).

TABLE 3-2: REQUIREMENTS OF A SCOPING REPORT IN TERMS OF THE EIA REGULATIONS 2012

Section 8	Content of Scoping Report	Completed (Y/N)	Section in Scoping Report
(a)	The curriculum vitae of the EAP who prepared the report;	Y	Appendix 1
(b)	A description of the proposed activity;	Y	Chapter 6
(c)	A description of the site on which the activity is to be undertaken and the location of the activity on the site;	Y	Chapter 6
(d)	A description of the environment that may be affected by the proposed activity and the manner in which the geographical, physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed listed activity;	Y	Chapter 7 & 8
(e)	An identification of laws and guidelines that have been considered in the preparation of the scoping report;	Y	Chapter 2
(f)	Details of the public consultation process conducted in terms of Regulation 7(1) in connection with the application, including:		
	(i) the steps that were taken to notify potentially interested and affected parties of the proposed application;	Y	Chapter 4
	(ii) proof that notice boards, advertisements and notices notifying potentially interested and affected parties of the proposed application have been displayed, placed or given;	N	<u>Appendix 2.3 to 2.4</u>
	(iii) a list of all persons, organisations and organs of state that were registered in terms of Regulation 22 as interested and affected parties in relation to the application; and	Y	Appendix 2.1
	(iv) a summary of the issues raised by interested and affected parties, the date of receipt of and the response of the EAP to those issues;	N	<u>Appendix 2.5 to 2.7</u>
(g)	A description of the need and desirability of the proposed listed activity and any identified alternatives to the proposed activity that are feasible and reasonable, including the advantages and disadvantages that the proposed activity or alternatives have on the	Y	Chapter 5 & Section 6.7

Section 8	Content of Scoping Report	Completed (Y/N)	Section in Scoping Report
	environment and on the community that may be affected by the activity;		
(h)	A description and assessment of the significance of any significant effects, including cumulative effects, that may occur as a result of the undertaking of the activity or identified alternatives or as a result of any construction, erection or decommissioning associated with the undertaking of the proposed listed activity;	Partial	There is currently insufficient information available for the assessment of impacts. This will be included in the EIA Report. Refer to Chapter 8 & Section 9.4 for a description of the key issues to be assessed and the assessment methodology, respectively.
(i)	Terms of reference for the detailed assessment; and	Y	Chapter 9
(j)	A draft management plan, which includes: (i) information on any proposed management, mitigation, protection or remedial measures to be undertaken to address the effects on the environment that have been identified including objectives in respect of the rehabilitation of the environment and closure; (ii) as far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of the activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and (iii) a description of the manner in which the applicant intends to modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation remedy the cause of pollution or degradation and migration of pollutants.	N	There is currently insufficient information available to develop this plan and, therefore, the plan will be submitted as part of the EIA Report.

3.4.2 Impact Assessment Phase

3.4.2.1 Specialist Studies

Four specialist studies will be commissioned to address the key issues associated with the proposed seismic survey. These include:

- Marine Noise Modelling;
- Marine Faunal Impact Assessment;

- Commercial Fisheries Impact Assessment; and
- Social Impact Assessment.

To assess the potential impact related to seismic noise, input will be obtained from a noise specialist. This will describe the likely background noise levels in the licence area, quantify the noise levels of the different activities involved in seismic surveys, determine the noise profile and noise transmission loss with distance from the survey area, and zoned of impact. This information will be used as an input by the marine ecologist and fisheries specialists.

The Marine Fauna, Commercial Fisheries and Social Impacts Assessments will each describe their respective baseline receiving environments, identify and assess environmental impacts that may occur as a result of the proposed project (according to pre-defined rating scales - see Chapter 9.4), and recommend appropriate mitigation enhancement measures.

The terms of reference for the proposed specialist studies are presented in Section 9.3. The EIA specialist team is listed in Table 3-1.

3.4.2.2 EIA Report and Environmental and Social Management Plan (ESMP)

The specialist findings and other relevant information will be integrated into a Draft EIA Report and ESMP. The specialist studies will be included as appendices to this report. The Draft EIA Report and ESMP will be released for a 30-day review and comment period. Steps that will be undertaken as part of the review process are summarised in Chapter 4.

After closure of the comment period on the Draft EIA Report, all comments received will be incorporated into the Final EIA Report, which will include the Final Comments and Responses Report. The Final EIA Report and ESMP will be submitted to MME for consideration and review. MME will then forward it and a recommendation to MEFT for a decision on the application. The decision taken by MEFT will be distributed to all I&APs registered on the project database.

3.5 MANAGEMENT OF CHANGE

As with most large, complex projects, refinement of the Project design is an ongoing and sometimes lengthy process. This EIA considers the current “worst case scenario” when assessing impacts and developing mitigation measures. However, should the Project design change after submission of the EIA Report, a Management of Change (MOC) Procedure will be implemented. The MOC Procedure applies to any changes to the project description (i.e. approved activities), impact assessment and / or mitigation and monitoring measures described in the EIA Report and ESMP.

The level of change will determine the action to be taken to ensure the changes do not affect the Project’s ability to meet environmental and social performance requirements outlined in the EIA Report and ESMP, ECC and other relevant Namibian legislation (see Table 3-3). All future design changes will undergo an “internal Screening” exercise in order to determine whether the change triggers a ‘Level 1’ or a ‘Level 2’ change.

TABLE 3-3: MANAGEMENT OF CHANGE PROCEDURE

Level of Change	Description of Level of Change and Action
<p>Level 1: Minor Change</p>	<p>Where the change is largely deemed to be immaterial to the EIA findings, the listed activities that were applied for are still relevant and it does not affect the Project’s ability to meet environmental and social performance requirements outlined in the EIA Report and ESMP.</p> <p>Assuming the project is approved by MEFT, the ECC will need to be renewed every three years. As part of the ECC renewal application, the relevance of the ESMP should be reviewed and amendments proposed where necessary.</p> <p>These changes and their evaluation should be communicated to MME and MEFT for information purposes and the ESMP revised where necessary.</p>
<p>Level 2: Significant Change</p>	<p>Where a future change or upgrade would lead to a significant departure from the base-case or a key aspect of it such that the existing EIA Report or ESMP does not adequately address potential impacts or require additional mitigation. This would imply that a new listed activity(s) is triggered or an approved activity would change.</p> <p>Update this EIA Report and ESMP through an amendment application in terms of the Environmental Management Act, 2007 and Regulations 19 and 21 of the EIA Regulations 2012, and submit to MEFT for review and decision.</p>

4 PUBLIC CONSULTATION PROCESS

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

4.1 PRINCIPLES

Key principles of effective engagement include (IFC, 2007):

- Providing meaningful information in a format and language that is readily understandable and tailored to the needs of the target stakeholder group(s);
- Providing information in advance of consultation activities and decision-making;
- Disseminating information in ways and locations that make it easy for stakeholders to access it;
- Respect for local traditions, languages, timeframes, and decision-making processes;
- Two-way dialogue that gives both sides the opportunity to exchange views and information, to listen, and to have their issues heard and addressed;
- Inclusiveness in representation of views, including women, vulnerable and/or minority groups;
- Processes free of intimidation or coercion;
- Clear mechanisms for responding to people's concerns, suggestions, and grievances; and
- Incorporating feedback into project or programme design and reporting back to stakeholders.

4.2 SCOPING PHASE

The public participation steps undertaken during the Scoping Phase are summarised below.

4.2.1 Stakeholder Identification

A preliminary I&AP database (see Appendix 2.1) has been compiled based on:

- TEPNA's existing database compiled for Block 2912 and 2913B during the 2019 well drilling EISA;
- SLR's existing databases from other offshore oil and gas EIAs undertaken in southern Namibia; and
- Input from the Fisheries Specialist (CapMarine) in order to ensure the fisheries sector is comprehensive and up to date.

This database focuses on Namibian authorities, Non-Governmental Organisations (NGOs), Community-based Organisations, fishing industry associations / companies, adjacent licence holders and other relevant business entities. As the licence blocks border with South Africa, the database also includes key maritime authorities from South Africa (e.g. SAMSA and SAN Hydrographic office) and South African fishing associations / companies operating in adjacent South African waters.

There are currently 228 stakeholders registered on the project database which may be directly / indirectly affected or interested by the project. These stakeholders have been divided into the following categories:

- Authorities:
 - Namibian Government (national, regional and local).
 - Maritime Authorities (Namibia and South Africa).
- Business:
 - Fishing associations and companies (Namibia).
 - Fishing associations and companies (South Africa).

- Offshore Oil and Gas Operators.
- Other Businesses.
- Civil Society:
 - Environmental and NGOs.
 - General Public.

The I&AP database will be continually updated during the EIA process. Additional I&APs will be added to the database based on responses to the advertisements and notification letters, attendance at meetings, comments received on public documents, etc.

4.2.2 Consultation and Disclosure Methods

4.2.2.1 Project Initiation and Screening

An Application for ECC was compiled and uploaded onto MEFT's online portal. On 30 April 2020 MEFT acknowledged that the application had been registered with application number **APP-001376**. The Application for Environmental Clearance was emailed to the Petroleum Commissioner (MME) on 30 April 2020 and a hardcopy will couriered to them with a copy of the FSR.

Due to the restrictions associated with the COVID-19 pandemic, no pre-application meetings could be held with MME and MEFT. Telephonic discussions were, however, held with MEFT (Saima Angula) and MME (Maggy Shino) on 6 and 30 April 2020, respectively. The purpose of these discussions was to provide notification of the proposed project and commencement of the EIA process.

4.2.2.2 Advertising

Two sets of advertisements announcing the proposed project, the availability of the DSR and the I&AP registration / comment period were placed in the Republikein, the Sun and the Allgemeine Zeitung (in English and Afrikaans) on 8 and 15 May 2020. Copies of the newspaper adverts are provided in Appendix 2.2.

4.2.2.3 Site notices

Two site notices (one in English and one in Afrikaans) were erected outside the port entrance in Walvis Bay and Lüderitz. Copies and proof of the site notices is provided in Appendix 2.3.

4.2.2.4 Availability of the DSR

The DSR was released for a 30-day review and comment period from 8 May to 8 June 2020. The objective of the DSR review and comment period was to ensure that I&APs were notified about the proposed project, given a reasonable opportunity to register on the project database and given an opportunity to provide initial comments. Copies of the DSR were made available on the SLR website for download and in Walvis Bay (local municipal office) and Lüderitz (information centre).

4.2.2.5 Notification letters

All I&APs registered on the project database were notified of the application, EIA process and DSR comment and review period by means of a notification letter (see Appendix 2.4 for a copy of the letter and proof of distribution). To facilitate the commenting process, a copy of the Executive Summary (in English) was attached to the letter.

4.2.2.6 Stakeholder meetings

Due to the COVID-19 restrictions, no public meetings were scheduled during the DSR review and comment period. Stakeholders were, however, offered an opportunity to attend virtual meetings (via Skype / TEAMS / WhatsApp / telecom) or small focus group meetings (refer to notification letters in Appendix 2.4).

The following focus group meetings were held during the DSR review and comment period:

- 15 May 2020: MFMR, Swakopmund.
- 26 May 2020: MFMR, Lüderitz.
- 27 May 2020: Lüderitz Town Council, Lüderitz.
- 28 May 2020: Jason Burgess (Tuna 3 JV Southern Wolf Holding), Lüderitz.

The purpose of these meetings was to provide an overview of the project proposal and EIA process, and provided stakeholders the opportunity to raise any issues or concerns. Minutes of these meetings (including presentation and attendance register) are presented in Appendix 2.5. All issues raised have been collated, and responded to, in a Comments and Responses Report (see Appendix 2.7).

In addition to the above, three telephonic discussions were held with the following stakeholders to inform them of the proposed project and to offer an opportunity to attend virtual or focus group meetings (note: no meetings were requested):

- 1 June 2020: Possessions Fishing, Matthew Hambuda (previous Chairman of the Large Pelagic and Hake Longlining Association).
- 1 June 2020: Antonio Kakoro (Chairman of the Large Pelagic and Hake Longlining Association).
- 3 June 2020: Namport, Stefanus Gariseb (Environmental Manager for both Walvis Bay and Lüderitz ports).

4.2.2.7 Request for updated fisheries data

Based on the meeting held with MFMR on 15 May 2020, a written request dated 21 May 2020 was submitted to the Permanent Secretary / Executive Director of MFMR requesting updated fisheries data (catch and effort) for various commercial fishing sectors (refer to letter in Appendix 2.4).

4.2.3 Written Comments received during the DSR Review and Comment Period

All written submissions received during the DSR review and comment period (five in total received via email) are presented in Appendix 2.6 and Table 4-1. All these submissions have been collated, and responded to, in the Comments and Responses Report (see Appendix 2.7). All submissions received are related to database management (contact details) and acknowledgement of receipt.

The key issues that will be addressed and / or assessed in the next phase of the EIA are summarised in Section 8.3 of this report.

TABLE 4-1: LIST OF I&APS THAT SUBMITTED WRITTEN CORRESPONDENCE DURING THE DSR REVIEW AND COMMENT PERIOD

<u>State Departments and Organs of State</u>	
<u>1</u>	<u>Ministry of Works and Transport: Civil Aviation (Executive Director)</u>
<u>2</u>	<u>Municipality of Walvis Bay, David Uushona (Manager: Solid Waste and Environmental Management)</u>
<u>General I&APs</u>	
<u>3</u>	<u>Benguela Current Commission</u>
<u>4</u>	<u>Possessions Fishing, Matthew Hambuda (previous Chairman of the Large Pelagic and Hake Longlining Association)</u>
<u>5</u>	<u>Galp Energia S.A. / Windhoek PEL28 B.V., António Fonseca (HSE Manager)</u>

4.3 IMPACT ASSESSMENT PHASE

Task that will be undertaken during the Impact Assessment Phase are summarised below:

- Release of Draft EIA Report and ESMP for review and comment: The Draft EIA Report and ESMP will be released for a 30-day review and comment period.
- Availability of the Draft EIA Report and ESMP: Copies of the Draft EIA Report and EMP will made available on the SLR website and at venues in Walvis Bay and Lüderitz (subject to any COVID-19 restrictions) for the duration of the review and comment period. It is anticipated that the Draft EIA Report and ESMP will be released in July 2020, subject to obtaining MEFT acceptance of the FSR.
- Notification letters: Notification letters will be emailed to all I&APs registered on the project database. The letter will inform them of the release of the Draft EIA Report and ESMP, and where the report can be reviewed. To facilitate the commenting process, a copy of the Executive Summary (in English) will be attached to the email.
- Possible public meetings: Public meetings will be held in Walvis Bay and Lüderitz (subject to any COVID-19 restrictions). If public meetings are not possible, stakeholders will be offered an opportunity to attend virtual (via Skype / TEAMS / WhatsApp / telecom) or small focus group meetings.

In addition to the above, MEFT: DEA's decision will also be uploaded onto the SLR website for information purposes. All I&APs registered on the project database will be notified via email.

5 NEED AND DESIRABILITY

This chapter describes the need and desirability for the proposed project. “Need and desirability” is the consideration of the strategic context of a development proposal within the broader societal needs and the public interest.

The “need and desirability” of the proposed project from the perspective of wider society and policy ‘fit’ is addressed in terms of the following:

- White Paper on the Energy Policy (1998);
- Vision 2030;
- The Fifth National Development Plan;
- Namibia’s Industrial Policy;
- Regional and local planning guidance; and
- Oil and gas sector history, policy and promotion initiatives.

The above sources are reviewed below and compatibility of ‘fit’ summarised in Section 5.7.

5.1 WHITE PAPER ON THE ENERGY POLICY (1998)

The White Paper on the Energy Policy (1998) is the overarching policy which guides planning in the energy sector. This White Paper embodies a new, 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.

5.2 VISION 2030

In 2004, Namibia adopted Vision 2030, which outlines the country's development programmes and strategies to achieve its national objectives. One of the major objectives of Vision 2030 is to “*ensure the development of Namibia’s ‘natural capital’ and its sustainable utilisation, for the benefit of the country’s social, economic and ecological well-being*”.

The vision for non-renewable resources is that Namibia’s mineral resources are strategically exploited and optimally benefited, while ensuring that environmental impacts are minimised. Vision 2030 acknowledges that poorly planned or badly managed mining can result in a great variety of impacts that threaten human health and environmental integrity. Vision 2030 further notes that with EIAs applied during the planning phase and the implementation of ESMPs during operational phase, operations are increasingly better planned and negative impacts can usually be mitigated and localised.

5.3 FIFTH NATIONAL DEVELOPMENT PLAN 2017/18 – 2021/22 (NDP5)

Vision 2030 is being implemented through a series of five-year National Development Plans. NDP5 aims to achieve rapid industrialisation, while adhering to the four integrated pillars of sustainable development:

- Economic Progression;
- Social Transformation;
- Environmental Sustainability; and
- Good Governance.

NDP5 recognises the use of Namibia’s natural resources in an efficient and sustainable way to achieve sustainable development and improve the welfare of the nation’s citizens. In this regard, it emphasises the importance of partnerships between government, the private sector, communities and civil society in ensuring that economic progress is achieved in an environment of social harmony.

It also plans to achieve economic progression by developing value added industrialisation, substituting imports for locally produced goods, creating value-chains of production, and to accelerate Small and Medium Enterprise (SME) development (NPC, 2017).

5.4 NAMIBIA’S INDUSTRIAL POLICY

In 2012, the then Ministry of Trade and Industry (MTI) developed Namibia’s Industrial Policy. Three years after drafting the Industrial Policy, the MTI produced an execution strategy for industrialisation in 2015 called “*Growth at Home*” (MTI, 2015).

The strategy advocates a targeted approach towards industrialisation. In the first phase of Growth at Home, sectors in which Namibia already has some sort of comparative advantage will be targeted (MTI, 2015). Mining (and other extraction) is identified as one of a number of particular sectors to be targeted. The strategy sets out a broad outline of how downstream industries should be developed to ensure that the job creation and socio-economic benefits which stem directly and indirectly from primary production are maximised (MTI, 2015).

5.5 LOCAL AND REGIONAL SOCIO-ECONOMIC POLICY

With respect to regional planning, the socio-economic development objectives of the Erongo Region have a special focus on uplifting the standard of living within the region (ERC, 2015). They include the following:

- ensuring regional and rural economic development;
- creating employment opportunities;
- improving infrastructure, with the delivery of basic services to rural areas a priority;
- co-ordinating training of community members in entrepreneurial skills; and
- educating the community with regard to the prevalence of HIV/Aids and Tuberculosis (TB) cases.

Socio-economic development goals are not readily available for the Karas Region, but the Karas Regional Council notes on their webpage that “[t]he region still possesses many untapped raw materials, such as offshore natural gas and other minerals that promise new industries” (KRC, 2015).

The town councils of both Lüderitz and Walvis Bay seek to ensure that its economy is well diversified. The Walvis Bay Town Council has pointed out that Walvis Bay, with its deep-water port, ship repair and logistics handling facilities, is particularly well placed to serve an oil extraction industry which could develop in the wake of a significant oil discovery (WBTC, 2017).

5.6 OIL AND GAS INDUSTRY HISTORY, POLICY AND PROMOTION INITIATIVES

Exploration aims to identify commercially viable reserves of hydrocarbons such as oil and gas. The first step in the search for hydrocarbons is to undertake geophysical surveys. These allow for the evaluation of the structure and composition of subsurface formations. Geophysical surveys include magnetometric, aerial photogrammetric, gravimetric, seismic, radiographic and stratigraphic surveys, all of which provide a more detailed understanding of the likelihood of the existence of commercially viable hydrocarbons. The certainty which can be achieved through surveys is limited and to prove the existence of commercially viable reserves, exploration and appraisal drilling is necessary (UKDTI, 2001).

The first Namibian oil and gas exploration wells were drilled in the 1960s, but it wasn't until 1974 that the presence of hydrocarbons was confirmed through the discovery of the Kudu Gas Field on the northern section of the Orange Basin, directly west of Oranjemund. By 1991, fewer than 10 hydrocarbon wells had been drilled in Namibia, with no commercially viable reserves having been discovered (OGJ, 1991). Following unsuccessful attempts to prove commercially viable reserves, interest in Namibian oil and gas waned.

In recent years there has been a resurgence in Namibian hydrocarbon exploration with major oil companies purchasing exploration licences from the government. Improvements in deep water drilling technology increased the economic viability of what were previously considered sub-commercial reserves. Between 2010 and 2014, 13 wells were drilled in Namibia bringing the total number of offshore hydrocarbon wells drilled in Namibian waters to 32. Of these, 15 have been exploratory wells, seven have been appraisal wells and a further ten have been drilled for scientific research (NAMCOR, 2017a). The collection of survey, seismic and aeromagnetic data has contributed to a substantial geological and geophysical database for the country, and has revealed the existence of four offshore frontier basins of interest to explorers: the Orange, Lüderitz, Walvis and Namibe basins. Commercially viable petroleum reserves are yet to be discovered in Namibia.

Regulation of the Namibian oil and gas industry is the mandate of MME. The fiscal regime is outlined in the Petroleum (Exploration and Production) Act, 1991 (No. 2 of 1991), the Petroleum (Taxation) Act, 1991 (No. 3 of 1991) and the Petroleum Laws Amendment Act, 1998 (No. 24 of 1998). Administrative provisions are also provided in the Income Tax Act, 1981 (No. 24 of 1981). Some key features of the fiscal regime associated with exploration and production are as follows (Deloitte, 2016; Ernst and Young, 2016; NAMCOR, 2017a and b):

- A licence application fee of between N\$3 000 and N\$30 000 is charged prior to exploration, followed by an annual licence area rental charge ranging between N\$60 and N\$150 per km²;
- Petroleum Income Tax (PIT) is levied at 35% on the taxable base. By comparison, the standard corporation tax rate is 32% while general mining companies are taxed at a rate of 37.5% and diamond miners at 55%;
- An incremental, three-tiered Additional Profit Tax (APT) is charged on after-tax net cash flow from petroleum production operations when they achieve relatively higher profits. Exploration, development and operating expenditures, along with royalties, PIT and annual licence rental charges are all fully deductible; and
- A royalty is levied at 5% of gross production revenue.

Overall, the tax regime is designed to encourage exploration with a view to increasing production, which is ultimately where the state would generate significant amounts of revenue if a substantial, commercially viable reserve is proven.

Policy advice is provided to MME by NAMCOR, a state-owned company which is also responsible for promoting exploration and production in the country. NAMCOR also has “the mandate to carry out reconnaissance, exploration and production operations either on its own or in partnership with other organisations in the industry” (NAMCOR, 2017b). NAMCOR is actively engaged in identifying prospects and leads, as well as in promoting and marketing the oil and gas potential of Namibia to local and international companies.

5.7 COMPATIBILITY OF ‘FIT’ OF THE PROJECT

The policy compatibility review suggests that Namibian policy is broadly aimed towards improving socio-economic welfare through the sustainable utilisation of the country’s natural resources. NDP5 plans to achieve economic progression by developing value added industrialisation, substituting imports for locally produced goods, creating value-chains of production, and to accelerate SME development. Although Namibian policy is increasingly focussed on beneficiation and the creation of downstream opportunities, it is still recognised that upstream industries involving resource extraction play a key role in the overall goal of realising the full potential which the country’s resources can offer. The overall conclusion is that the proposed project will be largely compatible with key socio-economic policies and plans provided environmental and other risks can be adequately mitigated.

The need and desirability for the proposed project is economic and strategic in nature. The project has the potential to benefit the country, society and surrounding communities (Lüderitz and Walvis Bay) both directly and indirectly; although only in the short-term. Direct economic benefits will be derived from employment (although unlikely) and wages, taxes and profits. Indirect economic benefits will be derived from the procurement of goods and services and the increased spending power of employees.

6 PROJECT DESCRIPTION

This chapter describes the project scope and activities, provides technical information on seismic surveys, and summarises the project alternatives.

6.1 EXPLORATION LICENCE HOLDERS

TEPNA holds the controlling interest in Blocks 2912 and 2913B (see Table 6-1), with Impact, Qatar Petroleum and the National Petroleum Corporation of Namibia (NAMCOR) holding the remaining interest. TEPNA's contact details are presented in Table 6-2.

TABLE 6-1: STRUCTURE OF LICENCE HOLDING AND SHAREHOLDING

	Licence Blocks	
	2912	2913B
TEPNA	37.77%	40%
Impact	18.9%	20%
Qatar Petroleum	28.33%	30%
NAMCOR	15%	10%

TABLE 6-2: CONTACT DETAILS OF LICENCE HOLDER

Address:	Total E and P Namibia B.V. Physical: 5 Otto Nitzsche Strasse, Klein Windhoek Postal: PO Box 4223, Windhoek
Responsible person:	Adewale Fayemi (Managing Director)
Tel:	+264 61 374 900
Fax:	+264 61 374 912
E-mail:	adewale.fayemi@total.com

6.2 SUMMARY OF SITE INFORMATION

Licence Blocks 2912 and 2913B are located in the deepwater Orange Basin off the coast of southern Namibia (see Figure 1-1). These blocks have a combined area of 18 170 km², with water depths ranging from 2 600 m to 3 800 m. Refer to Table 6-3 for additional information pertaining to the individual blocks.

6.3 PROJECT SCOPE AND ACTIVITIES

The proposal is to undertake a 3D seismic survey in the licence area. A summary of the project phases and anticipated activities is provided in Table 6-4.

The proposed 3D seismic survey and operational areas are 6 474 km² and 9 797 km² in extent, respectively (see Figure 6-1), mostly over Block 2912 (78% scheduled), and it is anticipated that the duration of survey acquisition will be in the order of 100 days, excluding any survey-related downtime, operating 24 hours/day and 7 days/week. This EIA will consider the implications of surveying for a period of up to four months (i.e. 120 days)

to take account of any downtime. TEPNA proposes to commence with the 3D seismic survey in December 2020 / January 2021, subject to obtaining an ECC.

The data collected during the seismic acquisition campaign will be analysed by the Contractor and by TEPNA and the results will be available approximately six to nine months after the seismic acquisition campaign.

TABLE 6-3: SUMMARY OF LICENCE BLOCKS

Licence Block No.:		2912	2913B	
Size of Licence Blocks:		9 955 km ²	8 215 km ²	
Water depths across licence area:		3 300 m to 3 800 m	2 600 m to 3 300 m	
Distance offshore (at closest point):		290 km	240 km	
Locality:		Refer to Figure 1-1		
Coordinates of Licence Blocks (WGS84):	2912	No.	Latitude (°) (S)	Longitude (°) (E)
		1	29°0'19.822"S	12°1'39.956"E
		2	28°59'57.732"S	12°59'57.559"E
	2913B	3	30°21'27.012"S	13°0'19.649"E
		1	28°59'57.732"S	12°59'57.559"E
		2	28°59'57.732"S	13°29'32.132"E
		3	30°33'43.35"S	13°29'39.495"E
		4	30°39'14.701"S	13°20'19.879"E
	5	30°21'27.012"S	13°0'19.649"E	

TABLE 6-4: SUMMARY OF PROJECT PHASES AND ACTIVITIES

Phase	Activity
1. Mobilisation Phase	Transit of survey vessels to survey area, including routine discharges to sea
	Discharge of ballast water
2. Operation Phase	Seismic acquisition, including the deployment of seismic equipment (sources and streamers) and acquisition operations
	Operation of supply vessels, including routine discharges to sea
	Provision of services from local service providers (e.g. catering and refuelling)
	Berthing during crew changes
	Operation of helicopters during crew changes
	Bunkering at sea
3. Demobilisation Phase	Survey vessels leave survey area and transit to port or next destination

6.4 SEISMIC SURVEYS

6.4.1 Principles

Marine seismic acquisition is a geophysical technique using acoustic energy and seismology to map the geological structures of the seabed. This technique makes it possible to identify possible structures in the underground rocks, favourable to the possible discovery of hydrocarbons. The key principles of a seismic survey are showing in Figure 6-2.

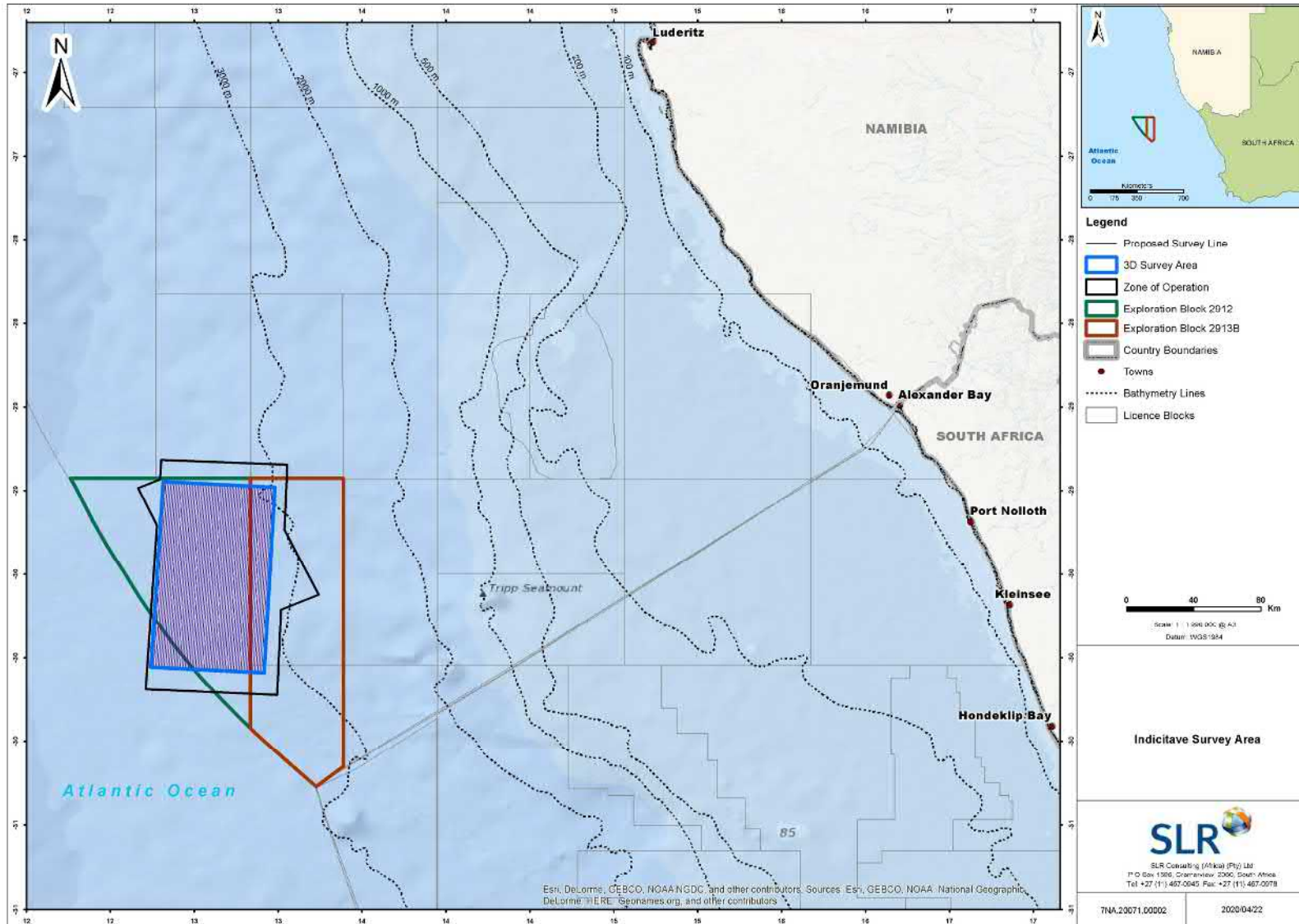


FIGURE 6-1: LOCATION OF LICENCE BLOCKS AND PROPOSED 3D ACQUISITION AREA

During seismic surveys, high-level, low frequency sounds are directed towards the seabed from near-surface sound sources (see Section 6.4.3) towed by a seismic vessel. The acoustic signal emitted into the water column penetrates the seabed, then is reflected by the rock formations in the basement. The reflected signals are recorded by multiple receivers (or hydrophones) towed in a single or multiple streamer configuration (see Section 6.4.4). Analyses of the returned signals allow for interpretation of subsea geological formations.

Seismic surveys are usually conducted using a purpose-built seismic vessel. The seismic vessel travels along specific pre-plotted survey lines covering a prescribed grid within the survey area that have been carefully chosen to cross any known or suspected geological structure with hydrocarbons. During surveying, the seismic vessel would travel on specific line headings at a speed of between four and five knots (i.e. 2 to 3 metres per second). With equipment deployed the vessel would have limited manoeuvrability (see Section 6.5.1.1).

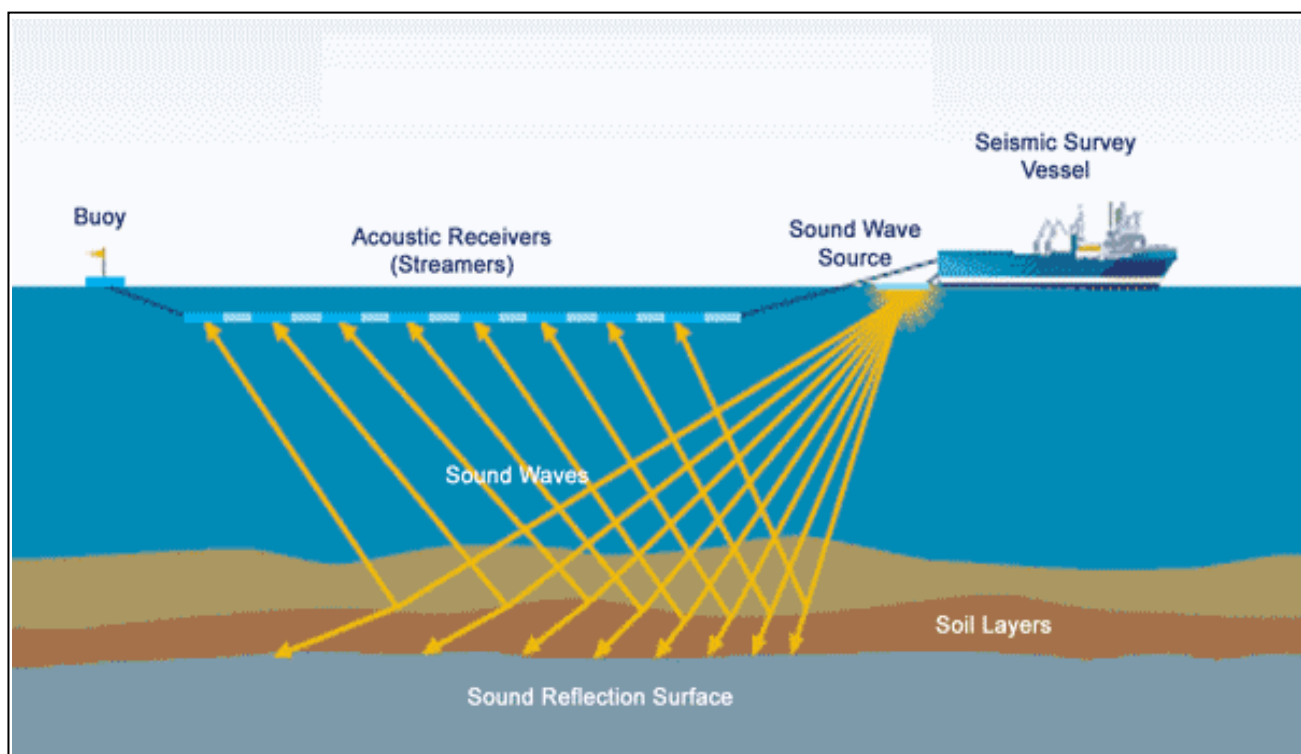


FIGURE 6-2: PRINCIPLES OF OFFSHORE SEISMIC ACQUISITION SURVEYS

Source: <https://www.tes.com/>

6.4.2 Difference between 2D and 3D seismic acquisition

A seismic acquisition campaign can be carried out in two or three dimensions (2D or 3D) - depending on the precision of the study sought.

- 2D seismic surveys are typically acquired to obtain regional data over a wider area from widely spaced survey grids (tens of kilometres). A 2D seismic survey would typically involve a single source (airgun array) and a single hydrophone streamer towed by the survey vessel. The data acquired is used to produce a 2D vertical image of the seabed just below the hydrophone streamer (see Figure 6-3a).
- 3D seismic surveys are typically acquired over promising petroleum prospects to assist in fault interpretation, distribution of sand bodies, estimates of oil and gas in place and the location of boreholes. The 3D seismic acquisition technique requires at least two seismic sources (airgun arrays) and several

hydrophone streamers, placed in parallel and separated from each other by several tens of meters. 3D seismic acquisition aims to provide a three-dimensional image of the geology of the seabed (see Figure 6-3b).

For this project, TEPNA is proposing to undertake a 3D seismic survey.

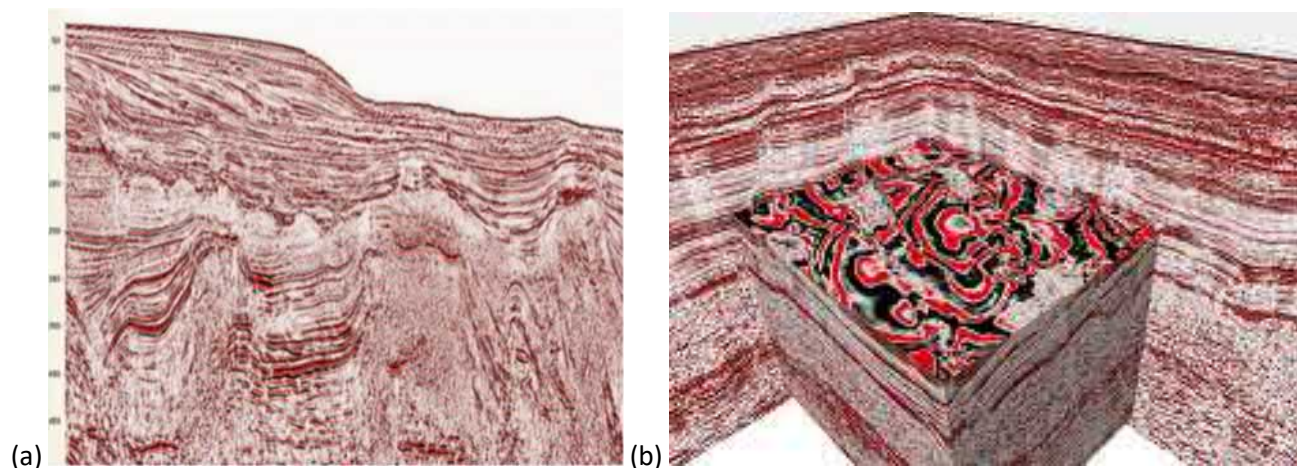


FIGURE 6-3: EXAMPLES OF (A) 2D IMAGE AND (B) 3D IMAGE

Source: TEPNA

6.4.3 Sound Source and Sound Pressure Emission Levels

Airguns are the most common sound source used in modern seismic surveys (see Figure 6-4). The airgun is an underwater pneumatic device from which high-pressure air is released suddenly into the surrounding water. Airguns are normally used in arrays, usually consisting of between 18 and 48 airguns arranged in a rectangular configuration parallel to the sea surface, which enables the added energy of the individual elements to be directed primarily downward (Gisiner, 2016).

The sound produced by a compressed air source is a function of the volume, size and shape of the ports by which the air escapes and the air pressure. An air pressure of 2 000 psi (13 789.5 kPa) is most commonly used, but can range from 1 500 to 3 000 psi (Gisiner, 2016). On release of pressure the resulting bubble pulsates rapidly producing an acoustic signal that is proportional to the rate of change of the volume of the bubble.

The primary output of an airgun source typically has most of the energy in the frequency bandwidth between 4 and 200 Hz, which is the frequency bandwidth of most interest in seismic surveying (OGP, 2011). The output characteristics of typical seismic source arrays are commonly presented in terms of a “nominal” peak source level or sound pressure level (SPL) in dB re 1 μ Pa @ 1 m (OGP, 2011). It is, however, important to note that the “nominal” source level will represent the so-called ‘back calculated’. Actual measurable levels around the array are typically 10-20 dB sound pressure level (SPL), which is the pressure level that would be achieved if all the elements in the source were concentrated into a single point (i.e. point source equivalent dimension) (Caldwell and Dragoset, 2000). For example, a nominal source level of 260 dB peak SPL re 1 μ Pa @ 1 m would produce measurable received sound levels between 225 and 243 dB (see Figure 6-5) (Gisiner, 2016).

One of the required characteristics of a seismic shot is that it is of short duration (the main pulse is usually between 5 and 30 milliseconds in duration). The main pulse is followed by a negative pressure reflection from the sea surface of several lower magnitude bubble pulses (see Figure 6-6). An important reason for using

different size seismic sources in an array is the cancellation of sound from oscillating bubbles after the initial formation. Any sound after the initial pulse clutters the return signal. Thus, by using multiple sources of different volumes, the bubbles oscillate at different rates, interfere with each other, and produce a “cleaner” pulse, as seen in the white composite waveform in Figure 6-6.



FIGURE 6-4: EXAMPLE OF A SEISMIC SOURCE (AIRGUN ARRAY)
Source: TEPNA

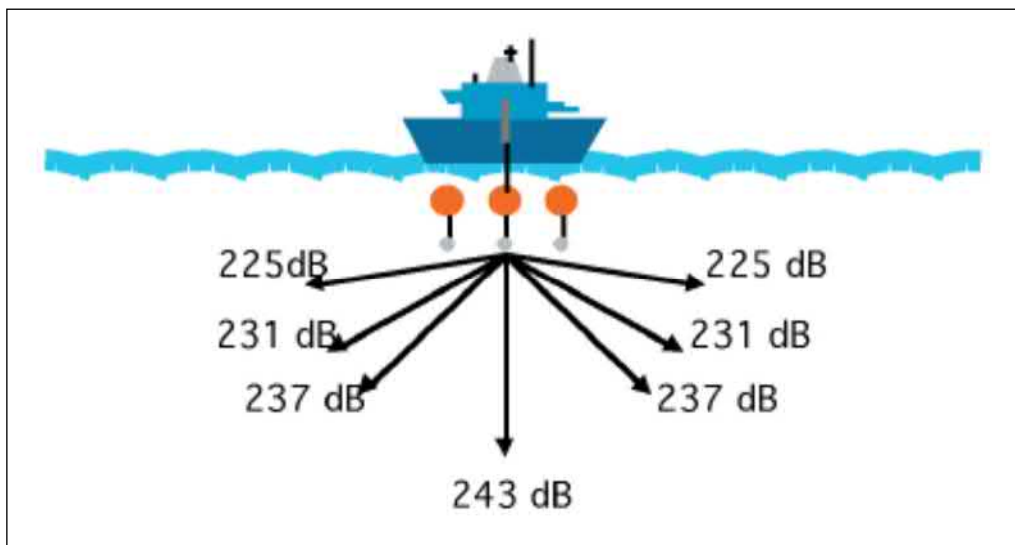


FIGURE 6-5: PATTERN OF MEASURABLE RECEIVED SOUND LEVELS AROUND A SCHEMATIC REPRESENTATION OF AN ARR, ASSUMING A NOMINAL POINT SOURCE LEVEL OF 260 DB PEAK SOUND PRESSURE LEVEL (SPL_{peak}) re 1 μPa

Source: Caldwell and Dragoset, 2000 in Gisinger, 2016

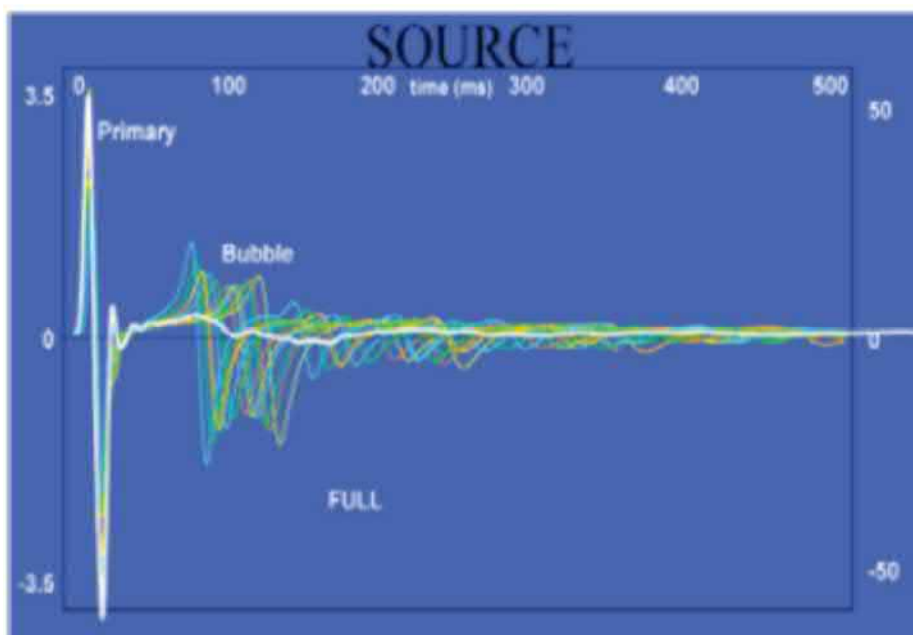


FIGURE 6-6: A TYPICAL PRESSURE SIGNATURE PRODUCED ON FIRING OF AN AIRGUN

Source: Gisiner, 2016

6.4.4 Recording Equipment and Tail Buoy

Signals reflected from geological discontinuities below the seafloor are recorded by hydrophones mounted inside streamer cables (see Figure 6-7), which can be up to 12 000 m long. Hydrophones are typically made from piezoelectric material encased in a rubber plastic hose. This hose containing the hydrophones is called a streamer. The reflected acoustic signals are recorded and transmitted to the seismic vessel for electronic processing. Analyses of the returned signals allow for interpretation of subsea geological formations. As noted earlier, the number of streamers depends on the type of seismic survey; typically one for a 2D survey and up to 16 streamers for a 3D survey.

The streamer(s) are towed at a depth of between 6 m and 30 m and are not visible, except for the tail-buoy at the far end of the cable (see Figure 6-8).



FIGURE 6-7: EXAMPLE OF A HYDROPHONE STREAMER

Source: (1) TEPNA and (2) <https://commons.wikimedia.org/>



FIGURE 6-8: EXAMPLE OF A TAIL BUOY

Source: <https://www.shutterstock.com/>

6.4.5 Technical Characteristics of the Seismic Acquisition

The main technical characteristics of the proposed seismic survey are summarised in Table 6-5 below.

TABLE 6-5: CHARACTERISTICS OF SEISMIC ACQUISITION OPERATIONS (INDICATIVE)

Airgun	
Type of Energy Source	Pressurized air
No. of airgun arrays	2 to 3
No. of active airguns	Approximately 36 per array (note: only one active array for each shot point)
Spacings between airgun arrays	50 m to 60m
Towing depth of the airgun	Approximately 8 m
Source volume	Max 4 000 cubic inches each
Operational pressure	2 000 psi
Shot interval	18.75 m interval between consecutive shot-points
Hydrophone Streamer	
Types of streamer	Solid - Polymer or gel
Number of streamers	10 to 14
Length of streamers	8 600 to 8800 m including 250 m source layback
Spacings between streamers	100 m to 180 m
Max spread	1 100 m to 1 620 m
Depth of streamers	8 to 25 m

6.5 MAIN PROJECT COMPONENTS FOR SEISMIC SURVEYING

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

- Seismic survey vessels;
- Support and escort vessels;
- Possible helicopter support; and
- Onshore logistics base.

6.5.1 Seismic Survey Vessel

TEPNA has not yet identified a contractor to undertake the proposed seismic survey; thus, this section only presents generic specifications of the survey vessel.

In all cases, there will be a single survey vessel equipped with seismic sources and streamers. Depending on the selected contractor, the generic specifications may vary slightly, but will be of the same order of magnitude as the *Polar Empress* (see Figure 6-9). Refer to Table 6-6 for generic specifications of a seismic survey vessel.

During the acquisition operations, the survey vessel will get supplies at sea. Its ability to manoeuvre is greatly limited by the length of the streamers deployed in the water, which must remain in place parallel to each other.



FIGURE 6-9: POLAR EMPRESS

Source: <https://www.gcrieber-shipping.com/fleet/marine-seismic/polar-empress/>

TABLE 6-6: GENERIC SPECIFICATIONS OF A SEISMIC VESSEL

Length	Polar Empress specifications	112.6 m
Width		25.8 m
Gross tonnage		10 138 Tons
Deadweight		2 700 Tons
Capacity (accommodation)		70 people / cabins
Fuel capacity		3 200 m ³
Cruising speed		18 knots
Acquisition speed		4.3 knots
Average fuel consumption		55 m ³ /day + 10 m ³ /day
Combustible to be used – Sulphur %		Heavy Fuel Oil (HFO) + Marine Gasoil (MGO)
Sewage treatment onboard (yes/no)		Yes
Incinerator onboard (yes/no)		Yes

6.5.1.1 Survey Vessel Exclusion Zone

The acquisition of high-quality seismic data requires that the position of the survey vessel and the array be accurately known. Seismic surveys consequently require accurate navigation of the sound source over pre-determined survey transects. This, and the fact that the array and the hydrophone streamer need to be towed in a set configuration behind the survey vessel, means that the survey operation 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 seismic survey 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 seismic operation.

Furthermore, in terms of the Petroleum (Exploration and Production) Act, 1991 (No. 2 of 1991), a seismic vessel is considered an “*offshore installation*” and as such it is protected by a 500 m exclusion zone. Unauthorised vessels may not enter the exclusion zone. The temporary 500 m exclusion zone around the survey vessel will always be enforced during operation. The exclusion zone will be described in a Notice to Mariners as a navigational warning.

In addition to a statutory 500 m exclusion zone, a seismic contractor will typically request a safe operational limit (that is greater than the 500 m exclusion zone) that it would like other vessels to stay beyond. Typical safe operational limits for 3D surveys are illustrated in Figure 6-10.

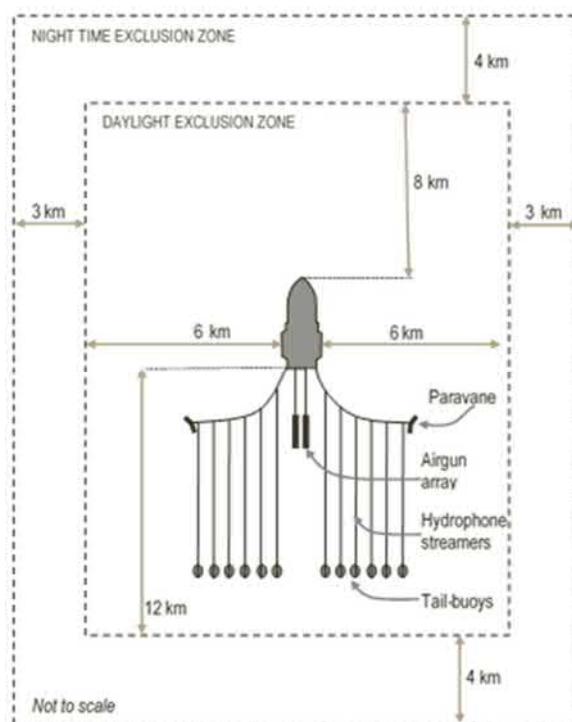


FIGURE 6-10: TYPICAL CONFIGURATION AND SAFE OPERATIONAL LIMITS FOR 3D SEISMIC SURVEY OPERATIONS

Source: SLR

6.5.2 Support and Escort Vessels

Two additional vessels will be commissioned for the survey; one support vessel and one escort vessel (or "chase boat"). The support vessel will be required to perform logistics support (including crew changes, supply of equipment, fuel, food and water) to the survey vessel.

The escort vessel will be equipped with appropriate radar and communications to patrol the area during the seismic survey to ensure that other vessels adhere to the safe operational limits. This vessel would assist in alerting other vessels (e.g. fishing, transport, etc.) about the survey and the lack of manoeuvrability of the survey vessel. At a minimum, one Fisheries Liaison Officer (FLO) person speaking English and Afrikaans will be on board each escort vessel to facilitate communication in the local language with the fishing vessels that are in the area.

6.5.3 Helicopter

Helicopters may also be used to transfer personnel to and from the survey vessel and Lüderitz or a suitable location nearby.

6.5.4 Staffing and Logistics

The onshore logistics base will be in either the Port of Lüderitz or the Port of Walvis Bay. The preferred alternative is Lüderitz due to proximity to the survey area. The service infrastructure required to provide the necessary onshore support is already in place in Lüderitz and Walvis Bay. Thus, no additional onshore infrastructure should be necessary for this project.

The survey vessel will accommodate up to 60 people working on 12-hour rotations. In addition, the support and escort vessels will include a crew of approximately 6 to 10 people each. Depending on the solutions proposed by the contractors, the teams will rotate either by the support vessel or by helicopter, as presented above.

The support vessel will call into port every 22 to 45 days during the survey for supplies (equipment, fuel, food and water) and crew changes. The supply vessels will occupy the quay for about 24 hours per trip, depending on the quantity of material to be loaded / unloaded.

The methods of refuelling will depend on the contractor and the vessels selected. It is, however, anticipated that the survey vessel will be refuelled at sea ('bunkering') by the support vessel, except in the event of extreme weather conditions which would force refuelling at port (mostly likely the Port of Lüderitz).

6.6 EMISSIONS, DISCHARGES AND WASTES

6.6.1 Introduction

This section presents the main sources of emissions to air, discharges to water and waste generated that will result from survey operations (including mobilisation and demobilisation).

All vessels will have equipment, systems and protocols in place for prevention of pollution by oil, sewage and garbage in accordance with Namibian legislation, the MARPOL convention, Total standards, national and international standards, and good international practices. A specific Waste Management Plan (covering all wastes generated offshore and onshore) will be developed in accordance with MARPOL requirements, Namibian legislation and international standards. Waste disposal sites and waste management facilities will be identified, verified and approved prior to commencement of survey operations.

6.6.2 Atmospheric Emissions

The principal sources of emissions to air from the proposed survey will be from vessel engines. The vessels will be supplied with marine gasoil (MGO) or heavy fuel oil (HFO) with less 0.5% sulphur (mass), which will lead to emissions of sulphur oxides (SO_x), nitrogen oxides (NO_x), carbon dioxide (CO₂) and carbon monoxide (CO). 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. They also contribute to regional and global atmospheric pollution.

The fuel consumption by the survey vessel is estimated at 61.1 Tons/day, that of the support vessel at 9.4 Tons/day and that of the escort vessels at 2.8 Tons / day. Fuel consumption estimates are presented in the Table 6-7 and the estimate of total air emissions is presented in Table 6-8. The emissions were estimated based on the emission factors of the methodology proposed by the International Association of Gas and Oil Producers (E&P Forum / UNEP, 1994).

Incineration of certain wastes onboard and compressors associated with energy sources will also produce limited occasional emissions. As with any combustion engine powered by fossil fuels, very limited emissions of unburned hydrocarbons, volatile organic compounds and particles are also likely to be generated by the propulsion system of the vessels.

TABLE 6-7: ESTIMATED FUEL CONSUMPTION

Source	Value	Units	No. units	Consumption of marine fuel (Tons)	Kerosene consumption (Tons)
Seismic	61.1*	Tons / day	120 day	7 332	-
Escort 1	2.8*	Tons / day	120 day	336	-
Support	9.4*	Tons / day	120 day	1 128	-
Helicopter (possible)	0.5	Tons / hr	16 journeys (3.5 hrs each)**		28
Total				8 796	28

* Values provided by TEPNA, which are based on previously survey campaigns.

** Assumptions: One journey per week over the 120-day (16 weeks) campaign. Distance to centre of survey area is approximately 400 km (i.e. 800 km return). Travel speed (250km/hr). Warm-up times 2x10 minutes. Consumption 0.5 tons / hr is based on the Super Puma characteristics (<https://www.swisshelicopter.ch/fr/a-propos-de-nous/flotte/super-puma-as-332-c1>).

TABLE 6-8: ESTIMATED TOTAL ATMOSPHERIC EMISSIONS

Gas	Emission factor (marine fuel) t/t	Emission factor (kerosene) t/t	Emitted GHG (marine fuel) Tons	Emitted GHG (kerosene) Tons	Emitted GHG- total - Tons
CO ₂	3.2	3.2	28 147.2	89.6	28 236.8
CO	0.008	0.0052	70.4	0.1	70.5
NO _x	0.059	0.0125	519.0	0.4	519.4
N ₂ O	0.00022	0.00022	1.9	0.0	1.9
SO _x	0.008	0.008	70.4	0.2	70.6
CH ₄	0.00027	0.000087	2.4	0.0	2.4
VOC	0.0024	0.0008	21.1	0.0	21.1
Greenhouse gas (GHG) expressed as CO ₂ equivalent (either sum of CO ₂ + 265 N ₂ O + 28 CH ₄)					28 807.5

* Greenhouse gas direct expressed in CO₂ equivalent - Values retained for the Global Warming Potential from IPCC, 2014, Fifth Assessment Report.

6.6.3 Liquid Discharges

The following main effluents will be discharged into the marine environment:

- Treated grey water¹;
- Treated sewage (black water);
- Treated bilge water²) used to clean engine rooms and other potentially polluted sources; and
- Engine cooling water.

¹ Grey water: water from the kitchen, washing and laundry activities and non-oily water used for cleaning.

² Bilge water: water collected in the lower sections of the vessel. One of the main contributors to bilge water is the cleaning of the engine rooms of the vessel. These waters can, therefore, be contaminated by hydrocarbons and other substances, some of which are likely to be toxic if discharged directly into the marine environment.

The survey vessel and support vessels will be equipped with a water treatment system. Different types of effluents will be treated according to the following prescriptions:

- The disposal into the sea of food waste is permitted, in terms of MARPOL Annex V, when it has been comminuted or ground to particle sizes smaller than 25 mm and the vessel is en route and located more than 3 nautical miles (approximately 5.5 km) from land. Disposal overboard without macerating can occur greater than 12 nautical miles (approximately 22 km) from the coast when the vessel is sailing. The volumes of sewage wastes released from the seismic and support vessels would be small and comparable to volumes produced by vessels of similar crew compliment (up to 80 people in total on all three vessels). Sewage would not be discharged instantaneously but at a moderate rate when the vessel is en route and travelling at no less than 4 knots.
- Bilge water will be treated by a hydrocarbon separator certified in accordance with MARPOL. In accordance with MARPOL Annex I, bilge water will be retained on board until it can be discharged to an approved reception facility, unless it is treated by an approved oily water separator to <15 ppm oil content and monitored before discharge. The residue from the onboard oil/water separator will be treated / disposed of via the vessels' waste incinerator (depending on specifications) or onshore at an approved hazardous landfill site.
- Grey water and sewage will be discharged intermittently throughout the survey and will vary according to the number of persons on board. All sewage discharges will be in compliance with MARPOL Annex IV.
 - a biological oxygen demand (BOD) of <25 mg l⁻¹ (if the treatment plant was installed after 1/1/2010) or <50 mg l⁻¹ (if installed before this date);
 - minimal residual chlorine concentration of 0.5 mg/l; and
 - no visible floating solids or oil and grease.
- Deck drainage consists of liquid waste resulting from rainfall, deck and equipment washing (using water and an approved 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 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 via the vessel's waste incinerator (depending on specifications) or onshore at an approved hazardous landfill site.
- The cooling water and surplus generated by the drinking water supply system are likely to contain a residual concentration of chlorine (generally less than 0.5 mg/l for drinking water supply systems).

The treated sanitary effluents discharged into the sea are estimated at around 16 000 litres per day for the duration of the seismic study based on 200 litres per 80 persons.

6.6.4 Solid Waste

Several other types of wastes generated during the survey will not be discharged at sea, but – depending 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 Walvis Bay, Swakopmund and Lüderitz; the closest of which to the licence area is Lüderitz. The landfill site at Walvis Bay is also designated to accept hazardous waste; whilst the Lüderitz site is not. 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 best practices and Namibian legislation. The services of a waste contractor will be used to collect and transport all operational waste for disposal or recycling.

A summary of the typical wastes expected to be generated and their management options are detailed in Table 6-9. It is estimated that approximately 14 m³ of solid waste per month will be generated during the seismic survey. For a program lasting almost four months, this implies a total volume of waste of the order of 56 m³.

TABLE 6-9: SUMMARY OF POTENTIAL SOLID WASTE STREAMS

Waste stream	Main sources	Main possible constituents	Comment
Garbage	Various	Packaging materials, paper, cans, etc.	The vessel will be equipped with an incinerator. The metals will be stored on the vessel, all other fuels will be incinerated (depending on incinerator specifications). Some waste will be transported ashore (including metallic waste, and other waste such as glass and incinerator ash).
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 will be disposed of by incineration (depending on incinerator 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.

6.6.5 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 airgun operations (see Section 6.4.5). Helicopters will also form a source of noise, which can affect marine fauna both in terms of underwater noise beneath the helicopter and airborne noise.

The extent of project-related noise above the background noise level may vary considerably depending on the specific vessels used, the number of supply vessels operating and the airgun array. It will also depend on the variation in the background noise level with weather and with the proximity of other vessel traffic (not associated with the project). A “Noise Assessment” will be undertaken during the next phase of the EIA, which will *inter alia* determine the noise transmission loss with distance from the survey area and relative zones of impact.

6.6.6 Light Emissions

Operational lighting will be required on the survey 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.

6.7 SUMMARY OF PROJECT ALTERNATIVES

Table 6-10 describes the project alternatives considered by TEPNA in the development of the proposed seismic survey programme.

TABLE 6-10: SUMMARY OF THE PROJECT ALTERNATIVES

No.	Alternatives	Description
1. Site / location alternatives		
1.1	Survey area	<p>Since TEPNA is the holder and operator of an Exploration Licence for Blocks 2912 and 2913B, seismic surveying area will be limited to these licence blocks, except for a small area in international waters south-west of Block 2912. The proposed survey area is targeting various prospects identified based on previous exploration activities (see 2.1 below).</p> <p>Although a survey area has been identified, it is indicative. Thus, this EIA will take the fact that the final survey layout may change slightly into consideration.</p>
2. Activity alternatives		
2.1	Exploration alternatives	<p>Previous exploration activities undertaken in Blocks 2912 and 2913B included a 2D seismic survey. This survey was undertaken by TGS (previously Spectrum) over the area (mainly 2912) in 2019. This data (1 097 km) was purchased and analysed by TEPNA. Based on the analysis of this data, TEPNA is currently planning to drill an exploration well in mid-2020. The ECC for well drilling was issued in 2019.</p> <p>The proposed 3D seismic acquisition is an essential step in the overall exploration programme to collect additional geological data necessary for the exploration of these licence blocks.</p> <p>This EIA will only assess the potential impacts related to the proposed 3D seismic survey.</p>
3. Design alternatives		
3.1	Scheduling	<p>Although TEPNA propose to commence with surveying in December 2020 / January 2021, this EIA will consider the implications of surveying at any time during the year.</p> <p>If the survey extends into the key cetacean breeding and migration period from the beginning of June to the end of November encounters with humpback whales to and from breeding grounds in equatorial West Africa are highly likely, which could result in a more significant impact.</p>
3.2	Survey duration	<p>The duration of the survey will be reduced as far as possible in order to maximise data collection and minimise time spent in the survey area. This will reduce survey costs, as well as potential impacts (specifically the noise impact - the longer the length of the survey, the longer the duration of noise transmission into the marine environment). Conservatively, it is anticipated that the duration of survey acquisition will be in the order of 90 to 100 days, excluding any survey-related downtime, operating 24 hours/day and 7 days/week.</p> <p>This EIA will consider the implications of surveying for a period of up to four months (i.e. 120 days) to take account of any downtime.</p>

No.	Alternatives	Description
3.3	Onshore logistics base	<p>An onshore logistics base would be located in either the Port of Lüderitz or the Port of Walvis Bay (refer to Section 6.5.4). The location of the onshore logistics base would ultimately be based on discussions with Namport and if there is sufficient berthing space to accommodate the support vessel.</p> <p>This EIA will assess the potential impacts related to a logistics base located in either Port of Lüderitz or the Port of Walvis Bay.</p> <p>The Port of Lüderitz and the Port of Walvis Bay are located approximately 400 km and 750 km from the centre of the survey area, respectively. Thus, the costs and impacts associated with travelling a further distance to Walvis Bay could be more significant.</p>
3.4	Support and chase vessels	<p>The number of support or escort vessels may differ from survey to survey depending on the type and location of survey and anticipated activity of other vessels in the area. The number of vessels will ultimately have an impact on the project costs, as well as potentially resulting in more significant impacts on the marine environment (e.g. discharges to sea, noise, etc.). For the proposed project, TEPNA conservatively anticipate that two additional vessels will be commissioned for the survey (one support vessel and one escort vessel - see Section 6.5.2).</p> <p>This EIA will assess the potential impacts related to the survey vessel and two additional vessels (i.e. three in total) operating in the survey area and to / from port.</p>
4. Technology / process alternatives		
4.1	Sound source	<p>Airguns are the most common sound source used in modern seismic surveys (see Section 6.4.3), due to their reliability and reduced impact on the marine life, compared to other traditional acoustic sources (e.g. explosives). The type and number of sound sources used may affect the source volume, which could result in a more significant impact on marine fauna. For the proposed project, the size and number of sources (two to three sources) were chosen according to the water depth constraints, between 2 600 m to 3 800 m.</p> <p>The EIA will assess the potential impacts associated with indicative specifications presented in Table 6-5.</p>
4.2	Source volume	<p>The volume of an energy source determines how deep the acoustic signal produced can penetrate geological formations under the ocean floor, as well as the sound level produced, and the quality of the data collected. As the volume of the source increases, the acoustic signal produced is greater and can travel a greater distance within the geological formations and the data thus obtained are of better quality. The total volume of energy sources to be used has been selected to ensure good data quality, while minimizing its potential impact on the environment. The use of three energy sources of average power instead of a single more powerful energy source will make it possible to shoot less powerful and will potentially have less impact on marine fauna.</p> <p>The EIA will assess the potential impacts associated with indicative specifications presented in Table 6-5.</p>
4.3	Hydrophones	<p>Data from seismic acquisition campaigns can be recorded in two different ways: by towed streamers or by means of sensor nodes or cables laid on the bottom. The sensors placed on the ocean floor (Ocean Bottom Sensors, OBS) are receivers equipped with hydrophones (6) and geophones (7) placed on the bottom to detect the waves reflected from the sound source. The nodes / cables must be laid, raised and repositioned several times during the study to cover each section of the survey grid. This repositioning process takes time and increases the duration and cost of the study. Studies using OBS are primarily used for oil and gas exploration in small areas and moderately deep water, although ocean floor nodes are known to have been used to depths of the order of 2 000 m.</p>

No.	Alternatives	Description
		Considering the water depths of Block 2912 and 2913B, the only possible technique involves the use of streamers. This EIA will thus assess the potential impacts related to streamers only (see in Table 6-5).
5. No-Go alternative		
5.1	No-go	<p>The No-Go alternative represents the option not to proceed with the proposed 3D seismic survey, which leaves the project areas of influence (i.e. offshore licence blocks, Lüderitz and Walvis Bay) in their current state except for variation by natural causes and other human activities, as well as that caused due to the planned exploration well drilling (for which an ECC has been issued). It thus represents the current status quo and the baseline against which all potential project-related impacts are assessed.</p> <p>If the proposed project is not carried out, TEPNA will have to reconsider its strategy for the development of offshore oil and gas reserves in Licence Block 2912 and 2913B, which could lead to plans being abandoned exploration and future development. Without the data obtained by 3D seismic acquisition, the exploration phase and then the development phase cannot be envisaged.</p> <p>This EIA will assess the no-go alternative.</p>

7 DESCRIPTION OF THE RECEIVING ENVIRONMENT

This chapter provides a description of the attributes of the physical, biological, socio-economic and cultural receiving environment of the licence area and the central to southern Namibian offshore regional area. 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.

7.1 GEOPHYSICAL CHARACTERISTICS

7.1.1 Bathymetry

The continental shelf off Namibia is variable in width. Off the Orange River the shelf is wide (230 km) and characterised by well-defined shelf breaks, a shallow outer shelf and the aerofoil-shaped submarine Recent River Delta on the inner shelf. It narrows to the north reaching its narrowest point (90 km) off Chameis Bay, before widening again to 130 km off Lüderitz (Rogers, 1977). The salient topographic features of the shelf include the relatively steep descent to about 100 m, the gentle decline to about 180 m, and the undulating depths to about 200 m. In the south, the Orange Banks comprise three low mounds rising to about 160 m on the outer shelf. North of Chameis Bay, the shelf becomes a stepped feature, with a low step having an elevation between roughly 400 - 450 m below mean sea level, making it one of the deepest in the world. The variable topography of the shelf is of significance for nearshore circulation and for fisheries (Shannon & O'Toole, 1998).

Banks on the continental shelf in the broader project area include the Orange Bank (Shelf or Cone), a shallow (160 - 190 m) zone that reaches maximal widths (180 km) offshore of the Orange River, and Childs Bank, situated approximately 150 km offshore in South African waters at about 31°S. Tripp Seamount is a geological feature situated approximately 230 km offshore at about 29°S, which rises from the seabed at approximately 1 000 m to a depth of 150 m. Tripp Seamount is located approximately 85 km to the east of Block 2913B (see Figure 1-1).

Within Block 2913B, previous seismic and bathymetric datasets have revealed several bathymetric features where variability in seabed erosion has resulted in defined bathymetric boundaries, which in turn are likely to affect localised habitat types. Conspicuous features include mass gravitational flow features, escarpments, eroded plateaus and sedimentary basins (AECOM, 2019).

7.1.2 Coastal and Inner-shelf Geology and Seabed Geomorphology

The distribution of seabed surface sediment types off the southern Namibian coast is presented in Figure 7-1. The inner shelf is underlain by Precambrian bedrock (also referred to as Pre-Mesozoic basement), whilst the middle and outer shelf areas are composed of Cretaceous and Tertiary sediments (Dingle, 1973; Birch *et al.*, 1976; Rogers, 1977; Rogers & Bremner, 1991). As a result of erosion on the continental shelf, the unconsolidated sediment cover is generally thin, often less than 1 m. Sediments are finer seawards, changing from sand on the inner and outer shelves to muddy sand and sandy mud in deeper water. However, this general pattern has been modified considerably by biological deposition (large areas of shelf sediments contain high levels of calcium carbonate) and localised river input. An approximately 500 km long mud belt (up to 40 km wide and of 15 m average thickness) is situated over the outer edge of the middle shelf between the Orange River and St Helena Bay in South Africa (Birch *et al.*, 1976; Meadows *et al.* 1997, 2002; Herbert and Compton 2007). These biogenic muds are the main determinants of the formation of low-oxygen waters and sulphur eruptions off central and southern Namibia (see Sections 7.2.7). Further offshore, sediment is dominated by muddy sands,

sandy muds, mud and some sand. The continental slope, seaward of the shelf break, has a smooth seafloor, underlain by calcareous ooze.

The baseline survey undertaken in Block 2913B (Benthic Solutions, 2019) identified that the seabed is characterised by homogeneous poorly to very poorly sorted fine to medium silts (muddy sands), which comprised between 81.5% and 94.4% of the sediments. The remaining sediment is a coarser component (>500 µm) comprising predominantly relic biogenic materials from foraminifera. Gravels were absent. Video footage of the seabed throughout the area revealed evidence of bioturbation on the silt-dominated surface, although with no discernible species could be identified. The Total Organic Carbon (TOC) content of the sediments is comparatively low, suggesting that the carbon flux from near surface productivity is not strong. This would be expected from sediments in areas far offshore of the highly productive coastal upwelling.

Present day sedimentation is limited to inputs from the Orange River. This sediment is generally transported northward. In the southern portion of the study area, most of the sediment is therefore considered to be relict deposits by now ephemeral rivers active during wetter climates in the past.

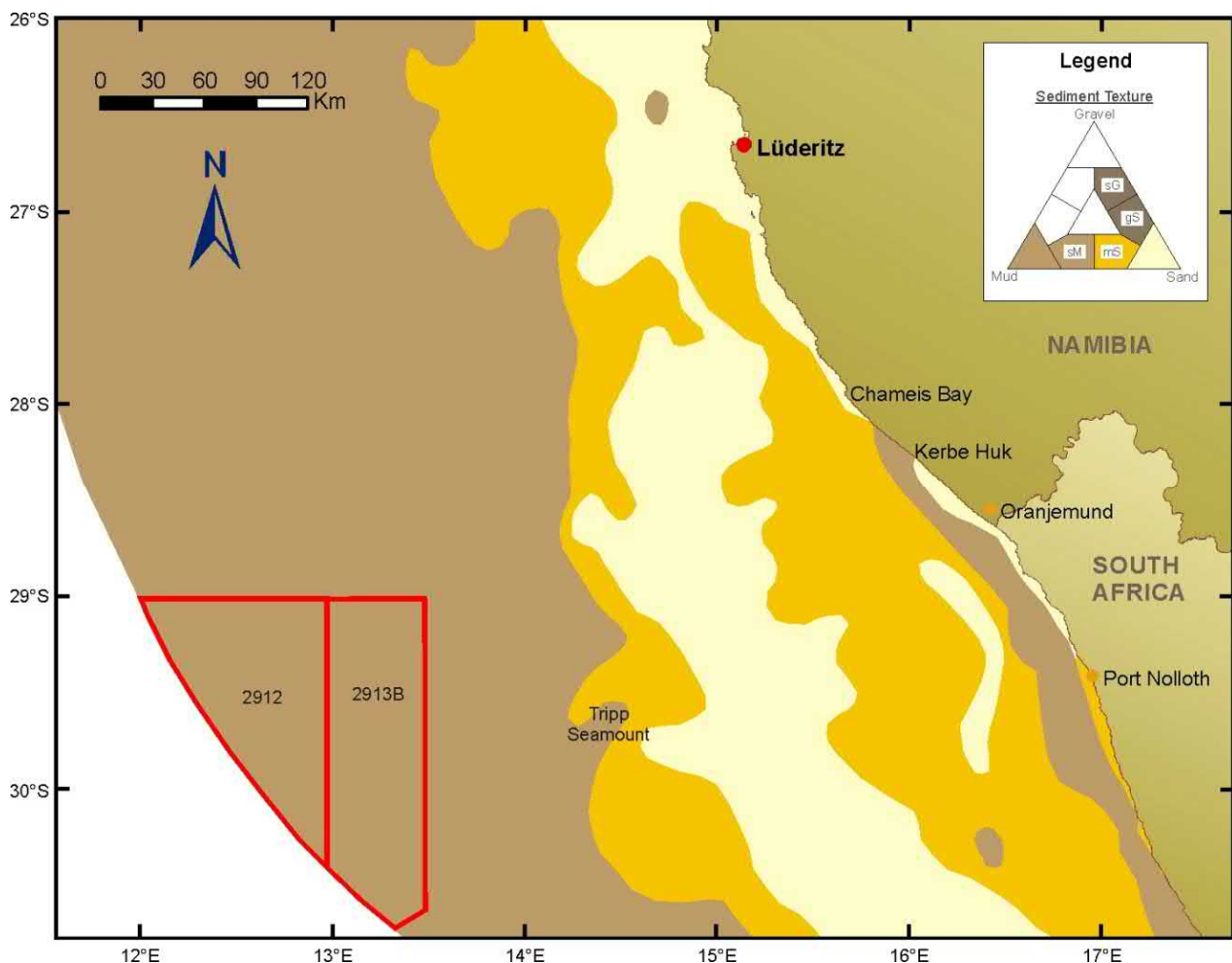


FIGURE 7-1: BLOCKS 2912 AND 2913B IN RELATION TO THE SEDIMENT DISTRIBUTION ON THE CONTINENTAL SHELF OFF CENTRAL AND SOUTHERN NAMIBIA

Source: adapted from Rogers, 1977

7.2 BIOPHYSICAL CHARACTERISTICS

7.2.1 Climate

The climate of the Namibian coastline is classified as hyper-arid with typically low, unpredictable winter rains and strong winds predominantly south-easterly winds. Winds are one of the main physical drivers of the nearshore Benguela Region, both on an oceanic scale, generating the heavy and consistent south-westerly swells that impact this coast, and locally, contributing to the northward-flowing longshore currents, and being the prime mover of sediments in the terrestrial environment. Consequently, physical processes are characterised by the average seasonal wind patterns and substantial episodic changes in these wind patterns have strong effects on the entire Benguela region.

The strongest winds occur in summer (November to April) with virtually all coming from the south-east and south-south-easterlies (see Figure 7-2). The combination of these southerly to south-easterly winds drives the massive offshore movements of surface water, and the resultant strong upwelling of nutrient-rich bottom waters, which characterise this region in summer. Winter (May to October) remains dominated by southerly to south-easterly winds, but the closer proximity of the winter cold-front systems results in a more significant north-westerly component (see Figure 7-2). This 'reversal' from the summer condition results in cessation of upwelling, movement of warmer mid-Atlantic water shorewards and breakdown of the strong thermoclines which typically develop in summer. There are also more calms in winter, occurring about 3% of the time, and wind speeds generally do not reach the maximum speeds of summer. However, the westerly winds blow in synchrony with the prevailing south-westerly swell direction, resulting in heavier swell conditions in winter.

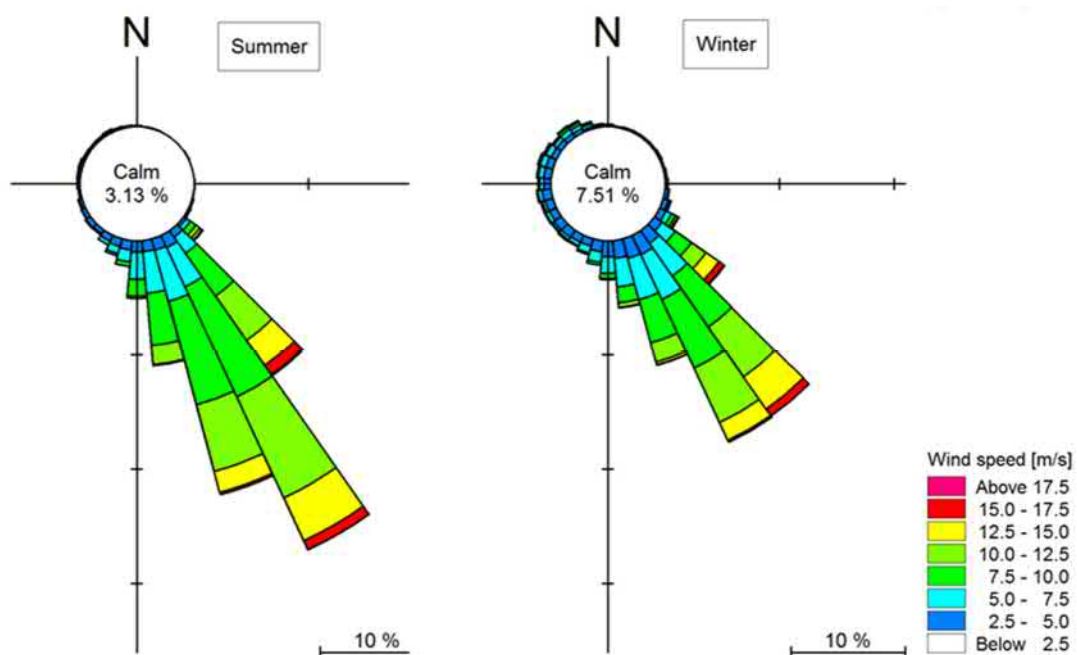


FIGURE 7-2: SEASONAL WIND ROSES AT 14°E, 28°S IN THE VICINITY OF BLOCKS 2912 AND 2913B

Source: PRDW, 2019

Average annual precipitation ranges from 16.4 mm at Lüderitz to 51.5 mm at Oranjemund. Due to the combination of wind and cool ocean water, temperatures are mild throughout the year. Coastal temperatures average around 16°C, gradually increasing inland (Barnard, 1998). In winter, maximum diurnal shifts in temperature can occur caused by the hot easterly 'berg' winds which blow off the desert. During such occasions, temperatures up to 30°C are not uncommon.

Coastal fog is a regular occurrence; occurring on average between 50 and 75 days of the year in the south, being most frequent during the months of February through May. The fog lies close to the coast extending about 20 nautical miles (nm) (approximately 35 km) seawards (Olivier, 1992, 1995). This fog is usually quite dense, appearing as a thick bank hugging the shore and reducing visibility to <300 m. Fog should in no way affect exploration activities in the offshore licence area. However, it may affect helicopter operations between the survey vessel and the Lüderitz airport.

7.2.2 Large-Scale Circulation and Coastal Currents

The Namibian coastline is strongly influenced by the Benguela Current system. Current velocities in continental shelf areas generally range between 10 to 30 cm/s (Boyd & Oberholster, 1994). In the south the Benguela current has a width of 200 km, widening rapidly northwards to 750 km. The flows are predominantly wind-forced, barotropic and fluctuate between poleward and equatorward flow (Shillington *et al.*, 1990; Nelson & Hutchings, 1983) (see Figure 7-3). Fluctuation periods of these flows are 3 - 10 days, although the long-term mean current residual is in an approximate northwest (alongshore) direction. Near bottom shelf flow is mainly poleward (Nelson, 1989) with low velocities of typically 5 cm/s.

Near-surface currents in the project area are primarily from the south-south-east (see Figure 7-4), with maximum speeds exceeding 60 cm/s occurring primarily during summer months (November to March). Current speeds decrease with depth to <20 cm/s near the seabed (Total E and P Namibia, unpublished data).

The major feature of the Benguela Current is coastal upwelling and the consequent high nutrient supply to surface waters leads to high biological production and large fish stocks. The prevailing longshore, equatorward winds move nearshore surface water northwards and offshore. To balance the displaced water, cold, deeper water wells up inshore. Although the rate and intensity of upwelling fluctuates with seasonal variations in wind patterns, the most intense upwelling tends to occur where the shelf is narrowest and the wind strongest. Consequently, it is a semi-permanent feature at Lüderitz and areas to the north due to perennial southerly winds (Shannon, 1985). The Lüderitz upwelling cell is the most intense upwelling cell in the system, with the seaward extent reaching nearly 300 km, and the upwelling water is derived from 300 m to 400 m depth (Longhurst, 2006). The Lüderitz Upwelling Cell / Orange River Cone (LUCORC) area between approximately 29°S - 31°S forms a major environmental barrier between the northern and southern Benguela sub-systems (Ekau & Verheye, 2005) (see Figure 7-5). Off northern and central Namibia, several secondary upwelling cells occur. Upwelling in these cells is perennial, with a late winter maximum (Shannon, 1985).

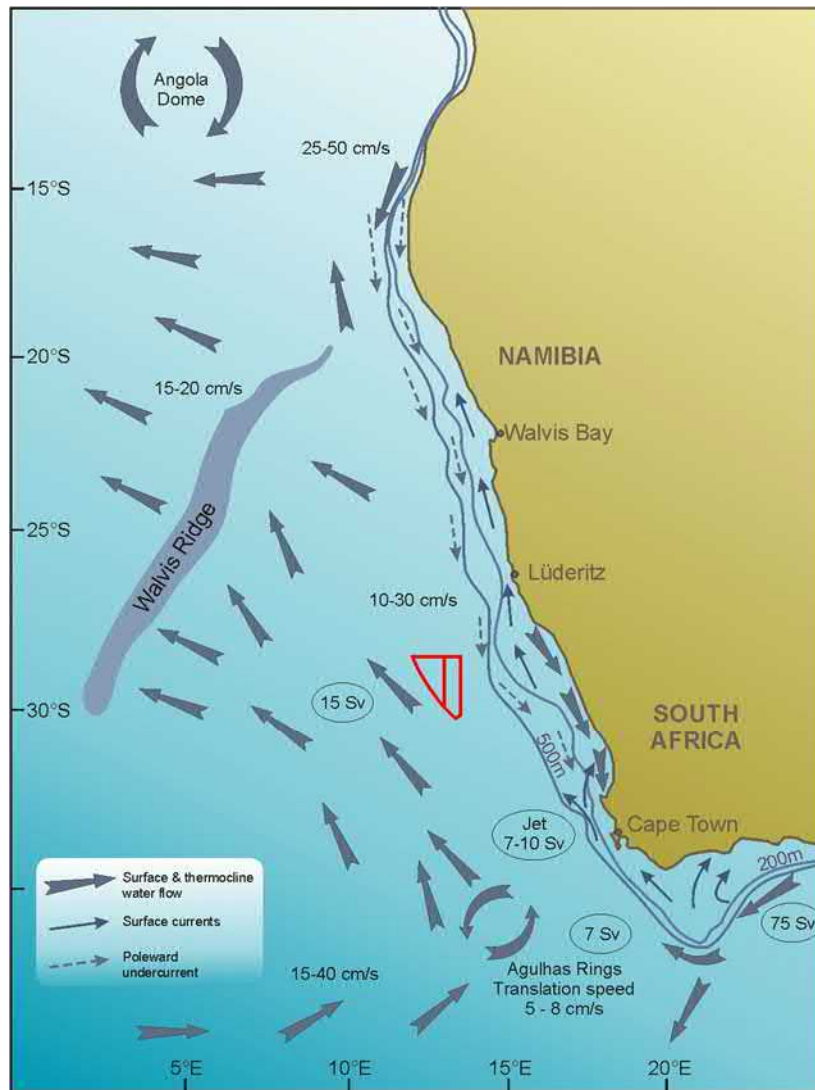


FIGURE 7-3: BLOCKS 2912 AND 2913B IN RELATION TO MAJOR FEATURES OF THE PREDOMINANT CIRCULATION PATTERNS AND VOLUME FLOWS IN THE BENGUELA SYSTEM

Source: adapted from Shannon & Nelson, 1996

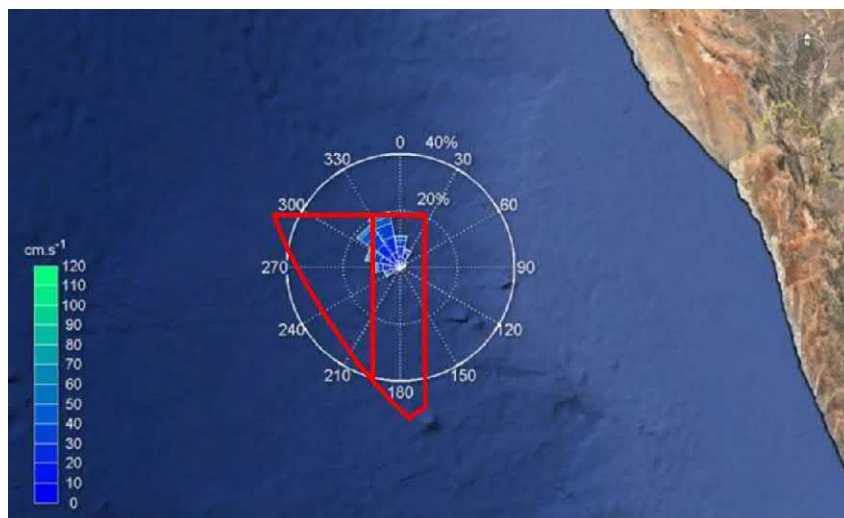


FIGURE 7-4: NEAR-SURFACE (~2 M DEPTH) CURRENT ROSE FOR BLOCKS 2912 AND 2913B

Source: Total E and P Namibia

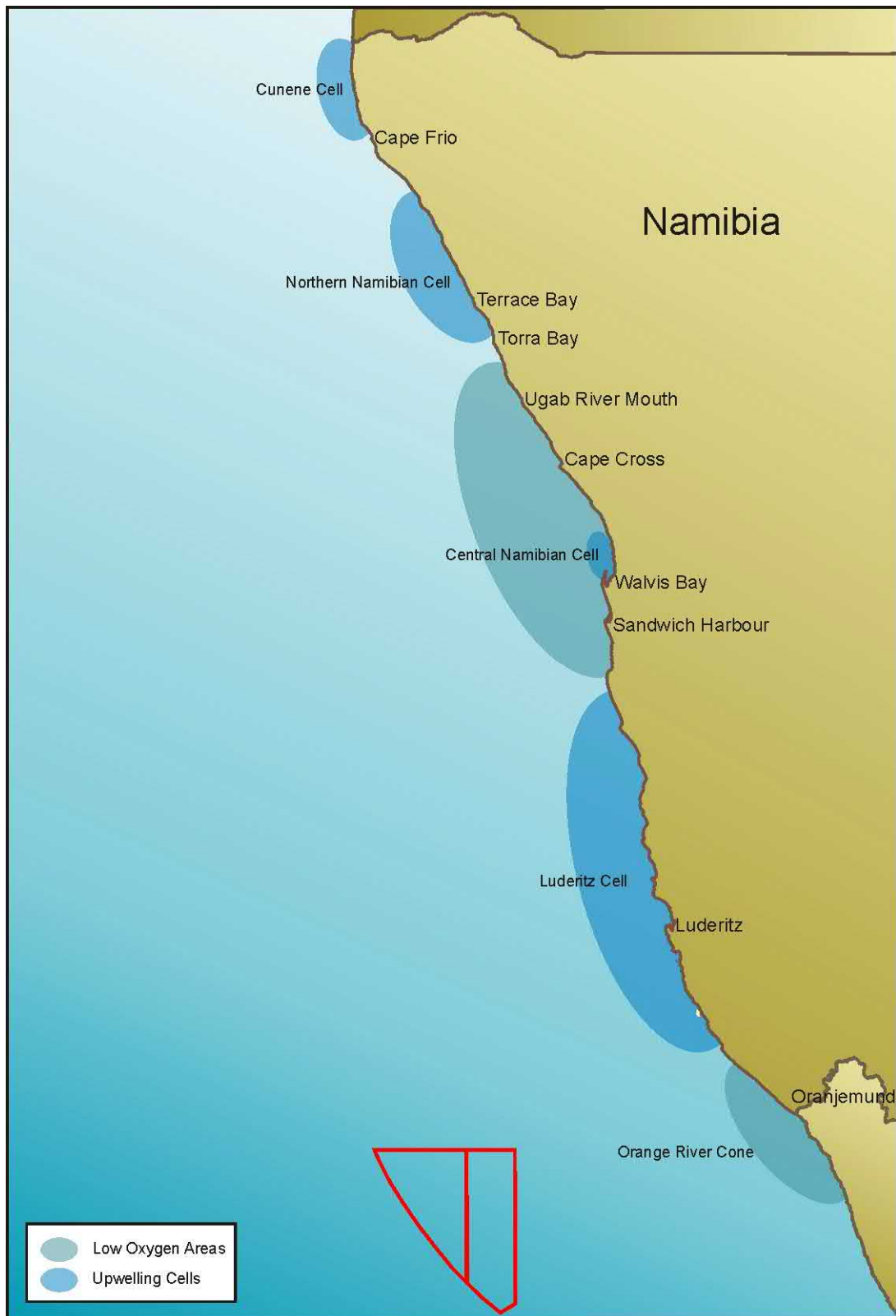


FIGURE 7-5: BLOCKS 2912 AND 2913B IN RELATION TO UPWELLING CENTRES AND LOW OXYGEN AREAS OFF THE WEST COAST OF NAMIBIA

Source: adapted from Shannon, 1995

7.2.3 Waves and Tides

The Namibian Coast is classified as exposed, experiencing strong wave action rating from 13-17 on the 20-point exposure scale (McLachlan, 1980). Much of the coastline is, therefore, influenced by heavy south-westerly swells generated in the roaring forties, as well as significant sea waves generated locally by the prevailing moderate to strong southerly winds.

Monthly surface current roses in area of interest are shown in Figure 7-6. The wave regime along the southern African West Coast shows only moderate seasonal variation in direction, with virtually all swells throughout the year coming from the south-west to south direction. Winter swells, however, are strongly dominated by those from the south-west to south-south-west, which occur almost 80% of the time, and typically exceed 2 m in height, averaging about 3 m, and often attaining over 5 m. With wind speeds capable of reaching 100 km/h during heavy winter south-westerly storms, winter swell heights can exceed 10 m.

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

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

7.2.4 Water

South Atlantic Central Water (SACW) comprises the bulk of the seawater in the study area, either in its pure form in the deeper regions or mixed with previously upwelled water of the same origin on the continental shelf (Nelson and Hutchings, 1983). Salinities range between 34.5 ‰ and 35.5 ‰ (Shannon, 1985).

Seawater temperatures on the continental shelf of the southern Benguela typically vary between 6°C and 16°C. Well-developed thermal fronts exist, demarcating the seaward boundary of the upwelled water. Upwelling filaments are characteristic of these offshore thermal fronts, occurring as surface streamers of cold water, typically 50 km wide and extending beyond the normal offshore extent of the upwelling cell. Such fronts typically have a lifespan of a few days to a few weeks, with the filamentous mixing area extending up to 625 km offshore (see Figure 7-7).

The continental shelf waters of the Benguela system are characterised by low oxygen concentrations, especially on the bottom. SACW itself has depressed oxygen concentrations (~80 % saturation value), but lower oxygen concentrations (<40 % saturation) frequently occur (Bailey et al., 1985; Chapman and Shannon, 1985). Oxygen minima recorded in Block 2913B ranged from 34.3% to 43.1% (Benthic Solutions, 2019).

Nutrient concentrations of upwelled water of the Benguela system attain 20 µm nitrate-nitrogen, 1.5 µm phosphate and 15-20 µm silicate, indicating nutrient enrichment (Chapman and Shannon, 1985). This is mediated by nutrient regeneration from biogenic material in the sediments (Bailey et al., 1985). Modification of

these peak concentrations depends upon phytoplankton uptake which varies according to phytoplankton biomass and production rate. The range of nutrient concentrations can thus be large but, in general, concentrations are high. As Blocks 2912 and 2913B are located well offshore of the upwelling cells, nutrient concentrations are expected to be low. This was confirmed from water samples collected in Block 2913B, which found that Phosphate as P and Orthophosphate (PO_4) ranged from 0.04 to 0.07 mg/l and 0.12 to 0.21 mg/l, respectively, with the highest concentrations recorded near the seabed. Nitrate and Nitrite were both below the limits of detection and ammoniacal nitrogen ranged from 0.41 to 0.44 mg/l, whilst total nitrogen remained below 2 mg/l (Benthic Solutions, 2019).

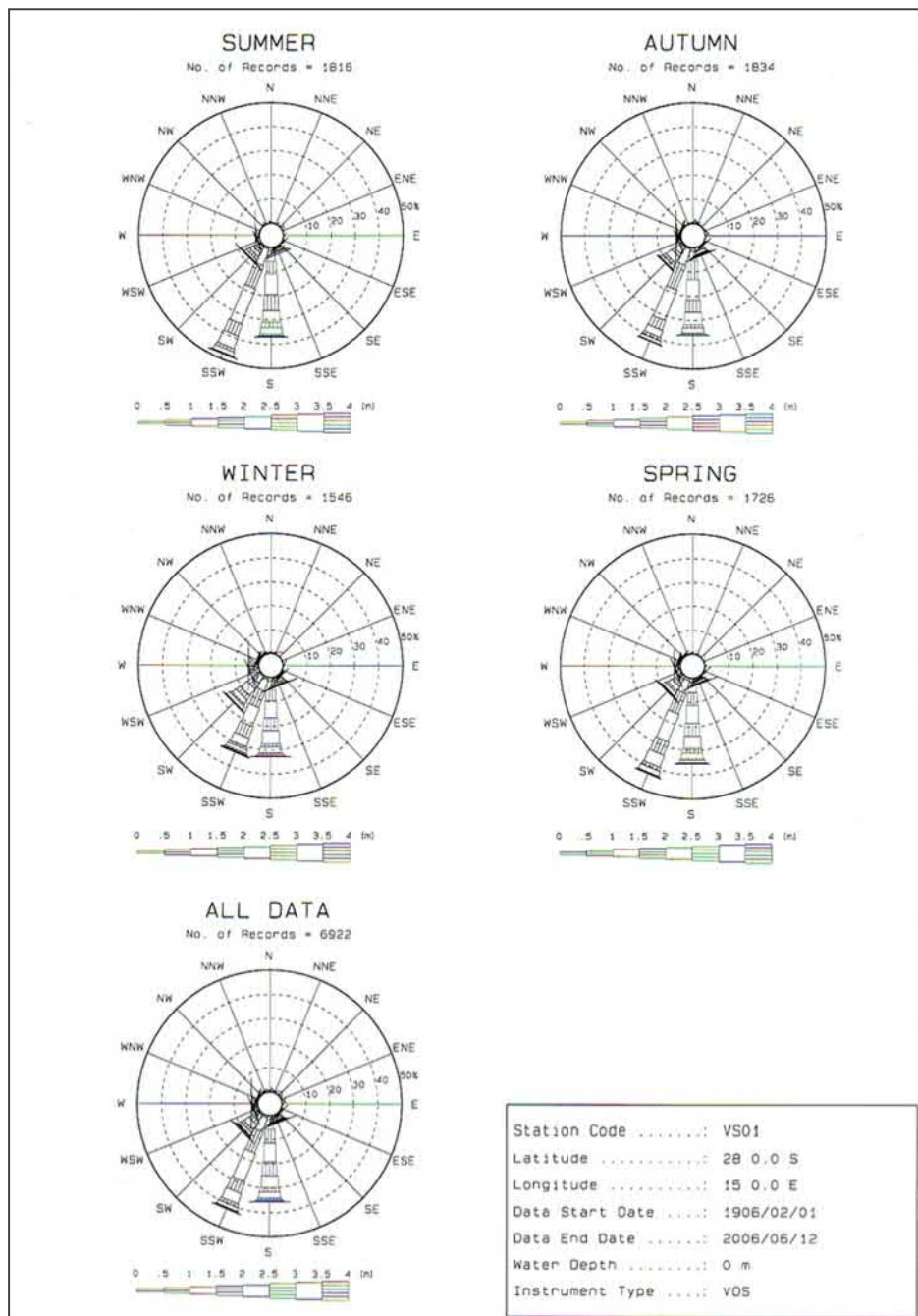


FIGURE 7-6: SEASONAL OFFSHORE WAVE CONDITIONS FOR A DATA POINT LOCATED AT 28°-29°S; 15°-16°E

Source: CSIR, 2009

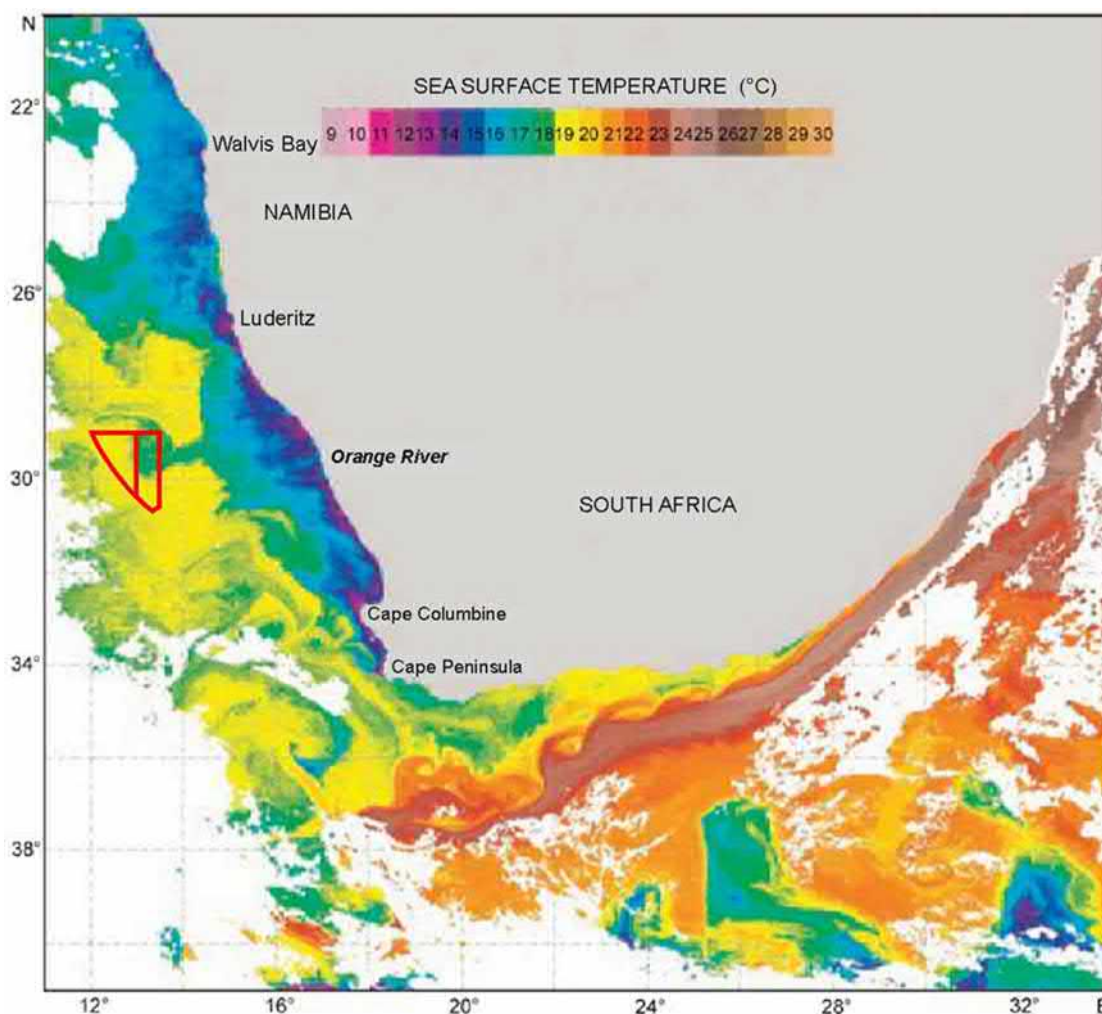


FIGURE 7-7: SEA SURFACE TEMPERATURE IMAGE FOR 15 MAY 2003 SHOWING BLOCKS 2912 AND 2913B (RED POLYGONS) IN RELATION TO COASTAL UPWELLING EVENTS

Source: adapted from Weeks *et al.*, 2006

7.2.5 Upwelling and Plankton Production

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

7.2.6 Turbidity

Turbidity is a measure of the degree to which the water loses its transparency due to the presence of suspended particulate matter, including both Particulate Organic Matter (POM) and Particulate Inorganic Matter (PIM). Concentrations of suspended particulate matter in shallow coastal waters can vary both spatially and temporally, typically ranging from a few mg/l to several tens of mg/l (Bricelj & Malouf, 1984; Berg & Newell, 1986; Fegley *et al.*, 1992). In the offshore waters of Blocks 2912 and 2913B, total suspended solids (TSS) remained below 5 mg/l, being highest near the surface (2.9 mg/l) declining to around 2.6 mg/l near the seabed (Benthic Solutions, 2019).

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

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

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

7.2.7 Organic Inputs, Hypoxia and Sulphur Eruptions

Balanced multispecies ecosystem models have estimated that 36% of the phytoplankton and 5% of the zooplankton are lost to the seabed annually (Shannon *et al.*, 2003). This natural annual input of millions of tons of organic material onto the seabed has a substantial effect on the ecosystems of the Benguela region. It provides most of the food requirements of the particulate and filter-feeding benthic communities, and results in the high organic content of the muds in the region. As most of the organic detritus is not directly consumed, it enters the seabed decomposition cycle, resulting in subsequent depletion of oxygen in deeper waters. As the mud on the shelf is distributed in discrete patches (see Figure 7-1), there are corresponding preferential areas for the formation of oxygen-poor water. The two main areas of low-oxygen water formation in the central Benguela region are in the Orange River Bight and off Walvis Bay (Chapman and Shannon, 1985; Bailey, 1991; Shannon and O'Toole, 1998; Bailey 1999; Fossing *et al.*, 2000).

The spatial distribution of oxygen-poor water is subject to short- and medium-term variability. Subsequent upwelling processes can move this hypoxic water onto the inner shelf and into nearshore waters, often with devastating effects on marine communities.

Closely associated with seafloor hypoxia, is the generation of toxic hydrogen sulphide and methane within the organically-rich, anoxic muds. Under conditions of severe oxygen depletion, hydrogen sulphide (H₂S) gas is formed by anaerobic bacteria in anoxic seabed muds (Brüchert *et al.*, 2003). This is periodically released from

the muds as 'sulphur eruptions', causing upwelling of anoxic water and formation of surface slicks of sulphur discoloured water (Emeis *et al.*, 2004). Although these processes are common off central and southern Namibia, they are not expected in the licence blocks.

7.3 BIOLOGICAL OCEANOGRAPHY

Biogeographically, the study area falls into the cold temperate Namaqua Bioregion, which extends from Sylvia Hill, north of Lüderitz in Namibia to Cape Columbine (Emanuel *et al.*, 1992; Lombard *et al.*, 2004). The portion of the project area that extends beyond the shelf break onto the continental slope and into abyssal depths falls into the Atlantic Offshore Bioregion (Lombard *et al.*, 2004). The coastal, wind-induced upwelling characterising the Namibian coastline, is the principle physical process which shapes the marine ecology of the central Benguela region. The Benguela system is characterised by the presence of cold surface water, high biological productivity, and highly variable physical, chemical and biological conditions.

Communities within marine habitats are largely ubiquitous throughout the southern African West Coast region, being particular only to substrate type or depth zone. These biological communities consist of many hundreds of species, often displaying considerable temporal and spatial variability (even at small scales).

Blocks 2912 and 2913B are located beyond the 200 m depth contour, the closest point to shore being approximately 240 km (approximately 100 km north of Oranjemund). The near- and offshore marine ecosystems comprise a limited range of habitats, namely unconsolidated seabed sediments and the water column. The biological communities 'typical' of these habitats are described briefly below, focussing both on dominant, commercially important and conspicuous species, as well as potentially threatened or sensitive species, which may be affected by the proposed seismic survey.

7.3.1 Benthic Invertebrate Macrofauna Communities

The seabed communities in the Blocks 2912 and 2913B area lie within the Namaqua sub-photic and continental slope biozones, which extend from a 30 m depth to the shelf edge and beyond to the lower deep-sea slope, respectively. The benthic and coastal habitats of Namibia were mapped as part of the Benguela Current Commission's Spatial Biodiversity Assessment (Holness *et al.*, 2014) to develop assessments of the ecosystem threat status and ecosystem protection level (see Table 7-1 and Figure 7-8). Possible submarine canyons (with 5 km buffer) were also mapped as lines by the International Deep Ocean Project (see Figure 7-8). The benthic habitats were subsequently assigned an ecosystem threat status ('Least Threatened', 'Vulnerable', 'Endangered' or 'Critically Endangered') based on their level of protection (see Table 7-1) and mapped (see Figure 7-9).

The benthic biota of unconsolidated marine sediments constitutes invertebrates that live on (epifauna) or burrow within (infauna) the sediments and are generally divided into macrofauna (animals >1 mm) and meiofauna (<1 mm).

Polychaetes, crustaceans and molluscs make up the largest proportion of individuals, biomass and species on the West Coast. The distribution of species within these communities are inherently patchy reflecting the high natural spatial and temporal variability associated with macro-infauna of unconsolidated sediments (Kenny *et al.*, 1998; Kendall & Widdicombe, 1999; van Dalfsen *et al.*, 2000; Zajac *et al.*, 2000; Parry *et al.*, 2003). Generally, species richness increases from the inner shelf across the mid shelf and is influenced by sediment type (Karenji,

unpublished data). The highest total abundance and species diversity has been measured in sandy sediments of the mid-shelf. Biomass is highest in the inshore ($\pm 50 \text{ g/m}^2$ wet weight) and decreases across the mid-shelf averaging around 30 g/m^2 wet weight. The mid shelf mud belt, however, is a particularly rich benthic habitat where biomass can attain 60 g/m^2 dry weight (Christie, 1974; see also Steffani, 2007). The comparatively high benthic biomass in this mud belt region represents an important food source to carnivores such as the mantis shrimp, cephalopods and demersal fish species (Lane & Carter, 1999). In deeper water beyond this rich zone, biomass declines to 4.9 g/m^2 at 200 m depth and then is consistently low ($<3 \text{ g/m}^2$) on the outer shelf (Christie, 1974).

The benthic fauna of the outer shelf and continental slope (beyond 450 m depth) are very poorly known largely due to limited opportunities for sampling, as well as the lack of access to ROVs for visual sampling of hard substrata. To date very few areas of the continental slope off the southern African West Coast have been biologically surveyed. Benthic habitats along the 500 m depth contour have been assigned a threat status of “Vulnerable”, with those further inshore to the 100 m depth contour considered “Endangered” by the Benguela Current Commission (BCC) Spatial Biodiversity Assessment (Holness *et al.* 2014), but further offshore in Blocks 2912 and 2913B, the benthic habitat type is considered ‘Least Threatened’ (see Figure 7-9).

TABLE 7-1: ECOSYSTEM THREAT STATUS FOR MARINE HABITAT TYPES ON THE NAMIBIAN COAST

Key	Habitat Type	Threat Status	Area (km ²)
1	Namib Abyss	Least Threatened	800.93
2	Namib Lower Slope	Least Threatened	1 380.13
3	Namib Upper Slope	Least Threatened	590.66
4	Namib Seamount	Least Threatened	26.83
5	Namaqua Shelf Edge	Endangered	44.40
6	Namaqua Outer Shelf	Least Threatened	175.29
7	Namaqua Inner Shelf	Least Threatened	69.48
8	Namaqua Inshore	Vulnerable	4.45
9	Lüderitz Shelf Edge	Critically Endangered	87.55
10	Lüderitz Outer Shelf	Vulnerable	184.70
11	Lüderitz Inner Shelf	Least Threatened	62.91
12	Lüderitz Islands	Least Threatened	13.32
13	Lüderitz Inshore	Least Threatened	3.56

Note: Those habitats potentially affected by the proposed seismic survey are shaded.

Source: Holness *et al.*, 2014

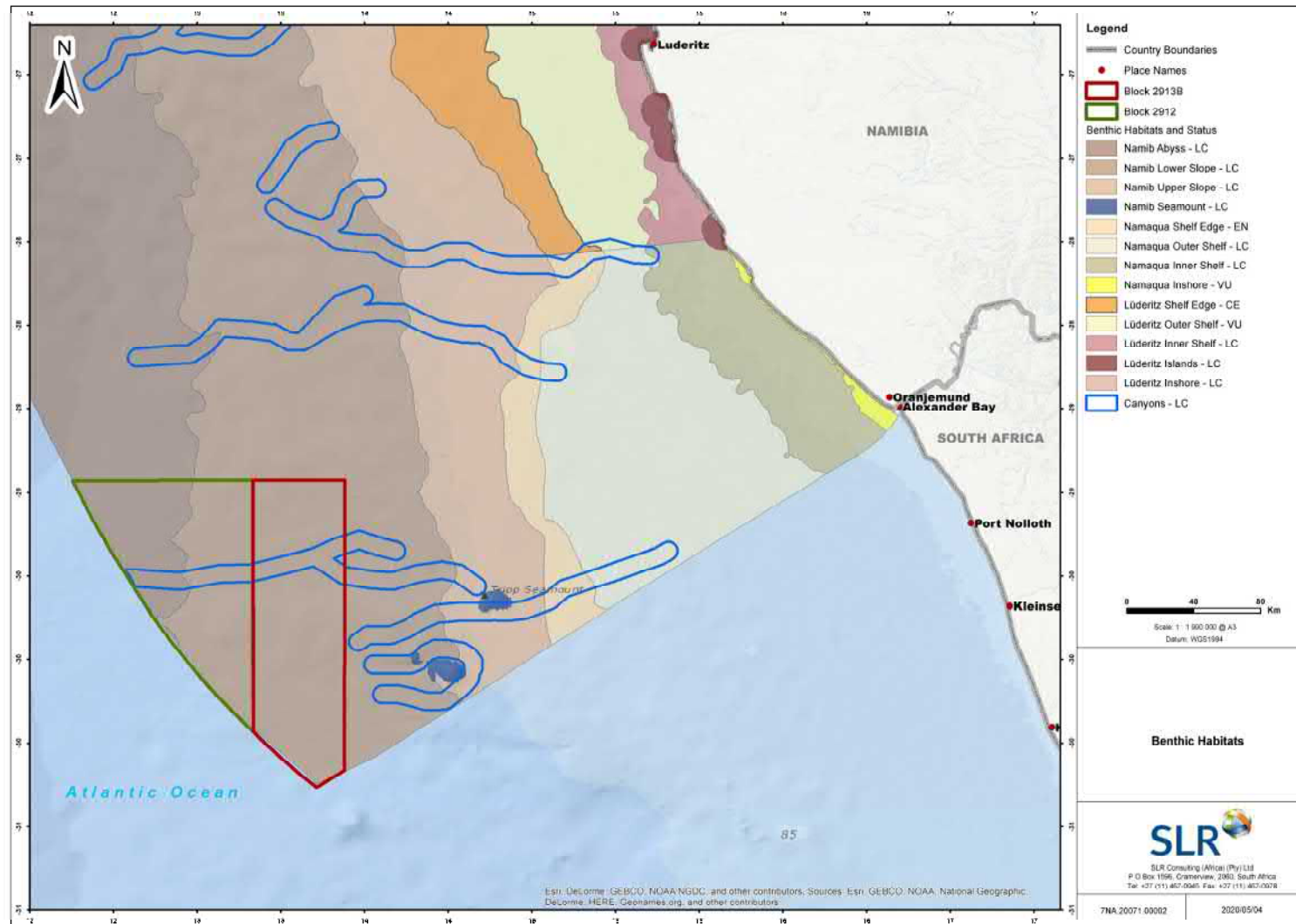


FIGURE 7-8: BLOCKS 2912 AND 2913B IN RELATION TO THE NAMIBIAN BENTHIC AND COASTAL HABITATS

Note: The positions of possible submarine canyons are also shown (blue lines).

Source: adapted from Holness *et al.*, 2014

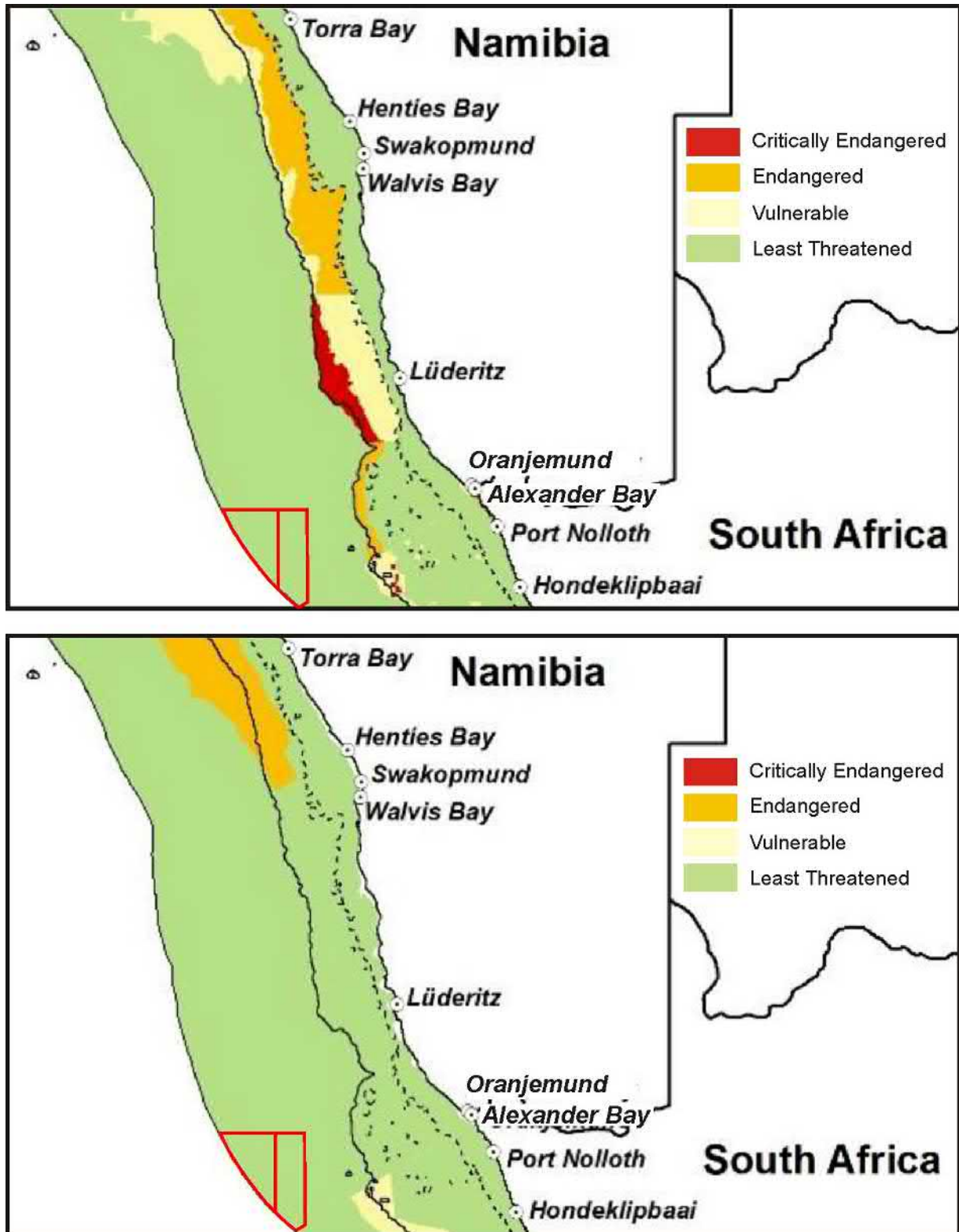


FIGURE 7-9: BLOCKS 2912 AND 2913B IN RELATION TO ECOSYSTEM THREAT STATUS FOR COASTAL AND OFFSHORE BENTHIC HABITAT TYPES (TOP) AND OFFSHORE PELAGIC HABITAT TYPES (BOTTOM) OFF THE NAMIBIAN COAST

Source: adapted from Holness *et al.*, 2014

Whilst many empirical studies related community structure to sediment composition (Christie, 1974; Warwick *et al.*, 1991; Yates *et al.*, 1993; Desprez, 2000; van Dalftsen *et al.*, 2000), other studies have illustrated the high natural variability of soft-bottom communities, both in space and time, on scales of hundreds of metres to metres (Kenny *et al.*, 1998; Kendall & Widdicombe, 1999; van Dalftsen *et al.*, 2000; Zajac *et al.*, 2000; Parry *et al.*, 2003), with evidence of mass mortalities and substantial recruitments (Steffani & Pulfrich, 2004). It is likely that the distribution of marine communities in the mixed deposits of the coastal zone is controlled by complex interactions between physical and biological factors at the sediment–water interface, rather than by the granulometric properties of the sediments alone (Snelgrove & Butman, 1994; Seiderer & Newell, 1999). For example, off central and southern Namibia it is likely that periodic intrusion of low oxygen water masses is a major cause of this variability (Monteiro & van der Plas, 2006; Pulfrich *et al.*, 2006). Although there is a poor understanding of the responses of local continental shelf macrofauna to low oxygen conditions, it is safe to assume that in areas of frequent oxygen deficiency (i.e. Oxygen Minimum Zones - OMZs) the communities are characterised by species able to survive chronic low oxygen conditions or colonising and fast-growing species able to rapidly recruit into areas that have suffered complete oxygen depletion. Local hydrodynamic conditions, and patchy settlement of larvae, will also contribute to small-scale variability of benthic community structure.

Information on the benthic fauna of the lower continental slope and abyss (beyond 1 800 m depth) is largely lacking due to limited opportunities for sampling. As part of the Environmental Baseline Survey for Block 2913B, however, deep-water benthic sampling was undertaken using a box corer (Benthic Solutions, 2019); thereby providing valuable information on the benthic infaunal communities in the project area.

The macrofauna throughout the survey area are generally impoverished, but fairly consistent, which is typical for deep water sediments. The 105 species recorded, were dominated by polychaetes, which accounted for 64.1% of the total individuals. Molluscs were represented by 11 species (19.6% of total individuals), whilst 20 species of crustaceans were recorded (contributing to only 9.8% of total individuals). Echinoderms were represented by only 3 species (5.8% of total individuals), whilst all other groups (Actiniaria, Nemertea, Nematoda, Ascidiacea and Priapulida) accounted for the remaining 5.9% of individuals. The deposit-feeding polychaete *Spiophanes sp.* was the most abundant species recorded. This small bristleworm can either be a passive suspension feeder or a surface deposit feeder, living off sediment particles, planktonic organisms and meiobenthic organisms. The bivalve mollusc *Microgloma mirmidina* was the second most common species, with the polychaete tentatively identified as a *Leiocapitellide* being the third most abundant. With the exception of the carnivorous polychaete *Glycera capitata*, most species were suspension or deposit feeders typical of soft unconsolidated sediments. Examples of the macroinvertebrate infauna of the project area are illustrated in Figure 7-10.

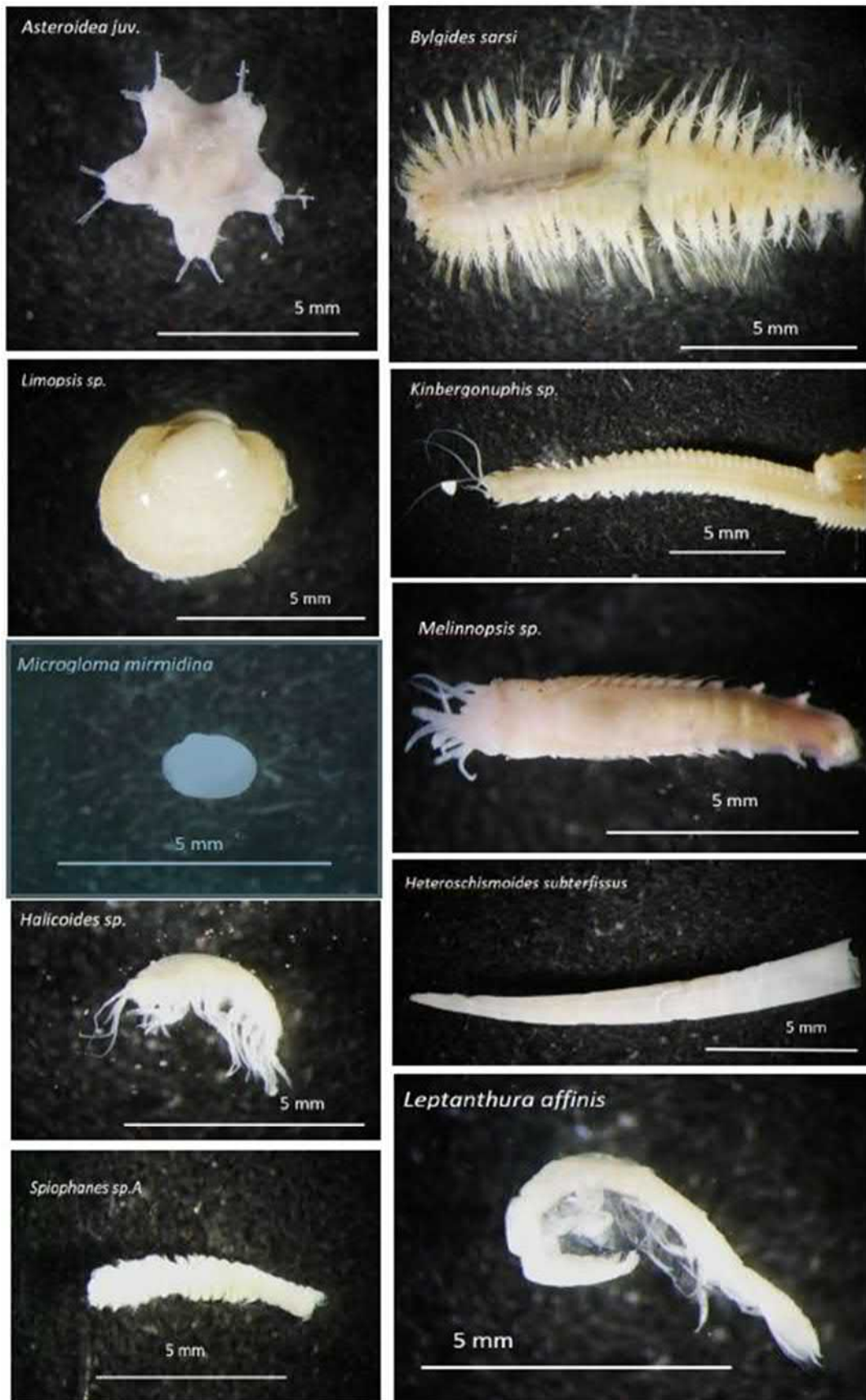


FIGURE 7-10: EXAMPLES OF MACROINVERTEBRATES RECORDED IN BLOCK 2913B

Source: Benthic Solutions, 2019

7.3.2 Deep-water Coral Communities

There has been increasing interest in deep-water corals in recent years because of their likely sensitivity to disturbance and their long generation times. These benthic filter-feeders generally occur at depths exceeding 150 m. Some species form reefs while others are smaller and remain solitary. Corals add structural complexity to otherwise uniform seabed habitats thereby creating areas of high biological diversity (Breeze *et al.*, 1997; MacIsaac *et al.*, 2001). Deep-water corals establish themselves below the thermocline where there is a continuous and regular supply of concentrated particulate organic matter, caused by the flow of a relatively strong current over special topographical formations which cause eddies to form. Nutrient seepage from the substratum might also promote a location for settlement (Hovland *et al.*, 2002). Substantial shelf areas in the productive Benguela region should thus potentially be capable of supporting rich, cold water, benthic, filter-feeding communities. Such communities would also be expected with topographic features such as Tripp Seamount (in Namibian waters) and Child's Bank (in South African waters), some 85 km to the east and 250 km to the south-east of Blocks 2912 and 2913B, respectively (see Figure 7-18).

7.3.3 Seamount Communities

Features such as banks, knolls and seamounts (referred to collectively here as "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 (Clark *et al.*, 1999), 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.

The enhanced fluxes of detritus and plankton that develop in response to the complex current regimes lead to the development of detritivore-based food-webs, which in turn lead to the presence of seamount scavengers and predators. Seamounts provide an important habitat for commercial deep-water fish stocks such as orange roughy, oreos, alfonsino and Patagonian toothfish, which aggregate around these features for either spawning or feeding (Koslow, 1996).

Such complex benthic ecosystems in turn enhance foraging opportunities for many other predators, serving as mid-ocean focal points for a variety of pelagic species with large ranges (turtles, tunas and billfish, pelagic sharks, cetaceans and pelagic seabirds) that may migrate large distances in search of food or may only congregate on seamounts at certain times (Hui, 1985; Haney *et al.*, 1995). Seamounts thus serve as feeding grounds, spawning and nursery grounds and possibly navigational markers for a large number of species (SPRFMA, 2007).

Enhanced currents, steep slopes and volcanic rocky substrata, in combination with locally generated detritus, favour the development of suspension feeders in the benthic communities characterising seamounts (Rogers, 1994). Deep- and cold-water corals (including stony corals, black corals and soft corals) are a prominent component of the suspension-feeding fauna of many seamounts, accompanied by barnacles, bryozoans, polychaetes, molluscs, sponges, sea squirts, basket stars, brittle stars and crinoids (reviewed in Rogers, 2004). There is also associated mobile benthic fauna that includes echinoderms (sea urchins and sea cucumbers) and crustaceans (crabs and lobsters) (reviewed by Rogers, 1994). Some of the smaller cnidarians species remain solitary while others form reefs thereby adding structural complexity to otherwise uniform seabed habitats. The

coral frameworks offer refugia for a great variety of invertebrates and fish (including commercially important species) within, or in association with, the living and dead coral framework thereby creating spatially fragmented areas of high biological diversity. Compared to the surrounding deep-sea environment, seamounts typically form biological hotspots with a distinct, abundant and diverse fauna, many species of which remain unidentified. Consequently, the fauna of seamounts is usually highly unique and may have a limited distribution restricted to a single geographic region, a seamount chain or even a single seamount location (Rogers *et al.*, 2008). Levels of endemism on seamounts are also relatively high compared to the deep sea. As a result of conservative life histories (*i.e.* very slow growing, slow to mature, high longevity, low levels of recruitment) and sensitivity to changes in environmental conditions, such biological communities have been identified as Vulnerable Marine Ecosystems (VMEs). They are recognised as being particularly sensitive to anthropogenic disturbance (primarily deep-water trawl fisheries and mining), and once damaged are very slow to recover, or may never recover (FAO, 2008).

It is not always the case that seamount habitats are VMEs, as some seamounts may not host communities of fragile animals or be associated with high levels of endemism. There is reference to decapods crustaceans from Tripp Seamount (Kensley, 1980, 1981) and exploratory deep-water trawl fishing (Hampton, 2003), but otherwise knowledge of benthic communities characterising southern African seamounts is lacking. Evidence from video footage taken on hard-substrate habitats in 100 - 120 m depth off southern Namibia (see Figure 7-11) suggest that vulnerable communities including gorgonians, octocorals and reef-building sponges occur on the continental shelf, and similar communities may thus be expected on Tripp Seamount.



FIGURE 7-11: GORGONIANS AND BRYOZOANS COMMUNITIES RECORDED ON DEEP-WATER REEFS (100-120 M) OFF THE SOUTHERN AFRICAN WEST COAST

Source: De Beers Marine

7.3.4 Plankton

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

Off the Namibian coastline, phytoplankton are the principle primary producers with mean annual productivity being comparatively high at 2 g C/m²/day (Barnard, 1998). The phytoplankton is dominated by diatoms, which are adapted to the turbulent sea conditions. Diatom blooms occur after upwelling events, whereas dinoflagellates are more common in blooms that occur during quiescent periods.

Namibian zooplankton reaches maximum abundance in a belt parallel to the coastline and offshore of the maximum phytoplankton abundance. The mesozooplankton (<2 mm body width) community includes egg, larval, juvenile and adult stages of copepods, cladocerans, euphausiids, decapods, chaetognaths, hydromedusae and salps, as well as protozoans and meroplankton larvae (Maartens, 2003; Hansen *et al.*, 2005). Copepods are the most dominant group making up 70-85 % of the zooplankton.

Ichthyoplankton constitutes the eggs and larvae of fish. As noted in Section 7.2.2, the LUCORC area is considered to be an environmental barrier to the transport of ichthyoplankton from the southern to the northern Benguela upwelling ecosystems. Areas of powerful upwelling are considered unfavourable spawning habitats, with pelagic fish species reported as spawning on either side of the LUCORC area, but not within it (see Figure 7-12). The area is characterised by diminished phytoplankton biomass due to high turbulence and deep mixing in the water column. A deficiency of phytoplankton in turn results in poor feeding conditions for micro-, meso- and macrozooplankton and for ichthyoplankton (Lett *et al.*, 2007). Phytoplankton, zooplankton and ichthyoplankton abundances in the licence blocks are thus expected to be low.

Vertical plankton hauls undertaken in Block 2913B, however, identified that a wide diversity of copepods (39 different species) dominated the zooplankton, contributing 88.5% to the zooplankton captured, followed by Ostracods (2.6%) and Amphipods (2.3%). Chaetognathes (1.84%), Ophiuroid larvae (1.24%) and Cnidaria (0.31%) were also present with decapods, mysids, euphausiids, ctenophores, molluscs, polychaetes and chordates also represented (Benthic Solutions, 2019).

7.3.5 Cephalopods

The major cephalopod resource in the southern Benguela is cuttlefish with up to 14 species being recorded (Lipinski, 1992; Augustyn *et al.*, 1995). Most of the cephalopod resource is distributed on the mid-shelf with *Sepia australis* being most abundant at depths between 60 - 190 m, whereas *S. hieronis* densities were higher at depths between 110 - 250 m. *Rossia enigmatica* occurs more commonly on the edge of the shelf to depths of 500 m. Biomass of these species was generally higher in the summer than in winter. Cuttlefish are largely epibenthic and occur on mud and fine sediments in association with their major prey item; mantis shrimps (Augustyn *et al.*, 1995). They form an important food item for demersal fish.

Pelagic invertebrates that may be encountered in the licence area are the colossal squid, *Mesonychoteuthis hamiltoni*, and the giant squid, *Architeuthis sp.* Both are deep dwelling species, with the colossal squid's distribution confined to the entire circum-Antarctic Southern Ocean (see Figure 7-13), while the giant squid is usually found near continental and island slopes all around the world's oceans (see Figure 7-14). Both species could thus potentially occur in the licence area, although the likelihood of encounter is extremely low. Growing to in excess of 10 m in length, they are the principal prey of the sperm whale, and are also taken by beaked whaled, pilot whales, elephant seals and sleeper sharks. Nothing is known of their vertical distribution, but data from trawled specimens and sperm whale diving behaviour suggest they may span a depth range of 300 to 1 000 m. They lack gas-filled swim bladders and maintain neutral buoyancy through an ammonium chloride solution occurring throughout their bodies.

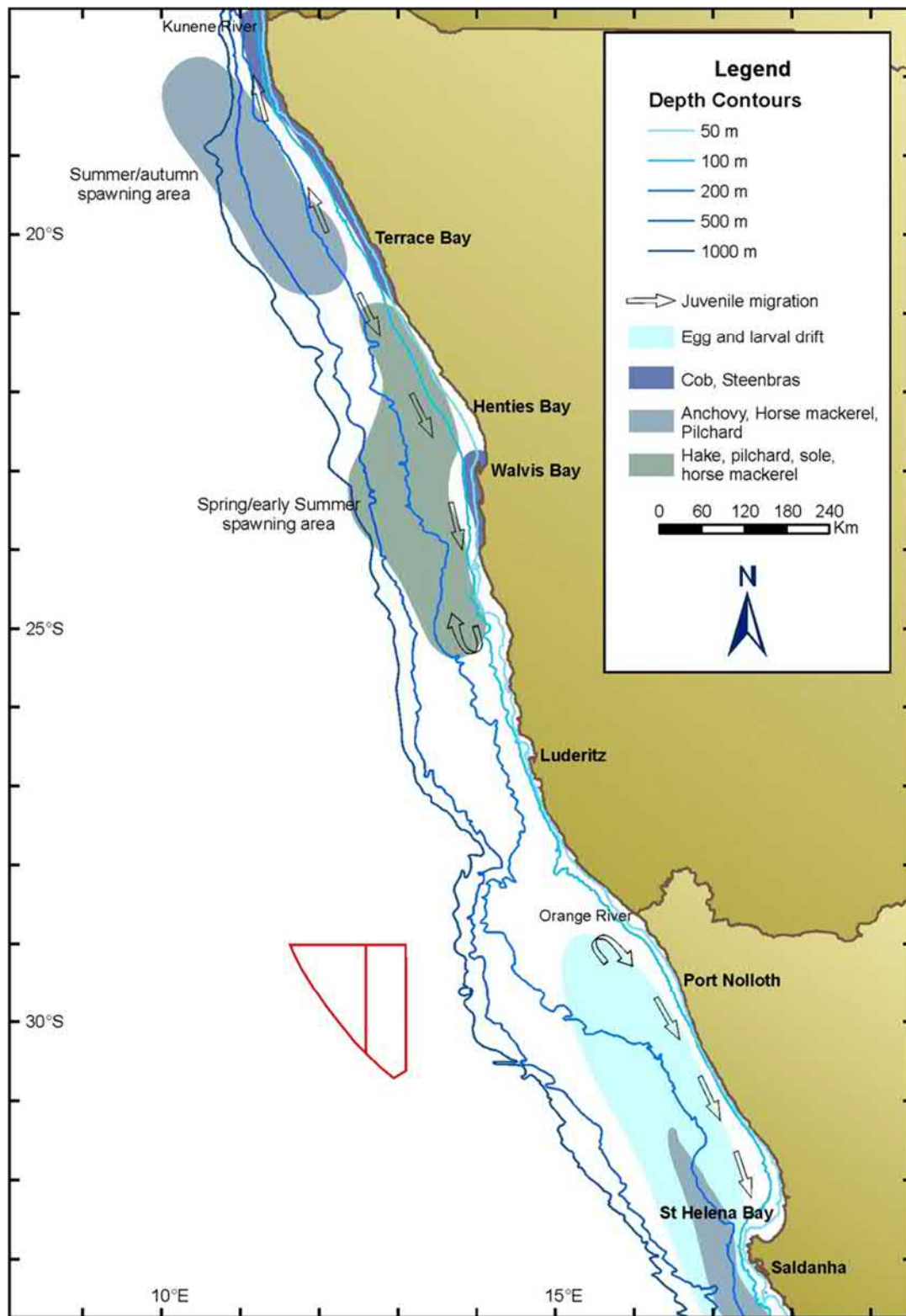


FIGURE 7-12: BLOCKS 2912 AND 2913B IN RELATION TO MAJOR PELAGIC FISH SPAWNING AREAS IN THE CENTRAL AND SOUTHERN BENGUELA REGION

Source: adapted from Cruikshank, 1990; Hampton, 1992



FIGURE 7-13: DISTRIBUTION OF THE COLOSSAL SQUID. KEY: BLUE <5 OBSERVATIONS

Source: <http://iobis.org>

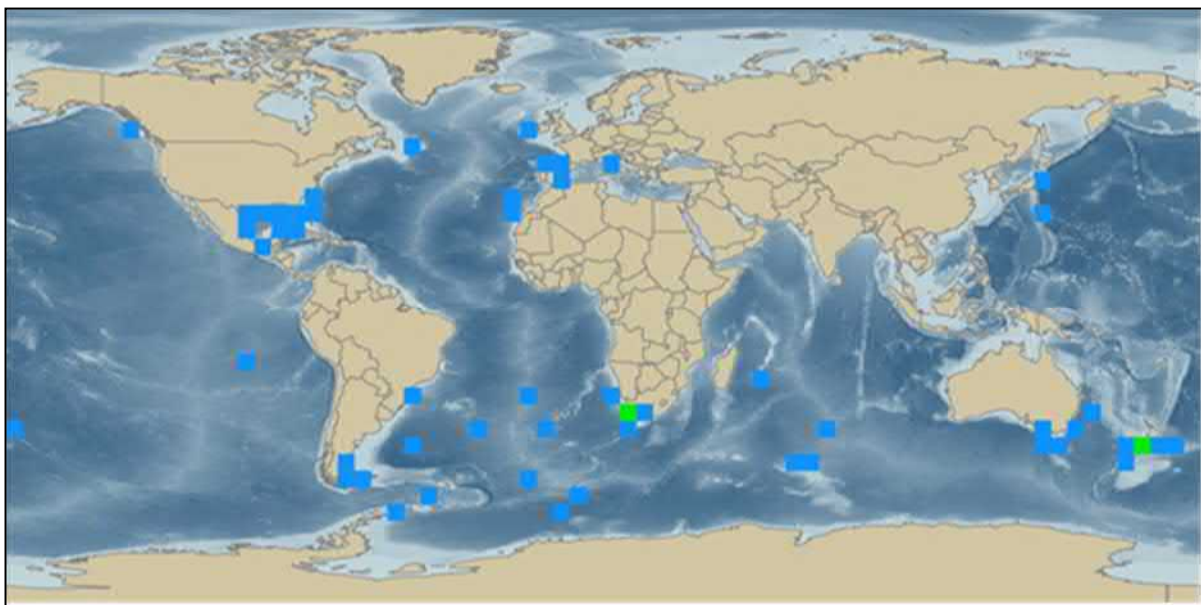


FIGURE 7-14: DISTRIBUTION OF THE GIANT SQUID. KEY: BLUE <5 OBSERVATIONS; GREEN 6-10 OBSERVATIONS

Source: <http://iobis.org>

7.3.6 Fish

Due to the cold temperate nature of the region, the fish fauna off the Namibian coast is characterised by a relatively low diversity of species compared with warmer oceans. However, the upwelling nature of the region results in huge biomasses of specific species that supports a commercially important fishery (Hampton, 2001; Hampton *et al.*, 1998).

Marine fish species can generally be divided in three categories, namely pelagic (species associated with water column), demersal (species associated with the substratum) or meso-pelagic (species associated with both the seafloor and the pelagic environment).

7.3.6.1 Pelagic fish

Pelagic fish species include two major groups, the planktivorous clupeid-like fishes (e.g. anchovy or pilchard) and piscivorous predatory fish (e.g. snoek).

Planktivorous shoaling fish

Three commercially important clupeoids (shoaling / schooling fish) are found within the Benguela system. These are the anchovy (*Engraulis capensis*), the South African pilchard (*Sardinops ocellatus*) and the round herring (*Etrumeus whiteheadi*). These species typically occur in mixed shoals of various sizes (Crawford *et al.*, 1987) and generally occur within the 200 m contour. They are thus unlikely to be encountered in the licence blocks.

Two distinct populations of pilchard and anchovy inhabit the northern and southern Benguela systems. The northern population centres in the area between the Kunene River and Lüderitz, while southern populations are focused to the south of the Orange River (Boyd & Cruikshank, 1983; Hewitson & Cruikshank, 1993; Crawford, 1991; Crawford, 1989). Both populations of each species are known to demonstrate spatial segregation of different life stages (Crawford, 1989; Hewitson & Cruikshank, 1993). The northern population nursery grounds are located off Walvis Bay. Recruitment to the fishery occurs in this region between March and August, where after a northward migration of juveniles starts. When upwelling in the Lüderitz cell is weak, larvae and pre-recruits from the southern stock may move into the northern population. The southern populations of both species consist of juvenile fish which aggregate in the nursery area between St Helena Bay and the Orange River mouth. Adult anchovy spawn on the Agulhas Bank between October and January. Spawning in pilchard occurs over a longer period with maximal egg abundance from late October to early April.

Round herring (*Etrumeus whiteheadi*) occur over the continental shelf mainly to the south of the Orange River in the southern Benguela system (Roel & Armstrong, 1991). This species does not form a dominant fishery although small catches are made off the Namibian coast each year. Recruitment occurs along the South African West Coast from April to September, where the species often occurs together with juvenile anchovy, pilchard and horse mackerel. A general southward migration occurs at the end of winter. Spawning occurs offshore along the West Coast of South Africa and southern Namibia as far north as Lüderitz with an onshore movement of eggs and larvae. A second spawning ground occurs off the shelf break in northern Namibia (Roel & Armstrong, 1991).

Piscivorous predators

Snoek (*Thyrustes atun*) are found off Namibia between September and March, where after individuals move southwards as far as the Western Cape of South Africa by August (Crawford *et al.*, 1987; Crawford, 1989). The return migration commences between August and October and occurs further offshore than do the southerly movements. The movements of this species correlate with distribution patterns of major prey species, including sardinellas off northern Namibia and juvenile anchovy and pilchard in the southern Benguela system. Spawning occurs off the coast between St Helena Bay and the Cape Peninsula from July to October. The movements of chub mackerel (*Scomber japonicus*) are very similar to those of snoek and appear to be related to the presence of prey (Crawford *et al.*, 1987; Crawford, 1989). Chub mackerel are most abundant in the northern Benguela in

spring and summer, migrating southward to occur south of the Orange River in winter to mid spring. They move inshore in June and July to spawn before starting the return migration northwards offshore later in the year.

The fish most likely to be encountered on the shelf, beyond the shelf break and in the offshore waters of Blocks 2912 and 2013B are the large migratory pelagic species, including various tunas, billfish and sharks, many of which are considered threatened by the International Union for the Conservation of Nature (IUCN), primarily due to overfishing (see Table 7-2). Tuna species are usually distributed offshore near the thermal front (at the shelf break). Their offshore distribution is also related to the presence of shoaling pelagic fish species (e.g. pilchard, anchovy and round herring). Many of these tuna species are found along the whole of the southern African West Coast, although no tuna populations are permanently resident within the Benguela system, and no tuna species spawn within it. Tuna are classified as highly migratory species and the many stocks of these species are a shared resource between the coastal states on both sides of the South Atlantic.

The big-eye tuna (*Thunnus obesus*) and the longfin tuna (*Thunnus alalunga*) are the two most common tuna species caught in Namibian waters (Lehmensiek, 1995). Longfin tuna or Albacore have a wide distribution in the south Atlantic Ocean and migrate annually through their distribution range between 10°S and 40°S (Penney *et al.*, 1992). The Namibian coast boasts one of the highest adult abundances of this species recorded globally (Yang & Sun, 1983).

Most spawning takes place in the tropical South Atlantic east of Brazil, and small Albacore are present throughout the year in the Benguela region (Nepgen, 1970). Adult abundances in the region peak in autumn and winter. Concentrations of Albacore are usually associated with hydrological features occurring at the shelf breaks or underwater features such as canyons and seamounts, and most tuna caught in the region are found in the vicinity of the Tripp Seamount, approximately 85 km east of the licence blocks.

TABLE 7-2: IMPORTANT LARGE MIGRATORY PELAGIC FISH LIKELY TO OCCUR IN THE OFFSHORE WATERS AROUND BLOCKS 2912 AND 2913B

Common Name	Species	IUCN Conservation Status
Tunas		
Southern Bluefin Tuna	<i>Thunnus maccoyii</i>	Critically Endangered
Bigeeye Tuna	<i>Thunnus obesus</i>	Vulnerable
Longfin Tuna/Albacore	<i>Thunnus alalunga</i>	Near Threatened
Yellowfin Tuna	<i>Thunnus albacares</i>	Near Threatened
Frigate Tuna	<i>Auxis thazard</i>	Least concern
Eastern Little Tuna	<i>Euthynnus affinis</i>	Least concern
Skipjack Tuna	<i>Katsuwonus pelamis</i>	Least concern
Billfish		
Blue Marlin	<i>Makaira nigricans</i>	Vulnerable
Striped Marlin	<i>Kajikia audax</i>	Near Threatened
Sailfish	<i>Istiophorus platypterus</i>	Least concern
Swordfish	<i>Xiphias gladius</i>	Least concern
Black Marlin	<i>Istiompax indica</i>	Data deficient
Pelagic Sharks		
Oceanic Whitetip Shark	<i>Carcharhinus longimanus</i>	Vulnerable
Dusky Shark	<i>Carcharhinus obscurus</i>	Vulnerable

Common Name	Species	IUCN Conservation Status
Great White Shark	<i>Carcharodon carcharias</i>	Vulnerable
Shortfin Mako	<i>Isurus oxyrinchus</i>	Endangered
Longfin Mako	<i>Isurus paucus</i>	Vulnerable
Whale Shark	<i>Rhincodon typus</i>	Endangered
Blue Shark	<i>Prionace glauca</i>	Near Threatened

7.3.6.2 Demersal fish

Changes in fish communities occur with increasing depth (Roel, 1987; Smale *et al.*, 1993; Macpherson & Gordo, 1992; Bianchi *et al.*, 2001; Atkinson, 2009), with the most substantial change in species composition occurring in the shelf break region between 300 m and 400 m depth (Roel, 1987; Atkinson, 2009).

Three species of hake occur in Namibian offshore waters. Shallow-water Cape hake (*Merluccius capensis*) ranges from southern Angola round the Agulhas Bank, while deep-water Cape hake (*M. paradoxus*) has a similar long-shore distribution in deeper waters (Crawford *et al.*, 1987; Payne, 1989). Benguela hake (*M. polli*) is limited to Angolan waters and waters of northern Namibia.

Deep-water hakes are most abundant along the edge of the continental shelf between 300 and 500 m depth and at distances of 80 to 120 km from the coast. In contrast shallow-water hake occur primarily close inshore at bottom depths of 100 to 300 m, with densest abundances occurring between 40 and 80 km from the coast. Shallow-water Cape hake are the most common of the three species occurring off Namibia, although both shallow-water and deep-water hake are fished commercially (Van der Westhuizen, 2001).

Vertical migration off the ocean bottom at night has been noted for both commercial species of hake (Payne, 1989). Shallow-water hake spawn over large areas off the Namibian coast, but there is currently no evidence of spawning deep-water hake in Namibian waters (Crawford *et al.*, 1987). Although the main area of shallow-water hake recruitment occurs in the central region at depths of 100 to 250 m between 20°S and 24°S, the area offshore to the north-west of Lüderitz (26°30'S) is also an important recruitment zone. Deep-water hake recruit further offshore between Lüderitz and the Orange River at depths of between 150 and 300 m. Hake are known to be pelagic during the first year of life, and inhabit the mid-water and upper layers in the shallower waters nearer to the coast. Immature shallow-water hake occur over the entire coastal shelf usually at depths shallower than 150 m. In contrast, immature deep-water hake are found mainly south of the Lüderitz upwelling cell at depths ranging between 200 and 300 m. Hake migrate offshore into deeper water during their second year and settle close to the bottom west of the 150 m isobath where they become more typically demersal in habit.

Two species of monkfish (*Lophius vomerinus* and *L. vaillanti*) are found in Namibian waters, although only *L. vomerinus* is recorded south of Walvis Bay (Maartens & Booth, 2001). *L. vomerinus* is found at depths of between 150 and 500 m but occurs at high abundance between 300 and 400 m off central and southern Namibia (Maartens & Booth, 2001; Leslie & Grant, 1990). Spawning is irregular and variable and is thought to occur throughout the year (Macpherson, 1985) with two separate areas of recruitment recorded between the 100 m and 300 m isobaths off Walvis Bay and Lüderitz (Leslie and Grant 1990).

Two distinct stocks of West Coast Sole (*Austroglossus microlepis*) exist along the Namibian coast. The northern most stock is centred in the region of 20°S - 25°S (i.e. the Walvis Bay basin) in water depths of 75 to 300 m, while the southern stock occurs off the mouth of the Orange River (28°-30° S) in water depths of 50 to 100 m. Both stocks spawn between September and December, with slightly earlier spawning occurring in the southern stock.

Kingklip (*Genypterus capensis*) have a wide distribution and occur between northern Namibia and the Eastern Cape, South Africa. Depth distribution is size dependent, with larger fish found offshore. Water temperature also appears to play an important role in distribution. Spawning is believed to occur off the southern African West Coast and off Namibia to the north of Lüderitz between August and October. This species is often in association with rocky substrata.

7.3.6.3 Meso-pelagic fish

Meso-pelagic fish are typified by extensive vertical migration. At night they rise into the epipelagic zone while by day they occur in bottom waters.

While juvenile horse mackerel is pelagic, adults are meso-pelagic. Two species of horse mackerel, the Cape horse mackerel (*Trachurus capensis*) and the Cunene horse mackerel (*T. trecae*) are found within the Benguela system. There are believed to be two stocks of Cape horse mackerel; one each off the South African Western Cape and Namibia (Crawford *et al.*, 1987). Spawning grounds occur off the Western Cape and off the shelf edge of northern Namibia, while nursery grounds occur over the continental shelf between the Western Cape and the Orange River Mouth and to the north of Walvis Bay off Namibia.

The bearded or pelagic goby (*Sufflogobius bibartus*) occurs in inshore waters off the southern African coast to the south of Walvis Bay, with a distributional break between Lüderitz and the Orange River. Spawning occurs between spring and early summer between Walvis Bay and Lüderitz. While juveniles live in the epipelagic zone, adults occur in deeper waters, but do not form large schools like pilchard and anchovy. As pelagic goby feeds on similar plankton to pilchard, the collapse of the pilchard stock resulted in marked increases of pelagic goby in the late 1970's and early 1980's.

7.3.7 Seabirds

The Namibian coastline sustains large populations of breeding and foraging seabird and shorebird species, which require suitable foraging and breeding habitats for their survival. In total, 12 species of seabirds are known to breed along the southern Namibian coast, both on oceanic islands and in mainland colonies (see Table 7-3). Most seabirds breeding in Namibia are restricted to areas where they are safe from land predators, although some species are able to breed on the mainland coast in inaccessible places. In general, most breed on islands or on the man-made guano platforms in Walvis Bay, Swakopmund and Cape Cross, well to the north of Blocks 2912 and 2913B. The islands along the Namibian coast, therefore, provide a vital breeding habitat to most species of seabirds that breed in Namibia. However, the number of successfully breeding birds at the particular breeding sites varies with food abundance (J. Kemper, MFMR Lüderitz, *pers. comm.*). With the exception of the Kelp Gulls and White-breasted Cormorants all the breeding species are listed Red Data species in Namibia.

TABLE 7-3: NAMIBIAN BREEDING SEABIRD SPECIES

Species	Namibian	Global IUCN
African Penguin <i>Spheniscus demersus</i>	Endangered	Endangered
Bank Cormorant <i>Phalacrocorax neglectus</i>	Endangered	Endangered
Cape Cormorant <i>Phalacrocorax capensis</i>	Endangered	Endangered
Cape Gannet <i>Morus capensis</i>	Critically Endangered	Endangered
Crowned Cormorant <i>Phalacrocorax coronatus</i>	Near Threatened	Near Threatened
African Black Oystercatcher <i>Haematopus moquini</i>	Near Threatened	Near Threatened
White-breasted cormorant <i>Phalacrocorax carbo</i>	Least Concern	Least Concern
Kelp Gull <i>Larus dominicanus</i>	Least Concern	Least Concern
Hartlaub's Gull <i>Larus hartlaubii</i>	Vulnerable	Least Concern
Sabine's Gull <i>Xema sabini</i>	Not listed	Least Concern
Swift Tern <i>Sterna bergii bergii</i>	Vulnerable	Least Concern
Damara Tern <i>Sterna balaenarum</i>	Near Threatened	Vulnerable

Note: Species recorded by Marine Mammal Observers (MMOs) en route to Block 2913B are highlighted (Benthic Solutions, 2019a, 2019b).

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

Most of the seabird species breeding in Namibia feed relatively close inshore (10-30 km). Cape gannets, however, are known to forage up to 140 km offshore (Dundee, 2006; Ludynia, 2007) and African penguins have also been recorded as far as 60 km offshore. As the licence blocks is approximately 240 km offshore at its closest point, encounters with Cape gannets during the proposed seismic survey is highly unlikely.

Among the other species present off Namibia's southern coast there are nine species of albatrosses, petrels or giant-petrels recorded (Boyer and Boyer, 2015). However, population numbers are poorly known and they do not breed in Namibian waters. Forty-nine species of pelagic seabirds have been recorded in the region, of which 14 are resident. Highest pelagic seabird densities occur offshore of the shelf-break in winter. Pelagic seabirds potentially encountered in Blocks 2912 and 2913B, and encountered en route and within Block 2913B (Benthic Solutions, 2019a, 2019b) are provided in Table 7-4.

TABLE 7-4: OTHER NAMIBIAN RED-LISTED BIRD SPECIES

Species	Namibian	Global IUCN
Tristan Albatross <i>Diomedea dabbenena</i>	Critically Endangered	Critically Endangered
Atlantic Yellow-nosed Albatross <i>Thalassarche chlororhynchos</i>	Endangered	Endangered
Black-browed Albatross <i>Thalassarche melanophrys</i>	Endangered	Least Concern
Wandering Albatross <i>Diomedea exulans</i>	Vulnerable	Vulnerable
Shy Albatross <i>Thalassarche cauta</i>	Near Threatened	Near Threatened
White-capped Albatross <i>Thalassarche snedi</i>	Near Threatened	Near Threatened
Spectacled Petrel <i>Procellaria conspicillata</i>	Vulnerable	Vulnerable
Northern Giant-Petrel <i>Macronectes halli</i>	Near Threatened	Least Concern
Pintado Petrel <i>Daption capense</i>	Not listed	Least Concern
Kerguelen Petrel <i>Lugensa brevirostris</i>	Not listed	Least Concern
Great-winged Petrel <i>Pterodroma macroptera</i>	Not listed	Least Concern
Soft-plumaged Petrel <i>Pterodroma mollis</i>	Not listed	Least Concern

Species	Namibian	Global IUCN
White-chinned Petrel <i>Procellaria aequinoctialis</i>	Vulnerable	Vulnerable
Leach's Storm-Petrel <i>Oceanodroma leucorhoa</i>	Not listed	Vulnerable
Wilson's Storm-Petrel <i>Oceanites oceanicus</i>	Not listed	Least Concern
European Storm-Petrel <i>Hydrobates pelagicus</i>	Not listed	Least Concern
Arctic Tern <i>Sterna paradisaea</i>	Not listed	Least Concern
Caspian Tern <i>Sterna caspia</i>	Vulnerable	Least Concern
Grey Phalarope <i>Phalaropus fulicarius</i>	Not listed	Least Concern
Sub-Antarctic Skua <i>Catharacta antarctica</i>	Not listed	Least Concern
Pomarine Skua <i>Stercorarius pomarinus</i>	Not listed	Least Concern
Long-Tailed Skua <i>Stercorarius longicaudus</i>	Not listed	Least Concern
Sooty Shearwater <i>Puffinus griseus</i>	Near Threatened	Near Threatened
Cory's Shearwater <i>Calonectris diomedea</i>	Not listed	Least Concern
Manx Shearwater <i>Puffinus puffinus</i>	Not listed	Least Concern
Great Shearwater <i>Puffinus gravis</i>	Not listed	Least Concern

Notes: Species recorded by Marine Mammal Observers (MMOs) en route to Block 2913B are highlighted (Benthic Solutions, 2019a, 2019b).

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

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

7.3.8 Turtles

Five of the eight species of turtle worldwide occur off Namibia (Bianchi *et al.*, 1999). Leatherback turtles (*Dermochelys coriacea*) are occasionally sighted off central and southern Namibia. Observations of Green (*Chelonia mydas*), Loggerhead (*Caretta caretta*), Hawksbill (*Eretmochelys imbricata*) and Olive Ridley (*Lepidochelys olivacea*) turtles in the area are rare. Although not reported in the MMOs reports for Block 2913B (Benthic Solutions, 2019a, 2019b), loggerhead turtles have been reported by MMOs during seismic operations in an adjacent licence area (PEL83). The leatherback turtle may also be encountered in the offshore waters of southern Namibia, although abundance in the study area is expected to be low.

The Benguela ecosystem, especially the northern Benguela where jelly fish numbers are high, is increasingly being recognised as a potentially important feeding area for leatherback turtles from several globally significant nesting populations in the south Atlantic (Gabon, Brazil) and south east Indian Ocean (South Africa) (Lambardi *et al.*, 2008, Elwen & Leeney, 2011; SASTN, 2011³). Leatherback turtles from the east South Africa population have been satellite tracked swimming around the West Coast of South Africa into central and southern Namibian waters and remaining in the warmer waters west of the Benguela ecosystem (Lambardi *et al.*, 2008) (see Figure 7-15).

Leatherback, Loggerhead and Olive Ridley turtles are listed as "Vulnerable" worldwide by the International Union for Conservation of Nature (IUCN) and are in the highest categories in terms of need for conservation in the Convention on International Trade in Endangered Species (CITES) and Convention on Migratory Species (CMS).

³ SASTN Meeting – Second meeting of the South Atlantic Sea Turtle Network, Swakopmund, Namibia, 24-30 July 2011.

Hawksbill and Green turtles are listed as “Critically Endangered” and “Endangered”, respectively. Namibia is, thus, committed to conserve these species at an international level.

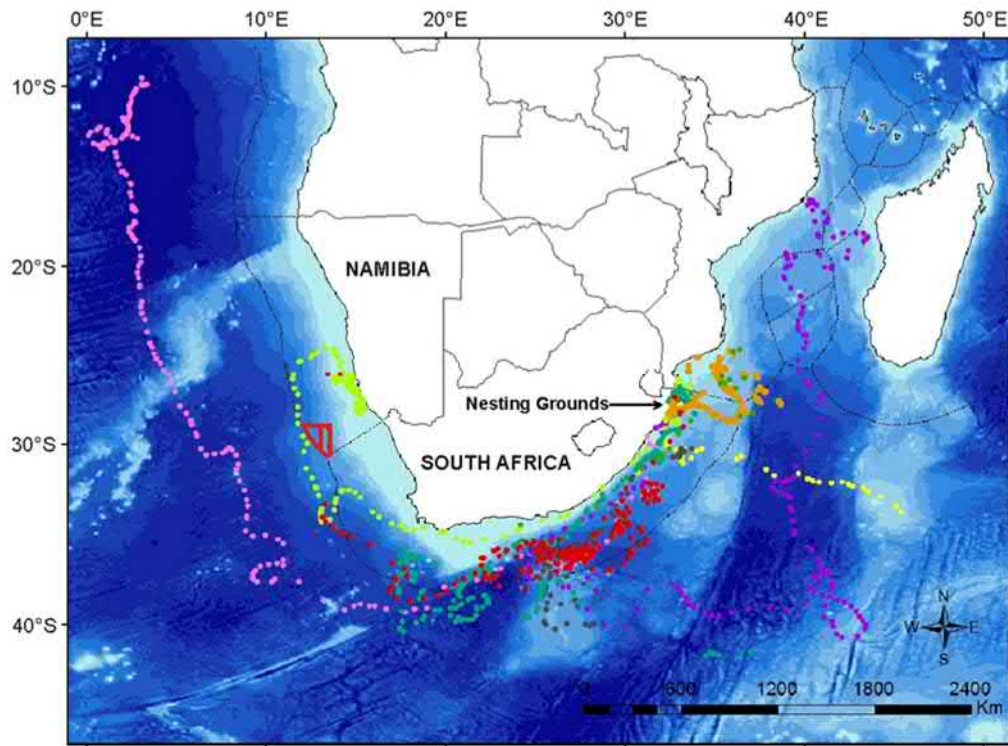


FIGURE 7-15: BLOCKS 2912 AND 2913B IN RELATION TO THE POST-NESTING DISTRIBUTION OF NINE SATELLITE TAGGED LEATHERBACK FEMALES

Source: 1996 – 2006; Oceans and Coast, unpublished data

7.3.9 Marine Mammals

The marine mammal fauna occurring off the central Benguela ecosystem coast includes several species of whales and dolphins and one resident seal species.

7.3.9.1 Cetaceans

Thirty-three species of whales and dolphins are known or likely to occur in central Benguela region and in the offshore waters of the licence area (see Table 7-5). Apart from the resident species such as the endemic Heaviside’s, bottlenose and dusky dolphins, the Namibian waters also host species that migrate between Antarctic feeding grounds and warmer breeding ground waters, as well as species with a global distribution.

TABLE 7-5: LIST OF CETACEAN SPECIES KNOWN OR LIKELY TO OCCUR IN NAMIBIAN WATERS

Common Name	Species	Shelf	Offshore	Seasonality	IUCN Conservation Status
<i>Delphinids</i>					
Dusky dolphin	<i>Lagenorhynchus obscurus</i>	Yes (0- 800 m)	No	Year round	Data Deficient
Heaviside's dolphin	<i>Cephalorhynchus heavisidii</i>	Yes (0-200 m)	No	Year round	Least Concern
Common bottlenose dolphin	<i>Tursiops truncatus</i>	Yes	Yes	Year round	Least Concern
Common (short beaked) dolphin	<i>Delphinus delphis</i>	Yes	Yes	Year round	Least Concern
Southern right whale dolphin	<i>Lissodelphis peronii</i>	Yes	Yes	Year round	Least Concern
Pantropical spotted dolphin	<i>Stenella attenuata</i>	Edge	Yes	Year round	Least Concern
Striped dolphin	<i>Stenella coeruleoalba</i>	No	Yes	Year round	Least Concern
Long-finned pilot whale	<i>Globicephala melas</i>	Edge	Yes	Year round	Least Concern
Short-finned pilot whale	<i>Globicephala macrorhynchus</i>	No	Yes	Year round	Least Concern
Rough-toothed dolphin	<i>Steno bredanensis</i>	No	Yes	Year round	Least Concern
Killer whale	<i>Orcinus orca</i>	Yes	Yes	Year round	Data Deficient
False killer whale	<i>Pseudorca crassidens</i>	Occasional	Yes	Year round	Least Concern
Pygmy killer whale	<i>Feresa attenuata</i>	Occasional	Yes	Year round	Least Concern
Risso's dolphin	<i>Grampus griseus</i>	Yes (edge)	Yes	?	Least Concern
<i>Sperm whales</i>					
Pygmy sperm whale	<i>Kogia breviceps</i>	Edge	Yes	Year round	Data Deficient
Dwarf sperm whale	<i>Kogia sima</i>	Edge	?	?	Data Deficient
Sperm whale	<i>Physeter macrocephalus</i>	Edge	Yes	Year round	Vulnerable

Common Name	Species	Shelf	Offshore	Seasonality	IUCN Conservation Status
Beaked whales					
Cuvier's	<i>Ziphius cavirostris</i>	No	Yes	Year round	Data Deficient
Arnoux's	<i>Beradius arnouxii</i>	No	Yes	Year round	Data Deficient
Southern bottlenose	<i>Hyperoodon planifrons</i>	No	Yes	Year round	Least Concern
Layard's	<i>Mesoplodon layardii</i>	No	Yes	Year round	Data Deficient
True's	<i>M. mirus</i>	No	Yes	Year round	Data Deficient
Gray's	<i>M. grayi</i>	No	Yes	Year round	Data Deficient
Blainville's	<i>M. densirostris</i>	No	Yes	Year round	Data Deficient
Baleen whales					
Antarctic Minke	<i>Balaenoptera bonaerensis</i>	Yes	Yes	Higher in Winter	Least Concern
Dwarf minke	<i>B. acutorostrata</i>	Yes	Yes	Year round	Least Concern
Fin whale	<i>B. physalus</i>	Yes	Yes	MJJ & ON, rarely in summer	Endangered
Blue whale	<i>B. musculus</i>	No	Yes	Higher in MJJ	Critically Endangered
Sei whale	<i>B. borealis</i>	Edge	Yes	MJ & ASO	Endangered
Bryde's (offshore)	<i>B. brydei</i>	Yes	Yes	Higher in Summer (JFM)	Not assessed
Bryde's (inshore)	<i>B. brydei (subsp)</i>	Yes	Yes	Year round	Vulnerable
Pygmy right	<i>Caperea marginata</i>	Yes	?	Year round	Data Deficient
Humpback	<i>Megaptera novaeangliae</i>	Yes	Yes	Year round, higher in JJASON	Vulnerable
Southern right	<i>Eubalaena australis</i>	Yes	No	Year round, higher in JASON	Least Concern

Notes: Species recorded by Marine Mammal Observers (MMOs) en route to Block 2913B are highlighted (Benthic Solutions, 2019a, 2019b).

Source: IUCN Conservation Status is based on the SA Red List Assessment (2014) (Child *et al.*, 2016).

Although the location of Blocks 2912 and 2913B can be considered to be truly within the Benguela Ecosystem, the warmer waters that occur more than 100 km offshore provide an entirely different habitat, that despite the relatively high latitude, may host some species associated with the more tropical and temperate parts of the Atlantic such as rough toothed dolphins, striped dolphins, Pan-tropical spotted dolphins and short finned pilot whales.

The distribution of cetaceans in Namibian waters can largely be split into those associated with the continental shelf and those that occur in deep, oceanic water. Importantly, species from both environments may be found in the continental slope (200 to 2 000 m) making this the most species-rich area for cetaceans. Cetacean density on the continental shelf is usually higher than in pelagic waters, as species associated with the pelagic environment tend to be wide ranging across thousands of kilometres. The most common species within the broader project area (in terms of likely encounter rate not total population sizes) are likely to be the humpback whale and pilot whale.

Cetaceans can be divided into two major groups, the mysticetes or baleen whales which are largely migratory, and the toothed whales or odontocetes which may be resident or migratory.

Mysticetes

The majority of mysticetes whales fall into the family Balaenopeteridae. Those occurring in the study area include the blue, fin, sei, Antarctic minke, dwarf minke, humpback, southern right, pygmy right and Bryde's whales. The majority of these species occur in pelagic waters with only occasional visits to shelf waters (<200 m deep). All of these species show some degree of migration either to, or through, the latitudes encompassed by the licence blocks when *en route* between higher latitude (Antarctic or Subantarctic) feeding grounds and lower latitude breeding grounds. Depending on the ultimate location of these feeding and breeding grounds, seasonality in Namibian waters can be either unimodal, usually in winter months, or bimodal (e.g. May-July and October-November) reflecting a northward and southward migration through the area. Northward and southward migrations may take place at different distances from the coast due to whales following geographic or oceanographic features, thereby influencing the seasonality of occurrence at different locations. Due to the complexities of the migration patterns, each species is discussed separately below. A best estimate of expected seasonality within the broader project area is provided in Table 7-6.

TABLE 7-6: SEASONALITY OF BALEEN WHALES IN THE LICENCE AREA

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

Note: Values of High (H), Medium (M) and Low (L) are relative within each row (species) and not comparable between species.

- **Blue whales (*Balaenoptera musculus*):** Blue whales were historically caught in high numbers during commercial whaling activities, with a single peak in catch rates during June to July in Walvis Bay, Namibia and at Namibe, Angola suggesting that in the eastern South Atlantic these latitudes are close to the northern migration limit for the species (Best, 2007). Evidence of blue whale presence off Namibia is rapidly increasing. Recent acoustic detections of blue whales in northern Namibia between May and July (Thomisch, 2017) and several recent (2014-2015) sightings during seismic surveys in southern Namibian in water >1 000 m deep confirm their current existence in the area and occurrence in autumn months. Encounters in the project area may occur.
- **Fin whales (*Balaenoptera physalus*):** Fin whales were historically caught off the West Coast of Namibia and South Africa. A bimodal peak in the catch data from South Africa suggests animals were migrating further north to breed (during May-June) before returning to Antarctic feeding grounds (during August-October). However, the location of the breeding ground (if any) and how far north it is remains a mystery (Best, 2007). Some juvenile animals may feed year round in deeper waters off the shelf (Best, 2007). Four strandings have occurred between Walvis Bay and the Kunene River, Namibia in the last decade during January, April (2) and October (NDP unpubl. data). Groups of 5-8 animals have been seen on multiple occasions on the coast either side of Lüderitz in April, May of 2014 and January 2015 (NDP unpubl. data) confirming their contemporary occurrence in Namibian waters and potential use of the upwelling areas for feeding. To date, most sightings or strandings have occurred in late summer (April-May), supporting evidence from whaling data that this is a peak time of occurrence in southern Namibia. Five sightings of Bryde's whales were made en route to and within Block 2913B in late 2018 and early 2019 (Benthic Solutions Ltd 2019a, 2019b). Encounters in the licence area are thus likely occur.
- **Sei whales (*Balaenoptera borealis*):** There is very little information on Sei whales in Namibian waters and most information on the species from the southern African sub-region originates from whaling data from 1958-1963. Sei whales spend time at high altitudes (40-50°S) during summer months and migrate north through South African waters to unknown breeding grounds further north (Best, 2007). Since whaling catches were confirmed off both Congo and Angola, it is possible they migrate through Namibian waters. Due to their migration pattern, densities in the licence area are likely to show a bimodal peak with numbers predicted to be highest in May and June, and again in August, September and October. All whales were historically caught in waters deeper than 200 m with most catches from deeper than 1 000 m (Best & Lockyer, 2002). Importantly, there may be considerable variation in the number of sei whales within an area between years, which may be influenced by food availability in feeding areas. There is no current information on the abundance or distribution of this species in the region, but a recent sighting of sei whales in March 2012 (NDP unpublished data) and a live stranding in July 2013 in Walvis Bay confirms their contemporary occurrence in Namibian shelf waters and beyond. Encounters in the licence blocks are likely to occur.
- **Bryde's whale (*Balaenoptera edeni*):** Two genetically and morphologically distinct populations of Bryde's whales live off the coast of southern Africa (Best, 2001; Penry, 2010). The "offshore population" lives beyond the shelf (> 200 m depth) off West Africa and migrates between wintering grounds off equatorial West Africa (Gabon) and summering grounds off western South Africa. Its seasonality within Namibian waters is thus opposite to the majority of the balaenopterids with abundance likely to be highest in the broader potential impact zone in January - March. Several strandings of adult offshore Bryde's whales in January 2012 and November 2017 near Walvis Bay confirms the population's current occurrence in Namibia. The "inshore population" of Bryde's whales is unique amongst baleen whales in the region by

being non-migratory. It lives on the continental shelf and Agulhas Bank of South Africa ranging from approximately Durban in the east to at least St Helena Bay off the West Coast. It may move further north into the Benguela current areas off the West Coast of South Africa and Namibia, especially in the winter months (Best, 2007). A live stranding of a calf of this population near Walvis Bay confirms the current occurrence of this population in Namibian waters. An additional live sighting in the Namibian Islands marine Protected Area (MPA) and a third stranding of a Bryde's whale adult in April 2013 has not yet been assigned to population but supports regular, year round occurrence of the species in the northern Benguela ecosystem (NDP unpubl. data). Three sightings of Bryde's whales were made en route to and within Block 2913B in early 2019 (Benthic Solutions, 2019b). Encounters in the licence area are thus likely to occur.

- **Minke whales (*Balaenoptera bonaerensis* / *acutorostrata*):** Two forms of minke whale occur in the Southern Hemisphere, the Antarctic minke whale and the dwarf minke whale; both species occur in the Benguela region (Best, 2007; NDP, unpubl. data). Antarctic minke whales range from the pack ice of Antarctica to tropical waters and are usually seen more than approximately 50 km offshore. Although adults of the species migrate from the southern ocean (summer) to tropical/temperate waters (winter) where they are thought to breed, some animals, especially juveniles, are known to stay in tropical/temperate waters year round. Regular sightings of semi-resident Antarctic minke whales in Lüderitz Bay, especially in summer months (December - March) and a stranding of a single animal in Walvis Bay (in February 2014) confirm the contemporary occurrence of the species in Namibia (NDP, unpubl. data). Recent data available from passive acoustic monitoring over a two-year period off the Walvis Ridge shows acoustic presence in June - August and November - December (Thomisch *et al.*, 2016). The dwarf minke whale has a more temperate distribution than the Antarctic minke and they do not range further south than 60-65°S. Dwarf minke whales have a similar migration pattern to Antarctic minkes with at least some animals migrating to the southern ocean in summer months. Around southern Africa, dwarf minke whales occur closer to shore than Antarctic minkes and have been seen <2 km from shore on several occasions around South Africa. Both species are generally solitary and densities are likely to be low in the broader project area, but encounters may occur.
- **Pygmy right whale (*Caperea marginata*):** The pygmy right whale is the smallest of the baleen whales reaching only 6 m total length as an adult (Best, 2007). The species is typically associated with cool temperate waters between 30°S and 55°S and in Namibia there are no confirmed records north of Walvis Bay.
- **Southern right (*Eubalaena australis*) and humpback (*Megaptera novaeangliae*) whales:** The most abundant baleen whales in the Benguela region are southern right and humpback whales. In the last decade, both southern right whales and humpback whales have been increasingly observed to remain on the West Coast of South Africa well after the 'traditional' South African whale season (June-November) into spring and early summer (October-February) where they have been observed feeding in upwelling zones, especially off Saldanha and St Helena Bays (Barendse *et al.*, 2011; Mate *et al.*, 2011). Increasing numbers of summer records of both species, suggest that animals may also be feeding in upwelling areas off Namibia, especially the southern half of the country near the Lüderitz upwelling cell (NDP unpubl. data) and will, therefore, occur in or pass through the project area.

The southern African population of southern right whales historically extended from southern Mozambique (Maputo Bay) to southern Angola (Baie dos Tigres) and is considered to be a single population within this range (Roux *et al.*, 2011). The most recent abundance estimate for this population

is available for 2017 which estimated the population at approximately 6 100 individuals including all age and sex classes, and still growing at approximately 6.5% per annum. When the population numbers crashed, the range contracted down to just the South Coast of South Africa, but as the population recovers, it is repopulating its historic grounds, including Namibia (Roux *et al.*, 2001) and Mozambique (Banks *et al.*, 2011). Southern right whales are seen regularly in Namibian coastal waters (<3 km from shore), especially along the southern half of the Namibian coastline (Roux *et al.*, 2001, 2011). Southern right whales have been recorded in Namibian waters in all months of the year (J-P. Roux, *pers. comm.*; NDP, unpublished data) but with numbers peaking in winter (June-August). A secondary peak in summer (November-January) also occurs, associated with animals feeding off the West Coast of South Africa (and possibly Namibia) and performing exploratory trips into southern Namibia (NDP, unpublished data). Notably, all available records have been very close to shore with only a few out to 100 m depth, so they are unlikely to be encountered in Blocks 2912 and 2913B.

The majority of humpback whales passing through the Benguela region are those migrating to breeding grounds off tropical West Africa, between Angola and the Gulf of Guinea (Rosenbaum *et al.*, 2009; Barendse *et al.*, 2010). A recent synthesis of available humpback whale data from Namibia (Elwen *et al.*, 2013) shows that in coastal waters, the northward migration stream is larger than the southward peak supporting earlier observations from whale catches (Best & Allison, 2010). This supports previous suggestions that animals migrating north strike the coast at varying places mostly north of St Helena Bay (South Africa) resulting in increasing whale density on shelf waters as one moves north towards Angola. On the southward migration, there is evidence from satellite tagged animals and the smaller secondary peak in numbers in Walvis Bay, that many humpback whales follow the Walvis Ridge offshore then head directly to high latitude feeding grounds, while others follow a more coastal route (including the majority of mother-calf pairs) possibly lingering in the feeding grounds off the West Coast of South Africa in summer (Elwen *et al.*, 2013; Rosenbaum *et al.*, 2014). Although migrating through the Benguela, there is no existing evidence of a clear 'corridor' and humpback whales appear to be spread out widely across the shelf and into deeper pelagic waters, especially during the southward migration (Barendse *et al.*, 2010; Best and Allison, 2010; Elwen *et al.*, 2013). Regular sightings of humpback whales in spring and summer months in Namibia, especially in the Lüderitz area, suggest that summer feeding is occurring in Namibian waters as well (or at least that animals foraging off West South Africa range up into southern Namibia). Recent abundance estimates put the number of animals in the west African breeding population in excess of 9 000 individuals in 2005 (IWC, 2012), and it is likely to have increased since this time at about 5% per annum (IWC, 2012). Humpback whales are thus likely to be the most frequently encountered baleen whale in in Blocks 2912 and 2913B, ranging from the coast out beyond the shelf, with year round presence but numbers peaking in June – July (northern migration) and a smaller peak with the southern breeding migration around September – October, but with regular encounters until February associated with subsequent feeding in the Benguela ecosystem.

Odontocetes

The majority of toothed whales and dolphins have more resident distribution patterns, rather than migratory. Those occurring in the study area are listed in Table 7-5 and discussed below.

- Killer whales (*Orcinus orca*) have a circumglobal distribution being found in all oceans from the equator to the ice edge (Best, 2007). Killer whales occur year round in low densities off western South Africa (Best *et*

al., 2010), Namibia (Elwen & Leeney, 2011) and in the Eastern Tropical Atlantic (Weir *et al.*, 2010). Killer whales are found in all depths from the coast to deep open ocean environments and may thus be encountered in the licence blocks at low levels.

- The false killer whale (*Pseudorca crassidens*) has a tropical to temperate distribution and most sightings off southern Africa have occurred in water deeper than 1 000 m, although a few observations have also been made close to shore (Findlay *et al.*, 1992). False killer whales usually occur in groups ranging in size from 1 - 100 animals (mean 20.2) (Best, 2007), and are thus likely to be fairly easily seen in most weather conditions. However, the strong bonds and matrilineal social structure of this species makes it vulnerable to mass stranding (8 instances of 4 or more animals stranding together have occurred in the Western Cape, all between St Helena Bay and Cape Agulhas). There is no information on population numbers or conservation status and no evidence of seasonality in the region (Best, 2007).
- Long-finned (*Globicephala melas*) and short-finned pilot whales: These whales display a preference for temperate waters and are usually associated with the continental shelf or deep water adjacent to it (Mate *et al.*, 2005; Findlay *et al.*, 1992, Weir, 2011). They are regularly seen associated with the shelf edge by Marine Mammal Observers, fisheries observers and researchers operating in Namibian waters (NDP, unpublished data). The distinction between long-finned and short-finned (*G. macrorhynchus*) pilot whales is difficult to make at sea. Short finned pilot whales are regarded as more tropical species (Best, 2007), it is likely that the vast majority of pilot whales encountered in the Namibian waters are long-finned. Due to the low latitude and offshore nature of the project, it is likely that either could be encountered. This is confirmed by the sighting of two short-finned pilot whales en route to Block 2913B in late 2018 (Benthic Solutions, 2019a).
- Sperm whales (*Physeter macrocephalus*): 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 live in deep ocean waters, usually greater than 1 000 m depth, although they occasionally come into waters 500 to 200 m deep on the shelf (Best, 2007). They are relatively abundant globally (Whitehead, 2002), although no estimates are available for Namibian waters. Seasonality of catches off west South Africa suggests that medium and large sized males are more abundant in winter months, while female groups are more abundant in autumn (March-April), although animals occur year round (Best, 2007). Sperm whales were one of the most frequently seen cetacean species during a series of observations made from offshore seismic survey vessels operating in tropical West Africa between Angola and the Gulf of Guinea (Weir, 2011). Multiple sightings of sperm whales have been recorded by during seismic surveys operating around Tripp Seamount in the last decade (NDP Unpublished data, De Rock *et al.*, in review). Sperm whales feed at great depths during dives in excess of 30 minutes making them difficult to detect visually. However, the regular echolocation clicks made by the species when diving make them relatively easy to detect acoustically using Passive Acoustic Monitoring (PAM). Sperm whales in the project area are likely to be encountered in deeper waters (>500 m), predominantly in the winter months (April - October). This is confirmed by the sighting / detection of two sperm whales en route to Block 2913B in April 2019 (Benthic Solutions, 2019b).
- Dwarf (*Kogia sima*) and pygmy (*K. breviceps*) sperm whales: The genus *Kogia* currently contains two recognised species, the dwarf and pygmy sperm whales. There are >30 records of *K. breviceps* collected along the Namibian coastline with a peak in strandings in June and August. A single account of *K. sima* collected in Walvis Bay in 2010, demonstrates that this species also occurs in Namibian waters (Elwen *et al.*, 2014) and as a warm-water specialist is likely to occur within the project area.

- Dusky dolphin (*Lagenorhynchus obscurus*): Dusky dolphins are likely to be the most frequently encountered small cetacean in water less than 500 m deep. The dusky dolphin is resident year round throughout the Benguela ecosystem in waters from the coast to at least 500 m deep, but may occur as far as 2 000 m depth (Findlay *et al.*, 1992). Although no information is available on the size of the population, they are regularly encountered in near shore waters off South Africa and Lüderitz, although encounters nearshore are rare along the central and southern Namibian coast (Walvis Bay area), with most records coming from beyond 5 nm from the coast (Elwen *et al.* 2010a; NDP unpubl. data). In a recent survey of the Namibian Islands MPA (between latitudes of 24°29' S and 27°57' S and depths of 30-200 m) dusky dolphin were the most commonly detected cetacean species with group sizes ranging from 1 to 70 individuals (NDP unpubl. data), although group sizes up to 800 have been reported in southern African waters (Findlay *et al.* 1992). Four sightings of dusky dolphins were made during the two trips to Block 2913B in late 2018 and early 2019 (Benthis Solutions, 2019a, 2019b). However, due to the offshore location of Blocks 2012 and 2913B, encounters within the project area are unlikely.
- Heaviside's dolphin (*Cephalorhynchus heavisidii*): Heaviside's dolphins are relatively abundant in both the southern and northern Benguela ecosystem within the region of 10 000 animals estimated to live in the 400 km of coast between Cape Town and Lamberts Bay (Elwen *et al.* 2009a) and several hundred animals living in the areas around Walvis Bay and Lüderitz. Heaviside's dolphins are resident year-round. This species occupies waters from the coast to at least 200 m depth (Elwen *et al.*, 2006; Best, 2007) and may show a diurnal onshore-offshore movement pattern feeding offshore at night, although this varies throughout the range. This species occupies waters from the coast to at least 200 m depth (Elwen *et al.*, 2006; Best, 2007; Elwen *et al.*, 2010). All sightings made during the two trips to Block 2913B in late 2018 and early 2019 (Benthis Solutions, 2019a, 2019b) occurred closer inshore suggesting they are unlikely to be encountered in the project area.
- Common dolphin (*Delphinus spp*): The common dolphin is known to occur offshore in Namibian waters (Findlay *et al.* 1992). A stranding in Lüderitz (May 2012, NDP unpublished data) and MMO reports have confirmed their occurrence in the region. They are more frequently seen in the warmer waters offshore and to the north of the country, and all sightings to date have been in water deeper than 500 m. There is no evidence of seasonality. Although not reported in the MMOs reports for Block 2913B (Benthis Solutions, 2019a, 2019b), common dolphins have been reported by MMOs during seismic operations in an adjacent licence area (PEL83). Thus, encounters in the licence area may occur.
- Southern right whale dolphins (*Lissodelphis peronii*): The cold waters of the Benguela provide a northwards extension of the normally Subantarctic habitat of this species (Best, 2007). Most records in the region originate in a relatively restricted region between 26°S and 30°S roughly between Lüderitz and Tripp Seamount in water 100-2 000 m deep (Rose & Payne, 1991; Best, 2007; NDP Unpublished data). There has been a recent live stranding of two individuals in Lüderitz Bay in December 2013. They are often seen in mixed species groups with other dolphins such as dusky dolphins. This small area where they are seen overlaps with the broader project area. It is possible that the Namibian sightings represent a regionally unique and resident population (Findlay *et al.*, 1992). Encounter rates in the broader project area are likely to be low.
- Common bottlenose dolphin (*Tursiops truncatus*): Common bottlenose dolphins are widely distributed in tropical and temperate waters throughout the world, but frequently occur in small (10s to low 100s) isolated coastal populations. Within Namibian waters two populations of bottlenose dolphins occur. A small population inhabits the very nearshore coastal waters (mostly <15 m deep) of the central and

southern Namibian coastline from approximately Lüderitz in the south to at least Cape Cross in the north. The population is thought to number less than 100 individuals (Elwen *et al.*, 2011), but its nearshore habitat makes it unlikely to be impacted by the proposed seismic activities. An offshore 'form' of common bottlenose dolphins occurs around the coast of southern Africa including Namibia and Angola (Best 2007) with sightings restricted to the continental shelf edge and deeper. Offshore bottlenose dolphins frequently form mixed species groups, often with pilot whales or Risso's dolphins.

- Other Delphinids: Several other species of dolphins that might occur in the deeper waters of broader project area at low levels include the pygmy killer whale, Risso's dolphin, rough toothed dolphin, pantropical spotted dolphin and striped dolphin (Findlay *et al.*, 1992; Best, 2007). Although nothing is known about the population size or density of these species in the broader project area, it is likely that encounters would be rare.
- Beaked Whales (Various Species) - Beaked whales are all considered to be true deep-water species, usually recorded in waters in excess of 1 000 – 2 000 m (Best, 2007) and thus may be encountered in the project area. Beaked whales seem to be particularly susceptible to man-made sounds and several strandings and deaths at sea, often *en masse*, have been recorded in association with naval mid-frequency sonar (Cox *et al.*, 2006; MacLeod & D'Amico, 2006) and a seismic survey for hydrocarbons also running a multi-beam echo-sounder and sub bottom profiler (Cox *et al.*, 2006). Although the exact reason that beaked whales seem particularly vulnerable to man-made noise is not yet fully understood, the existing evidence clearly shows that animals change their dive behaviour in response to acoustic disturbance (Tyack *et al.*, 2011), and all possible precautions should be taken to avoid causing any harm. Sightings of beaked whales in the project area are expected to be very low.

7.3.9.2 Pinnipeds

The Cape fur seal (*Arctocephalus pusillus pusillus*) is the only species of seal resident along the West Coast of Africa. Vagrant records from four other species of seal more usually associated with the Subantarctic environment have also been recorded: southern elephant seal (*Mirounga leoninas*), subantarctic fur seal (*Arctocephalus tropicalis*), crabeater (*Lobodon carcinophagus*) and leopard seals (*Hydrurga leptonyx*) (David, 1989).

Currently, half the Namibian seal population occurs in southern Namibia, south of Lüderitz and approximately 300 km northeast of Blocks 2912 and 2913B. It consists of about 300 000 seals, producing roughly 100 000 pups per year. Atlas Bay, Wolf Bay and Long Islands (near Lüderitz) together represent the largest breeding concentration (about 68 000 pups) of seals in Namibia. The colonies closest to Blocks 2912 and 2913B are at Van Reenen Bay and Baker's Bay approximately 280 km inshore and to the northeast of the north-eastern corner of the Blocks, in the Tsau//Khaeb-Sperrgebiet National Park (see Figure 7-16).

There is a controlled annual quota, determined by government policy, for the harvesting of Cape fur seals on the Namibian coastline. The Total Allowable Catch (TAC) currently stands at 60 000 pups and 5 000 bulls, distributed among four licence holders. The seals are exploited mainly for their pelts (pups), blubber and genitalia (bulls) (Molloy & Reinikainen, 2003).

Seals are highly mobile animals with a general foraging area covering the continental shelf up to 120 nm (approximately 220 km) offshore (Shaughnessy 1979), with bulls ranging further out to sea than females. Seals were regularly sighted by MMOs during seismic surveying in the adjacent licence area (PEL83), inshore and

adjacent to Blocks 2912 and 2913B, but no seals were reported from Block 2913B (Benthic Solutions, 2019a, 2019b), although they were encountered en route.

The timing of the annual breeding cycle is very regular occurring between November and January. Breeding success is highly dependent on the local abundance of food, territorial bulls and lactating females being most vulnerable to local fluctuations as they feed in the vicinity of the colonies prior to and after the pupping season (Oosthuizen 1991).

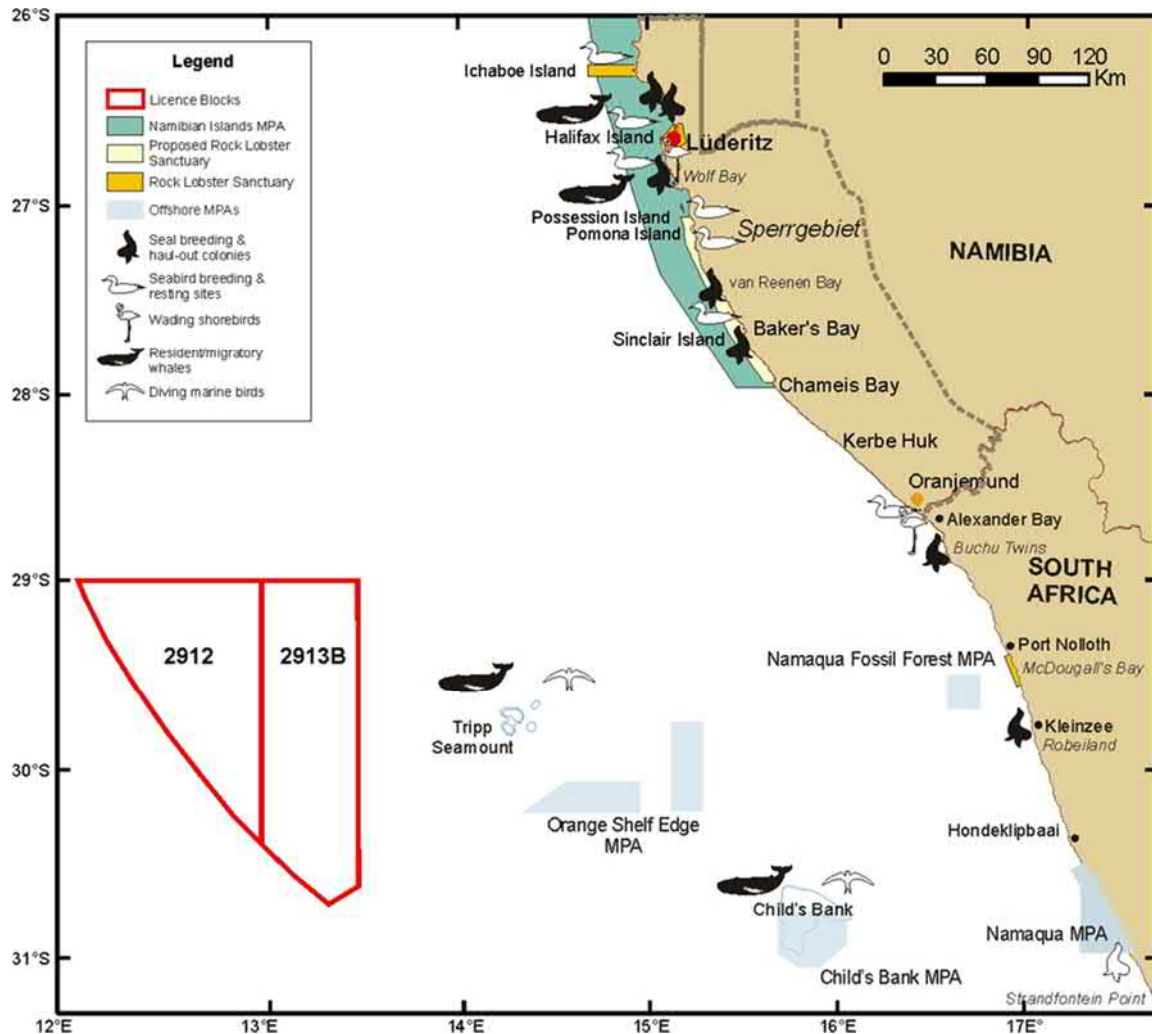


FIGURE 7-16: BLOCKS 2912 AND 2913B IN RELATION TO BIODIVERSITY SENSITIVITIES ALONG THE NAMIBIAN COAST

Source: Pisces

7.4 CONSERVATION AREAS AND MARINE PROTECTED AREAS

Inshore of Blocks 2912 and 2913B, the coastline of Namibia is part of a continuum of protected areas that stretch along the entire Namibian coastline, a distance of about 1 570 km, from Southern Angola into Namaqualand in South Africa. Recently proclaimed as the Namib-Skeleton Coast National Park, it incorporates four terrestrial Management Areas, namely the Skeleton Coast National Park, the Dorob National Park, the Namib-Naukluft National Park and the Tsau//Khaeb-Sperrgebiet National Park (see Figure 7-16). The central and southern components of the **Namib-Skeleton Coast National Park** are described briefly below:

- The Namib-Naukluft National Park has an area of 49 800 km² and encompasses part of the Namib Desert, the Naukluft mountain range, Sandwich Harbour and Sossusvlei, which is a main visitor attraction in Namibia.
- The Sperrgebiet was proclaimed in 1908 to prevent public access to the rich surface diamond deposits occurring in the area, and has largely remained closed off to general public access since then. It extends between latitude 26° in the north and the Orange River in the south, extending inland from the coast for 100 km, covering an area of approximately 22 000 km². As diamond mining has remained confined to the narrow coastal strip and along the banks of the Orange River and around Elizabeth Bay, most the area has effectively been preserved as a pristine wilderness. Large parts of the Sperrgebiet have since been de-proclaimed from exclusive prospecting and mining licences, and reverted to unproclaimed State land. Consequently, the Tsau//Khaeb-Sperrgebiet National Park was proclaimed in 2008. The park has been zoned in accordance with IUCN guidelines for Protected Area Management Categories. Management and tourism plans for the park are at an advanced stage of development.

All three of the designated coastal **Ramsar sites** in Namibia fall within the broader project area and are described briefly below.

- The Walvis Bay Wetland is one of the most important coastal wetlands in Southern Africa. As the largest single area of shallow sheltered water along the Namibian coastline, it encompasses the lagoon, mudflats and sandbars, Paaltjies beach on the Pelican Point peninsula, the Walvis Bay saltworks, and sand dunes and gravel fields extending to the boundary of the Namib-Naukluft Park (Barnard 1998; www.nacoma.org.na). The estimated total area for these wetlands is 35 - 40 km². It supports up to 250 000 birds at peak times during the summer season and about 80 000 to 100 000 birds during winter. The wetland serves primarily as a dry-season and drought refuge for intra-African migrants and as a non-breeding area for Palearctic migrants. Key species are Greater and Lesser Flamingos, Chestnut-banded Plover, Black-necked Grebe and the African Black Oystercatcher (www.nacoma.org.na, www.nnf.org.na/CTEN). Eleven endangered bird species are regularly observed (http://www.ramsar.org/profile/profiles_namibia.htm).
- Sandwich Harbour, located 55 km south of Walvis Bay, is one of southern Africa's richest and most unique coastal wetlands. Situated within the Namib-Naukluft Park, the area consists of two distinct parts. Firstly, a northern saltmarsh and adjoining intertidal sand flat area (5 km x 300 m), which supports emergent freshwater vegetation (37 species) and 4 000 – 5 500 wetlands birds. The more extensive (40 km²) southern area of unvegetated tidal mudflats and raised shingle bars supports up to 175 000 birds, mainly waders, terns, pelicans and flamingos. Although the area is not directly associated with a river, water from an inland aquifer seeps into the northern portion of Sandwich Harbour, filling the lagoon and sustaining freshwater vegetation at the base of the dunes. Thirty-six species of fish and eight Namibian Red Data bird species can be found at Sandwich Harbour. The wetland and shallow lagoon is protected from the open ocean by a sand barrier thus supporting an extremely rich avifauna including eight endangered species among the large numbers of waders, terns, pelicans and flamingos. Bird numbers are reported to reach maximum concentrations of 238 000 birds, with Palearctic waders reaching densities of 7 800 birds per km². Several archaeological sites dating back 1 000 years also exist within the area (Barnard, 1998).

- The Orange River Mouth is an important staging area for Palaearctic migrants. On the South African side, the Orange River Mouth received its Ramsar status on 28 June 1991. The Namibian side was declared a Ramsar wetland on 23 August 1995. Processes are underway to declare a jointly-managed transboundary Ramsar reserve. The Orange River Mouth is regarded as one of the most important coastal wetlands in southern Africa in terms of the number of birds supported, at times supporting more than 20 000 water birds of between 50 and 57 species. It is consequentially also recognised as an Important Bird Area (SA030).

Of the 19 Important Bird Areas (IBAs) designated by BirdLife International in Namibia, those located along the southern Namibian coastline are listed in Table 7-7.

TABLE 7-7: LIST OF IMPORTANT BIRD AREAS (IBAS) AND THEIR CRITERIA LISTINGS

Site Name	IBA Criteria
Ichaboe Island	A1, A4i, A4ii, A4iii
Lüderitz Bay islands	A1, A4i, A4iii
Possession Island	A1, A4i, A4ii, A4iii
Sperrgebiet	A1, A2, A3, A4i

Key: A1. Globally threatened species; A2. Restricted-range species; A3. Biome-restricted species; A4. Congregations.

Various marine IBAs have also been proposed in Namibian territorial waters, with a candidate trans-boundary marine IBA suggested off the Orange River mouth (see Figure 7-17). Blocks 2912 and 2913B lie offshore of these marine IBAs.

The first Namibian **Marine Protected Area (MPA)**, the Namibian Islands' Marine Protected Area (NIMPA), was launched on 2 July 2009 under the Namibian Marine Resources Act (No. 29 of 1992 and No. 27 of 2000), with the purpose of protecting sensitive ecosystems and breeding and foraging areas for seabirds and marine mammals, as well as protecting important spawning and nursery grounds for fish and other marine resources (such as rock lobster). NIMPA comprises a coastal strip extending from Hollamsbird Island (24°38'S) in the north, to Chameis Bay (27°57'S) in the south, spanning approximately three degrees of latitude and an average width of 30 km, including 16 specified offshore islands, islets and rocks (Currie *et al.*, 2009). The NIMPA spans an area of 9 555 km² and includes a proposed rock-lobster sanctuary constituting 478 km² between Chameis Bay and Prince of Wales Bay (27°05'S). The offshore islands, whose combined surface area amounts to only 2.35 km² have been given priority conservation and highest protection status (Currie *et al.* 2009). The area has been further zoned into four degrees of incremental protection. These are detailed in Currie *et al.* (2009). The NIMPA lies inshore and north-eastwards of the licence blocks, with the closest point (southern boundary of the NIMPA) being over 225 km away (see Figure 7-16).

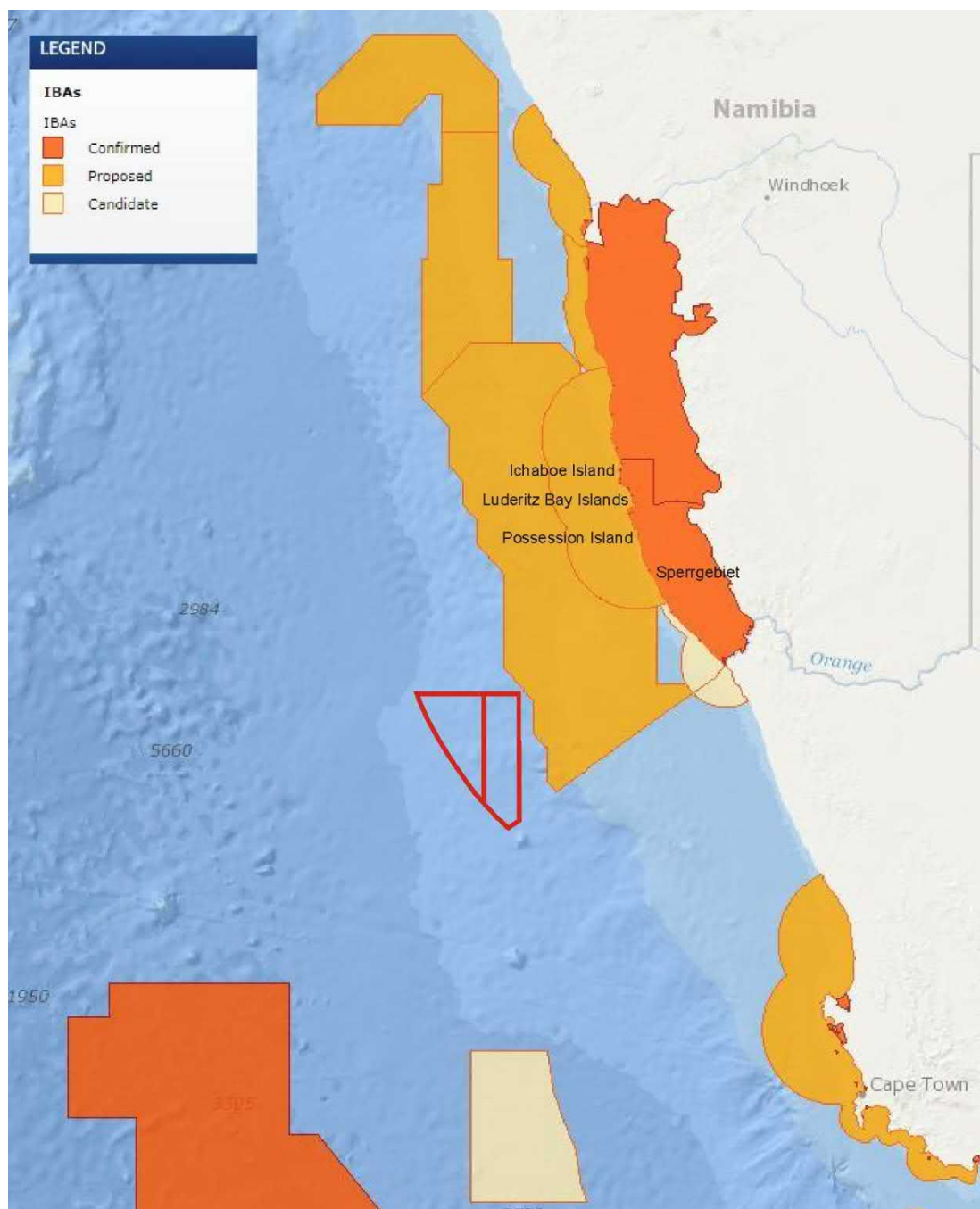


FIGURE 7-17: BLOCKS 2912 AND 2913B IN RELATION TO COASTAL AND MARINE IBAS IN NAMIBIA

Source: <https://maps.birdlife.org/marineIBAs>

In the spatial marine biodiversity assessment undertaken for Namibia (Holness *et al.* 2014), a number of offshore and coastal area were identified as being of high priority for place-based conservation measures. To this end, **Ecologically or Biologically Significant Areas (EBSA)** spanning the coastline between Angola and South Africa were proposed and inscribed under the Convention of Biological Diversity (CBD). The principal objective of the EBSAs is identification of features of higher ecological value that may require enhanced conservation and management measures. Although no specific management actions have as yet been formulated for the EBSAs, two biodiversity zones have recently been defined within each EBSA as part of the marine spatial planning process (see Figure 7-18) (<https://cmr.mandela.ac.za/EBSA-Portal/Namibia/Namibian->

EBSA-Status-Assessment-Management). The management objective in the zones marked for 'Conservation' is *"strict place-based biodiversity protection aimed at securing key biodiversity features in a natural or semi-natural state, or as near to this state as possible"*. The management objective in the zones marked for 'Impact Management' is *"management of impacts on key biodiversity features in a mixed-use area to keep key biodiversity features in at least a functional state"*.

Although there is no overlap of Blocks 2912 and 2913B with any of these EBSAs, the EBSAs in the project area are presented in Figure 7-18 and described briefly below:

- The Namibian Islands are located offshore of the central / southern Namibian coastline and within the intensive Lüderitz upwelling cell. These islands and their surrounding waters are significant for life history stages of threatened seabird species as they serve as crucial seabird breeding sites within the existing NIMPA. The surrounding waters are also key foraging grounds for both seabirds and for "Critically Endangered" leatherback turtles that nest along the north-eastern coast of South Africa. This EBSA lies well inshore of the lice blocks.
- The Orange Seamount and Canyon Complex, occurs at the western continental margin of southern Africa, spanning the border between South Africa and Namibia. On the Namibian side, it includes Tripp Seamount and a shelf-indenting canyon. The EBSA comprises shelf and shelf-edge habitat with hard and unconsolidated substrates, including at least eleven offshore benthic habitat types of which four habitat types are "Threatened", one is "Critically Endangered" and one "Endangered". The Orange Shelf Edge EBSA is one of few places where these threatened habitat types are in relatively natural/pristine condition. The local habitat heterogeneity is also thought to contribute to the Orange Shelf Edge being a persistent hotspot of species richness for demersal fish species. Although focussed primarily on the conservation of benthic biodiversity and threatened benthic habitats, the EBSA also considers the pelagic habitat, which is characterized by medium productivity, cold to moderate Atlantic temperatures and moderate chlorophyll levels related to the eastern limit of the Benguela upwelling on the outer shelf. Blocks 2912 and 2913B lie west of this EBSA.
- The Orange Cone is a transboundary EBSA that spans the mouth of the Orange River. The estuary is biodiversity-rich but modified, and the coastal area includes many "Critically Endangered", "Endangered", and "Vulnerable" habitat types (with the area being particularly important for the Critically Endangered Namaqua Sandy Inshore, Namaqua Inshore Reef and Hard Grounds and Namaqua Intermediate and Reflective Sandy Beach habitat types). The marine environment experiences slow, but variable currents and weaker winds, making it potentially favourable for reproduction of pelagic species. An ecological dependence for of river outflow for fish recruitment on the inshore Orange Cone is also likely. This EBSA lies well inshore of the lice blocks.
- The Benguela Upwelling System EBSA is a transboundary EBSA is globally unique as the only cold-water upwelling system to be bounded in the north and south by warm-water current systems and is characterised by very high primary production. It includes important spawning and nursery areas for fish as well as foraging areas for threatened vertebrates, such as sea- and shorebirds, turtles, sharks, and marine mammals. Another key characteristic feature is the diatomaceous mud-belt in the northern Benguela, which supports regionally unique low-oxygen benthic communities that depend on sulphide oxidising bacteria. Blocks 2912 and 2913B lie west of this EBSA.
- The Namaqua Fossil Forest EBSA, which lies inshore of the Deep Western Orange Basin block, is a small seabed outcrop composed of fossilized yellowwood trees at 136-140 m depth, approximately 30 km

offshore on the west coast of South Africa. A portion of the EBSA comprised the Namaqua Fossil Forest MPA. The fossilised tree trunks form outcrops of laterally extensive slabs of rock have been colonised by fragile, habitat-forming scleractinian corals and a newly described habitat-forming sponge species. The EBSA thus encompasses a unique feature with substantial structural complexity that is highly vulnerable to benthic impacts.

- The Childs Bank and Shelf Edge EBSA, which lies to the east of the Deep Western Orange Basin block, is a unique submarine bank feature rising from 400 m to -180 m on the western continental margin on South Africa. This area includes five benthic habitat types, including the bank itself, the outer shelf and the shelf edge, supporting hard and unconsolidated habitat types. Childs Bank and associated habitats are known to support structurally complex cold-water corals, hydrocorals, gorgonians and glass sponges; species that are particularly fragile, sensitive and vulnerable to disturbance, and recover slowly.
- The Namaqua Coastal Area EBSA, which lies to the east of the Deep Western Orange Basin block and encompasses the Namaqua Coastal Area MPA, is characterised by high productivity and community biomass along its shores. The area is important for several threatened ecosystem types represented there, including two ‘Endangered’ and four ‘Vulnerable’ ecosystem types, and is important for conservation of estuarine areas and coastal fish species.

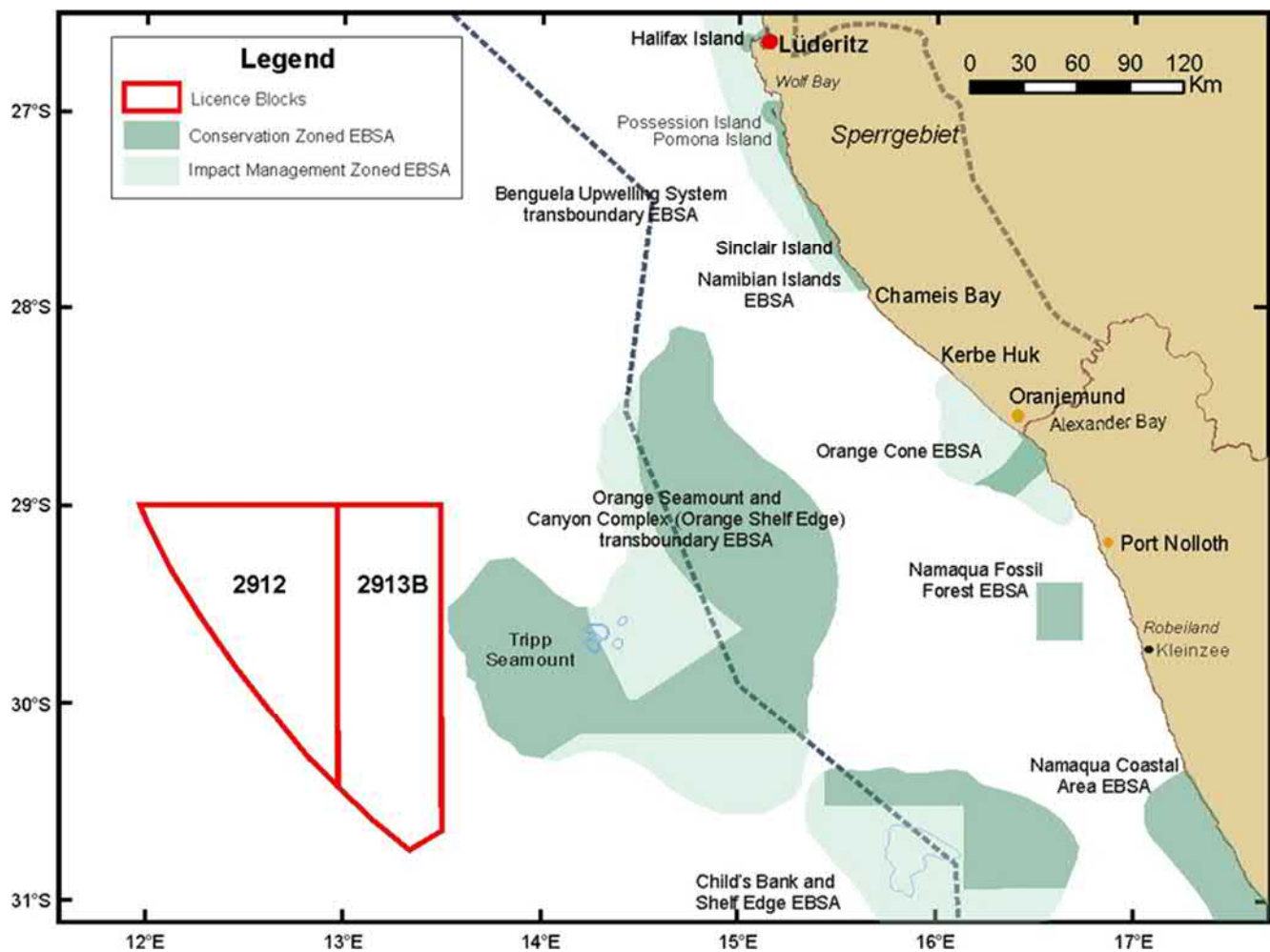


FIGURE 7-18: BLOCKS 2912 AND 2913B IN RELATION TO ECOLOGICALLY AND BIOLOGICALLY SIGNIFICANT AREAS (EBSAS) AND PROPOSED SPATIAL PLANNING ZONES

Source: Pisces

7.5 SOCIO-ECONOMIC ENVIRONMENT

This section outlines the socio-economic context within which the proposed project would occur, focusing on the towns of Lüderitz (in the !Nami-Nus Constituency, Karas Region) and Walvis Bay (in the Walvis Bay Urban Constituency, Erongo Region) (see Figure 7-19).

7.5.1 Settlement Patterns

The Namibian southern and central coastline is sparsely populated and is dominated by the Namib-Naukluft National Park, the Sperrgebiet National Park and the Namibian Islands' Marine Protected Area (see Figure 7 16).

The only appreciable settlement along the southern coastline is Lüderitz, which supports 90% of the total population of the !Nami-Nus Constituency. Lüderitz is primarily a small port town that supports the fishing and mining sectors, with the latter being a key economic sector for the town. The port is a key feature of the town with little appreciable industrial development. Much of the remaining town is comprised of residential neighbourhoods. This includes both formal housing concentrated around the port and informal or low-income settlements on the outskirts of the town.

Walvis Bay is located on the northern boundary of the Namib-Naukluft National Park and is the third largest town in Namibia (after Windhoek and Rundu). The city has Namibia's largest commercial port, which handles container imports, exports and transshipments, as well as bulk commodities. There is also notable industrial development that flanks the port operations. Walvis Bay also supports a larger and more diversified population compared to Lüderitz. It supports a quarter of the total regional population in an area of 19 km², and the city's population is entirely urbanised. This includes formalised (middle to high income) households that flank the port to the east and south, and informal or low-income neighbourhoods north and east of the port.

7.5.2 Population Demographic

7.5.2.1 Demographics

In 2011, Lüderitz Town supported a total population of 12 537 or 90% of the entire population of the !Nami-Nus Constituency (see Table 7-8). While supporting most of the local population, the town is only 15 km² in size and accounts for only 0.03% of the total area of the Constituency (48 257 km² in size). Therefore, the local population is near exclusively concentrated in the town, while much of the remaining Constituency is made up of national parks and the Namib Desert.

In 2011, Walvis Bay supported a total population of 35 828 persons (see Table 7-8) with a projected population of 44 744 persons in 2020. Walvis Bay is the third largest settlement and supports 23% of the total Erongo Region population, despite accounting for only 0.02% of the region's area. It has seen substantial growth, partly driven by the migration of rural households to urban areas, which is a common feature in Namibia.

The age and gender profile of the !Nami-Nus and Walvis Bay Urban Constituencies is presented in Table 7-9 below. The economically inactive population (persons aged below 15 years and above 65 years of age) account for 32% and 26% of the Nami-Nus and Walvis Bay Urban Constituencies, respectively, with the majority being comprised of children below the age of 15 years. The greater proportion of working age persons in Walvis Bay is suggestive of the town's inward pull of work seekers from rural households.

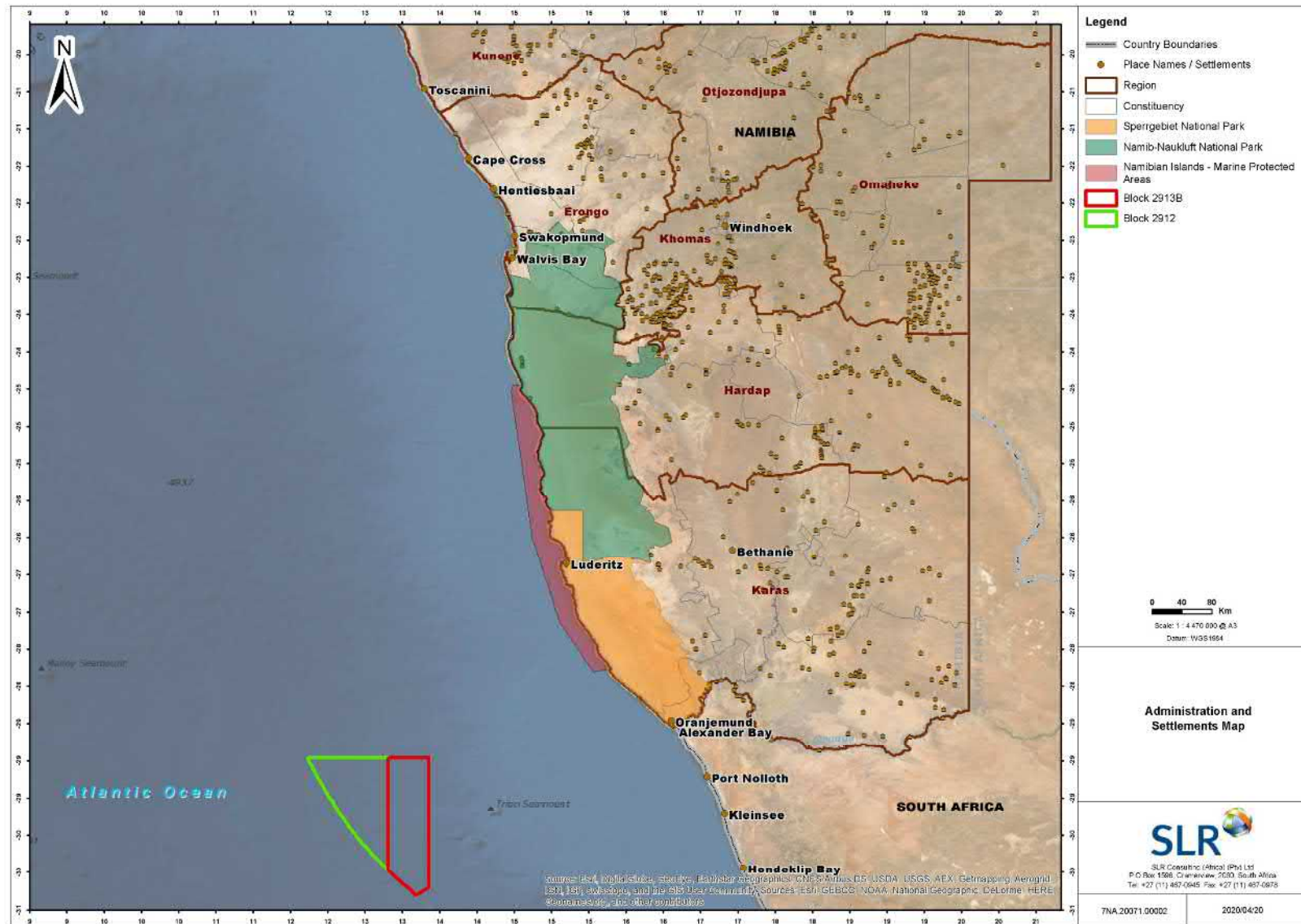


FIGURE 7-19: ADMINISTRATION AND SETTLEMENTS MAP

In general, there is a gender balance across all age groups and both constituencies. The only notable variation is the slightly higher proportion of males (between 3.8 and 4.6% more males) aged between 25 to 64 in Walvis Bay. This is again suggestive of the inward movement of work seekers, which are predominately male from rural households.

TABLE 7-8: POPULATION PROFILE

Zone	Administrative Level	Name	Total Population (2011)			Total Households
			Male	Female	Total	
Zone 1	Region	Karas	39 407	38 014	77 421	20 988
	Constituency	!Nami-Nus / Lüderitz	6 972	6 887	13 859	4 362
	Settlement	Lüderitz Town	-	-	12 537	4 179
Zone 2	Region	Erongo	79 823	70 986	150 809	44 116
	Constituency	Walvis Bay (Urban)	19 350	16 478	35 828	10 400
	Settlement	Walvis Bay City				
-	National	Namibia	1 021 912	1 091 165	2 113 077	464 839

Source: Namibian Statistics Agency, 2014

TABLE 7-9: AGE AND GENDER PROFILE

Age Group	Percent of Total Population					
	!Nami-Nus Constituency			Walvis Bay Urban Constituency		
	Male	Female	Total	Male	Female	Total
0 to 4	5.2	5.2	10.4	4.8	4.8	9.6
5 to 14	9.8	9.9	19.7	7.0	7.4	14.4
15 to 19	4.1	4.5	8.6	3.2	3.5	6.6
20 to 24	4.0	4.0	8.1	5.9	5.4	11.3
25 to 39	14.6	13.9	28.6	19.7	15.1	34.8
40 to 64	11.5	10.7	22.2	12.1	8.3	20.4
Above 65	1.2	1.3	2.5	1.2	1.7	2.9
Total	50.3	49.7	100.0	54.0	46.0	100.0

Source: Namibian Statistics Agency, 2014

7.5.2.2 Housing and Living Conditions

Both the !Nami-Nus and the Walvis Bay Urban Constituencies support a largely urbanised population, and the housing profile reflects this as indicated in Table 7-10. Most households are resident in a combination of formal free-standing houses, semi-detached houses or apartments – accounting for 58 and 64% of !Nami-Nus and the Walvis Bay Urban Constituencies, respectively.

Informal urban settlements are, however, present and improvised housing (shacks) account for 34% and 41% of all housing in the two respective constituencies. The presence of such informal settlements is largely indicative of endemic inequality found nationally, as well as patterns of increased migration of rural households to urban areas.

TABLE 7-10: HOUSING TYPE BY CONSTITUENCY

Type of Housing	Percent of Households (2011)	
	!Nami-Nus Constituency	Walvis Bay (Urban) Constituency
Detached house	40.4	43.3
Semi-Detached House	9.4	9.9
Apartment/Flat	7.7	10.4
Guest Flat	0.9	1.6
Part Commercial/Industrial	0.5	0.3
Mobile Home	0.3	0.2
Single Quarters	6.1	2.5
Traditional Dwelling	0.1	0.2
Improvised Housing Unit (Shack)	34.4	31.5
Other	0.2	0.1
Total	100	100

Source: Namibian Statistics Agency , 2014

The level of access to basic services for the !Nami-Nus and the Walvis Bay Urban Constituencies is presented in Table 7-11. Being mostly an urban population, basic services are largely provided by the State or via local municipal services with minimal dependency on natural resources.

In 2011, both Lüderitz and Walvis Bay had good access to electricity, with 76% of 99% of households in the !Nami-Nus and the Walvis Bay Urban Constituencies using electricity for lighting, respectively (see Table 7-11). There is a noted use of candles by 16% of households in Lüderitz, which is indicative of a greater proportion of poorer households without access to electrical connections or lack of funds to pay for electricity.

In 2011, both the !Nami-Nus and the Walvis Bay Urban Constituencies provided good access to piped and treated water; however, the level of access to piped water varied by neighbourhood. Walvis Bay provided a higher level of services with 72% of households having internal piped water, while 28% of households relied on water stands inside their property (see Table 7-11). Lüderitz had substantively poorer levels of services, with 38% of households having access to internal piped water, while poorer households in surrounding informal or low-income settlements relied on water stands inside their property (32%) or communal standpipes (28%).

Access to sanitation also differed between the two constituencies in 2011 (see Table 7-11). Walvis Bay was substantively more developed, with 99% of households having access to private or shared flush toilets connected to water-borne sewage. In contrast, 77% of Lüderitz had access to the same facilities, while the remaining households used shared flush toilets connected to septic tanks (5%) or had no toilet facility (10%).

In 2011, most households in Lüderitz (77% of households) and Walvis Bay (95% of households) had their domestic waste regularly collected by the municipality. The level of service in Lüderitz was, however, lower and some households had only irregular collections (5.7% of households) or rely on roadside dumping (4% of households) and burning (11% of households).

In summary, both Lüderitz and Walvis Bay are formalised urban settlements that support a largely urban population. However, Walvis Bay is substantially larger and is an officially designated city that has a more

diversified population and economy when compared to Lüderitz. Walvis Bay also has a noted upward population growth and strong economic profile in Namibia.

There is a noted divide between formalised and informal households that are present in both Lüderitz and Walvis Bay. The level of access to basic services for formalised households (i.e. comprised of middle to high-income households) is likely to be good, but highly variable for informal or low-income households.

Households located in informal settlement have relatively reduced access to sanitation, waste collection and water. The reduced level of access is particularly apparent in Lüderitz when compared to Walvis Bay. This is indicative of the relative inequality differences between the two settlements, where 7% of households in Lüderitz are considered below the poverty line compared to 2.4% of all households in Walvis Bay (see Section 7.5.4).

TABLE 7-11: BASIC SERVICES PROFILE BY CONSTITUENCY

Type of Basic Services	Percent of Households (2011)	
	!Nami-Nus Const.	Walvis Bay (Urban) Const.
Source of Energy for Cooking		
Electricity from Mains	45.9	97.3
Gas	48.8	2.3
Source of Energy for Lighting		
Electricity from Mains	76.7	99.4
Candles	16.0	0.4
Source of Domestic Water		
Piped Water Inside House	38.6	71.6
Piped Water Outside House	31.7	27.9
Public Pipe	28.8	0.1
Type of Sanitation		
Private Flush Connected to Sewer	37.7	58.7
Shared Flush Connected to Sewer	39.6	40.0
Private Flush Connected to Septic/Cesspool	0.7	0.3
Shared Flush Connected to Septic/Cesspool	5.1	0.4
Bucket Toilet	4.0	0.0
No Toilet Facility	9.5	0.1
Waste Disposal		
Regularly Collected	77.4	95.7
Irregularly Collected	5.7	4.0
Burning	1.8	0.0
Roadside Dumping	4.2	0.2
Rubbish Pit	10.7	0.1

Source: Namibian Statistics Agency, 2014

7.5.2.3 Public and Private Facilities

Both Lüderitz and Walvis Bay provide good access to public and private facilities and services (see Table 7-12).

Walvis Bay is a much larger settlement with a proportionately larger range of services, including banking, retail, public and private health facilities. Accommodation, restaurants and take-aways are numerous, as well as tourism and recreational facilities, that suggest that tourism is an important sector for Walvis Bay and there is a substantial local market for recreational activities. Most of these services and facilities are found in the residential and business areas of Walvis Bay, as well as in industrial areas that surround the Port. However, the Walvis Bay Yacht Club and various restaurants and retail shops are located within the Walvis Bay Port area.

Lüderitz has fewer public and private facilities or services (see Table 7-12). These are largely limited to accommodation, restaurants or take-aways, as well as recreational facilities. These services are likely primarily used by residents of Lüderitz, although there is provision for domestic and international tourism though accommodation (notably hotels, bed and breakfasts, back-backers etc.), as well as the expanded waterfront.

TABLE 7-12: PROFILE OF PRIVATE AND PUBLIC SERVICES AND FACILITIES

Type of Facility / Service	Number of Facilities / Services	
	Lüderitz Town	Walvis Bay Town
Accommodation & Food	24	32
Cemetery	2	2
Education	2	4
Finance	3	12
Government	0	1
Health	1	4
Motor Repair	0	4
Petrol Station	2	9
Police	0	1
Tourism and Recreation	10	40
Retail	4	7
Transport	0	1

Source: OpenStreetMap

7.5.2.4 Employment and Occupations

Namibia broadly defines all persons above the age of 15 being employable (i.e. economically active population). Of this total population, 56% and 59% were employed in 2011 in the !Nami-Nus and Walvis Bay Urban Constituencies respectively (see Table 7-13), suggesting that employment levels are largely equal in Lüderitz and Walvis Bay.

There is, however, a clear gender divide in terms of employment, with 4% and 7% fewer women being economically active in the !Nami-Nus and Walvis Bay Urban constituencies, respectively (see Table 7-13). In addition, employment rates for women is 10% and 17% lower when compared to men in the two respective areas, with an overall lower labour participation rate for women (of 14% and 25% for Lüderitz and Walvis Bay, respectively) when compared to men.

TABLE 7-13: PRIMARY OCCUPATION OF PERSONS ABOVE 15 YEARS OF AGE

Activity Status	Percent of Total Population (2011)					
	!Nami-Nus Constituency			Walvis Bay (Urban) Constituency		
	Male	Female	Total	Male	Female	Total
Economically Active	80.2	76.5	78.3	84.4	77.9	81.4
Employed	61.0	51.4	56.2	67.8	50.3	59.6
Unemployed	19.2	25.1	22.1	16.6	27.6	21.8
Economically Inactive	14.0	14.9	14.5	10.2	17.8	13.8
Student	6.9	7.5	7.2	6.0	7.9	6.9
Homemaker	0.3	1.9	1.1	0.2	3.7	1.8
Income Recipient	0.2	0.3	0.2	0.5	0.4	0.4
Retired Pensioner	0.8	0.8	0.8	1.4	1.8	1.6
Old Age Pensioner	2.6	3.7	3.1	1.7	3.7	2.6
Unable to Work (ill)	2.9	0.4	1.7	0.2	0.2	0.2
Unable to Work (Disabled)	0.4	0.3	0.3	0.2	0.2	0.2
Other	0.3	0.7	0.5	1.3	0.2	0.8
Don't Know	5.5	7.9	6.7	4.1	4.1	4.1

Source: Namibian Statistics Agency , 2014

While the employment levels are largely similar between the !Nami-Nus and Walvis Bay Urban constituencies, there is a substantive difference in the types of employment (see Table 7-14). The major employers are private businesses or households, which account for 54% and 68% of all employment for Lüderitz and Walvis Bay in 2011, respectively, highlighting that the private sector is a key employer notably in the more developed Walvis Bay.

Employment by the State is higher in Lüderitz (36% of the employed population) compared to Walvis Bay (22% of the employed population), indicating that both towns are strongly dependant on State income, notably Lüderitz (see Table 7-14).

As both the !Nami-Nus and Walvis Bay Urban constituencies support a largely urban population, employment in the commercial or subsistence agricultural sector is minimal and accounts for only around 3.5% of total employment (see Table 7-14). This shows that the resident population is near exclusively reliant on wage labour for income, which include either formal full-time private employment, government employment or self-employment.

The division of employment by type is largely similar by gender in both constituencies (see Table 7-14). Both genders are reliant on private employment or employment by the State. Generally, fewer women are employed in these two major sectors, as 5% and 13% fewer women work in the private sector in Lüderitz and Walvis Bay, respectively, while 4% fewer women work in the public sector in the two settlements.

TABLE 7-14: EMPLOYMENT PROFILE BY CONSTITUENCY

Type of Employment	Percent of Total Population					
	!Nami-Nus Constituency			Walvis Bay (Urban) Constituency		
	Male	Female	Total	Male	Female	Total
Subsistence/Communal Farmer (Paid)	1.3	1.1	2.5	0.1	0.1	0.2
Subsistence/Communal farmer (Unpaid)	0.0	0.2	0.2	0.8	0.5	1.2
Commercial Farmer	0.4	0.2	0.6	0.3	0.1	0.5
Other Employer	0.9	0.5	1.4	2.4	1.1	3.5
Own Account Worker	0.4	0.4	0.8	1.6	1.2	2.9
Employee (Communal Farms)	0.1	0.1	0.2	0.0	0.0	0.0
Employee (Commercial Farms)	1.0	0.5	1.5	0.2	0.1	0.3
Employee (Government)	6.6	6.8	13.5	6.1	4.8	10.9
Employee (Parastatal)	13.1	10.1	23.2	7.5	3.4	10.9
Employee (Private)	29.7	24.7	54.4	41.0	27.7	68.7
Unpaid Family Worker (Subsistence)	0.0	0.0	0.0	0.1	0.1	0.1
Other Unpaid Family Worker	0.6	0.7	1.3	0.1	0.1	0.2
Other	0.2	0.2	0.4	0.1	0.2	0.4
Don't Know	0.1	0.0	0.1	0.1	0.0	0.1
Total	54.4	45.6	100.0	60.4	39.6	100.0

Source: Namibian Statistics Agency, 2014

The major industry sector of the !Nami-Nus Constituency is Agriculture, Forestry and Fishing (see Table 7-15); however, the fishing sub-sector emerges as the major local employer and accounted for 42% of all local employment in 2011. Other primary sector industries included mining (8% of employment), while secondary sector industries⁴ contributed 24% of all employment.

In contrast, the Walvis Bay Urban Constituency has a more diversified economy and employment is spread across multiple sectors (see Table 7-15). The three major employers include manufacturing (27% of employment), wholesale and retail trade and motor repair (10% of employment). The Agriculture, Forestry and Fishing, Construction, Transportation and Storage Administrative and Support Services, Public Admin., Defence, Social Security sectors each contribute to around 7% of local employment.

The key economic sectors noted above for the Nami-Nus and Walvis Bay Urban constituencies are compared to the major national industry sectors in 2018 (see Table 7-15). Lüderitz has a substantially higher dependence on fishing compared to Namibia as a whole, while the secondary and services sectors are less active. Walvis Bay benefits more from the mining sector, manufacturing, accommodation and food services, but has a lesser proportion of employment under the Professional, Scientific and Technical Activities sector and the Wholesale and Retail Trade, Motor Repair sector when compared to Namibia as a whole.

⁴ Covering the Manufacturing, Electricity, Gas, Steam and Air Conditioning Supply, Water Supply, Sewerage, Sanitation, Construction and Wholesale and Retail Trade, Motor Repair Sectors combined.

With respect to the gender split by industry, it is notable that the fishing sector is the dominant employer for both males and females in !Nami-Nus Constituency (see Table 7-15) and account for 41% of all employment. Males still dominate the mining, construction, transportation sectors while females dominate the accommodation and food services, education, human health and social work and household care sectors.

Walvis Bay is dominated by the manufacturing sector which shows a balance in terms of the employment of both males and females (25% of total employment for both genders). This is similarly reflected in the Wholesale and Retail Trade, Motor Repair sector (10-11% of total employment for both genders). Males still dominate Agriculture, Forestry and Fishing, Mining and Quarrying, Construction, Transportation and Storage sectors, while females are more prominent in the financial insurance, education, human health and social work, and household care sectors.

TABLE 7-15: EMPLOYMENT BY INDUSTRY SECTOR

Industry Sector	Percent of Total Population (2011)						Namibia (2018)
	!Nami-Nus Constituency			Walvis Bay (Urban) Constituency			
	M	F	T	M	F	T	
Agriculture, Forestry and Fishing	39	44	42	8	4	7	23
Mining and Quarrying	9	2	6	6	1	4	2
Manufacturing	7	8	8	27	27	27	6
Electricity, Gas, Steam and Air Condition.	0	0	0	0	0	0	0
Water Supply, Sewerage, Sanitation	1	0	0	1	0	0	1
Construction	10	1	6	11	1	7	6
Wholesale and Retail Trade, Motor Repair	5	6	5	10	11	10	11
Transportation and Storage	6	1	3	11	3	8	3
Accommodation and Food Services	2	7	4	2	4	3	11
Information and Communication	1	1	1	1	1	1	1
Financial Insurance Activities	1	3	2	2	6	3	2
Real Estate Activities	0	0	0	0	1	0	0
Profess., Scientific and Technical Activities	1	1	1	1	3	2	1
Administrative and Support Services	9	8	8	6	8	7	4
Public Admin., Defence, Social Security	4	3	4	8	5	7	5
Education	1	5	3	1	6	3	6
Human Health and Social Work	1	4	2	1	5	3	3
Arts, Entertainment and Recreation	0	0	0	0	1	1	1
Other Services Activities	1	1	1	2	5	3	3
Activities of Private Households	1	4	2	1	7	3	10
Extraterritorial Organisations	0	0	0	0	0	0	0
Don't Know	1	0	1	1	1	1	0

Source: Namibian Statistics Agency, 2014

7.5.3 Economics

The size of the Namibian economy expanded from N\$169 475 million in 2017 to N\$177 020 million in 2018 (Namibian Statistics Agency, 2018). The net contribution to national Gross Domestic Product (GDP) is divided between the three main industry sectors – the primary, secondary and tertiary sectors.

In 2018, the tertiary sector was the main contributor to national GDP (accounting for 58.7% of GDP). The tertiary sector includes that segment of the economy that provides services and is more commonly termed the service industry / sector, and will include wholesale, retail, hotels and restaurants, transport and communication, finance, real estate and business services.

In 2018, wholesale and retail trade contributed 10.1% of GDP making it the largest single sub-sector. Public administration and defence (11.7%) education (9.8%) and health (3.7%) in combination contributed a 25.2% to the national GDP. Government spending, therefore, is the single largest contributor to the national GDP.

Over the last five years, the tertiary sector has shown highly variable growth. Noted growth occurred in 2013, 2014, 2015 of 4%, 10% and 3%, respectively. This reversed to negative growth in 2016 and 2017 of -1.6% and -0.1% percent, respectively (Namibian Statistics Agency, 2018).

The secondary sector includes manufacturing, construction, water and electricity. This sector contributed 17.7% to the national GDP in 2018 and is second only to the tertiary sector in terms of overall contribution. Manufacturing is a key sub-sector and accounts for 63.1% of this sector's total contribution of GDP. The main manufacturing industries, by contribution to GDP, include food products, metals, beverages, grain mill products, and diamond processing.

Growth in the secondary sector, much like other sectors has been variable, with positive trends in 2014 and 2015 (11 and 4%, respectively) and negative growth in 2016 and 2017 (-4 and -8%, respectively). This is most likely driven by a contraction in the construction sector due to government spending cuts around 2016 (Office of the President, 2018).

The primary sector includes mining, quarrying, farming, fishing and forestry, and other activities which produce raw materials that can be processed into a finished product. In 2018, the primary sector contributed 17.6% of the total national GDP (Office of the President, 2018) and was primarily driven by the mining sector, followed by fishing and agriculture. In terms of national employment, agriculture and fishing is the main contributor (accounting for 20% of the total population employment in 2016) compared to mining (2.2% of the total employed population in 2016).

The economy of the Karas Region and the !Nami-Nus Constituency is dominated by the primary sectors specifically by mining, followed by fishing and lesser inputs from livestock production, tourism and port logistics at Lüderitz. Lüderitz is similarly dependant on the Region's economy and the Port is primarily aimed at supporting the onshore minerals and offshore diamond mining sectors as well as the fishing sector (Namport, n.d.).

The local economy of Lüderitz is, however, primarily dependant on fishing with 80% of the town's employment provided by this sector (Luderitz Town Council, 2020). The lack of economic diversity has been identified as a key risk due to variations in fish stock and competition from Walvis Bay. There is, therefore, an increased focus towards tourism development and the logistics industry (Luderitz Town Council, 2020). In addition, the town

supports a range of secondary / service businesses including supermarkets, commercial banks, insurance, and hospitality amongst others. However, this sector will likely remain largely dependent on larger mining and fishing sectors.

The economy of the Erongo Region and the Walvis Bay Urban Constituency is more developed and diversified when compared to Lüderitz. The region remains largely dependent on the primary sector including mining (notably uranium), commercial and small-scale fishing, agriculture (mostly livestock farming).

Walvis Bay reflects a deference economic profile to the Erongo Region and is primarily a port and manufacturing city that provides key transport and port logistics to the mining and fishing sectors. Walvis Bay supports a diverse economy including industrial development largely centred around the Namibian Export Processing Zone and secondary / service sector businesses (finance, retail, accommodation and food). The fishing industry is however considered a critical economic sector (Walvis Bay Municipality, 2020) and provides an estimate 8 000 local jobs.

The fishing sector is critical for both the economies of Walvis Bay and Lüderitz and warrants more consideration. The Food and Agriculture Organisation (FAO) recognises that Namibia has one of the most productive fishing grounds in the world, with 20 fish species that are commercially exploited (Food and Agriculture Organisation, 2020). Most catches are landed at either Walvis Bay or Lüderitz; however, because of its strategic location in the middle of the fishing grounds, most of the landings and processing plants are in Walvis Bay (Food and Agriculture Organisation, 2020). Both Walvis Bay and Lüderitz support businesses in both primary commercial fishing as well secondary fish processing.

In 2012 / 2013, a total number of 256 vessels were licenced to operate in the Namibian Exclusive Economic Zone (Ministry of Fisheries and Marine Resources, n.d.), which are largely based at either Walvis Bay or Lüderitz. It is broadly estimated that 10 000 (or 80% of the total resident population) fishing-based jobs are provided in Lüderitz (Luderitz Town Council, 2020), while an estimated 8 000 (or 20% of the total resident population) are employed in the fishing sector.

7.5.4 Poverty

Namibia is defined as an upper middle-income country. However, it retains a Human Development Index (HDI)⁵ of 0.645 in 2018, which places it in the medium human development level, and at 130 out of 189 monitored countries and territories (UNDP, 2019).

However, when the HDI is adjusted for inequality (IHDI) the score is reduced to 0.417. The loss of 35.3% from the HDI is strongly indicative of inequalities in Namibia, and such inequalities are generally recognised by the public, the national government, as well as international organisations (i.e. the World Bank). The IHDI places Namibia at 129 of 150 countries in terms of inequality (UNDP, 2019) alongside such countries as India, Guatemala and Tajikistan.

⁵ The HDI is a summary measure for assessing long-term progress in three basic dimensions of human development: a long and healthy life, access to knowledge and a decent standard of living.

While there has been a general positive trajectory in terms of improvement in the IHDI since Namibia’s independence in 1990, the rate of decline in inequality is slowing down (Namibian Statistics Office, 2012), and this has likely been exacerbated by the economic slow-down noted in 2016 and 2017.

In part, the endemic inequality is attributed to the exclusion of many households from the modern economy and associated benefits, despite the economy growing substantially since Namibia’s independence in 1990 (Namibian Statistics Office, 2012). This is notably apparent between administrative regions, as well as between urban and rural areas.

Poverty mapping undertaken in 2011 (National Planning Commission, n.d.) shows that the Erongo Region has the second lowest rates of poverty (2.4% of the total population being below a predetermined poverty limit) while Karas is higher at 6.7%. This compares positively against the national poverty rate of 26.9% of the total population.

At the Constituency level, !Nami-Nus has a poverty rate of 7% (or 970 persons below the poverty line). While this rates favourably against the national rate, it is the second poorest performing constituency in the Karas Region. Agriculture, mining, manufacturing, construction and tourism are the main employers in the Region; however, Lüderitz is far more dependent on commercial fishing.

The Walvis Bay Urban Constituency shows lower poverty rates of 2.4% (860 persons). The relatively low poverty rates in Walvis Bay are attributed to a well-established formal economy based on manufacturing, retail, fishing, transport and port facilities, as well as good access to education (Office of the President, 2018).

7.5.5 Human Rights Profile

Fundamental human rights are recognised in the Namibian Constitution of 1990, and Namibia is a signatory to a range of United Nations Human Rights Conventions (see Table 7-16). The latest universal review undertaken by the United Nations in 2016 indicates that human rights are largely respected; however, the country still faces challenges with respect to addressing the root causes of poverty, hunger and to uplift the living conditions of the poor.

TABLE 7-16: RATIFIED HUMAN RIGHTS TREATIES

Treaty Description	Ratification Date
Con against Torture and Other Cruel Inhuman or Degrading Treatment or Punishment	28 Nov 1994
Optional Protocol of the Convention against Torture	None
International Covenant on Civil and Political Rights	28 Nov 1994
Second Optional Protocol to the International Covenant on Civil and Political Rights	28 Nov 1994
Convention for the Protection of All Persons from Enforced Disappearance	None
Convention on the Elimination of All Forms of Discrimination against Women	23 Nov 1992
International Convention on the Elimination of All Forms of Racial Discrimination	11 Nov 1982
International Covenant on Economic, Social and Cultural Rights	28 Nov 1994
Int. Con. on the Protection of the Rights of All Migrant Workers and Their Families	None
Convention on the Rights of the Child	30 Sep 90
Op. Prot. to the Convention on the Rights of the Child (Armed Conflict)	16 Apr 02
Op. Prot. to the Convention on the Rights of the Child (Child Prostitution)	16 Apr 02
Convention on the Rights of Persons with Disabilities	04 Dec 07

7.5.6 Fishing Sector Activities

The commercial fishing sectors that operate off the coast of Namibia include:

- Demersal trawl;
- Midwater trawl;
- Deep-water trawl;
- Small pelagic purse seine;
- Large pelagic longline;
- Demersal longline;
- Tuna pole;
- Traditional line-fish;
- Deep-sea crab;
- Rock lobster;
- Mariculture.

Namibia has only two major fishing ports from which all the main commercial fishing operations are based namely, Walvis Bay and Lüderitz.

The major port is Walvis Bay and it is from here that the majority of fishing vessels operate. The majority of the fishing conducted from this port is, for economic and logistic reasons, directed mostly at fishing grounds in the central and northern part of Namibia and to a lesser extent the southerly fishing grounds. A significant amount of fishing activity also takes place from Lüderitz where hake trawlers and longliners operate, as well as a small rock lobster fishery.

7.5.6.1 Demersal trawl

The demersal trawl sector targets primarily hake (*Merluccius capensis* and *M. paradoxus*). Main by-catch species include monkfish (*Lophius* spp.), kingklip (*Genypterus capensis*) and snoek (*Thyrsites atun*). The directed hake trawl fishery is Namibia's most valuable fishery with a current annual hake TAC of 154 000 tons (2018/19).

This fishery operates along the shelf contours between depths of 200 m and 850 m (see Figure 7-20). Trawlers are prohibited from operating inshore of the 200 m isobath. The demersal trawl grounds are situated 75 km eastward of the licence blocks. There is no overlap however with the licence blocks.

Fishing effort is relatively constant throughout the year, except during the month of October when the fishery is closed, and relatively lower levels of effort expended during November and December (see Figure 7-21).

A fleet of about 71 Namibian-registered trawlers currently operate along the whole Namibian coastline (17°S to 30°S) following the distribution of hake along the continental shelf. Demersal trawlers are segregated into wet fish and freezer vessels which differ in terms of the capacity for the processing of fish offshore (at sea) and in terms of vessel size and capacity. Trawlers vary from 35 m to 90 m in length, with a shaft power of 750 to 3 000 kW. Wetfish vessels are generally smaller than freezer vessels and do not range as far offshore. While freezer vessels may work in an area for up to a month at a time, wetfish vessels fish for about seven days before returning to port.

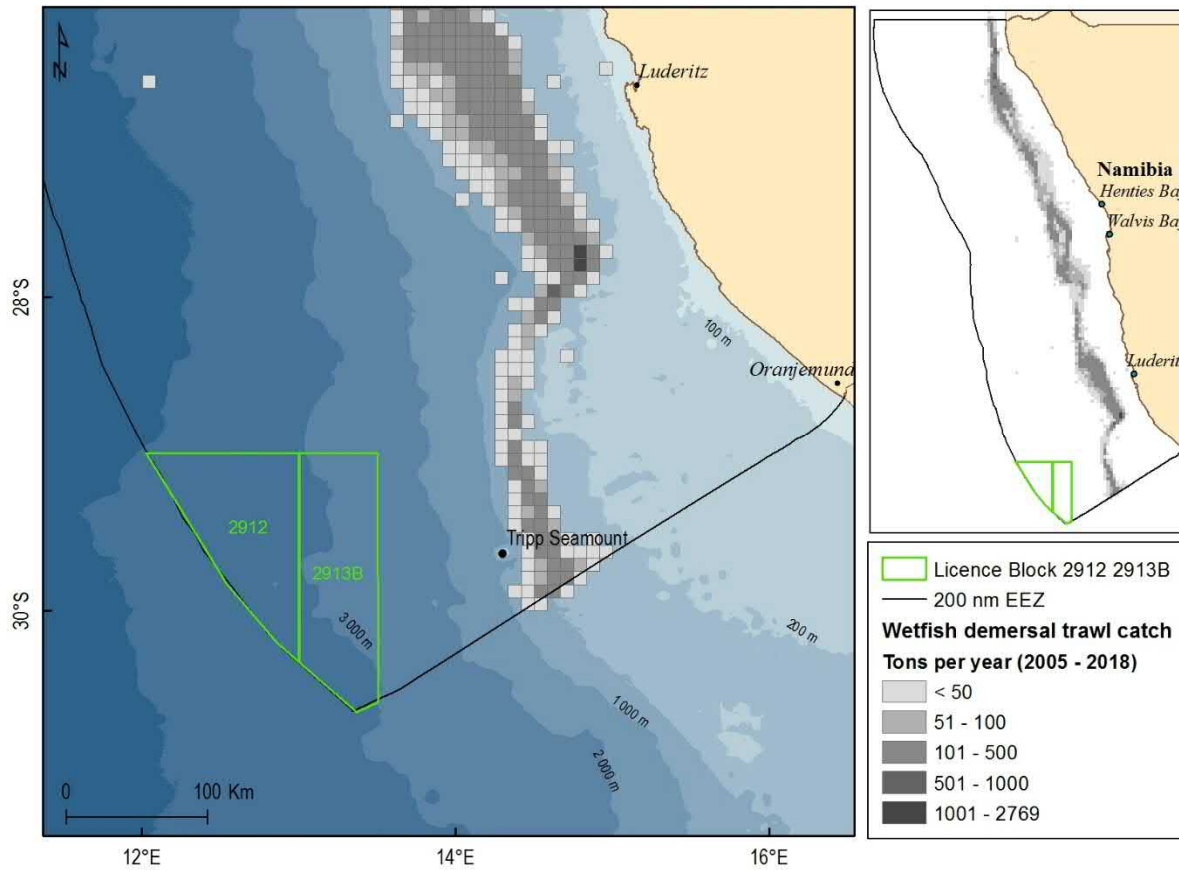


FIGURE 7-20: BLOCKS 2912 AND 2913B IN RELATION TO HAKE-DIRECTED DEMERSAL TRAWL (2005-2018)
 Source: CapMarine

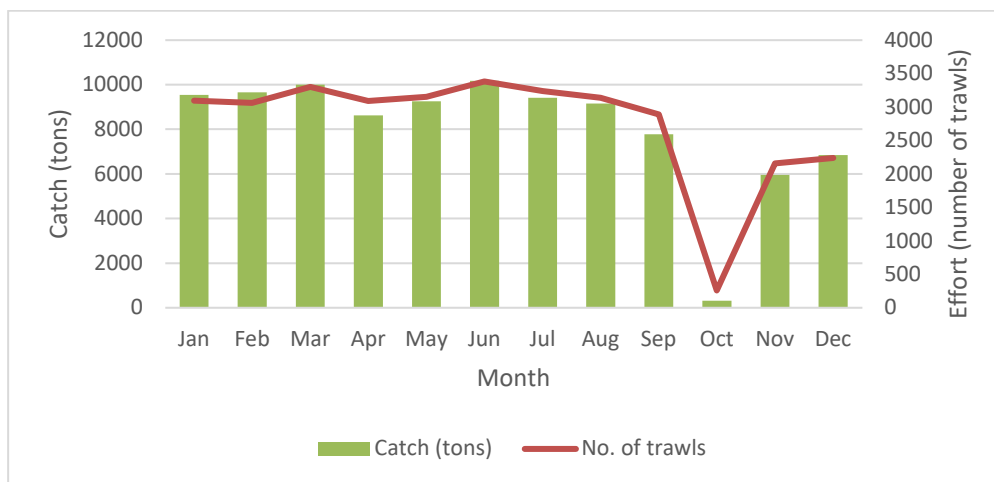


FIGURE 7-21: AVERAGE LANDINGS BY MONTH REPORTED FOR WETFISH TRAWLERS FROM 2005 TO 2017

Trawl gear configurations are similar for both freezer and wetfish vessels (see Figure 7-22). Typical demersal trawl gear configuration consists of:

- Steel warps up to 32 mm diameter (in pairs up to 3 km long when towed);
- A pair of trawl doors (500 kg to 3 tons each);

- Net footropes which may have heavy steel bobbins attached (up to 24" diameter), as well as large rubber rollers ("rock-hoppers"); and
- Net mesh (diamond or square shape) is normally wide at the net opening whereas the bottom end of the net (or cod-end) has a 130 mm stretched mesh.

Generally, trawlers tow their gear at 3.5 knots for up to four hours per drag, and hake-directed trawling occurs mainly from sunrise to sunset. When towing gear, the distance of the trawl net from the vessel is usually 2 to 3 times the water depth. The horizontal net opening may be up to 50 m in width and 10 m in height.

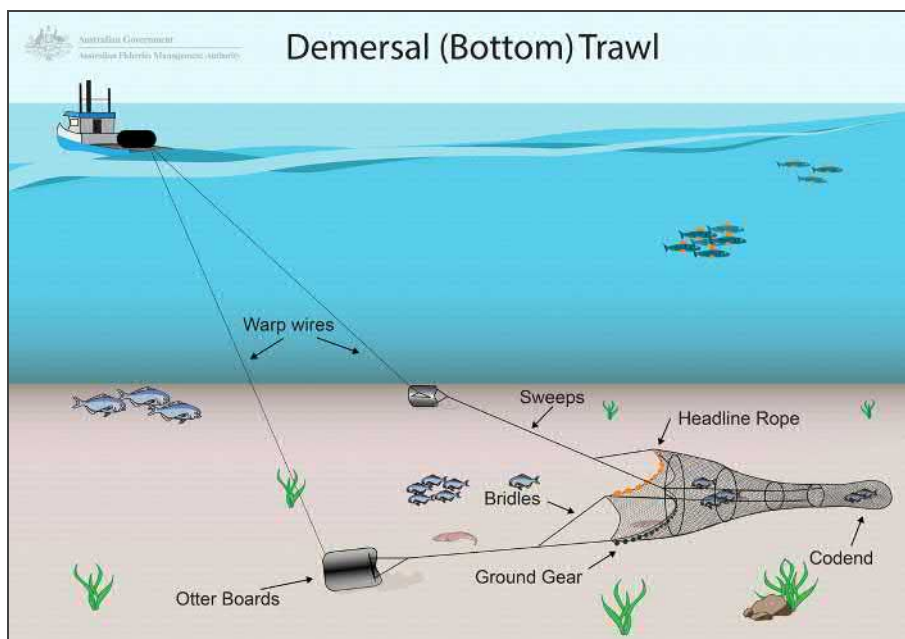


FIGURE 7-22: SCHEMATIC OF TRAWL GEAR TYPICALLY USED BY THE NAMIBIAN HAKE TRAWL VESSELS

Source: <http://www.afma.gov.au/portfolio-item/trawling>

7.5.6.2 Midwater trawl

The midwater trawl fishery targets adult horse mackerel (*Trachurus capensis*). This fishery has the highest volume and catch of all Namibian fish stocks, but in terms of economic value is the second highest contributor behind the Cape hake fisheries. The TAC for horse mackerel for 2018/2019 was set at 349 000 tons and there are currently 67 rights-holders registered within the fishery.

The midwater trawl fleet operates almost exclusively out of the port of Walvis Bay and fishing grounds extend north of 25°S to the border of Angola and effort is highest in the north. Juvenile Cape horse mackerel move into deeper water when mature and are fished mostly between the 200 m and 500 m isobaths towards the shelf break. Although the main commercial fishing grounds are situated approximately 400 km northward of the licence blocks, incidental fishing has been recorded 170 km north east of the licence blocks. There is no overlap of fishing activity; however, with the licence blocks (see Figure 7-23). The fishery operates year-round with relatively constant catch and effort values by month (see Figure 7-24).

The target catch species migrate vertically upwards through the water column between dusk and dawn. Mid-water trawlers exploit this behaviour (diurnal vertical migration) by adjusting the depth at which the net is towed (this typically varies from 400 m to just below the water surface). The net itself does not come into contact

with the seafloor (unlike demersal trawl gear) and towing speed is greater than that of demersal trawlers (between 4.8 and 6.8 knots).

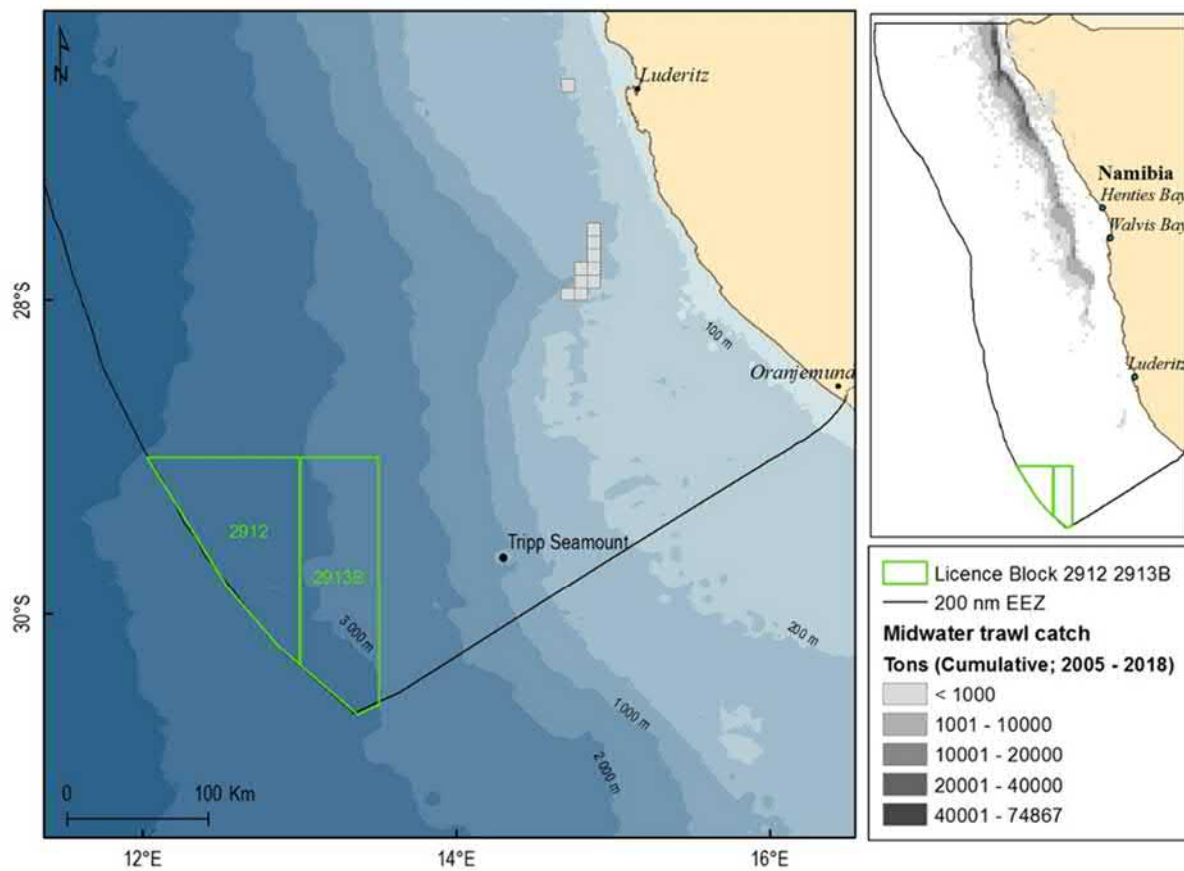


FIGURE 7-23: BLOCKS 2912 AND 2913B IN RELATION TO MID-WATER TRAWL CATCH TARGETING HORSE MACKEREL OFF THE COAST OF NAMIBIA (2005-2018)

Source: CapMarine

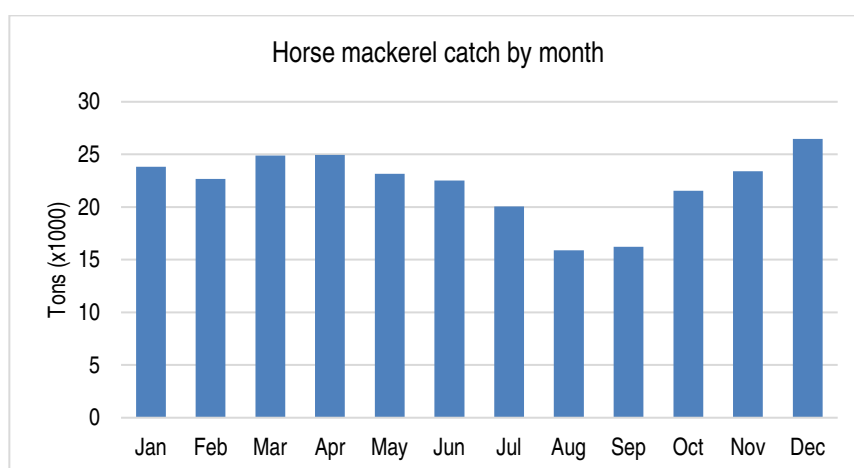


FIGURE 7-24: AVERAGE MONTHLY CATCH (TONS) OF HORSE MACKEREL BY THE NAMIBIAN MID-WATER TRAWL FISHERY (2005 – 2018)

7.5.6.3 Deep-water trawl

The deep-water trawl fishery is a small fishing sector targeting orange roughy (*Hoplostethus atlanticus*) and alfonsino (*Beryx splendens*). The fishing grounds were discovered in 1995/1996 and total catches reached 15 500 tons in 1997. Following a drop in biomass levels, the TAC was decreased from 12 000 tons in 1998 to 1 875 tons in 2000. The fishery has been closed since 2007. Although the fishery is closed, the stock is currently being assessed with a view to considering the viability of re-opening the fishery.

The deep-water trawl fishery is directed at the outer Namibian shelf from 400 m to 1 500 m water depth. In Namibia the orange roughy fishery is split into four Quota Management Areas (QMAs) referred to as “Hotspot”, “Rix”, “Frankies” and “Johnies”. Almost no fishing for this species takes place outside of the designated QMA’s. The licence area does not coincide with any of the QMA’s with the closest being “Johnies”, situated 47 km north-east of the licence blocks (see Figure 7-25).

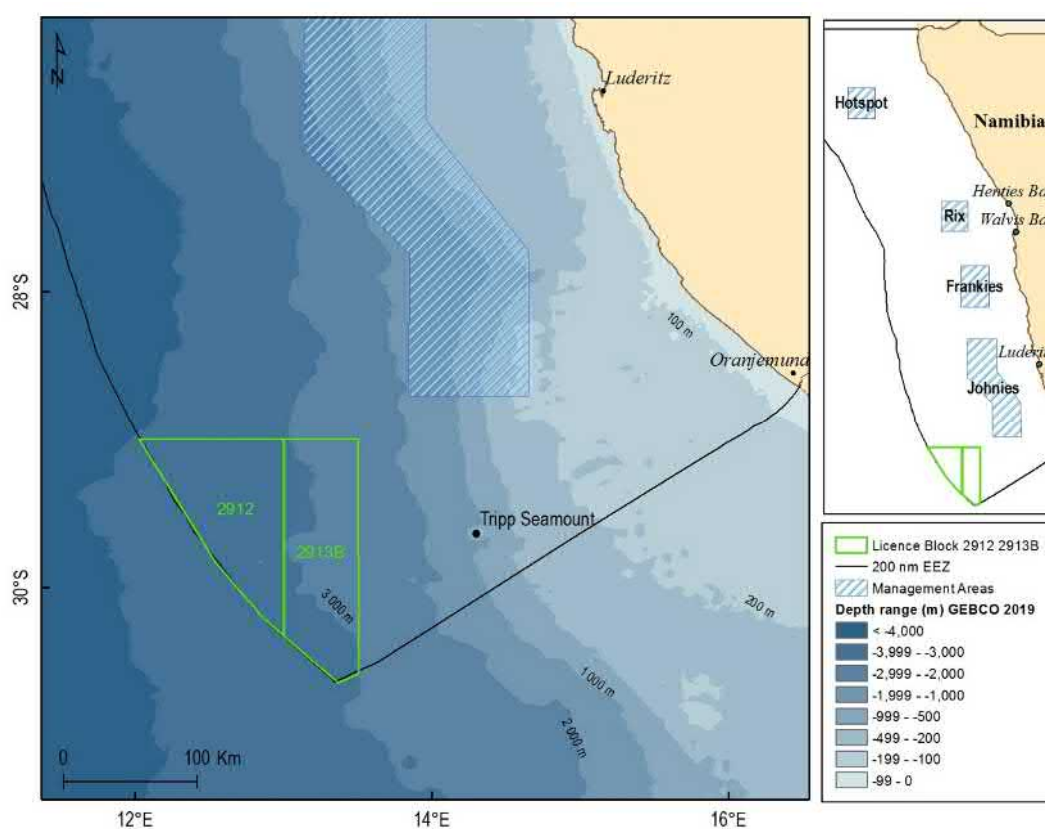


FIGURE 7-25: BLOCKS 2912 AND 2913B IN RELATION TO MID MANAGEMENT AREAS USED BY THE DEEP-WATER TRAWL SECTOR (1994 – 2007)

Source: CapMarine

7.5.6.4 Small pelagic purse seine

The pelagic purse seine fishery, which targets sardine (*Sardinops sagax*) and juvenile horse mackerel, was historically the largest fishery (by volume) in Namibia. The fishery started in 1947 and operated predominantly from the port of Walvis Bay. The fishery grew rapidly until 1968 when the fish stock collapsed. Since independence, Namibia has issued a small TAC of sardine to sustain the small pelagic sector and to allow land-based factory turnover. In addition, they allow part of this catch to target juvenile horse mackerel. However, in recent years the resource base has been unable to sustain even these minimal TACs and the fishery has been

closed and reopened on an ad hoc basis depending on resource availability. The fishery was open in 2017 with a TAC of 14 000 t for sardine; however, in 2018 the TAC for sardine was set at zero and is expected to remain so until January 2021 (at the earliest) to allow recovery of the stock.

Fishing activity occurs primarily northwards of Walvis Bay extending to the Angolan border, inshore of the 200 m isobath. The fishing grounds targeted by the purse-seine fleet are largely located off and to the north of Walvis Bay. The main commercial fishing grounds are situated at least 480 km northward of the licence area, and the closest fishing activity recorded 100 km east of the licence area is incidental. There is no overlap of fishing activity with the licence block (see Figure 7-26).

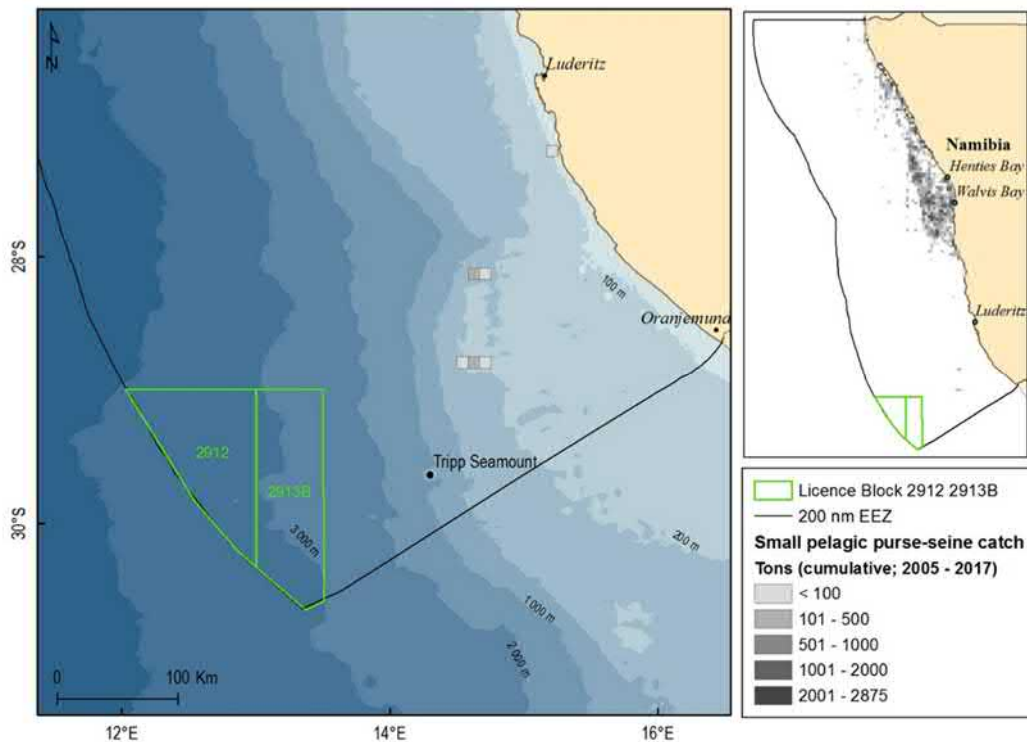


FIGURE 7-26: BLOCKS 2912 AND 2913B IN RELATION TO PELAGIC PURSE-SEINE CATCH (2005 – 2017)

Source: CapMarine

Monthly pelagic purse seine trends in landings and catch composition are shown in Figure 7-27.

The pelagic purse seine fleet consists of approximately 36 wooden, glass-reinforced plastic and steel-hulled vessels ranging in length from 21 m to 48 m. The targeted species are surface-shoaling and once a shoal has been located the vessel encircles it with a large net (see Figure 7-28), which has a depth of 60 m to 90 m. Netting walls surround aggregated fish both from the sides and from underneath, thus preventing them from escaping by diving downwards. These are surface nets framed by lines: a float line on top and lead line at the bottom. Once the shoal has been encircled the net is pursed and hauled in and the fish are pumped on board into the hold of the vessel. It is important to note that after the net is deployed the vessel has no ability to manoeuvre until the net has been fully recovered on board and this may take up to 1.5 hours.

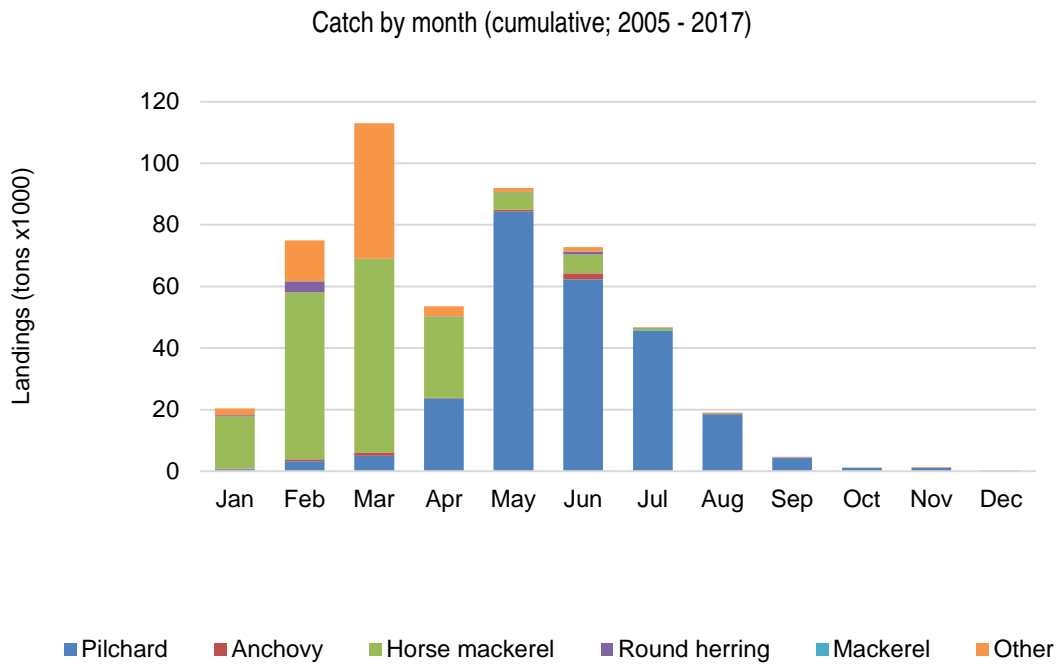


FIGURE 7-27: MONTHLY CUMULATIVE LANDINGS OF SMALL PELAGIC SPECIES BY THE PURSE-SEINE SECTOR FROM 2005 TO 2017

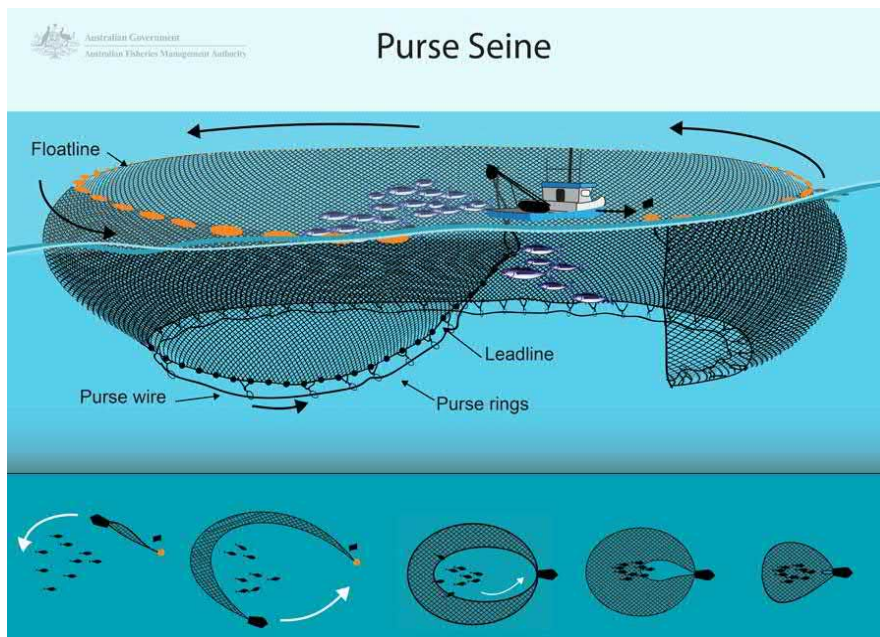


FIGURE 7-28: SCHEMATIC OF TYPICAL PURSE-SEINE GEAR DEPLOYED IN THE “SMALL” PELAGIC FISHERY

Source: <http://www.afma.gov.au/portfolio-item/purse-seine>

7.5.6.5 Large pelagic longline

This sector uses surface longlines to target migratory pelagic species including albacore tuna (*Thunnus alalunga*), yellowfin tuna (*T. albacares*), bigeye tuna (*T. obesus*), swordfish (*Xiphias gladius*) and various shark species.

Pelagic longline vessels operate extensively around the entire coast along the shelf-break and into deeper waters between 200 m and 2 000 m isobaths. Thus, grounds used by the pelagic longline fishery coincide with the licence area (see Figure 7-29).

Effort occurs year-round with lower levels of fishing effort expected between June and October (see Figure 7-30).

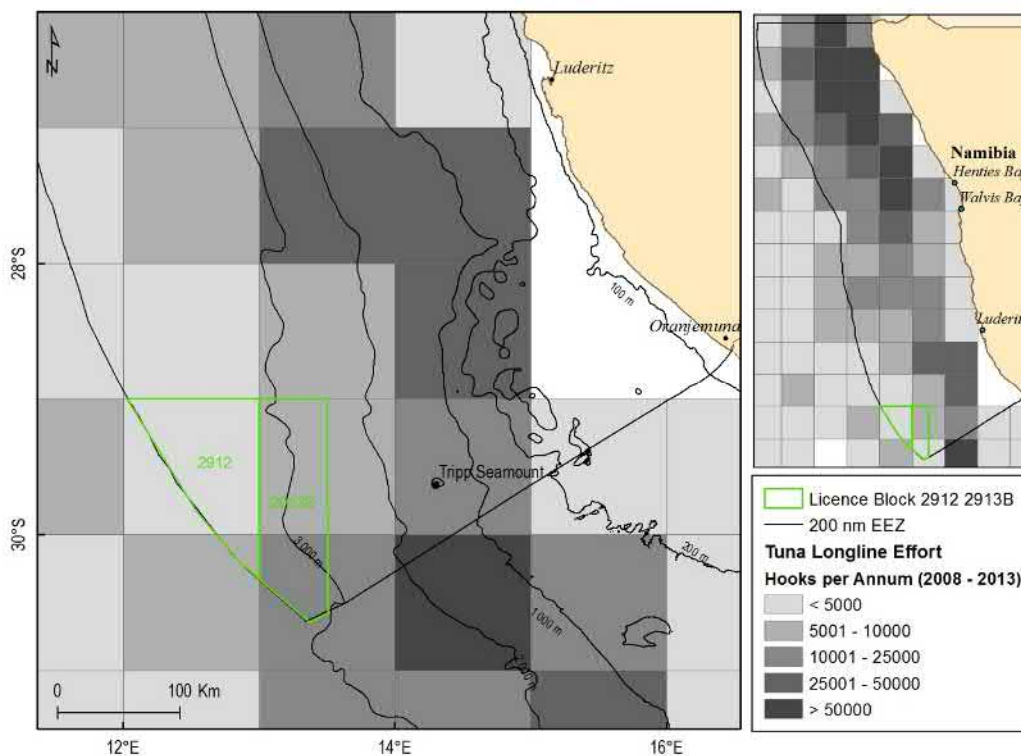


FIGURE 7-29: BLOCKS 2912 AND 2913B IN RELATION TO LARGE PELAGIC LONGLINE EFFORT OFF THE COAST OF NAMIBIA (2008 – 2013)

Source: CapMarine

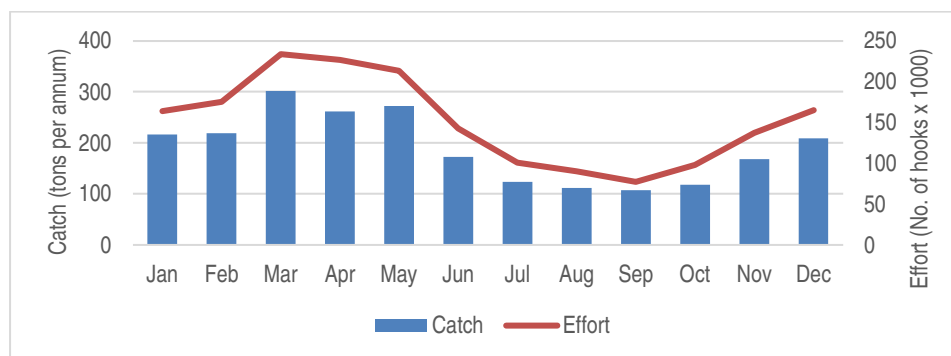


FIGURE 7-30: MONTHLY AVERAGE CATCH AND EFFORT RECORDED WITHIN THE LARGE PELAGIC LONGLINE SECTOR WITHIN NAMIBIAN WATERS (2008 – 2013)

There is provision for up to 26 fishing rights and 40 vessels in this sector (<http://www.mfmr.gov.na/>). Pelagic longline vessels set a drifting mainline, which are up to 100 km in length. The mainline is kept near the surface or at a certain depth by means of buoys (connected via “buoy-lines”), which are spaced approximately 500 m apart along the length of the mainline (see Figure 7-31). Hooks are attached to the mainline on relatively short sections of monofilament line (“snoods”) which are clipped to the mainline at intervals of 20 to 30 m. A single main line consists of twisted tarred rope (6 to 8 mm diameter), nylon monofilament (5 to 7.5 mm diameter) or braided monofilament (6 mm diameter). Various types of buoys are used in combinations to keep the mainline near the surface and locate it should the line be cut or break for any reason. Each end of the line is marked by a Dahn Buoy and Radar reflector, which marks its position for later retrieval by the fishing vessel. A line may be left drifting for up to 18 hours before retrieval by means of a powered hauler at a speed of approximately 1 knot. During hauling a vessel’s manoeuvrability is severely restricted and, in the event of an emergency, the line may be dropped to be hauled in at a later stage.

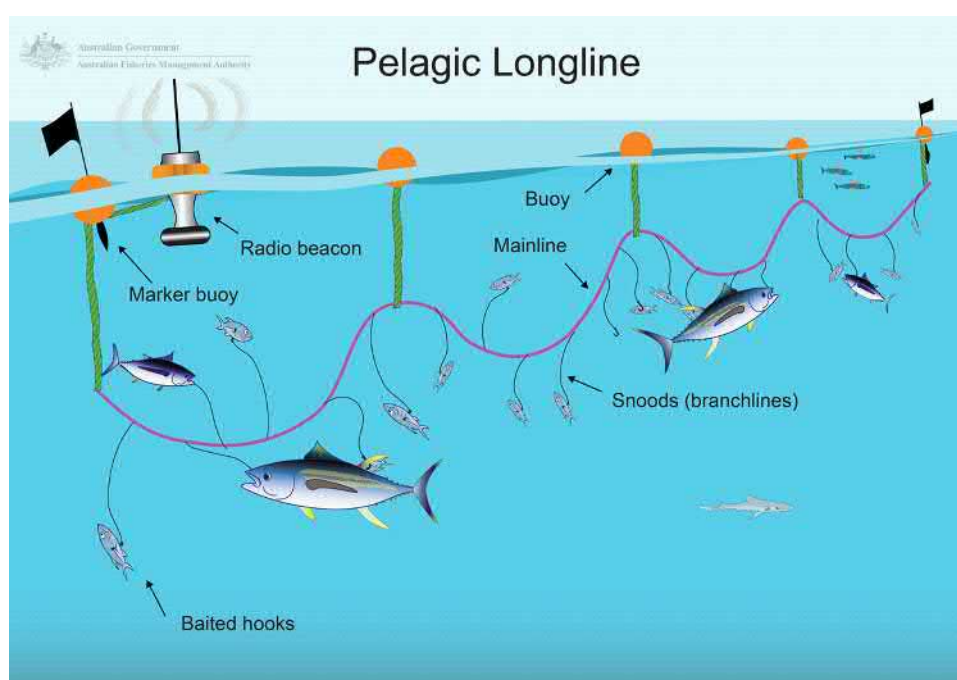


FIGURE 7-31: TYPICAL PELAGIC LONGLINE GEAR CONFIGURATION

Source: <http://www.afma.gov.au/portfolio-item/longlining>

7.5.6.6 Demersal longline

The demersal longline fishery targets bottom-dwelling species, predominantly hake (*Merluccius capensis* and *M. paradoxus*), with a small non-targeted commercial by-catch that includes kingklip. A total hake TAC of 154 000 tons was set for 2018/19 but less than 10 000 tons of this is caught by longline vessels.

Demersal long-lining is expected to occur in similar areas used by the hake-directed trawling, i.e. along the entire Namibian coastline at a depth range of 200 m to 650 m. Figure 7-32 shows the spatial distribution of the average annual catch landed by the demersal longline fishery for the period 2005 to 2018. Fishing grounds are situated 50 km eastward of the licence blocks and there is no overlap.

Approximately 18 vessels are currently operating within the sector within three broad areas. Vessels based in Lüderitz work south of 26°S towards the South Africa border while those based in Walvis Bay operate between

23°S and 26°S and North of 23°S. Vessels operate year-round, but operations are particularly low in October (see Figure 7-33).

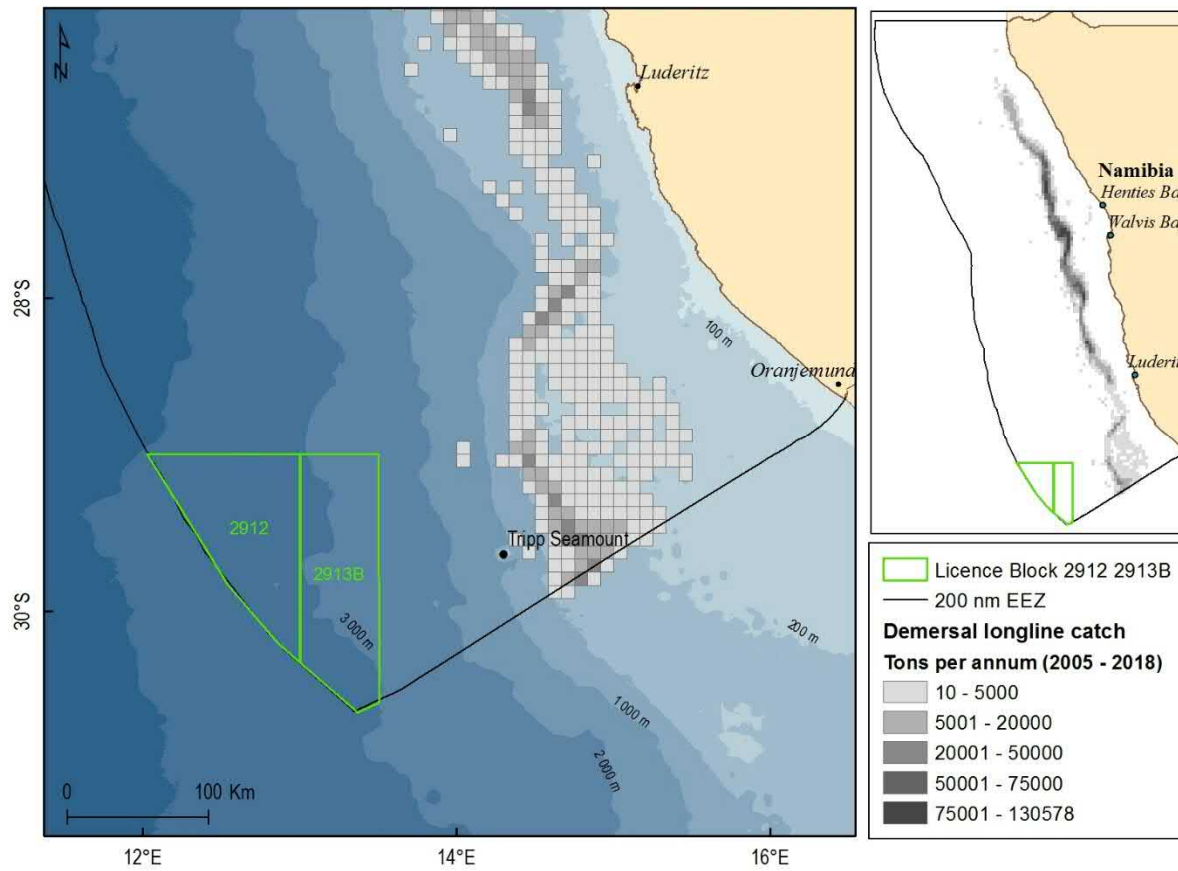


FIGURE 7-32: BLOCKS 2912 AND 2913B IN RELATION TO THE CATCH LANDED BY THE DEMERSAL LONGLINE FISHERY TARGETING CAPE HAKE (2005 – 2015)

Source: CapMarine

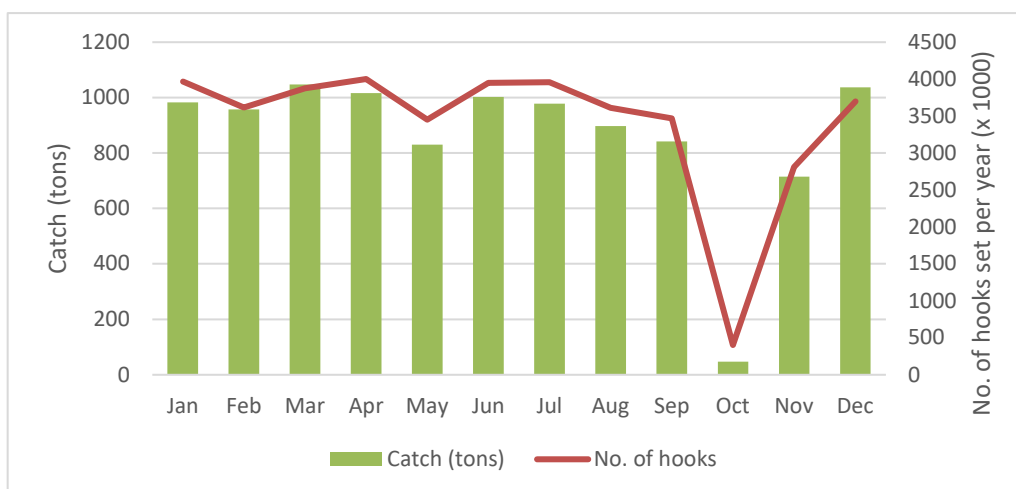


FIGURE 7-33: AVERAGE MONTHLY CATCH (TONS) RECORDED BY THE NAMIBIAN DEMERSAL LONGLINE SECTOR (2005 – 2018)

Longline vessels vary from 18 m to 50 m in length and remain at sea for four to seven days at a time and retain their catch on ice. A demersal longline vessel may deploy either a double or single line which is weighted along its length to keep it close to the seafloor (see Figure 7-34). Steel anchors are placed at the ends of each line to anchor it. These anchor positions are marked with an array of floats. If a double line system is used, top and bottom lines are connected by means of dropper lines. Since the topline is more buoyant than the bottom line, it is raised off the seafloor and minimises the risk of snagging or fouling. The purpose of the topline is to aid in gear retrieval if the bottom line breaks at any point along the length of the set line, which may be up to 30 nm in length. Baited hooks are attached to the bottom line at regular intervals by means of a snood. Gear is usually set at night at a speed of 5 to 9 knots. Once deployed the line is left to soak for up to eight hours before retrieval. A line hauler is used to retrieve gear at a speed of approximately 1 knot and usually takes six to ten hours to complete. During hauling operations, the vessel's manoeuvrability is severely restricted.

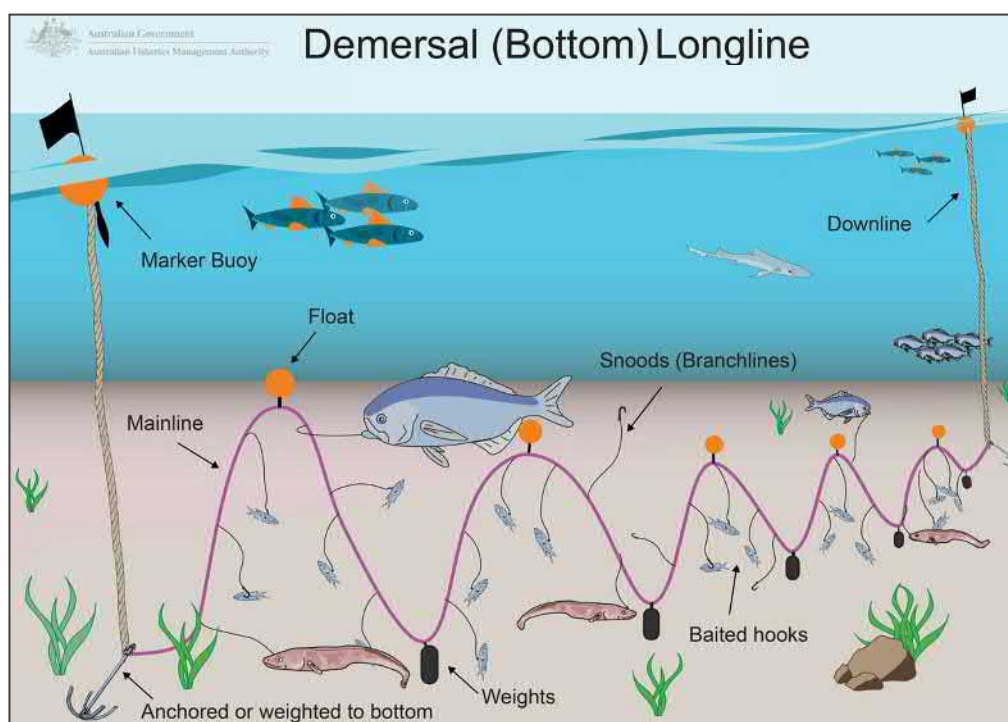


FIGURE 7-34: TYPICAL CONFIGURATION OF DEMERSAL (BOTTOM-SET) HAKE LONGLINE GEAR

Source: <http://www.afma.gov.au/portfolio-item/longlining>

7.5.6.7 Tuna pole

Poling for tuna (predominantly albacore tuna, yellowfin tuna and bigeye tuna), from mostly small boats (< 25 m), is common in southern Namibian waters. Albacore tuna migrate and are particularly important for fisheries in the Benguela ecosystem. Movement of albacore tuna between South Africa and Namibia is not clear although it is believed the fish move northwards following bathymetric features generally deeper than 200 m water depth. Within Namibian waters, the fishery operates southwards of 25°S between the 200 m and 500 m bathymetric contours. Aggregations of albacore tuna are known to occur in the vicinity of the Tripp Seamount (approximately 85 km east of the licence blocks) and the highest effort levels are recorded in this area (see Figure 7-35). Fishing activity within the licence blocks is low; on average 0.1% (7 poles per year) of the overall effort expended by the sector was recorded within the licence blocks.

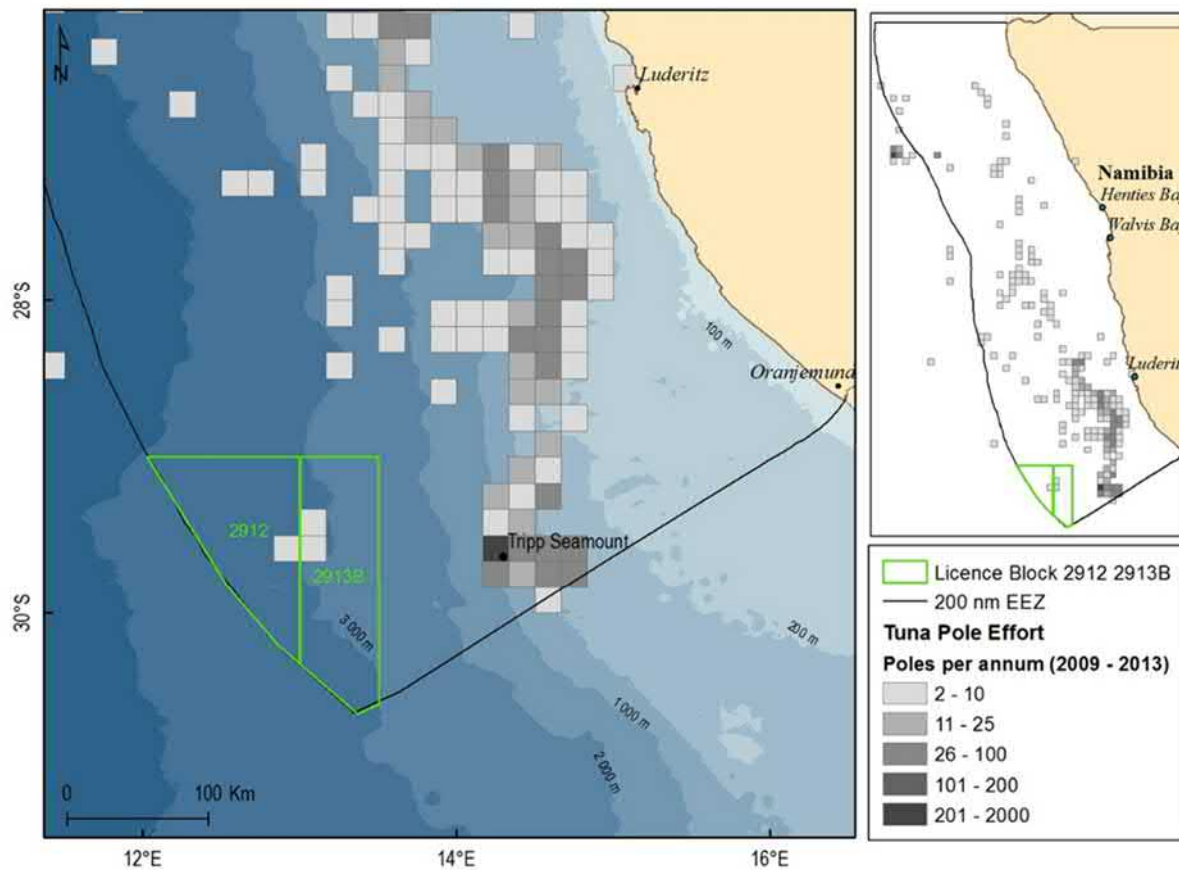


FIGURE 7-35: BLOCKS 2912 AND 2913B IN RELATION TO TUNA POLE FISHING EFFORT (2009 – 2013)

Source: CapMarine

The fishery is seasonal with vessel activity mostly between December and May with peak catches in February, March and April (see Figure 7-36). The records that are available for this fishery are reported by Namibia for the whole Exclusive Economic Zone (EEZ) and no detailed spatial catch and effort data exists.

Approximately 36 South African vessels operate in the sector under arrangement with Namibian rights holders each year, however, the number of active vessels and landed catch have recently shown a decline. Historically catches of albacore tuna caught by South Africa and Namibia combined were very low, increasing steadily to a peak in 2000 and declining thereafter to below 6 000 tons in 2015. In 2016, the estimated Namibian and South African catches were below that of the previous five year (ICCAT, 2018) and, in 2018, Namibian catches declined to approximately 1 000 tons. Figure 7-37 shows the total catches of albacore and yellowfin tuna by the South African and Namibian tuna pole sectors.

Whilst at sea, the majority of time is spent searching for fish with actual fishing events taking place over a relatively short period of time. Sonars and echo sounders are used to locate schools of tuna. At the start of fishing, water is sprayed outwards from high-pressure nozzles to simulate small baitfish aggregating near the water surface, thereby attracting tuna to the surface. Live bait is flung out to entice the tuna to the surface (chumming). Tuna swimming near the surface are caught with hand-held fishing poles. The ends of the 2 m to 3 m poles are fitted with a short length of fishing line leading to a hook. Hooked fish are pulled from the water

and many tons can be landed in a short period of time. In order to land heavier fish, lines may be strung from the ends of the poles to overhead blocks to increase lifting power (see Figure 7-38).

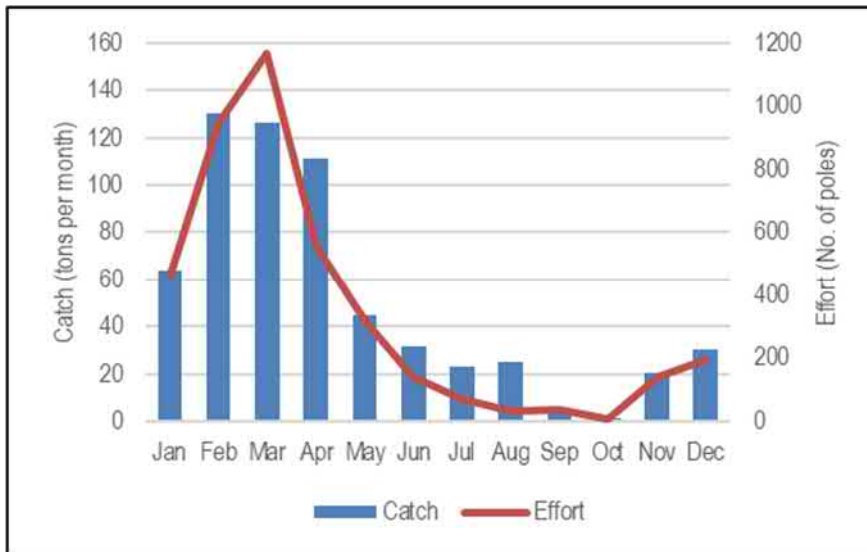


FIGURE 7-36: AVERAGE MONTHLY CATCH AND EFFORT RECORDED BY THE TUNA POLE AND LINE FLEET IN NAMIBIAN WATERS

Source: MFMR, 2014

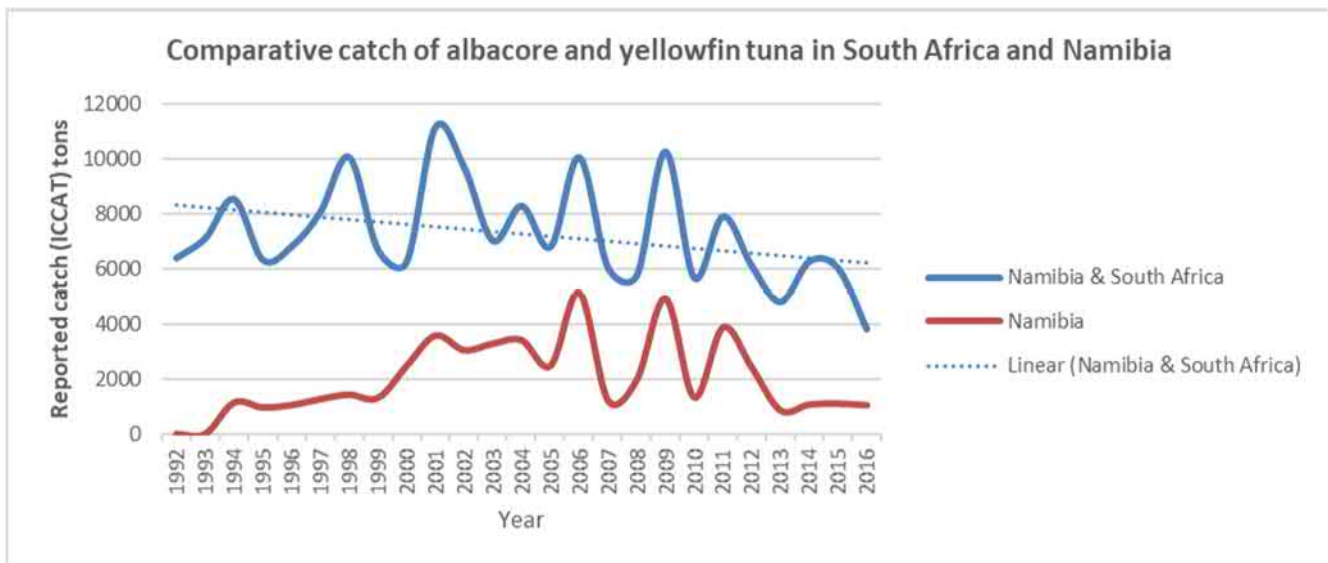


FIGURE 7-37: TOTAL NOMINAL BAITBOAT AND LONGLINE CATCH (TONS) OF LONGFIN (ALBACORE) AND YELLOWFIN TUNA REPORTED BY SOUTH AFRICA AND NAMIBIA BETWEEN 1992 AND 2016

Source: ICCAT statistical bulletin, 2018

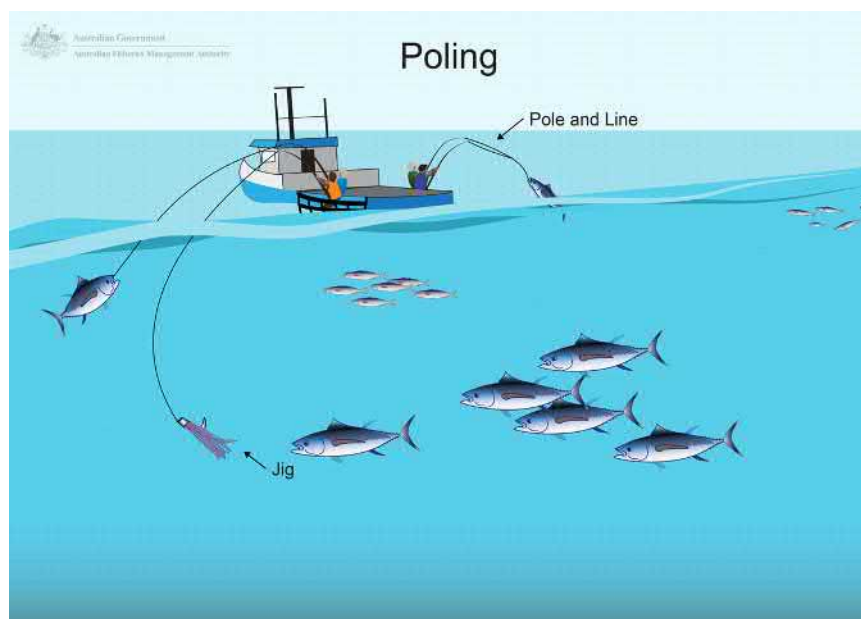


FIGURE 7-38: SCHEMATIC DIAGRAM OF POLE AND LINE OPERATION

Source: <http://www.afma.gov.au/portfolio-item/minor-lines>

7.5.6.8 Traditional line-fish

The traditional line fishery is based on only a few species that includes kob (*sciaenidae*), snoek (*Thyrsites atun*) and numerous shark species which are sold on the local market or exported.

The fishery is limited in extent mostly northwards of Walvis Bay and does not operate much further than 12 nm offshore (i.e. 22 km). The distribution of line-fish catch in relation to the licence blocks is shown in Figure 7-39. The sector operates inshore of the 200 m depth contour with the closest fishing activity taking place from Lüderitz, at least 250 km north-east of the licence blocks. There is no spatial overlap with the sector.

The two commercial components of the line-fish fishery comprise a fleet of between 10 and 13 ski-boats and a fleet of 26 industrial vessels. While ski-boats fish close to the shore in the vicinity of Swakopmund and Walvis Bay, the industrial vessels fish offshore areas between Walvis Bay and the northern border with Angola.

7.5.6.9 Deep-sea crab

The Namibian deep-sea crab fishery is based on two species of crab, namely red crab (*Chaceon maritae*) and spider crab (*Lithodes ferox*). The fishery is small, with only two vessels currently operating from Walvis Bay at depths of between 500 m and 900 m. The fishery is seasonal (between June and August) and has a minimum operational depth limit of 400 m. The deep-sea crab fishery commenced in 1973 with a peak in catches between 5 000 and 7 000 tons during the 1980s. Since 1998, annual catches have averaged at approximately 2 000 tons. The TAC for 2018/2019 was set at 3 900 tons.

The distribution of this fishery extends from approximately 5°S to Walvis Bay at a depth range of 300 m to 1 000 m. There is a minimum operational depth of 400 m set for the fishery. Fishing grounds are located at least 780 km to the north of the licence blocks and there is, therefore, no spatial overlap of the licence blocks with the sector (see Figure 7-40).

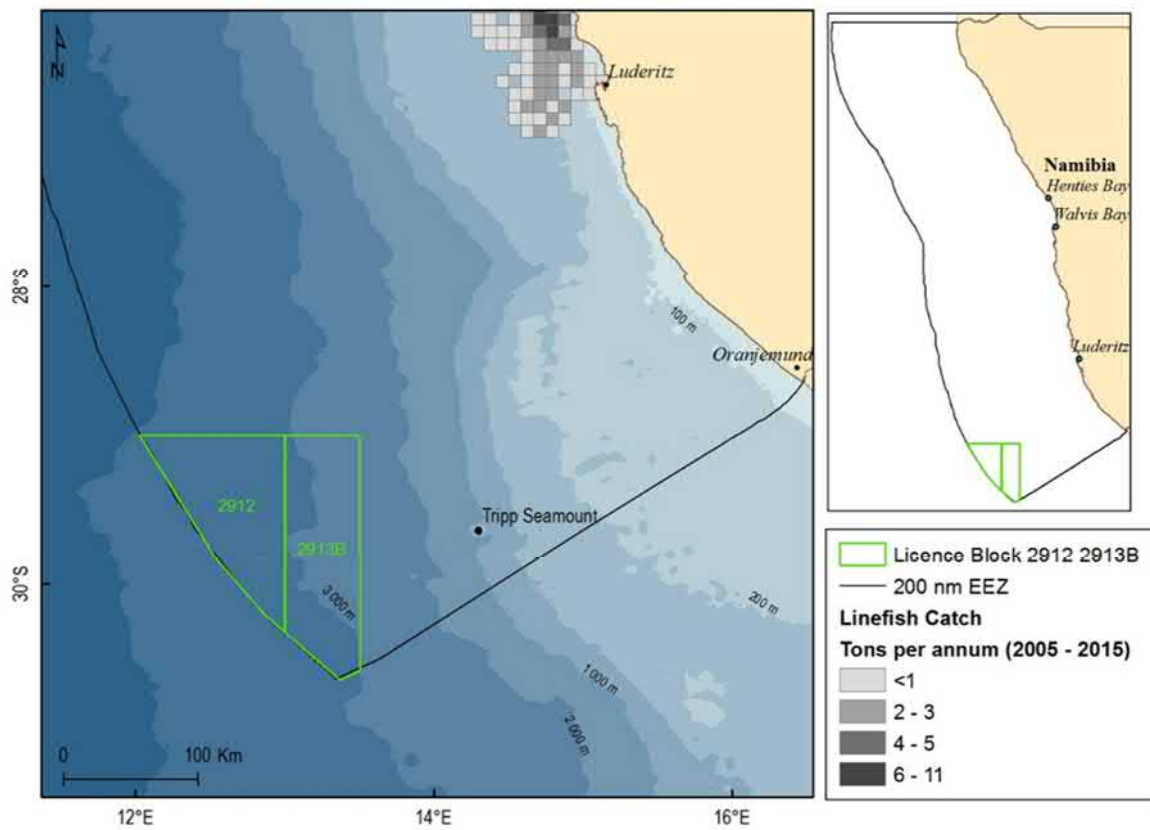


FIGURE 7-39: BLOCKS 2912 AND 2913B IN RELATION TO LINE-FISH FISHING CATCH (2005 - 2015)

Source: CapMarine

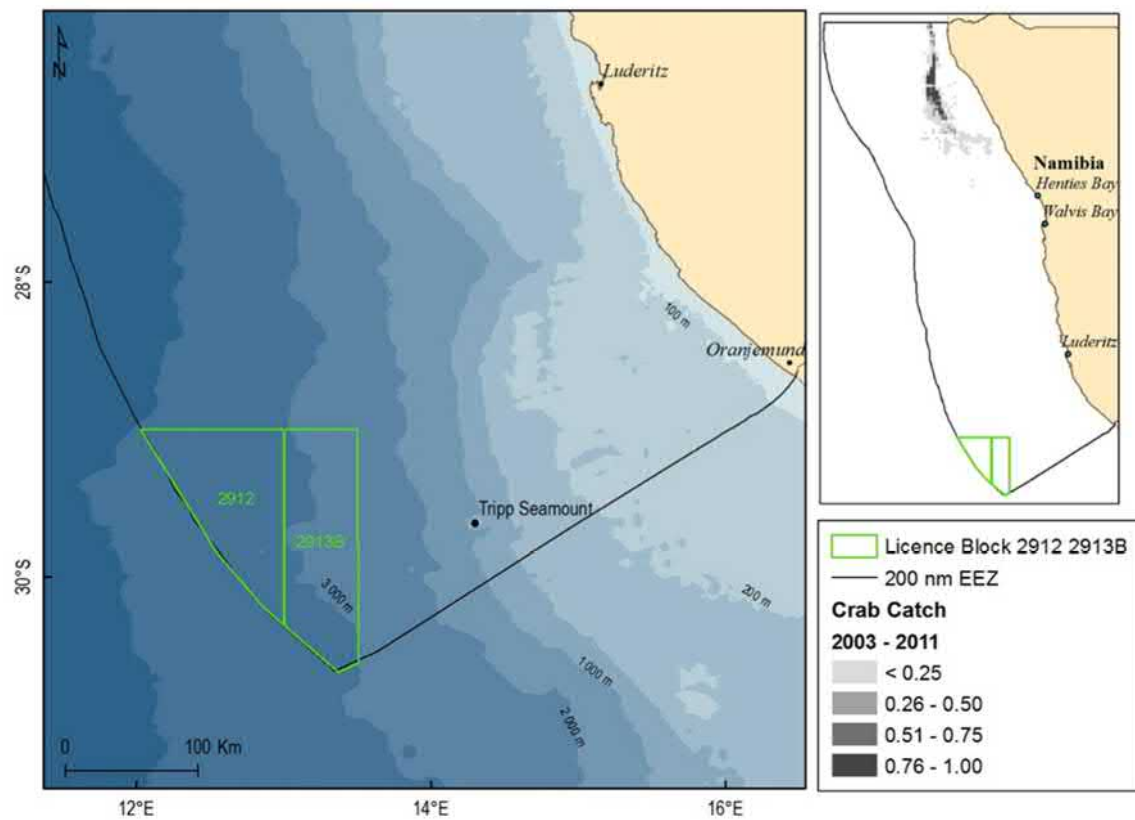


FIGURE 7-40: BLOCKS 2912 AND 2913B IN RELATION TO DEEP-SEA CRAB CATCH (2003 – 2011)

Source: CapMarine

Method of capture involves the setting of a demersal longline with a string of approximately 400 Japanese-style traps (otherwise known as “pots”) attached to each line. Traps are made of plastic and dimensions are approximately 1.5 m width at the base and 0.7 m in height. They are spaced 15 m apart and typically baited with horse mackerel or skipjack. The line is typically 6 000 m in length and weighted at each end by a steel anchor. A surface buoy and radar reflector mark each end of the line via a connecting dropper line that allows retrieval of the gear. Up to 1 200 traps may be set each day (or two to three lines) and are left to soak for between 24 and 120 hours before being retrieved. Schematic diagrams of the types of gear used within the fishery are shown in Figure 7-41.

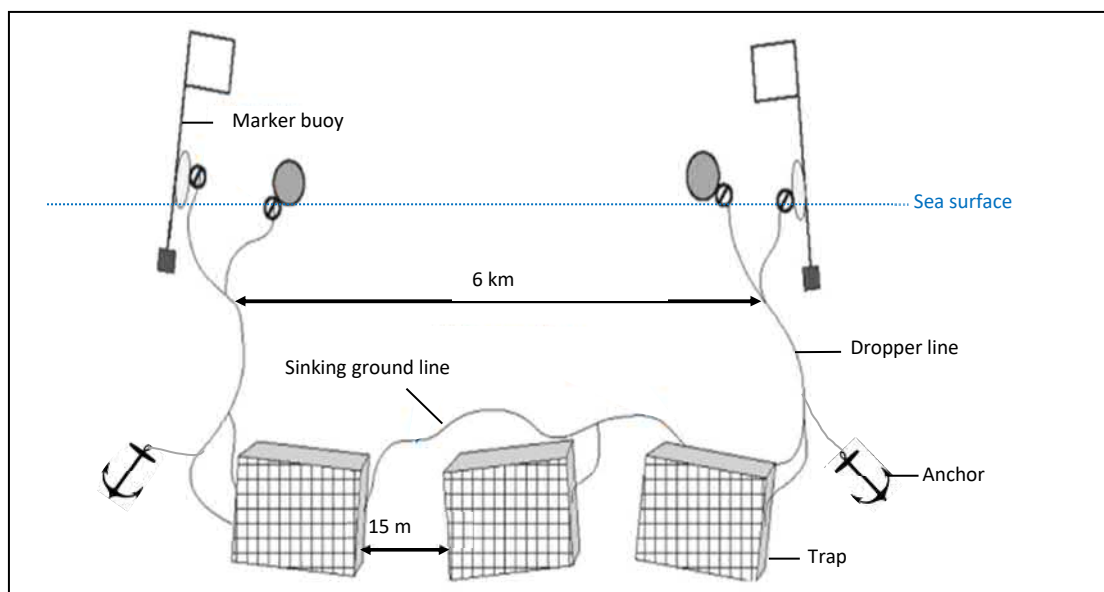


FIGURE 7-41: SCHEMATIC DIAGRAM OF THE GEAR CONFIGURATION USED WITHIN THE DEEP-SEA CRAB FISHERY

Source: adapted from <http://safinacenter.org>

7.5.6.10 West Coast Rock lobster

The West Coast rock lobster (*Jasus lalandii*) is commercially exploited within Namibian waters between the Orange River in the south to Easter Cliffs/Sylvia Hill north of Mercury Island (approximately 25°S). The fishery is spatially managed through the demarcation of catch grounds by management area. Recent TACs for 2014/15 and 2015/16 were set at 300 and 250 tons, respectively. The industry lands between 50% and 80% of the total TAC each season. The fishing season for rock lobster is a six-month period with a closed period extending from 1 May to 31 October. Highest fishing activity levels are experienced over January and February. This sector operates in water depths of between 10 and 80 m, thus well inshore of the licence area. Thus, no interference is expected with this fishery (see Figure 7-42).

Baited traps consisting of rectangular metal frames covered by netting are deployed from small dinghy's and delivered to larger catcher reefers to take to shore for processing. The rock lobster fishing fleet consists of vessels that range in length from 7 m to 21 m. Traps are set at dusk and retrieved during the early morning using a powerful winch for hauling.

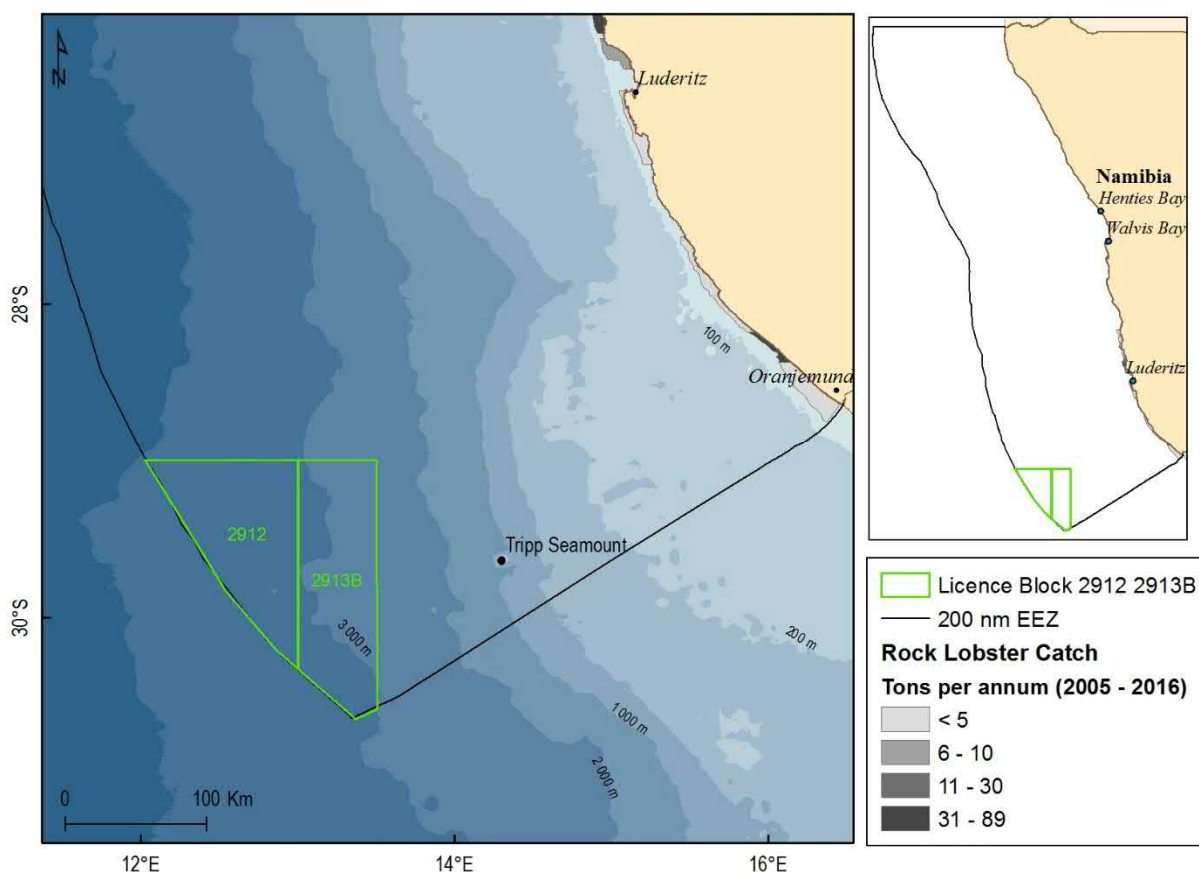


FIGURE 7-42: BLOCKS 2912 AND 2913B IN RELATION TO ROCK LOBSTER CATCH (2005 TO 2016)

Source: CapMarine

7.5.6.11 Mariculture

Namibia has a developing mariculture industry for oysters (*Crassostrea gigas* and *Ostrea edulis*), black mussel (*Choromytilus meridionalis* and *Mytilus Gallo-provincialis*), abalone (*Haliotis midae*) and seaweed (*Gracilaria gracilis*) (Oellermann, 2007). Mariculture methods vary but include rafts, suspended longlines, racks in ponds and onshore flow-through tanks. Mariculture operations along the Namibian coastline are concentrated around Oranjemund, Lüderitz, Walvis Bay and Swakopmund. These coastal towns are of particular importance for Namibia’s aquaculture industry due to their existing infrastructure and the shelter provided by the bays.

- Oranjemund: the abandoned diamond mine pits/ponds are used for the culturing of Pacific oysters (*Crassostrea gigas*). There was also a small-scale feeding and harvesting of marine finfish, mainly Steenbras (*Lithognathus lithognathus*).
- Lüderitz: NamPort has allocated 20 plots covering a total area of approximately 281 ha to mariculture (see Figure 7-43). Mariculture is aimed at oysters, with some experimental farming of mussels and rock lobsters. Abalone ranching takes place around the islands within the port limits.
- Walvis Bay: Mariculture production is mainly aimed at Pacific oysters, with one farm producing mussels (*Mytilus galloprovincialis*) for the local market, both using the longline method for cultivation. There are 27 licenced aquaculture sites in Aqua Park 1 (not all are operational), located east of Walvis Peninsula, covering a cumulative area of approximately 1 341 ha. In addition, there are two open water sites located

within the waters of Walvis Bay, one is located west of the Walvis Peninsula (known as Donkiesbaai) and the second is located approximately 13 km north-east of Pelican Point (known as Patrysborg).

- Swakopmund: The Swakopmund Municipality has earmarked a portion of land for mariculture purposes. There is one aquaculture producer in Swakopmund, which cultivates Pacific and European flat oysters (*Ostrea edulis*) in onshore holding ponds associated with the Salt Works, approximately 6.5 km north of Swakopmund. They use a variation of the rack and bag method for cultivation.

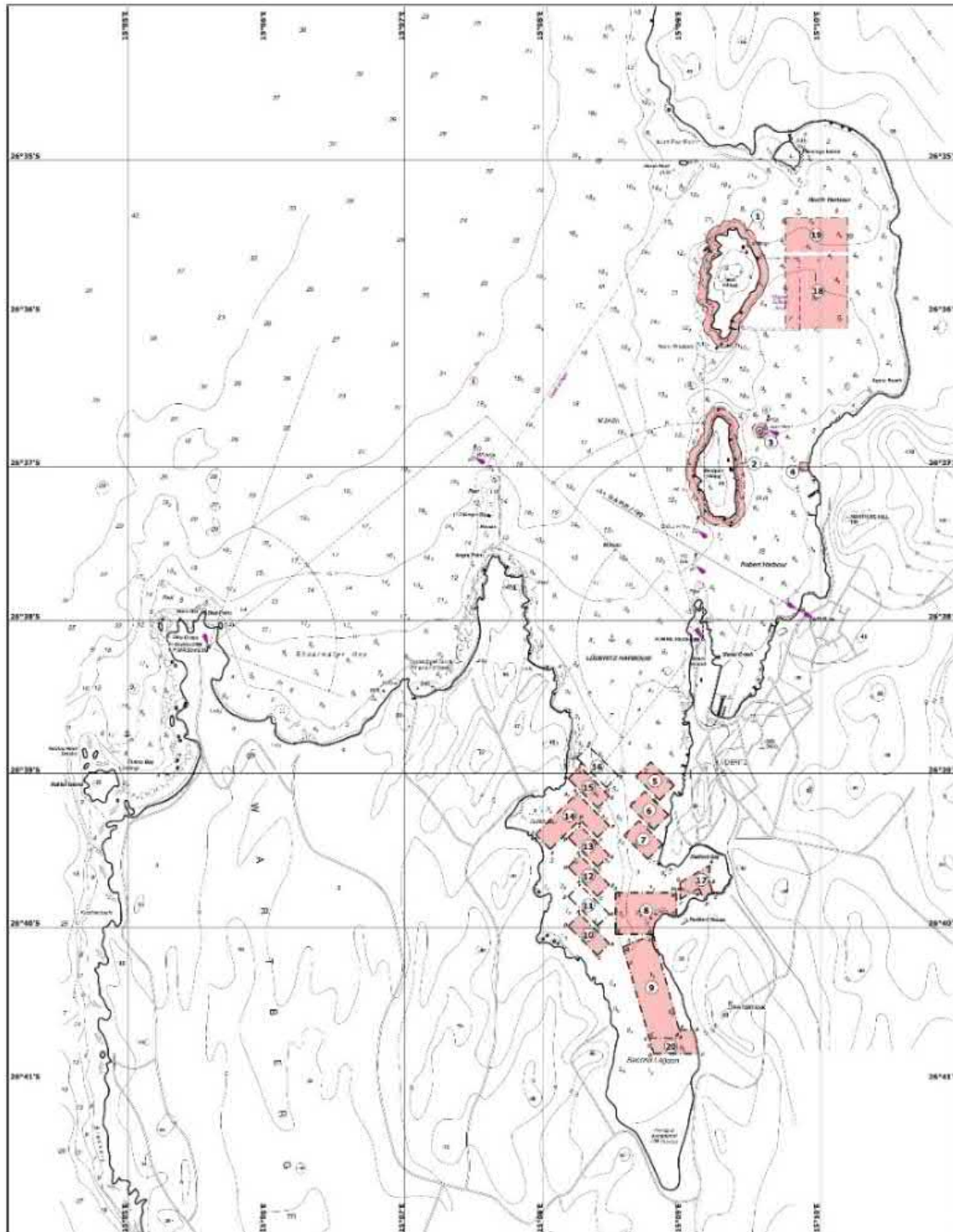


FIGURE 7-43: AREAS ALLOCATED FOR AQUACULTURE IN THE PORT OF LÜDERITZ

Source: Namibian Ports Authority, 2010

7.5.6.12 Fisheries research

MFMR conducts regular research (biomass) surveys for demersal, mid-water and small pelagic species. These surveys are normally fixed at specific times of the year and cover the entire continental shelf from the Angolan to South African maritime borders. Demersal trawl surveys normally take place over a one month period between January and February. In some years the Benguela Current Commission may conduct “transboundary” surveys. The method of abundance estimation from these surveys is based on depth stratification and trawls range in depth from 100 m to 600 m; thus, eastward of the licence blocks.

Scientific acoustic surveys are carried out between February and March each year to estimate the biomass of small pelagic species. These surveys cover the Namibian shelf from the coastline to the 500 m depth contour (and up to the 2 000 m contour northwards of 18°30′S). The vessel surveys along pre-determined transects that run perpendicular to depth contours (East-West / West-East direction).

7.5.7 Marine Traffic and Transport

There are various international shipping routes along the Namibian coastline. Most international shipping traffic is located on the outer edge of the continental shelf. Traffic inshore of the continental shelf largely comprises fishing and mining vessels, especially off the coast of Oranjemund, which is inshore of the licence area. The licence blocks are located on the western boundary of the main traffic routes that pass around southern Africa (see Figure 7-44).

The two main ports in Namibia are:

- Port of Walvis Bay: Walvis Bay is Namibia's largest commercial port and is a key port for regional and international shipping trade. It offers direct access to principal shipping routes and is a natural gateway for international trade. It has a sheltered deep-water harbour which benefits from a temperate climate. The port is operated by Namport and receives approximately 3 000 vessel calls each year and handles over 5.3 million tons of cargo.
- Port of Lüderitz: Lüderitz Port is historically Namibia's second largest port, functioning mainly as a fishing port. It has expanded in recent years to ship cargo from the mining industry and to support and service offshore petroleum exploration and diamond mining activities. Lüderitz is closest Namibian port to the licence blocks, approximately 310 km to the north-east.

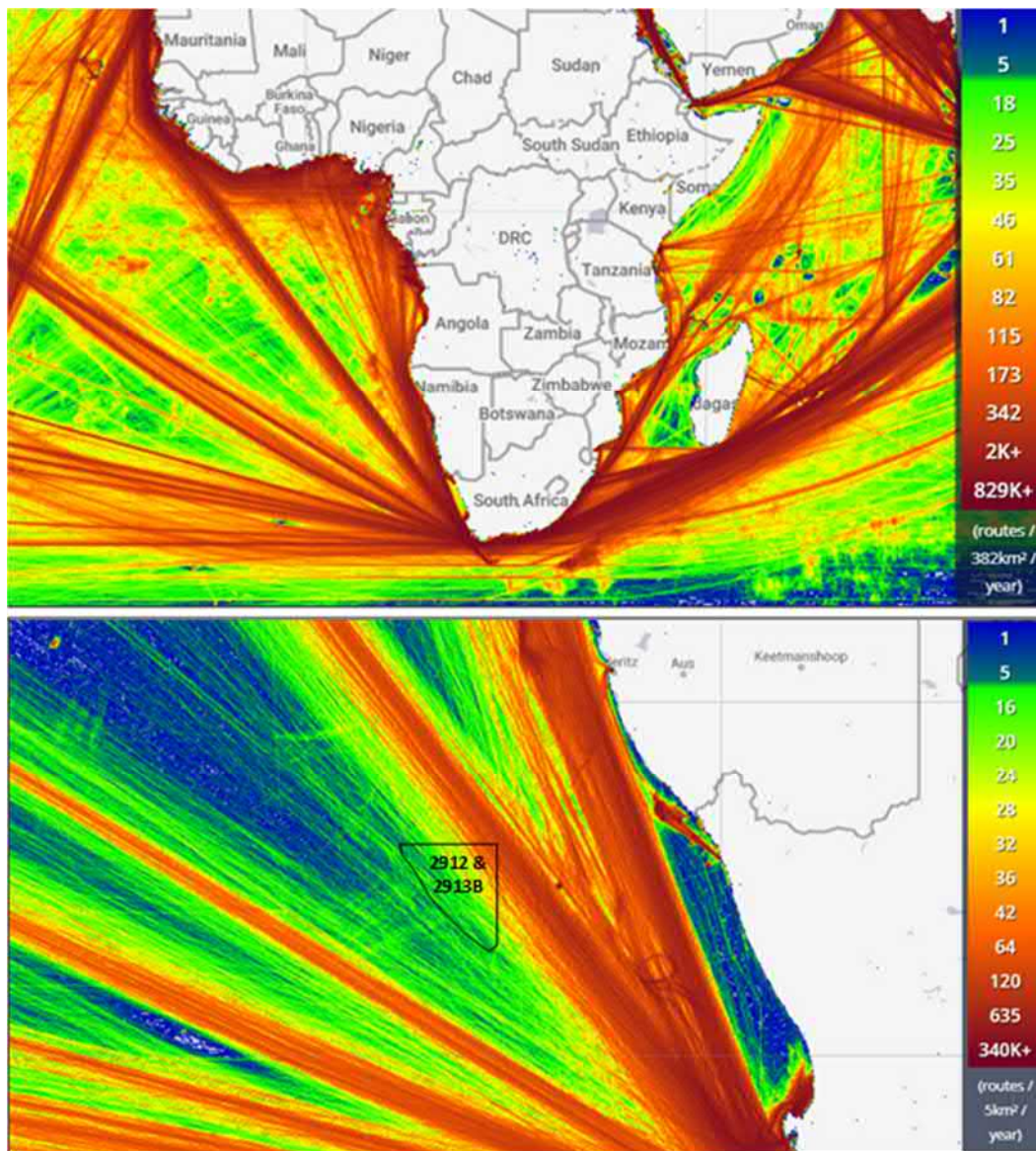


FIGURE 7-44: BLOCKS 2912 AND 2913B IN RELATION TO SHIPPING DENSITY AROUND SOUTHERN AFRICA
Source: <http://www.marinetraffic.com/> (accessed April 2020)

7.5.8 Prospecting and Mining

7.5.8.1 Oil and gas exploration and production

A summary of the oil and gas industry in Namibia is provided in Section 5.6. Namibian Licence Blocks and their respective holders are shown in Figure 7-45.

Numerous seismic surveys (2D and 3D) have been undertaken and wells have previously been drilled in the Namibian offshore (see Figure 7-46 to Figure 7-48). Previous exploration activities undertaken in Blocks 2912 and 2913B included a 2D seismic survey. This survey was undertaken by TGS (previously Spectrum) over the area (mainly Block 2912) in 2019. This data (1 097 km) was purchased and analysed by TEPNA. Based on the analysis of this data, TEPNA is currently planning to drill an exploration well in Block 2913B in mid-2020. The ECC for well drilling was issued in 2019.

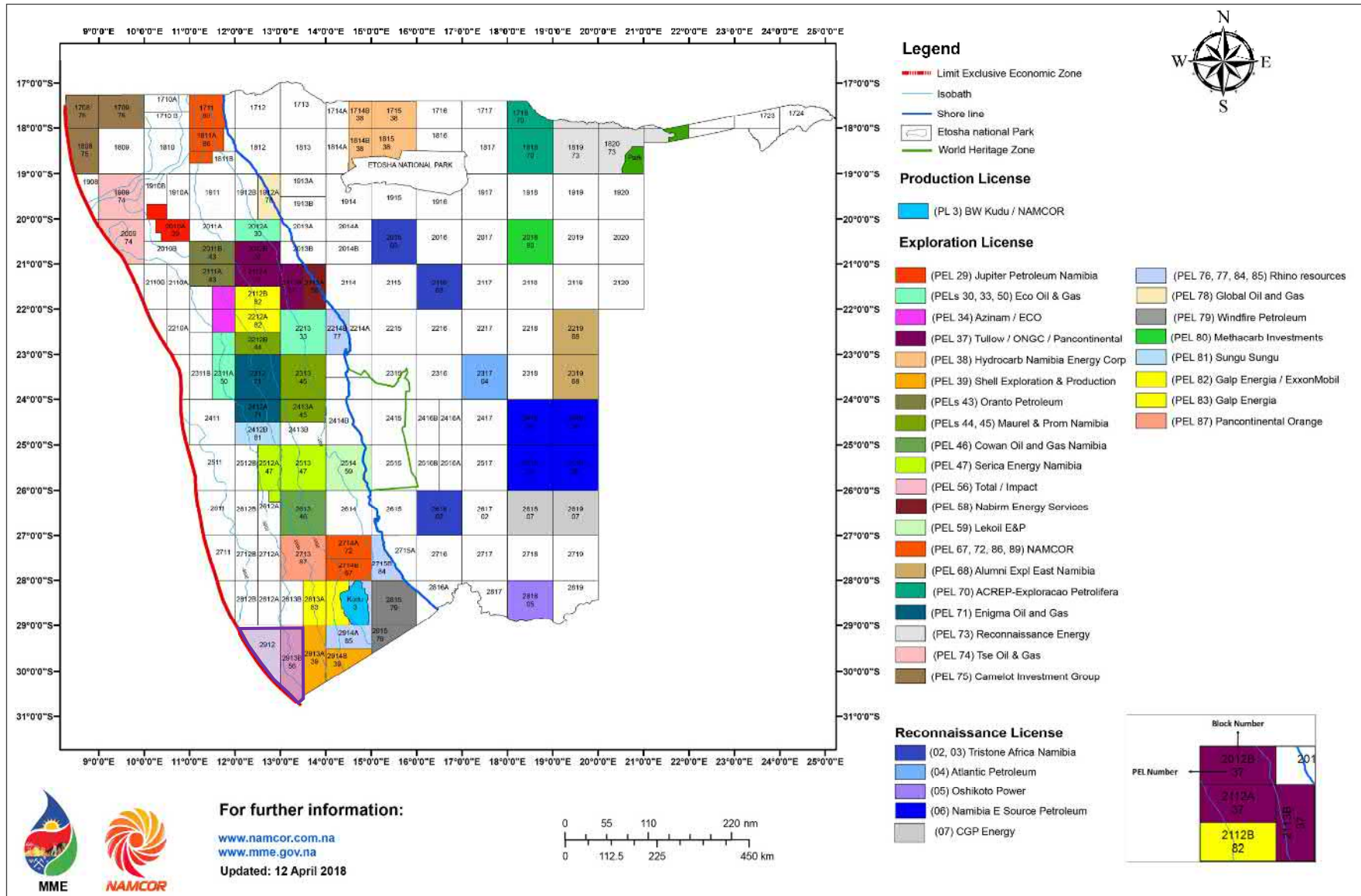


FIGURE 7-45: NAMIBIAN LICENCE BLOCKS AND THEIR RESPECTIVE LICENCE HOLDERS

Source: <http://www.mme.gov.na/maps/>

NAMIBIA 2D BASE MAP AUGUST 2017

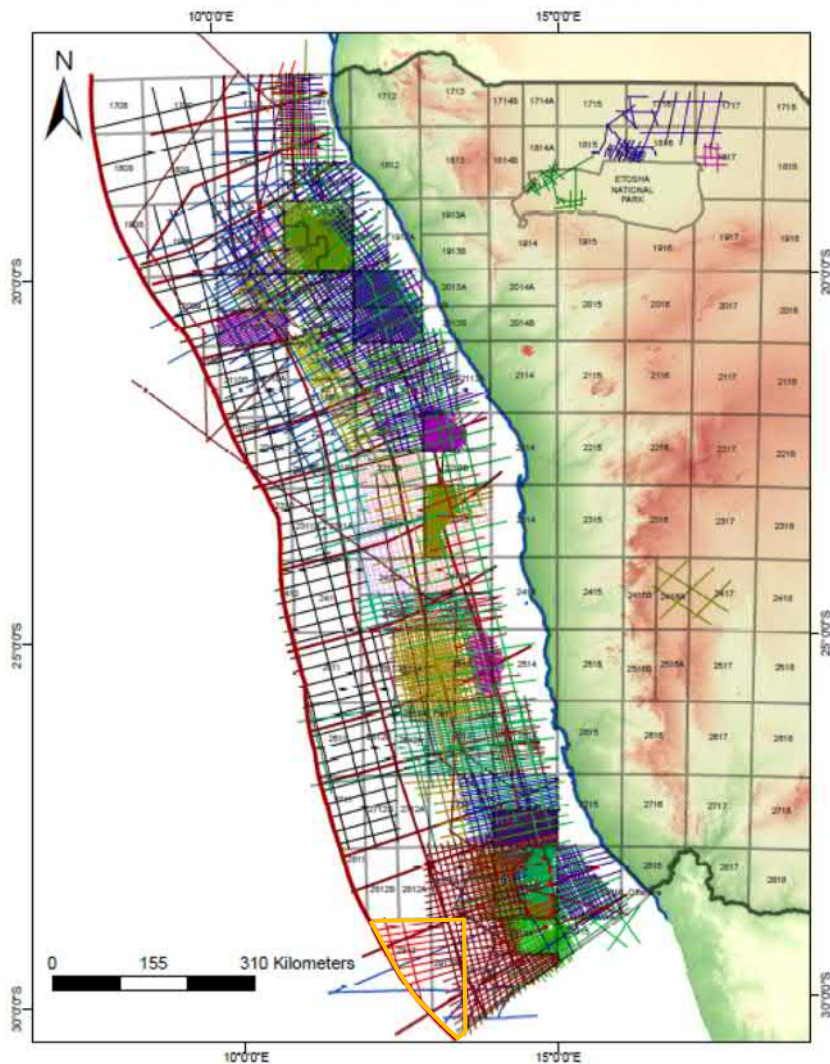


FIGURE 7-46: BLOCKS 2912 AND 2913B IN RELATION TO NAMIBIAN 2D SEISMIC SURVEYS

Source: <http://www.mme.gov.na/maps/>

NAMIBIA 3D BASE MAP AUGUST 2017

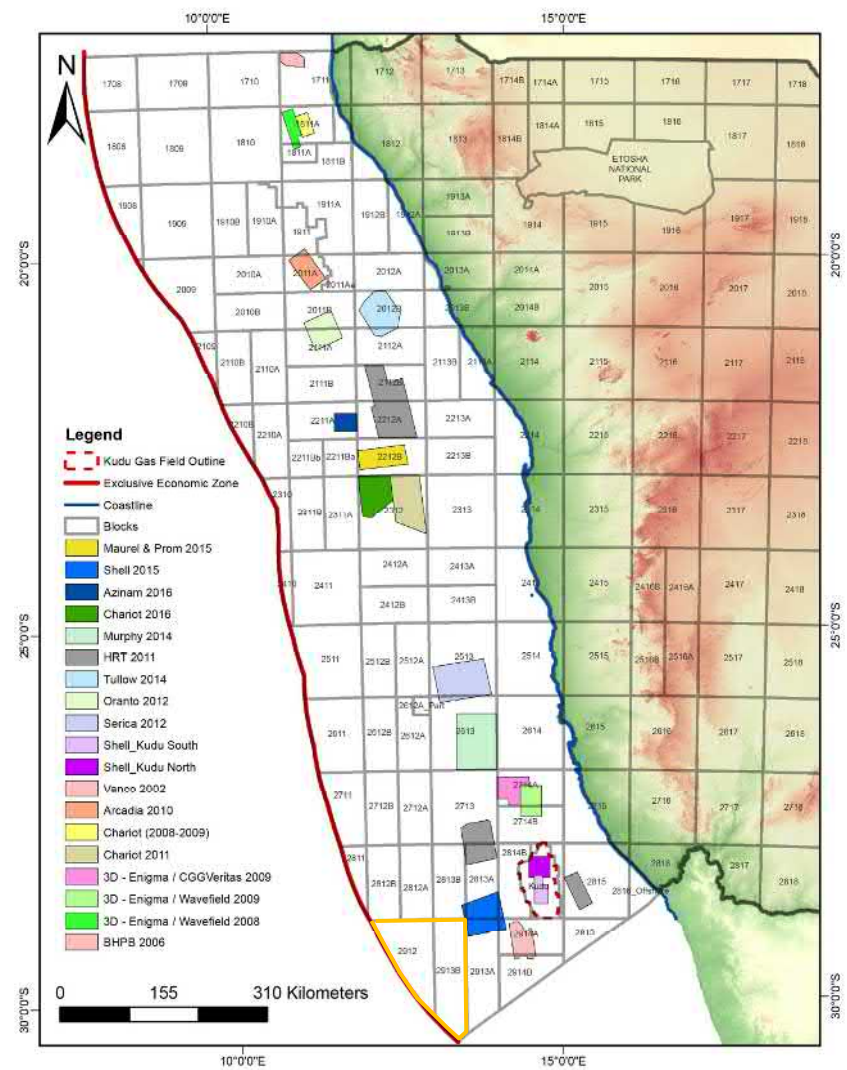


FIGURE 7-47: BLOCKS 2912 AND 2913B IN RELATION TO NAMIBIAN 3D SEISMIC SURVEYS

Source: <http://www.mme.gov.na/maps/>

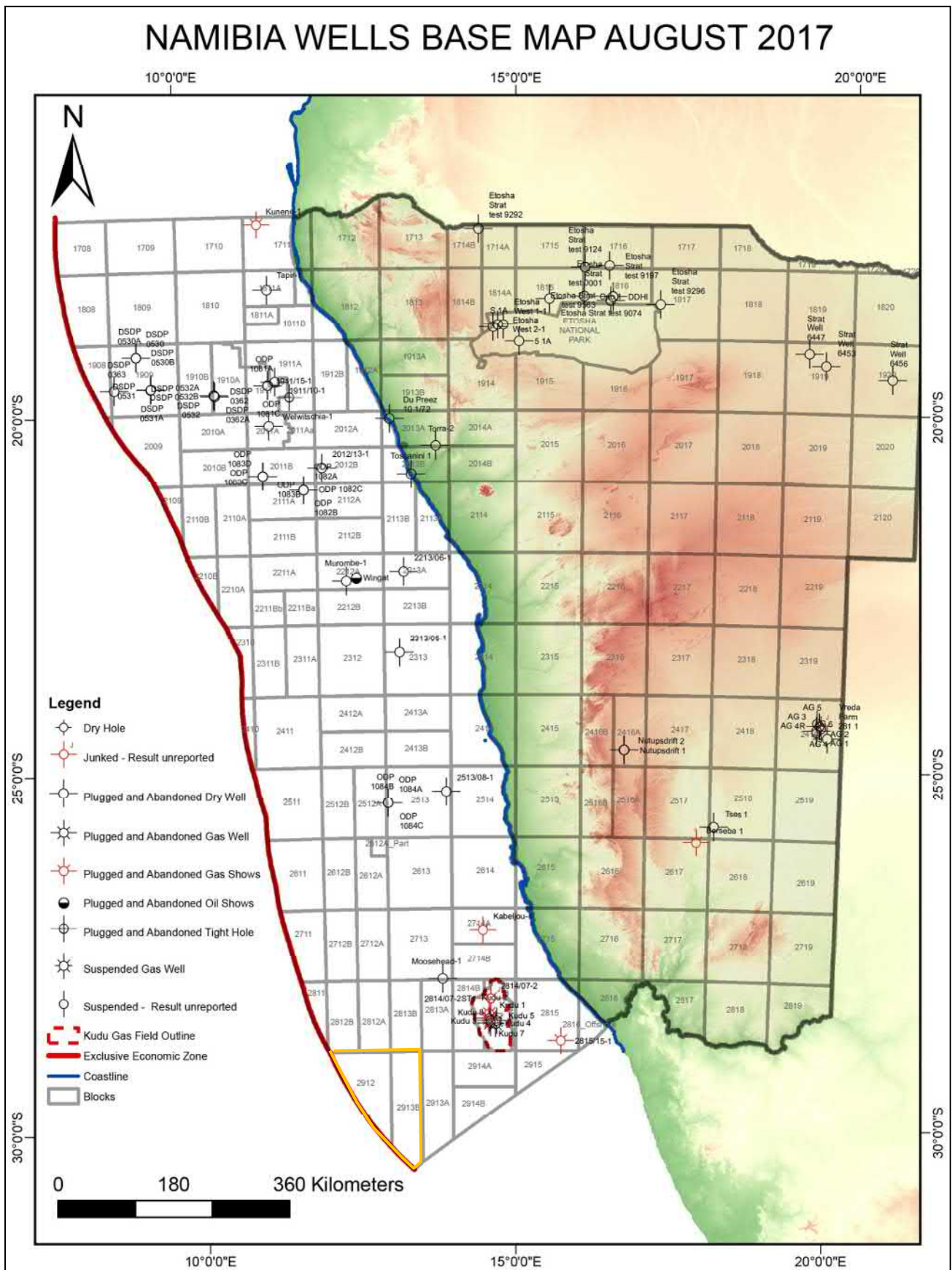


FIGURE 7-48: BLOCKS 2912 AND 2913B IN RELATION TO NAMIBIAN OFFSHORE WELLS

Source: <http://www.mme.gov.na/maps/>

7.5.8.2 Diamond prospecting and mining

Marine diamonds are mined along the Southern African West Coast from the Olifants River mouth northwards to Walvis Bay. Diamonds are mined either:

- in shallow waters (less than 30 m depths) by shore-based divers or small vessel-based divers who employ suction pipes to deliver gravel to land for sorting;
- in the midwater (30 - 70 m depth) region, where remote operated tools are used; or
- in deep waters, where custom mining equipment (undersea crawlers and large rotating drills) and high-pressure airlift suction is used in waters depths of over 75 m.

Marine diamond mining is currently limited to the southern half of the Namibian offshore. Diamond Mining Licence (ML) Areas well inshore of the licence blocks are shown in Figure 7-49. Current diamond mining activities are minimal to non-existent, with the only active operations being in ML-47 (Atlantic 1) held by Debmarine Namibia. Deep-water diamond mining operations in the Atlantic 1 Mining Licence Area are typically conducted to depths of 150 m.

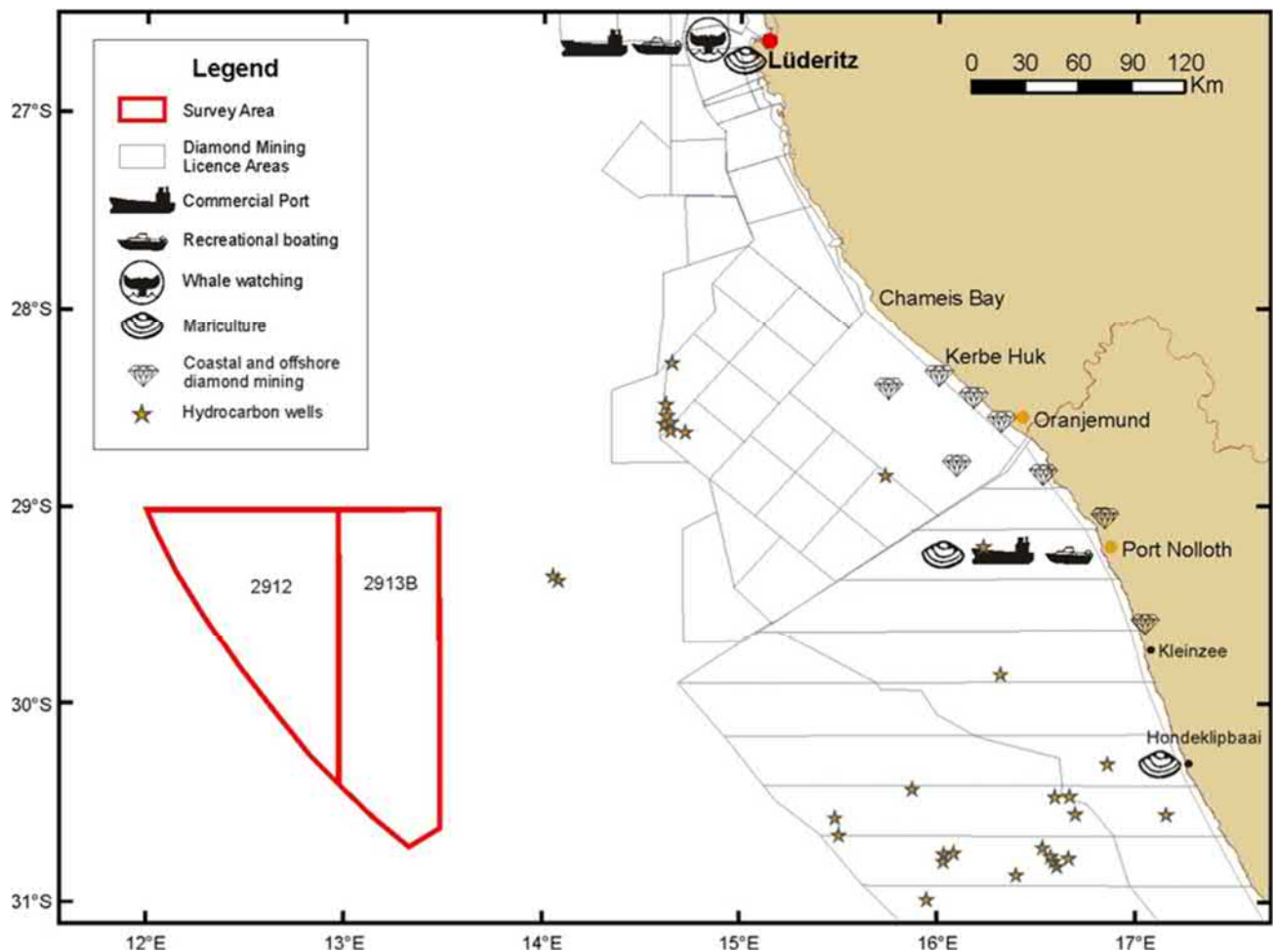


FIGURE 7-49: BLOCKS 2912 AND 2913B IN RELATION TO EXISTING INDUSTRIES AND OTHER USERS IN THE COASTAL REGION ON THE NAMIBIAN COAST

Source: Pisces

7.5.8.3 Phosphate prospecting and mining

Phosphate deposits off Namibia were delineated during regional studies in the 1970's, but have remained undeveloped to date. The deposits occur as unconsolidated seafloor sediments, which can be efficiently mined by applying currently available dredging technology. Preliminary reconnaissance sampling by Bonaparte Diamond Mines NL during 2007 demonstrated potential for enrichment to commercial grades (up to 35% P₂O₅) (Mining Review Africa. 2008).

In 2011, the MME granted mining licences to two companies Namibian Marine Phosphate (NMP) and LL Namibia Phosphates for licence areas located south-west of Walvis Bay (https://cer.org.za/wp-content/uploads/2016/06/CER_Factsheet3_web.pdf). Strong opposition to the granting of these rights resulted in the Namibian government establishing a moratorium on offshore phosphate mining. A condition of the moratorium was that an independent and comprehensive EIA must be conducted.

In 2016, NMP was awarded an Environmental Clearance Certificate to mine offshore phosphates. Strong reaction to the issuing of the certificate resulted in legal action in which the High Court set-aside the Environmental Clearance Certificate on concerns relating to the local fishing industry (specifically monk fish) and the environment (Perks, 2016). However, in May 2018 NMP received a further High Court judgment; winning back its Environmental Clearance Certificate for its marine phosphate EIA. Further legal action has since been ongoing regarding the validity of the mining licence (Russell, 2018).

7.5.9 Recreational Use

Traditional recreational coastal pursuits are less popular in this region than in many other coastal areas because of the cold water and generally cool, foggy climate. Coastal recreation may be either consumptive or non-consumptive. Due to access restrictions along the coastline between Lüderitz and Oranjemund (part of the Namdeb mining area) no recreational activities occur within this area.

7.5.9.1 Consumptive

Consumptive recreational uses involve collection of material from the sea for personal use. Recreational anglers (Brouwer *et al.*, 1997) and divers target line-fish from either a boat or the shore, with shore-based divers also targeting West Coast rock lobsters. Rock lobsters are also exploited recreationally from boats with the use of hoop nets. Consumptive recreational use is carried out more regularly near coastal settlements (e.g. Henties Bay), although is of a limited nature off the coast of Namibia, largely due to access restrictions imposed by diamond mining concessions.

7.5.9.2 Non-consumptive

Tourism is a major contributor (14.5%) to Namibia's GDP, creating approximately 18% of all employment (directly or indirectly). Offshore recreational and tourist activities which take place in the areas around Walvis Bay and Lüderitz include recreational boating, boat tours (including whale watching) and recreational angling. Since the licence blocks are located approximately 310 km south-west of Lüderitz, these activities occur well inshore and would not be impacted by proposed seismic operations.

7.5.10 Other Human Use

7.5.10.1 Undersea cables

There are a number of submarine telecommunications cable systems across the Atlantic and the Indian Ocean (see Figure 7-50), four of which land pass through Namibian waters, namely the African Coast to Europe (ACE), the West Africa Cable System (WACS), Eastern Africa Submarine Cable System (EASSy) and South Atlantic Telecommunications cable No.3 / West African Submarine Cable / South Africa Far East (SAT3/WASC/SAFE). Both the ACE and WACS have cable landings and connections at Swakopmund.

Where seafloor conditions permit, the cables are buried 0.7 m below the seafloor from the landing points to 1 000 m water depth. There is an activity exclusion zone applicable to the telecommunication cables one nautical mile (approximately 1.9 km) each side of the cable in which no anchoring is permitted.

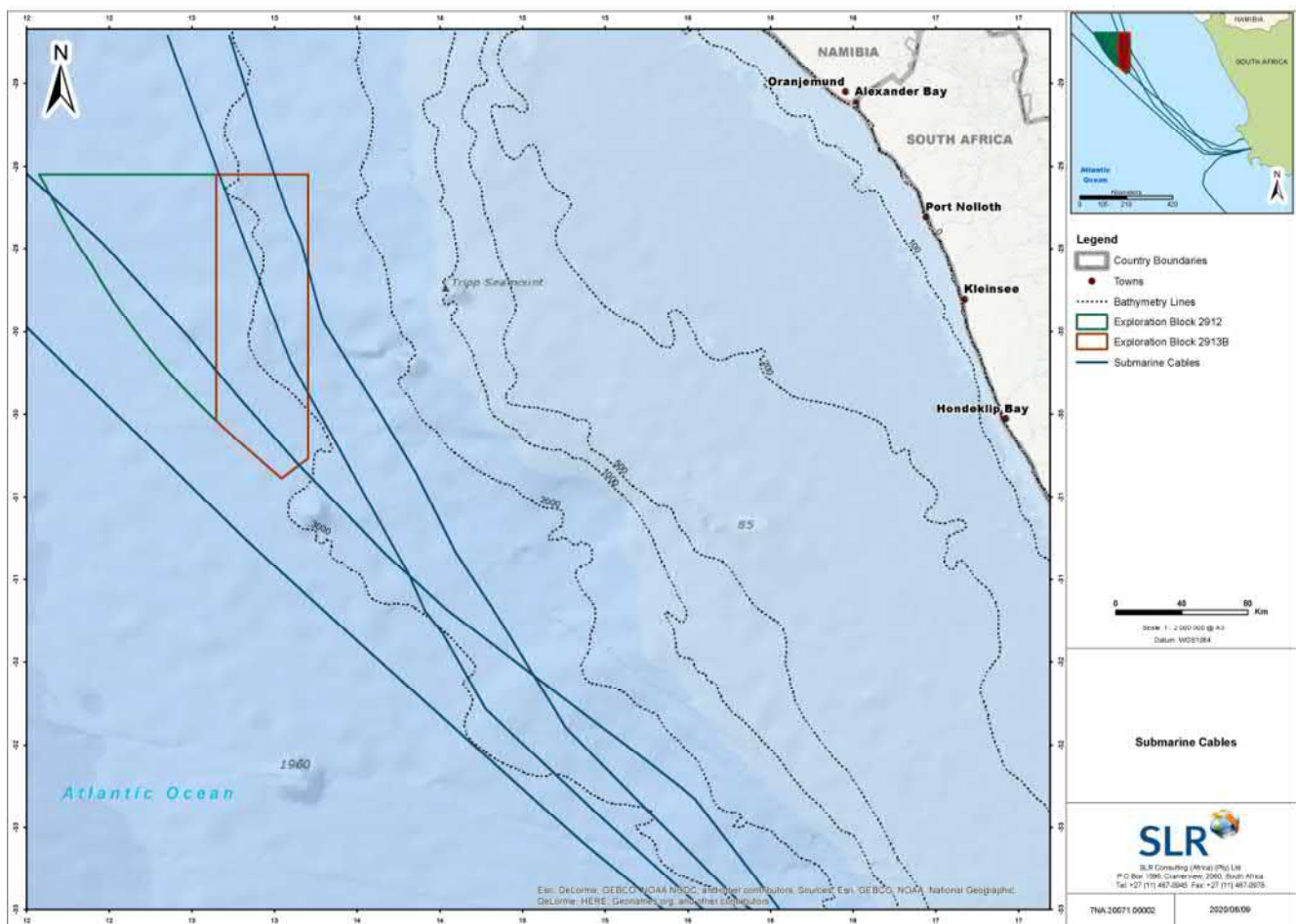


FIGURE 7-50: BLOCKS 2912 AND 2913B IN RELATION TO SUBMARINE CABLES

7.5.10.2 Marine Cultural and Heritage Resources

There are a number of shipwrecks located along the Namibian coastline. In Namibian waters, wrecks older than 50 years are declared national monuments. The majority of identified shipwrecks occur close to the coastline (Turner, 1988) and are not likely to be present in the licence blocks. However, because most of the sites described on the shipwreck list have been documented only through survivor accounts, archival descriptions and eyewitness reports, many remain uncharted and undiscovered. It is not, therefore, possible to provide accurate

location data. Although no wrecks are known to occur in the licence area based on available information, the possibility of identifying new shipwrecks remains, although of very low probability.

7.5.10.3 Guano harvesting

There is limited guano harvesting on guano platforms off the coast of Namibia. A 1.7 ha wooden platform is located approximately 200 m offshore between Swakopmund and Walvis Bay (see Figure 7-51). North of Swakopmund at the Salt Pans and at Cape Cross, a further two platforms (4 ha each) have been erected (ref. <http://www.namibweb.com/guano.htm>, 6 Feb 23017). These sites are located well to the north-east of the licence area and would not be affected by the proposed seismic activities.



FIGURE 7-51: GUANO PLATFORM OFF THE COAST OF NAMIBIA BETWEEN SWAKOPMUND AND WALVIS BAY

Source: <https://freeassociationdesign.wordpress.com/2010/09/10/islands-and-post-peak-guano>

8 ENVIRONMENTAL AND SOCIO-ECONOMIC SCREENING AND KEY IMPACTS

This chapter provides a high-level screening of the interaction between the project activities and the receiving environment. It also presents a project-specific Aspects and Impacts Register, which has been developed to ensure that all environmental and social aspects of the proposed operation and the associated impacts are identified.

Lastly, this chapter also presents the key impacts identified by the EIA project team. This list of impacts will be finalised once the Scoping Phase public participation process has been completed (see Section 4.2).

Specialists will be required to confirm these potential impacts, as well as identify any others, and assess the significance thereof.

8.1 ENVIRONMENTAL AND SOCIAL INTERACTION MATRIX

The environmental and social interaction matrix prepared for the proposed project is presented in Table 8-1.

The Matrix provides a list of the project activities and allows for easy checking of interaction against components of the receiving environment. Each box denotes whether or not a proposed project activity will interact with the corresponding environmental or socio-economic receptor. Interactions are screened to have a “*minor negative interaction*”, “*moderate / major negative interaction*” or “*positive interaction*” on the receptor.

Most of project activities are considered to have a minor negative interaction with the environment mainly due to the offshore location of the licence area, 240 km from the coast at the closet point, and the short survey duration of up to four months (including downtime). The key project activities during normal operation that need to be investigated are related to the seismic operation itself, specifically the noise impact on marine fauna and fishing.

8.2 ASPECTS AND IMPACTS REGISTER

The project-specific Aspects and Impacts Register developed for the proposed project is presented in Table 8-2. This register lists all project activities and associated environmental aspects and impacts.

“Aspect” and “impact” are defined as follows:

- An “aspect” is the element of an organisation’s activities, products or services that can interact with the environment.
- An “impact” is any change to the environment, whether adverse or beneficial, wholly or partially resulting from the organisation’s activities, products or services.

TABLE 8-1: ENVIRONMENTAL AND SOCIAL INTERACTION MATRIX

Project Phase	Project Activities	Sensitive receptors in the receiving environment															
		Physical			Biological						Socio-economic						
		Water Column (including Water Quality, Noise and Turbidity)	Atmosphere (including Air Quality, Noise and Lighting)	Seabed Sediment and Profile	Fish and Plankton Communities	Benthic Habitats and Communities	Sea and shore birds	Turtles and Marine Mammals	Seabed Features and Seamounts	Nearshore Habitats and Communities	Protected Area (Offshore and Coastal)	Fishing	Maritime Heritage	Marine Traffic / Navigation	Public Health and Safety	Infrastructure and Services	Settlements, Tourism and Recreation
Planned Activities (Normal Operation)																	
Seismic Surveying	Mobilisation	Transit of survey vessels to survey area, including routine discharge to sea															
		Discharge of ballast water															
	Operation	Operation of survey vessels, including routine discharge to sea															
		Seismic acquisition, including the deployment of seismic equipment (sources and streamers) and acquisition operations															
		Provision of services from local service providers (e.g. catering and refuelling)															
		Berthing during crew changes															
	Demobilisation	Operation of helicopters															
Survey vessels leave survey area and transit to port or next destination																	
Unplanned Activities (Emergency Event)																	
All	Vessel accident																
Operation	Dropped objects / lost equipment																
	Hydrocarbon spills during bunkering (minor)																
Colour key:																	
	No interaction		Minor negative interaction		Moderate / major negative interaction		Positive interaction										

TABLE 8-2: ASPECTS AND IMPACTS REGISTER

Activity Phase	Activity	Aspect	Potential Impact				
Seismic Surveying	Mobilisation Phase	Transit of survey vessels to survey area	Underwater noise levels	Disturbance of behaviour (foraging and anti-predator) and physiology of marine fauna			
			Air emissions and local reduction in air quality due to exhaust gases	<u>Contribution to global greenhouse gas emissions</u>			
			Routine discharge to sea (e.g. deck and machinery space drainage, sewage and galley wastes) and local reduction in water quality	Physiological effect on marine fauna Increased food source for marine fauna Increased predator - prey interactions			
			Discharge of ballast water and introduction of invasive alien species	Loss of biodiversity			
	Operation Phase	Operation of survey vessels	Increase in underwater noise levels	Disturbance / behavioural changes to marine fauna Fish avoidance of key feeding areas Reduced fish catch and increased fishing effort for local commercial fisheries <u>Reduced employment or income related to impacted commercial fisheries</u>			
				Routine discharge to sea (e.g. deck and machinery space drainage, sewage and galley wastes) and local reduction in water quality	Physiological effect on marine fauna Increased food source for marine fauna Fish aggregation and increased predator - prey interactions		
					Exclusion zone around survey vessel	Disruption of shipping routes by ships having to make detours Reduced fishing grounds and catch	
				Increase in ambient lighting	Disorientation and mortality of marine birds Increased predator - prey interactions		
			<u>Local employment and local business opportunities</u>		Income for local service providers and suppliers		
			Seismic acquisition	Increase in underwater noise levels	Physiological effect on marine fauna Disturbance / behavioural changes to marine fauna <u>Masking of environmental sounds and communication</u> <u>Effects on predators or prey interactions</u> Fish avoidance of key feeding areas Reduced fish catch and increased fishing effort		
		Provision of services (e.g. catering and refuelling)			<u>Local employment and local business opportunities</u> Income for local service providers and suppliers		
		Berthing during crew changes			<u>Local employment and local business opportunities</u> <u>Use of local services and facilities</u> Income for Namport and local service providers and suppliers <u>Pressure on local services and facilities</u>		
					Operation of helicopters	Increase in noise levels Avoidance of key breeding areas (e.g. coastal birds and cetaceans) Abandonment of nests (birds) and young (birds and seals)	
		Demobilisation Phase				Survey vessels leave survey area and transit to port or next destination	Increase in underwater noise levels during transit
					Air emissions and local reduction in air quality due to exhaust gases		Potential contribution to cumulative impact on local air quality
			Routine discharge to sea (e.g. deck and machinery space drainage, sewage and galley wastes) and local reduction in water quality during transit	Physiological effect on marine fauna Increased food source for marine fauna Increased predator - prey interactions			

Activity Phase	Activity	Aspect	Potential Impact
Unplanned Activities	Vessel accident	Release of fuel into the sea and localised reduction in water quality	Effect on faunal health (e.g. respiratory damage) or mortality (e.g. suffocation and poisoning)
		Collision with recreational fishing and pleasure vessels	<u>Exclusion of fisheries and displacement of targeted species</u>
	Dropped objects / Lost equipment	<u>Obstruction on seafloor or in water column</u>	Public health, safety and security impacts
			Physical damage to and mortality of benthic species / habitats
	Small spills	Discharge of fuel into sea during bunkering and localised reduction in water quality	Obstruction to or damage of fishing gear
			Effect on faunal health (e.g. respiratory damage) or mortality (e.g. suffocation and poisoning)
<u>Exclusion of fisheries and displacement of targeted species</u>			

8.3 KEY ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACTS

The key impacts related to the proposed project are listed below. These impacts will require specialist input in order to assess the significance thereof.

8.3.1 Effect on Marine Ecology and Fauna

The proposed project could result in the following potential effects on marine ecology and fauna:

- Localised reduction in air quality due to emissions from the combustion of diesel fuel for vessel engines, aviation fuel for aircrafts and helicopters, as well as the incineration of wastes;
- Localised reduction in water quality due to normal discharges, as per MARPOL requirements, to the marine environment from a variety of sources, including deck drainage, machinery space drainage, sewage and galley wastes from the survey vessels;
- Introduction of alien invasive marine species through ballast water discharge;
- Seismic noise could have the following impacts on marine fauna:
 - physiological injury (e.g. permanent hearing threshold shift - PTS)⁶ and temporary hearing threshold -TTS⁷) and mortality;
 - disturbance and / or behavioural changes;
 - masking of environmental sounds and communication;
 - disturbance to spawning and recruitment; and
 - effects on predators-prey relationships.
- Possible effects of seismic noise on seabed and seamounts communities, as well as protected areas;
- Localised disturbance of and / or behavioural changes to marine fauna due to noise and lighting from the survey vessels and helicopter operations; and
- Localised and regional effect on water quality, marine fauna, benthic communities and oiling of seabirds due to accidental oil spills during normal operations (e.g. bunkering at sea), as well as the unlikely event of a vessel collision or dropped objects/lost of equipment.

How issue will be addressed in the EIA:

A marine fauna impact assessment will be commissioned to assess the potential impacts on marine fauna. The terms of reference for this assessment are presented in Section 9.3.3.

To assess the potential noise impact on marine fauna from seismic activities, input will be obtained from a noise specialist (see Section 9.3.2). This input will aim to, *inter alia*, describe the likely background noise levels, determine noise transmission loss with distance from the survey area, and zones of impact relating to PTS, TTS and behaviour.

⁶ PTS - Permanent hearing Threshold Shift, i.e. permanent hearing loss as the potential physical effects on the auditory system due to high level of noise exposure.

⁷ TTS - Temporary hearing Threshold Shift, i.e. temporary hearing loss as the potential physical effects on the auditory system due to high level of noise exposure.

8.3.2 Effect on Commercial Fisheries

The proposed project could potentially affect commercial fishing activities, as a result of the proposed 500 m exclusion zone around the survey vessel, seismic noise, and accidental oil spills during bunkering or the unlikely event of a vessel collision. Potential issues include:

- Disturbance / behavioural changes to fish;
- Displacement of fishing activities;
- Loss-of-access to fishing grounds;
- Increased fishing effort; and
- Loss of catch.

How issue will be addressed in the EIA:

A commercial fisheries impact assessment will be commissioned to, *inter alia*, determine the fishing effort and catch of all fisheries operating off the coast of Namibia in relation to the licence blocks and the survey area. The terms of reference for the commercial fisheries impact assessment are presented in Section 9.3.4.

The commercial fisheries assessment, as will be undertaken for the marine fauna impact assessment, will use the findings of the noise assessment to assess the potential impact on commercial fish from seismic activities (see Section 9.3.2).

8.3.3 Effect on the Socio-Economic Environment

The proposed project could have localised direct and in-direct economic and social costs and benefits. Potential issues include:

- Loss of employment and income related to the disruption of commercial fisheries (as described above): Any substantive impact on commercial fishing would have a knock-on effect for individuals who rely on fishing for employment and wage income. This is particularly pertinent for households in Walvis Bay and Lüderitz, as both towns support substantial populations that are employed in the commercial fisheries sector. In addition, both towns will have both secondary and tertiary industries that provide services to the fisheries sector, therefore they considered sensitive to any disruption to local commercial fishing.
- Promoting local employment and local business development: The exploration activities will have limited positive spin-offs related to providing local employment and local business development opportunities due to the highly technical nature of seismic surveys and the requirement for specialised services. Lüderitz or Walvis Bay will likely see limited benefits related to local services that will be required for the seismic vessels such as crew accommodation, meals, basic goods and refuelling.
- Use of local services and facilities: The provision of services as well as berthing during crew changes may result in the use of local services and both private and public facilities. There may be increased pressure on such services and facilities if they do not have sufficient capacity to support the exploration activities.
- Collisions with Recreational Fishing and Pleasure Vessels (Public Health and Safety): Although seismic activities will be undertaken approximately 250 km from the Namibian coastline, support vessels will dock at either Walvis Bay or Lüderitz for refuelling, restocking, repairs and crew changes. The movement of the support vessels between the licence blocks and the two port towns may result in some limited interaction with recreational fishing boats, pleasure crafts and other marine recreational activities during the approach of the seismic vessels to the two ports. This could result in vessel strikes or accidents, which is deemed a public health and safety risk.

How issue will be addressed in the EIA:

A social impact assessment will be commissioned to assess the social and economic impacts and benefits associated with the proposed project. The terms of reference for the social impact assessment are presented in Section 9.3.5.

9 TERMS OF REFERENCE FOR THE DETAILED ASSESSMENT

In terms of the EIA Regulations 2012, the terms of reference for detailed assessment must be set out in the Scoping Report. This chapter sets out the plan of study for the EIA and ESMP.

9.1 DESCRIPTION OF THE TASKS PLANNED FOR THE EIA PHASE

An overview of the EIA and public consultation process, highlighting each phase and corresponding activities, is provided in Chapter 3 and 4, respectively. An outline of the planned specialist investigations is included in Section 9.3 below.

The specialist findings, mitigation, recommendations and other relevant information will be integrated into an EIA Report and ESMP. The ESMP will provide recommendations on how to establish, operate, maintain and close the proposed project throughout all relevant phases of the project activities. The aim of the ESMP will be to ensure that the project activities are managed to avoid or reduce potential negative environmental impacts and enhance potential positive environmental impacts. The ESMP 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 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 9.5.

9.2 ALTERNATIVES TO BE CONSIDERED

The project scope to be considered and assessed in the EIA is the proposed project as described in Chapter 6. A summary of the project alternatives that will be considered during the EIA is provided in Section 6.7.

9.3 SPECIALIST STUDIES TO BE UNDERTAKEN

Four specialist studies will be commissioned to address the key impacts that require further investigation and detailed assessment. These include:

- Marine Noise Modelling Study;
- Marine Fauna Impact Assessment;
- Commercial Fisheries Impact Assessment; and
- Social Impact Assessment.

The specialist Terms of Reference for these studies are presented in Section 9.3.1 to 9.3.5 below. The terms of reference of these investigations have been designed to address all the issues that have been identified by the EIA project team.

The noise study will not assess any potential impacts as such, but rather provide supporting information for use in the other specialist studies. The other three specialist studies will gather data relevant to identifying and assessing environmental impacts (including any associated cumulative impacts) that might occur as a result of the proposed project in their particular field of expertise. They will provide baseline information and identify and assess impacts according to predefined impact assessment criteria (see Section 9.4). 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 specialist studies will be integrated into the draft EIA Report and ESMP.

9.3.1 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 and identify any sensitive areas that will need special consideration.
- Review the Scoping Comments and Responses Report to ensure that all relevant issues and concerns relevant to fields of expertise are addressed.
- Identify and assess potential impacts of the proposed project activities and infrastructure, including any associated cumulative impacts.
- 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.
- Identify alternatives that could avoid or minimise impacts.
- Determine significance thresholds for limits of acceptable change.
- Where applicable, specialists shall use the assessment method for impact prediction and assigning significance (see Section 9.4).

9.3.2 Marine Noise Modelling Study

The terms of reference for the marine noise modelling study are as follows:

- Drawing on the published literature, describe the noise threshold and noise sensitivities for relevant marine faunal species.
- Undertake airgun array source signature modelling, and source spectra estimates for airgun arrays and survey vessels.
- Undertake sound propagation modelling, including both short-range and long-range modelling cases.
- Undertake cumulative sound exposure level (SEL_{cum}) modelling prediction, as recommended in ACCOBAMS⁸ guidelines.
- Post-process and analysis of the above modelling results to derive relevant zones of impact, which are to be used for further noise impact assessment.

⁸ Agreement for the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area.

9.3.3 Marine Fauna Impact Assessment

The terms of reference for the marine fauna impact assessment are as follows:

- Provide a general description of the benthic environment in the Benguela System along the central and southern Namibian coast, based on current available literature.
- Describe the offshore habitats that are likely to be affected by seismic activities.
- Identify sensitive habitats and species that may be potentially affected by the seismic activities.
- Describe seasonal and migratory occurrences of key marine fauna.
- Identify, describe and assess the significance of potential impacts of the proposed seismic survey on the local marine fauna.
- Identify practicable mitigation measures to reduce the significance of any negative impacts and indicate how these can be implemented during the execution of the seismic survey.

9.3.4 Commercial Fisheries Impact Assessment

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

- Provide a description of the fisheries sectors operating in southern Namibian coastal waters.
- Undertake a spatial and temporal assessment of recent and historical fishing effort and catch in the licence blocks and proposed survey area.
- Use available data to describe natural variability in historical trends and check monthly catches for seasonality.
- Assess the risk of impact of the seismic activities on specific commercial fish species and the consequential implications for fish catch by the different fishing sectors.
- Assess the potential impacts of seismic operations on the fishing activities in terms of estimated catch and effort loss.
- Identify practicable mitigation measures to reduce any negative impacts on the fishing industry.

9.3.5 Social Impact Assessment

The terms of reference for the social impact assessment are as follows:

- Establish a social baseline using existing and freely available social statistics (including Census 2011, the National Household Income and Expenditure Survey of 2015 and other relevant datasets) as relevant to the study area. The study area is considered to include the offshore and nearshore coastline of Namibia between Walvis Bay and Lüderitz.
- Undertake an interview programme with key stakeholders and role-players located at both Walvis Bay and Lüderitz, to develop an understanding of the socio-economic characteristics of each town, as well as concerns regarding the exploration activities.
- Assess the likely socio-economic impacts and benefits (direct and indirect) associated with the proposed exploration activities.
- Provide practical and reasonable mitigation measures to reduce predicted social impacts, as well as recommendations for the enhancement of social benefits.

9.4 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.

9.4.1 Approach to Impact Assessment

The identification and assessment of environmental 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 impacts associated with a proposed project. Impacts are identified throughout the EIA process by environmental and social assessment practitioners, from specialist studies and stakeholder engagement, and refined as more detailed baseline information, modelling data or project design information is available.

For potentially significant impacts or those of stakeholder concern, the impact identification and evaluation process involves the following main steps:

1. 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 socioeconomic sphere of influence of the project.

2. Step 2: Identification of Potential Impacts

Potential impacts 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, exploration, construction, 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). 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.

3. Step 3: Compile Aspects – Impacts Register

An aspects-impacts register (see Table 8-2) 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 Aspects-Impacts 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.

4. Step 4: Impact Evaluation

Evaluation of impact significance follows a stepwise process as set out below with reference to definitions in Section 9.4.2.

4a: Assign sensitivity ratings to receptors

The sensitivity of a receptor is defined on a scale of Very Low, Low, Moderate, High or Very High guided by the definitions for biophysical, ecological and social receptors in Section 9.4.3. These are derived from the baseline information, which shall be used to support the sensitivity ratings in the description of impact.

4b: Determine the impact magnitude (or consequence) ratings

Magnitude (or Consequence) is determined based on a combination of the “intensity”, “duration” and “extent” of the impact following the designations set out in Section 9.4.4. Magnitude (or Consequence) is assigned to the **pre-mitigation impact** (i.e. before additional mitigation measures are applied, but taking into account embedded controls specified as part of the project description) **and residual impacts** after additional mitigation is applied.

4c: Determine impact significance rating

The significance of an impact is a function of the intensity and the sensitivity of the impact determined using the matrix table in Section 9.4.5 and is assigned to the predicted impact **pre-mitigation and post-mitigation (residual)** after considering all possible feasible mitigation measures in accordance with the mitigation hierarchy.

4d: Applying the mitigation hierarchy

Identification of mitigation measures in accordance with the mitigation hierarchy is done throughout the EIA process with emphasis placed on avoiding significant impacts where feasible. Certain avoidance mitigation measures may be identified early in the Scoping Phase and become ‘embedded’ into the project design and specified in the project description (e.g. drilling sites may be confirmed to avoid sensitive sea floor areas or the timing of seismic surveys may avoid certain seasons). These embedded controls are not ‘added’ to the list of mitigation measures or used to determine the post-mitigation significance. Additional mitigation measures may be identified during the impact assessment process and those agreed with the proponent will be used to assess the post-mitigation significance ratings. These may include measures such as helicopters to avoid fly-over of islands at certain heights.

4e: Assign additional ratings to describe the impact

Qualifying ratings are assigned to criteria such as probability (or likelihood of the impact occurring), confidence (in the impact prediction), mitigation potential, extent of resource loss (as defined in Section 9.4.5). reversibility of impact and potential for cumulative impacts.

9.4.2 Definitions of Impact Types and Criteria Used

9.4.2.1 Impact Types

The table below defines the criteria used to categorise and describe impacts.

Term	Definition
Nature of Impact	The direction of impact and whether it leads to an adverse effect (negative), beneficial effect (positive) or no effect (neutral)
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.
Type	Cause and effect relationship between the project activity and the nature of effect on receptor
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 management measures.

9.4.2.2 Definitions of Impact Assessment Criteria and Categories Applied

Definitions of the criteria used in assessing impact significance and the assigned categories, and the additional criteria used to describe the impacts, are summarised in the table below.

Criterion	Definition	Categories
Sensitivity	Sensitivity is a rating given to the importance and/ or vulnerability of a receptor (e.g. conservation value of a biodiversity feature or cultural heritage resource or social receptor).	Very Low Low Medium High Very High
Magnitude (or Consequence)	A term describing the actual change predicted to occur to a resource or receptor caused by an action or activity or linked effect. It is derived from a combination of Intensity, Extent and Duration and takes into account scale, frequency and degree of reversibility	Very Low Low Medium High Very High
Intensity	A descriptor for the degree of change an impact is likely to have on the receptor which takes into account scale and frequency of occurrence.	Very Low Low Medium High

Criterion	Definition	Categories
Extent	The spatial scale over which the impact will occur.	Site Local National Regional International /Transboundary
Duration	Time scale over which the consequence of the effect on the receptor/s will last. [Note that this does not apply to the duration of the project activity]. The terms 'Intermittent' and 'Temporary' may be used to describe the duration of an impact.	Short-term Medium-term Long-term Permanent
Probability	A descriptor for the likelihood of the impact occurring. Most assessed impacts are likely to occur but Probability is typically used to qualify and contextualise the significance of unplanned events or major accidents.	Unlikely Possible Likely Highly Likely Definite
Confidence	A descriptor for the degree of confidence in the evaluation of impact significance.	Low Medium High Certain
Mitigation potential	A descriptor for the degree to which the impact can be mitigated to an acceptable level.	None Very Low Low Medium High
Loss of Irreplaceable resources	A descriptor for the degree to which irreplaceable resources will be lost, fragmented or damaged.	Low Medium High
Reversibility	A descriptor for the degree to which an impact can be reversed.	Irreversible Partially Reversible Fully Reversible
Cumulative	A descriptor of the potential for an impact to have cumulative impacts to arise.	Unlikely Possible Likely

9.4.3 Determination of Sensitivity

Sensitivity is a term that covers the 'importance' (e.g. value of an ecological receptor or heritage resource) or 'vulnerability' (e.g. ability of a social receptor to cope with change) of a receptor to a project-induced change. It takes into account 'Irreplaceability' - measure of the value of, and level of dependence on, impacted resources to society and/ or local communities, as well as of consistency with policy (e.g. conservation) targets or thresholds.

Broad definitions of sensitivity ratings for social, ecological and physical/abiotic receptors are defined below. These are not exhaustive and may be modified on a case by case basis, as appropriate. Additional ratings can be developed for other receptors such as cultural heritage.

Sensitivity Rating	Definition
Social Receptors	Individuals, communities or groups of stakeholders
Very Low	Receptors who are not vulnerable or susceptible to project-related changes and have substantive resources and support to understand and anticipate Project impacts. Such receptors have the ability to avoid negative Project impacts, or to cope with, resist or recover from the consequences of a such an impact with negligible changes to their lives, or will derive little benefit or opportunities from the project.
Low	Receptors who have few vulnerabilities and are marginally susceptible to project-related changes but still have substantive resources and support to understand and anticipate a Project impact. Such receptors are able to easily adapt to changes brought about by the project with marginal impacts on their living conditions, livelihoods, health and safety, and community well-being, or will derive marginal benefits or opportunities from the project.
Medium	Receptors have some vulnerabilities and are more susceptible to project-related changes given they only have moderate access to resources, support, or capacity to understand and anticipate a Project impact. Such receptors are not fully resilient to Project impacts but are generally able to adapt to such changes albeit with some diminished quality of life. For positive impacts, these receptors are likely to derive a moderate level of benefit or opportunities from the project.
High	Receptors are vulnerable and susceptible to project-related changes, and have minimal access to resources, support, or capacity to understand and anticipate a Project impact. Such receptors are not resilient to Project impacts and will not be able to adapt to such changes without substantive adverse consequences on their quality of life. For positive impacts, these receptors are likely to derive a substantial level of benefits or opportunities from the project.
Very High	Receptors are highly vulnerable and have very low resilience to project-related changes. By fact of their unique social setting or context, such receptors have a diminished or lack of capacity to understand, anticipate, cope with, resist or recover from the consequences of a potential impact without substantive external support. For positive impacts, receptors are likely to derive substantial benefits or opportunities from the project which could lead to significant and sustained improvement in their quality of life.
Ecological Receptor	Species, habitats or ecosystems including processes necessary to maintain ecosystem functions
Very Low	Species or habitats with negligible importance for biodiversity including habitats that are largely transformed or highly modified.
Low	Species or habitats listed as Least Concern (LC) on the International Union for Conservation of Nature (IUCN) Red List or on regional or national Red Lists and/or habitats or species which are common and widespread, of low conservation interest, or habitats which are degraded and qualify as 'modified habitat' under international definitions (e.g. IFC or World Bank standards).
Medium	Species, habitats or ecosystems listed as globally Vulnerable (VU) or Near Threatened (NT) on IUCN Red List; or listed as VU or NT on national or regional Red Lists, or which meet the IUCN criteria based on expert-driven biodiversity planning processes. It includes habitats that meet definitions of 'natural habitat'; or ecosystems with important functional value in maintaining the biotic integrity of these habitats or VU or NT species.

Sensitivity Rating	Definition
High	Species, habitats or ecosystems listed as globally Endangered (EN) or Critically Endangered (CR) by IUCN, or listed as EN/CR on national or regional Red Lists; or which meet IUCN criteria for range-restricted species ⁹ or which meet the definition of migratory and congregatory species ¹⁰ , but which do <u>not</u> qualify as Critical Habitat based on IUCN Key Biodiversity Area thresholds ¹¹ . It includes habitats or ecosystems which are important for meeting national conservation targets based on expert-driven national or regional systematic conservation planning processes, but which do not meet global IUCN thresholds. It can also include protected areas such as national parks, marine protected areas or ecological support areas designated for biodiversity protection containing species that are nationally or globally listed as EN or CR, or other designated areas important for the persistence of EN/CR species or habitats.
Very High	Species, habitats or ecosystems listed as globally Endangered (EN) or Critically Endangered (CR) by IUCN, or listed as EN/CR on expert-verified national or regional Red Lists; or which meet IUCN criteria for range-restricted or migratory /congregatory species and which meet IUCN thresholds for Key Biodiversity Areas. It includes habitats or ecosystems which are of high importance for maintaining the persistence of species or habitats that meet critical habitat thresholds. Habitats of high sensitivity may typically include legally protected areas that meet IUCN categories 1, 1a and 1b ¹² , or KBAs or Important Bird Areas (IBAs) with biodiversity features that meet the IUCN KBA criteria and thresholds.
Physical Abiotic Receptors	Water quality, sediment quality, air quality, noise levels
Very Low	Receptors are highly resilient to project-induced change and changes remain undetectable and within any applicable thresholds.
Low	Receptors are resilient to project-induced change and changes, while detectable, are within the range of natural variation and remain within any applicable thresholds.
Medium	Receptors are moderately resilient to project-induced changes, but these changes are easily detectable, exceed the limit of the normal range of variation on an intermittent basis and / or periodically exceed applicable thresholds.
High	Receptors are vulnerable to project-induced change and changes are readily detectable, well outside the range of natural variation or occurrence, and regularly exceed any applicable thresholds.
Very High	Receptors are highly vulnerable to project-induced change and changes are easily detectable, fall well outside the range of natural variation or occurrence, and will continually exceed any applicable thresholds.

⁹ Restricted range species are those with limited Extent Of Occurrence (EOO) (GN74):

- For terrestrial vertebrates and plants, a restricted-range species is defined as those species that have an EOO less than 50,000 square kilometres (km²).
- For marine systems, restricted-range species are provisionally being considered those with an EOO of less than 100 000 km².
- For coastal, riverine, and other aquatic species in habitats that do not exceed 200 km width at any point (for example, rivers), restricted range is defined as having a global range of less than or equal to 500 km linear geographic span (i.e., the distance between occupied locations furthest apart)

¹⁰ Migratory species are defined as any species of which a significant proportion of its members cyclically and predictably move from one geographical area to another (including within the same ecosystem) (GN76). Congregatory species are defined as species whose individuals gather in large groups on a cyclical or otherwise regular and/or predictable basis.

¹¹ IUCN, A Global Standard for the Identification of Key Biodiversity Areas, 2016.

¹² IUCN, "Protected Areas Category", <https://www.iucn.org/theme/protected-areas/about/protected-area-categories>

9.4.4 Determination of Magnitude (or Consequence)

9.4.4.1 Definitions of Criteria Used to Derive Magnitude (or Consequence)

The term 'magnitude' (or 'consequence') describes and encompasses all the dimensions of the predicted impact including:

- the nature of the change (what is affected and how);
- its size, scale or intensity;
- degree of reversibility; and
- its geographical extent and distribution.

Taking the above into account, Magnitude (or Consequence) is derived from a combination of 'Intensity', 'Duration' and 'Extent'.

The criteria for deriving Intensity, Extent and Duration are summarised below.

Criteria	Rating	Description
Criteria for ranking of the INTENSITY of environmental impacts taking into account reversibility and scale	VERY LOW	Negligible change, disturbance or nuisance which is barely noticeable or may have minimal effect on receptors or affect a tiny proportion of the receptors.
	LOW	Minor (Slight) change, disturbance or nuisance which is easily tolerated and/or reversible in the short term without intervention, or which may affect a small proportion of receptors.
	MEDIUM	Moderate change, disturbance or discomfort caused to receptors or which is reversible over the medium term, and/or which may affect a moderate proportion of receptors.
	HIGH	Prominent change, or large degree of modification, disturbance or degradation caused to receptors or which may affect a large proportion of receptors, possibly entire species or community and which is not easily reversed.
Criteria for ranking the EXTENT / SPATIAL SCALE of impacts	SITE	Impact is limited to the immediate footprint of the activity and immediate surrounds within a confined area.
	LOCAL	Impact is confined to within the project concession / licence area and its nearby surroundings.
	REGIONAL	Impact is confined to the region, e.g. coast, basin, catchment, municipal region, district, etc.
	NATIONAL	Impact may extend beyond district or regional boundaries with national implications.
	INTERNATIONAL	Impact extends beyond the national scale or may be transboundary.
Criteria for ranking the DURATION of impacts	SHORT TERM	The duration of the impact will be < 1 year or may be intermittent.
	MEDIUM TERM	The duration of the impact will be 1-5 years.
	LONG TERM	The duration of the impact will be 5-25 years, but where the impact will eventually cease either because of natural processes or by human intervention.
	PERMANENT	The impact will endure for the reasonably foreseeable future (>25 years) and where recovery is not possible either by natural processes or by human intervention.

9.4.4.2 Determining Magnitude (or Consequence) Ratings

Once the intensity, extent and duration are defined based on the definitions set out in Section 9.4.4.1, the magnitude (or Consequence) of negative and positive impacts is derived based on the table below. It should be noted that there may be times when these definitions may need to be adjusted to suit the specific impact where justification should be provided. For instance, the permanent loss of the only known occurrence of a species in a localised area of impact can only achieve a “High” magnitude rating but could, in this instance, warrant a Very High rating. The justification for amending the rating should be indicated in the impact table.

Magnitude (or Consequence) Rating	Description *
VERY HIGH	Impacts could be EITHER: of high intensity at a regional level and endure in the long term ; OR of high intensity at a national level in the medium or long term ; OR of medium intensity at a national level in the long term .
HIGH	Impacts could be EITHER: of high intensity at a regional level and endure in the medium term ; OR of high intensity at a national level in the short term ; OR of medium intensity at a national level in the medium term ; OR of low intensity at a national level in the long term ; OR of high intensity at a local level in the long term ; OR of medium intensity at a regional level in the long term .
MEDIUM	Impacts could be EITHER: of high intensity at a local level and endure in the medium term ; OR of medium intensity at a regional level in the medium term ; OR of high intensity at a regional level in the short term ; OR of medium intensity at a national level in the short term ; OR of medium intensity at a local level in the long term ; OR of low intensity at a national level in the medium term ; OR of low intensity at a regional level in the long term .
LOW	Impacts could be EITHER of low intensity at a regional level and endure in the medium term ; OR of low intensity at a national level in the short term ; OR of high intensity at a local level and endure in the short term ; OR of medium intensity at a regional level in the short term ; OR of low intensity at a local level in the long term ; OR of medium intensity at a local level and endure in the medium term .
VERY LOW	Impacts could be EITHER of low intensity at a local level and endure in the medium term ; OR of low intensity at a regional level and endure in the short term ; OR of low or medium intensity at a local level and endure in the short term . OR Zero to very low intensity with any combination of extent and duration.

* Note: For any impact that is considered to be “Permanent” or “International” apply the “Long-Term” and “National” ratings, respectively. For impacts at the “Site” or “Local” level apply the “Local” level rating.

9.4.5 Determination of Impact Significance

9.4.5.1 Matrix to Derive Impact Significance

The significance of an impact is based on expert judgement of the sensitivity (importance or vulnerability) of a receptor and the magnitude (or consequence) of the effect that will be caused by a project-induced change.

In summary, the impact assessment method is based on the following approach:

Significance = Magnitude x Sensitivity

Where Magnitude = Intensity + Extent + Duration

Once ratings are applied to each of these parameters the following matrix is used to derive Significance:

		SENSITIVITY				
		VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH
MAGNITUDE (OR CONSEQUENCE)	VERY LOW	NEGLIGIBLE	NEGLIGIBLE	VERY LOW	LOW	LOW
	LOW	VERY LOW	VERY LOW	LOW	LOW	MEDIUM
	MEDIUM	LOW	LOW	MEDIUM	MEDIUM	HIGH
	HIGH	MEDIUM	MEDIUM	HIGH	HIGH	VERY HIGH
	VERY HIGH	HIGH	HIGH	HIGH	VERY HIGH	VERY HIGH

9.4.5.2 Definitions of Significance Ratings

Broad definitions of impact significance ratings are provided in the table below. Impacts of 'High' and 'Very High' significance require careful evaluation during decision-making and need to be weighed up against potential long-term socioeconomic benefits of the project to inform project authorisation. Where there are residual biodiversity impacts of 'High' and 'Very High' significance this will require careful examination of offset feasibility and confirmation that an offset is possible prior to decision-making.

Significance Rating	Interpretation
Very High	<p>Impacts where an accepted limit or standard is far exceeded, changes are well outside the range of normal variation, or where long-term to permanent impacts of large magnitude (or consequence) occur to highly sensitive resources or receptors.</p> <p>For adverse residual impacts of very high significance, there is no possible further feasible mitigation that could reduce the impact to an acceptable level or offset the impact, and natural recovery or restoration is unlikely. The impact may represent a possible fatal flaw and decision-making will need to evaluate the trade-offs with potential social or economic benefits.</p> <p>Positive social impacts of very high significance would be those where substantial economic or social benefits are obtained from the project for significant duration (many years).</p>

Significance Rating	Interpretation
High	<p>Impacts where an accepted limit or standard is exceeded; impacts are outside the range of normal variation or adverse changes to a receptor are long-term. Natural recovery is unlikely or may only occur in the long-term and assisted and ongoing rehabilitation is likely to be required to reduce the impact to an acceptable level.</p> <p>High significance residual impacts warrant close scrutiny in decision-making and strict conditions and monitoring to ensure compliance with mitigation or other compensation requirements.</p> <p>Positive social impacts of high significance would be those where considerable economic or social benefits are obtained from the project for an extended duration in the order of several years.</p>
Medium	<p>Moderate adverse changes to a receptor where changes may exceed the range of natural variation or where accepted limits or standards are exceeded at times. Potential for natural recovery in the medium-term is good, although a low level of residual impact may remain. Medium impacts will require mitigation to be undertaken and demonstration that the impact has been reduced to as low as reasonably practicable (even if the residual impact is not reduced to Low significance).</p> <p>Positive social impacts of medium significance would be those where a moderate level of benefit is obtained by several people or a community, or the local, regional or national economy for a sustained period, generally more than a year.</p>
Low	<p>Minor effects will be experienced, but the impact magnitude (or consequence) is sufficiently small (with and without mitigation) and well within the range of normal variation or accepted standards, or where effects are short-lived. Natural recovery is expected in the short-term, although a low level of localised residual impact may remain. In general, impacts of low significance can be controlled by normal good practice but may require monitoring to ensure operational controls or mitigation is effective. Positive social impacts of low significance would be those where a few people or a small proportion of a community in a localised area may benefit for a few months.</p>
Very Low	<p>Very minor effects on resources or receptors are possible but the predicted effect represents a minimal change to the distribution, presence, function or health of the affected receptor, and no mitigation is required.</p>
Negligible	<p>Predicted impacts on resources or receptors of very low or low sensitivity are imperceptible or indistinguishable from natural background variations, and no mitigation is required.</p>

9.4.6 Additional Assessment Criteria

Additional criteria that are taken into consideration in the impact assessment process and specified separately to further describe the impact and support the interpretation of significance, include the following:

- **Probability (Likelihood) of the impact occurring** (which is taken into account mainly for unplanned events);
- **Degree of Confidence in the impact prediction;**
- **Degree to which the impact can be mitigated;**
- **Degree of Resource Loss** (i.e. the extent to which the affected resource/s will be lost, taking into account irreplaceability); and
- **Reversibility** – the degree to which the impact can be reversed.
- **Cumulative Potential** – potential for cumulative impacts with other planned projects or activities.

Definitions for these supporting criteria are indicated below.

Criteria	Rating	Description
Criteria for determining the PROBABILITY of impacts	UNLIKELY	Where the possibility of the impact to materialise is very low either because of design or historic experience, i.e. $\leq 5\%$ chance of occurring.
	POSSIBLE	Where the impact could occur but is not reasonably expected to occur i.e. 5-35% chance of occurring.
	LIKELY	Where there is a reasonable probability that the impact would occur, i.e. > 35 to $\leq 75\%$ chance of occurring.
	HIGHLY LIKELY	Where there is high probability that the impact would occur i.e. > 75 to $< 99\%$ chance of occurring.
	DEFINITE	Where the impact would occur regardless of any prevention measures, i.e. 100% chance of occurring.
Criteria for determining the DEGREE OF CONFIDENCE of the assessment	LOW	Low confidence in impact prediction ($\leq 35\%$)
	MEDIUM	Moderate confidence in impact prediction (between 35% and $\leq 70\%$)
	HIGH	High confidence in impact prediction ($> 70\%$).
	CERTAIN	Absolute certainty in the impact prediction (100%)
Criteria for the DEGREE TO WHICH IMPACT CAN BE MITIGATED	NONE	No mitigation is possible or mitigation even if applied would not change the residual impact.
	VERY LOW	Some mitigation is possible but will have marginal effect in reducing the residual impact or its significance rating.
	LOW	Some mitigation is possible and may reduce the residual impact, possibly reducing the impact significance.
	MEDIUM	Mitigation is feasible and will reduce the residual impact and may reduce the impact significance rating.
	HIGH	Mitigation can be easily applied or is considered standard operating practice for the activity and will reduce the residual impact and impact significance rating.
Criteria for DEGREE OF IRREPLACEABLE RESOURCE 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 REVERSIBILITY - the degree to which an impact can be reversed	IRREVERSIBLE	Where the impact cannot be reversed and is permanent .
	PARTIALLY REVERSIBLE	Where the impact can be partially reversed and is temporary
	FULLY REVERSIBLE	Where the impact can be completely reversed.
Criteria for POTENTIAL FOR CUMULATIVE IMPACTS – the extent to which cumulative impacts may arise from interaction or combination from other planned activities or projects	UNLIKELY	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.

9.4.7 Application of the Mitigation Hierarchy

A key component of this EIA 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 proposed project as part of the ESMP. Mitigation is aimed at preventing, minimising or managing significant negative impacts to as low as reasonably practicable (ALARP) 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 EIA 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 9-1. 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.

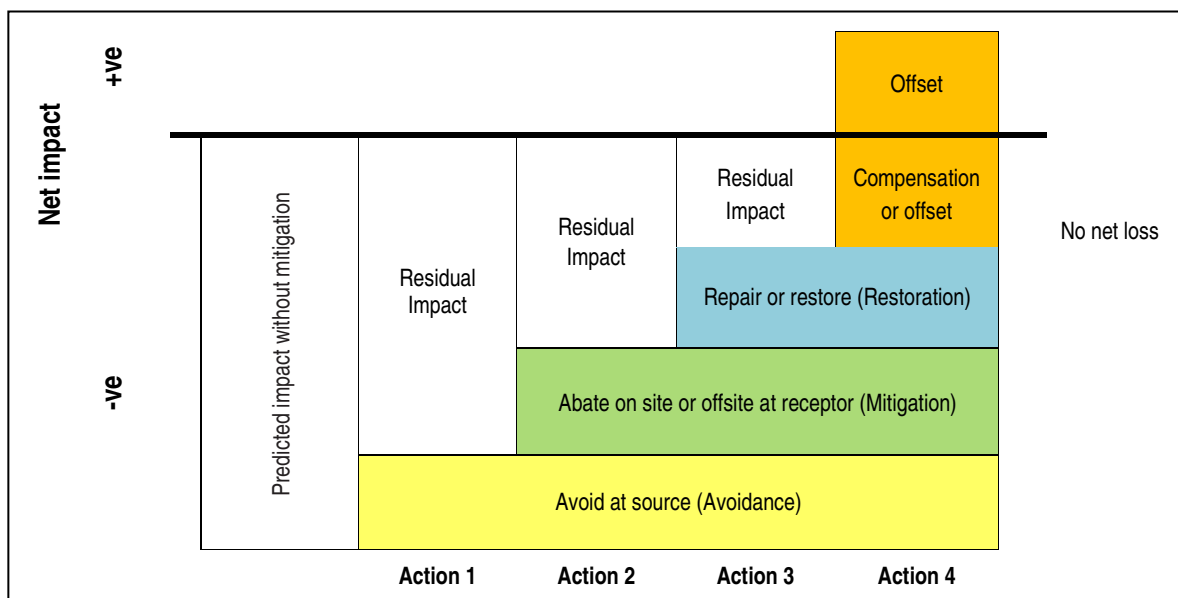


FIGURE 9-1: MITIGATION HIERARCHY

9.5 CONSULTATION PROCESS DURING IMPACT ASSESSMENT PHASE

9.5.1 Consultation with the Competent Authority

Any conditions attached to the acceptance of the Scoping Report will be implemented in the EIA process. If requested, a meeting shall be held with MME (as the competent authority) and MEFT.

The EIA Report and ESMP will be submitted to MME in both draft and final formats and to MEFT as a final document. Opportunities for consultation and participation in the EIA process are shown in Chapter 4.

9.5.2 Public Consultation Process during the Impact Assessment Phase

A description of the tasks that will be undertaken during the Impact Assessment Phase, with specific reference to the opportunities for consultation and participation for I&APs is detailed in Section 4.3.

TABLE 9-1: 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).
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 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. shoreline pollution arising from an oil spill. Repair essentially involves restoration and reinstatement type measures, such as clean-up of the shoreline.
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.

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APPENDIX 1:
CURRICULA VITAE OF THE EIA PROJECT TEAM



JONATHAN CROWTHER

LEAD ENVIRONMENTAL CONSULTANT

Environmental Management Planning & Approvals, Africa

QUALIFICATIONS

M.Sc	1988	Environmental Science
B.Sc (Hons)	1983	Geology
B.Sc	1982	Geology and Geography

EXPERTISE

- Environmental Impact and Social Assessment
- Environmental Management Plans/Programmes
- Public Participation & Facilitation
- Environmental Compliance & Monitoring

Jonathan is a Lead Environmental Consultant with the SLR Environmental Management Planning & Approvals (EMPA) team, Africa. He has over 32 years of experience with expertise in a wide range of environmental disciplines, including Environmental Impact and Social Assessments (ESIA), Environmental Management Plans, Environmental Planning, Environmental Compliance & Monitoring, and Public Participation & Facilitation.

He has project managed a large number of offshore oil and gas EIAs for various exploration and production activities in Southern Africa. He also has extensive experience in large scale infrastructure projects including some of the largest road projects in South Africa, ESIA's for waste landfill facilities, general industry and the built environment.

PROJECTS

Oil and Gas Exploration and Production

Total E&P South Africa B.V. Internal Amendment of EMP for exploration activities in Block 11B/12B, offshore South Coast, South Africa (2019 - current)

Internal Amendment of EMP for undertaking seismic surveys and well drilling. Facilitated updating specialist studies, updated mitigation management actions, compile amendment report and project director.

Total E&P South Africa B.V. Provision of environmental services for a seismic survey programme in Block 11B/12B, offshore South Coast, South Africa (2019 - current)

Provided environmental support ahead of a 2D and 3D seismic survey programme, environmental compliance services during the survey activities and will compile survey close-out reports. Project director, client liaison, ECO services and report compilation.

Total E&P South Africa B.V. Social Baseline and SIA related to exploration activities in Block 11B/12B, offshore South Coast, South Africa (2019 - 2020)

Social Baseline Study and Social Impact Assessment related to the impacts that exploration activities in Block 11B / 12B would have on the Mossel Bay area. Project director and review.

Galp Energia S.A. ESIA's for Offshore Exploration Well Drilling in PEL82 and PEL83, Namibia (2019)

Two separate ESIA's for proposed exploration well drilling in Petroleum Exploration Licence 82 (PEL82) and PEL83 offshore Namibia. Project director and review.

Total E&P South Africa B.V. Provision of environmental services for seismic surveys and well drilling in Block 11B/12B, offshore South Coast, South Africa (2018 - 2019)

Provided environmental support ahead of a seismic survey and exploration well drilling operation, environmental compliance services during the exploration activities, and prepared close-out reports on completion of each exploration activity. Project director, client liaison, report compilation and ECO services.

Total E&P South Africa B.V. Application to amend Environmental Management Programme Block 11B/12B, offshore South Coast, South Africa (2018-2019)

TEPSA is the holder of an Environmental Management Programme to undertake exploration well drilling in Block 11B/12B offshore of the South Coast, South Africa. An amendment application was undertaken to change the well completion status described in the programme. Client liaison, report compilation and quality review.

PGS Exploration (UK) Limited – Reconnaissance Permit Application to undertake a 2D and 3D seismic surveys offshore West Coast South Africa (2018)

Environmental Management Programme Amendment for the proposal to undertake a 2D and 3D speculative seismic surveys offshore West Coast, South Africa. Project director, documentation and quality review.

PGS Exploration (UK) Limited – Reconnaissance Permit Application Amendment to undertake a 3D seismic survey offshore KwaZulu-Natal, South Africa (2018)

Environmental Management Programme Amendment for a 3D speculative seismic survey offshore of KwaZulu-Natal, South Africa. Project director, documentation and quality review.

Shell Namibia Upstream BV – EIA for proposed offshore well drilling, Namibia (2017)

EIA for the drilling of up to two deep water exploration wells in Petroleum Exploration Licence 39 off the coast of southern Namibia. Provided project management and quality review during the Scoping Phase of the EIA.

PGS Exploration (UK) Limited – Reconnaissance Permit Application to undertake 2D and 3D seismic surveys, South Africa (2017)

Environmental Management Programme process for a Reconnaissance Permit Application to undertake 2D and 3D speculative seismic surveys of the East Coast, South Africa. Project director, documentation and quality review.

Rhino Oil & Gas Exploration South Africa (Pty) Ltd - EIAs for various onshore exploration right applications, South Africa (2015 - 2017)	Individual ESIA's were undertaken for exploration right applications for the initial exploration phases for onshore gas in five license areas across the eastern part of South Africa. Provided high level management support and documentation review.
Spectrum Geo Limited – Reconnaissance Permit Application to acquire 2D multi-client seismic data, South Africa (2017)	Undertook the Environmental Management Programme for a reconnaissance permit application to acquire 2D multi-client seismic survey data off the Southern Coast, South Africa. Project director and provided quality review.
Rhino Oil & Gas Exploration South Africa (Pty) Ltd – Application for exploration programmes for two offshore blocks, South Africa (2015 - 2017)	Undertook an EIA for exploration right applications for 2D seismic surveys for each of two blocks located offshore of the West Coast, South Africa. Project director and quality control of the EMP.
Petroleum Geo-Services (Pty) Ltd – Addendum application for expansion of speculative seismic survey, South Africa (2016)	Facilitated and undertook the EMP Addendum for the expansion of a speculative seismic survey off the South Coast of South Africa. Project management and quality review of the EMP.
BHP Billiton Petroleum (South Africa 3B/4B) Limited - Relinquishment of Licence Block 3B/4B, South Africa (2016)	Application for a Closure Certificate and consolidated Environmental Risk Report and Closure Plan for the relinquishment of Licence Block 3B/4B (ER 12/3/23) off the West Coast, South Africa. Project director and quality review.
Murphy Oil Corporation - Exploration well drilling in Licence Blocks 2613A and 2613B, Namibia (2014-2016)	EIA for the drilling of up to two exploration wells in Licence Blocks 2613A and 2613B off the coast of Namibia. Project director and quality review.
Sunbird Energy Ltd - Ibhubesi Gas Project, South Africa (2013 - 2016)	EIA for the proposed Ibhubesi Gas Project, West Coast, South Africa. The project includes the development of an offshore well field, a 400 km offshore pipeline, an onshore pipeline and onshore processing facility. Tasks involved stakeholder engagement, document compilation, high level project management, quality control and overall review of the EIA.
Anadarko South Africa (Pty) Ltd - Exploration Right renewal for Licence Blocks 5, 6 & 7, South Africa (2015)	Preparation of an Environmental Compliance Report as part of the Exploration Right renewal for Licence Blocks 5, 6 & 7 (ER 12/3/224) off the South-West Coast of South Africa. Project director and quality review.
ExxonMobil Exploration and Production South Africa Ltd – Well drilling Roadmap and Permitting Plan, South Africa (2015)	Development of a high level Regulatory Roadmap and Permitting Plan for offshore exploration well drilling and associated onshore activities for ExxonMobil's South African licence areas, focusing on the Tugela South licence area off the East Coast, South Africa. Project director and quality review.

Nabirm Energy Services - 2D seismic survey compliance, Block 2113, Namibia (2014-2015)	EMP Compliance and audit services for a 2D seismic survey in the offshore portion of Block 2113A in the Walvis Basin off the coast of Namibia. Project director and quality review.
Thombo Petroleum (Pty) Ltd – Exploration Right application to undertake well drilling in Block 2B, South Africa (2014- 2015)	The scope of work included undertaking an EIA and EMP Addendum for exploration well drilling in Block 2B situated off the West Coast of South Africa. Project management and quality control tasks were undertaken.
Murphy Oil Corporation and TGS-NOPEC Geophysical Company ASA – 3D seismic survey, Licence Blocks 2613A and 2613B, Namibia (2013-2014)	EIA for a proposed 3D seismic survey in Licence Blocks 2613A and 2613B, Lüderitz Basin, off the coast of Namibia. Project director and quality review.
Shell South African Upstream B.V – EIA and EMP Amendment to undertake exploration well drilling in Orange Basin, South Africa (2013-2015)	EIA and EMP for an amendment to the existing Exploration Right to undertake Exploration Well Drilling in the Orange Basin Deep Water Block, West Coast, South Africa. Provided client interaction, high level management and quality control.
Cairn South Africa (Pty) Ltd – Exploration right amendment to undertake well drilling in Block 1, South Africa (2013-2015)	EIA and EMP for an amendment to the existing Exploration Right to undertake Exploration Well Drilling in Block 1, West Coast, South Africa. Project director and quality control of the EIA.
OK Energy Ltd - Proposed exploration programme in the Northern Cape Ultra-deep Licence Area, South Africa (2014)	EMP for an Exploration Right application for undertaking an exploration programme (including seismic survey, tensor gravity and magnetics, bathymetry survey, seabed sampling) in the Northern Cape Ultra-deep Licence Area in the Orange Basin off the Northwest Coast of South Africa. Project director and quality review.
Total E and P South Africa (Pty) Ltd – Deep Water well drilling in Block 11B/12B, south Africa (2013-2014)	Undertook the Environmental Compliance services during and the environmental audit on completion of the deep water well drilling operation in Block 11B/12B, South Coast South Africa. Audit services, compiled the audit report and project management.
Anadarko South Africa (Pty) Ltd - Seafloor geochemical sampling programme, Licence Blocks 5/6 & 7, South Africa (2013)	EMP Addendum for a seafloor geochemical sampling programme in Petroleum Licence Blocks 5/6 & 7 off the South-West Coast of South Africa. The sampling programme consisted of seafloor sampling (piston coring), seafloor heat flow measurements and a possible multi-beam bathymetry survey. Project director and quality review.
Spectrum ASA – Speculative 2D seismic survey, Namibia (2013)	EIA for a proposed 2D speculative seismic survey in the Orange Basin, Namibia. Project director and provided quality control.

CGG Services SA - Proposed 2D speculative seismic survey in the Durban Basin, South Africa (2013)	EMP for a Reconnaissance Permit application for undertaking a speculative 2D seismic survey in the Durban Basin off the East Coast of South Africa. Project director and quality review.
Tullow Kudu Limited – 2D and 3D seismic survey, Namibia (2013)	ESIA for a proposed 3D and 2D seismic survey in Licence Blocks 2012B, 2112A and 2113B, Walvis Basin, Namibia. Project director, client interface and quality control.
Sasol Petroleum International (Pty) Ltd – 2D seismic survey programme, South Africa (2012-2013)	EMP for a proposed 2D seismic survey programme in the Durban and Zululand Basins off the East Coast of South Africa. Project director and provided quality control.
Anadarko South Africa (Pty) Ltd - Exploration programme, Licence Block 2C, South Africa (2012-2013)	EMP for a proposed exploration programme in Block 2C off the West Coast, South Africa. The exploration programme included 2D/3D seismic surveys, multi-beam bathymetry survey, seafloor sampling and seafloor heat flow measurements. Project director and quality review.
Total E and P South Africa (Pty) Ltd – Application for various exploration activities, South Africa (2012-2013)	EMP for a proposed 2D seismic survey, sonar bathymetry and drop core sampling in the Outeniqua South Area, South Coast, South Africa. Project director and quality review.
Impact Africa Limited - Exploration programme, Tugela North, South Africa (2012-2013)	EMP for a proposed exploration programme in the Tugela North area off the East Coast, South Africa. The exploration programme included Airborne geophysical acquisition (gravity and magnetics), 2D/3D seismic surveys, seafloor heat flow measurements, multi-beam bathymetry survey and seafloor sampling. Project director and quality review.
PetroSA (Pty) Ltd – Amendment application for a seismic survey campaign, South Africa(2012)	EMP Amendment for a proposed seismic survey campaign in Block 1, West Coast, South Africa. Project director and EMP review.
Bayfield Energy Ltd – EMP amendment for a proposed seismic survey, South Africa (2012)	EMP Amendment for a proposed seismic survey in the Pletmos Inshore Area, South Coast, South Africa. Project director and report review.
CGG Veritas Services (UK) Ltd – Speculative seismic survey, South Africa (2012)	EMP for a proposed speculative seismic survey off the East Coast, South Africa. Project director and quality control of the EIA.
Signet Petroleum Ltd – Application to undertake 2D and 3D seismic surveys, Namibia (2011)	EIA for proposed 2D and 3D seismic surveys in Block 2914B off the southern coast of Namibia. Project director, client interaction and quality control.
PetroSA (Pty) Ltd - 2D/3D seismic survey, Blocks 5 & 6, South Africa (2011)	EMP for a 2D/3D seismic survey campaign in Blocks 5 & 6 off the South-West Coast of South Africa. Project director and quality review.

Chariot Oil & Gas - Proposed seismic survey off the coast of Namibia (2011)	EIA process for a seismic survey off the coast of Namibia. EIA and EMP compliance monitoring services were also provided during the survey operations and a Close-out Report produced. Project director and quality review.
HRT Netherlands B.V. – Application to undertake a 3D seismic survey, Namibia (2010-2011)	EIA for a 3D seismic survey in two offshore areas, Namibia. Project director and quality review.
Atacama Consulting for Dominion Oil – Proposed seismic survey, Uganda (2010)	Undertook an independent review of the EIA undertaken for a proposed onshore and offshore seismic survey in the Queen Elizabeth National Park, Uganda. Site visit, documentation review and report.
PetroSA (Pty) Ltd – Proposed F-O Field development, South Africa (2008-2011)	EIA and EMP for the development of the F-O Gas Field in Petroleum Licence Block 9, South Coast, South Africa. The project included the drilling of up to 14 production wells in the F-O Gas Field and connecting the gas field to the existing F-A Platform via a new 39 km subsea production pipeline. Project director, client liaison and quality control.
Enigma Oil and Gas – Proposed 2D and 3D seismic survey, Namibia (2008-2009)	EIA for proposed 2D and 3D seismic surveys in three areas off the coast of Namibia. Project management and quality review.
PetroSA (Pty) Ltd – 3D seismic survey, Block 1, West Coast, South Africa (2008)	EMP for a 3D seismic survey in Block 1 (ER83) off the West Coast of South Africa. Project director and quality review.
Petroleum Agency SA – South African Shelf Claim Project (2007)	Compiled an Environmental Report for a proposed seismic survey to be undertaken as part of the South African Shelf claim project. Project management and quality control.
PetroSA (Pty) Ltd – Construction of the South Coast Gas Project, South Africa (2007)	Management of various aspects of the EMP for the construction phase of the South Coast Gas project, including being appointed as the Chair and Secretariat of the Environmental Monitoring Committee, Mossel Bay, South Africa.
BHP Billiton Petroleum (Americas) Inc – Proposed 2D seismic survey, Namibia (2007)	EIA for a proposed 2D seismic survey in the Northern Block, Namibia. Project management and quality control.
Forest Exploration International (SA) – Proposed Ibhubesi Gas Project (2006-2008)	EIA and EMP for the proposed Ibhubesi Gas Project. This included the drilling of 99 wells, offshore production platforms, a 70 km pipeline to the shore and an onshore processing plant. The project is located off West Coast, South Africa. Project director, client interaction and quality review.

Ferromarine Africa - Oil and Gas Service Hub in the Port of Cape Town and Fabrication Yard for Oil and Gas Structures in the Port of Saldanha, South Africa (2006)	Construction and Operational EMPs for two facilities for the servicing and fabrication of oil and gas structures, i.e. an oil and gas service hub at A-Berth in the Port of Cape Town and an oil and gas structures fabrication yard in the Port of Saldanha, South Africa. Project director and quality review.
BHP Billiton Petroleum (Americas) Inc – Deep water exploration well drilling, South Africa (2004-2007)	Compiled an Expanded Environmental Notification for a proposed deep water exploration well in Petroleum Licence Block 3B/4B off the West Coast of South Africa. Project management, client interaction and quality control.
PetroSA (Pty) Ltd – South Coast Gas Development Project, South Africa (2004-2007)	EIA and EMP for the proposed South Coast Gas Development project in Petroleum Block 9, South Africa. The project included well drilling, injection wells, an offshore gas pipeline and the connection to existing infrastructure. Involvement included the role as project director, client interaction, facilitation of stakeholder interaction and quality control.
Pioneer Natural Resources (Pty) Ltd – Application for the drilling of three exploration wells (2003)	Preparation of an Environmental Notification document and Close-out Reports for the drilling of three exploration wells in Block 9, South Coast, South Africa. Project manager, stakeholder engagement, report compilation and quality control.
PetroSA (Pty) Ltd – Proposed development of the Sable Oil Field, South Africa (2001)	Undertook the EMPR for the proposed development of the Sable Oil Field, offshore South Coast, South Africa. This included well drilling, seafloor infrastructure and an FPSO. Project manager, stakeholder engagement, report compilation and quality control.
Petroleum Agency SA – Generic EMPR for oil and gas prospecting, South Africa (2001)	The appointment was to develop a Generic EMPR for oil and gas prospecting for the whole of the South African Offshore. This covered seismic surveys and exploration well drilling. Key impacts were identified and assessed, and templates were developed for future explorers. Client interaction, project management, report compilation and quality control.
Brown and Root on behalf of Shell Exploration and Production Namibia – Route selection for the proposed Kudu Gas pipeline (1998-1999)	Provided environmental baseline and legislative input into the route selection for the proposed Kudu Gas pipeline between Oranjemund, Namibia and Cape Town, South Africa. Site visit, client interaction, report delivery and quality control.
Soekor E&P (Pty) Ltd – Extension of the Oribi Oil Production facility (1997)	In a joint venture with the CSIR, undertook the EIA and EMPR for the proposed extension of the Oribi Oil Production facility and hydrocarbon exploration in Block 9 off the South Coast, South Africa. Management of the process and compilation of the EIA and EMPR.

	Road and related infrastructure
GIBB (Pty) Ltd for Western Cape Government (WCG): Department of Transport & Public Works - Swartberg River Bridge, South Africa (2016-2017)	Basic Assessment for the proposed implementation of erosion protection measures along a section of the Swart River which is traversed by the TR 34, approximately 7 km north of Prince Albert. Project director and quality control.
SMEC SA (Pty) Ltd for Saldanha Bay IDZ Licencing Company (SOC) Ltd - Proposed new access roads to the Saldanha Bay IDZ, south Africa (2016-2017)	Basic Assessment for the construction of two new access roads linked to the back of port area of the Saldanha Bay IDZ. Project director and quality review.
Bergstan SA Consulting and Development Engineers (Pty) Ltd for WCG: Department of Transport and Public Works – Proposed stormwater repairs on Main Road 101, Cape Town, South Africa (2014-2016).	Basic Assessment and environmental compliance for the storm damage repair of slopes and roadway on MR101 between Simon’s Town and Smitswinkel Bay, Cape Town. Project director, stakeholder engagement, alternate ECO and quality review.
Bergstan SA Consulting and Development Engineers (Pty) Ltd for WCG: Department of Transport and Public Works – Resurfacing of a section of Victoria Road, Cape Town, South Africa (2014-2015)	Environmental compliance services for the repair and resurfacing of Victoria Road (MR103) km 2.1 to km 4.75 between Oudekraal and Llandudno, Cape Town. Project director.
Gibb (Pty) Ltd for WCG: Department of Transport & Public Works - Proposed changes to the proclaimed road network affected by the raising of the Clanwilliam Dam wall, South Africa (2013-ongoing)	Environmental input and facilitation of the public participation process for the proposed changes to the proclaimed secondary road network that would be affected by the raising of the Clanwilliam Dam wall. Project director, stakeholder engagement and quality review.
Kantey & Templer Consulting Engineers (Pty) Ltd for WCG: Department of Transport & Public Works, South Africa (2012-2017)	Basic Assessment for the proposed safety and operational improvement to the R44 Road between Somerset West and Stellenbosch. Project director, stakeholder engagement and quality review.
Hatch GOBA (Pty) Ltd for WCG: Department of Transport & Public Works, South Africa (2015-2016)	Maintenance Management Plan for proposed flood damage repairs to bridge and culvert structures along various roads in the Eden and Winelands Municipal areas between Ladismith and Montagu, Western Cape. Project director and provided quality review.

ERO Engineers (Pty) Ltd for WCG: Department of Transport & Public Works, South Africa (2015-2016)	Compiled a Maintenance Management Plan for the proposed rehabilitation and reseal of Main Road 233, between the R27 and just north of Langebaan, Western Cape. Project director and quality review.
Bergstan SA Consulting and Development Engineers (Pty) Ltd for WCG: Department of Transport & Public Works (2014-2015)	Basic Assessment for the storm damage repair of slopes and roadway on Main Road MR101 between Simons Town and Smitswinkel Bay, Western Cape. Project director and quality review.
AECOM SA (Pty) Ltd. for South African National Roads Agency SOC Limited – Upgrading of National Route 7, South Africa (2013-2015)	The project involved the proposed upgrading of the National Route 7 between Leliefontein and Hopefield intersections near Malmesbury, Western Cape. This included widening of the existing road to a dual carriageway, consolidating access and secondary roads and the addition of new interchanges. A Basic Assessment and an EIA were undertaken for two different portions of this section of the N7. Project director, stakeholder engagement and quality review.
EFG Engineers (Pty) Ltd for WCG: Department of Transport and Public Works –Hermanus to Stanford Road Upgrade Project, South Africa (2013-2014)	Basic Assessment for the upgrading of Trunk Road 28 Section 2 (TR28/2) between Hermanus and Stanford, Western Cape. Project director, stakeholder engagement and quality review.
BKS (Pty) Ltd for WCG: Department of Transport & Public Works – Road network improvements to support Saldanha IDZ, South Africa (2012-2015)	EIA for the proposed road network improvements required to support the development of the Saldanha Industrial Zone and port expansion, Western Cape. Project director and quality control.
Aurecon (Pty) Ltd for WCG: Department of Transport & Public Works – Flood repair of damaged structures, South Africa (2012-2013)	Five Basic Assessments for the repair of flood damaged structures along roads in the Eden District Municipality, Southern Cape. Project director and quality control.
ERO Engineers (Pty) Ltd for South African National Roads Agency Limited – N7 Improvement between Melkbos and Atlantis intersections, South Africa (2010-2011)	EIA for the improvement of National Route N7 Section1 between Melkbos and Atlantis Intersections, Western Cape. The project involved duelling of the N7, consolidating of access points and the upgrade of the existing intersections to grade-separated interchanges. Project director, facilitated stakeholder engagement and provided quality control.

BKS (Pty) Ltd for South African National Roads Agency Limited – Improvement of five bridges over the Orange River, South Africa (2009-2011)	A Basic Assessment was undertaken for the improvement and widening of five large bridges where the R27 National Route, Section 10 & 11, cross the Orange River between Kenhardt and Keimoes, Northern Cape. Further services involved providing environmental compliance services (ECO services) during the construction operation and completion auditing. Overall project director, attended specialist site visit and review all project documentation.
Bergstan South Africa (Pty) Ltd for WCG: Department of Transport & Public Works – Repair to flood damaged bridges (2009-2010)	Basic Assessment for the reconstruction of three flood damaged bridges in the Hex River Valley, Western Cape. Project director and quality control.
UWP (Pty) Ltd for South African National Roads Agency Limited – Rehabilitation of National Routes N1 and N9 near Colesberg, South Africa (2008-2011)	Basic Assessment for the proposed rehabilitation of National Route 9 Section 7 from Wolwefontein (km63.63) to Colesberg (km94.84) including a new N1/N9 access interchange at Colesberg, Western Cape. Project director and quality review.
HHO Africa (Pty) Ltd for WCG: Department of Transport and Public Works – Construction of the Koeberg Interchange, Cape Town, South Africa (2008-2011)	Environmental compliance during the construction phase of the Koeberg Interchange upgrade. Alternative ECO services and project director.
BKS (Pty) Ltd for City of Cape Town – Construction of the Hospital Bend upgrade, Cape Town, South Africa (2008-2010)	Environmental compliance for the construction phase of the upgrading of the N2 Hospital Bend, Cape Town. Facilitated the Environmental Monitoring Committee, alternative ECO and project manager.
BKS (Pty) Ltd for WCG: Department of Transport & Public Works - Upgrading of TR 2, M5 Viaduct to Black River Parkway Interchange, South Africa (2007-2011)	Basic Assessment and environmental compliance during construction for the upgrading of Trunk Road 2 Section 1 (M5) between the M5 Viaduct and the Black River Parkway Interchange, Cape Town. Project management of the Basic Assessment and ECO
City of Cape Town – Proposed Bloubos and Gustrow Roads, South Africa (2007-2011)	EIA for the proposed new sections of Bloubos and Gustrow Roads for the Gordon's Bay and Sir Lowry's Pass Development Areas, Cape Town. Project management, report writing, stakeholder facilitation and quality control.

Kwezi V3 (Pty) Ltd for WCPA: Department of Transport and Public Works – Development of borrowpits in the Central Karoo District, South Africa (2007)	EMPR for the development of 40 borrowpits for the regraveling of trunk-, main- and divisional roads in the Central Karoo District, Western Cape. Roles included project management, attending the specialist site visit, report writing and quality control.
Jeffares & Green (Pty) Ltd for WCPA: Department of Transport and Public Works – Upgrading of roads in the Redelinghuys area, South Africa (2006-2009)	Basic Assessment for the proposed upgrading of Main Road 531, regravelling of Main Road 534 and development of 10 borrowpits in the Redelinghuys area, Western Cape. Project director and quality review.
South African National Roads Agency Limited – Propose N2 Wild Coast Toll Road, South Africa (2005-2011)	EIA for the proposed N2 Wild Coast Toll Road, Eastern Cape to Kwa-Zulu Natal. The proposed project involved various improvements to a 550 km stretch of the N2 between East London and Durban. A 90 km greenfield alignment formed the northern end of the Eastern Cape section which included the crossing of five large river gorges. Project co-director, client liaison and quality review.
HHO Africa for PGWC (Department of Transport) – Upgrading of the road between Gansbaai and Bredasdorp (2005-2010)	Undertook the EIA for the proposed upgrading to a tarred road of the existing gravel road between Gansbaai and Bredasdorp. An EMPR was also compiled for a number of borrowpits that were required of the proposed project. Project director, stakeholder engagement, report drafting and quality review.
Protea Parkways Consortium and South African National Roads Agency Limited – N1 Second Huguenot Tunnel Completion, Western Cape, South Africa (2008-2009)	Basic Assessment for the proposed completion of the second tunnel bore of the Huguenot Tunnel on National Route 1 and construction of the western and eastern access roads. Project manager and quality review.
BKS (Pty) Ltd for PGWC (Department of Transport) – Rehabilitation of the N2. Modderdam Road to Airport Interchange, South Africa (2005-2007)	Scoping Study for the proposed rehabilitation and widening of the N2 between Modderdam Road and Airport Interchange, Cape Town. Project manager, stakeholder engagement and quality control.
Protea Parkways Consortium and South African National Roads Agency Limited – Proposed N1/N2 Winelands Toll Highway (2000-2009)	EIA for the proposed Winelands N1/N2 Toll Highway, Western Cape. The proposed project included upgrading of various sections of the N1 and N2 national roads outside Cape Town, grade separated intersections, a bypass around Somerset West and various toll plaza locations. Roles included a substantial stakeholder engagement process, project management, specialist report review and report writing.
BKS (Pty) Ltd for PGWC (Department of Transport) – Construction of the TR31, South Africa (1999-2004)	Prepared the Construction EMP and provided Environmental Control Officer services for the construction of Phase 2 and 3 of the TR31 between Worcester and Robertson. Project Director and environmental compliance.

BKS (Pty) Ltd for City of Cape Town – Proposed upgrading of Hospital Bend, Cape Town, South Africa (1998-2002)	EIA for the upgrading of the N2 from Rhodes Drive Interchange to the top of Hospital Bend, Cape Town. Project management, stakeholder engagement, client liaison and quality review.
	Mining and Minerals Sites
Belton Park Trading 127 (Pty) Ltd – Prospecting Right application for Sea Concessions 13C, 15C, 16C, 17C & 18C, West Coast, South Africa (2019 - current)	EIA for the proposed offshore prospecting operations in Sea Concessions 13C, 15C, 16C, 17C and 18C, off the West Coast of South Africa. Project director and reviewer.
Belton Park Trading 127 (Pty) Ltd – Prospecting Right application for Sea Concessions 14B, 15B & 17B, West Coast, South Africa (2019 - current)	EIA for proposed offshore prospecting operations in Sea Concessions 14B, 15B and 17B, off the West Coast of South Africa. Project Director and reviewer.
De Beers Marine (Pty) Ltd – Prospecting Right application for offshore marine Diamonds in Sea Concession 6C, West Coast, South Africa (2019 – 2020)	EIA for the proposed offshore Bulk Sampling operations in the Sea Concession 6C, off the West Coast of South Africa. Project director and reviewer.
Zevocept (Pty) Ltd – Development of a borrow pit, Western Cape, South Africa (2019-2020)	Basic Assessment for the proposed development of a borrow pit on Farm Modder Rivier, Western Cape. Project Director and reviewer.
De Beers Marine (Pty) Ltd – Pre-Scope Environmental Input as part of an application for Offshore Geophysical Survey, Greenland (2019)	Undertook an initial evaluation of the anticipated impacts associated with an application to undertake geophysical surveys off the west coast of Greenland and compiled environmental input to be included into a Pre-Scope submission to the Greenland Minerals Authority. Provided client interaction, final report compilation and overall project director.
De Beers Marine (Pty) Ltd – Prospecting Right application for offshore marine Diamonds in Sea Concession 6C, West Coast, South Africa (2018)	A Basic Assessment was undertaken for the proposed offshore prospecting operations in the Sea Concession 6C, off the West Coast of South Africa. Project reviewer.

Belton Park Trading 127 (Pty) Ltd – Mining Right application for offshore marine Diamonds in Sea Concession 2C, West Coast, South Africa (2016 - 2017)	EIA for the proposed offshore mining of marine diamonds in the Sea Concession 2C, off the West Coast of South Africa. Project Director and reviewer.
International Mining & Dredging Holdings Ltd – Mining Right Application for offshore diamond concession Block 2C, South Africa (2015-2016)	EIA for a Mining Right Application for an offshore diamond concession in Block 2C off the West Coast of South Africa. Project director and quality review.
International Mining & Dredging Holdings Ltd – Application for sediment sampling for diamond mining concession areas, West Coast, South Africa (2014-2015)	Basic Assessment for marine sediment sampling activities in Diamond Mining Concession Areas off the West Coast, South Africa. Project director and quality review.
Landfill Sites and Waste Water Treatment Works	
AECOM SA (Pty) Ltd – ECO for the Development of the Langebaan Waste Transfer Facility (2019 - ongoing)	ECO services for the development of the Langebaan Waste Transfer Facility. Project director and review.
City of Cape Town – Supplementary EIA for a Regional Landfill Site to service the City of Cape Town, South Africa (2010-2014)	Supplementary EIA for the proposed regional landfill site to service the City of Cape Town. This involved updating the earlier EIA following court proceedings and a revised Ministerial decision. Project director, report compilation, facilitation of public participation and quality review.
Arcus Gibb (Pty) Ltd for Theewaterskloof Municipality, South Africa (2008-2011)	Scoping Study and EIA for the proposed upgrading of the Grabouw Wastewater Treatment Works, Western Cape. Stakeholder engagement, quality review and project director.
City of Cape Town – EIA for a Regional Landfill Site to service the City of Cape Town, South Africa (2001-2007)	EIA for the proposed new regional landfill site to service the City of Cape Town. The project involved a preliminary assessment of a large number of candidate landfill sites. These were shortlisted to four which were evaluated in the Scoping Report. The two recommended sites were carried through for detailed assessment in the EIA. Project manager, client liaison, stakeholder interaction, specialist engagement, report writing and quality review.
City of Cape Town – EIA for the proposed licensing of the Bellville South Landfill site, South Africa (1999-2001)	EIA for the proposed licensing of the Bellville South Waste Disposal Site, Cape Town. Various completion development scenarios were included in the assessment. Stakeholder interaction, specialist engagement, client liaison, report drafting, quality control and project manager.

Cape Agulhas Municipality – Proposed regional solid waste disposal site, South Africa (1999-2001)	EIA for a proposed regional solid waste disposal site for the towns of Struisbaai, L'Agulhas and Suiderstrand, Western Cape. Stakeholder engagement and quality review.
Mossop Western Leathers – Proposed closure of the Herman Road Waste Disposal facility, South Africa (1998)	EIA for the proposed closure of the Hermon Road Waste Disposal Site, Wellington. Project manager, stakeholder interaction, specialist engagement, report writing and quality review.
Greater Hermanus Municipality – Study to identify a regional waste site for the region, South Africa (1997)	EIA for the identification of a regional waste site for the Hermanus, Kleinmond and Bot River regions, Western Cape. Stakeholder engagement, report compilation and project management.
Kleinmond Municipality – Selection of a new waste disposal site to serve the area, South Africa (1996)	Scoping Study for the selection of a new waste disposal site to serve the area between Rooi-Els and Kleinmond, Western Cape. Project manager, stakeholder engagement and report compilation.
Southern Natal Joint Services Board – Siting of regional landfill sites, South Africa (1994)	EIA procedure (from initial assessment to comments report) for the siting of two regional landfill sites in southern Natal. Report compilation, client liaison and project management.
Water and Sewage Pipelines	
BVI Consulting Engineers Western Cape (Pty) Ltd for City of Cape Town: Transport for Cape Town – Proposed upgrade of the Bayside Canal, South Africa (2016 - ongoing)	Basic Assessment for the proposed upgrading of the Bayside Canal Outfall System located in Tableview, Cape Town. Project director and quality review.
BVI Consulting Engineers WC (Pty) Ltd for the City of Cape Town: Transport for Cape Town – Proposed stormwater pipeline linking Sunningdale to the Big Bay stormwater outfall pipeline, South Africa (2015 -2016)	Basic Assessment process for the construction of a new stormwater pipeline to route runoff from Sunningdale Phases 12A, 13 and 14 to the existing Big Bay Outfall pipeline located at the eastern boundary of the suburb of Big Bay, Cape Town. Project director and quality review.
Jeffares & Green (Pty) Ltd for Stellenbosch Municipality – Jamestown Bulk Water Supply, South Africa (2012-2013)	Basic Assessment for the proposed Jamestown Bulk Water Supply pipeline and reservoir, Stellenbosch. Project director and quality review.

Sujean Investments (Pty) Ltd - Kuils River Flood Alleviation Project, Cape Town, South Africa (2010-2011)	Basic Assessment for the proposed Kuils River flood alleviation measures for Erf 38771, Bellville. Project director and quality review.
City of Cape Town – Bulk Water system for the Gordon’s Bay Development Area, South Africa (2007-2009)	Basic Assessment for the proposed bulk water system for the Gordon’s Bay Development Area, Cape Town. Project director, stakeholder engagement and quality review.
City of Cape Town – Extension of the Trappies Sewer line, South Africa (2007)	Basic Assessment for the proposed extension of the Trappies Sewer line, Gordon’s Bay, Cape Town. Project director, stakeholder engagement and quality review.
Velddrift Salt Company (Pty) Ltd - Seawater Pump Station and Pipeline, South Africa (2003)	Scoping Study, EMP and ECO for a seawater pump station and pipeline to augment water supply to the Velddrift Salt Company’s operation north of Laaiplek, Western Cape. Project manager, stakeholder engagement and quality review.
Entech Consulting Engineers for the Boland District Municipality - Eerste River Bulk Sewage Scheme, South Africa (1999-2001)	EIA for the proposed Eerste River Bulk Sewage Scheme, Stellenbosch. Project manager, stakeholder engagement, report compilation, quality review.
	Rivers and Wetlands
City of Cape Town - proposed Sir Lowry’s Pass River flood alleviation and upgrade, South Africa (2007-2011)	Scoping Study and EIA for the proposed Sir Lowry’s Pass River flood alleviation and upgrade in the Gordon’s Bay and Sir Lowry’s Pass Development Area, Cape Town. Project manager, stakeholder engagement, report compilation, quality review.
Stewart Scott International for City of Cape Town: Helderberg Administration – Proposed Lourens River Flood Alleviation Measures, South Africa (2000-2001)	EIA, Construction EMP and ECO for the proposed Lourens River Flood Alleviation measures, Cape Town. Project director, stakeholder engagement and quality control.
Southern Waters for City of Cape Town, South Peninsula Municipality - Management Plan for Zeekoevlei/Rondevlei, South Africa (2000)	Public consultation for the development of a Management Plan for Zeekoevlei/Rondevlei, Cape Town. Facilitated the public consultation for the development of the plan.
Helderberg Municipality and Cape Metropolitan Council - upgrade of the Moddergat River, South Africa (1999)	EIA for the proposed upgrade of the Moddergat River, Macassar, Cape Town. Project director, stakeholder engagement and quality control.

	General Industries and similar
Irvin & Johnson Limited - Abalone Processing Facility, Western Cape, South Africa (2017-2019)	Basic Assessment and EIA for a proposed abalone processing facility and expansion of the existing abalone farm, respectively, at the existing I&J operation near Gansbaai. Project director and quality control.
Saldanha Bay IDZ Licencing Company – Establishment of an Oil and Gas Offshore Supply Base, South Africa (2013-2016)	EIA for the proposed establishment of an Oil and Gas Offshore Supply Base at the Saldanha Bay IDZ. Project director and quality review.
ZAA Engineering Projects and Naval Architecture (Pty) Ltd for Transnet National Ports Authority - Pre-feasibility study for an offshore LPG handling and storage facility, Saldanha Bay, South Africa (2011)	Environmental input into the pre-feasibility study for the proposed offshore LPG handling and storage facility, Port of Saldanha, Western Cape. Project manager and environmental content input.
FerroMarine Cape – Construction of the Oil and Gas Service Hub, Port of Cape Town, South Africa (2010-2011)	ECO for the construction of an Oil and Gas Service Hub in the Port of Cape Town. Project director and alternate ECO.
Yachtport SA (Pty) Ltd – Marine Lift Facility, Saldanha Bay, South Africa (2009-2011)	Basic Assessment and ECO for the proposed Marine Lift Facility in the Small Craft Harbour, Port of Saldanha. Project director and quality review.
Richmond Business Park Joint Venture Consortium – Proposed Richmond Park Development, Cape Town, South Africa (2010-2012)	EIA for the proposed Richmond Park Development for the project facilitation joint venture on behalf of the successful land claimants, Cape Town. Project director, stakeholder engagement and quality review.
SAB Maltings (Pty) Ltd – Proposed Steep Water Purification Plant, Caledon, South Africa (2008-2011)	EIA for a Waste Management Licence Application for the construction of a Steep Water Purification Plant (Two- phased Membrane Bioreactor and Reverse Osmosis system) at the South African Breweries’ Malting Plant, Caledon, Western Cape. Project director, stakeholder engagement and quality control.
Savannah Environmental (Pty) for Eskom Holdings Ltd – Proposed Eskom Wind Energy Facility (Sere Wind Farm), Koekenaap, South Africa (2007-2008)	Environmental Review of the EIA and EMP for the proposed Eskom Wind Energy Facility and associated infrastructure (Sere Wind Farm), near Koekenaap, Western Cape. Review of process and report.

Finavera Renewables Ltd – Proposed Wave Energy Project, Western Cape, South Africa (2007-2008)	Environmental input for a site pre-selection exercise for a proposed Wave Energy Project located off the Southwest Coast of South Africa. Project manager and research.
Irvin & Johnson Limited – Offshore aquaculture Project, Mossel Bay, South Africa (2007-2009)	Basic Assessment for a proposed aquaculture project in Mossel Bay. The project involved the develop of 18 floating flexible type cages within a concession area off the coast of Mossel Bay to produce indigenous line fish (namely yellow tail, dusky cob and silver cob). Project director, specialist review and quality control.
Tow Surf South Africa – Noise and Emissions evaluation of Tow Surfing, Cape Town, South Africa (2006)	Environmental evaluation of the effects of tow surfing in terms of noise and emissions on surrounding residential areas. Project manager and report compilation.
Water Research Commission – Compilation of a Groundwater Licensing Guide (2004-2007)	A member of the project consultant team that prepared a Groundwater Licensing Guide to guide groundwater development and use applications. Project manager and workshop participant.
P & I Associates (Pty) Ltd – Proposed wreck reduction of vessel BBC China, Eastern Cape, South Africa (2004)	Environmental Assessment for the proposed wreck reduction of the vessel BBC China, Wild Coast. Project manager, facilitate specialist input and compilation of EMP for the wreck reduction operation.
PetroSA (Pty) Ltd – Unleaded Fuel Refinery Conversion Project, Mossel Bay, South Africa (2003-2005)	EIA for the upgrading of the PetroSA refinery near Mossel Bay for the conversion to 100% unleaded fuel production. Project director and quality review.
Namakwa Sands Ltd – Proposed extension of mining and processing operations, West Coast, South Africa (2003)	Initial environmental investigation for the proposed extension of Namakwa Sands' mining, mineral separation and smelting operations. Project director, specialist site visit and quality review.
Caltex SA (Pty) Ltd – Processing and disposal of sulphur produced at the Milnerton refinery, South Africa (2001-2002)	EIA for the additional equipment to process sulphur produced at the Milnerton Oil refinery and offsite disposal of sulphur. Project director and quality review.
PetroSA (Pty) Ltd – Distillate Project, Voorbaai Tank Farm, South Africa (2001)	Compilation and implementation of construction-phase Environmental Management Plan for the Low Aromatic Distillate Project, Voorbaai Tank Farm Mossel Bay. Project manager and report compilation.
Caltex SA (Pty) Ltd – Capacity increase of the Saldanha-Milnerton crude oil pipeline, South Africa (2000)	EIA for the increase in the flow-rate of the Saldanha-Milnerton crude oil pipeline. Project management, stakeholder engagement and report compilation.

LAMA International for Sappi Saiccor – Construction of the extended marine outfall pipeline, KwaZulu-Natal, South Africa (1996)	Compiled the Construction EMP and undertook the construction compliance for the duration of the construction operation to extend the Sappi Saiccor marine outfall pipeline, Umkomaas, KwaZulu-Natal. Project manager, report compilation and ECO.
CSIR – Proposed Gas monitoring laboratory at Cape Point, South Africa (1994-1996)	Public consultation for the proposed CSIR gas monitoring laboratory at Cape Point. Quality review.
CSIR for Saldanha Steel (Pty) Ltd – Proposed steel mill for Saldanha Bay (1994-1995)	Facilitated the public consultation process for the proposed development of a steel mill in the Saldanha Bay area. Stakeholder engagement and co-project manager.
	Tourism/Resort
Meerenhof Properties (Pty) Ltd - Proposed expansion of dams on Uitsig Farm, Cape Town, South Africa (2016 – 2019)	Basic Assessment for the proposed expansion of dams on Uitsig Farm, Constantia, Cape Town to provide for additional storage for summer irrigation purposes. Project director, stakeholder engagement and quality review.
City of Cape Town – Feasibility Study for proposed Monwabisi Coastal Node, Cape Town, South Africa (2011)	Feasibility study for the proposed Monwabisi Coastal Node, Cape Town. Project manager and content contributor.
Olympian Developing Company – Proposed multi-purpose estate, Firgrove, South Africa (2003-2005)	EIA for the development of a multi-purpose estate on Rem. Farm 681, Firgrove/Macassar, Cape Town (Sitari Fields Golf Estate). Project director, stakeholder engagement, review of specialist studies and quality control.
Lourensford Estate – Construction of Lourensford Winery, Somerset West, South Africa (2002-2003)	Compiled the Construction and Operation EMP and undertook compliance monitoring for the development of a wine cellar on Lourensford Estate, Somerset West, Cape Town. Report compilation and ECO.
Johnnic Property Development (Pty) Ltd – Atlantic Beach Golf Estate, Cape Town, South Africa (1997)	EIA for the proposed development of the Atlantic Beach Golf Estate, Melkbosstrand, Cape Town. Project director, specialist study review, report compilation and quality review.
Table Mountain Aerial Cableway Company - Upgrade of the Table Mountain Cableway, Cape Town, South Africa (1995-1996)	EIA for the proposed upgrading of the Table Mountain Aerial Cableway, Cape Town. Facilitated public consultation process, reviewed specialist studies, report compilation and project management. Member of the Environmental Monitoring Committee for the duration of the construction operation.

	Built Environment
Luna Trust - Proposed Subdivision of Erf 177476, St James, Cape Town, South Africa (2017 – Ongoing)	Basic Assessment for the proposed subdivision into two additional portions of Erf 177476, St James, Cape Town. Project director, client liaison and quality review.
Peter Koekemoer – Rectification process for house construction in Cape Town, South Africa (2015-2016)	EIA for a Section 24G application process for House Koekemoer ERF 3446, Oranjezicht, Cape Town. Project director, client interaction and quality review.
Rustyrose 41 (Pty) Ltd t/a Brights Hardware (Pty) Ltd - Rezoning of Erf 10565 Belville (2011-2013)	Basic Assessment for the proposed rezoning of a portion of Erf 10565, Boston (Belville), Cape Town and ECO services for the duration of the construction period.
Martin Kelly – Proposed subdivision of a portion of Erf 1, Simon's Town, South Africa (2006-2011)	Basic Assessment for the proposed subdivision and rezoning of a portion of Erf 1, Simon's Town (Glencairn), Cape Town. Project manager, stakeholder engagement, specialist report review, client interaction and quality control.
Llandudno Surf Lifesaving Club – Extension of the club boathouse, Cape Town, South Africa (2007-2010)	Basic Assessment for the proposed extension of the Llandudno Surf Lifesaving Club Boathouse, Llandudno, Cape Town. Project director, authority liaison and quality review.
Cape Town Community Housing Company – Proposed Royal Maitland Phase 3, Cape Town, South Africa (2006-2007)	Basic Assessment for the proposed rezoning and subdivision of Erf 23300, Maitland (Royal Maitland Phase 3). Project management and quality review.
Rocklands Eco Estate (Pty) Ltd – Proposed development of Rocklands Farm, Simon's Town, South Africa (2005-2011)	Basic Assessment for the proposed rezoning and subdivision of parts of Portions 1 and 2 of Farm 1020, Simon's Town (Rocklands Farm), Western Cape. Stakeholder engagement, specialist study review, report compilation, client interaction, project management and quality review.
Trans Caledon Tunnel Authority – Construction of the Berg River Dam, Franschhoek, South Africa (2005-2008)	Environmental compliance for various construction components of the Berg River Dam Project, Franschhoek, Western Cape. Tasks included weekly site visits, ECO report compilation and monthly audit reports for the duration of the construction operation.
Gavin Wurz – Proposed development of Farm Rouen, Strand, South Africa (2004)	Scoping Study for the proposed rezoning and subdivision of Farm Rouen on Erven 5100 & 5101, Strand, Cape Town. Project manager, stakeholder engagement and quality review.

Plattner Racing Stables – Redevelopment of of Rondeberg Farm, West Coast, South Africa (1999-2000)	Environmental input included undertaking a Scoping Study for the proposed rezoning and development of Farm Rondeberg Flats, No. 116, West Coast north of Cape Town. A Construction EMP and Operation EMP were also compiled. The project included the construction of a horse racing track, jockey stables and various other supporting infrastructure. Project management, stakeholder engagement, specialist study review, report compilation and quality review.
Thesen & Co – Proposed development of Thesen Island, Knysna, South Africa (1994-1996)	Facilitation of the public consultation process for the proposed development options for Thesen Island, Knysna.
MEMBERSHIPS	
IWM	Member of the Institute of Waste Management, since 1998
IAIASa	Member of the International Association for Impact Assessment South Africa, since 1997
Pr.Sci.Nat.	Registered as a Professional Natural Scientist - Environmental Scientist, 1993 (Reg. no. 400145/93)
PUBLICATIONS	
	R Parsons, L Eichstadt, J Crowther, J Blood. (2008) "Application Procedure for the Development and Use of Groundwater". WRC Report No. 1510/1/08.
	Shippey K., Campbell H.M. and Crowther J. (1997). "Constructing successful environmental management plans for building sites". IAIA '97 Conference, Integrated Environmental Management in Southern Africa: The State of the Art and Lessons Learnt. Pilansberg, South Africa.
	Crowther J. and Dorren D. (1994) "Public consultation in the search for regional landfill sites, South Coast Natal". Wastecon '94 All-Africa Congress, Somerset West, South Africa.
	Hendry R W, Crowther J and Homes R (1990) "Stabilisation of Rock Cuttings on the Florence to Worcester Section of the National Route N1, South Africa". International Society for Rock Mechanics, International symposium on Static and Dynamic Considerations in Rock Engineering, Swaziland.
	Crowther J., Parsons R. and Palm J. (1986). "Experience of Public Participation in developing new waste disposal sites". Wastecon '96 International Congress. Convened by the Institute of Waste Management, Durban, South Africa.



ANDREW BRADBURY

TECHNICAL DIRECTOR

Africa Oil and Gas and Power Sector Lead

QUALIFICATIONS

MSc	1993	Environmental Assessment and Management
BSc (Hons)	1990	Earth and Life Studies

EXPERTISE

- Environmental and Social Due Diligence (ESDD)
- Environmental and Social Impact Assessment (ESIA)
- Environmental Planning
- Environmental Management Plans/Systems
- Environmental Compliance

Andrew is a Technical Director at SLR and leads both the Oil & Gas and Power sectors for SLR in Africa. Andrew is an environmental professional with over 24 years of consulting experience in the oil and gas, power (conventional, hydro, and renewable), finance & legal, chemical, infrastructure and built environment sectors.

Andrew has worked on projects in South Africa, Mozambique, Namibia, Tanzania, Uganda, Kenya, Angola, Gabon, Ghana, Equatorial Guinea, Botswana, Gambia, Ethiopia, Nigeria, the United Kingdom, Bangladesh, Uzbekistan, Qatar, Kuwait, Dubai, St Vincent and the Grenadines, Commonwealth of Dominica and Saint Lucia.

His areas of experience covers: Environmental and Social Impact Assessment, Environmental and Social Planning and Management, Environmental and Social Due Diligence, Compliance, Training and Capacity Building and Policy work. He has worked on some of the largest Impact Assessment and due diligence projects in Southern Africa.

PROJECTS

	Oil and Gas	
Dangote Industries Limited Refinery ESIA review and gap analysis; Nigeria. (2017- 2018)		Andrew is leading a review and gap analysis of an ESIA produced for a 650,000 bpd refinery proposed for the Lekki Peninsular in Nigeria. The works scope is to review the ESIA, identify gaps working with Dangote and the local consultant to fill the gaps in order to get the ESIA ready for submission to the Department of Petroleum Resources for permitting.
Shell Namibia Upstream BV – Application for deep water exploration well drilling, Namibia. (2017)		Provided project management and quality review during the Scoping SLR was appointed to conduct an Environmental and Social Impact Assessment (ESIA) for an offshore well drilling programme in Namibia. The project involved potential drilling of up to two deep water exploration wells in Petroleum Exploration Licence 39 off the southern coast. Andrew joined SLR part way through project and took over from an existing senior staff member who was going on sabbatical for three months. Andrew was responsible leading the SLR team, interacting with the client on key issues, reviewing reports and overall quality control.

Dangote and Standard Chartered, Bank's Independent Environmental and Social Consultant (IESC), Environmental and Social Due Diligence (including review and gap analysis of the ESIA) of Dangote Refinery Project, Lekki Free Trade Zone, Nigeria.
(2016-2017)

Standard Chartered is Lead financier to Dangote to build Africa's largest oil refinery (650,000bpd) working with the Italian and UK export credit agencies. Andrew was part of a core team of four people acting as Independent Environmental and Social Consultant to the banks. Andrew led day to day project execution: he visited the site, undertook management interviews on site and at Dangote Headquarters, and was primary author of the Environmental and Social Due Diligence report and Environmental and Social Action Plan. Andrew reviewed the projects ESIA and identified gaps and a plan to close these, he reviewed compliance with Applicable Standards including Nigeria laws, regulation and permitting requirements plus relevant international obligations, the IFC Performance Standards, relevant IFC Sector and EHS Guidelines and the requirements in Equator Principles III. A number of non-compliances were identified and a comprehensive Environmental and Social Action Plan was developed to close these gaps during the loan disbursement process. The project included on and offshore elements including pipelines and SPM.

Halliburton/Baker Hughes, Environmental and Social Due Diligence and Permit Planning, Angola, Gabon, Ghana, Equatorial Guinea, Nigeria and Tanzania
(2015-2016)

Andrew was part of the team appointed to work on one of the largest energy transactions in recent years; the merger of oil field services businesses Halliburton and Baker Hughes. The work scope was to consider the environmental and social liabilities of the transfer of facilities in Africa as part of the deal. The work identified numerous compliance gaps and developed plans to close these.

Anadarko, Environmental Social Health Impact Assessment, Environmental and Social Management Plan and associated permitting plans for Anadarko's new LNG terminal in northern Mozambique.
(2011-2016)

Andrew led a global consulting team to prepare the Environmental Social Health Impact Assessment, Environmental and Social Management Plan and associated permitting plans for Anadarko's new LNG terminal in northern Mozambique; one of the biggest Oil and Gas developments in the region. The project included offshore elements, coastal elements and land based components. The area is remote and undeveloped. There were a number of sensitive marine issues including potential impact on coral and coastal sediment transport. Social, settlement and influx management issues were also a key part of the work. The work was undertaken in line with Mozambican regulations and the International Finance Corporation's (IFC) environmental and social standards as external financing was being sought. A species new to science was found and recorded. This was an extremely large and complex consulting project involving teams from around the world. The reports were delivered in English and Portuguese. The ESIA is available here: <http://www.mzlng.com/Responsibility/Environmental-Social-Management/Environmental-Impact-Assessment/>

Confidential Oil Major, Environmental and Social Due Diligence and Permit Planning, Kenya.
(2014)

Andrew led the team appointed to provide environmental and social due diligence services in relation to the potential entry of a major oil and gas company into Kenya through acquisition of some existing infrastructure plus exploration licenses. The project scope covered existing assets but considered the environmental and social risks associated with the field development plan. Land access and resettlement were major issues and those, combined with the permitting schedule, meant the client decided not to invest. Andrew's team was the only external advisor in this highly commercial sensitive deal working as part of the client deal team.

Shell International BV, New Country Entry Environmental and Social Due Diligence, Namibia. (2014)	<p>Andrew was part of a team appointed to provide environmental and social due diligence services in relation to the potential re-entry of Shell into Namibia through acquisition of exploration licenses. Shell decided did re enter Namibia to explore.</p> <p>Andrew led the work and interacted with the client explaining the environmental and social risks both associated with the company's return into Namibia generally but associated with the development of a particular exploration project and, in particular, it's potential for impact on a sensitive marine area.</p>
Shell, New Country Entry Risk Assessments/Due Diligence, Various Sub Saharan African countries. (2013 – 2016)	<p>Andrew either led or contributed to new country entry risk reviews undertaken for Shell for numerous African countries. This included review of the environmental and social risks including review of impact assessments where available. The work contributed to Shell's decision to pursue and investment or not.</p>
Sasol, Gas to Liquids Project ESIA and Gas to Liquids Site Selection, Uzbekistan. (2011 and 2014)	<p>Andrew has worked on two GTL projects; one in Mozambique and the other in Uzbekistan. The work in Mozambique was a site selection study based on environmental, social and technical factors and was focused on northern Mozambique. The work in Uzbekistan was a full ESIA for a GTL plant. Andrew led both projects and was responsible for quality, client liaison and ESIA team leadership.</p>
Confidential Client, GTL Site Selection Study, Mozambique. (2014)	<p>Andrew worked on a proposed GTL project in Mozambique. The work was a site selection study based on environmental, social and technical factors and was focused on northern Mozambique. Andrew led the project and was responsible for quality, client liaison and ESIA team leadership.</p>
Total and Tullow Oil, Environmental and Social Impact Assessment for Seismic Survey in Murchison Falls National Park in Uganda (2011-2012)	<p>Andrew led an ESIA team preparing an ESIA for a seismic survey in a very sensitive part of Uganda in the Murchison Falls National Park. The work had complex biodiversity and social issues to consider and mitigate.</p>
Power	
Globeleq, 247 MW Kalunqwishi hydro power, Environmental and Social Due Diligence including review of ESIA and Gap Analysis plus Transmission Line Routing Study, Zambia (2016-2017)	<p>Andrew led an Environmental and Social Due Diligence on a 247 MW hydropower project planned in Northern Zambia. The client was considering investing into the Zambian project company. Andrew led a team reviewing the project's environmental and social risk as part of a due diligence to international standards and that included review of the ESIA. A number of 'red flag issues' were identified and gaps in the ESIA highlighted. Scopes of work for an improved ESIA including additional studies on biodiversity, environmental flows, downstream impacts on people were developed as part of a program of work to close the gaps in the ESIA and make the project bankable. At the same time Andrew lead another team reviewing the environmental and social impacts of the various transmission routes to identify the optimum route in terms of environmental and social impacts. The study used remote sensing as the core of the work.</p>

Enel Greenpower, Project Environmental and Social Impact Review and Shared Value Proposition Development 100mw Solar PV, Ethiopia (2016)	<p>Andrew led an environmental and social impact study looking at the risks associated with Enel Green Power building 100MW Solar PV project in Ethiopia. The study considered environmental, social, permitting and security risks and also included the development of a shared value proposition for Enel's bidding.</p>
Consolidated Infrastructure Group, Ethiopia Transmission Lines ESIA and Financing Advisory Support, Ethiopia. (2016-2017)	<p>Andrew led the team appointed to conduct an Environmental and Social Impact Assessment (ESIA) for three transmission line projects in urban Addis. The scope covered Environmental and Social Impact Assessment, Environmental and Social Management Planning and resettlement planning. The projects are being financed by a group of lenders including the Swedish Export Credit Guarantee Agency EKN.</p> <p>Consolidated Infrastructure Group was seeking finance for this program transmission line networks. Andrew led a team who undertook an Environmental and Social Impact Assessment to international standards to meet the requirements of Standard Bank and EKN.</p>
Various CCGT Power Project ESIA	<p>Andrew has undertaken ESIA's for a number of combined cycle gas turbine stations both in the UK and overseas. The last project was a CCGT project in Qatar which included desalination and complex water abstraction and discharge issues.</p>
MEMBERSHIPS	
Pr.Sci.Nat.	<p>Registered as a Professional Natural Scientist - Environmental Scientist, South Africa (Reg. no. 116729)</p>
IoDSA	<p>Institute of Directors Southern Africa</p>
FRGS	<p>Fellow of the Royal Geographical Society</p>
PUBLICATIONS	
	<p>A Step Ahead of the Game – Site Selection and Constraints Mapping through Geographical Information Systems (GIS). Africa Energy Yearbook 2015.</p>



JEREMY BLOOD

SENIOR ENVIRONMENTAL CONSULTANT

Environmental Management, Planning & Approvals,
South Africa

QUALIFICATIONS

MSc	2006	Masters in Conservation Ecology (Stellenbosch University). Cum Laude.
BSc (Hons)	1995	Honours in Botany (Rhodes University). Academic colours.
BSc	1994	Majors in Botany and Zoology (Rhodes University).

EXPERTISE

- Environmental & Social Impact Assessment
- Environmental Legislation
- Environmental Management Programmes
- Stakeholder Engagement
- Environmental compliance & monitoring
- Rehabilitation Planning
- Environmental Control Officer

Jeremy is a Senior Environmental Consultant and 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 Programmes, Stakeholder Engagement, Environmental Compliance and Monitoring and Environmental Control Officer related work in South Africa, Namibia, Mozambique and Kenya. Jeremy has also recently been involved in an Environmental and Social Due Diligence for a wind energy facility.

He has expertise in a wide range of projects relating to oil / gas and mining (heavy mineral mining and borrowpits), housing/industrial developments, renewables (solar PV) and infrastructure projects (e.g. roads, railway line, power lines and pipelines).

PROJECTS

Environmental and Social Due Diligence

Client confidential – ESDD for a Wind Energy Facility, South Africa (2018)
ESDD for a 102 MW Wind Energy Facility near Copperton in the Northern Cape, South Africa. Jeremy's role included reviewing project-related and legislative information and report writing.

Anadarko South Africa (Pty) Ltd - Environmental Due Diligence, Block 2C, West Coast, South Africa (2011)
Environmental Due Diligence for Licence Block 2C, West Coast, South Africa. Jeremy's role included project management, review / auditing and report writing.

Anadarko South Africa (Pty) Ltd - Environmental Due Diligence, Block 5/6, South-West Coast, South Africa (2011)
Environmental Due Diligence for Licence Block 5/6, South-West Coast, South Africa. Jeremy's role included project management, review / auditing and report writing.

Oil and Gas

Anadarko Moçambique Área 1, Lda (AMA1) – Update Area 1 EMP for the Liquefied Natural Gas Project in Cabo Delgado, Mozambique (2018-2019)

In June 2014 AMA1 received approval to develop the proposed LNG Project in offshore Area 1 and at the Afungi Peninsula of Cabo Delgado Province in northern Mozambique. Following project approval, the development of the project design continued through a process of optimization, resulting in further refinements to the Project Description. SLR was appointed to evaluate proposed project changes, to determine / confirm impact significance, and to update the approved EMP accordingly. Jeremy's role included the screening of project changes through an internal Management of Change Procedure to identify and evaluate the environmental implications of any changes arising from the design optimisation process, specialist report review and EMP report writing.

Shell Namibia Upstream BV - Exploration well drilling in Petroleum Exploration Licence 39, Namibia (2017-2018)

EIA for the drilling of up to two deep water exploration wells in Petroleum Exploration Licence 39 off the coast of southern Namibia. Jeremy's role included managing the EIA process and public participation process, specialist report review and EIA report writing.

Spectrum Geo Limited – 3D seismic survey in the Walvis Basin, Namibia (2017)

EIA for a 3D seismic survey in the Walvis Basin of the coast of northern Namibia. Jeremy was the project manager and responsible for the public participation process, specialist report review and EIA report writing.

Afro Energy (Pty) Ltd - Coal bed methane exploration, Free State and Mpumalanga Provinces (2016)

Scoping Phase of an EIA for an Exploration Right application for Petroleum and Natural Gas (Coal Bed Methane) on various farms in a portion of the Free State and Mpumalanga Provinces. Jeremy was responsible for the management and undertaking of the scoping phase, which involved managing the public participation process and writing the scoping report.

Spectrum Geo Ltd - 2D seismic survey, Namibia (2016-2017)

EIA for a 2D seismic survey in the Orange Basin off the coast of southern Namibia. Jeremy was the project manager and responsible for the public participation process, specialist report review and EIA report writing.

BHP Billiton Petroleum (South Africa 3B/4B) Limited - Relinquishment of Licence Block 3B/4B, West Coast, South Africa (2016)

Application for a Closure Certificate and consolidated Environmental Risk Report and Closure Plan for the relinquishment of Licence Block 3B/4B (ER 12/3/23) off the West Coast of South Africa. Jeremy's role included managing the relinquishment process, report writing and liaison with the competent authority.

Rhino Oil & Gas Exploration South Africa (Pty) Ltd – Oil and gas exploration in Licence Blocks 3617 and 3717, South-West Coast, South Africa (2015-2016)

Scoping and EIA for exploration activities in offshore Licence Blocks 3617 and 3717 off the South-West Coast of South Africa. Exploration activities included multi-beam bathymetry and 2D/3D seismic surveys. Jeremy was the project manager and responsible for the public participation process, specialist report review and report writing.

Rhino Oil & Gas Exploration South Africa (Pty) Ltd – Oil and gas exploration in various inshore licence blocks, South Africa (2015-2016)	Scoping and EIA for exploration activities in various inshore licence blocks off the South-West Coast of South. Exploration activities included multi-beam bathymetry and 2D/3D seismic surveys. Jeremy was responsible for quality control and report review.
PGS Exploration (UK) Ltd - 2D seismic survey, South Coast, South Africa (2015-2016)	EMP Addendum for a speculative 2D seismic survey off the South Coast of South Africa. Jeremy was the project manager and responsible for the public participation process, specialist report review and EMP report writing.
Thombo Petroleum Ltd - Exploration well drilling in Block 2B, West Coast, South Africa (2014-2016)	EIA and EMP Addendum for the drilling of up to five exploration wells in Block 2B off the West Coast of South Africa. Jeremy's role included managing the EIA process and public participation process, specialist report review and EIA report writing.
Murphy Oil Corporation - Exploration well drilling in Licence Blocks 2613A and 2613B, Namibia (2014-2016)	EIA for the drilling of up to two exploration wells in Licence Blocks 2613A and 2613B off the coast of Namibia. Jeremy was the project manager and responsible for the public participation process, specialist report review and report writing.
Cairn South Africa - Exploration well drilling in Licence Block 1, West Coast, South Africa (2013-2016)	EIA and EMP Addendum for the drilling of up to five exploration wells in Block 1 off the West Coast of South Africa. Jeremy was the project manager and responsible for the public participation process, specialist report review and report writing.
Sunbird Energy Ltd – Ibhubesi Gas Project (2013-2017)	EIA and EMP Addendum for the proposed Ibhubesi Gas Project, Western and Northern Cape, South Africa. The project involved the development of the gas field in Block 2A, which included a 430 km production pipeline (offshore and onshore) to the Ankerlig Power Station. Jeremy was the project manager and responsible for the public participation process, specialist report review and report writing.
PGS Exploration (UK) Ltd – 2D seismic survey compliance, South Coast, South Africa (2015-2016)	EMP Compliance and audit services for a speculative 2D seismic survey off the South Coast of South Africa. Jeremy's role included managing the audit process and compiling the survey close-out report, which outlined the implementation of the EMP (compliance) and highlighted any problems and non-compliance issues that arose during the survey.
ExxonMobil Exploration and Production South Africa Ltd – Well drilling Roadmap and Permitting Plan, South Africa (2015)	SLR was appointed to develop a high level Regulatory Roadmap and Permitting Plan for offshore exploration well drilling and associated onshore activities for ExxonMobil's South African licence areas, focusing on the Tugela South licence area off the East Coast. Jeremy was the project manager and responsible for the legal review and report writing.
Anadarko South Africa (Pty) Ltd - Exploration Right renewal for Licence Blocks 5, 6 & 7, South-West Coast, South Africa (2015)	SLR was appointed to prepare an Environmental Compliance Report as part of the Exploration Right renewal for Licence Blocks 5, 6 & 7 (ER 12/3/224) off the South-West Coast of South Africa. Jeremy's role included managing the audit process and compiling the Environmental Compliance Report.

Anadarko South Africa (Pty) Ltd - Relinquishment of a portion of Licence Blocks 5, 6 & 7, South-West Coast, South Africa (2016)	Application for a Closure Certificate and Consolidated Environmental Risk Report and Closure Plan for the relinquishment of Licence Blocks 5, 6 & 7 (ER 12/3/224) off the South-West Coast of South Africa. Jeremy's role included managing the relinquishment process, report writing and liaison with the competent authority.
Nabirm Energy Services - 2D seismic survey compliance, Block 2113, Namibia (2014-2015)	EMP Compliance and audit services for a 2D seismic survey in the offshore portion of Block 2113A in the Walvis Basin off the coast of Namibia. Jeremy's role included managing the audit process and compiling the survey close-out report, which outlined the implementation of the EMP (compliance) and highlighted any problems and non-compliance issues that arose during the survey.
ExxonMobil Exploration and Production South Africa Limited - Relinquishment of a portion of the Tugela South Block, East Coast, South Africa (2014)	Application for a Closure Certificate and Consolidated Environmental Risk Report and Closure Plan for the relinquishment of a portion of the Tugela South Block off the East Coast of South Africa. Jeremy's role included managing the relinquishment process, report writing and liaison with the competent authority.
CGG Services SA - 2D seismic survey compliance, East Coast, South Africa (2014)	EMP Compliance and audit services for a speculative 2D seismic survey off the East Coast of South Africa. Jeremy's role included managing the audit process and compiling the survey close-out report, which outlined the implementation of the EMP (compliance) and highlighted any problems and non-compliance issues that arose during the survey.
Murphy Oil Corporation and TGS-NOPEC Geophysical Company ASA – 3D seismic survey, Licence Blocks 2613A and 2613B, Namibia (2013-2014)	EIA for a proposed 3D seismic survey in Licence Blocks 2613A and 2613B, Lüderitz Basin, off the coast of Namibia. Jeremy was the project manager and responsible for the public participation process, specialist report review and EMP report writing.
Tullow Kudu Ltd - 3D seismic survey, Licence Blocks 2012B and 2112A, Namibia (2013-2014)	EIA for a proposed 3D seismic survey in Licence Blocks 2012B and 2112A, Walvis Basin, off the Coast of Namibia. Jeremy was the project manager and responsible for the public participation process, specialist report review and EMP report writing.
Shell South Africa Upstream BV - Exploration well drilling in the Orange Basin Deepwater Licence Area, West Coast, South Africa (2013-2015)	EIA for the drilling of up to two deep water exploration wells in the northern portion of the Orange Basin Deepwater Licence Area off the West Coast of South Africa. Jeremy's role included managing the EIA process and public participation process, specialist report review and EIA report writing.
CGG Veritas Services (UK) Ltd – 2D seismic survey compliance, East Coast, South Africa (2013)	EMP Compliance and audit services for a 2D seismic off the East Coast of South Africa. Jeremy's role included managing the audit process and compiling the survey close-out report, which outlined the implementation of the EMP (compliance) and highlighted any problems and non-compliance issues that arose during the survey.

Petroleum Geo-Services ASA – 2D seismic survey, South Coast, South Africa (2013)	EMP for the proposed speculative 2D seismic survey off the South Coast of South Africa. Jeremy's role included managing the EMP and public participation process, specialist report review and EMP report writing.
Anadarko South Africa (Pty) Ltd - Seafloor geochemical sampling programme, Licence Blocks 5/6 & 7, South-West Coast, South Africa (2013)	EMP Addendum for a seafloor geochemical sampling programme in Petroleum Licence Blocks 5/6 & 7 off the South-West Coast of South Africa. The sampling programme consisted of seafloor sampling (piston coring), seafloor heat flow measurements and a possible multi-beam bathymetry survey to refine target locations for seafloor sampling. Jeremy was the project manager and responsible for the public participation process, specialist report review and EMP report writing.
Anadarko South Africa (Pty) Ltd - Exploration programme, Licence Block 2C, West Coast, South Africa (2012-2013)	EMP for a proposed exploration programme in Block 2C off the West Coast, South Africa. The exploration programme included 2D/3D seismic surveys, multi-beam bathymetry survey, seafloor sampling and seafloor heat flow measurements. Jeremy was the project manager and responsible for the public participation process, specialist report review and EMP report writing.
Impact Africa Limited - Exploration programme, Tugela North, East Coast, South Africa (2012-2013)	EMP for a proposed exploration programme in the Tugela North area off the East Coast of South Africa. The exploration programme included Airborne geophysical acquisition (gravity and magnetics), 2D/3D seismic surveys, seafloor heat flow measurements, multi-beam bathymetry survey and seafloor sampling. Jeremy was the project manager and responsible for the public participation process, specialist report review and EMP report writing.
Sasol Petroleum International (Pty) Ltd – 2D seismic survey, Durban and Zululand Basins, East Coast, South Africa (2012)	EMP for a proposed 2D seismic survey programme in the Durban and Zululand Basins off the East Coast of South Africa. Jeremy was the project manager and responsible for the public participation process, specialist report review and EMP report writing.
Petroleum Geo-Services ASA – 2D seismic survey, South and East Coasts, South Africa (2012)	EMP for the proposed speculative 2D seismic survey off the South and East Coast of South Africa. Jeremy's role included managing the EMP and public participation process, specialist report review and EMP report writing.
PetroSA (Pty) Ltd – 3D seismic survey, Block 1, West Coast, South Africa (2012)	EMP Amendment for the 3D seismic survey campaign in Block 1 off the West Coast of South Africa. Jeremy's role included managing the EMP and public participation process, specialist report review and EMP report writing.
Spectrum Geo Ltd - 2D seismic survey, Lüderitz and Walvis Basin, Namibia (2012)	EIA for a 2D seismic survey in various Blocks in the Lüderitz and Walvis Basin offshore areas, Namibia. Jeremy's role included managing the EIA process and public participation process, specialist report review and EIA report writing.
Bayfield Energy Ltd – 2D seismic survey, Pletmos Inshore Area, South Coast, South Africa (2012)	EMP Amendment for a 2D seismic survey in the Pletmos Inshore Area off the South Coast of South Africa. Jeremy's role included managing the EMP and public participation process, specialist report review and EMP report writing.

CGG Veritas Services (UK) Ltd - 2D seismic survey, East Coast, South Africa (2012)	EMP for a speculative 2D seismic survey off the East Coast of South Africa. Jeremy was the project manager and responsible for the public participation process, specialist report review and EMP report writing.
Spectrum Geo Ltd - 2D seismic survey, West Coast, South Africa (2012)	EMP for a speculative 2D seismic survey off the West Coast of South Africa. Jeremy was the project manager and responsible for the public participation process, specialist report review and EMP report writing.
Signet Petroleum Ltd - 2D/3D seismic survey, Block 2914B, Namibia (2011)	EIA for a proposed 2D and 3D seismic survey in Block 2914B off the coast of Namibia. Jeremy's role included managing the EIA process and public participation process, specialist report review and EIA report writing.
PetroSA (Pty) Ltd - 2D/3D seismic survey, Blocks 5 & 6, South Africa (2011)	EMP for a 2D/3D seismic survey campaign in Blocks 5 & 6 off the South-West Coast of South Africa. Jeremy's role included managing the EMP process and public participation process, specialist report review and EMP report writing.
UNX Energy Corp – 3D seismic survey, Licence Blocks 2713A/2713B and 2815, Namibia (2010-2011)	EIA (including EMP for a proposed 3D seismic survey programme in the southern Orange Basin (Licence Blocks 2713A/2713B and 2815) off the coast of Namibia. Jeremy's role included managing the EIA process and public participation process, specialist report review and EIA report writing.
HRT Oil Gas Ltd - 3D seismic survey, Licence Blocks 2112B/2212A and 2813A/2814B, Namibia (2010-2011)	EIA for a proposed 3D seismic survey programme in the central Walvis Basin (Licence Blocks 2112B/2212A) and southern Orange Basin (Licence Blocks 2813A/2814B) off the coast of Namibia. Jeremy's role included managing the EIA process and public participation process, specialist report review and EIA report writing.
PetroSA (Pty) Ltd – Exploration well drilling, Block 1, West Coast, South Africa (2010-2011)	Basic Assessment and EMP for the drilling of up to six exploration wells in Block 1 (ER83) off the West Coast of South Africa. Jeremy's role included managing the Basic Assessment process and public participation process, specialist report review and report writing.
Bayfield Energy Ltd – 2D seismic survey, Pletmos Inshore Area, South Coast, South Africa (2010)	EMP for a 2D seismic survey in the Pletmos Inshore Area off the South Coast of South Africa. Jeremy's role included managing the EMP and public participation process, specialist report review and EMP report writing.
Silver Wave Energy (Pte) Ltd– 2D seismic survey, Tugela South, East Coast, South Africa (2010)	EMP for a 2D seismic survey in the Tugela South area (Blocks 2931C, 2931D, 2932A and 2932C) off the East Coast of South Africa. Jeremy's role included managing the EMP and public participation process, specialist report review and EMP report writing.
BHP Billiton Petroleum – Seismic surveys and well drilling, Block 3A/4A, West Coast, South Africa (2009-2010)	EMP amendment for conducting seismic surveys and exploration well drilling in Petroleum Licence Block 3A/4A, West Coast, South Africa. Jeremy's role included managing the EMP and public participation process, specialist report review and EMP report writing.

PetroSA (Pty) Ltd – Performance Assessments, South Coast, South Africa (2009)	Compilation of offshore performance assessments for Block 9, Block 11a, F-A Gas Field, E-M Gas Field, South Coast Gas (SCG) Gas Field, Sable Oil Field and Oribi (E-BT)/Oryx (E-AR) Oil Fields. Jeremy's role included managing the audit process and compiling the Performance Assessment report, which outlined the implementation of the EMP (compliance) and highlighted any problems and non-compliance issues.
PetroSA (Pty) Ltd – F-O Gas Field development, South Coast, South Africa (2008-2012)	EIA and EMP for the development of the F-O Gas Field in Petroleum Licence Block 9, South Coast, South Africa. The project included the drilling of up to 14 production wells in the F-O Gas Field and connecting the gas field to the existing F-A Platform via a new approximately 39 km subsea production pipeline. Jeremy's role included managing the EIA/EMP and public participation process, specialist report review and EIA report writing.
PetroSA (Pty) Ltd – 3D seismic survey, Block 1, West Coast, South Africa (2008)	EMP for a 3D seismic survey in Block 1 (ER83) off the West Coast of South Africa. Jeremy's role included managing the EMP and public participation process, specialist report review and EMP report writing.
Forest Exploration International (SA) (Pty) Ltd - Ibhubesi Gas Field development (2006-2007)	EIA and EMP for the proposed development of the Ibhubesi Gas Field and associated infrastructure in License Block 2A off the west coast of South Africa. The project involved the drilling of 99 wells and a 110 km production pipeline to an onshore gas receiving facility. Jeremy's role included managing the EIA/EMP and public participation process, specialist report review and report writing.
PetroSA (Pty) Ltd – Well close-out report, E-M Gas Field, South Coast, South Africa (2005)	Close-out report for a workover on well E-M03P in the E-M mining lease off the South Coast of South Africa. Jeremy was responsible for report writing.
PetroSA (Pty) Ltd – South Coast Gas development project, Licence Block 9, South Coast, South Africa (2004-2006)	EIA and EMP for the development of the South Coast Gas project in Petroleum License Block 9 off the South Coast of South Africa. Jeremy was responsible for specialist report review and report writing.
	Mining
Gecko Cobalt Mining (Pty) Ltd - Opuwo Cobalt Project, Opuwo, Kunene Region, Namibia (2019)	EIA for the proposed Opuwo Cobalt Project Near Opuwo in the Kunene Region of Namibia. Based on the results of exploration drilling undertaken since 2017, Gecko is proposing to apply for a Mining Licence (ML) to mine the ore (copper and cobalt mineralisation) through a combined open-pit and underground mine and to process this material on site within the proposed ML area, which is located within EPL 4346. Jeremy's role included managing the EIA and public participation process, specialist report review and EIA / EMP report writing.
Belton Park Trading 127 (Pty) Ltd - Offshore diamond mining in Sea Concessions 2c and 3c, the West Coast, South Africa (2018)	Amendment application to expand the approved diamond mining target area within Sea Concession 2C, as well as the Mining Right area to include Sea Concession 3C. Jeremy's role included managing the EIA and public participation process, specialist report review and EIA / EMP report writing.

Velddrift Salt Company (Pty) Ltd –Salt mine, Velddrift, South Africa (2018)	Update the Financial Provision for the salt mine on Portion 69 of Farm 110 near Velddrift, Western Cape, South Africa. Jeremy's role included project management, client liaison and report review.
Alexkor RMC Pooling and Sharing Joint Venture – EMP amendment for mining rights, West Coast, South Africa (2017-2018)	EMP Amendment for Mining Rights 554MRC, 10025MR, 512MRC and 513MRC (diamonds) located off the West Coast of South Africa, situated roughly between Kleinsee and Port Nolloth. Jeremy's role included managing the EMP and public participation process, specialist report review and EMP report writing.
Velddrift Salt Company (Pty) Ltd –Salt mine, Velddrift, South Africa (2012)	EMP amendment for a salt mine on Portion 69 of Farm 110 near Velddrift, Western Cape, South Africa. Jeremy's role included managing the EMP and public participation process, specialist report review and EMP report writing.
Green Flash Trading 251 & 257 (Pty) Ltd - Mineral prospecting, West and South-West Coasts, South Africa (2012)	EMP amendment for the prospecting for minerals off the West and South-West Coast of South Africa. Jeremy was responsible for report writing.
Umhlabla Environmental Consulting CC – Sand mine rehabilitation, Macassar, South Africa (2011)	EMP for the rehabilitation of Afrisam's Sand Mine in Macassar, Western Cape, South Africa. Jeremy's role included managing the EMP process, specialist report review and EMP report writing.
White Water Resources Limited – Heavy mineral prospecting, Namaqualand, South Africa (2009)	EMPs for ten prospecting applications in an area north of the Olifants River. Namaqualand, South Africa. Jeremy's role included managing the EMP process, specialist report review and EMP report writing.
Coega Brick – Brickworks, Eastern Cape, South Africa (2003)	EMP amendment for operations at the Coega Brick brickworks. Jeremy was responsible for report writing.
Corridor Sand Limitada - Corridor Sands Heavy Mineral Mining Project, Gaza Province, Mozambique (1999-2002)	EIA and EMP for the Southern Mining Corporation's Corridor Sands Heavy Mineral Mining Project, Gaza Province, Mozambique. Jeremy's role included managing the EIA/EMP and public participation process, specialist report review and report writing.
Kenmare Resources - Moma Titanium Minerals Project in Nampula Province, Mozambique (2002)	EMP for the Kenmare Moma Titanium Minerals Project in Nampula Province, Mozambique. Jeremy was responsible for EMP report writing.

<p>Southern Mining Corporation Ltd - Corridor Sands Heavy Mineral Mining Project, Gaza Province, Mozambique (1999-2002)</p>	<p>Vegetation and floristics specialist report for the Corridor Sands EIA, Gaza Province, Mozambique. Jeremy undertook the baseline assessment and compiled the vegetation and floristics report.</p>
<p>BESC Consulting – Quarry, Willowvale, Transkei (1999)</p>	<p>Biological survey for a quarry near Willowvale in the Transkei. Jeremy compiled the biological survey report.</p>
<p>Roads and related infrastructure</p>	
<p>HHO Africa for the City of Cape Town - Broadway Boulevard Dualling Project, Western Cape, South Africa (2016)</p>	<p>Basic Assessment for stormwater infrastructure required as part of the Broadway Boulevard Dualling Project, Strand, Western Cape. Jeremy's role included managing the Basic Assessment and public participation process, specialist report review and report writing.</p>
<p>HHO Africa for WCG: Dept. of Transport and Public Works – Gansbaai-Bredasdorp Road Upgrade Project, Western Cape, South Africa (2016-2017)</p>	<p>Closure application for seven borrowpits used during Phase 3 of the Gansbaai-Bredasdorp Road Upgrade Project, Western Cape. Jeremy's role included managing the closure application process, report writing and liaison with the competent authority.</p>
<p>HHO Africa for WCG: Dept. of Transport and Public Works – Phase 3 of the Gansbaai-Bredasdorp Road Upgrade Project, Western Cape, South Africa (2013-2015)</p>	<p>ECO for the third phase of construction (km 7.8 to km 36.0) of the road between Gansbaai and Bredasdorp, Western Cape. Jeremy acted as the ECO and was responsible for ensuring the contractor complied with the Construction EMP.</p>
<p>HHO Africa for WCG: Dept. of Transport and Public Works – Gansbaai-Bredasdorp Road Upgrade Project, Western Cape, South Africa (2014)</p>	<p>Basic Assessment for a causeway near Elim and a box culvert near Baardskeerdersbos / Pearly Beach Intersection, Western Cape. Jeremy's role included managing the Basic Assessment and public participation process, specialist report review and report writing.</p>
<p>EFG Engineers (Pty) Ltd for WCG: Dept. of Transport and Public Works – Hermanus – Stanford Road Upgrade Project, Western Cape, South Africa (2013-2014)</p>	<p>Basic Assessment for the upgrading of Trunk Road 28 Section 2 (TR28/2) between Hermanus and Stanford, Western Cape. Jeremy's role included managing the Basic Assessment and public participation process, specialist report review and report writing.</p>

<p>HHO Africa (Pty) Ltd – Borrowpits for the Gansbaai-Bredasdorp Road Upgrade Project, Western Cape, South Africa (2012)</p>	<p>Screening, Basic Assessment and EMP for nine proposed borrowpits for Phase 3 of the Gansbaai-Bredasdorp Road Upgrade Project, Western Cape. Jeremy's role included managing the Screening, Basic Assessment and public participation process, specialist report review and report writing.</p>
<p>Bergstan South Africa for WCG: Dept. of Transport and Public Works – Repair of flood damaged bridges, Western Cape, South Africa (2010)</p>	<p>Basic Assessment for the repair of two flood damaged bridges in the Worcester and De Doorns area. Jeremy's role included managing the Basic Assessment process and report review.</p>
<p>HHO Africa for WCG: Dept. of Transport and Public Works –Phase 3 of the Gansbaai-Bredasdorp Road Upgrade Project, Western Cape, South Africa (2010)</p>	<p>EMP for Phase 3 borrowpits required for the Gansbaai-Bredasdorp Road Upgrade Project. Jeremy acted as the project manager and was responsible for compiling the EMP.</p>
<p>HHO Africa for WCG: Dept. of Transport and Public Works – Phase 2 of the Gansbaai-Bredasdorp Road Upgrade Project, Western Cape, South Africa (2009-2010)</p>	<p>ECO for the second phase of construction (km 0 to km 7.8) of the road between Gansbaai and Bredasdorp, Western Cape. Jeremy acted as the ECO and was responsible for ensuring the contractor complied with the Construction EMP.</p>
<p>PD Naidoo & Associates (Pty) Ltd for WCG: Dept. of Transport & Public Works – Borrowpit development, Overberg District, South Africa (2006-2008)</p>	<p>EMP for the development of 17 strategic borrowpits for the regraveling of trunk-, main- and divisional roads in the Overberg District. Jeremy's role included managing the EMP and public participation process, specialist report review and report writing.</p>
<p>BKS (Pty) Ltd / Goba (Pty) Ltd JV for WCG: Dept. Transport and Public Works – Bridge and culvert rehabilitation, Western Cape, South Africa (2006-2008)</p>	<p>ECO for the rehabilitation of bridges and major culverts in the Calitzdorp, Oudtshoorn and De Rust area. Jeremy acted as the ECO and was responsible for ensuring the contractor complied with the Construction EMP.</p>
<p>HHO Africa for WCG: Dept. of Transport and Public Works –Phase 2 of the Gansbaai-Bredasdorp Road Upgrade Project, Western Cape, South Africa (2010)</p>	<p>EMP for Phase 2 of Gansbaai-Bredasdorp Road Upgrade Project. Jeremy acted as the project manager and was responsible for compiling the EMP.</p>

<p>BKS (Pty) Ltd / Goba (Pty) Ltd JV for WCG: Dept. Transport and Public Works – Bridge and culvert rehabilitation, Western Cape, South Africa (2005)</p>	<p>Construction EMP for the rehabilitation of bridges and culverts in the Calitzdorp, Oudtshoorn and De Rust area. Jeremy acted as the project manager and was responsible for compiling the EMP.</p>
<p>HHO Africa for WCG: Dept. of Transport and Public Works – Phase 1 of the Gansbaai-Bredasdorp Road Upgrade Project, Western Cape, South Africa (2009-2010)</p>	<p>ECO for the first phase of construction of the road between Gansbaai and Bredasdorp, Western Cape. Jeremy acted as the ECO and was responsible for ensuring the contractor complied with the Construction EMP.</p>
<p>HHO Africa for WCG: Dept. of Transport and Public Works –Phase 1 of the Gansbaai-Bredasdorp Road Upgrade Project, Western Cape, South Africa (2010)</p>	<p>EMP for Phase 1 borrowpits required for the Gansbaai-Bredasdorp Road Upgrade Project. Jeremy acted as the project manager and was responsible for specialist report review and compiling the EMP.</p>
<p>MBB Engineers – Kat River Causeway, Eastern Cape, South Africa (2000)</p>	<p>Scoping study for the upgrading of a causeway over the Kat River, Fairbairn, Eastern Cape. Jeremy's role included managing the Scoping and public participation process, specialist report review and report writing.</p>
<p>Prestedge, Retief, Dresner & Wijnberg – Ngqura harbour dune stabilisation, Eastern Cape, South Africa (1999)</p>	<p>Stabilisation specifications for work areas and roads within the proposed Ngqura (ex Coega) harbour area. Jeremy was responsible for report writing.</p>
<p>Renewables</p>	
<p>Kokerboom Solar Generation (Pty) Ltd – Kokerboom Solar Project, Keetmanshoop, Namibia (2016)</p>	<p>Scoping study for a solar (photovoltaic) power plant, near Keetmanshoop, Namibia. Jeremy's role included managing the Scoping and public participation process, specialist report review and report writing.</p>
<p>Solarhybrid AG, Germany - Skeyfontein Photovoltaic Power Plant, Northern Cape, South Africa (2011-2012)</p>	<p>Scoping study for the proposed Development of Skeyfontein Photovoltaic power plant and power lines near Postmasburg, Northern Cape. Jeremy's role included managing the Scoping and public participation process, specialist baseline report review and report writing.</p>
<p>Business Venture Investments 1421 (Pty) Ltd - De Aar Photovoltaic Power Plant, Northern Cape, South Africa (2011-2012)</p>	<p>EIA for the proposed Development of a Photovoltaic power plant and power line near De Aar & Prieska, Northern Cape. Jeremy's role included managing the EIA process and public participation process, specialist report review and EIA report writing.</p>

<p>IlangaPower (Pty) Ltd - Solar Cell Manufacturing Factory, Western Cape, South Africa (2008)</p>	<p>Basic Assessment for a proposed Solar Cell Manufacturing Factory, Sacks Circle, Bellville. Jeremy's role included managing the Basic Assessment process and public participation process, specialist report review and report writing.</p>
<p>Landfill sites and waste water treatment works</p>	
<p>V3 Consulting Engineers - Bedford sewage works upgrade, Eastern Cape, South Africa (1999)</p>	<p>Scoping study for Phase II of the upgrading of the Bedford reticulation system and current sewage works. Jeremy's role included managing the Scoping and public participation process, specialist report review and report writing.</p>
<p>V3 Consulting Engineers - Bedford sewerage reticulation system, Eastern Cape, South Africa (1999)</p>	<p>Scoping study for the construction of a waterborne sewerage reticulation system in Nyarha and Goodwin Park, Bedford, and for the rehabilitation and upgrading of the sewerage treatment works. Jeremy's role included managing the Scoping and public participation process, specialist report review and report writing.</p>
<p>Department of Public Works - Hole-in-the-Wall car park and ablution facilities, Eastern Cape, South Africa (1999)</p>	<p>Scoping study for the proposed car park and ablution facilities at Hole-in-the-Wall. Jeremy's role included managing the Scoping and public participation process, specialist report review and report writing.</p>
<p>Department of Public Works – Coffee Bay car park and ablution facilities, Eastern Cape, South Africa (1999)</p>	<p>Scoping study for the proposed car park and ablution facilities at Coffee Bay. Jeremy's role included managing the Scoping and public participation process, specialist report review and report writing.</p>
<p>Water and sewage pipelines</p>	
<p>Velddrift Salt Company (Pty) Ltd – Seawater Augmentation Project, Velddrift, South Africa (2003-2009)</p>	<p>Scoping study, EMP and ECO for a seawater pump station and pipeline to augment water supply to the Velddrift Salt Company's operation north of Laaiplek, Western Cape. Jeremy's role included managing the Scoping and public participation process, specialist report review and report writing. Jeremy also acted as the ECO and was responsible for ensuring the contractor complied with the Construction EMP.</p>
<p>City of Cape Town: Tygerberg Region - Durbanville North Bulk Water Supply Project, Western Cape, South Africa (2004-2005)</p>	<p>ECO for the Durbanville North Bulk Water Supply (Gravity Main Phase 2). Jeremy acted as the ECO and was responsible for ensuring the contractor complied with the Construction EMP.</p>

	Rivers, dams and wetlands
Royal HaskoningDHV (Pty) Ltd for City of Cape Town - Phase 1H of the Lourens River Flood Alleviation Project, Western Cape, South Africa (2016-2018)	ECO for Phase 1H of the Lourens River Flood Alleviation project, Western Cape. Jeremy acted as the project manager.
Royal HaskoningDHV (Pty) Ltd for City of Cape Town - Phase 1G of the Lourens River Flood Alleviation Project, Western Cape, South Africa (2015)	ECO for Phase 1G of the Lourens River Flood Alleviation project, Western Cape. Jeremy acted as the project manager.
Royal HaskoningDHV (Pty) Ltd for City of Cape Town - Lourens River Stormwater Outlets, Litter Traps and Detention Pond, Western Cape, South Africa (2015)	Basic Assessment for Lourens River Stormwater Outlets, Litter Traps and Detention Pond, Somerset West. Jeremy's role included managing the Basic Assessment and public participation process, specialist report review and report writing.
SSI Engineers and Environmental Consultants (Pty) Ltd for City of Cape Town- Phase 1E of the Lourens River Flood Alleviation Project, Western Cape, South Africa (2011-2012)	ECO for Phase 1E of the Lourens River Flood Alleviation project, Western Cape. Jeremy acted as the ECO and was responsible for ensuring the contractor complied with the Construction EMP.
SSI Engineers and Environmental Consultants (Pty) Ltd for City of Cape Town- Phase 1E of the Lourens River Flood Alleviation Project, Western Cape, South Africa (2008-2010)	ECO for Phase 1D of the Lourens River Flood Alleviation project, Western Cape. Jeremy acted as the ECO and was responsible for ensuring the contractor complied with the Construction EMP.
Sujean Investments (Pty) Ltd - Kuils River Flood Alleviation Project, Western Cape, South Africa (2010-2011)	Basic Assessment for the proposed Kuils River flood alleviation measures for Erf 38771, Bellville. Jeremy's role included managing the Basic Assessment and public participation process, specialist report review and report writing.
Nsele Trading 44 (Pty) Ltd – Retention ponds, Western Cape, South Africa (2004-2006)	Scoping study for the proposed diversion of a canalised stream into three new retention ponds on the remainder of farm 1407, Sunnysdale (Noordhoek). Jeremy's role included managing the Scoping and public participation process, specialist report review and report writing.

	General industries
Mortar SA (Pty) Ltd – Pre-mixed dry mortar facility, Western Cape, South Africa (2018-2019)	SLR was appointed to facilitate the Atmospheric Emission Licence (AEL) application process to the West Coast District Municipality and associated public participation process. Jeremy's role included managing the AEL and public participation process, specialist report review (Atmospheric Impact Report) and compilation of the Public Participation Report.
Irvin & Johnson Limited - Abalone Processing Facility, Western Cape, South Africa (2017-2019)	Basic Assessment for an abalone processing facility at Danger Point near Gansbaai. Jeremy acted as the project manager and was responsible for report review.
Irvin & Johnson Limited - Abalone Expansion Project, Gansbaai, Western Cape, South Africa (2017-2019)	EIA for an abalone expansion project at Danger Point near Gansbaai. The project involved expanding the facility's production from 500 tons per annum (t/a) to 1 700 t/a. Jeremy's role included managing the EIA process and public participation process, specialist report review and EIA report writing.
Clay Industry cc - Atmospheric Emission Licence application (2015)	Atmospheric Emission Licence amendment application in terms of the National Environmental Management: Air Quality Act. Jeremy acted as the project manager and was responsible for compiling the amendment application.
Irvin & Johnson Limited – Offshore aquaculture Project, Western Cape, South Africa (2007-2009)	Basic Assessment for an aquaculture project in Mossel Bay. The project involved the develop of 18 floating flexible type cages within a concession area off the coast of Mossel Bay to produce indigenous line fish (namely yellow tail, dusky cob and silver cob). Jeremy's role included managing the Basic Assessment process and public participation process, specialist report review and report writing.
Eskom Holdings Limited - Atlantis and Mossel Bay Open Cycle Gas Turbines, Western Cape, South Africa (2006-2008)	Environmental compliance audits for the Atlantis and Mossel Bay Open Cycle Gas Turbines. Jeremy's role included managing the audit process and compiling the audit report, which outlined the implementation of the EMP (compliance) and highlighted any problems and non-compliance issues that arose during construction.
Velddrift Salt Company (Pty) Ltd –Mining Right conversion application, Western Cape, South Africa (2006-2009)	Conversion application from an old order mining right from the Velddrift Salt Company's saltworks. Jeremy acted as the project manager and was responsible for the conversion application and EMP report writing.
PetroSA (Pty) Ltd – Refinery Conversion Project, Western Cape, South Africa (2003-2005)	EIA for the conversion of the PetroSA Refinery, near Mossel bay, for 100% unleaded fuel production. Jeremy's role included managing the EIA process and public participation process, specialist report review and EIA report writing.
East London Development Zone Corporation - East London IDZ, Eastern Cape (2000-2001)	EIA for the rezoning of land from Agriculture to General Industry for the establishment of the East London Industrial Development Zone. Jeremy was responsible for managing the public participation process, specialist report review and report writing.

East London Development Zone Corporation - East London IDZ, Eastern Cape (2001)	Vegetation survey and sensitivity map of the land on the West Bank for the East London Industrial Development Zone. Jeremy undertook the baseline assessment and compiled the vegetation and floristics report.
Coega Development Corporation - Coega IDZ, Eastern Cape (1999-2000)	EIA for the Rezoning of the Core Development Area from Agriculture to Special Purposes for the establishment of the Coega Industrial Development Zone. Jeremy was responsible for managing the public participation process, specialist report review and report writing.
	Power lines
Electricity Supply Corporation of Malawi – Mwanza to Pombeya Power line, Malawi (2003)	Scoping study for the Mozambique – Malawi 220km interconnection 220 / 400kV power line from Mwanza to the substation at Pombeya, Malawi. Jeremy's role included managing the Scoping and public participation process, specialist report review and report writing.
Eskom. East London IDZ power line, Eastern Cape, South Africa (2002)	Scoping study for construction and operation of the East London Industrial Development Zone power line. Jeremy's role included managing the Scoping and public participation process, specialist report review and report writing.
Eskom. Trollip power line, Eastern Cape, South Africa (2002)	Scoping study for construction and operation of Eskom's Trollip scheme (22kV power line), Cape St. Francis, Eastern Cape. Jeremy's role included managing the Scoping and public participation process, specialist report review and report writing.
Kenmare Resources. Kenmare Moma Power line (2002)	Vegetation and floristics specialist report: Kenmare Moma Power line Environmental Impact Assessment, Nampula Province, Mozambique. Jeremy undertook the baseline assessment and compiled the vegetation and floristics report.
Corridor Sands Limitada. Corridor Sands Power Line, Gaza Province, Mozambique (2001-2002)	EIA for the SMC Corridor Sands Power Line from Chibuto to Maputo, Gaza Province, Mozambique. Jeremy was the project manager and responsible for the EIA and public participation process, specialist report review and EIA report writing.
Corridor Sands Limitada. Corridor Sands Power Line, Gaza Province, Mozambique (2001)	Corridor Sands Limitada. Vegetation and floristics specialist report: Corridor Sands Power line Environmental Impact Assessment, Mozambique. Jeremy undertook the baseline assessment and compiled the vegetation and floristics report.
Eskom. Poseidon - Albany power line, Eastern Cape, South Africa (2002)	Vegetation survey of the corridor for the proposed Eskom 400kV power line between Poseidon and Albany substations, Eastern Cape. Jeremy undertook the baseline assessment and compiled the vegetation and floristics report.
	Railways
Corridor Sands Limitada - Corridor Sands Railway line, Gaza Province, Mozambique (2001)	EIA for the Corridor Sands Rail link from Chibuto to Barragem, Gaza Province, Mozambique. Jeremy was the project manager and responsible for the EIA and public participation process, specialist report review and EIA report writing.

Corridor Sands Limitada - Corridor Sands Railway line, Gaza Province, Mozambique (2001)	Vegetation survey of the Corridor Sands Rail link from Chibuto to Barragem, Gaza Province, Mozambique. Jeremy undertook the baseline assessment and compiled the vegetation and floristics report.
	Housing Developments
South African Dutch Development (Pty) Ltd - Beverley Estate and Jubilee Park residential developments, Western Cape, South Africa (2012)	ECO services for the residential development on Erf 1366 (Beverley Estate) and Erf 5540 (Jubilee Park), Eerste River. Jeremy acted as the ECO and was responsible for ensuring the contractor complied with the Construction EMP.
Cape Town Community Housing Company (Pty) Ltd - Morgen's Village 3 and Westcape residential developments, Western Cape, South Africa (2012)	ECO services for the Morgen's Village 3 and Westcape Precincts, Mitchell's Plain. Jeremy acted as the ECO and was responsible for ensuring the contractor complied with the Construction EMP. Jeremy acted as the ECO and was responsible for ensuring the contractor complied with the Construction EMP. Jeremy acted as the ECO and was responsible for ensuring the contractor complied with the Construction EMP.
City of Cape Town (Human Settlements) – Phase 2 to 4 of the Bardale Housing Scheme, Western Cape, South Africa (2009-2012)	ECO for the construction of the Bardale Housing Scheme (Phases 2 to 4) on the Remainder of the Farm Stellenbosch No. 451 (Bardale), Mfuleni. Jeremy acted as the ECO and was responsible for ensuring the contractor complied with the Construction EMP.
Sovereign Seekers Investments 77 (Pty) Ltd – Karbonkelberg Housing Development, Western Cape (2007-2012)	Basic Assessment for the proposed rezoning and subdivision of Erf 4870, Karbonkelberg, Hout Bay. Jeremy's role included managing the Basic Assessment process and public participation process, specialist report review and report writing.
Hope of Africa Foundation – Eerste River housing development, Western Cape, South Africa (2007-2008)	Basic Assessment for the proposed rezoning and subdivision of Erf 5540, Eerste River. Jeremy's role included managing the Basic Assessment process and public participation process, specialist report review and report writing.
City of Cape Town (Directorate: Human Settlements) – Driftsands Housing Project (2006-2012)	EIA for the proposed rezoning and subdivision a portion of the Driftsands Nature Reserve to consolidate and upgrade the existing informal settlements of Green Park and Los Angeles. Jeremy was the project manager and responsible for the EIA and public participation process, specialist report review and EIA report writing.
Tech-Sure Fin cc – Eerste River rezoning and subdivision, Western Cape, South Africa (2006-2007)	Basic Assessment for the proposed rezoning and subdivision of Erf 1366, Eerste River. Jeremy's role included managing the Basic Assessment process and public participation process, specialist report review and report writing.

City of Cape Town (Human Settlements) – Phase 1 of the Bardale Housing Scheme, Western Cape, South Africa (2005-2007)	Construction EMP and ECO for the construction of the Bardale Housing Scheme on the Remainder of the Farm Stellenbosch No. 451 (Bardale), Mfuleni. Jeremy compiled the EMP and acted as the ECO and was responsible for ensuring the contractor complied with the Construction EMP.
Target Shelf 151 cc – Hout Bay rezoning and subdivision, Western Cape, South Africa (2005-2006)	EIA for the proposed rezoning and subdivision of Erf 1480, Hout Bay. Jeremy was the project manager and responsible for the EIA and public participation process, specialist report review and EIA report writing.
Ahmed Janahi Architects – Hout Bay hotel development, Western Cape (2004-2005)	EIA for the proposed rezoning and consolidation of Erf 1126, 1127 and 1128 for the development of a hotel, Hout Bay. Jeremy was the project manager and responsible for the EIA and public participation process, specialist report review and EIA report writing.
Hope of Africa Foundation – Eerste River housing development, Western Cape, South Africa (2004-2005)	Scoping Study for the proposed rezoning and subdivision of Erf 5540, Eerste River. Jeremy's role included managing the Scoping and public participation process, specialist report review and report writing.
Lezmin cc – Hout Bay rezoning and subdivision, Western Cape, South Africa (2003-2005)	EIA for the proposed rezoning and subdivision of Erf 1156, Hout Bay. Jeremy was the project manager and responsible for the EIA and public participation process, specialist report review and EIA report writing.
Bellemar Properties - Hout Bay rezoning, Western Cape, South Africa (2003-2004)	EIA for the proposed rezoning of Erf 1127 and 1128, Hout Bay. Jeremy was the project manager and responsible for the EIA and public participation process, specialist report review and EIA report writing.
SRK Consulting – Sanderling Development, Western Cape, South Africa (1999)	Biological survey of the wetland on the Sanderlings residential development site, Plettenberg Bay. Jeremy undertook the baseline assessment and compiled the vegetation report.
	Resort and Tourism
Van Horsten Property Holdings Pty Ltd - elephant park resort, Maputo Special Reserve, Mozambique (2003)	Pre-feasibility assessment for the proposed elephant park resort, Maputo Special Reserve, Mozambique. Jeremy compiled the pre-feasibility assessment report.
	Other
Attfund Limited - Willowbridge Shopping Centre, Western Cape, South Africa (2011)	EMP for Willowbridge North and South shopping centre, Kenridge, Bellville. Jeremy acted as the project manager and was responsible for EMP report writing.

Brights Hardware – Brights Hardware car park, Western Cape, South Africa (2006-2007)	Basic Assessment for the proposed rezoning of Portion of Erf 10565 (Public Open Space) for the development of a car park, Boston, Cape Town. Jeremy acted as the project manager and was responsible for report review.
Mini-Cape Developments (Pty) Ltd – Bowling Club relocation, Western Cape, South Africa (2005-2006)	Scoping Checklist and EMP for the proposed relocation of the Old Oak Bowling Club to a portion of public open space on Erf 2225, Bellville. Jeremy acted as the project manager and was responsible for compiling the Scoping Checklist and EMP.
Attfund Limited - Willow Village Lifestyle Centre, Western Cape, South Africa (2005-2007)	EMP and ECO for the construction and operation of the Willow Village Lifestyle Centre on Erf 1201 (portion of Erven 975 & 976) Kenridge, Bellville. Jeremy compiled the EMP and acted as the ECO and was responsible for ensuring the contractor complied with the Construction EMP.
Mini-Cape Developments (Pty) Ltd - Willow Village Lifestyle Centre, Western Cape, South Africa (2004-2007)	ECO for the construction of the Willowbridge Shopping Centre, Kenridge, Bellville. Jeremy acted as the ECO and was responsible for ensuring the contractor complied with the Construction EMP.
	PUBLICATIONS
	Parsons, R., Eichstadt, L., Crowther, J. & Blood, J. (2008). "Application Procedure for the Development and Use of Groundwater". WRC Report No. 1510/1/08.
	Blood, J.R., Van Schalkwyk, S.J., Cloete, S.W.P. & Brand, Z. (1998). Embryonic deaths in relation to water loss of artificially incubated ostrich eggs. Proceedings of the Second International Ratite Congress.
	Salih, M.E., Brand, T.S., Van Schalkwyk, S.J., Blood, J., Brand, Z. & Akbay, R. (1998). The effect of dietary fibre level on the production of growing ostriches. Proceedings of the Second International Ratite Congress.
	Salih, M.E., Brand, T.S., Van Schalkwyk, S.J., Blood, J.R., Pfister, B. & Akbay, R. (1998). Number of cellulolytic bacteria in the gastro-intestinal tracts of ostriches fed diets with different fibre levels. Proceedings of the Second International Ratite Congress.
	Brand, Z., Van Schalkwyk, S.J., Cloete, S.W.P. & Blood, J.R. (1998). The effect of pre-heating of ostrich eggs prior to storage and setting in commercial hatcheries. Proceedings of the Second International Ratite Congress.
	Van Schalkwyk, S.J., Brand, Z., Cloete, S.W.P. & Blood, J.R. (1998). The influence of different disinfection protocols on the hatching performance of ostrich eggs. Proceedings of the Second International Ratite Congress.
	MEMBERSHIPS
Pr.Sci.Nat.	Registered as a Professional Natural Scientist - Environmental Scientist (Reg. no. 400164/06)
IAIAsa	Member of the International Association for Impact Assessment South Africa



WERNER PETRICK

TECHNICAL DIRECTOR & ENVIRONMENTAL ASSESSMENT MANAGER

Environmental Management Planning & Approvals, Africa

QUALIFICATIONS

B.Eng	1995	Civil Engineering
Masters	2004	Environmental Management

EXPERTISE

- Environmental Management
- Environmental (and Social) Impact Assessments (EIA's)
- Environmental Feasibility Studies
- Stakeholder Management
- Environmental Management Systems (EMS)
- Environmental Auditing
- Environmental Training and capacity building
- Mine Closure

PROJECTS

Shell Namibia Upstream BV – EIA for proposed offshore well drilling (2017 -2018)

Shell Namibia Upstream BV holds PEL 39, which is located adjacent to the southernmost Namibian offshore border with South Africa. Shell is proposing to drill one or possibly two exploration wells in the northern portion of the licence area. Werner was the Lead Environmental Assessment Practitioner managing the EIA process (including stakeholder engagement, PPP and report review).

Gecko Cobalt Mining - Environmental and Social Screening process (2018)

Gecko Cobalt Mining (Pty) Ltd conducted reconnaissance drilling over a stretch of 24 km length over the cobalt and copper mineralisation in EPL 4346, located approximately 25 km northwest of Opuwo. Depending on the outcome of further exploration activities and the feasibility study, GCM and CR are proposing to apply for a ML to ultimately mine the ore and process it on site. Gecko appointed SLR (Namibia) to conduct an Internal Environmental (and Social) Screening exercise. Lead Environmental Assessment Practitioner managing an internal Environmental and Social Screening process.

Manila Investments – Kombat Copper Mine EIA (2017 - 2018)

Manila Investments (Pty) Ltd holds Mining Licences 73B, 16, 9 (collectively the old Kombat Copper mine, which is currently under care and maintenance). The mine is a past-producing copper, lead and silver mine. Manila is considering implementing the following activities upon completion of the Environmental Impact Assessment process and acquiring the relevant permits and approvals for:

Open pit (surface) mining in ML 73B (also referred to as “Asis”) and associated activities;

Processing of the ore at the existing process plant, currently being refurbished, and associated activities; and

Dewatering the “Asis Far West” (AFW) Shaft and conducting further underground exploration activities in ML 16.

Lead Environmental Assessment Practitioner managing the EIA process (including stakeholder engagement, PPP and report review).

Swakop Uranium Waste Rock Dump Amendment and Incinerator - EIA amendment (2017 - 2018)

Swakop Uranium owns and operates the Husab Mine in the Erongo Region of Namibia; they propose amendment to their Waste Rock dump and also to implement a new on-site waste incinerator.

Lead Environmental Assessment Practitioner managing the EIA process (including stakeholder engagement, PPP and report review).

EIB and NamPower Encroacher Bush Biomass Power Project – EIA (2017 - 2018)

European Investment Bank and NamPower: Environmental Impact Assessment (EIA) for the proposed Encroacher Bush Biomass Power Project in Namibia.

Lead Environmental Assessment Practitioner managing the EIA process (including stakeholder engagement, managing specialists, etc.) and compiling reports.

Igneous Mining (Pty) Ltd – Application for Environmental Clearance (2016)

Igneous Mining (PTY) LTD Environmental is seeking a Clearance Certificate (ECC) Renewal for small scale mining activities on ML 135 in Sarusus Area, Skeleton Coast Park.

Lead Environmental Assessment Practitioner managing the ECC Renewal Process.

City of Windhoek Gammams Waste Water Treatment Works Upgrade EIA (2017)

The Gammams Waste Water Treatment Plant (GWWTWP) located in the Wanaheda suburb of Windhoek, is the City of Windhoek's (CoW) largest wastewater treatment plant. The CoW appointed SLR to develop an environmental Scoping Report (including Impact Assessment) for the planned GWWTWP upgrade.

Lead Environmental Assessment Practitioner managing the completion of the EIA process, report compilation / review.

NAMPARKS Facility Amendments at Mudumu NP – EIA amendment (2016 - 2018)

NAMPARKS Environmental Scoping Report for Infrastructure Development: Amendment for the proposed addition of an Entrance Gate, Tourist Reception and Staff Housing at Mudumu National Park.

Lead Environmental Assessment Practitioner for the EIA amendment process required for infrastructure development. Report review.

Gecko Salt (Pty) Ltd Cape Cross Salt Project - EIA (2016 - 2018)

Gecko Salt (Pty) Ltd Environmental Impact Assessment for the proposed Cape Cross Salt Project.

Lead Environmental Assessment Practitioner managing the EIA process (including stakeholder engagement, managing specialists, etc.) and review reports.

Namibia Rare Earths – Proposed Lofdal Mine and linear infrastructure – EIA (2015 - 2016)	NRE holds the EPL at Lofdal located west of Khorixas, exploring for rare earth. They wish to apply for a mining license in 2016, for which an EIA would be required. Lead Environmental Assessment Practitioner managing the EIA process (including stakeholder engagement, managing specialists, etc.) and compiling reports.
Rössing Uranium – Impacts of the TSF on biota and desert ecology – Management of study (2015 - 2016)	Impacts of the TSF at Rössing Uranium and related dust dispersion on biota and desert ecology. Managing the process and coordinating various specialists for input into the study (i.e. vegetation, air quality, biological soil crust, invertebrates and hyperspectral work). Compiling consolidated report summarising all the findings.
High Speed Railway Lines – Environmental Screening Process (2015 - 2016)	Feasibility studies for a railway line between Windhoek and Katutura, as well as a study for a railway line between Windhoek and Okahandja. Lead Environmental Assessment Practitioner managing the environmental Screening process (including limited stakeholder engagement, managing specialists, etc.) and compiling reports.
Swakop Uranium Reagents – EIA for storage at the Manica facilities (2015)	Swakop Uranium is developing the Husab Mine in the Erongo Region of Namibia (70 km north-east of the Walvis Bay port). The reagents and chemicals that will be used in the processing plant will be imported through the port of Walvis Bay. It will be sourced in advance and stored in Manica warehouse facility (on a temporary basis – “phase 1 project”) and container yard in the industrial area of Walvis Bay. Lead Environmental Assessment Practitioner managing the EIA process (including stakeholder engagement, managing specialists, etc.) and compiling reports
Sand Miners Association of Swakopmund – EIA for sandmining in the Swakop River (2015)	The members of the Sand Miners Association have been mining sand from the Swakop River, within the Swakopmund Municipal boundaries, for many years. The sand they mine supplies Swakopmund, Long Beach and Walvis Bay with sand for construction purposes. The Sand Miners Association has had to look for an alternate source of sand for construction activities in their area and EIA had to be done. Lead Environmental Assessment Practitioner managing the EIA process (including stakeholder engagement, managing specialists, etc.) and compiling reports.
Swakop Uranium Reagents storage at a new facility in the Port of Walvis Bay – EIA (2015)	Swakop Uranium is developing the Husab Mine in the Erongo Region of Namibia (70 km north-east of the Walvis Bay port). The reagents and chemicals that will be used in the processing plant will be imported through the port of Walvis Bay. It will be sourced in advance and stored in a warehouse facility within the boundaries of NamPort’s harbour area (long term – “phase 2” project). Lead Environmental Assessment Practitioner managing the EIA process (including stakeholder engagement, managing specialists, etc.) and compiling reports.
Namibia Rare Earths – Lofdal mine – Environmental baseline development (2015)	NRE holds the EPL at Lofdal located west of Khorixas, exploring for rare earth. They wish to apply for a mining license in 2016, for which an EIA would be required. The baseline environment needs to be described in detail to feed into such an EIA process. Compile the environmental baseline project plan. Manage specialists and develop Baseline data/report with input from various specialists.

Swakop Uranium – Husab Mine amendments - EIA (2015)	Swakop Uranium is developing the Husab Mine in the Erongo Region of Namibia (70 km north-east of the Walvis Bay port). The EMP needs to be implemented during construction Swakop Uranium and their contractors. It further needs to be rolled out into a management system for operations. Lead Environmental Assessment Practitioner managing the various EIA processes and compiling reports. Provide guidance and support to Environmental Control Officer(s), training to ECOs and contractors. Develop EMS procedures and other relevant documentation.
B2Gold – Otjikoto Gold Mine landfill site - EIA (2013 – 2014)	B2Gold is developing the Otjikoto (gold mine) Project, located approximately 70 km north-east of Otjiwarongo in the Otjozondjupa Region of Namibia. B2 Gold proposed to develop a landfill site (waste disposal facility) on site to cater for non-hazardous waste. They also proposed to construct and operate an on-site (heavy fuel oil) Power Plant. Lead Environmental Assessment Practitioner managing the EIA process (including stakeholder engagement, managing specialists, etc.) and compiling reports.
B2Gold – Otjikoto Gold Mine development - EIA (2012 – 2013)	B2Gold applied for Mining Licence (ML 169) to developed the Otjikoto (gold mine) Project, located approximately 70 km north-east of Otjiwarongo in the Otjozondjupa Region of Namibia. As part of the ML application process, a detail EIA process needs to be conducted. Lead Environmental Assessment Practitioner managing the EIA process (including stakeholder engagement, managing specialists, etc.) and compiling reports. The Scoping phase was already completed by another company. SLR (in corporation with the other company) completed the EIA process – i.e. assessment phase. Develop Mine Closure Framework.
Arandis Power Plant - EIA amendment (2014)	Arandis Power proposed to construct and operate a ‘hybrid’ thermal/PV plant with the maximum output capacity of 120 MW. Lead Environmental Assessment Practitioner managing the EIA process (including stakeholder engagement, managing specialists, etc.) and compiling reports.
EPL’s for exploration activities – various EIA’s (2013 – 2015)	Various exploration companies planning to conduct exploration activities on the EPLs they hold. Prior the activities commencing, and EIA process needs to be conducted. Lead Environmental Assessment Practitioner managing the EIA process (including stakeholder engagement, managing specialists, etc.) and compiling reports. Also review of reports.
Commissiekraal Coal Mine – EIA Scoping Report (2015)	Development of the proposed Commissiekraal Coal Mine including services and associated infrastructure in South Africa. Compiled EIA Scoping Report.

<p>Various Mining and Exploration companies - various services (2012 – 2015)</p>	<p>Various Mining and exploration companies across Namibia sought assistance.</p> <p>Provided various services and support to various mining and exploration companies, including amongst others external audits, training, rehabilitation planning, compiling EMS procedures and other relevant documents, compile environmental performance reports, etc.</p>
<p>Various Mining, Exploration and Infrastructure Projects – various services (2012 – 2015)</p>	<p>Various Mining and exploration projects as well as infrastructure projects across Namibia sought assistance with EIAs, EMPs and review processes.</p> <p>Review process and reports for various projects managed by other SLR environmental practitioners, including amongst others rail sidings; Nanomill which will produce 150,000 tons rebar's and billets per year from scrap steel; Okorusu Fluorspar Mine expansion; Offshore exploration drilling (Murphy); water and waste water treatment facilities EIA and EMPs; Dundee Precious Metal Tsumeb Hazardous Waste Site expansion; Walvis Bay Salt Holdings Expansion; and others.</p>
<p>Pietersite Mining License – EIA (2013)</p>	<p>Mining Pietersite (gemstone) on Mining License (ML) 57 in the Kunene Region, north-central Namibia.</p> <p>Lead Environmental Assessment Practitioner managing the EIA process (including stakeholder engagement, managing specialists, etc.) and compiling reports.</p>
<p>TransNamib – sulphuric acid transport – EIA (2014)</p>	<p>TransNamib plans to transport sulphuric acid by rail from Dundee Precious Metals (Tsumeb) to Rössing Uranium Mine and to Walvis Bay.</p> <p>Lead Environmental Assessment Practitioner managing the EIA processes and compiling reports.</p>
<p>Rössing Uranium Z20 deposit – EIA (2012 – 2014)</p>	<p>It is envisaged that the Z20 uranium deposit would be mined as a satellite open pit as it contains uranium bearing alaskite rocks, utilising conventional blast, load and haul methodology. An infrastructure corridor would need to be established to link the Z20 site to the existing Rössing Uranium Mine across the Khan River.</p> <p>Managing the EIA processes and compiling reports in a 'joint venture' with Aurecon.</p>
<p>Desalination Plant – Managing SEIA processes (2014)</p>	<p>A new Desalination Plant (located approximately 6 km north of Swakopmund, at the premises of the existing Swakopmund Salt Works.) to supply water to the for Rössing Uranium Mine. The plant will have a design capacity of 8,800 m³/day.</p> <p>Managing the SEIA processes and compiling reports in a 'joint venture' with Aurecon.</p>
<p>Coal Storage at Walvis Bay Harbour – EIA (2012)</p>	<p>Environmental Screening/ fatal flaw analysis for the proposed expansion of coal storage at the Walvis Bay Harbour.</p> <p>Lead Environmental Assessment Practitioner managing the EIA process (including stakeholder engagement, managing specialists, etc.) and compiling reports.</p>

<p>Arandis Power HFO and recycled oil power plant - EIA (2012)</p>	<p>Arandis Power proposes to develop an independent power generation plant east of the town of Arandis, located in the Erongo Region, Namibia. Arandis Power is proposing a power station with a nominal output capacity of approximately 120MW which utilises reciprocating engines. Arandis Power will utilise a residual fuel known as heavy fuel oil (HFO) and recycled oil from a waste oil recycling plant.</p> <p>Lead Environmental Assessment Practitioner managing the EIA process (including stakeholder engagement, managing specialists, etc.) and compiling reports.</p>
<p>Langer Heinrich Uranium Mine – expansion projects – Specialist environmental support (2009 – 2012)</p>	<p>Langer Heinrich is an operational Uranium Mine in Namibia Naukluft National Park.</p> <p>Specialist environmental support to ensure EIAs for expansion projects are correctly managed and implemented. Also to provide support, guidance and management in terms of environmental management implementation at the mine i.e. EMS development and implementation; mine closure and restoration strategy; environmental training; etc.).</p>
<p>Port Expansion Projects in SA – Project environmental management (2008 - 2009)</p>	<p>Port expansions and development (Port Elizabeth, Coega and Richards Bay).</p> <p>Project Environmental Manager - managing the EIA process (including stakeholder engagement, managing specialists, etc.) and compiling reports.</p>
<p>Gautrain Rapid Rail Link - EIA (2006 - 2007)</p>	<p>Development of the Gautrain Rapid Rail Link.</p> <p>Appointed (on contract basis) to provide specialist input into the very challenging EIA processes and EMP development for the project. Also appointed as the Environmental Manager for the Bombela Turnkey Contractor, the managing contractor, for the Gautrain Rapid Rail Link Project.</p>
<p>MEMBERSHIPS</p>	
<p>EPAN</p>	<p>Certified as a Lead Environmental Practitioner and a Reviewer under the Environmental Professionals of Namibia (Membership No. 114)</p>
<p>PUBLICATIONS</p>	
	<p>Paper on the integration of the EIA process with the project execution model through the University of Pretoria.</p>

CURRICULUM VITAE



MARCO MARIANO

TECHNICAL DISCIPLINE MANAGER

CAD & GIS, Africa

EXPERTISE

- CAD Specialist (Civil 3D)
- Drawing Office Manager
- GIS Data Handling
- 3D Modelling & Design
- Model Analysis & Clash Detection
- CAD Training
- Drawing Management & Administration
- Design Coordination
- Quality Control & Drawing Standards

PROJECTS

Marco is a CAD Specialist who joined SLR late in 2017 with over 11 years' experience working with CAD software on numerous civil engineering projects. He offers an expertise in 3D modelling and design, as well as extensive knowledge of engineering drawing production, management and administration. He is familiar with GIS operation and is skilled at utilising and coordinating various GIS and CAD data. He also has a keen interest in knowledge sharing and has implemented internal CAD training to encourage technical skills development and advancement. In addition to reviewing and updating the drawing standards and procedures to align with new and ever advancing software packages, he is also responsible for file management systems and quality control of the various CAD and GIS outputs. Marco is able to assist with project delivery throughout a projects lifespan in several ways, including site selection and conceptual design analysis, dynamic 3D visualisations, continual design modification and clash detection, drawing development and updating, as well as project closure figures and as-built drawings.

SLR Projects

Newmont Akyem Cell 2 Tailing Storage Facility, Ghana (2017)

Compiled and updated construction drawings of the modified TSF embankment. Developed monitoring borehole installation figures and created 3D images and visualizations of complex embankment design for reports and presentations.

Evander Elikhulu Tailings Storage Facility, Mpumalanga (2017)

Ongoing detail design and construction drawings of various mining infrastructure components for the TSF complex.

Bulyanhulu Lined Tailings Storage Facility, Tanzania (2017)

Assisted with as-built drawings of the lined TSF.

Previous Projects

Sasol Fine Ash Dam 6, Mpumalanga (2014-2017)

Lead draughtsman responsible for the development, management and coordination of drawings for the project, from tender submissions to detail design and final construction drawings. Managed and coordinated design and model information for multiple units, while supervising relevant document control and drawing quality.

Sebokeng Waste Water Treatment Works, Gauteng (2013-2014)

Detailed design drawings for structures, roads, pipelines, bulk earthworks, stormwater infrastructure and/or other services in conjunction with the management and administration of master drawings containing the relevant CAD information.

CURRICULUM VITAE

NAME

Moreleta Outfall Sewer Phase 2A & 2B (2013-2014)

As-built drawings of the entire outfall sewer rehabilitation project.

Richards Bay Port Expansion Project FEL2, Eastern Cape (2012-2014)

Involvement included a combination of detailed design drawings for bulk earthworks and stormwater infrastructure.

Moatize Coal Mine, Mozambique (2011-2013)

Involvement included a combination of detailed design drawings for structures, roads, pipelines, bulk earthworks, stormwater infrastructure and/or other services in conjunction with the management and administration of master drawings containing the relevant CAD information.

Ekurhuleni Stormwater Management, Gauteng (2009-2012)

Detailed assessment of stormwater infrastructure in high flood risk areas (using municipal GIS information). Detailed stormwater rehabilitation designs and upgrades (municipal GIS database updated).

Jukskei River Stormwater Protection, Gauteng (2008-2012)

Detailed design drawings of gabion stormwater protection structures in high flood risk areas.

AngloGold Ashanti & Implats Minpro Mines, North West (2008-2012)

Detailed design drawings of various mining infrastructure with a focus on stormwater management, dams and drainage reticulation.

Mmamabula Energy Project, Botswana (2008-2010)

Provided preliminary design for the proposed project, including early works access, infrastructure, electrical generation and reticulation for the construction village and rail and airfield design.

De Hoop Dam & Staff Housing, Limpopo (2007-2010)

Detailed design drawings of stormwater management for the dam's construction as well and various infrastructure for the staff housing development.

Sasol Gas Pipeline Deviation, Gauteng (2007-2012)

Detailed design of gas pipeline deviations in high risk urban and suburban areas. Included stormwater management and drainage assessments and rehabilitation.

KOV: Kolwezi Decanting Dam, DRC (2007-2009)

Detailed design drawings of various mining infrastructure with a focus on piping, stormwater management, dams and drainage reticulation.

CURRICULUM VITAE



Bronwyn Gernet

SENIOR GIS OPERATOR

GIS and CAD, South Africa

EXPERTISE

Bronwyn has been employed with SLR (previously called Metago Environmental Engineers) since 2001.

She gained her initial training as a draughtsperson and AutoCad operator, and moved into GIS work in 1998. She has gained considerable experience in data capture, the integration of spreadsheets and databases into GIS coverages, and the preparation of maps for reports and presentations. She has done the following courses for GIS: Arcview, Advanced Arcview, Projections and Rasters The software used for this work has been ArcView, ArcInfo, Autocad and MS Office

PROJECTS

Bilboes Holdings (Pvt) – Proposed Isabella, McCays and Bubi Sulphide Gold Project, Zimbabwe (2018 –Current)

Environmental and Social Impact Assessment (ESIA) for the proposed expansion of an existing gold mine complex located in Zimbabwe. Bronwyn compiled the figures for the Scoping and Environmental Reports.

Pilanesberg Platinum Mine: Processing Plant Expansion, North West (2014-Current)

Pilanesberg Platinum Mine is planning to make changes to its mineral processing plant to allow for improved recoveries and the KELL treatment of concentrate on site. Bronwyn compiled the figures for the environmental and social impact assessment report.

Windhoek PEL23 BV - Exploration well drilling in Petroleum Exploration Licence 82, Namibia (2019)

EIA for the drilling of up to two exploration wells in Petroleum Exploration Licence 82 (PEL82) in the Walvis Basin off the coast of Namibia. Bronwyn compiled the figures for this report.

Environmental Assessment Process for the merging of the Mamatwan Mine Sinterfontein Waste Rock dump and the Tshipi Eastern Waste Rock dump for the South32 Mamatwan mine (Northern Cape Province) (2019)

Compilation of Basic Assessment Report and environmental management programme report figures and the Water Use Licence Application figures.

CURRICULUM VITAE

NAME

Environmental Assessment Process for the proposed alternative closure and rehabilitation strategy for the Tshipi Borwa Mine (Northern Cape Province) (2018 to 2019)

Compilation of Basic Assessment Report Figures and Environmental Management Programme reports figures.

Environmental Assessment Process for the merging of the Mamatwan Mine Sinterfontein Waste Rock dump and the Tshipi Eastern Waste Rock dump for the South32 Mamatwan mine (Northern Cape Province) (2019)

Compilation of Basic Assessment Report Figures, Environmental Management Programme Report Figures and the Water Use Licence Application Figures

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Integrated Water Use Licence Application for the new Khwara manganese mine in the Northern Cape Province (2018 - 2019)

Compilation of the Integrated Water and Waste Management Plan Figures and Water Use Licence Application Figures

Commissiekraal Coal project, Kwa-Zulu Natal (2014-2019)

Tholie Logistics (Pty) Ltd proposed the development of a Greenfields Coal Mine (Commissiekraal Coal Project). Bronwyn compiled the figures for the environmental and social impact assessment.

EMP commitments consolidation of the Tshipi and Mamatwan Mine for the mining of the barrier pillar in the Northern Cape Province (2018)

Figures for a barrier pillar mining commitments report to outline the collective environmental management programme, integrated water use licence and environmental authorisation commitments for both Tshipi and South32 specifically for the mining of the barrier pillar.

The environmental permitting process associated with a processing plant for AB InBev & CCBSA, Gauteng, (2018)

Compilation of the figures for the basic assessment report.

The environmental permitting process associated with amendments to the Taung Gold Evander Shaft 6 Mine, Mpumalanga (2018)

Compilation of scoping and environmental impact assessment and environmental management programme amendment report figures

The environmental permitting process associated with a new mining right, mining right amendment and WUL for Kudumane Manganese Resources, Northern Cape (2013-2017)	Compilation of scoping and environmental impact assessment and environmental management programme report figures and WUL figures
	Use This Title Style if the CV is Sorted by Project Type – Delete if not required
Prospecting EMP Performance Assessment and Financial Provision Update for Inkosi Platinum's Greater Inkosi Area, North-West (2017)	Compilation of EMP performance assessment figures
The environmental permitting process associated with a new ferrochrome smelter for Siyanda Chrome Smelting Company, Limpopo (2014-2017)	Project Manager. Compilation of scoping and environmental impact assessment and environmental management programme reports and WUL. The management of the stakeholder engagement process and specialists.
The environmental permitting process associated with a new mining right, mining right amendment and WUL for Kudumane Manganese Resources, Northern Cape (2013-2017)	Compilation of scoping and environmental impact assessment and environmental management programme report figures.
EIA and EMP for the development of the new Khwara underground mine in the Northern Cape Province (2016- 2017)	Compilation of scoping and environmental impact assessment and environmental management programme report figures.
Environmental assessment process, waste management license process and water use license process for the establishment of a new Mokala Manganese Mine in the Northern Cape Province (2014-2016)	Compilation of the environmental impact assessment figures and environmental management programme report figures

Proposed Kinsenda project amendment: underground mine and surface infrastructure for Meterox, Kinsenda Copper mine in the DRC (2013)	Environmental Management Programme (EMP) for the proposed prospecting activities to be undertaken on the Farm Chieftains Plain 46-JT and Walhalla 1-JT. Bronwyn compiled the figures for the EMP
Aquarius Platinum (SA) (Pty) Ltd – Prospecting rights application on the Farms Chieftains Plain 46-JT and Walhalla 1-JT (2014)	Environmental Management Programme (EMP) for the proposed prospecting activities to be undertaken on the Farm Chieftains Plain 46-JT and Walhalla 1-JT. Bronwyn compiled the figures for both projects
Community Water and Sanitation Supply (CWSS) Project, Kwa-Zulu Natal, South Africa (1999-2000)	Capture and collation of digital data for GIS for the region of KwaZulu-Natal, to be used for strategic planning of water and sanitation for the Reconstruction and Development Program (RDP) and generation of digital maps for reports and presentations. Integrating of spreadsheet and database data into ArcInfo coverages and Arcview. For Department of Water Affairs and Forestry.
Vaal Augmentation Planning Study (VAPS), Kwa-Zulu Natal, South Africa (1999-2000)	Preparation of drawings indicating proposed water supply infrastructure including aqueducts, pipelines, dams and pump stations for a pre-feasibility study. In addition, Bronwyn assisted with the South Coast water resources development study. For Department of Water Affairs and Forestry.
Road and General Draughting, Pietermaritzburg, South Africa. (1982-1990)	Production of township road plans, longitudinal sections, cross-sections and mass haul diagrams for provincial district and township surfaced roads using AutoCAD. Preparation of structural drawings for reservoirs, sand filters and storage bins at a wastewater treatment works. In addition infrastructure mapping comprised digitising and annotating 1:10 000 orthographic photos, capturing topographical information, boreholes, diptanks, roads, etc. For various clients.

CURRICULUM VITAE



BINGHUI LI

ASSOCIATE

Acoustics & Vibration, Asia Pacific

QUALIFICATIONS

PhD	Applied Physics – Underwater Acoustics
MSc	Applied Physics – Acoustics
BSc	Applied Physics

EXPERTISE

- Underwater acoustics propagation modelling, measurement and monitoring
- Data processing and analysis, impact assessment, mitigation and control management
- Environmental, transport and industrial noise and vibration monitoring, modelling prediction, impact assessment, mitigation and control

Bing has been working as an engineering consultant since early 2010 after completion of his PhD study in Curtin University. In his professional career as an acoustic consultant, Bing has been providing consulting services in various acoustical disciplines, including underwater acoustics, environmental noise, transport (Rail & Road) and industrial noise and vibration, and architectural acoustics.

Bing has extensive experience in underwater acoustics with technical skills covering propagation modelling prediction, measurement and monitoring, data processing and analysis, impact assessment, and mitigation and control management. His project experience, particularly in Oil and Gas sector, ranges from offshore explorations to onshore/offshore development and operations, across regions of different jurisdictions including Australia, New Zealand, Europe, Africa and America.

Prior to his consulting career, Bing has been engaged in underwater acoustics research and development for seven years. The research subjects he has undertaken include underwater acoustics propagation modelling development, as well as hydro-acoustic data acquisition, processing and analysis.

SELECTED PROJECT EXPERIENCE

Marine Seismic Survey Noise Modelling – Coastal and Offshore Australia

Conducted airgun array source and underwater sound transmission loss modelling (STLM) for numerous seismic survey programs proposed to be undertaken within Australian waters. The modelling exercises are to predict the received sound levels from the surveys, with the modelling outputs to be used for marine fauna impact assessment as part of the Environmental Plan (EP) as required by the regulators (e.g. The National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), Department of Mines, Industry Regulation and Safety (DMIRS) and Department of Primary Industries and Regional Development (DPIRD)).

The seismic survey programs include but not limited to the following:

- Perth Basin XANADU 3D marine seismic survey array source and acoustic propagation modelling – Norwest Energy
- Baleen 2D marine seismic survey GI Gun source and acoustic propagation modelling – Asset Energy
- Otway Basin 2D marine seismic survey array source and acoustic propagation modelling – SLB
- NWS WA Exmouth SLB15 3D marine seismic survey array source and acoustic propagation modelling – SLB
- NWS WA Exmouth SLB15 'eSource' 3D marine seismic survey array source and

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- acoustic propagation modelling – SLB
- Browse Basin Aurora 3D marine seismic survey acoustic propagation modelling and model validation monitoring – PGS
- Browse Basin Ichthys Field 3D marine seismic survey acoustic propagation modelling – INPEX
- NWS WA Bassett Field 3D marine seismic survey acoustic propagation modelling – TOTAL

Marine Seismic Survey Noise Modelling – Offshore New Zealand

Conducted airgun array source and underwater sound transmission loss modelling (STLM) for numerous seismic survey programs proposed to be undertaken within New Zealand offshore waters. The modelling exercises are to predict the received Sound Exposure Levels (SELs) from the surveys, with the outputs to be used to demonstrate whether the proposed surveys comply with the SEL statutory requirements within the *2013 Code of Conduct for Minimising Acoustic Disturbance to Marine Mammals from Seismic Survey Operations* (the Code).

The seismic survey programs include but not limited to the following:

- South Taranaki 18SBB3D marine seismic survey array source and acoustic propagation modelling – Todd Energy
- East Coast Basin 3D marine seismic survey array source and acoustic propagation modelling – CGG
- Taranaki Basin Māui 4D marine seismic survey array source and acoustic propagation modelling – Shell
- Taranaki Basin 3D marine seismic survey array source and acoustic propagation modelling – SLB
- Pegasus Basin 3D marine seismic survey array source and acoustic propagation modelling – SLB
- Taranaki Basin 3DMC marine seismic survey array source and acoustic propagation modelling – Shearwater GeoServices
- North Taranaki Basin Nikau 3D marine seismic survey array source and acoustic propagation modelling – OMV
- Drilling Programme NZ Borehole and Hazard marine seismic survey array source and acoustic propagation modelling – OMV
- Taranaki West 3D marine seismic survey array source and acoustic propagation modelling – PGS
- Taranaki South 3D marine seismic survey array source and acoustic propagation modelling – PGS
- Taranaki Basin Kauri MC3D marine seismic survey array source and acoustic propagation modelling – PGS
- NZ-wide 2D marine seismic survey array source and acoustic propagation modelling – ION

Marine Seismic Survey Noise Modelling – North Sea, Offshore Africa and South America

Conducted airgun array source and underwater sound transmission loss modelling (STLM) for seismic survey programs proposed to be undertaken within the North Sea, African and South American offshore waters. The modelling exercises are to predict the received sound levels from the surveys, with the modelling outputs to be used for marine fauna impact assessment.

The seismic survey programs include but not limited to the following:

- BEIS Southern North Sea (SNS) 3D marine seismic survey source and acoustic propagation modelling – GeoPartners/SeaBird
- Northern North Sea (NNS) and Southern North Sea (SNS) 2D marine seismic survey source and acoustic propagation modelling – SeaBird Exploration Norway AS

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	<ul style="list-style-type: none"> Offshore Brazil 'eSource' 3D marine seismic survey source and acoustic propagation modelling – SLB Offshore Mauritania 3D marine seismic survey source and acoustic propagation modelling – TOTAL
Hilcorp Liberty Project Underwater Noise Modelling and Impact Assessment	Undertook underwater noise modelling in support of an Incidental Harassment Authorization (IHA) for the construction of the Hilcorp Liberty Project in the Beaufort Sea, Alaska. The objective of the study is to identify the area around the source that would be ensounded to a level above the relevant impact thresholds for marine mammal species, including US National Oceanic and Atmospheric Administration (NOAA) Level A harassment (injury) and Level B harassment (behavioural disturbance) for each scenario of interest.
Offshore Well Drilling Projects, Namibia and South Africa	Underwater noise modelling and impact assessment to determine the potential impacts to marine mammals and fish species and address concerns identified by the local fishing industry. Modelling prediction and impact assessment for drilling operation activities, including vertical seismic profiling (VSP), drill ships, rigs and supporting and maintenance vessels and tugs.
Abbott Point Dredging and Onshore Placement of Dredged Material Underwater Noise Impact Assessment	Undertook marine noise modelling studies for the dredging operations and the associated supporting vessel movements in relation to the proposed development of two new terminals in the Port of Abbot Point, located approximately 25 km north of Bowen of the Northern Queensland coast. Assessed the consequent noise impact on marine fauna species of significance identified in proximity to the Abbot Point.
Gladstone Harbour Channel Duplication - Underwater Noise Impact Assessment	Undertook long-term underwater noise baseline characterization via noise logging and data analysis. Conducted noise modelling studies for the marine operations associated with the proposed channel duplication dredging and Western Basin dredging disposal activities, and assessed consequent noise impact on identified significant marine fauna species as a result of the proposed development.
The Swan River Pedestrian Bridge Construction Piling Underwater Noise Modelling, Measurement and Assessment	Conducted underwater noise modelling prediction and site monitoring for piling noise associated with the construction of the proposed Swan River Pedestrian Bridge as part of the new Perth Stadium Transport Infrastructure (nPSTI). Assessed the piling noise impact on marine fauna species identified in Swan River, including marine tubules, fish species and Dolphins. Developed management plan to manage, mitigate and minimise the noise impact during the construction phase of the project.
Underwater Noise Impact Assessment for Marine Barge Operation – Fitzroy River Estuary Region	Underwater noise modelling for marine barge operations at the Fitzroy River Estuary, situated in Central Queensland north of Curtis Island, and the consequent noise impact risk assessment on local marine mammal species, particularly Australian Snubfin Dolphins.
Inpex Underwater Noise Modelling – Darwin Harbour	Underwater noise modelling and impact assessment for construction activities associated with the proposed LNG infrastructure development in Darwin Harbour, Northern Territory, Australia. The assessed construction activities include underwater drilling and blasting, as well as piling and dredging activities.
Theoretical Investigation of reflection loss mechanisms from the seafloor with elastic characteristics	Undertook theoretical investigation of the loss mechanisms of plane-wave reflection from the seafloor with elastic characteristics, with research results published in Annual Conference of the Australian Acoustical Society 2012 held in Fremantle, Western Australia, 21-23 November.

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Downstream Browse Underwater Noise Assessment	Undertook underwater noise modelling for construction activities associated with the proposed Browse LNG Precinct development near James Price Point, 60 km north of Broome in Western Australia, and carried out the consequent noise impact assessment on marine fauna species. The assessed marine construction activities include pile driving, dredging operations, marine blasting and vessel movements.
Underwater Environmental Noise Assessment – Wheatstone Piling	Undertook underwater noise modelling for piling activities associated with the proposed Wheatstone Port Facility Development at Ashburton North, 12 kilometres west of Onslow on the Pilbara coast of Western Australia, and carried out the impact assessment on marine turtles, including adult turtles and turtle hatchlings, as a result of the piling activities.
Measurement and Modelling of Cape Lambert B (CLB) Pile Driving	Underwater noise modelling for pile driving activities associated with the Cape Lambert Port B development at Cape Lambert in the Pilbara region of Western Australia. Underwater noise measurements of the piling operations were also carried out to validate the model predictions, as well as to assess the consequent impact on marine mammal species.
Gorgon Upstream Underwater Environmental Noise Risk Assessment	Provided impact assessment of the underwater environmental noise on cetaceans and marine turtles for the activities associated with the Gorgon Upstream infrastructure development, off the west coast of Barrow Island, Western Australia.
Anketell Point Port Underwater Noise Modelling and Measurement	Underwater noise modelling, measurements and impact assessment for piling and dredging operations associated with the proposed Anketell Point Port facility development, in the Pilbara region of Western Australia.
MEMBERSHIPS	
Member and Treasure	Australian Acoustical Society (AAS) Western Australian Division
Member	Acoustical Society of America (ASA)

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DANA LEWIS

PROJECT CONSULTANT

Acoustics & Vibration, Asia-Pacific

QUALIFICATIONS

BE (Hons)	2018	Bachelor of Engineering (Hons), University of Queensland, Australia
ME (Mech)	2018	Masters of Engineering (Mechanical), University of Queensland, Australia

EXPERTISE

- Noise and Vibration Data Processing and Analysis

Dana joined SLR part time as Project Consultant while in her final semester of university. She graduated at the end of 2018 with a Bachelor of Engineering (Honours) and a Master of Engineering (Mechanical).

Since joining the team, Dana has had exposure to many areas of acoustics and vibration, with focus on rail noise and vibration. Dana also spent time out on site, completing attended monitoring and setting up unattended measurement.

PROJECTS

Inland Rail Monitoring, QLD, Australia	Isolating and analysing individual train passbys from attended monitoring data, using Python to compare different train consists.
Demolition Noise and Vibration Monitoring, QLD, Australia	Analysing noise and vibration data for the site monthly and reporting back to clients over a span of four months.
Cross River Rail, QLD, Australia	Data analysis of baseline noise and vibration monitoring.
New Acland Coal Mine, QLD, Australia	Continuing Acoustic Support, attended and unattended measurement of the New Acland Coal Mine.
Elizabeth Drive Enterprise Precinct, QLD, Australia	Preliminary Noise Assessment, focusing on potential intrusion of aircraft noise on flexible employment zone and providing recommendations on building components for different zoning/area usage.

Curriculum Vitae

Dr Andrea Pulfrich

Dr Andrea Pulfrich is the founder, director, sole employee and share holder of Pisces Environmental Services (Pty) Ltd. The company was established in January 1998 to help fill the growing need for an expert interface between users of the coastal and marine environment and the various national and provincial management authorities. Since then, PISCES has been providing a wide range of information, analyses, environmental assessments, advice and management recommendations to these user groups, particularly the South African and Namibian marine diamond mining and hydrocarbon industries.

Personal Details

Born: Pretoria, South Africa on 11 August 1961
Nationality and Citizenship: South African and German
Languages: English, German, Afrikaans
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Academic Qualifications

- BSc (Zoology and Botany), University of Natal, Pietermaritzburg, 1982
- BSc (Hons) (Zoology), University of Cape Town, 1983
- MSc (Zoology), University of Cape Town, 1987
- PhD, Department of Fisheries Biology of the Institute for Marine Science at the Christian-Albrechts University, Kiel, Germany, 1995

Membership in Professional Societies

- South African Council for Natural Scientific Professions (Pr.Sci.Nat. No: 400327/06)
- South African Institute of Ecologists and Environmental Scientists
- International Association of Impact Assessment (South Africa)
- Registered Environmental Assessment Practitioner (Certification Board for Environmental Assessment Practitioners of South Africa).

Employment History and Professional Experience

1998-present: Director: Pisces Environmental Services (Pty) Ltd. Specifically responsible for environmental impact assessments, baseline and monitoring studies, marine specialist studies, and environmental management programme reports.

1999: Senior researcher at the University of Cape Town on contract to Namdeb Diamond Corporation and De Beers Marine South Africa; investigating and monitoring the impact

of diamond mining on the marine environment and fisheries resources; experimental design and implementation of dive surveys; collaboration with fishermen and diamond divers; deep water benthic sampling, sample analysis and macrobenthos identification.

1996-1999: Senior researcher at the University of Cape Town, on contract to the Chief Director: Marine and Coastal Management (South African Department of Environment Affairs and Tourism); investigating and monitoring the experimental fishery for periwinkles on the Cape south coast; experimental design and implementation of dive surveys for stock assessments; collaboration with fishermen; supervision of Honours and Masters students.

1989-1994: Institute for Marine Science at the Christian-Albrechts University of Kiel, Germany; research assistant in a 5 year project to investigate the population dynamics of mussels and cockles in the Schleswig-Holstein Wadden Sea National Park (employment for Doctoral degree); extensive and intensive dredge sampling for stock assessments, collaboration with and mediation between, commercial fishermen and National Park authorities, co-operative interaction with colleagues working in the Dutch and Danish Wadden Sea, supervision of Honours and Masters projects and student assistants, diving and underwater scientific photography. Scope of doctoral study: experimental design and implementation of a regular sampling program including: (i) plankton sampling and identification of lamellibranch larvae, (ii) reproductive biology and condition indices of mussel populations, (iii) collection of mussel spat on artificial collectors and natural substrates, (iv) sampling of recruits to the established populations, (v) determination of small-scale recruitment patterns, and (vi) data analysis and modelling. Courses and practicals attended as partial fulfilment of the degree: Aquaculture, Stock Assessment and Fisheries Biology, Marine Chemistry, and Physical and Regional Oceanography.

1988-1989: Australian Institute of Marine Science; volunteer research assistant and diver; implementation and maintenance of field experiments, underwater scientific photography, digitizing and analysis of stereo-photoquadrats, larval culture, analysis of gut contents of fishes and invertebrates, carbon analysis.

1985-1987: Sea Fisheries Research Institute of the South African Department of Environment Affairs and Tourism: scientific diver on deep diving surveys off Cape Agulhas; censusing fish populations, collection of benthic species for reef characterization.

South African National Research Institute of Oceanography and Port Elizabeth Museum: technical assistant and research diver; quantitative sampling of benthos in Mossel Bay, and census of fish populations in the Tsitsikamma National Park.

University of Cape Town, Department of Zoology and Percy Fitzpatrick Institute of African Ornithology; research assistant; supervisor of diving survey and collection of marine invertebrates, Prince Edward Islands.

1984-1986: University of Cape Town, Department of Zoology; research assistant (employment for MSc Degree) and demonstrator of first year Biological Science courses. Scope of MSc study: the biology, ecology and fishery of the western Cape linefish species *Pachymetopon blochii*, including (i) socio-economic survey of the fishery and relevant fishing communities, (ii) collection and analysis of data on stomach contents, reproductive biology, age and growth, (iii) analysis of size-frequency and catch statistics, (iv) underwater census, (v) determination of hook size selectivity, (vi) review of historical literature and (vii) recommendations to the Sea Fisheries Research Institute of the South African Department of Environment Affairs and Tourism for the modification of existing management policies for the hottentot fishery.

Projects Undertaken

Since establishment in 1998, Pisces Environmental Services have successfully completed the following projects, either independently or in collaboration with various associates and partners.

Hydrocarbon Industry

- Marine Faunal Assessments for proposed exploration well-drilling by Cairn, Shell and Thombo on the South African West Coast, with CCA Environmental.
- Marine Faunal Assessments for proposed exploration well-drilling by Murphy Oil on the Namibia Coast, with CCA Environmental.
- Marine Faunal Assessments for proposed exploration well-drilling by Shell off the Namibia Coast, with SLR Environmental Consulting (Namibia) (Pty) Ltd.
- Marine Faunal Assessments for proposed exploration well-drilling by Eni off the KwaZulu-Natal Coast, with ERM Southern Africa Limited.
- Marine Faunal Assessments for proposed seismic, Controlled Source Electromagnetic surveys and hydrocarbon exploration activities (seismic surveys, multibeam bathymetry, seabed sampling, surface heat-flow measurements, well drilling) off the West, South West, South and East Coasts of South Africa, and off northern, central and southern Namibia, for CCA Environmental/SLR Consulting.
- Marine Faunal Assessments for proposed seismic surveys and hydrocarbon exploration off the West, South and East Coasts of South Africa for ERM.
- Marine Faunal Assessments for proposed seismic surveys off the West, South and East Coasts of South Africa for EIMS.
- Marine Faunal Assessments for proposed seismic surveys off the South and West Coasts of South Africa for SRK.
- Marine Faunal Assessments for proposed hydrocarbon exploration off the West, South and East Coasts of South Africa for Jeffares & Green.
- Baseline Marine Ecological Assessment and post-ESHIA monitoring for the proposed Anadarko LNG Development, Palma Bay, Northern Mozambique with Lwandle Technologies (Pty) Ltd for ERM (Pty) Ltd.
- Marine Faunal Assessment for proposed well stimulation in the F-O Field offshore of Mossel Bay, with WorleyParsons.
- Marine Faunal Assessment for the proposed development of the iBhubezi Gas Field and installation of a subsea gas transfer pipeline, with CCA Environmental.
- Marine ecology and fisheries assessment for the Potential Impacts of the Operation of a LNG Power Generating facility in Walvis Bay, for Xaris Energy Namibia (Pty) Ltd with EnviroDynamics cc.
- IFC PS6 Critical Habitats Assessment for proposed LNG developments by Anadarko Mozambique Area I Lda, with Lwandle Technologies.
- Baseline Marine Ecological Surveys for the proposed Sasol Development Project for Liquid hydrocarbon Export, Inhassaro Province, Mozambique with Lwandle Technologies (Pty) Ltd for ERM (Pty) Ltd.

Diamond Mining

- Evaluation of deepwater benthic community composition changes and recovery rates in the Atlantic 1 Mining Licence Area off Namibia, for De Beers Marine.
- Evaluation of the impact of nearshore diver-operated diamond mining on rock-lobster and benthic communities near Lüderitz, Namibia, for Namdeb Diamond Corporation.

- Evaluation of the effects of shore-based contractor mining and fines deposition from the Elizabeth Mine on rock-lobster abundance, and intertidal and subtidal communities, for Namdeb Diamond Corporation.
- Review of the interactions between the rock-lobster fishery and marine diamond mining along the southern African West Coast, for GOPA-Consultants/GTZ.
- Environmental Management Program Reports for South African west coast (a), (b), (c) and (d) marine diamond mining concessions, for Benguela Operations, Trans Hex Group, Namagroen Prospecting and Investments, GeoMining and Wealth 4 U.
- Environmental impact assessment for proposed beach terrace mining at Karoetjies Kop by De Beers Namaqualand Mines for Metago Environmental Engineers.
- Beach macrofaunal survey to assess the impacts of beach mining operations by Trans Hex Operations.
- Specialist reviews of the potential effects of sediments derived from proposed pocket-beach and off-beach mining operations in Namibia on intertidal and subtidal benthic communities, for Namdeb Diamond Corporation and De Beers Marine.
- Baseline marine survey of intertidal and subtidal rocky shore habitats in the Brand-se-Baai Complex and associated EIA and EMP for surf-zone, diver-operated diamond mining for De Beers Namaqualand Mines.
- Baseline marine survey and annual monitoring of intertidal and subtidal rocky shores and beaches at Elizabeth Bay, Namibia, for Namdeb Diamond Corporation (ongoing).
- Macrofaunal sample analysis and baseline and monitoring reports on Benthic Communities in the De Beers ML3/2003 Mining Licence Area, for De Beers Marine South Africa.
- Macrofaunal sample analysis and report on Benthic Communities in ML-43, ML-44, ML-45, ML-47 and ML-128 off Namibia, for Namdeb Diamond Corporation.
- Compilation of a Scoping Report, EIA and EMP for marine dredging operations in the Chameis Bay and the Atlantic 1 Mining Licence areas, for De Beers Marine Namibia.
- Reports on the recovery and rehabilitation of marine diamond mining operations off the southern African West Coast, for De Beers Marine South Africa, De Beers Marine Namibia and Namdeb Diamond Corporation.
- Specialist input to an EIA on proposed pocket-beach mining by Namdeb Diamond Corporation, for EnviroScience.
- Review of the potential effects of increased sediment disposal from the Elizabeth Bay mine (Namibia) on shallow water marine communities, for CSIR.
- Identification of deepwater benthic organisms collected in seabed benthic community surveys in mined areas off Namibia, for De Beers Marine Namibia.
- Compilation of a scoping report reviewing the EIA and EMP for De Beers South African Sea Areas Prospecting and Mining Concessions along the West Coast, for De Beers Marine South Africa.
- Assessment the potential effects of dredging-related suspended sediments on intertidal and subtidal communities in the Chameis Bay area, for De Beers Marine Namibia.
- Study on the cumulative impacts of scouring of sub-tidal areas and kelp cutting by diamond divers in near-shore areas of the BCLME region (BEHP/CEA/03/04), for the BCLME Task Group on Management of Mining and Petroleum Exploration and Production Activities.
- Data gathering and gap analysis for assessment of cumulative effects of marine diamond mining activities on the BCLME region (BEHP/CEA/03/02).
- Assessment of the cumulative effects of sediment discharges from on-shore and near-shore diamond mining activities on the BCLME (BEHP/CEA/03/03), with CSIR Environmentek.

- Baseline and monitoring surveys of the effects of Pocket Beach mining at Site 11/12 on nearshore reef habitats in the Bogenfels Licence Area for Namdeb Diamond Corporation.
- Compilation of an EIA and EMPR for proposed Wet Overburden Mining in Namdeb's Mining Area 1, with Anchor Environmental Consultants.
- Baseline and monitoring surveys of the effects of fine-tailings discharges and shoreline accretion on rocky-shore and sandy-beach communities in Mining Area 1, for Namdeb Diamond Corporation (ongoing).
- Baseline and monitoring surveys of sandy beach and intertidal rocky shore habitats of the pocket beaches in the Bogenfels Licence Area for Namdeb Diamond Corporation, with Anchor Environmental Consultants.
- Development of a medium- to long-term benthic sampling program to ascertain the recovery rate of the macrofaunal benthic communities after disturbance through mining in De Beers Marine's SASA ML3, for De Beers Marine (Pty) Ltd.
- Compilation of EIAs and EMPRs for Namdeb's Inshore and Inner Shelf Projects, for Namdeb Diamond Corporation (Pty) Ltd.
- Review and compilation of EIAs and EMPRs for Namdeb's offshore mining licence areas mined under exclusive contract by De Beers Marine Namibia, with CSIR Environmentek.
- Preparation and submission of a Letter of Intent and Draft Basic Assessment Report for land-based aspects associated with proposed dredging operations in Namagroen's concessions 8(a) and 9(a), for GeoMining.
- Compilation of an EMPR for vessel and shore-based diving by Diamond Fields Namibia in the Lüderitz concessions, with Jeremy Midgley & Associates.
- Specialist Assessment of tailings plumes from De Beers' Horizontal Mining Vessel Operating in South African Sea Areas Mining Licence Area ML3/2003, with Dr Robin Carter, for De Beers Marine.
- Review of, and input into De Beers Marine's Biodiversity Action Plan, for De Beers Marine (Pty) Ltd.
- Review of, and input into Namdeb's Biodiversity Action Plan, for Namdeb Diamond Corporation (Pty) Ltd.
- EIA-Amendment and EMPR for Namdeb's Elizabeth Bay Optimisation Study.
- Basic Assessment Report and Stakeholder Engagement for Namdeb's Southern Coastal Unconstrained Accretion (SCUBA) Project.
- Risk Assessment and final closure report for MPT 25/2011 diamond mining licence held by De Beers Consolidated Mines. Compiled for De Beers Marine.
- Stakeholder Engagement and EMPR for prospecting application off the South African West Coast for Belton Park Trading 127 (Pty) Ltd.
- Marine Specialist studies for exploration, prospecting and bulk sampling off the South African West Coast for Belton Park Trading 127 (Pty) Ltd.
- Marine Ecology Specialist Study for Exploration activities by LK Mining (Pty) Ltd in EPL 5965 near Lüderitz for SLR Consulting Namibia.
- Revision and update of Namdeb's EMPRs for ML-43, ML-44, ML-45 and ML-128 with EnviroScience (in progress).
- Marine Ecology Specialist Study for proposed cofferdam mining by West Coast Resources along the Namaqualand coast for Myezo Environmental Management Services.
- Marine and Coastal Ecology Assessment as part of the EIA for the Amendment of Environmental Management Programmes for Mining Rights 554MRC, 10025MRC, 512MRC and 513MRC held by Alexkor RMC Pooling and Sharing JV.
- Baseline and impact monitoring of marine and coastal communities in response to cofferdam mining by West Coast Resources along the Namaqualand coast (ongoing).

- Specialist statement for proposed nearshore diamond mining utilizing mass flow excavation technology for Rapid Mining cc.

Other Minerals

- Prospecting permit application and EMPR compilation for the extraction of heavy mineral sands in the Geelwal Karoo area for the Australian-based company Mineral Sands Resources Ltd.
- Marine Specialist Study and EIA Review for the proposed Tormin heavy mineral sands mining north of the Olifants River mouth for GCS.
- Marine Specialist Report for the EIA and EMP for proposed prospecting for shell and sand off Richard's Bay, with AGES (Pty) Ltd.
- Marine Baseline Report for the proposed Cacata Phosphate Project in Cabinda Province, Angola, with Prime Resources (Pty) Ltd.
- Marine Specialist Report for the EIA and EMP for shore-based operations associated with the proposed Namibian Marine Phosphates project, with EnviroDynamics cc.
- Marine Specialist Statement on the potential benthic impacts of proposed offshore sampling for heavy minerals, with CCA Environmental.
- Marine Specialist Statement on the potential effects of the discharge of bitterns from the proposed Cape Cross Salt Works, for Gecko Salt Namibia.
- Marine Ecology Specialist Statement on the potential effects of blasting at the Wlotzkasbaken Ridge Quarry, for Gecko Salt Namibia.
- Marine ecology Specialist Assessment for Environmental Screening Study for the proposed Development of a Bittern Beneficiation pond and Associated Infrastructure at the Walvis Bay Salt Works, Walvis Bay, Namibia, for SLR Environmental Consulting (Namibia) (Pty) Ltd.
- Marine ecology Specialist Statement as part of the Environmental Impact Assessment and Environmental Management Plan for Salt Mining at Mile 68 within EPL 4426, Erongo Region, for Gecko Salt Namibia.

Desalination and Power Plants

- Assessment of a proposed cooling water discharge from the Kudu Power Plant near Oranjemund, into the marine environment, for CSIR Environmentek.
- Assessment of a cooling water discharge on the marine environment, from the proposed 2400 MW gas-fired combined cycle power generator at Coega, for CSIR Environmentek.
- Assessment of an effluent discharge from proposed Reverse Osmosis Plants at the Multipurpose Terminal in Saldanha Bay and Swakopmund Namibia on the marine environment, for CSIR Environmentek.
- Specialist Marine Environmental Impact Assessment Study, baseline survey and Environmental Management Plan for the proposed Reverse Osmosis Plant for the Trekkopje Uranium Mine, Namibia, for Turgis Consulting (Pty) Ltd.
- Specialist Marine Environmental Impact Assessment Study, Baseline Survey and Environmental Management Plan for the proposed NamWater Reverse Osmosis Plant near Swakopmund, Namibia, for CSIR Environmentek.
- Marine Specialist Study for the proposed Saldanha Bay Desalination Plant, with CSIR Environmentek.
- Environmental Screening for Reverse Osmosis Plants in KwaZulu-Natal, with Aurecon South Africa (Pty) Ltd.

- Environmental Risk Analysis and Marine Specialist Study as part of the Environmental Impact Assessment for Reverse Osmosis Plants in KwaZulu-Natal, with CSIR Environmentek (in progress).
- Environmental Screening for Reverse Osmosis Plant in the greater Cape Town area, with CSIR Environmentek and Steffani Marine Environmental Consultant.
- Marine Specialist Study for the proposed Desalination Plant at Volwaterbaai, with SRK.
- Marine Specialist Study for the proposed Frontier Saldanha Regional Marine Outfall, with CSIR Environmentek.
- Marine Specialist Study for the proposed Rössing Mine Desalination Plant at the Swakopmund Saltworks, with SLR Namibia.

Harbour, Industrial and Coastal Developments

- Intertidal beach and rocky-shore specialist study for Dollas Downs EIA, for CSIR Environmentek.
- Compilation of an EIA and EMPR for the construction of a new jetty in Lüderitz Bay Harbour.
- Specialist study on the potential impacts on marine ecosystems in Table Bay of the expansion of the container storage terminal in Cape Town harbour, for CSIR Environmentek.
- Preparation of national launchsites database in support of prospective launchsite applications for the SA Deep Sea Angling Association.
- Marine Ecology Specialist Study and EIA for the development of Eden Island in Republic of Seychelles.
- Marine Specialist input into the Basic Assessment for the proposed marine lift facility in the Small Boat Harbour, Saldanha Bay, for CCA Environmental (Pty) Ltd.
- Compilation of a Marine Specialist Study for the Feasibility Assessment for the proposed expansion of the Port of Lüderitz, for Aurecon Namibia.
- Marine environmental risk assessment for an industrial park near Swakopmund, with CSIR Environmentek.
- Marine Specialist Study for the AfriSam Saldanha Cement Project, for Aurecon South Africa.
- Marine Specialist Assessment for the upgrade of the waste water treatment facility on Robben Island, for WSP Environmental, South Africa.
- Marine Monitoring Report and Assessment for the Chlorine disinfection pilot project at Three Anchor Bay, for Jeffares & Green through Ma-Re.
- Baseline monitoring and marine ecological assessment for the proposed Vision Industrial Park near Swakopmund Namibia, for Gecko Namibia.
- Marine ecology Specialist Assessment for the proposed development of the West Bank WWTW marine outfall pipeline, East London for WSP Environmental.
- Marine ecology Specialist Assessment for the proposed installation of a submarine fibre-optics cable off East London, for ERM Southern Africa Limited.
- Marine ecology Specialist Assessment for the proposed installation of a submarine fibre-optics cable off Amamzimtoti, KwaZulu-Natal, for ERM Southern Africa Limited.

Marine Living Resources

- Population dynamics and stock assessment of giant periwinkles *Turbo sarmaticus*, *Turbo cidaris* and *Oxysteles sinensis*, in the southwestern Cape for M&CM.
- Evaluation of coastal fauna community composition and pesticide contamination levels in northern False Bay, Cape Town for AECI Operations Services.
- Economic study of the South African pelagic longline and abalone fishing sectors, for EFA.
- Evaluation of shark by-catches in southern African shark longline fisheries, for EFA.
- A review of information relevant to development of effective co-operative arrangements for the management of shared fish stocks in the SADC region, for EFA.
- Economic Assessment of the South African Abalone Fishery, with EFA.
- Conducting of a benthic community baseline diving survey in the Cape Peninsula National Park marine zone, for SA National Parks.
- Conducting of Fisheries Independent Abalone Surveys (FIAS) for Marine & Coastal Management, and comparative abalone diving survey for the abalone industry.
- Development and management of a Fisheries Independent Monitoring Survey (FIMS), and small-scale mark-and-recapture experiment for rock lobsters off the southern Namibian coastline, for De Beers Marine Namibia.
- Management of an infra-red aerial photographic survey of the southern Namibian kelp beds, for De Beers Marine Namibia.
- Marine Specialist inputs into technical report on the Environmental Flow Requirements of the Fish River and the Orange-Senqu River Mouth with CSIR Environmentek.
- Marine Specialist Report and risk assessment for a proposed abalone ranching pilot project along the Northern Cape Coast, with Steffani Marine Environmental Consultant.
- Risk Assessment as part of an application for restricted activities involving listed threatened or protected turtle species, for NMMU.
- Marine Specialist Report for the proposed Saldanha Bay Aquaculture Development zone, with CapMarine Environmental and SRK Consulting.
- Strategic Environmental Assessment for Mariculture Development in South Africa, with CSIR (in progress).
- Specialist Statement on the impacts of beach driving in the Arniston area, for SLR Consulting.
- Specialist study for the proposed expansion of the I&J Abalone farm at Danger Point, for SLR Consulting (South Africa) (Pty) Ltd.



CURRICULUM VITAE: DAVID WILLIAM JAPP

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Academic Record:

1975 – 1980 Merchant Navy Academy General Botha, Cape Town

1980 – 1983 Chief Navigating Officer (Foreign)

1983 – 1985 University of Cape Town; BSc (Zoology, Marine Biology and Oceanography)

1986 – 1986 Rhodes University; BSc Honours (Ichthyology and Fisheries Science; Cum Laude)

1987 – 1989 Rhodes University and Sea Fisheries Research Institute; MSc (Ichthyology and Fisheries Science; Cum Laude)

Languages: English (First language); Afrikaans (Basic written and spoken)

Membership of Professional Bodies: SA Council for Natural Scientific Professions (SACNASP) Reg. No. 400208/12

Key Experience:

- Masters Degree in Fisheries Science
- Management of Company and Corporate Structures (founded companies in 1996 – FOSS cc, CapFish cc, CapMarine (Pty) Ltd)
- Project Management and Appraisal
- Environmental Impact Assessments
- Marine Stewardship Council Assessor
- International and Regional Consultant and Director of CapFish cc

Professional Experience (selected):

- South Africa : Head of Offshore Research - **Sea Fisheries Research Institute (SFRI / DAFF)** undertook 8 years of direct research and training of sea staff on biomass surveys as Chief Scientist;
- Consultant has worked extensively in the region including South Africa, Mozambique, Angola, Mozambique, Uganda, Namibia, Kenya, Tanzania and West Indian Ocean Fisheries Sectors since 1990;
- Benguela System : Benguela Current Commission (BCC) Strategic Impact Assessment (SEA)
- World Bank fisheries consultant – development and implementation of fisheries and aquaculture components : 1) MACEMP (Tanzania); 2) KCDP (Kenya) 3) SWIOFP (West Indian Ocean) 4) SWIOFish 1 (Current – WIO countries focus is Tanzania 5) LVEMP 2 (Lake Victoria)
- Environmental Impact Assessment of the Aquaculture Development Zone in Mossel Bay (South Africa)
- Scoping assessment and EIA of the potential for and Aquaculture Development Zone in Saldanha Bay, South Africa (pending)
- Lake Victoria – field trip and overview of the “Source of the Nile” tilapia cage culture including provision of juvenile grow out and adult cage culture (conducted through LVEMP2 and the World Bank with the Lake Victoria Fisheries Organization and NAFIRI)

Aquaculture-Specific

- Post graduate degrees in Fisheries science included bot fresh water and marine aquaculture
- East African project undertaken with the World Bank include major fisheries components which incorporate development of aquaculture (fresh and marine)
- Scoping studies and Impact assessments of Aquaculture Development Zones in Mossel Bay (South Africa)
- Scoping studies and EIA of ADZ in Saldanha Bay (this project is not yet activated and is pending subject to tender and financing)
- World Bank Project (LVEMP2) – consultant has been providing specialist fisheries advice to the LVFO including aquaculture field work in the Jinga / Lake Victoria including the use of Mukene as both feed and for human consumption
- Assessment of the Saldanha Bay Aquaculture Development Zone (ADZ)

Regional and International Experience:

Date	Location	Company & reference person	Position	Description
1987 – 1996	South Africa	Sea Fisheries Research Institute and Marine and Coastal Management (Ref. Dr Augustyn)	Head of Offshore Research	Fisheries Research head – Management of Offshore resources including Demersal, Large Pelagic and Small Pelagic resources. Ref. Is Dr J. Augustyn (Depr Agriculture, Forestry and Fisheries, Cape Town. (johann@sadstia.co.za)
1996 – 2016	South Africa	Capricorn Fisheries Monitoring and Fisheries & Oceanographic Support Services	Consultant and Director	Many consulting projects with the FAO, World Bank, Benguela Current LME. Also developed the Regional Observers Programme. Specialization : Fisheries Management and Research ref. Xavier Vincent : xvincent@worldbank.org
2008 – 2009	Namibia	Benguela Current Commission	Consultant	State of Stock review – Benguela Current Commission. Hashali Hamukuaya (hashali@benguelacc.org)

Date	Location	Company & reference person	Position	Description
2009 – 2017	Mombasa, Kenya	Development of the Kenya Coastal Development Project (KCDP) – World Bank and FAO	Fisheries Expert	Ongoing consultancy developing the KCDP with the World Bank Team – project participation was on near continuous basis until project effectiveness in June 2011. Portfolio : Fisheries Management, Research and Development : Ref is AG. Glauber – World Bank Office, Dar Es Salaam aglauber@worldbank.org
2007 – 2012	Tanzania & Zanzibar	Appraisal of the Tanzania Marine and Coastal Environment Project (MACEMP) – World Bank / FAO	Fisheries Expert	Ongoing consultancy every six months to Tanzania – Project appraisal and Mid-Term review. Presently project is winding down and new MACEMP two phase being developed. Portfolio : Fisheries Management, Research and Development : Ref is AG. Glauber – World Bank Office, Dar Es Salaam aglauber@worldbank.org
2005 – 2016	Kenya, Tanzania, Mozambique and IOC countries	World Bank and FAO – Fisheries Expert Project development and implementation (South West Indian Ocean Fisheries Shared Growth and Governance Project (SWIOFish 1))	Fisheries Expert	Consultancy up to 2015 – fisheries components – development and implementation. Specialization : Fisheries Management and Development. Ref ; AJ Glauber aglauber@worldbank.org
2004 – 2007	IOTC	IOTC	Fisheries Experts	Provision of trained tuna tagging technicians and Cruise leaders for the IOTC Tuna Tagging programme (Note: this was done through CapFish under contract to MEP). Ref : Gerard Dominique (IOTC) . gerard.domingue@iotc.org
2009 - 2017	IOTC	IOTC	Fisheries Observers	Provision of Observers for Transshipment vessels (ongoing). Gerard Domingue (IOTC) gerard.domingue
2004 – 2014	FAO	FAO – Jessica Sanders / Ross Shotton	Fisheries Expert	Consultancy undertaken for technical works relating to 1. South West Indian Ocean Fisheries 2. Regional (Indian Ocean) fisheries reporting (catches) 3. Observer training (Madagascar) 4. Development of High Sea Guidelines (FAO)
2009 – 2017	FAO and WWF	FAO - and WWF USA	Fisheries Expert	Fishery Improvement Process – fishery pre-assessments for MSC and follow-up. Contract is current. Portfolio : Fisheries Management and Development. Domingos Gove (dgoove@wwfesarpo.org)

Date	Location	Company & reference person	Position	Description
2013	Angola Namibia (BCC)	ACP Fish 2	Fisheries Expert	Development of horse mackerel national plans and transboundary management (BCC)
2004 – 2017	International	MSC Assessments – RSA Hake, Tristan da Cunha lobster, Russian Pollock and numerous pre-assessments and peer rev.	Fisheries expert : P2 and P3	Full assessments through CABs (Moody, Intertek, MRAG, Tavel, FCI, BV, Acoura)

Major Projects - Summary

- Resource Assessment:
- Submission of management advice on hake (TAC assessments from 1989 to 1997);
- Biological assessment of hake species in South African waters and determination of ageing and stock structure;
- Design of hake-directed biomass surveys and cruise leader on up to four demersal surveys a year from 1989 to 1997;
- Demersal Working Group co-ordinator from 1991 to 1997 responsible for the management advice on hake and other demersal species;
- Project management (Scientist responsible) of hake-directed longline experiment in SA from 1992-1996

Fishery Economics and Governance :

- Preparation of sector economic reports for RSA fisheries to assist with rights allocation procedures: Hake Longline, Inshore Trawl (Hake and Sole), Shark longline, South Coast Rock Lobster, Patagonian Toothfish, Deepwater Fishery, Midwater Trawl & Hake Handline
- Economic Assessment of the Wetfish and Freezer Trawl apportionment of Hake in Namibia
- BCLME – Ecosystem Approach to Fisheries – Cost Benefit Analysis (March 2006)
- Review of the West Indian Ocean Tuna Fishery and Potential Opportunities and Options for the Development of the Port of Victoria (Seychelles) – Completed March 2008
- Assessment of economic loss due to hydrocarbon development – numerous ongoing projects, PetroSA, Forrester Oil west coast gas, CNR well drilling and many others.
- Value-Adding of Anchovy *Engraulis encrasicolus* in South Africa and potential for poverty relief.
- Governance of Kenya Fisheries – Consultancy and report prepared for IOC Smartfish programme (2011)

Other Projects Completed :

- Comparative assessment (socio-economic) of trawl and Longline fisheries in Benguela Region (BCLME).
- Evaluation of deepwater groundfish fishery in South West Indian Ocean 2004/2005 – FAO.
- Review of Ecosystem Approach to Fisheries Management for South African Fisheries (BCLME – MCM project).
- Review of South Africa's Indian Ocean fisheries – management and policy.
- Development of the South West Indian Ocean Fisheries Programme Implementation Plan – World Bank / FAO – Completed March 2007 (preparation of Project Documents for World Bank and GEF).
- Ecosystem Approach to Fisheries – BCLME project LMR/EAF/03/01 – Contracted consultant including Risk Assessments and Benefit Cost estimators for EAF – Ongoing as of 5 November 2006.
- Indian Ocean Tuna Tagging Programme – 2004-2007 collaborative programme with McAllister Elliot and Partners (UK) and Capricorn Fisheries Monitoring cc (RSA)
- Indian Ocean Tuna Commission – 2009 Collaborative programme between MRAG (UK) and Capricorn Fisheries Monitoring cc for the provision of Observers and monitors on Indian Ocean tuna transshipment vessels.
- International Commission for the Conservation of Atlantic Tunas – 2007 Collaborative programme between MRAG (UK) and Capricorn Fisheries Monitoring cc for the provision of Observers and monitors on Atlantic tuna transshipment vessels.

- Domestic contract awarded (Sept. 2007) for the monitoring of national and high seas tuna longline fisheries, all trawl and small pelagic sectors and deep water rock lobster trap fisheries
- FAO / World Bank – review of Tanzania MACEMP programme with WB surveillance team (2008, 2009, 2010, 2011, 2012)
- FAO / World Bank – initiation of the South West Indian Ocean Fisheries Project – development of Project Implementation Manual and Observer programme (Mombasa – 2007- 2009)
- FAO / World Bank – Project development – Kenya Coastal Development Project (KCDP) – Ongoing 2010-2015
- FAO – EAF-Nansen Programme – Mozambique Sofala Bank Shrimp fishery management plan – development of effort management recommendations.
- FAO World Bank – Lake Victoria LVEMP project. Project management and support to Lake Victoria Fisheries Organisation.
- FAO World Bank – South West Indian Ocean Fisheries Shared Growth and Governance Project (Tanzania effective from June 2015)
- ICCAT Tuna Transshipment Programme Observers – CapFish project executant (2009 to 2012) – ongoing
- IOTC Tuna Transshipment Programme Observers – CapFish project executant (2010-2012) – ongoing
- Tuna Longline – RSA Observer deployments – 100% coverage on Deep Water Fishing Nations (RSA) – Project executant (2007-2012) – on-going
- IOTC Tuna – review of economic reports undertaken by WWF (10 country reports and summaries) – May 2012

Marine Stewardship Council :

- Numerous fisheries assessed including Russian Pollock, Tristan da Cunha Lobster, RSA Hake and many others including many pre-assessments
- Fishery Improvement projects ongoing : Kenya Lobster, Mozambique shallow and deepwater shrimp and Namibian Hake assessment
- Assessment of the PNA Western Pacific tuna Fishery (current September 2016)
- Review of the Mozambique linefish fishery (MSC preassessment) and SASSI assessment (WWF – South Africa) (Current September 2016)

Lecturing and Document Preparation:

- Extensive lecturing and seminar presentations (30 years) as well as detailed project and document preparation experience.
- Presentation of 5 x International courses in Namibia on International Agreements, UNCLOS, RFO's etc to Inspectors, Observers and Fisheries Managers.

Courses:

- Conflict resolution course completed in 1996
- Introductory course in resource economics completed in 2006 (Rhodes University MBA)

List of Recent Specialist Fisheries Assessments for Hydrocarbon and Phosphate Mining EIAs:

- Shell Namibia Upstream B.V.: Proposed deep water exploration well drilling in petroleum exploration licence 39 off the coast of southern Namibia (October 2018) Client: SLR Environmental Consulting (Namibia) (Pty) Ltd.
- Spectrum Geo Ltd: Proposed 3D Seismic Survey offshore northern Namibia: Baseline Study and Environmental Impact Assessment (June 2017) Client: SLR Environmental Consulting (Namibia) (Pty) Ltd.
- GALP: Environmental Impact Assessment for Namibia 3D Seismic Survey for PEL 82 (May 2017) Client: ERM Iberia, S.A.
- GALP: Environmental Impact Assessment for Namibia 3D Seismic Survey for PEL 83 (May 2017) Client: ERM Iberia, S.A.
- Sungu Sungu Oil (Pty) Ltd: Environmental Impact Assessment for a proposed 3D seismic survey in the Pletmos Basin, southern Cape (February 2017) Client SRK Consulting (Pty) Ltd.
- Spectrum ASA: Proposed 3D seismic survey, Walvis Basin, northern Namibia (January 2017) Client SLR Environmental Consulting (Pty) Ltd.
- Spectrum ASA: Proposed 2D seismic survey, Orange Basin, southern Namibia (October 2016). Client SLR Environmental Consulting (Pty) Ltd.

- LK Mining (Pty) Ltd: Proposed Prospecting Licence within EPL 5965, Hottentots Bay, Namibia – Baseline Study and Environmental Impact Assessment on Fisheries (April 2016) Client: SLR Environmental Consulting (Pty) Ltd
- PetroSA (Pty) Ltd: Proposed Development of the E-BK Area in Offshore Licence Block 9, South Coast, South Africa. Client SRK Consulting (Pty) Ltd
- Spectrum ASA: Western Approaches 2D Speculative Seismic Survey, South Africa. Client SLR Environmental Consulting (Pty) Ltd
- Schlumberger: Proposed 3D Seismic Survey off the East Coast of South Africa (November 2015). Client: Environmental Resources Monitoring (ERM).
- Rhino Oil & Gas Exploration South Africa (Pty) Ltd: Proposed Exploration Activities in Offshore Licence Blocks 3617 and 3717 off the South-West Coast of South Africa (November 2015) Client: CCA Environmental (Pty) Ltd
- Xaris Energy Namibia (Pty) Ltd: Proposed Construction and Operation of a LNG Facility in Walvis Bay, Namibia (July 2015) Client: Enviro Dynamics Namibia (Pty) Ltd
- Murphy Ludertiz Oil Co. Ltd: Proposed Exploration Well Drilling in Licence Blocks 2613A and 2613B off the coast of Namibia (July 2015) Client: SLR Environmental Consulting Namibia (Pty) Ltd
- Shell Namibia Upstream B.V.: Environmental Impact Assessment for a 3D seismic survey within Namibian blocks 2913A & 2914B (PEL 39) (July 2014) Client: ERM South Africa (Pty) Ltd.
- Shell South Africa Upstream B.V.: Proposed Exploration Drilling in the Orange Basin Deep Water Licence Area off the West Coast of South Africa (July 2014) Client: CCA Environmental (Pty) Ltd

Publications:

- COCHRANE, K, D.W. JAPP *et al.* 2007 : Results and conclusions of the project "Ecosystem approach to fisheries management in the Benguela Current Large Marine Ecosystem" . FAO Fisheries Circular No. 1026.
- COCHRANE, K, C.J. AUGUSTYN, T. FAIRWEATHER, D.W. JAPP, K. KILONGO, J. IITEMBU, N. MOROFF, J.P. ROUX, L.SHANNON, B. VAN ZYL and F. VAZ VELHO. 2009. Benguela Current Large Marine Ecosystem – Governance and management for an Ecosystem Approach to Fisheries in the region. *Coastal management*, 37:235-254.
- COCHRANE, K, and D.W. JAPP. 2012. Retrospective analysis on pelagic fishes in the South West Indian Ocean for the South West Indian Ocean Fisheries Project. Component 4 (23 November 2012)
- COCHRANE, K and D.W. JAPP, 2015. Offshore fisheries of the Southwest Indian Ocean. (5). Pelagic Fisheries. *Oceanographic Research Institute Special Publication No. 10* (eds. Van der Elst and Everett.
- JAPP, D.W. 1988 - The status of the South African experimental longline fishery for kingklip *Genypterus capensis* in Divisions 1.6, 2.1 and 2.2. *Colln. Scient. Pap. int. Comm. SE Atl. Fish.* 15(2). 35-39
- JAPP, D.W. 1989 - An assessment of the South African longline fishery with emphasis on stock integrity of kingklip *Genypterus capensis* (Pisces: Ophidiidae). **M.Sc. Thesis**, Rhodes University: [iii] + 138pp
- JAPP, D.W. and A.E. PUNT 1989 - A preliminary assessment of the status of kingklip *Genypterus capensis* stocks in **ICSEAF** Division 1.6 and Subarea 2. *ICSEAF Document SAC/89/S.P.*: 15 pp (mimeo).
- JAPP, D.W. 1990 - ICSEAF otolith interpretation guide No.3 - kingklip (publication completed but not published due to dissolving of ICSEAF).
- JAPP, D.W. 1990 - A new study on the age and growth of kingklip *Genypterus capensis* off the south and west coasts of South Africa, with comments on its use for stock identification. *S. Afr. J. mar. Sci.* 9: 223-237.
- JAPP, D.W. 1993 - Longlining in South Africa. In: *Fish fishers and fisheries* L.E. Beckley and R.P. van der Elst (Eds). *Proceedings of the second South African linefish symposium, Durban, 23-24 October 1992.* Special Publication No 2: 134-139.
- JAPP, D.W. 1995 - The hake-directed pilot study conducted from 23 May 1994 to 31 May 1995. *Mimeo* 110 pp
- JAPP, D.W. 1997 - Discarding practices and bycatches for fisheries in the Southeast Atlantic Region (Area 47). In I.J. Clucas & D.G. James, eds. 1997. *Papers presented at the Technical Consultation on Reduction of Wastage in Fisheries.* Tokyo. FAO Fisheries Report No. 547 (Suppl.). Rome, FAO.
- JAPP, D.W. 1999 - Management of elasmobranch fisheries in South Africa. In: *Case studies of the management of elasmobranch fisheries* Edited by R. Shotton. *FAO Fisheries Technical Paper 378/1* : 199-217.
- JAPP, D.W. 1999 - Allocation of fishing rights in the South African hake fishery. In: *Case studies of Rights allocations.* *FAO Fisheries Technical Paper 411.*
- JAPP, D.W. 2006 - Country Review : South Africa (Indian Ocean). *Review of the state of world marine capture fisheries management : Indian Ocean.* *FAO Fisheries Technical Paper 488.*

- JAPP, D.W. 2008. Scientific rationale and alternatives for the introduction of Fishery Management Areas for hake. Unpub report. *South African Deep Sea Trawling Industry Association*.
- JAPP, D.W. P. SIMS and M.J. SMALE 1994 - A Review of the fish resources of the Agulhas Bank. *S. Afr. J. Sci.* **70**: 123-134.
- JAPP, D.W. 2010. Discussion Paper Prepared for Workshop on the Implementation of the FAO Guidelines for the Management of Deep-sea Fisheries in the High Seas. Pusan, South Korea (May 2009).
- JAPP, D.W. 2010. Pre Assessment Report for the South African Longline Fishery for Hake Client: WWF (RSA) and Ocean Fresh. Capricorn Fisheries Monitoring cc. 3 February 2010 (final)
- JAPP, D.W. 2012. Rapid Fishery Pre-Assessment for Marine Stewardship Council (MSC) Namibian Hake : *Merluccius paradoxus* and *M. capensis* undertaken for MRAG Americas
- JAPP, D.W. 2012 . South African large pelagic (tuna) assessment. MRAG Americas: WWF ABNJ Tuna Project Baseline Analysis
- JAPP, D.W. 2014. Development of a Training and Capacity Building Programme for Developing Country Fisheries Pursuing MSC certification: Principle 2 - Ecosystems Working towards Marine Stewardship Council Certification in a Developing Country – Identifying the gaps, needs and means to achieving certification
- JAPP, D.W and A. JAMES 2005 - Potential exploitable deepwater resources and exploratory fishing off the South African coast and the development of the deepwater fishery on the south Madagascar Ridge. *FAO Fisheries Proceedings 3/2*. Deep Sea 2003 : Conference on the Governance and Management of Deep-sea Fisheries. R. Shotton ed.
- JAPP, D.W., M. PURVES and S. WILKINSON. 2007. Benguela Current Large Marine Ecosystem State of Stocks Review 2007. Report No. 1 (2007) BCLME.
- JAPP, D.W., M. PURVES and D. NEL. 2008. Draft management plan for the Prince Edward Islands Marine Protected Area : in Nel, D & Ouardien, A. (eds): *Towards the development of a Marine Protected Area at the Prince Edward Islands*. WWF South Africa Report Series – 2008/Marine/001.
- JAPP, D.W. and H. CURRIE-POTGIETER. 2009. FAO case studies : Marine Protected Areas. *The development and status of Marine Protected Areas in South Africa and Namibia*. (In press, FAO)
- JAPP, D.W. AND M. SMITH 2012. Fisheries, Mammals and Seabirds specialist study Environmental Impact Assessment. Namibian Marine Phosphate (Pty) Ltd.: Dredging of marine phosphates from ML 170 Report (Revised 8 March 2012)
- JAPP, D.W., KELLEHER, K, D. BOYER. 2013. Preparation of the Horse Mackerel (*Trachurus trecae*) Management Plan for Angola. ACP - Support for the devising of the management plan for the Horse Mackerel fishery Angola and Namibia Project ref. N° SA-1.2-B5 REL Region: Southern Africa Country: Namibia, Angola 27 October 2013
- JAPP, D.W. AND A. HERVAS. 2013. Pre-Assessment Report – Uruguayan Hake fishery. Food Certification International Ltd Client : FRIPUR & Oceanfresh
- OSBORNE, R.F. , MELO, Y.C. , HOFMEYER, M.D. AND D.W. JAPP – Serial spawning and batch fecundity of *Merluccius capensis* and *M. paradoxus*. *S. Afr. J. mar. Sci.* **21**: 211 - 216.
- PUNT, A.E. and D.W. JAPP 1994 - Stock assessment of the kingklip *Genypterus capensis* off South Africa. *S. Afr. J. mar. Sci.* **14**: 133-149.
- PAYNE, A.I.L. , BADENHORST, A. AND D.W. JAPP 1996 - Managing fisheries following political transition in South Africa, faced with multiple objectives and aspirations. **ICES C.M. 1996/P.5**
- SHANNON, L.V., CRAWFORD, R.J.M., POLLOCK, D.E., HUTCHINGS, L., BOYD, A.J., TAUNTON-CLARK, J., BADENHORST, A., MELVILLE-SMITH, R., AUGUSTYN, C.J., COCHRANE, K.L., HAMPTON, I., NELSON, G., JAPP, D.W. AND R.J. TARR. 1992 - The 1980s - a decade of change in the Benguela ecosystem. In: *Benguela Trophic Functioning*. Payne, A.I.L., Brink, K.H., Mann, K.H., and R. Hilborn (Eds). *S. Afr. J. mar. Sci.* **12**: 271-296.
- SMITH, M, COCHRANE, K AND D.W. JAPP. 2012. Review of Significant Bycatch species in the South African Hake-Directed Trawl Fishery. Prepared for the South African Deep Sea Trawling Industry Association in fulfilment of the Marine Stewardship Council (MSC) certification of the South African Hake-Directed Trawl Fishery: Condition 3
- WICKENS, P.A., JAPP, D.W., SHELTON, P.A., KRIEL, F., GOOSEN, P.C., ROSE, B., AUGUSTYN, C.J., BROSS, C.A.R., PENNEY, A.J. AND R.G. KROHN 1992 - Seals and fisheries in South Africa - competition and conflict. In: *Benguela Trophic Functioning*. Payne, A.I.L., Brink, K.H., Mann, K.H. and R. Hilborn (Eds). *S. Afr. J. mar. Sci.* **12**: 773-789.

CURRICULUM VITAE: SARAH WILKINSON

SACNASP-Registered Professional Natural Scientist (Membership number 115666)

Geographical information systems, mapping and data analysis of southern African fisheries

Date of Birth: 20 June 1979

Nationality: South African / British

Academic Record: University of Cape Town, South Africa; BSc Honours (2001)
University of Cape Town; BSc (Oceanography and Botany 1998 – 2000)

Employment Record: Capricorn Marine Environmental (Pty) Ltd (2003 – 2019)
Institute of Plant Conservation, University of Cape Town (2002)

Languages: English (First language); Afrikaans & French (Basic written & spoken)

Key Experience:

- Geographical information systems, mapping and data analysis with focus on fisheries, oil and gas specialist assessments.
- Specialist assessments on the impact of offshore hydrocarbon exploration and installation activities on fisheries in South Africa, Namibia, Mozambique and Angola (in accordance with scoping and EIA requirements). A selection of projects over the last five years is listed overleaf and a full list of project reports is available on request.
- Management of Marine Mammal Observer (MMO), Passive Acoustic Monitoring (PAM) and Fisheries Liaison Services for seismic survey vessels in the offshore sub-Saharan region (a full list of over 100 deployments is available on request).
- Management of the industry-funded ship-based scientific observer programmes for the South African Pelagic Fishing Industry Association (SAPFIA) and the SA Deepsea Trawling Industry Association (SADSTIA).
- GIS support and analysis of the South African fishery catch and effort for use in the Offshore Marine Protected Area Project - contracted by the South African National Biodiversity Institute (SANBI).
- A review on the effects of trawling on benthic habitat in part fulfilment of the Marine Stewardship Council certification of the South African hake trawl fishery (Client: South African Deepsea Trawling Industry Association (SADSTIA)).
- Spatial mapping of the proposed expanded Saldanha Bay Aquaculture Development Zone (ADZ) in line with the goals of operation Phakisa.

CURRICULUM VITAE: SARAH WILKINSON

SACNASP-Registered Professional Natural Scientist (Membership number 115666)

Geographical information systems, mapping and data analysis of southern African fisheries

NAMIBIAN EXPERIENCE : Selected projects undertaken over the past five years			
Client	Activity	Area	Date
Shell Namibia B.V.	Seismic Survey	PEL39	May 2018
Shell Namibia B.V.	Well Drilling	PEL39	Oct 2017
Spectrum Geo Ltd	Seismic Survey	Regional (North)	Jun 2017
GALP	Seismic Survey	PEL82 & PEL83	May 2017
Spectrum Geo Ltd	Seismic Survey	Regional (South)	Oct 2016
LK Mining	Marine Mining	EPL5965	May 2016
Murphy Lüderitz Oil Co. Ltd	Well Drilling	2613A and 2613B	Jul 2015
Xaris Energy Namibia	Subsea Pipeline Installation	Walvis Bay	Jul 2015
Nabirm Energy Services (Pty) Ltd	Seismic Survey	2113A	Jan 2015
Namdeb	Mapping of benthic habitat types, Southern Namibia inshore and nearshore region		

SOUTH AFRICA EXPERIENCE : Selected projects undertaken over the past five years			
Client	Activity	Area	Date
Total E&P South Africa	Well Drilling	Southeast Coast	Jul 2019
METISS Cable System	Subsea Cables (Telecommunications)	East Coast	Mar 2019
Petroleum Geo-Services	Seismic Survey	West & Southwest Coasts	Oct 2018
Belton Park Trading 127 (Pty) Ltd	Marine Mining	2C & 3C	Sep 2018
IOX	Subsea Cables	South Coast	Jun 2018
De Beers Marine	Marine Mining	6C	Jun 2018
ENI	Well Drilling	East Coast	Jun 2018
Petroleum Geo-Services	Seismic Survey	East & South Coasts	Jan 2018
Alexkor	Marine Mining	1A-C,2A,3A,4A-B	Sep 2017
Impact Africa Ltd	Seismic Survey	Orange Basin	Jul 2017
Sungu Sungu Oil (Pty) Ltd	Seismic Survey	Pletmos Basin	Mar 2017
PetroSA (Pty) Ltd	Subsea Pipeline	E-BK, Block 9	Feb 2017
ACE Cable / MTN (Pty) Ltd	Subsea Cables	West Coast	Sep 2016
West Coast Resources (Pty) Ltd	Marine Mining	6A-8A	Jul 2016
Belton Park Trading 127 (Pty) Ltd	Marine Mining	2C	May 2016
Spectrum ASA	Seismic Survey	West Coast	Jan 2016
Schlumberger	Seismic Survey	East Coast	Nov 2015
Rhino Oil & Gas Exploration	Seismic Survey	Blocks 3617/3717	Nov 2015
Belton Park Trading 127 (Pty) Ltd	Marine Mining	2C-5C	Jan 2015
Aquaculture development zone	Identification of suitable areas for expansion of aquaculture within Saldanha Bay		
South African National Biodiversity Institute	Offshore Marine Protected Areas Project: spatial distribution/ mapping of South Africa's commercial fisheries		
WWF South Africa	Hake longline sector footprint: Spatial distribution of fishing effort and overlap with benthic habitats of the South African Exclusive Economic Zone (2002 – 2012)		
South African Deepsea Trawling Industry Association	Ringfencing the trawl footprint		

Courses and Symposia :

- 7th and 5th International Symposia on GIS/Spatial Analyses in Fishery and Aquatic Sciences, Hakodate, Japan & Wellington, New Zealand. International Fishery GIS Society
- Joint Nature Conservation Committee-certified Marine Mammal Observer Training (Intelligent Ocean Training Services)
- Passive Acoustic Monitoring Training (Intelligent Ocean Training and Consultancy Services and Seiche Measurements Ltd)
- Bureau of Ocean Energy Management, Regulation and Enforcement Gulf of Mexico: Protected Species Observer Training
- ArcGIS I, II and Spatial Analyst (GIMS: ESRI South Africa)
- Maxsea Navigational Software (TimeZero)
- Marine Stewardship Council Chain of Custody Training Course (Moody Marine Ltd)
- SAQA-approved learning facilitator

Publications:

- Massie, P, Wilkinson S & D Japp 2015. Hake longline sector footprint: Spatial distribution of fishing effort and overlap with benthic habitats of the South African Exclusive Economic Zone (2002 – 2012). Capricorn Marine Environmental, Cape Town 15 pages.
- Sink KJ, Wilkinson S, Atkinson LJ, Leslie RW, Attwood CG and McQuaid KA 2013. Spatial management of benthic ecosystems in the South African demersal trawl fishery. South African National Biodiversity Institute, Pretoria.22 pages.
- Sink K, Wilkinson S, Atkinson L, Sims P, Leslie R and C Attwood 2012. The potential impacts of South Africa's demersal trawl fishery on benthic habitats: Historical perspectives, spatial analyses, current review and potential management actions. South African National Biodiversity Institute (SANBI).
- Technical Report: Spatial/data layers of South African commercial fisheries (May 2009). Prepared for South African National Biodiversity Institute.
- Wilkinson, S. and D. Japp. 2009. Spatial boundaries of the South African hake-directed trawling industry: trawl footprint estimation prepared for the South African Deepsea Trawling Industry Association (SADSTIA) - unpublished
- Benguela Current Large Marine Ecosystem State of Stocks Review: Report No.1 (2007). Eds D.W. Japp, M.G. Purves and S. Wilkinson, Cape Town.
- Description and evaluation of hake-directed trawling intensity on benthic habitat in South Africa: Prepared for the South African Deepsea Trawling Industry Association in fulfilment of the Marine Stewardship Council certification of the South African hake-directed trawl fishery; condition 4. December 2005. Fisheries & Oceanographic Support Services cc, Cape Town
- Purves, MG, Wissema J, Wilkinson S, Akkers T & D. Agnew. 2006. Depredation around South Georgia and other Southern Ocean fisheries. Presented at the Symposium: 'Fisheries Depredation by Killer and Sperm Whales: Behavioural Insights, Behavioural Solutions', Pender Island, British Columbia, Canada from Oct. 2-5, 2006.
- Gremillet D., Pichegru L., Kuntz G., Woakes A.G., Wilkinson S., Crawford, R.J.M. and P.G. Ryan. 2007. A junk-food hypothesis for gannets feeding on fishery waste. Proc. R. Soc. B. doi:10.1098/rspb.2007.1763. Online publication.



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PERSONAL DETAILS

Full Name: Greg Huggins
Date of Birth: 20 December 1962
Nationality: South African
Country of Residence: South Africa
Home Language: English

PROFESSIONAL SUMMARY

Mr Greg Huggins is the Managing Director of NOMAD Socio Economic Management and Consulting (Pty) Ltd. He has 30 years of experience in the research and consultancy fields and specializes in resettlement and development planning, socio-economic impact assessment, strategic environmental assessment, resource economics and utilisation analysis, IFC compliance auditing and assessment, socio-economic survey research, public participation and facilitation, socio-economic analysis and applied research and consultancy with respect to corporate social responsibility planning.

Greg has managed large social survey and resettlement projects including surveys of over 3 000 households. He has been involved in a wide variety of studies prepared to World Bank and IFC standards. Greg has worked extensively in the water, mining and bio-energy sectors. Greg has consulted directly for the IFC in Uganda and Ethiopia. Greg has worked on MCC funded projects in Tanzania and Sierra Leone. Greg has been the project leader for social impact and resettlement studies for dams and infrastructure projects, a suite of mining houses as well as bio-energy firms, housing projects and port developments.

Large projects recently undertaken have been the development of a Resettlement Action Plan for a Bio-fuels project in Sierra Leone, and Resettlement Action Plans for major mines in Tanzania, Zambia and the DRC. Recently he has acted as a review consultant auditing various institutions and organisations against compliance as to the IFC Performance Standards. Audits and reviews commissioned by the bank and lenders have been carried out in Zambia, South Africa, Mozambique, Democratic Republic of Congo and Mauritania. Greg has lectured in applied social research and resettlement planning at the Universities of Cape Town, Rhodes and KwaZulu Natal. Greg, in association with Localcolour, runs an annual course on best practise compliance in the social sector, responsible resettlement planning and land access.

Geographical Experience – South Africa, Mozambique, Angola, Botswana, Cameroon, Congo (both the Republic of as well as the Democratic Republic), Ethiopia, Kenya, Lesotho, Malaysia, Malawi, Mauritania, Namibia, Nigeria, Philippines, Serbia, Sierra Leone, Swaziland, Tanzania, Zambia, Zimbabwe.

EMPLOYMENT HISTORY

NOMAD: Nottingham Road and Durban, SA – Director and employer, 2009 –current.
WFA: Director. One of 6 directors in Engineering, Management and Environmental Consultancy. In charge of resettlement, socio-economic and planning division, 2005 -2009
IWR Nottingham Road, SA, Director Company Managing Director of small consultancy, 1999- 2005.
Scott Wilson Durban, SA, Divisional Director in charge of socio-economic planning division, 1998 – 1999.
University of Cape Town, Cape Town, SA Lecturer Taught Masters Level Programme in Applied Anthropology, 1997.
Scott Wilson/Seneque, Smit Maughan-Brown Durban, SA Senior Consultant; Responsible for Management of Medium Scale Projects and Task Leader on Large Project, 1994 – 1996
Human Sciences Research Council, Pretoria, SA. Senior Researcher, 1987 – 1994.

EDUCATION

MSocSc - Anthropology: University of Cape Town 1993.
BSocSc. (Hons) – Anthropology – University of Natal 1984.
BSocSc. – Anthropology and Economics: University of Natal 1983.

REPRESENTATIVE PROJECTS

Tanzania – Southern Serengeti Bypass (2017-current). Resettlement Policy Framework (RPF) developed for KfW as project funders and TANROADS as project principle. Also oversight and eternal expert for ESIA study team. International Team Technical Advisor and RPF principle author.

Madagascar – (2018 – current) Resettlement action Plan for proposed Titanium mine in Toliara area, South West Madagascar. Study Specialist.

Uganda – (2018-current) FC Completion audit for IFC of Bujagali UETCL Transmission Powerline– Study Leader.

Zambia (2016 – 2017)- IFC Standards Compliance audit for Standard Bank of Zesco Transmission Powerline in North West Province – overview and guidance to Study Team.

Zambia (2014-2016) - IFC Standards Compliance audit for DEG of Zambeef farms and associated operations throughout Zambia. Study Leader for Social Component and project successfully concluded.

Sierra Leone (2015- 2016) - Socio-economic safeguard compliance and strategic input assessment into MCC Threshold Programme for proposed WASH sectors projects. Social Aspects and Resettlement Task leader. Study component one was successfully concluded in 2016 and the project is now entering its commissioning phase.

South Africa (2016) - Compliance assessment of potential trigger or resettlement impacts associated with changed management flood regime for St Lucia Estuary. Work undertaken for World Bank/GEF. Study Leader. Study successfully concluded.

Kenya (2015) - Socio Economic Compliance Audit for 132kV power line in Kwale County for Kenya Power and Lighting and Base Titanium. Study Leader. Study successfully concluded.

Uganda (2014 -2015) - IFC Technical Assistance Safeguard expert tasked with ensuring documents comply with social and resettlement aspects for proposed Kampala Jinja Expressway and Southern Kampala Bypass. Task Leader. Study component one was successfully concluded in 2016 and the project is now entering its commissioning phase and retained as IFC lead consultant.

Mozambique (2014) - Compliance audit and monitoring review of social aspects Kenmare Moma Heavy Minerals Project– Moma District (Project Leader). Study successfully concluded.

Kenya (2014) - Socio Economic and Labour Recruitment Compliance Audit Base Titanium. Study Leader. Study successfully concluded.

Malaysia (2013) - Revision and Review of Social Impact Assessment for PETRONAS component of RAPID Project for compliance with International funding Requirements. Study Leader. Study successfully concluded.

Guinea, Ghana, Tanzania (2012-2014)- Series of Compliance audit and remedial programme initiated undertaken for AngloGold Ashanti to ensure that all of their key operations are performing to IFC standards with regard to all resettlement and social mitigation action. Study Leader. Study successfully concluded.

Kenya (2011 – 2014) - Compliance audit and ongoing monitoring undertaken for Heavy Minerals Mine Resettlement Implementation Programme. Study Leader. Study successfully concluded.

Swaziland (2009-2010) - Compliance audit for Usuthu Mills as to fulfilment of lenders and other conditions with respect to IFC and Equator Principle requirements Study successfully concluded.

Mozambique (2009) - Equator Principle and IFC compliance review of Kenmare Moma Mine Resettlement Programme – Moma District (Project Leader). Study successfully concluded.

Zambia (2009) - Equator Principle and IFC compliance review of First Quantum Minerals Kansanshi Mine – Copper Belt Province (Project Leader). Study successfully concluded.

Mauritania. (2009 -2010)- IFC Compliance Certification for First Quantum Minerals at their active operations. Study Leader. Study successfully concluded.

Democratic Republic of Congo (2009) - Equator Principle and IFC compliance review of First Quantum Minerals Frontier Mine – (Project Leader). Compliance review covering all IFC Performance Standards. Study successfully concluded.

Relevant Experience (ESIA, ESMP, Resettlement Policy Frameworks and Resettlement Action Plans)

Ghana (Current) - Resettlement Policy Framework for power component of proposed MCC Compact II – Co - Author. Study successfully concluded.

Sierra Leone (Current) - Resettlement Policy Framework for WASH component of proposed MCC Threshold Project –Author. Study successfully concluded.

Uganda- (2016-2017) RAP specialist for CNOOC joint venture Lake Albert Gas field and associated Pipeline.

Tanzania (2015-2016) - Resettlement Policy Framework for power component of proposed MCC Compact II – Co - Author. Study successfully concluded.

Mozambique (2012-2015) - Massingir - Trans Frontier Game Park – Three Resettlement Action Plans to World Bank Standards for resettlement of communities from the Park area. Study Leader. Study successfully concluded.

South Africa (2009 - Current)- Socio-Economic Impact Monitoring and Resettlement Action Plan for Proposed Spring Grove Dam – Department of Water Affairs requirements for project to be undertaken to World Commission on Dam Guidelines and World Bank OP 4.12. Study Leader. Study successfully concluded.

Liberia (2013-2014) - Socio Economic Impact Assessment and Resettlement Policy Framework for proposed Hummingbird Gold Mine (IFC Standard). Study Leader. Study successfully concluded.

Zambia (2014) - RAP for proposed expansion of First Quantum Minerals Kansanshi Mining operation at Solwezi. Study Leader. Study successfully concluded.

Zambia (2013) - Compliance Review and Resettlement Policy Framework (RPF) for proposed dam for sugar cane irrigation project in Mkushi Farming Block of Central Province. Study Leader. Study successfully concluded.

Zambia (2013) - Socio-Economic Profile of Kafue Basin for inclusion in overall Kafue Basin Catchment Management Plan. Study Leader. Study successfully concluded.

Liberia (2011) - Resettlement and social impact review of Port Buchanan Tailings. Study Leader. Study successfully concluded.

Sierra Leone (2010 - 2012) - Resettlement Policy Framework for proposed Gold Mine in Bo District (IFC Standard). Study Leader. Study successfully concluded.

Ethiopia (2011-2012) - Resettlement action plan for Nyota Mining for their Tulu Kapi mine in Western Ethiopia. Study successfully concluded.

Serbia (2012) - Resettlement Policy frameworks for two IRBDC funded mines in Serbia. Undertake to ensure that policy framework is in line with proposed requirements of funding streams. Study Leader. Study successfully concluded.

Tanzania (2012)-Resettlement Policy Framework for proposed Nickel Mine in Mtwara Corridor Area (IFC Standard). Study Leader. Study successfully concluded.

Liberia (2012)-Resettlement Policy Framework for proposed Putu Iron Mine (IFC Standard). Study Leader. Study successfully concluded.

Zambia (2010 - 2012) - Proposed Copper Mine in Solwezi ESIA and Resettlement Action Plan to IFC Standards for proposed USD 1-billion-dollar mine in North Western Zambia.

South Africa (2009 – Current) - Resettlement Plan for Dingleton Resettlement. Resettlement Plan undertaken for Kumba Iron Ore for proposed expansion of their mine located in Kathu (South Africa). (Project Leader). Study successfully concluded.

Tanzania (2010-2011) - Resettlement Action Plan for proposed African Barrick Gold Golden Ridge Mine in North Western Tanzania. Study Leader.

Sierra Leone (2009 - 2010) - Resettlement Policy Framework for proposed Bio Energy Plant in Makeni District. Study Leader. Study successfully concluded.

Mozambique (2009 -2010) - Social Impact Assessment and Resettlement Plan for proposed upgrade of Nacala Dam. MCC funded project. Sub-consultant (Task Leader). Study successfully concluded.

South Africa (2008) - Resettlement Plan for proposed coal mine. Resettlement Plan undertaken for Miranda Minerals of their proposed mine in Dundee (South Africa). (Project Leader). Study successfully concluded.

Democratic Republic Congo (2008) - Resettlement Plan for proposed gold mine. Resettlement Plan undertaken for Banro of their proposed mines in Eastern DRC (Project Leader for RAP). Study successfully concluded.

Democratic Republic Congo (2008) - Resettlement Plan for proposed gold mine. Resettlement Plan undertaken for KMT mine held by First Quantum Minerals in Katanga, DRC (Project Leader for RAP). Study successfully concluded.

Angola (2008) - Resettlement Policy Framework for proposed Lobito Port. Resettlement Plan undertaken for Heerema Marine Contractors of their proposed port facility in Angola. (Project Leader for RAP). Study successfully concluded.

South Africa- N2 Knysna Bypass (2008) Social Impact Assessment and Resettlement Plan for proposed N2 Bypass of Knysna. Sub-consultant for SANRAL EIA. (Task Leader). Study successfully concluded.

Kenya (2007) - Resettlement Policy Advisor to Kenya Power and Lighting Company (KPLC is equivalent of South African – Eskom), charged with developing a resettlement policy framework for all KPLC projects. Study Leader. Study successfully concluded.

Kenya (2007) - Rabai Power Station. Resettlement Policy Advisor and socio-economic impact specialist to developer of proposed power station. Study successfully concluded.

Mozambique, Swaziland, South Africa (2006-2008) - Maputo Basin Planning Study. Key Socio-Economic specialist and task leader for integrated water resources planning study for the Maputo Basin. Study successfully concluded.

Tanzania (2005-2007) - Resettlement Action Plan for proposed Gold Mine in Kahama District. Resettlement Plan undertaken for Barrick Mining Corporation (Canada). Also involved in monitoring and implementation advice. Study Leader. Study successfully concluded.

Mozambique (2000-2007) - Pre-Implementation Resettlement Planning for proposed Titanium mine. Resettlement Plan undertaken for Western Mining Corporation (Australia) of proposed Titanium in Chibuto District (Gaza Province of Southern Mozambique). Study Leader. Study successfully concluded

South Africa - Eskom (2004) - Braamhoek Pumped Storage Scheme Resettlement Policy Framework. Project for Eskom (Project Leader). Study successfully concluded.

Malawi (2004) - Resettlement Policy Framework for proposed new Inter- country Power line. Project for the World Bank (Task Leader). Study successfully concluded.

Mozambique (2004-2006) - Resettlement Policy Framework for proposed Limpopo National Park in Gaza Province of Mozambique. (Project Leader). Project to World Bank Requirements. Study successfully concluded.

Mozambique (2002 - 2003) - Social Impact Assessment and Resettlement Plan for proposed Alternative Export Facility for Corridor Sands Mine. (Task Leader). Study successfully concluded

South Africa (2003) - Social Impact assessment of proposed Durban refinery expansion (Project Leader). Study successfully concluded.

South Africa (2003-2004)-Usuthu Mhlathuze CMA Proposal Document: Preparation of CMA Document for submission to Minister of Water Affairs for the establishment of the CMA (In association with AJ Wilson International). Study successfully concluded.

South Africa (2003-2004)- Thukela CMA Proposal Document (2004-2005) Preparation of CMA Document for submission to Minister of Water Affairs for the establishment of the CMA (In association with AJ Wilson International). Study successfully concluded.

South Africa (2003-2004)- Mvoti Mzimkhulu CMA Proposal Document 2004-2005 Preparation of CMA Document for submission to Minister of Water Affairs for the establishment of the CMA (In association with AJ Wilson International). Study successfully concluded.

South Africa (2002-2008) - N2 Toll Road Social impact assessment and resettlement planning for proposed N2 Toll Road linking East London to Natal South Coast. Study successfully concluded.

South Africa (2002) - EIA for Wild Coast Tourism Development Programme. Project undertaken for European Union (Project Leader). Study successfully concluded.

South Africa (2002) - Resettlement Plan for expansion of 300 000 ha Addo National Park in Easter Cape (South Africa). Project undertaken for South African National Parks and World Bank. (Project Leader). Study successfully concluded.

South Africa (2002)-KwaMashu Link Road Resettlement Social impact assessment of proposed main arterial road for the Durban Metropolitan Council. Study Leader. Study successfully concluded.

South Africa (2002) - Somkele Coal Mine Resettlement and Social Impact Assessment of proposed coal mine for Afriore and draft resettlement plan. (Project Leader). Study Leader. Study successfully concluded.

Cameroon (2001) - Resettlement and Impact Assessment for proposed Gas to Power Plant in West Cameroon. (Task leader for SIA). Study successfully concluded.

Mozambique (1999) - Resettlement Plan for proposed heavy minerals mine. Resettlement Plan undertaken for Kenmare Corporation of their proposed titanium mine in Moma District (Nampula Province of Northern Mozambique). (Project Leader). Study successfully concluded.

Mozambique (1999) - Resettlement Plan for proposed Titanium mine. Resettlement Plan undertaken for Southern Mining Corporation of proposed Corridor Sands Titanium in Chibuto District (Gaza Province of Southern Mozambique). (Project Leader). Study successfully concluded.

South Africa (1998) - Mearns Dam Impact management and Resettlement Plan for the pre-implementation phase of the project. Project undertaken for Umgeni Water and DWAF (Project Leader). Study successfully concluded.

Kenya (1998) - Social Impact Assessment of proposed Titanium mine. Impact assessment undertaken for a Canadian mining company in Kwale district, south of Mombassa. Generation of a resettlement and development policy to accompany the Environmental Management Plan. Study successfully concluded.

South Africa (1997) - Mhlathuze Environmental Water Reserve Assessment. Responsible for social and participatory component of environmental reserve assessment. (Project Leader). Study successfully concluded.

Tugela Water Project: - 1997-1999- Undertaking Feasibility Level socio – economic Impact Assessment of proposed bulk water transfer project. (Project Leader). Study successfully concluded.

South Africa (1997) - Mgeni Water Transfer. Pre-feasibility level social impact study of the proposed Mkomazi – Mgeni Water Transfer (Project Leader). Study successfully concluded.

South Africa (1997) - Guidelines for the Development of Bulk Ground Water Infrastructure. Responsible of the generation of socio-economic guidelines to be used by consultants to Umgeni Water for the development of Bulk Ground Water Infrastructure. (Project leader). Study successfully concluded.

South Africa (1997) - Umgeni Water, Generation of social impact management, resettlement, and compensation policy document for Umgeni Water to apply to development of all new works. (Project leader). Study successfully concluded.

Philippines (1996) - Social Impact Assessment of the Bridge Replacement Project in support of the Presidents Bridge Programme (project undertaken for the ODA). Study successfully concluded.

Lesotho (1996) - Matsuko Weir: Resettlement and Social impact assessment and resettlement planning (Project leader). Study successfully concluded.

South Africa (1995) - Mvoti Dam Site Feasibility level social impact assessment of the proposed Mvoti Dam site. (Project Leader). Study successfully concluded.

Relevant Experience (Key Management Roles – Other Projects)

Lesotho (2105 - current) - Lesotho Highlands Water Project Phase II – part of Project Management Unit (PMU) responsible for assistance with all resettlement aspects. Preparation of the Terms of Reference for procurement of consultants, evaluation of proposal on behalf of Lesotho Highlands Development Authority and management of consultant outputs.

South Africa (2009 - 2011)- Isimangaliso/GEF (World Bank): Strategic Assessment, Scoping Study and Terms of Lower Umfolozi River and St Lucia Mouth and Estuary Sediments, Hydrology, Ecosystem Functioning, Socio-Economics and Resource Economics Study Leader.

Zambia (2010) - Scoping Study, Strategic Assessment, and Development of Terms of Reference for IFC/ZESCO proposal to develop Phase II of Kafue Hydro Power at lower gorge site. Study Leader.

South Africa (2006-2007) - European Union funded Gijima Socio Economic Baseline Study leader for generation of socio-economic baseline for EU funded USD30million local economic development initiative in KwaZulu Natal (Project Leader).

Lesotho (2007 -2008) - Review Specialist for Social Impact and Resettlement planning for further phase's development of the Lesotho Highlands Water Project (Policy Design Specialist).

South Africa (2004-2006)-Department of Water Affairs Water Reform Programme - Toolkit for Water Allocation. Task leader responsible for generating an analysis of strategic pre-requisites for an enabling environment.

South Africa and Mozambique (2004-2006)- Maputo Basin Strategic Assessment and Socio-Economic and Planning investigation Project for DIFID aimed at generating an overview of inter-basin complexity in terms of competing water demands and designing a way forward in terms of water reform in the basin (Project Leader).

South Africa (2005) - Wild Coast Conservation-Development Initiative. Project for European Union aimed at designing co-management agreements along the Wild Coast of Eastern South Africa so as to unlock eco-tourism development initiatives (Project Leader).

South Africa (2005) - Evaluation of the Department of Environment and Tourism Poverty Relief Programme. Project initiated by UNDP on behalf of the South African Government (Part of 2 person expert evaluation panel).

South Africa (2001 – 2004) - Thukela Water Study: Reserve Determination Module. Project aimed at determining environmental reserve for the Thukela River and main tributaries. (Project Leader).

Zimbabwe (2000 -2001) - Bulawayo Urban Water Study. Study aimed at developing a water development/conservation strategy for the Bulawayo City Council. My role was to develop the socio-economic methodology to determine affordability levels for proposed options.

South Africa (2000 - 2001) - Study to locate the development potential of proposed Spring Grove Dam in a strategic and regional socio-economic context. (Project leader of multi-disciplinary team).

South Africa (1999-2000)-Receiving Streams Environmental Impact Assessment: Environmental study to determine impacts of proposed bulk water transfer project on receiving stream. (Project leader of multi-disciplinary team).

Mozambique (1999) - Social Impact Assessment of proposed Titanium mine. Impact assessment undertaken for Southern Mining Corporation of their proposed Corridor Sands Titanium in Chibuto District (Gaza Province of Southern Mozambique).

South Africa (1999) - Environmental baseline study to determine water use, water quality and bio – physical conditions in the Mvuzane area. (Project leader of multi-disciplinary team).

Zambia (1998) - Socio-economic study for re-capitalisation programme of cities of Ndola and Lunashya in Copper-belt area of Zambia.

South Africa (1997)- A policy for unlocking the development potential of New Dams in KwaZulu Natal – 1997 Policy study commissioned by Umgeni Water and the Town and Regional Planning Commission. (Project Leader).

Lesotho (1997-1998) - Lesotho Highlands Development Authority Contract 669. Task leader responsible for data input and analysis of a survey of 2700 households directly affected by the Phase 1A and 1B dams.

South Africa (1997) - Namaqualand Regional Development Plan. Generation of regional development plan for the Namaqualand region. Responsible for, institutional analysis and social assessment of planned mining activity downscaling, also responsible for public participation components of the project.

South Africa (1997) - Umgeni Water. Working for Water Riparian Zone Clearance project: Feasibility level impact study for a programme aimed at clearing alien vegetation from riparian zones in the Umgeni River catchment. (Project leader).

South Africa (1996) - Middeldrift Reconstruction and Development Social planning and feasibility study for R60million RDP regional community water supply project in KwaZulu Natal. Multi-phase scheme is designed to deliver water to 50 000 people living in scattered settlement in the magisterial districts of Inkanyezi and Nkandla. Phase 1 has been successfully completed. (Project Leader).

South Africa (1996) - Community water schemes in KwaZulu- Natal. Team leader responsible for evaluation of selected Reconstruction and Development Programme (RDP) community water supply schemes in KwaZulu- Natal. Evaluated five schemes with projected values of between R500 000 and R12 000 000. Responsible for preliminary institutional set-up in all five instances.

Botswana (1995) - Mahalapye Urban Village: Task leader responsible for socio-economic profile and institutional analysis necessary for of the town layout and structure plans.



MARCO DA CUNHA
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PERSONAL DETAILS

Full Name: Marco Filipe Santos da Cunha
Date of Birth: 19 July 1980
Nationality: South African / Portuguese
Country of Residence: South Africa
Home Language: English
Other Language: Portuguese

PROFESSIONAL SUMMARY

Marco has 16 years of experience in the field of environmental and social management. This includes specialisation in undertaking Social Impact Assessments (SIAs) and Resettlement Action Plans (RAPs) for a range of industry sectors throughout sub-Saharan Africa and more recently globally. Specific industry sector experience includes mining, oil and gas, transport infrastructure, dams and hydropower, forestry, agriculture, and public infrastructure.

All work is undertaken in conformance with international good practice standards as framed by the World Bank, International Finance Corporation, and Equator Principles, where specifically required by the client or financing Institutions.

Marco also has extensive expertise in undertaking Environmental and Social Screening Studies, Compliance Audits, Due Diligence Assessments, Resettlement Close Out-Audits and Monitoring and Evaluation. This has included internal performance monitoring for private clients, and independent audits required by financing Institutions.

Geographical Experience – Afghanistan, Angola, Botswana, Ethiopia, Ghana, Guinea-Bissau, Kenya, Lesotho, Malaysia, Myanmar, Mozambique, Namibia, Rwanda, Pakistan, Sierra Leone, South Africa, Swaziland, Tanzania, Uganda, Zambia.

EMPLOYMENT HISTORY

Resettlement and Social Specialist, Nomad Consulting, 2012 to Current
Senior Consultant, Environmental Resources Management, 2010-2012
Environmental Consultant, Jeffares & Green, 2008-2010
Environmental Consultant, Coastal & Environmental Services, 2005-2008

EDUCATION

MSc (Geography and Environmental Management), University of Natal, South Africa, 2004-2005
BSc Honours (Geography and Environmental Management), University of Natal, South Africa, 2003
BSc (Geography and Environmental Management), University of Natal, South Africa, 1998-2002

REPRESENTATIVE PROJECTS

Obetsebi Roundabout Framework Resettlement Action Plan, Ghana, 2020: Preparation of a Framework Resettlement Action Plan for the proposed Obetsebi Roundabout upgrade located in Accra, Ghana.

TAPI Pipeline ESIA Social Baseline Study, Afghanistan, 2019: Preparation of a social baseline report for the Addendum ESIA covering a re-routed section of the Afghanistan portion of the TAPI Pipeline that cover an additional 104 kilometres through the Registan Desert, Afghanistan.

KML Sentinel Mine Social Monitoring, Zambia, 2019: Preparation and implementation of a social monitoring programme at the KML Sentinel Mine including a household survey of 850 households and extensive interview programme.

Kitwe Tailings Retreatment Project Resettlement Action Plan, Zambia, 2019: Preparation of a Resettlement Action Plan covering land acquisition and economic displacement aspects related to the Kitwe Tailings Retreatment Project located at Kitwe, Zambia.

TEPSA Oil & Gas Exploration of Block 11B/12B Social Impact Assessment, South Africa, 2019: Preparation of a social baseline report and social impact assessment report covering the exploration activities proposed by TEPSA at Exploration Block 11B/12B offshore of Mossel Bay.

Chloorkop Landfill Expansion Social Impact Assessment, South Africa, 2019: Preparation of a Social Impact Assessment for the proposed expansion of the existing Chloorkop Land in Gauteng, South Africa.

Opportunity for Maximising Agribusiness Investment and Development Project Environmental and Social Framework, Afghanistan, 2019: Formed part of a multi-disciplinary team that developed an Environmental and Social Framework for the World Bank funded OMAID project in Afghanistan.

Opportunity for Maximising Agribusiness Investment and Development Project Resettlement Policy Framework, Afghanistan, 2019: Preparation of a Resettlement Policy Framework covering the land acquisition and resettlement requirements related to infrastructure components under the World Bank funded OMAID project in Afghanistan.

Kitwe Tailings Retreatment Project Resettlement Policy Framework, Zambia, 2019: Preparation of a Resettlement Policy Framework covering land acquisition and economic displacement aspects related to the Kitwe Tailings Retreatment Project located at Kitwe, Zambia.

SIIP 2 Third Party Monitoring and Evaluation, Afghanistan, 2019: Social and resettlement monitoring of two Asian Development Bank (ADB) funded projects in Afghanistan, including two projects funded under the Transport Network Development Investment Programme and Energy Sector Development Investment Programme.

Mphepo Wind Unika 1 Wind Farm Social Impact Assessment, Zambia, 2019: Preparation of the SIA for a proposed Mphepo Wind Unika 1 Wind Farm located in the Eastern Province of Zambia. The SIA includes the development of a social baseline, impact assessment and Social Management Plan.

Toliara Sands Resettlement Action Plan, Madagascar, 2019: Preparation of a Resettlement Action Plan for the development of the Toliara Sands Heavy Mineral Sands Project. This includes both physical and economic displacement on the mine site, dedicated haul road and the port site.

Sese Power RAP, Botswana, 2019: Project manager for the development of a Resettlement Action Plan for the resettlement of households' resident in the surface right area of the proposed open pit coal mine and a power station (the Sese Power Project) approximately 60 km south-west of Francistown.

Globeleq Aurora Solar PV Plant Livelihoods Restoration Framework, Zambia, 2019: Preparation of a Livelihoods Restoration Framework (LRF) for a proposed 40MW solar PV plant located in Zambia. The LRF forms part of the overall environmental assessment required to secure project funding.

Kitwe Tailings Retreatment Project, Land Acquisition and Resettlement Framework, Zambia, 2019: Preparation of a Land Acquisition and Resettlement Framework (LARF) to address economic displacement related to the proposed re-treatment of 11 historical tailing dumps by Copper Tree Minerals in Kitwe Town, Zambia

Resettlement Policy Framework, DRC, 2019: Preparation of a Resettlement Policy Framework document as a precursor to a full Resettlement Action Plan for a Private Client in the Democratic Republic of Congo.

Ngonye Falls Hydropower Project Social Impact Assessment, Zambia, 2019: Preparation of the SIA for a proposed hydropower Project located on the Zambezi River and directly upstream of the Ngonye Falls in Zambia. The SIA is being prepared to conform with the provisions of the IFC Performance Standards.

Ngonye Falls Hydropower Project Resettlement Policy Framework, Zambia, 2019: Preparation of a Resettlement Policy Framework document as a precursor to a full Resettlement Action Plan for the proposed hydropower Project located on the Zambezi River and directly upstream of the Ngonye Falls in Zambia. The Resettlement Policy Framework is being prepared to conform with the provisions of the IFC Performance Standards.

TAPI Pipeline Project Resettlement Action Plan, Pakistan and Afghanistan, 2019: Team member in providing remote advisory services and guidance in the preparation of separate RAPs for the TAPI Pipeline Project that is proposed to cross Pakistan and Afghanistan.

20MW Solar PV Plant Social Screening Assessment, Zambia, 2018: Preparation of a social screening assessment of a proposed 20MW solar PV plant located in Zambia. The screening form part of the overall environmental assessment required to secure project funding.

World Wildlife Fund – Training on IFC Performance Standards, Kenya, 2017: Presenter at a WWF sponsored training workshop on the application of the IFC Performance Standards for private and public projects in Kenya. Special focus was given to the social components of the Performance Standards notably in terms of involuntary resettlement and indigenous peoples.

Social and Resettlement Services for Contract Area 1, Uganda, 2017: Part of a consortium of specialists appointed by Total E&P Uganda and Tullow Uganda to prepare an IFC conformance Resettlement Action Plan for multiple phases of resettlement related to Contract Area 1, EA-1, EA-1A and Licensed Area 2 development in Uganda.

Chiansi Resettlement Action Plan, AgDevCo, Zambia, 2017: Provided support to the Client in the validation of household assets and defined entitlement contracts for Project-Affected-Persons as a lead-up to the update of the Project RAP.

Anglo-Platinum Twickenham Resettlement Review, Anglo-Platinum, South Africa, 2017: Currently undertaking a detailed review of the resettlement undertaken at multiple mine sites in South Africa. The intent of the review is to determine the socio-economic changes over time and advise on the way forward on any community development programmes.

Kenmare Moma Mineral Sands Social Monitoring, Mozambique, 2017: Completed a detailed social monitoring programme for the Kenmare-Moma Minerals Sands Project in Mozambique. This included a household survey and focus group interviews, as well as the review of community investment projects.

Baseline Socio-Economic Survey for the Northern Agricultural Hub, AgDevCo, Zambia, 2016: Provided support in the preparation of a baseline study to facilitate future impact evaluations and understand and improve livelihoods associated with the Northern Zambia Agricultural Hub (NZAH). This included a detailed assessment of the potential socio-economic and resettlement risks related to specific project components.

ZESCO Resettlement Review, Nordea, Standard Bank, SEK and SEF, Zambia, 2016: Completed a comprehensive independent review of the the resettlement aspects of the construction of a high-voltage power transmission line project (the North-Western Grid Extension Project, or "Project") owned by ZESCO in Zambia. The review included an assessment of the RAP implementation regarding its alignment with the IFC Performance Standards.

Farim Resettlement Action Plan, GB Minerals, Guinea-Bissau, 2016: Prepared an IFC conformant RAP for the proposed Farim Phosphate Mine located in Guinea-Bissau. The RAP defines the entitlement and livelihoods restoration requirements for the resettlement of approximately 175 households and land acquisition of approximately 3000 hectares.

Panda Hill Environmental and Social Due Diligence, Tanzania, KfW, Tanzania, 2016: Completed a detailed due diligence review of the socio-economic risks and proposed management interventions related to the proposed Panda Hill Niobium Project against both national requirements and international good practice standards (as framed by the International Finance Corporation (IFC) Performance Standards).

Richards Bay Minerals Socio-Economic Baseline Study, Rio Tinto, South Africa, 2015: Completed a comprehensive a Socio-Economic Baseline Study of the 17 communities surrounding the Richards Bay Minerals Project area, which covers heavy mineral sands mining in the Richards Bay area in Kwazulu-Natal, South Africa. This included a household census survey of 521 households and extensive focus group meetings and interviews of key stakeholders. The findings were integrated into a Social Management Plan (SMP)

Ethemba Dam Resettlement Action Plan, Ministry of Natural Resources, Swaziland, 2015: Prepared a Resettlement Action Plan for the proposed Ethemba Dam in Swaziland on behalf of the Ministry of Natural Resources. The Resettlement Action Plan functioned as a specific technical input into the Environmental Impact Assessment.

Border Management Agency Bill SIA, Government of South Africa, South Africa, 2015: Prepared a Social Impact Assessment System to assess the socio-economic implications, both costs and benefits, associated with the establishment of the Border Management Agency. This included an analysis of policy, organisational, functional implications, and the potential impacts on, both legitimate and undocumented, users of the South African Ports of Entry and borderline.

Trident Kalumbila Mine Resettlement Close-Out Audit, Zambia, Trident Minerals, 2015: Prepared a Close-Out Audit for the Kalumbila Mine Project resettlement and compensation programme in Zambia, on behalf of Trident Minerals. This included a household survey and focus group interviews, as well as the review on company internal systems against the RAP commitments.

Farim Phosphate Mine Resettlement Policy Framework, GB Minerals, Guinea-Bissau, 2015: Prepared a Resettlement Policy Framework for the proposed Farim Phosphate Mine located in Guinea-Bissau. The framework included a household survey to determine the initial quantum of resettlement as well as interviews with potentially affected persons.

Social Impact Assessment for 2D/3D Offshore Seismic Survey, Woodside Energy, Myanmar, 2015: Prepared a Social Impact Assessment and Social Management Plan a specialist component of the ESIA for 2D and 3D Offshore Seismic Surveys in blocks AD-05 and A-7 in the Rakhine Basin, Myanmar.

Kenmare Moma Heavy Mineral Sands Resettlement Close-Out Audit, Kenmare, Mozambique, 2015: Completed a detailed Close-Out Audit for the Kenmare-Moma Minerals Sands resettlement and compensation programme in Mozambique. This included a household survey and focus group interviews, as well as the review on company internal systems against the RAP commitments.

Copler Complex Mine Capacity Increase Project Social Impact Assessment, Turkey, 2015 Project team member in the preparation of the Social Impact Assessment for the expansion of the Copler Mine in Turkey. This included the assessment of local community livelihoods, cumulative impacts related to existing mine operations and the development of a Social Management Plan.

Pietermaritzburg National Ring Road Social Impact Assessment, SANRAL South Africa, 2015 Prepared a Social Screening Assessment of the proposed upgrade of the National Route 3 (N3) in proximity to the City of Pietermaritzburg, KwaZulu-Natal. This functions as a lead up to the Environmental and Social Impact Assessment.

Waste to Energy Facility Environmental and Social Screening Study, Malaysia, 2014 Team member in the preparation of an Environmental and Social Screening Study for a proposed USD 100 million Waste-to-Energy Facility that seeks to incinerate municipal waste and generate electricity in Malaysia.

Project RAPID Social Impact Assessment, PETRONAS, Malaysia, 2014 Team member in the preparation of an IFC conformance Social Impact Assessment for the Refinery and Petrochemical Integrated Development Project (Project RAPID) proposed to be developed by PETRONAS in Malaysia.

Kenmare Moma Mineral Sands Resettlement Monitoring, Kenmare Minerals, Mozambique, 2014 Prepared a social and resettlement monitoring programme for the Kenmare Moma Mineral Sands Project, Moma District, Mozambique. Task work included household surveys, database development and a range of qualitative interviews and focus group discussions.

Bingo Resettlement Action Plan, Mozambique, Limpopo National Park, 2014, Team member for the preparation of a Resettlement Action Plan for the community of Bingo, whom reside in the Limpopo National Park, on behalf of the Ministry of Tourism - National Directorate of Conservation Areas.

Kwale Mineral Sands Social Monitoring, Kenya, Base Minerals, 2014 Managed the monitoring and evaluation of the Kwale Mineral Sands Project against the Projects' Social Monitoring Plan (SMP), including undertaking field surveys, database development, interviews and report writing.

New Forest Socio-Economic Baseline, Rwanda, New Forest, 2014 Team member in the preparation and field work for the development of a socio-economic baseline of communities located in proximity of the New Forest plantation concession area (termed the Nyungwe Buffer Zone) in conformance with New Forest Corporate Social Responsibilities, and international good practice standards. This included recommending potential community development and investment plans.

Makandazulo Resettlement Action Plan, Mozambique, Limpopo National Park, 2014 Prepared a Resettlement Action Plan for the community of Makandazulo, whom reside in the Limpopo National Park, on behalf of the Ministry of Tourism - National Directorate of Conservation Areas.

Geita Compensation Programme, AngloGold, Tanzania, 2013, Team member in the preparation of compensation contracts and database development for the Geita Gold Mine Compensation Programme. This included working alongside the Anglo-Gold Ashanti community team on-site.

Kafue Catchment Socio-Economic Baseline, KFW, Zambia, 2013 Project manager in preparing a socio-economic baseline for the Kafue Catchment, Zambia as part of a wider integrated water resources management information system, and application of the information system to incorporate climate change in water resources management in Zambia.

Mafube Coal Mine Resettlement Review, AngloCoal, South Africa, 2013 Project manager in undertaking a detailed review of the resettlement process managed by Anglo American at the Mafube Colliery Project, South Africa. The review included detailed household surveys, interviews, and data review to determine fulfilment of resettlement commitments.

AngloGold Ashanti Iduapriem Mine Resettlement Planning, AngloGold, Ghana, 2013 Project manager on the survey of potentially affected villages and hamlets associated with the AngloGold Ashanti Iduapriem Mine. Functions included the management and supervision of field surveys, development of eligibility and entitlement frameworks, database development and on-going support on the development of a RAP.

Nacala Dam Resettlement Action Plan, MCC Mozambique, Mozambique, 2013: Provision of advisory services to the Millennium Challenge Account, Mozambique in terms of entitlement provision as part of the Nacala Dam upgrade resettlement process.

Kwale Mineral Sands Social Monitoring, Base Minerals, Kenya, 2013 Managed the monitoring and evaluation of the Kwale Mineral Sands Project against the Projects' Social Monitoring Plan (SMP), including undertaking field surveys, database development, interviews and report writing.

Kwale Mineral Sands Labour Audit, Base Minerals, Kenya, 2013: Managed an audit of the overall performance of Base Minerals, and third-party contractors, against the requirements and indicators established in the Labour, Recruitment, and Influx Management Plan (LRIMP).

Kwale Mineral Sands EMP/EMS Support, Base Minerals, Kenya, 2012 Assisted in the preparation of Environmental Management Plans and Programmes, as part of the development of the Environmental and Social Management System for the Kwale Minerals Sands Project, Kenya

Sisili-Kulpawn Irrigation Project Environmental and Social Screening Study, Ghana, 2012 Assessed the socio-economic, land-tenure and environmental context of the proposed Sisili-Kulpawn Irrigation Project located in northern Ghana, as well as identify key opportunities and risks to the project, and advise on suitable strategies and mitigation measures.

Sonaref Refinery ESIA, Angola, SONAREF, 2012 Managed the Environmental, Social and Health Impact Assessment (ESIA) for the Sonaref Refinery Project in Lobito, Angola. Several addenda EIA were prepared covering an Early Works Programme, Dredging Programme, and a Demining Programme, in addition to the main Refinery ESIA.

Ncondezi Coal Mine ESIA, Mozambique, Ncondezi Coal, 2012 Managed the Environmental and Social Impact Assessment (ESIA) for the proposed Ncondezi Coal Mine in the Province of Tete, Mozambique. This project has been structured to meet both Mozambiquan environmental law and international best practice standards in terms of environmental performance and due process.

Dube TradePort Environmental Compliance Auditing, Dube TradePort, South Africa, 2012 Prepared Operational Environmental Compliance Audits at quarterly intervals for the Dube TradePort, specifically against the Operational Environmental Management Plan (OEMP) and EIA Record of Decision.

Etango Uranium Mine Linear Infrastructure ESIA, Namibia, 2011 Part of the ESIA team that prepared an Environmental and Social Impact Assessment for all ancillary linear infrastructures for the Etango Uranium Mine in Namibia. This included the preparation of a Scoping Report and an Environmental Impact Report in line with local legislation and international best practice standards.

Riversdale Transshipment EIA, Riversdale, Mozambique, 2011 Prepared a Simplified Environmental Assessment for the proposed transshipment programme for Riversdale from the Port of Beira to ocean-going vessels in the Bay of Sofala, Mozambique.

Coal of Africa Due Diligence, Coal of Africa, South Africa, 2011 Part of a multidisciplinary team that prepared an independent International Finance Corporation and Equator Principles review of the Makhado Colliery Project Limpopo Province, South Africa. This included a review of all environmental and social factors to determine overall conformance with IFC performance standards.

Angola LNG Due Diligence, Chevron and BP, Angola, 2011 Managed an independent third-party Due Diligence review of the Angola LNG facility. The review compared the environmental and social performance against the commitments established in the Angola LNG Environmental, Socio-Economic and Health Impact Assessment.

Transnet Durban International Airport Dig-Out Port Environmental Sensitivity Study, TRANSNET, South Africa, 2011 Managed a feasibility level environmental sensitivity analysis of the dig-out port proposed by Transnet at the existing Durban International Airport Site.

Project Craft Due Environmental and Health and Safety Diligence Assessment, Simba Food, South Africa, 2011 Prepared a Due Diligence was undertaken of a food flavourants facility located in Durban, South Africa. The overall objective was to identify any environmental and health and safety compliance issues or soil and groundwater risks which may affected the proposed acquisition of facility by a private client.

Prospection Phase 1 Environmental Due Diligence, Private Client, 2011 Prepared a Phase 1 Environmental Due Diligence of a food manufacturing facility in Durban South, South Africa to provide input into the acquisition Due Diligence process by a private client.

Bluefield's Due Diligence, South Africa, Private Client, 2011 Prepared a Phase 1 Environmental Due Diligence was undertaken of a proposed facility in KwaZulu-Natal for a private client as part of acquisition process. This included an assessment of national and provincial legislative requirements and consideration of environmental and social risks related to the facility.

Project St Lawrence Environmental and Health and Safety Audit, Private Client, South Africa, 2011 Team member in the preparation of a Phase 1 Environmental and Health and Safety Audit for a major metal firm in South Africa as part of a wider due diligence assessment.

Chevron Lubricants Plant Compliance Assurance, Private Client, South Africa, 2011 Team member in the preparation of a Compliance Assurance programme to determine the environmental, health and social legal requirements of the Chevron Lubricants Plant, in East London, South Africa.

Dube TradePort Operational EMP, Dube TradePort, South Africa, 2011 Prepared an Operational Environmental Management Plan for the Dube TradePort – which a special development zones associated with the King Shaka International Airport, Durban, South Africa. This OEMP was based on ISO 14001 standards and defined legal requirement, performance standards, roles and responsibilities, monitoring and reporting, and non-compliance procedures.

Vale Beira Coal Terminal EMP, Riverside, Mozambique, 2011 Prepared an Environmental Management Plan prepared for the Beira Coal Terminal located at the Port of Beira, Mozambique. The coal terminal functions as a key logistics point in the wider Vale Moatize Coal Project.

Chevron Lubricants Plant Compliance Assurance, Chevron, South Africa, 2010 A Compliance Assurance programme was undertaken to determine the environmental, health and social legal requirements of the Chevron Lubricants Plant, in Durban South Africa.

Schlumberger Environmental Audit and License Application, Schlumberger, Angola, 2010 Prepared an Environmental, Social and Health and Safety Audit of the Schlumberger Facilities in Luanda and Soyo, Angola as part of the environmental license application process.

Kangra Coal Legal Compliance Audit, Kangra Coal, South Africa, 2010 Prepared a legal compliance audit for the Kangra Coal Mine, in Mpumalanga Province, South Africa. The audit focused on applicable environmental legislation, compliance issues, risk profile and final recommendations.

Como Oil Due Diligence, South Africa, and Mozambique, 2010 Prepared an Environmental Due Diligence Assessment of Como Oils facilities in both South Africa and Mozambique, against International Finance Corporation Performance Standards.

Nacala Dam ESIA, MCC Mozambique, Mozambique, 2010 Project manager in the preparation of an Environmental Impact Assessment to international best practice standards for the rehabilitation and upgrade of the Nacala Dam, Nampula Province. Key focus areas included ensuring that ecological flow requirements were sustained, addressing resettlement concerns, and developing a community investment strategy.

Mpofana Bulk Water Supply Scheme EIA, Umgeni Water, South Africa, 2009 Prepared an Environmental Impact Assessment prepared for the establishment of a 70km bulk water supply scheme in the Natal Midlands in KwaZulu-Natal. Key issues involved the protection of natural endemic vegetation, reducing potential impacts on local tourism and ensuring landowner consultation.

La Repose Resort EIA, South Africa, 2008 Project Manager in the preparation of an Environmental Impact Assessment of the La Repose Golf Estate and Holiday Resort on the Eastern Cape coast in compliance with the South African environmental legislation.

Namalope Resettlement Action Plan, Mozambique, Moma Mineral Sands, 2006 Developed a RAP for the Moma Heavy Minerals Sands Project. This included surveying 183 affected households, the establishment of resettlement protocols and on-going monitoring of the resettlement process.

Corridor Sands Heavy Minerals Sands, BHP Billiton, Mozambique, 2006 Provided consulting support as part of the Environmental and Resettlement Management Team, in terms of day-to-day management and monitoring for the Corridor Sands Heavy Minerals Sands Project.

APPENDIX 2:
PUBLIC PARTICIPATION PROCESS

APPENDIX 2.1:
I&AP DATABASE

INTERESTED AND AFFECT PARTY (I&AP) DATABASE

The dataset is structured as follows:

1. Government
2. Authorities - Maritime
3. Business - Fishing (Namibia)
4. Business - Fishing (South Africa)
5. Business - Oil and Gas
6. Business - Other
7. Civil Society - Environmental, NGOs
8. Civil Society - General Public

No.	Organisation	Last name	Initial	First Name
1. GOVERNMENT				
NATIONAL GOVERNMENT				
1	Ministry of Environment, Forestry and Tourism	Nchindo	D	Damian
2	Ministry of Environment, Forestry and Tourism	Angula	S	Saima
3	Ministry of Fisheries and Marine Resources	Kreiner	A	Anja
4	Ministry of Fisheries and Marine Resources	Tjizoo	B	Beau
5	Ministry of Fisheries and Marine Resources	Bartholomae	C	Chris
6	Ministry of Fisheries and Marine Resources	Maurihungirire	M	Moses
7	Ministry of Fisheries and Marine Resources	Kainge	P	Paulus
8	Ministry of Fisheries and Marine Resources	Victor	M	Libuku
9	Ministry of Fisheries and Marine Resources	Shivute	L	La-toya
10	Ministry of Fisheries and Marine Resources	Grobler	K	Kolette
11	Ministry of Fisheries and Marine Resources	N	A	Anna-Marie
12	Ministry of Fisheries and Marine Resources	Hamukwaya	F	Ferdinand
13	Ministry of Fisheries and Marine Resources	Nghimatya	V	Victor
14	Ministry of Fisheries and Marine Resources	Shikongo	T	Taimi
15	Ministry of Mines and Energy	Sheehama	A	Andrea
16	Ministry of Mines and Energy	Simon	H	Hendrina
17	Ministry of Mines and Energy	Shino	M	Maggy
18	Ministry of Works and Transport	Günzel	T	Tobias
19	Ministry of Works and Transport	Paulo	AS	Angeline
20	Ministry of Works and Transport	Auene	P	Pinehas
21	Ministry of Works and Transport	Silishebo	P	Patrick
22	Ministry of Works and Transport	Goeiemann	P	Willem
23	NAMPORT	Uirab	B	Bisey
24	NAMPORT	Gelderbloem	E	Elzevir
25	NAMPORT	Shilongo	F	Festus
26	NAMPORT	Shivoro	J	Justina
27	NAMPORT	Kufuna	L	Lukas
28	NAMPORT	Kooper	M	Max
29	NAMPORT	Nawaseb	P	Patrick
30	NAMPORT	lbwima	R	Richard
31	NAMPORT	Visagie	R	Raymond
32	NAMPORT	Gariseb	S	Stefanos

No.	Organisation	Last name	Initial	First Name
33	NAMPORT	Mutwa	W	Widux
34	National Petroleum Corporation of Namibia (NAMCOR)	Mulunga	I	Immanuel
35	National Petroleum Corporation of Namibia (NAMCOR)	Sibeya	V	Victoria
36	National Petroleum Corporation of Namibia (NAMCOR)	Misika	R	Rachel
37	National Petroleum Corporation of Namibia	Kandjoze	OM	Obeth Mbui
REGIONAL GOVERNMENT				
38	Erongo Regional Council	Engelbrecht	P	Paulina
39	Karas Regional Council	Scholtz	JA	Jan
LOCAL GOVERNMENT				
40	Lüderitz Town Council	Abraham	J	Johannes
41	Lüderitz Town Council	Mukapuli	M	Hilaria
42	Lüderitz Town Council	Fredericks	B	Brigitte
43	Lüderitz Town Council	Willem	G	Gumede
44	Lüderitz Town Council	Ochs	RS	
45	Lüderitz Town Council	Tjipura	IM	Ignatius
46	Lüderitz Town Council	Kaangundue	C	
47	Lüderitz Town Council	Da Fonseca	E	
48	Lüderitz Town Council	Beukes	R	
49	Walvis Bay Town Council	Brummer	A	Andre
50	Walvis Bay Town Council	David	U	Uushona
51	Walvis Bay Town Council	Ephraim	N	Namabahu
52	Walvis Bay Town Council	Goseb	G	Gibson
53	Walvis Bay Town Council	Wilfried	I	Immanuel
54	Walvis Bay Town Council	Muronga	H	Haingura
55	Walvis Bay Town Council	Monica	T	Thomas
56	Walvis Bay Town Council	Martin	P	Penelope
2. AUTHORITIES - MARITIME				
NAMIBIA				
57	Namibian Maritime & Fisheries Institute	Nambala	T	Tobias
58	Maritime Affairs	Shapua	K	Kalomo
SOUTH AFRICA				
59	South African Navy Hydrographic Office	Coetzer	I	Irene
60	South African Navy Hydrographic Office	Nelson	M	Malcolm
61	South African Navy Hydrographic Office	van Niekerk	T	
3. BUSINESS - FISHING (NAM)				
62	Confederation of Namibian Fishing Association	Green	N	Noleen
63	Confederation of Namibian Fishing Associations / Namibian Hake Association	Walters	R	Ron
64	Confederation of Namibian Fishing Associations and Namibian Hake Association	Amakwa	M	Matti
65	Crab Association	The Manager		
66	Crab Association	Nishikawa	Y	Yoshinobu
67	Crab Association	Haenisch		
68	Crab Association / Taiyo Namibia (Pty) Ltd	Tikawa	S	Susumu
69	Crab Association / Taiyo Namibia (Pty) Ltd	Atsuko		
70	Large Pelagic (Tuna and Swordfish) and Hake Longlining Association / Possessions Fishing	Hambuda	M	Matthew
71	Large Pelagic and Hake Longlining Ass. of Namibia / Dave Russell Fisheries Consultancy	Russell	D	Dave
72	Large Pelagic and Hake Longlining Ass. of Namibia / Marco Fishing (Pty)	Laufer	K	Kurt

No.	Organisation	Last name	Initial	First Name
	Ltd			
73	Large Pelagic Association	Kakoro	AW	Antonio
74	Large Pelagic Association / Ondjaba Fisheries cc	de Castro	R	Ricky
75	Midwater Trawling Association & Carapau Fishing (Pty) Ltd	Carlson	P	Peter
76	Midwater Trawling Association (Horse Mackerel)	Neumbo	S	Sharon
77	Midwater Trawling Association / Novanam Fishing Enterprises	Hough	G	Gerrie
78	Midwater Trawling Association of Namibia / Namsov Fishing Enterprises (Pty) Ltd	Mouton	J	Jerome
79	Namibia Hake Fishing Association	Martin	S	Sidney
80	Namibian Crab Association	Haenish	R	
81	Namibian Crab Association / Taiyo Namibia (Pty) Ltd	Mansinho	A	Antonio
82	Namibian Fisherman Association / Corvima Fishing	The Manager		
83	Namibian Hake & Tuna Longline Association	Louw	L	Francois
84	Namibian Hake Association	Walters	R	Ron
85	Namibian Hake Association	Pahl	P	
86	Namibian Hake Association	Kathindi	S	Silvanus
87	Namibian Hake Association / Ark Fishing Industries	Goagoseb	M	M
88	Namibian Large Pelagic Association	Ambunda	M	Matthew
89	Namibian Large Pelagic Association / Seaflower Group	Coppin	R	Ronnie
90	Namibian Line Fish Association	Coppin	R	Ronnie
91	Namibian Mariculture Association / Tetelestai Mariculture (Pty) Ltd	du Plessis	H	Henning
92	Namibian Midwater Trawling Association / Erongo Marine Enterprises (Pty) Ltd	Jacobs	C	Callie
93	Namibian Monk and Sole Association	Maree	L	Louisa
94	Namibian Monk and Sole Association / Tunacor Fisheries Ltd	Hitula	P	Peya
95	Namibian Pelagic Fishing Association	Van Dyk	E	
96	Namibian Pelagic Fishing Association	Viljoen	H	Hugo
97	Namibian Pelagic Fishing Association	Van Wyk	M	
98	Namibian Rock Lobster Fishing Association	Schoombe	D	
99	Namibian Rock Lobster Fishing Association	Wolters	R	Ron
100	Namibian Rock Lobster Fishing Association / Seaflower Group	Shanjengange	RD	Rene Dean
101	Namibian Small Pelagic Association	Pronk	W	Pronk
102	Pelagic Fishing Association / Etosha Fishing Corp (Pty) Ltd	Greeff	P	Pieter
103	The Deep Water Trawling Association / Lelandii Holdings / Nautilus Fishing / Novanam	Tordesillas	M	Miguel
104	Walvis Bay Pelagic Fishing Association	van Bergen	D	Denise
FISHING COMPANIES				
105	ABB Marine	Antonio	E	Epifanio
106	Agatha Bay Fishing Company (Pty) Ltd / Merlus Marine / Helgoland Fishing (Pty) Ltd / Oryx Fisheries	Correia	D	Diamantino
107	Amstai (Pty) Ltd	Mansinho	T	Tony
108	Ark Fishing Industries	Amadhila	M	Mateus
109	Atab Fisheries Consortium (Pty) Ltd	Mbili	I	
110	Atlantic Pacific Fishing (Pty) Ltd	Burger	A	Adolf
111	Beira Aquaculture (Pty) Ltd	Romero	M	Manuel
112	Benguella Sea Products (Pty) Ltd	Olivier	A	Andres
113	Bidvest Fisheries Namibia Holdings (Pty) Ltd / Namsov Fishing Enterprises (Pty) Ltd	Arnold	J	Jan
114	Cadilu Fishing & Overberg Fishing	Reyero	J-L	Jose-Luis
115	Cadilu Fishing (Pty) Ltd	Dreyer	C	Charl

No.	Organisation	Last name	Initial	First Name
116	Cadilu Fishing (Pty) Ltd	Swart	J	Jacky
117	Cato Fishing Company (Pty) Ltd		S	Sam
118	Cavema Fishing (Pty) Ltd	Shimooshili	R	Robert
119	De Castro Fishing	de Castro	T	Tony
120	Demersal Fishing	Pata	E	
121	Diaz Fishing (Pty) Ltd	Diaz	G	Gerardo
122	Ehanga Fishing	Ehanga	E	
123	Empire Fishing Co (Pty) Ltd	The Manager		
124	Esja Fishing	Stefansson	J	Johannes
125	Etale Fishing	Dreyer	C	Charl
126	Etosha Fishing Corp (Pty) Ltd	Conradie	P	Philip
127	Etosha Fishing Corp (Pty) Ltd	Esau	G	George
128	Etosha Fishing Corp (Pty) Ltd	Kapundja	L	Linekela
129	Etosha Fishing Corp (Pty) Ltd	I.	J	Jessica
130	Freddie Fish Processors (Pty) Ltd	Hart	W	Wayne
131	Freddie Fish Processors (Pty) Ltd	Greeff	Y	Yvette
132	Gendev Fishing Group	Paulsmeier	V	Volker
133	Goncalo Murta Aquaculture / Mariculture	Murta	G	Goncalo
134	Grisham Assets Corp. Ltd.	Hangula	J	Jeremy
135	Grupo Pereira	Gutierrez	I	Ignacio
136	Hagana Seafood	Theron	H	Herman
137	Hangana Abalone / Ludertiz Abalone Company	Erasmus	R	Rassie
138	Hatutunga Fishing	Hatutunga	K	Klaus
139	Hodago Fishing	Kaune	H	Harold
140	Hottentot Bay Investments CC	Labuschagne	JHN	Jan
141	Huab Fishing / Morcar Fishing / Omaru Fishing / Onbaye Fishing	The Manager		
142	Joe's Oyster Company (Pty) Ltd	Baumeister	J	Joe
143	Lalandi (Namfish)	Malherbe	JP	
144	Large Pelagics	Van Zyl	J	James
145	Lüderitz Mariculture / Tuna & JV	Burgess	J	Jason
146	Marco Fishing (Pty) Ltd	Louw	AJ	
147	Marco Fishing (Pty) Ltd	Burger	H	Hugo
148	Martin's Den Fisheries (Pty) Ltd	The Manager		
149	Merlus Seafood Processors (Pty) Ltd	Kjelgaard	T	Tomas
150	Namibian Fishing Industries (Pty) Ltd	The Manager		
151	Namibian Marine Resources	Nambahu	T	Tommy
152	Namsov Fishing Enterprises (Pty) Ltd	Hough	G	Gerrie
153	Namsov Fishing Enterprises (Pty) Ltd	Smidt	H	Herman
154	National Fishing Corporation / Seaflower Whitefish Group	Nghipunya	M	Mike
155	Nipponex CC	Ueda	Y	Yasuhiro
156	Northern Fishing Industries (Pty) Ltd	The Manager		
157	Novanam (PTY) Ltd / Skeleton Coast Trawling	Kaulinge	PS	Patricia Susan
158	Novanam Group	Magdelene	J	Juan
159	NovaNam Ltd	Magdalena	J	Juan
160	NovaNam Ltd	Canosa	JR	Jose Ramon
161	NovaNam Ltd	Mackenzie	M	
162	Novaship	De Villiers	F	Ferdinand
163	Oceana Group Ltd	Stefanus-Zincke	T	Titania

No.	Organisation	Last name	Initial	First Name
164	Omakete Investments	Shigwana	O	Omakete
165	Omaru Fishing	Kasper	H	Hermanus
166	Ompangona Fishing Company (Pty) Ltd	Sandro	O	
167	Omuvalu Fishing Company	Kadhila	S	Sacky
168	Omuhuka Holdings	Kadhila	O	
169	Ondjaba Fisheries cc	de Castro	R	Ricky
170	Ondjaba Fisheries cc / South Rock Investments cc	Hlasek	M	Mariele
171	Oryx Fisheries (Pty) Ltd	de Castro	O	
172	Pacific Andes Group	Yeh	K	Kent
173	Pereira Fishing Co (Pty) Ltd	The Manager		
174	Pescanova Group	Tordesillas	A	Angel
175	Seaflower Whitefish Corp	Pretorius	J	
176	Seaflower Whitefish Corp	Damens	S	Sandra
177	Seaworks Fish Processors (Pty) Ltd	Germishuys	P	
178	Seaworks Fish Processors (Pty) Ltd	Le Roux	P	Pierre
179	Seaworks Fish Processors (Pty) Ltd	Pahl	P	Peter
180	South East Atlantic Fisheries Organisation	van Zyl	B	Ben
181	South Namibian Hake Fishing	Kessler	G	
182	Southern Namibia Hake Fishing Industries (Pty) Ltd	Mathias	B	Brigitte
183	Southern Namibia Hake Fishing Industries (Pty) Ltd	Schroeder	K	Klaus
184	Taiyo Namibia (Pty) Ltd	Miyagawa	N	Naohisa
185	Tunacor Fisheries Ltd	Marino	A	Antonio
186	United Fishing Enterprises (Pty) Ltd	Ahrens	R	Richard
4. BUSINESS - FISHING (SA)				
187	FishSA	Phantshwa	L	Loyiso
188	Large pelagic longline fishery	van Antwerpen	D	Deon
189	SA Hake Longline Association	Bodenham	C	Clyde
190	SA Tuna Longline Association	Wilson	T	Trevor
191	SA Tuna Longline Association	Walker	S	Shaun
192	SA Tuna Longline Association	Chairman		
5. BUSINESS - OIL AND GAS				
193	Windhoek PEL28 B.V. & Galp Energia S.A.	Fonseca	A	Antonio
194	Impact Oil & Gas	Kaura	K	Kaura
195	Impact Oil & Gas	Webber	H	Heidi
196	Impact Oil and Gas Namibia (Pty)	Birch	P	Phillip
197	Impact Africa Limited	Ilett	S	Steve
198	Impact Africa Limited	Doherty	M	Mike
199	Shell Namibia Upstream B.V.	Zekveld	D	Dennis
6. BUSINESS - OTHER				
200	Chamber of Commerce and Industry Lüderitz	Namukonda	I	Immanuel
201	Chamber of Commerce and Industry Walvis Bay	Doeseb	J	Johnny
202	Chamber of Commerce and Industry	Mwiya	C	Charity
203	Chamber of Mines of Namibia	Malango	M	Veston
7. CIVIL SOCIETY - ENV, NGOs				
204	African Penguin Conservation Project	Kemper	J	Jessica
205	Animal Demography Unit	Roux	JP	
206	Benguela Current Commission	Gxaba	T	Thandiwe
207	Benguela Current Commission	Hutu	Z	Zukile

No.	Organisation	Last name	Initial	First Name
208	Benguela Current Commission	van Zyl	B	Ben
209	Benguela Current Commission	Ndjambula	P	Paul
210	Benguela Current Commission	Kumbi	P	Paul
211	Benguela Current Commission	Thomas	M	Monica
212	Coastal Environmental Trust of Namibia	Susan	S	Roux
213	Earthlife Namibia	Kohrs	B	Bertchen
214	GIZ- MARISMA (Marine Spatial Management and Governance Project)	Selma	S	Shitilifa
215	GIZ- MARISMA (Marine Spatial Management and Governance Project)	Brabey	R	Rod
216	NACOMA	Kandjii	C	
217	NACOMA	Alexander	A	Alexander
218	Namibia Chamber of Environment	Brown	C	Chris
219	Namibia Chamber of Environment	Krohne	H	Henriette
220	Namibia Dolphin Project (Walvis Bay)	Gelletich	J	Jelly
221	Namibia Nature Foundation	Muukua	V	Veripura
222	Namibia Nature Foundation	Middleton	A	Angus
223	Namibian Dolphin Project & University of Pretoria	Elwen	S	Simon
224	Namibian Dolphin Project & University of Pretoria	Gridley	T	Tess
225	Namibian Environment & Wildlife Society	Botha	H-M	Hilda-Marie
226	Namibian Environment & Wildlife Society	Frauke	K	Kreitz
227	National Commission on Research and Technology	Van Der Westhuizen	M	Maxii
8. CIVIL SOCIETY - GENERAL PUBLIC				
228	Environmental Justice Organisations, Liabilities and Trade	Temper	L	Leah

APPENDIX 2.2:
ADVERTISEMENTS

KENNISGEWING VAN OMGEWINGSIMPAKSTUDIEPROSES (OIS)



OIS VIR 'N AANSOEK OM 'N VOORGESTELDE 3D SEISMIESE OPNAME TE ONDERNEEM IN LISENSIEBLOKKE 2912 EN 2913B LANGS DIE SUIDELIKE KUS VAN NAMIBIË

Kennis geskied hiermee, ooreenkomstig die Wet op Omgewingsbestuur (No. 7 van 2007) en Artikel 21 van die OIS Regulasies, van 'n aansoek om 'n Omgewingsklaringsertifikaat vir die onderneem van 'n 3D seismiese opname in Lisensieblokke 2912 en 2913B.

'n OIS proses word vir die voorgestelde projek onderneem. 'n Aansoek om 'n Omgewingsklaringsertifikaat is by die Bevoegde Owerheid (Ministerie van Myne en Energie) ingedien. Die projek en aansoek is ook deur die aanlyn aansoekstelsel van die Ministerie van Omgewing, Bosbou en Toerisme (MOBT) geregistreer. Hierdie advertensie is die begin van die OIS publieke deelname.

Naam van Aansoeker: Total E and P Namibia B.V ("TEPNA").

Aard en Ligging van die voorgestelde aktiwiteit: TEPNA hou tans Eksplorasielisensies vir Blokke 2912 en 2913B wat aangrensend aan mekaar geleë is in die diepwater Oranjeom langs die suidelike kus van Namibië. TEPNA is van voorneme om 'n 3D seismiese opname binne hierdie lisensieblokke te onderneem. Blok 2912 is die verste afdandig geleë (290 km by die naaste punt) in waterdieptes van 3 300 m tot 3 800 m. Blok 2913B is reg oos daarvan geleë (240 km afdandig by die naaste punt) in waterdieptes wat wissel van ongeveer 2 600 m tot 3 300 m.

Die voorgestelde 3D seismiese opname en operasionele areas het 'n omvang van, respektiewelik, 6 474 km² en 9 797 km², grotendeels oor Blok 2912. Die voorgestelde opname sal na verwagting ongeveer 100 dae duur, uitsluitende enige opname-vernante vertrags. TEPNA stel voor om in Desember 2020 / Januarie 2021 met die 3D seismiese opname te begin, onderheilig aan die uitreik van 'n Omgewingsklaringsertifikaat.

Omgewingspraktisyn: SLR Environmental Consulting (Namibia) (Pty) Ltd ("SLR") is deur TEPNA aangestel om die OIS proses vir die voorgestelde projek te onderneem.

Kontakpersoon: Werner Petrick
 Posbus 86386, Windhoek
 Tel: +264 61 231 287; Sel: +264 81 739 4591
 E-pos: wpetrick@slrconsulting.com

Registrasie om kennisgewings / inligting te ontvang en geleentheid om kommentaar te lewer:

Om as 'n belanghebbende en/of geaffekteerde party te registreer, stuur asseblief u volle naam en kontakbesonderhede na die bostaande SLR adres. 'n OIS Konsep Omvangsverlag (KOV) is saamgestel en is beskikbaar vir 'n 30-dae oorsig en kommentaarperiode vanaf 8 Mei tot 8 Junie 2020.

'n Elektroniese kopie van die KOV is beskikbaar op die SLR webblad (<http://slrconsulting.com/za/slr-documents/tepna>) of op versoek van SLR.

Vir kwessies en/of kommentaar om ingesluit te word in die Finale Omvangsverlag moet dit SLR bereik teen 8 Junie 2020.



NOTICE OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA) PROCESS



EIA FOR AN APPLICATION TO UNDERTAKE A PROPOSED 3D SEISMIC SURVEY IN LICENCE BLOCKS 2912 AND 2913B OFF THE COAST OF SOUTHERN NAMIBIA

Notice is hereby given in terms of the Environmental Management Act (No. 7 of 2007) and Regulation 21 of the EIA Regulations of an Environmental Clearance Certificate (ECC) application to undertake a 3D seismic survey in Licence Blocks 2912 and 2913B.

An EIA process is being undertaken for the proposed project. An application for an ECC has been submitted to the Competent Authority (Ministry of Mines and Energy). The project and ECC application have also been registered on Ministry of Environment, Forestry and Tourism's (MEFT) online application portal. This advertisement is the start of the EIA public participation.

Name of applicant: Total E and P Namibia B.V ("TEPNA").

Nature and Location of the proposed activity: TEPNA is the holder of two Exploration Licences for Blocks 2912 and 2913B, located adjacent to each other in the deepwater Orange Basin off the coast of southern Namibia. TEPNA is planning to undertake a 3D seismic survey within these licence blocks. Block 2912 is located furthest offshore (290 km at its closest point) in water depths of 3 300 m to 3 800 m. Block 2913B is immediately to the east (240 km offshore at its closest point) in water depths ranging from approximately 2 600 m to 3 300 m.

The proposed 3D seismic survey and operational areas are 6 474 km² and 9 797 km² in extent, respectively, mostly over Block 2912. It is anticipated that the duration of the proposed survey would be in the order of 100 days, excluding any survey-related downtime. TEPNA proposes to commence with the 3D seismic survey in December 2020 / January 2021, subject to obtaining an ECC.

Environmental Assessment Practitioner: SLR Environmental Consulting (Namibia) (Pty) Ltd ("SLR") has been appointed by TEPNA to undertake the EIA process for the proposed project.

Contact Person: Werner Petrick
 PO Box 86386, Windhoek
 Tel: +264 61 231 287; Cell: +264 81 739 4591
 E-mail: wpetrick@slrconsulting.com

Registration to receive notifications / information and opportunity to comment: To register as an interested and/or affected party (I&AP), please submit your full name and contact details to the SLR address provided above. A Draft EIA Scoping Report (DSR) has been compiled and is available for a 30-day review and comment period from 8 May to 8 June 2020.

An electronic copy of the DSR is available for download from the SLR website (<http://slrconsulting.com/za/slr-documents/tepna>) or on request from SLR.

For issues and/or comments to be included in the Final Scoping Report they should be forwarded to SLR no later than 8 June 2020.



DM0202000360674_IK

DM0202000360791



EXCELLENCE IS ALL ABOUT DETERMINATION
APPLY BEFORE 29 MAY 2020

At SGA Chartered Accountants and Auditors we offer: bursaries to full and part-time students; employment to Trainee Accountants, Audit Seniors and Audit Supervisors with normal employment benefits including above average salaries.

Grade 12 learners

- Minimum of 4 subjects on NSSCH including Mathematics and two languages,
- or qualify for the exemption from the Matriculation Board.
- Namibian citizenship.

Graduates

- BCom Accounting or similar.
- Namibian citizenship.

Auditors or Accountants

- Completed CA/NIPA training contracts and relevant qualifications.
- Namibian citizenship.

Submit your CV with copies of all relevant documentation and qualifications by 29 May 2020 to:
 Linda Newby | PO Box 30 Windhoek, Namibia | E-mail lnewby@sga-na.com | Fax +264 61 232 309

ONLY SHORTLISTED CANDIDATES WILL BE CONTACTED. PLEASE DO NOT SEND ORIGINAL DOCUMENTS. PERSONS WITH DISABILITIES MEETING THE ABOVE REQUIREMENTS ARE ENCOURAGED TO APPLY. SGA IS A CERTIFIED EMPLOYMENT EQUITY COMPLIANT EMPLOYER IN TERMS OF THE AFFIRMATIVE ACTION ACT 1998.

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CHARTERED
 ACCOUNTANTS
 & AUDITORS

KENNISGEWING VAN OMGEWINGSIMPAKSTUDIEPROSES (OIS)


OIS VIR 'N AANSOEK OM 'N VOORGESTELDE 3D SEISMIESE OPNAME TE ONDERNEEM IN LISENSIEBLOKKE 2912 EN 2913B LANGS DIE SUIDELIKE KUS VAN NAMIBIË

Kennis geskied hiermee, ooreenkomstig die Wet op Omgewingsbestuur (No. 7 van 2007) en Artikel 21 van die OIS Regulasies, van 'n aansoek om 'n Omgewingsklaringsertifikaat vir die onderneem van 'n 3D seismiese opname in Lisensieblokke 2912 en 2913B.

'n OIS proses word vir die voorgestelde projek onderneem. 'n Aansoek om 'n Omgewingsklaringsertifikaat is by die Bevoegde Owerheid (Ministerie van Myne en Energie) ingedien. Die projek en aansoek is ook deur die aarlyn aansoekstelsel van die Ministerie van Omgewing, Bosbou en Toerisme (MOBT) geregistreer. Hierdie advertensie is die begin van die OIS publieke deelname.

Naam van Aansoeker: Total E and P Namibia B.V ("TEPNA").

Aard en Ligging van die voorgestelde aktiwiteit: TEPNA hou tans Eksplorasielisensies vir Blokke 2912 en 2913B wat aangrensend aan mekaar geleë is in die diepwater Oranjeom Langs die suidelike kus van Namibië. TEPNA is van voorneme om 'n 3D seismiese opname binne hierdie lisensieblokke te onderneem. Blok 2912 is die verste afdandig geleë (290 km by die naaste punt) in waterdieptes van 3 300 m tot 3 800 m. Blok 2913B is reg oos daarvan geleë (240 km afdandig by die naaste punt) in waterdieptes wat wissel van ongeveer 2 600 m tot 3 300 m.

Die voorgestelde 3D seismiese opname en operasionele areas het 'n omvang van, respektiewelik, 6 474 km² en 9 797 km², grotendeels oor Blok 2912. Die voorgestelde opname sal na verwagting ongeveer 100 dae duur, uitsluitende enige opname-ervante vertrags. TEPNA stel voor om in Desember 2020 / Januarie 2021 met die 3D seismiese opname te begin, onderhewig aan die uitreik van 'n Omgewingsklaringsertifikaat.

Omgewingspraktisyn: SLR Environmental Consulting (Namibia) (Pty) Ltd ("SLR") is deur TEPNA aangestel om die OIS proses vir die voorgestelde projek te onderneem.

Kontakpersoon: Werner Petrick
 Posbus 86386, Windhoek
 Tel: +264 61 231 287; Sel: +264 81 739 4591
 E-pos: wpetrick@slrconsulting.com

Registrasie om kennisgewings / inligting te ontvang en geleentheid om kommentaar te lewer:

Om as 'n belanghebbende en/of geaffekteerde party te registreer, stuur asseblief u volle naam en kontakbesonderhede na die bostaande SLR adres. 'n OIS Konsep Omvangsverlag (KOV) is saamgestel en is beskikbaar vir 'n 30-dae oorsig en kommentaarperiode vanaf 8 Mei tot 8 Junie 2020.

'n Elektroniese kopie van die KOV is beskikbaar op die SLR webblad (<http://slrconsulting.com/za/slr-documents/tepna>) of op versoek van SLR.

Vir kwessies en/of kommentaar om ingesluit te word in die Finale Omvangsverlag moet dit SLR bereik teen 8 Junie 2020.



DM0202000360674_IK

NOTICE OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA) PROCESS


EIA FOR AN APPLICATION TO UNDERTAKE A PROPOSED 3D SEISMIC SURVEY IN LICENCE BLOCKS 2912 AND 2913B OFF THE COAST OF SOUTHERN NAMIBIA

Notice is hereby given in terms of the Environmental Management Act (No. 7 of 2007) and Regulation 21 of the EIA Regulations of an Environmental Clearance Certificate (ECC) application to undertake a 3D seismic survey in Licence Blocks 2912 and 2913B.

An EIA process is being undertaken for the proposed project. An application for an ECC has been submitted to the Competent Authority (Ministry of Mines and Energy). The project and ECC application have also been registered on Ministry of Environment, Forestry and Tourism's (MEFT) online application portal. This advertisement is the start of the EIA public participation.

Name of applicant: Total E and P Namibia B.V ("TEPNA").

Nature and Location of the proposed activity: TEPNA is the holder of two Exploration Licences for Blocks 2912 and 2913B, located adjacent to each other in the deepwater Orange Basin off the coast of southern Namibia. TEPNA is planning to undertake a 3D seismic survey within these licence blocks. Block 2912 is located furthest offshore (290 km at its closest point) in water depths of 3 300 m to 3 800 m. Block 2913B is immediately to the east (240 km offshore at its closest point) in water depths ranging from approximately 2 600 m to 3 300 m.

The proposed 3D seismic survey and operational areas are 6 474 km² and 9 797 km² in extent, respectively, mostly over Block 2912. It is anticipated that the duration of the proposed survey would be in the order of 100 days, excluding any survey-related downtime. TEPNA proposes to commence with the 3D seismic survey in December 2020 / January 2021, subject to obtaining an ECC.

Environmental Assessment Practitioner: SLR Environmental Consulting (Namibia) (Pty) Ltd ("SLR") has been appointed by TEPNA to undertake the EIA process for the proposed project.

Contact Person: Werner Petrick
 PO Box 86386, Windhoek
 Tel: +264 61 231 287; Cell: +264 81 739 4591
 E-mail: wpetrick@slrconsulting.com

Registration to receive notifications / information and opportunity to comment: To register as an interested and/or affected party (I&AP), please submit your full name and contact details to the SLR address provided above. A Draft EIA Scoping Report (DSR) has been compiled and is available for a 30-day review and comment period from 8 May to 8 June 2020.

An electronic copy of the DSR is available for download from the SLR website (<http://slrconsulting.com/za/slr-documents/tepna>) or on request from SLR.

For issues and/or comments to be included in the Final Scoping Report they should be forwarded to SLR no later than 8 June 2020.



DM0202000361182

VACANCIES



NamPower (Pty) Ltd, an equal opportunity employer invites candidates who are passionate about the Electricity Supply Industry and with uncompromising standard of excellence to a career in the industry.

Positions:

- **Artisan: Air-Conditioning (1x 12-month Fixed-term Contract)**
- **Artisan: Air-Conditioning (1x Permanent)**

Business Unit: Human Capital

Duty Station: Windhoek

Closing Date: 29th May 2020

Primary Purpose of the job:

The incumbent will be responsible to carry out maintenance, repairs and installations of air-conditioning units, supervision of air-conditioning personnel as well as to assist the supervisor in the drawing up of air-conditioning maintenance schedules.

For Enquiries contact:

HR Officer: Human Capital
 Tel: 061 - 205 2270

If this is appealing to you, submit your job application by hand at NamPower Head Office, 15 Luther Street, or email it to HR.Recruitment@nampower.com.na. Please visit our website at www.nampower.com.na for more information.

In return for your skills, NamPower offers a generous remuneration package and attractive fringe benefits in line with the seniority of the position.

NB: FEMALE CANDIDATES ARE ENCOURAGED TO APPLY. ONLY SHORT LISTED CANDIDATES WILL BE CONTACTED & NO PERSONAL DOCUMENTS WILL BE RETURNED.

DM0202000361160



TENDER INVITATION

MINE CAMP MANAGEMENT

B2Gold Namibia (Pty) Ltd, a subsidiary of B2Gold Corporation is located in the north-central part of Namibia, approximately 300 km north of the country's capital, Windhoek. The Otjikoto Mine is the largest gold producer in the country.

This contract (*which shall be entered into with the successful bidder*) is for the Mine Camp Management of B2Gold Namibia (Pty) Ltd facilities at the Contractors Camp, situated at the B2Gold Otjikoto Mine.

THE SERVICES SHALL INCLUDE, BUT NOT BE LIMITED TO THE PROVISION OF:

1. Cleaning & Housekeeping
2. Laundry
3. Accommodation Management
4. Minor Maintenance
5. Recreational Facilities Support
6. Commissary Services
7. Catering, Food Service, Food Procurement & Storage & Preparation
8. Reception Services

The CONTRACTOR shall be responsible for the SERVICES listed in the above table, which SERVICES shall be rendered within CONTRACTOR's Camp and for all structures within the CONTRACTOR's Camp. A layout of the Contract shall consist of the following sub-categories:

TENDER NAME: Mine Camp Management **Tender documents:** Detailed tender documents are available at no charge
TENDER NUMBER: B2NA000268
CLOSING DATE: Friday, 5 June 2020 at 12H00 **Cut-off date to request tender documents:** Wednesday, 27 May 2020 at 12H00

Enquiries: Must be directed in writing **only** (e-mail) to the contact below, with the tender name and tender number clearly indicated in the subject line. No telephonic enquiries will be done.

Contact: Mrs. Natali Van Rensburg, Contracts Administrator
Email: nvanrensburg@b2gold.com

APPENDIX 2.3:
SITE NOTICES

NOTICE OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA) PROCESS

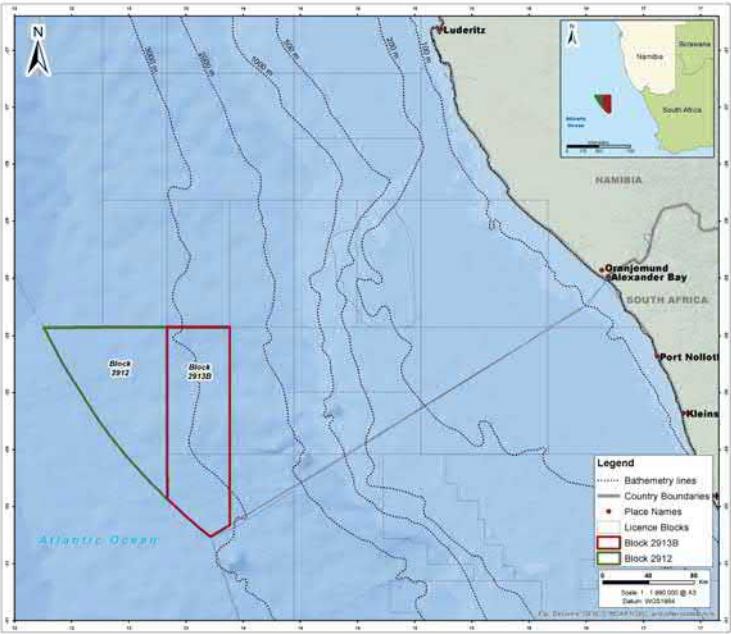



EIA FOR AN APPLICATION TO UNDERTAKE A PROPOSED 3D SEISMIC SURVEY IN LICENCE BLOCKS 2912 AND 2913B OFF THE COAST OF SOUTHERN NAMIBIA

Notice is hereby given in terms of the Environmental Management Act (No. 7 of 2007) and Regulation 21 of the EIA Regulations of an Environmental Clearance Certificate (ECC) application to undertake a 3D seismic survey in Licence Blocks 2912 and 2913B in the deepwater Orange Basin off the coast of southern Namibia.

An EIA process is being undertaken for the proposed project. An application for an ECC has been submitted to the Competent Authority (Ministry of Mines and Energy). The project and ECC application have also been registered on Ministry of Environment, Forestry and Tourism's (MEFT) online application portal. This advertisement is the start of the EIA public participation.

Project and EIA details are presented below.

Applicant:	Total E and P Namibia B.V ("TEPNA")
Nature of proposed activity:	TEPNA is planning to undertake a 3D seismic survey within Licence Blocks 2912 and 2913B. The proposed 3D seismic survey and operational areas are 6 474 km ² and 9 797 km ² in extent, respectively, mostly over Block 2912. It is anticipated that the duration of the proposed survey would be in the order of 100 days, excluding any survey-related downtime. TEPNA proposes to commence with the 3D seismic survey in December 2020 / January 2021, subject to obtaining an ECC.
Location:	<p>The blocks are located adjacent to each other in the Orange Basin off the coast of southern Namibia. Block 2912 is located the furthest offshore (290 km at its closest point) in water depths of 3 300 m to 3 800 m. Block 2913B is immediately to the east (240 km offshore at its closest point) in water depths ranging from approximately 2 600 m to 3 300 m.</p> 
Environmental Assessment Practitioner:	<p>SLR Environmental Consulting (Namibia) (Pty) Ltd ("SLR") has been appointed by TEPNA to undertake the EIA process for the proposed project.</p> <p>Contact Person: Werner Petrick PO Box 86386, Windhoek Tel: +264 61 231 287; Cell: +264 81 739 4591; E-mail: wpetrick@slrconsulting.com</p> 
Registration to receive information:	<p>If you or your organisation wishes to register as an Interested and Affected Party (I&AP) on the project database and be notified of opportunities to be involved in the EIA process, please submit your name, contact details and any initial comment to SLR no later than 8 June 2020.</p>

KENNIS VAN OMGEWINGSIMPAKSTUDIEPROSES (OIS)

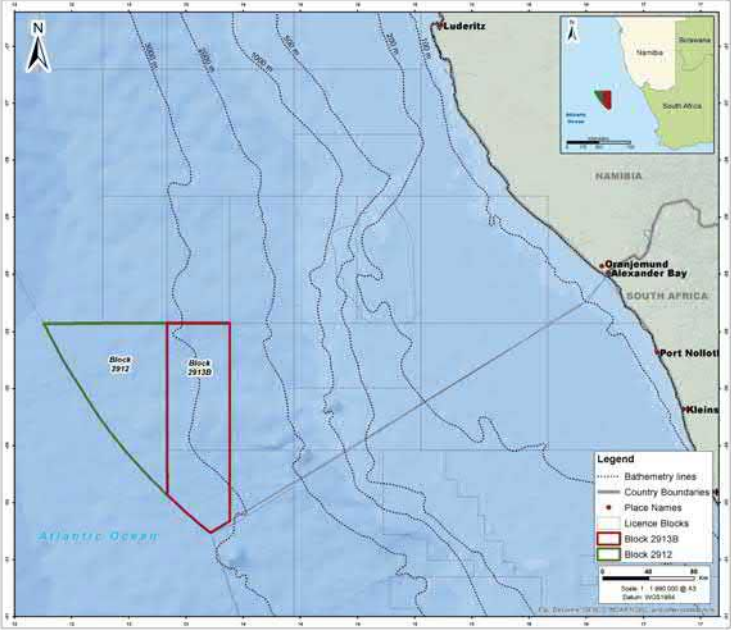



OIS VIR 'N AANSOEK OM 'N VOORGESTELDE 3D SEISMIESE OPNAME TE ONDERNEEM IN LISENSIEBLOKKE 2912 EN 2913B LANGS DIE SUIDELIKE KUS VAN NAMIBIË

Kennis geskied hiermee, ooreenkomstig die Wet op Omgewingsbestuur (No. 7 van 2007) en Artikel 21 van die OIS Regulasies, van 'n aansoek om 'n Omgewingsklaringertifikaat vir die onderneem van 'n 3D seismiese opname in Lisensieblokke 2912 en 2913B in die diepwater Oranjekom langs die suidelike kus van Namibië.

'n OIS proses word vir die voorgestelde projek onderneem. 'n Aansoek om 'n Omgewingsklaringertifikaat is by die Bevoegde Owerheid (Ministerie van Myne en Energie) ingedien. Die projek en aansoek is ook deur die aanlyn aansoekstelsel van die Ministerie van Omgewing, Bosbou en Toerisme (MOBT) geregistreer. Hierdie advertensie is die begin van die OIS publieke deelname.

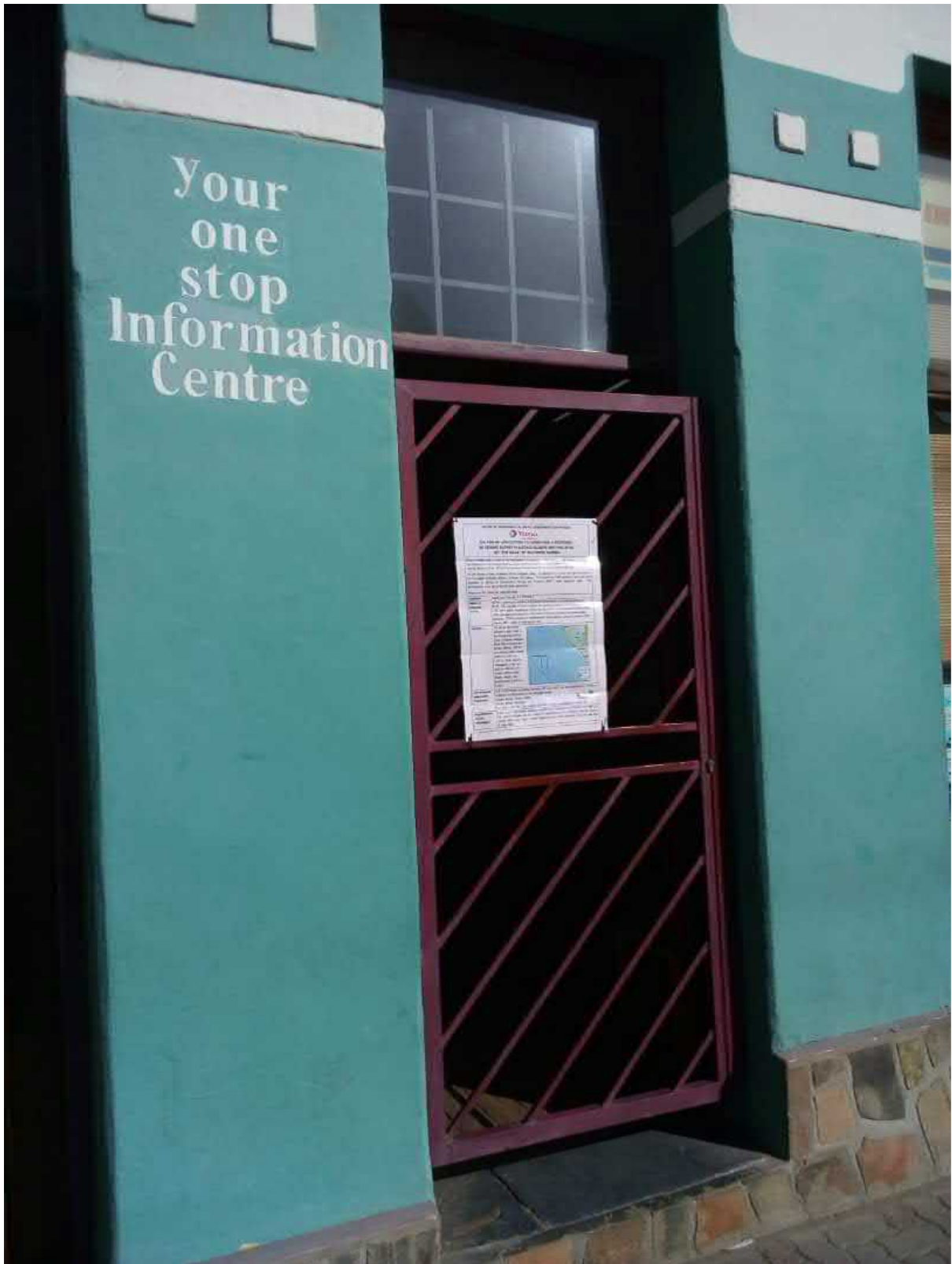
Projek en OIS besonderhede word hieronder vervat.

Aansoeker:	Total E and P Namibia B.V ("TEPNA")
Aard van die voorgestelde aktiwiteit:	TEPNA is van voorneme om 'n 3D seismiese opname te onderneem in Lisensieblokke 2912 en 2913B. Die voorgestelde 3D seismiese opname en operasionele areas het 'n omvang van, respektiewelik, 6 474 km ² en 9 797 km ² , grotendeels oor Blok 2912. Die voorgestelde opname sal na verwagting ongeveer 100 dae duur, uitsluitende enige opname-verwante verdragings. TEPNA stel voor om in Desember 2020 / Januarie 2021 met die 3D seismiese opname te begin, onderhewig aan die uitreik van 'n Omgewingsklaringertifikaat.
Ligging:	<p>Die blokke is aangrensend aan mekaar geleë in die Oranjekom langs die suidelike kus van Namibië. Blok 2912 is die verste afluandig geleë (290 km by die naaste punt) in waterdieptes van 3 300 m tot 3 800 m. Blok 2913B is reg oos daarvan geleë (240 km afluandig by die naaste punt) in waterdieptes wat wissel van ongeveer 2 600 m tot 3 300 m.</p> 
Omgewings-praktisyn:	<p>SLR Environmental Consulting (Namibia) (Pty) Ltd ("SLR") is deur TEPNA aangestel om die OIS proses vir die voorgestelde projek te onderneem.</p> <p>Kontakpersoon: Werner Petrick Posbus 86386, Windhoek Tel: +264 61 231 287; Sel: +264 81 739 4591; E-pos: wpetrick@slrconsulting.com</p> 
Registrasie om inligting te ontvang:	<p>Indien u of u organisasie as 'n belanghebbende en/of geaffekteerde party op die projekdatabasis wil registreer en in kennis gestel wil word van geleenthede om betrokke te wees by die OIS proses, vra ons dat u asseblief u naam, kontakbesonderhede en enige aanvanklike kommentaar na SLR sal te stuur teen 8 Junie 2020.</p>

Port of Walvis Bay



Lüderitz Information Centre



APPENDIX 2.4:
I&AP NOTIFICATION LETTERS

7 May 2020

Dear Sir/Madam,

TOTAL E AND P NAMIBIA B.V. - PROPOSED 3D SEISMIC SURVEY IN LICENCE BLOCKS 2912 AND 2913B, NAMIBIA: PROJECT NOTIFICATION AND AVAILABILITY OF DRAFT SCOPING REPORT FOR REVIEW AND COMMENT

This letter provides notification under the Environmental Management Act, 2007 (No. 7 of 2007) and Regulation 21 of the Environmental Impact Assessment (EIA) Regulations (Government Notice No. 30 of 2012) of an application by Total E and P Namibia B.V. (“TEPNA”) for an Environmental Clearance Certificate (ECC) to undertake a proposed three-dimensional (3D) seismic survey off the coast of southern Namibia.

TEPNA holds Exploration Licences for Blocks 2912 and 2913B. To investigate subsea geological formations and meet the obligations of the Exploration Licence for Block 2912, TEPNA is planning to undertake a 3D seismic survey within this licence block, as well as a portion of Block 2913B. The proposed 3D seismic survey and operational areas are 6 474 km² and 9 797 km² in extent, respectively. The duration of survey acquisition will be in the order of 100 days, excluding any survey-related downtime. TEPNA proposes to commence with the 3D seismic survey in December 2020 / January 2021, subject to obtaining an ECC.

SLR Environmental Consulting (Namibia) (Pty) Ltd (“SLR”) has been appointed to undertake the EIA process for the proposed project. As part of this process, notice is given that the Draft Scoping Report (DSR) compiled for the above-mentioned project is available for a 30-day review and comment period from **8 May to 8 June 2020**. A copy of the Executive Summary of the DSR is attached for your reference. Copies of the full DSR are available on the SLR website (at <http://slrconsulting.com/za/slr-documents/tepna>) and at the following locations:

Location	Name of facility	Physical address
Walvis Bay	Walvis Bay Municipality	Water, Waste & Environmental Management Offices Gertrude Rikumba Kadanga Hilukilwa Road Office of the Environmental Coordinator
Lüderitz	Lüderitz Information Centre	Lüderitz Safaris & Tours, Bismarck Street (9h00 to 12h30)

If you or your organisation would like to register as an interested and affected party (I&AP) and/or wish to raise any issues or concerns regarding the proposed project, please submit your full name, contact details and any comments to the SLR address provided below. For comments to be included in the Final Scoping Report, comments should reach SLR by **no later than 8 June 2020**.



SLR Environmental Consulting (Namibia) (Proprietary) Limited

Registered Address: 61 Bismarck Street, Windhoek, Namibia
Postal Address: PO Box 2184, Windhoek 10005, Namibia

Reg. No: 2009/831
VAT No: 5067.931-01-5

Directors: A Bittner, R Hounsome, N Penhall, P MacKellar

Windhoek Office: Physical Address: 8 General Murtala Muhammed Ave, Eros, Windhoek
Postal Address: PO Box 86386, Windhoek, 10009 Tel: +264 61 231 287 Fax: +264 61 231 289

www.slrconsulting.com

SLR Environmental Consulting (Namibia) (Pty) Ltd

Attention: Werner Petrick

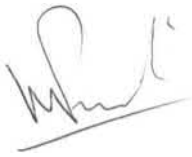
PO Box 86386, Windhoek

Tel: +264 61 231 287 Cell: +264 81 739 4591 Email: wpetrick@slrconsulting.com

Due to COVID-19 related restrictions on public gatherings, no public meetings will be held at this stage of the EIA process. However, virtual (via Skype, TEAMS or WhatsApp) or face-to-face meetings (in Walvis Bay, Swakopmund or Lüderitz) could be arranged during the comment period should you wish to discuss the project and EIA process.

Should you have any queries in this regard please do not hesitate to contact the undersigned.

Yours sincerely

A handwritten signature in black ink, appearing to read 'W. Petrick', written over a horizontal line.

Werner Petrick

SLR CONSULTING (NAMIBIA) (PTY) LTD

7 Mei 2020

Geagte Heer/Dame,

TOTAL E AND P NAMIBIA B.V. – VOORGESTELDE 3D SEISMIESE OPNAME IN LISENSIEBLOKKE 2912 EN 2913B, NAMIBIË: PROJEKKNISGEWING EN BESIKKBAARHEID VAN KONSEP OMVANGSVERSLAG VIR OORSIG EN KOMMENTAAR

Hierdie brief verskaf kennisgewing, ooreenkomstig die Wet op Omgewingsbestuur, 2007 (No. 7 van 2007) en Artikel 21 van die Omgewingsimpakstudie (OIS) Regulasies (Goewermentskennisgewing No. 30 van 2012), van 'n aansoek deur Total E and P Namibia B.V. ("TEPNA") om 'n Omgewingsklaringsertifikaat vir die onderneem van 'n drie-dimensionele (3D) seismiese opname langs die suidelike kus van Namibië.

TEPNA hou Eksplorasielisensies vir Blokke 2912 en 2913B. Om subsee geologiese formasies te ondersoek en om die verpligtinge van die Eksplorasielisensie vir Blok 2912 na te kom, beplan TEPNA om 'n 3D seismiese opname binne die lisensieblok, sowel as 'n gedeelte van Blok 2913B, te onderneem. Die voorgestelde 3D seismiese opname en operasionele areas het 'n omvang van, respektiewelik, 6 474 km² en 9 797 km². Die voorgestelde opname sal na verwagting ongeveer 100 dae duur, uitsluitende enige opname-verwante verdragings. TEPNA stel voor om in Desember 2020 / Januarie 2021 met die 3D seismiese opname te begin, onderhewig aan die uitreik van 'n Omgewingsklaringsertifikaat.

SLR Environmental Consulting (Namibia) (Pty) Ltd ("SLR") is aangestel om die OIS proses vir die voorgestelde projek te onderneem. As deel van die proses, stel ons u in kennis dat die Konsep Omvangverslag (KOV) vir die bogemelde projek saamgestel is en beskikbaar is vir 'n 30-dae oorsig- en kommentaarperiode **vanaf 8 Mei tot 8 Junie 2020**. 'n kopie van die Bestuursoorsig van die KOV is as verwysing hierby aangeheg. Eksemplare van die volle KOV is op die SLR webblad beskikbaar (by <http://slrconsulting.com/za/slr-documents/tepna>) sowel as by die volgende plekke:

Dorp	Naam van plek	Straatadres
Walvisbaai	Walvisbaai Munisipaliteit	Departement van Water, Afval en Omgewingsbestuur se Kantore Gertrude Rikumba Kadanga Hilukilwa Straat Omgewingskoördineerder se Kantoor
Lüderitz	Lüderitz Information Centre	Lüderitz Safaris & Tours, Bismarck Straat (9h00 to 12h30)

Indien u of u organisasie wil registreer as 'n belanghebbende of geaffekteerde party en/of u enige kwessies of bekommernisse aangaande die voorgestelde projek het, vra ons dat u asseblief u volle naam, kontakbesonderhede en enige kommentaar aan SLR sal stuur by die onderstaande kontakbesonderhede. Vir kommentaar om ingesluit te word by die Finale Omvangverslag moet dit SLR **teen 8 Junie 2020** bereik.



SLR Environmental Consulting (Namibia) (Proprietary) Limited

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Postal Address: PO Box 2184, Windhoek 10005, Namibia

Reg. No: 2009/831
VAT No: 5067.931-01-5

Directors: A Bittner, R Hounsome, N Penhall, P MacKellar

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Postal Address: PO Box 86386, Windhoek, 10009 Tel: +264 61 231 287 Fax: +264 61 231 289

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SLR Environmental Consulting (Namibia) (Pty) Ltd

Aandag: Werner Petrick

Posbus 86386, Windhoek

Tel: +264 61 231 287 Sel: +264 81 739 4591 E-pos: wpetrick@slrconsulting.com

As gevolg van die beperkinge op openbare samekomste verwant aan COVID-19 sal geen openbare vergaderings op hierdie stadium van die OIS proses gehou word nie. Aanlyn vergaderings (via Skype, TEAMS of WhatsApp) of van-aangesit-tot-aangesig vergaderings (in Walvisbaai, Swakopmund of Lüderitz) kan wel gereël word gedurende die kommentaarperiode, sou daar 'n behoefte wees vir u om die projek en OIS proses te bespreek.

Indien u enige vrae hieromtrent het, kan u gerus met die ondergetekende in verbinding tree.

Vriendelike groete

A handwritten signature in black ink, appearing to read 'W. Petrick', written over a horizontal line.

Werner Petrick

SLR CONSULTING (NAMIBIA) (PTY) LTD

Candice Sadan

From: Candice Sadan
Sent: Thursday, 07 May 2020 15:03
To: Candice Sadan
Cc: 'wpetrick@namisun.com'
Subject: PROPOSED 3D SEISMIC SURVEY IN LICENCE BLOCKS 2912 AND 2913B, NAMIBIA: PROJECT NOTIFICATION AND AVAILABILITY OF DRAFT SCOPING REPORT FOR REVIEW AND COMMENT
Attachments: ESIA_Na Seismic 2912_13B_DSR_200507_Rev4_Executive_Summary.pdf; TEPNA Seismic ESIA - I&AP letters (Eng & Afr).pdf

Bcc: 'damian.nchindo@met.gov.na'; 'saima@webmail.co.za'; 'anja.kreiner@mfmr.gov.na'; 'btjizoo@mfmr.gov.na'; 'Chris.Bartholomae@mfmr.gov.na'; 'mmaurihungirire@mfmr.gov.na'; 'paulus.kainge@mfmr.gov.na'; 'victor.libuku@mfmr.gov.na'; 'LaToya.Shivute@mfmr.gov.na'; 'asheehama@mme.gov.na'; 'hendrina.simon@mme.gov.za'; 'maggy.shino@mme.gov.na'; 'ddaan@dca.com.na'; 'director@dca.com.na'; 'pauene@mwtc.gov.na'; 'psilishebo@mwtc.gov.na'; 'pssecretary@mwtc.gov.na'; 'bisey@namport.com.na'; 'elzevir@namport.com.na'; 'f.shilongo@namport.com.na'; 'j.shivoro@namport.com.na'; 'l.kufuna@namport.com.na'; 'max.kooper@namport.com.na'; 'p.nawaseb@namport.com.na'; 'r.ibwima@namport.com.na'; 'Raymond@namport.com.na'; 's.gariseb@namport.com.na'; 'widux@namport.com.na'; 'imulunga@namcor.com.na'; 'VSibeya@namcor.com.na'; 'info@namcor.com.na'; 'mbui@namcor.com.na'; 'pengelbrecht@swkmun.com.na'; 'pheita@swkmun.com.na'; 'janscholtz2@gmail.com'; 'abrahaj@telecom.na'; 'bettiewilskut@yahoo.nz'; 'hmukapuli@yahoo.com'; 'namfilua@mweb.com.na'; 'wggumede@gmail.com'; 'ceo@lrc.com.na'; 'abrummer@walvisbaycc.org.na'; 'Duushona@walvisbaycc.org.na'; 'enambahu@walvisbaycc.org.na'; 'lcoetzee@walvisbaycc.org.na'; 'lcoetzee@walvisbaycc.org.na'; 'mhaingura@walvisbaycc.org.na'; 'mthomas@walvisbaycc.org.na'; 'pmartin@walvisbaycc.org.na'; 'tobias@namfi.net'; 'skalomo@mwtc.gov.na'; 'hydrosan@iafrica.com'; 'noleen.green@gmail.com'; 'secretary@nha.org.na'; 'ronw@namfish.com'; 'empire@namibnet.com'; 'tafcooverseas@gmail.com'; 'taiyoct@mweb.co.za'; 'acorn@acornserv.com'; 'kani@maruhanichiro.co.jp'; 'bwa41205@nifty.com'; 'matthew.possessions@gmail.com'; 'info.largepelagicNamibia@gmail.com'; 'matthew.thynnusfishing@iway.na'; 'davelin@iway.na'; 'kurtl@marcofishing.com.na'; 'aweh2601@gmail.com'; 'ricky@castrobros.com.na'; 'pcarlson.na@gmail.com'; 'Carlson@asp.com.na'; 'sharon@tunga.com.na'; 'gerrie@novanam.com'; 'gerrie.h@tunacor.com.na'; 'Jerome.Mouton@namsov.com.na'; 'diazfi@mweb.com.na'; 'reini@ebony.life'; 'antonio@taiyo.com.na'; 'syreetak@corvima.com.na'; 'francois@marcofishing.com.na'; 'md@marcofishing.com.na'; 'secretary@nha.org.na'; 'pp@seawork.com.na'; 'bobboh@etalefishing.com'; 'mgheimat@iway.na'; 'arkfish@iafrica.com.na'; 'matthew.possessions@gmail.com'; 'ronniec@seaflower.com.na'; 'ronnie@marshallreef.com'; 'henning@namsov.com.na'; 'Henning.du.Plessis@namsov.com.na'; 'cjacobs@erongo.co.za'; 'calie@erongo.co.za'; 'louisa@freddiefishpro.com.na'; 'phitula@tunacor.com.na'; 'evandyk@etoshafish.com.na'; 'hugo@gendev.com.na'; 'mvanwyk@etoshafish.com.na'; 'nmp@mweb.com.na'; 'ronw@namfish.com'; 'evat@seaflower.com.na'; 'angela.kriel@ufefish.com'; 'pgreeff@etoshafish.com.na'; 'mat@pescanova.co.za'; 'novanam@novanam.com'; 'vanfish@mweb.com.na'; 'antonio.epifanio@na.abb.com'; 'diamantino@merlus.com.na'; 'tony@namibnet.com'; 'arkfish@iway.na'; 'imbili@mweb.com.na'; 'adolf.burger@apfishing.com'; 'adolf.burger@apfishing.com'; 'beira@iway.na'; 'a.olivier@benguella.com'; 'Jan.arnold@bidfish.com.na'; 'reyero@catofishing.com'; 'cdreyer@cadilu.com'; 'jswart@cadilu.com'; 'Sam.a@catofishing.com'; 'shimooshilirobert68@gmail.com'; 'swtern@gmail.com'; 'epata@iway.na'; 'diazfi@mweb.com.na'; 'ehanga.holdings@gmail.com'; 'empire@idz.namib.com'; 'charl@etalefishing.com'; 'petrus@etalefishing.com'; 'info@etalefishing.com'; 'pconradie@etoshafish.com.na'; 'georgeesau@yahoo.com'; 'linekelak@etoshafish.com.na'; 'prohse@etoshafish.com.na'; 'namcoast@iway.na'; 'yvette@freddiefishpro.com'; 'volker@gendev.com.na'; 'mail@gmurta.com';

Bcc: 'jeremyhangula@me.com'; 'ignacio@grupopereira.com'; 'Herman.Theron@olfitra.com.na'; 'rassie.erasmus@ol.na'; 'seagulls@africaonline.com.na'; 'klaus@hafico.com.na'; 'harold.kaune@hodagofishing.com'; 'labuschagne1605@gmail.com'; 'jlabuschagne@fnbNamibia.com.na'; 'beluga@tunacor.com.na'; 'jmp@namfish.com'; 'jw2s@afol.com.na'; 'llm@iway.na'; 'ludmar@iway.na'; 'md@marcofishing.com.na'; 'operations@marcofishing.com.na'; 'rene-dean@iway.na'; 'tomas@merlusseafood.com'; 'namfish@iafrica.com.na'; 'tommy@nmr.com.na'; 'Gerrie.Hough@namsov.com.na'; 'Herman.Smidt@namsov.com.na'; 'miken@seaflower.com.na'; 'yas@nipponex.co.za'; 'sama@namfish.com'; 'patriciaa@novanam.com'; 'juanm@novanam.com'; 'jmagdalena@novanam.com'; 'jrcc@novanam.com'; 'michaelm@novanam.com'; 'ferdinand@novaship.com.na'; 'titanias@oceana.co.za'; 'oshigwana@iway.na'; 'hkasper@mweb.co.za'; 'sandro@mweb.com.na'; 'sacky@omualu.com.na'; 'omuhuka@africaonline.com.na'; 'ondjaba@absamail.co.za'; 'mariele-ondjaba@mweb.com.na'; 'diamantino@merlus.com.na'; 'kent.yeh@pacificandes.com'; 'reception@blueseas.com.na'; 'atord@pescanova.co.za'; 'janp@seaflower.com.na'; 'sandrad@seaflower.com.na'; 'pg@seawork.com.na'; 'plr@seawork.com.na'; 'pp@seawork.com.na'; 'bvanzyl@seafo.org'; 'snh@iafrica.com.na'; 'dfc2@afol.com.na'; 'klausps@iway.na'; 'taiyoct@mweb.co.za'; 'antonio@tunacor.com.na'; 'richard.ahrens@ufefish.com'; 'ufefish@iafrica.com.na'; 'liaison@fishsa.org'; 'antwerpdeon@gmail.com'; 'clyde@molimoman.co.za'; 'Secretary@satla.co.za'; 'swalker@breakwaterproducts.com'; 'chairman@satla.co.za'; 'antonio.fonseca@galp.com'; 'k.kaura@impactoilandgas.com'; 'h.webber@impactoilandgas.co.uk'; 'tashi@lekoil.com'; 's.ilett@impactoilandgas.co.uk'; 'm.doherty@impactoilandgas.co.uk'; 'dennis.zekveld@shell.com'; 'travisncci@gmail.com'; 'pr@walvisbaycc.org.na'; 'charity@ncci.org.na'; 'malango@iway.na'; 'jkemper01@gmail.com'; 'jprouxnamibia@gmail.com'; 'hashali@benguelacc.org'; 'zukile@benguelacc.org'; 'ben@benguelacc.org'; 'paul@benguelacc.org'; 'kumbi@benguelacc.org'; 'monica@benguelacc.org'; 'cetn@iafrica.com.na'; 'bertchenk@iway.na'; 'earthl@iway.na'; 'selma.shitilifa@giz.de'; 'rodney.braby@giz.de'; 'ckandjii@nacoma.org.na'; 'intern1@nacoma.org.na'; 'ceo@n-c-e.org'; 'admin@n-c-e.org'; 'nam.dolphin.edu@gmail.com'; 'veripura@nnf.org.na'; 'agm@nnf.org.na'; 'simon.elwen@gmail.com'; 'nam.dolphin.project@gmail.com'; 'nam.dolphin.project@gmail.com'; 'information@news-namibia.org'; 'frauken@new-media-consult.com'; 'info@ncrst.na'; 'leah.temper@gmail.com'; 'info@joc.com.na'; 'marie-line.pagnoux@external.total.com'; 'elizabeth.pion@total.com'; 'jacques.grimaud@total.com'; Jeremy Blood; Andrew Bradbury

Dear Sir/ Madam

This email and attached letter provides notification under the Environmental Management Act, 2007 and the Environmental Impact Assessment (EIA) Regulations of an application by Total E and P Namibia B.V. for an Environmental Clearance Certificate (ECC) to undertake a proposed three-dimensional (3D) seismic survey off the coast of southern Namibia. SLR Environmental Consulting (Namibia) (Pty) Ltd has been appointed to undertake the EIA process for the proposed project.

As part of this process, notice is given that the Draft Scoping Report (DSR) compiled for the above-mentioned project is available for a 30-day review and comment period from 8 May to 8 June 2020. A copy of the Executive Summary of the DSR is attached for your reference.

Refer to the attached letter for further details.

Should you have any queries in this regard please do not hesitate to contact the undersigned (wpetrick@slrconsulting.com).

Yours sincerely



Jeremy Blood

From: Werner Petrick
Sent: 18 May 2020 04:06 PM
To: kolettegr@gmail.com
Cc: Jeremy Blood; Candice Sadan
Subject: Fw: PROPOSED 3D SEISMIC SURVEY IN LICENCE BLOCKS 2912 AND 2913B, NAMIBIA: PROJECT NOTIFICATION AND AVAILABILITY OF DRAFT SCOPING REPORT FOR REVIEW AND COMMENT

Attachments: ESIA_Na Seismic 2912_13B_DSR_200507_Rev4_Executive_Summary.pdf; TEPNA Seismic ESIA - I&AP letters (Eng & Afr).pdf

Follow Up Flag: Follow up
Flag Status: Completed

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Yours sincerely

Werner Petrick
SLR CONSULTING (NAMIBIA) (PTY) LTD

Werner Petrick
Technical Director and Environmental Assessment Manager

 +264 61 231 287
 +264 81 140 5968
 wpetrick@slrconsulting.com

19 May 2020

Environmental Commissioner
Ministry of Environment and Tourism
Department of Environmental Affairs
Private Bag 13346
Windhoek

ATTENTION: MR TIMO MUFETI

CC: Ms Saima Angula & Mr Damian Nchindo

Dear Sir,

TOTAL E AND P NAMIBIA B.V. - PROPOSED 3D SEISMIC SURVEY IN LICENCE BLOCKS 2912 AND 2913B, NAMIBIA: AUTHORITY MEETING

Your Department's acknowledgment of the ECC Application on 30 April 2020 (ref. no. APP-001376) and subsequent discussion with Mr Damian Nchindo on 13 May 2020 regarding the above-mentioned project, refer.

As you may be aware, Total E and P Namibia B.V. ("TEPNA") is planning to undertake a 3D seismic survey within these licence blocks. SLR Environmental Consulting (Namibia) (Pty) Ltd ("SLR"), as the appointed independent Environmental Assessment Practitioner, has compiled and released the Draft Scoping Report (DSR) for a 30-day comment period from 8 May to 8 June 2020.

After closure of the comment period, the DSR will then be updated into a final report, incorporating all comments received during this period. Thereafter, the final report will be submitted to the Ministry of Mines and Energy (MME): Directorate of Petroleum Affairs (the Competent Authority for this EIA Application), for its review, who will forward its comments and the report to your Department for consideration. The final report will also be uploaded to your Department's online portal.

In order to facilitate your review of the Scoping Report, SLR would like to offer the possibility of presenting the findings of the draft report. Should you feel the need for such a meeting, it would be appreciated if you could confirm what dates during the comment period (until 8 June 2020), or once you've received the final report, will suit you for such a meeting. Should you not see the need for such a meeting at this stage, this is completely understandable.

Should you have any queries in this regard please do not hesitate to contact the undersigned.

Yours sincerely



Werner Petrick

SLR CONSULTING (NAMIBIA) (PTY) LTD



SLR Environmental Consulting (Namibia) (Proprietary) Limited

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Postal Address: PO Box 86386, Windhoek, 10009 Tel: +264 61 231 287 Fax: +264 61 231 289

www.slrconsulting.com

19 May 2020

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Department of Environmental Affairs
Private Bag 13346
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Yours sincerely



Werner Petrick
SLR CONSULTING (NAMIBIA) (PTY) LTD

Date: 19 May 2020Sign: [Signature]

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Postal Address: PO Box 86386, Windhoek, 10009 Tel: +254 61 231 297 Fax: +254 61 231 289

www.slrconsulting.com

21 May 2020

Permanent Secretary / Executive Director
Ministry of Fisheries and Marine Resources (MFMR)
Private Bag 13355
Windhoek, Namibia
Fax: +264 61 224 566
Email: Moses.Maurihungirire@mfmr.gov.na

ATTENTION: DR MOSES MAURIHUNGIRIRE

CC. La Toya Shivute, Tomas Shapaka, Joyce Mbuende and Anja Kreiner

Dear Sir

TOTAL E AND P NAMIBIA B.V. - PROPOSED 3D SEISMIC SURVEY IN LICENCE BLOCKS 2912 AND 2913B, NAMIBIA: REQUEST FOR ACCESS TO FISHERIES DATA

Our previous email correspondence with Ms La Toya Shivute regarding the above-mentioned project refers.

SLR Environmental Consulting (Namibia) (Pty) Ltd ("SLR") has been appointed by Total E and P Namibia B.V. ("TEPNA") to undertake an Environmental Impact Assessment (EIA) for a proposed 3D Seismic Survey in Licence Blocks 2912 and 2913B, Orange Basin, Namibia.

In order for us to assess the potential impacts on the fishing sectors operating in the proposed survey area we require recent spatial and temporal data of fishing effort and catch of the various sectors. In order to put the impact into context, it is important to calculate the percentage overlap the survey area has with the various sectors. This requires data for the entire Namibian EEZ, not just the survey area.

we have previously received the following data from your Ministry:

- Demersal trawl catch (2005 – 2018)
- Demersal long-line catch (2005 - 2015)
- Large Pelagic long-line effort (2008 - 2013)
- Tuna pole-and-line effort (2009 - 2013)
- Line-fish catch (2005 - 2015)
- crab catch (2003 - 2011)
- Purse-seine catch (2005 - 2017)
- Midwater trawl catch (2005 – 2018)

Some of this data is now unfortunately slightly out of date (specifically the demersal long-line, large pelagic long-line, tuna pole, line-fish and crab) and it would be greatly appreciated you could authorise the sharing of more updated data for these sectors.

We hope you find this request in order and look forward to hearing from you in this regard. Please do not hesitate to contact the undersigned should you have any queries in this regard.

Yours sincerely



Werner Petrick

SLR CONSULTING (NAMIBIA) (PTY) LTD



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Postal Address: PO Box 86386, Windhoek, 10009 Tel: +264 61 231 287 Fax: +264 61 231 289

www.slrconsulting.com

Jeremy Blood

From: Werner Petrick
Sent: 21 May 2020 12:09 PM
To: Moses.Maurihungirire@mfmr.gov.na; mmaurihungirire@gmail.com
Cc: Thomas.Shapaka@mfmr.gov.na; Anja.Kreiner@mfmr.gov.na; La Toya Shivute; Jeremy Blood; Sarah Wilkinson; joyce.mbuende@mfmr.gov.na
Subject: Fw: TEPNA proposed 3D Seismic survey EIA - fishing catch / effort data
Attachments: ESIA_Na Seismic 2912_13B_MFMR_Fisheries_Data_200521_Rev0.pdf

Dear Dr Maurihungirire

With reference to the e-mail correspondence below, please refer to the attached letter regarding our request for access to fisheries data, relating to the above mentioned activity / EIA process.

Please feel free to contact me should you need any further information.

Kind regards,

Werner

Werner Petrick

Technical Director and Environmental Assessment Manager

+264 61 231 287
+264 81 140 5968
wpetrick@slrconsulting.com

SLR Consulting
SLR Environmental Consulting (Namibia) (Pty) Ltd
8 General Murtala Muhammed Street
Ernst
Windhoek,

From: La Toya Shivute <LaToya.Shivute@mfmr.gov.na>
Sent: Wednesday, 20 May 2020 16:38
To: Werner Petrick <wpetrick@slrconsulting.com>
Subject: Re: TEPNA proposed 3D Seismic survey EIA - fishing catch / effort data

Hi Werner,

Consulted my colleagues, so this request also needs an official letter to ED (via email) in mean time we will also try to prepare the data for you, while we wait for directives to share data. also in your emails to the ED always Cc: Me, Anja, ED, Tomas Shapaka (Secretary to ED), Joyce Mbuende (PA to ED)

Contact details you may need :-)

Ms. Joyce R. Mbuende
Personal Assistant

Office of the Executive Director
Ministry of Fisheries and Marine Resources
Private Bag 13347
Windhoek

APPENDIX 2.5:
MINUTES OF FOCUS GROUP MEETINGS



TOTAL E&P NAMIBIA B.V. (TEPNA) - ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR 3D SEISMIC SURVEY IN BLOCKS 2912 / 2913B

MINUTES OF FOCUS GROUP MEETING

DATE	15 May 2020	
VENUE:	Ministry of Fisheries and Marine Resources (MFMR), Swakopmund	
PROJECT:	Environmental and Societal Impact Assessment (ESIA) for a 3D Seismic Survey in Blocks 2912 / 2913B, Orange Basin, Southern Namibia	
SLR COMPANY:	SLR Environmental Consulting (Namibia) (Pty) Ltd	
PROJECT NUMBER:	733.20071.00002	
PURPOSE:	<p>The objectives of the meeting were to:</p> <ul style="list-style-type: none"> • Provide notification of project and ECC application • Provide a description of the 3D seismic survey • Provide a description of the EIA process • Provide an initial opportunity to be involved in the EIA and provide comment • Identify potential environmental issues and impacts • Describe the way forward, highlighting further opportunities to be involved in the EIA process. 	
ATTENDANCE:	Name:	Organisation:
	F. Hamukwaya (FH)	MFMR
	L Shivutu (LS)	MFMR
	A. Kreiner (AK)	MFMR
	V. Libuku (VL)	MFMR
	L. Nghimuatya (LN)	MFMR
	T. Shikogo (TS)	MFMR
	A. Namboga (AN)	MFMR
	W. Petrick (WP)	SLR
DISTRIBUTION	Attendees – Refer to Attendance Register in Appendix A	

NO.	NOTES	ACTION
1	WELCOME AND INTRODUCTION	
1.1	<p>The meeting commenced at 10h00. WP welcomed all to the Scoping Meeting. This was followed by a short introduction, which included the following:</p> <ul style="list-style-type: none"> • Introduction of all attendees; • Apologies: TEPNA representative(s) not attending due to COVID-19 travel restrictions; • HSE moment; • Meeting agenda; and • Objectives of the meeting. <p>In terms of the HSE moment, the following was discussed:</p>	

NO.	NOTES	ACTION
	<ul style="list-style-type: none"> • COVID-19 requirements, i.e. face masks and less than 10 people to attend a meeting. • Linked to COVID-19 and meeting restrictions, the issue relating to public meetings during the EIA process were discussed - refer to point 3.1 below. 	
2	PRESENTATION	
2.1	<p>WP provided an overview of proposed project and EIA process. The presentation included the following aspects:</p> <ul style="list-style-type: none"> • Location and size of the two license blocks (1912 and 2913B); • TEPNA overview and shareholding in the two blocks; • Namibian Work Programme; • Proposed project activities (3D seismic survey); • EIA process; • Receiving environment; and • Key environmental and social issues. <p>Refer to presentation in Appendix B.</p>	
3	DISCUSSION (QUESTIONS / COMMENTS RAISED BY MFMR AND ANSWERS)	
3.1	<p>MFMR question / comment:</p> <ul style="list-style-type: none"> • How will SLR handle the EIA process and specifically the public participation, taking into consideration that no (open) public meetings can be held as part of EIA processes due to the current COVID-19 restrictions? • SLR could also consider radio announcements or interviews in future. <p>SLR Response:</p> <ul style="list-style-type: none"> • During the planning phase of the EIA (Stakeholder Engagement Plan), SLR developed various possible public participation strategies, depending on the “lockdown” requirements and possible further restrictions or relaxations. • The current plan during the Scoping phase, based on the current restrictions, will be to conduct either smaller Focus Group (or one-on-one) meetings or virtual meetings. This is over and above the other public participation actions undertaken, including newspaper adverts, e-mail correspondence, the distribution of the Draft Scoping Report (DSR) for comment via e-mail, telephone calls, site notices, etc. • Radio announcements are sometimes an effective tool for public participation and could be considered during the assessment phase of the EIA as a form of notification, if necessary, depending on possible future COVID-19 restrictions. 	
3.2	<p>MFMR question / comment:</p> <ul style="list-style-type: none"> • Considering the current COVID-19 situation worldwide, will TEPNA still continue with its plans to drill the exploration well (Venus-1) in 2020? <p>SLR Response:</p> <ul style="list-style-type: none"> • As per the current planning, referring to slide 7 in the presentation, TEPNA is planning to drill in 2020. However, the future COVID-19 restrictions could influence the timing of the drilling. 	

NO.	NOTES	ACTION
	<ul style="list-style-type: none"> WP indicated that he could not respond any further on the likelihood of drilling on behalf of TEPNA. 	
3.3	<p>MFMR question / comment:</p> <ul style="list-style-type: none"> How long did the 2D seismic survey take to acquire (i.e. how many months)? Are there any lessons that can be learnt or information that can be used from this survey for future surveys, e.g. behavioural impacts that were noted / monitored? <p>SLR Response:</p> <ul style="list-style-type: none"> The 2D recon survey data was purchased in 2019. WP indicated that since the data was purchased, he did not know the details of the 2D survey. WP indicated that he would try obtain additional information and revert. 	WP to respond (via email) to these questions, if possible.
3.4	<p>MFMR question / comment:</p> <ul style="list-style-type: none"> Considering the potential socio-economic benefits, how many people will be employed through the proposed 3D seismic survey project? <p>SLR Response:</p> <ul style="list-style-type: none"> The survey vessel will accommodate up to 60 people working on 12-hour rotations. In addition, the support and escort vessels will include a crew of approximately 6 to 10 people each. However, the vessel contractor will have its own crew and unfortunately this type of (exploration) project will not result in many local employment opportunities. Various “indirect” business opportunities will, however, be possible due to the need for supplies (equipment, fuel, food and water), material to be loaded / unloaded, support vessels, accommodation requirements onshore, etc. These potential impact of these employment and business opportunities will be assessed during the impact assessment phase of the EIA. 	
3.5	<p>MFMR question / comment:</p> <ul style="list-style-type: none"> What does the “critical (i.e. red area) ecosystem” on slide 13 entail? <p>SLR Response:</p> <ul style="list-style-type: none"> The benthic habitats have been assigned an ecosystem threat status (‘Least Threatened’, ‘Vulnerable’, ‘Endangered’ or ‘Critically Endangered’) based on their level of protection, which is presented on the top figure in slide 13. The red area relates to the Lüderitz Shelf Edge. 	
3.6	<p>MFMR question / comment:</p> <ul style="list-style-type: none"> In the executive summary, it is stated that deep-water trawl fishery is currently closed. What does this refer to? <p>SLR Response:</p> <ul style="list-style-type: none"> The deep-water trawl fishery is a small fishing sector targeting orange roughy (and alfonsino – added to the minutes after the meeting). 	

NO.	NOTES	ACTION
3.7	<p>MFMR question / comment</p> <ul style="list-style-type: none"> • Some of the fishing effort data presented in the DSR are relatively old data, i.e. up to 2013. • A question (directed to MFMR) is whether more recent data cannot be provided to SLR. • Certain efforts (i.e. tuna) might show a drop over the last few years and it will be good to show the time series of records. 	
	<p>SLR Response:</p> <ul style="list-style-type: none"> • The Environmental Team will submit to your office further information requirements, by email, specifying the additional data required for the EIA. The additional information will better describe the (more recent) baseline information and better contextualise the assessment of impacts relating to Fishing. 	<p>WP to send e-mail to MFMR requesting further more updated fisheries data / information</p>
3.8	<p>MFMR question / comment</p> <ul style="list-style-type: none"> • What is the general mitigation measures that will be applied during the execution of the 3D seismic survey? 	
	<p>SLR Response:</p> <ul style="list-style-type: none"> • The management and mitigation measures will be developed as an outcome of the specialist studies and EIA. These measures will be included in the EMP. However, typical (key) management and mitigation measures include the following: <ul style="list-style-type: none"> ○ 30-minute pre-watch survey by Marine Mammal Observer (MMO) and Passive Acoustic Monitoring (PAM) Observer – confirm presence of mammals & turtles within the 500 m mitigation zone around the airgun. ○ 20-minute soft start - ramp-up of noise over a period of 20 minutes. ○ If animal(s) are confirmed to be in the 500 m mitigation zone when the airguns are active, the MMO or PAM operator will ask for temporary termination of activities. Thereafter, the start-up procedures will again be implemented. 	
3.9	<p>MFMR question / comment</p> <ul style="list-style-type: none"> • Can we please get a copy of the presentation? 	
	<p>SLR Response:</p> <ul style="list-style-type: none"> • WP provided MFMR with an electronic copy (in PDF) of the presentation after the meeting. 	

NO.	NOTES	ACTION
4	THE WAY FORWARD	
4.1	WP outlined the way forward as follows: <ul style="list-style-type: none"> • Initial comments on the DSR to reach SLR by 8 June 2020. • Comments received will be included in the Final Scoping Report for submission to MME and MEFT. • Draft EIA Report and ESMP will be distributed for 30-day comment period in July 2020. 	
5	CLOSE	
5.1	The meeting was closed at 11:30.	

APPENDIX A: ATTENDANCE REGISTER

SCOPING PHASE FOCUS GROUP MEETING: ATTENDANCE REGISTER

Date: 15 May Time: 10:00 Venue: MFMR - Swakopmund

Name	Organisation	Postal address	Tel / Cell No.	E-mail	Signature
Andre-Thomas	MFMR	P.O. Box 3865	0813003008	andre2mani@gmail.com	
F. Hamukwaya	MFMR	Box 912, SWK	0812444495	Ferdinand.Hamukwaya@mfmr.gov.na	
KaTjayaShivuthi	MFMR	P.O. Box 912 SWK	0812082784	katjaya.shivute@mfmr.gov.na	
Anga Krenow	MFMR	Box 912 SWK	081 2896878	Anga.Krenow@mfmr.gov.na	
Victor Miti Haulke	MFMR	P.O. Box 912 SWK	0811468142	Victor.Libuku@mfmr.gov.na	
Lavinia Nghimurhyanh	MFMR	P.O. BOX 912 SWK	0811226175	Lavinia.Nghimurhyanh@mfmr.gov.na	
Taimi Shitongo	MFMR	PO BOX 912 SWK	0813327664	taimi.shitongo@mfmr.gov.na	
Werner Petrick	SLR	PO Box 8386 Wlk	0811405968	wpetrick@slrconsulting.com	

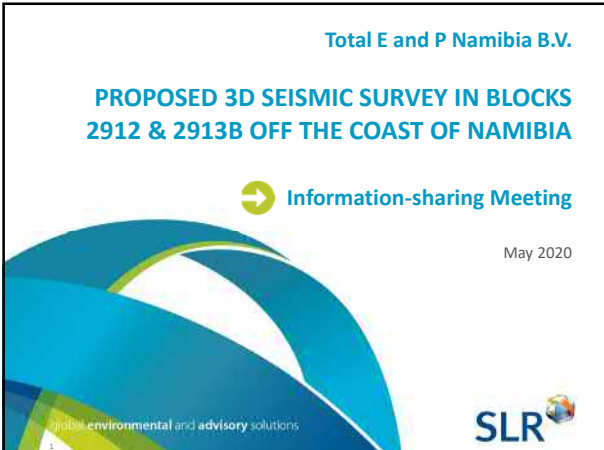
APPENDIX B: PRESENTATION

Total E and P Namibia B.V.

PROPOSED 3D SEISMIC SURVEY IN BLOCKS 2912 & 2913B OFF THE COAST OF NAMIBIA

Information-sharing Meeting

May 2020



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Agenda

- Introduction
 - > HSE moment
 - > Introduction
 - > Meeting Objectives
- Presentations
 - > TEPNA Overview
 - > Namibian Work Programme
 - > Seismic surveys
 - > Project Description
 - > EIA Overview
 - > Namibian Regulated EIA Process
 - > Receiving Environment
 - > Key Issues
- Way Forward and Next Opportunity to Comment
- Question and Answer Session



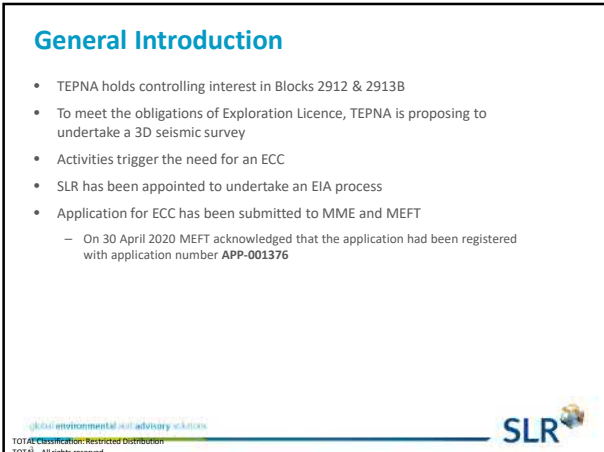

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General Introduction

- TEPNA holds controlling interest in Blocks 2912 & 2913B
- To meet the obligations of Exploration Licence, TEPNA is proposing to undertake a 3D seismic survey
- Activities trigger the need for an ECC
- SLR has been appointed to undertake an EIA process
- Application for ECC has been submitted to MME and MEFT
 - On 30 April 2020 MEFT acknowledged that the application had been registered with application number **APP-001376**




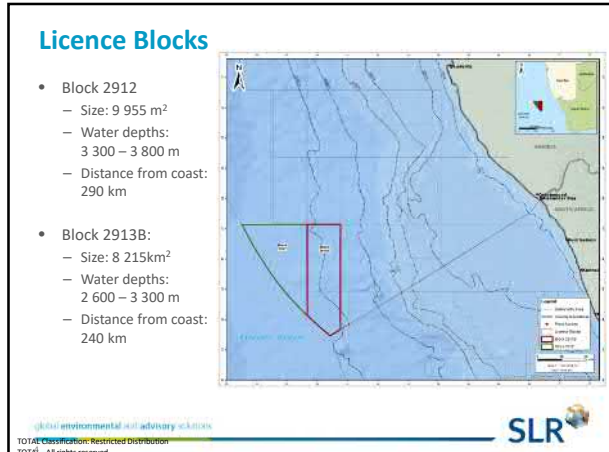
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Licence Blocks

- Block 2912
 - Size: 9 955 m²
 - Water depths: 3 300 – 3 800 m
 - Distance from coast: 290 km
- Block 2913B:
 - Size: 8 215km²
 - Water depths: 2 600 – 3 300 m
 - Distance from coast: 240 km

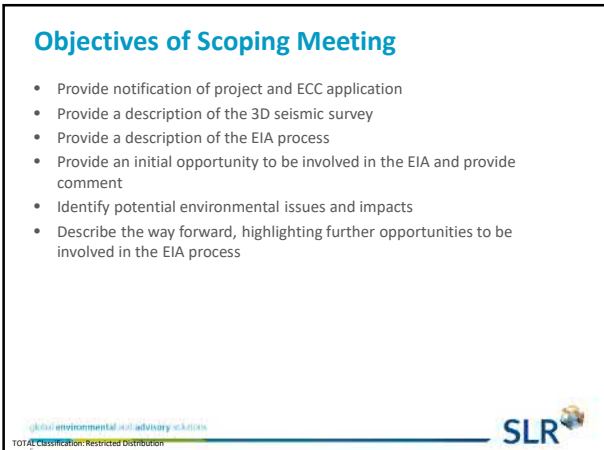
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Objectives of Scoping Meeting

- Provide notification of project and ECC application
- Provide a description of the 3D seismic survey
- Provide a description of the EIA process
- Provide an initial opportunity to be involved in the EIA and provide comment
- Identify potential environmental issues and impacts
- Describe the way forward, highlighting further opportunities to be involved in the EIA process




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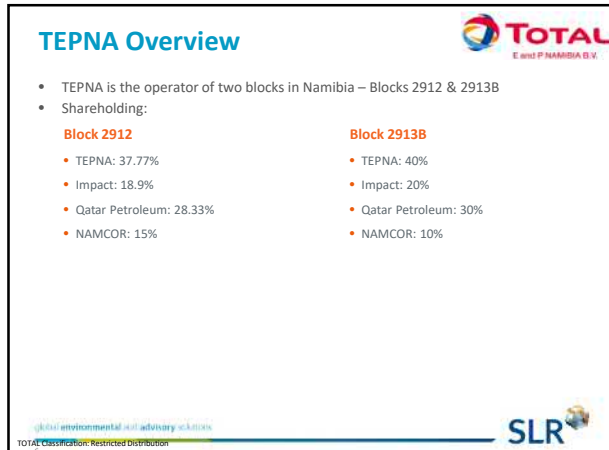
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TEPNA Overview



- TEPNA is the operator of two blocks in Namibia – Blocks 2912 & 2913B
- Shareholding:

<p>Block 2912</p> <ul style="list-style-type: none"> • TEPNA: 37.77% • Impact: 18.9% • Qatar Petroleum: 28.33% • NAMCOR: 15% 	<p>Block 2913B</p> <ul style="list-style-type: none"> • TEPNA: 40% • Impact: 20% • Qatar Petroleum: 30% • NAMCOR: 10%
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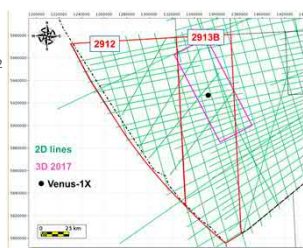
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Namibian Work Programme



- Preparatory studies:
 - 2913B: Metocean and Environmental Baseline Study in 2018 / 2019
- Data Purchase:
 - 2012-2014 : 2D seismic
 - 2017 : 3D seismic mainly over 2913B
 - 2019 : 1 097 km 2D mainly over 2912
- Exploration Well (2913B):
 - Venus-1: mid 2020
- Acquisition:
 - Proposed 3D seismic survey
 - Contingent to Venus-1 Well success



2D lines
3D 2017
● Venus-1X

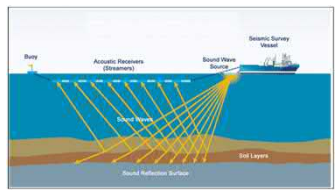
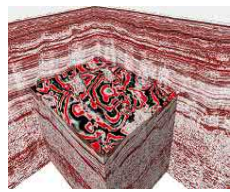
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Seismic Surveys

- Geophysical technique using acoustic energy to map the geological structures of the seabed and identify possible hydrocarbon reserves
- High-level, low frequency sounds are emitted from the sound source (owed airgun) towards the seabed
- The acoustic signal penetrates the seabed, then is reflected by the rock formations
- Reflected signals are recorded by towed receivers (or hydrophones)
- Analyses of the returned signals allow for interpretation of subsea geology

Principles of offshore seismic acquisition surveys

Example of 3D image

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Seismic Surveys



Example of a survey vessel, Polar Empress



Airgun array – 2 to 3 arrays; up to 8 m deep



Hydrophone streamer – 14 streamers up to 8 800 m long and 25 m deep




Tail buoy at end of streamer

SLR

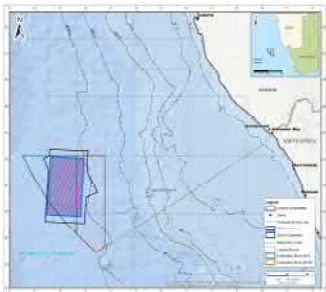
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Project Description



- Survey details:
 - Survey area: 6 474 km²
 - Operation area: 9 797 km²
 - Distance offshore: ± 265 km
 - Duration: 100 days
 - Commencement date: December 2020 / January 2021
- Vessels:
 - 1 x survey vessel
 - 1 x support vessel
 - 1 x escort vessel – maintain 500 m safety zone
- Possible helicopter support
- Onshore logistics base options:
 - Lüderitz (± 320 km)
 - Walvis Bay (± 690 km)

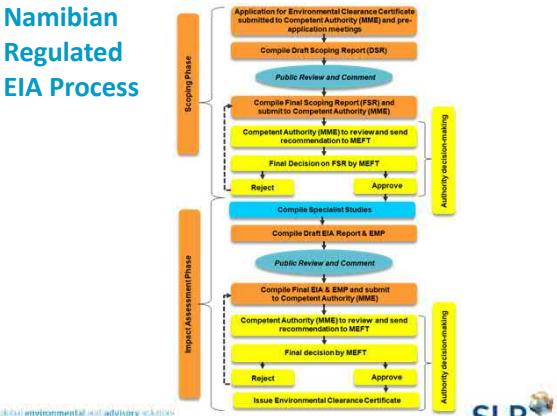


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Namibian Regulated EIA Process



Scoping Phase

- Application for Environmental Clearance Certificate submitted to Competent Authority (MME) and pre-application meetings
- Compile Draft Scoping Report (DSR)
- Public Review and Comment
- Compile Final Scoping Report (FSR) and submit to Competent Authority (MME)
- Competent Authority (MME) to review and send recommendation to MEFT
- Final Decision on FSR by MEFT
- Reject / Approve

Impact Assessment Phase

- Complete Specialist Studies
- Compile Draft EIA Report & EMP
- Public Review and Comment
- Compile Final EIA & EMP and submit to Competent Authority (MME)
- Competent Authority (MME) to review and send recommendation to MEFT
- Final decision by MEFT
- Reject / Approve
- Issue Environmental Clearance Certificate

Authority decision-making

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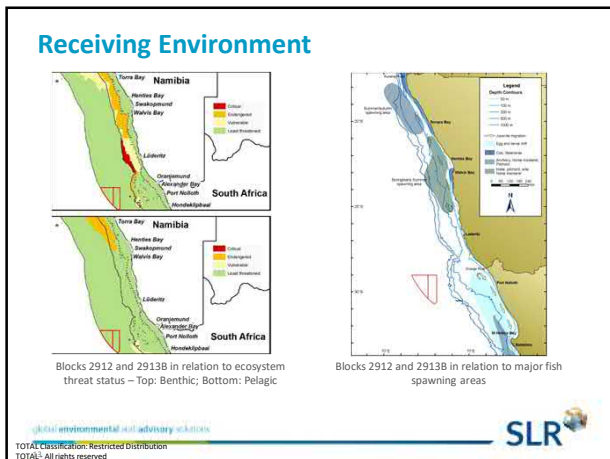
EIA Process - Anticipated EIA Programme

- Scoping Report
 - Distribute Draft Scoping Report for 30-day review: **8 May – 8 June 2020**
 - Submit Final Scoping report to MME / MEFT: **mid June 2020**
- EIA Report and ESMP
 - Distribute Draft EIA Report & ESMP for 30-day review: **July 2020**
 - Submit Final EIA Report & ESMP to MME / MEFT: **September 2020**

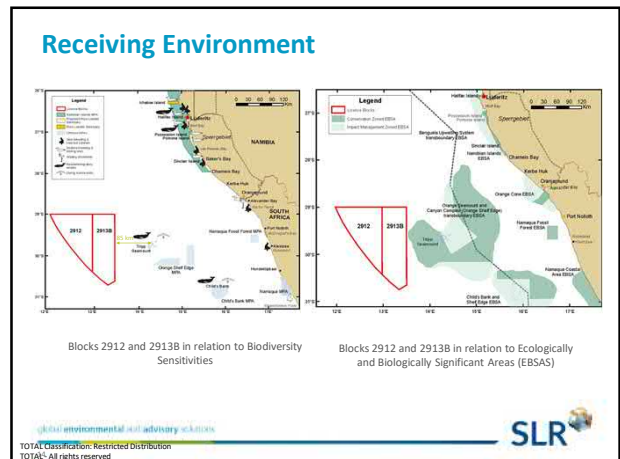
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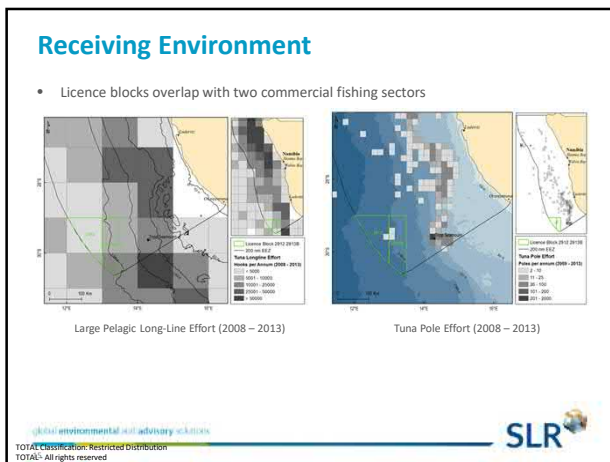
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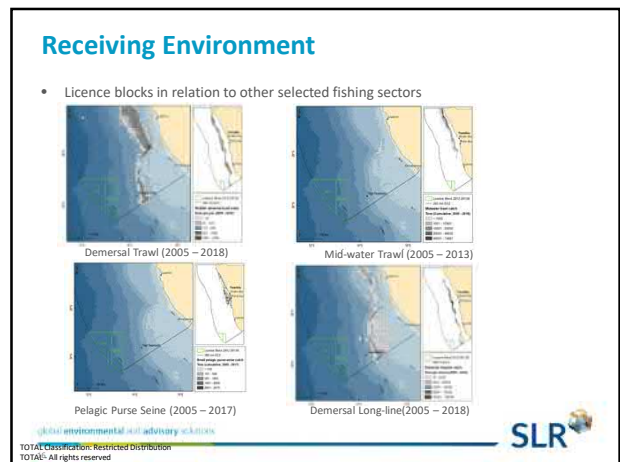
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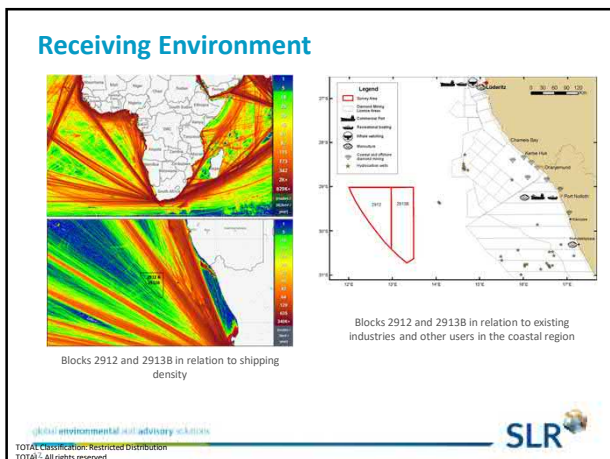
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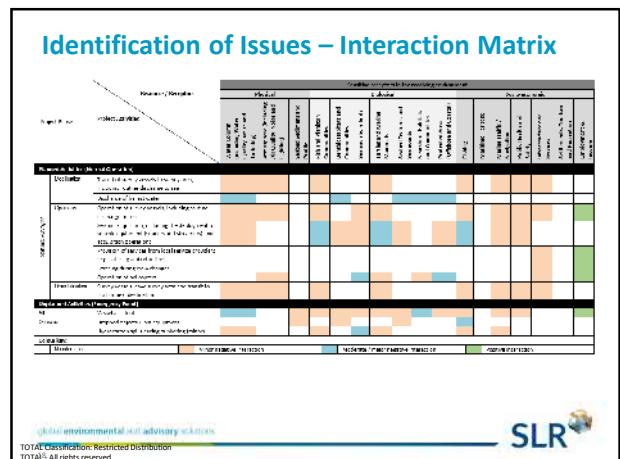
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18

Key Issues

- **Marine Ecology** – Potential Impacts
 - Normal discharges to air and sea, incl. sewage, galley waste, etc.
 - Introduction of alien invasive marine species through ballast water discharge
 - Seismic noise impact on marine fauna, including TTS, PTS and behaviour
 - Disturbance of marine fauna due to noise and lighting
 - Accidental oil / fuel spills
 - Lost equipment




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Key Issues

- **Fishing** – Potential Impacts
 - Disruption to fishing operations and temporary loss of access to fishing grounds due to the 500 m safety zone
 - Fish avoidance of survey area and changes in feeding behaviour due to seismic noise
 - Accidental oil / fuel spills
 - Lost equipment



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Key Issues

- **Socio-Economic** – Potential Impacts
 - Disruption of commercial fisheries (as per previous slide)
 - Short-term employment and business opportunities – 3- 4 months
 - Interference with shipping routes as a result of the 500 m safety zone



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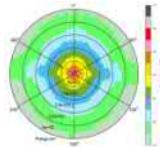
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Specialist Studies

- **Modelling studies:**
 - Noise modelling

This information will be used to inform the specialist assessments.
- **Specialist Assessments:**
 - Commercial fisheries impact assessment
 - Marine fauna impact assessment
 - Social Assessment



Assessments will include:

- ✓ Baseline description
- ✓ Assess potential impacts
- ✓ Identify management and mitigation measures

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Way Forward

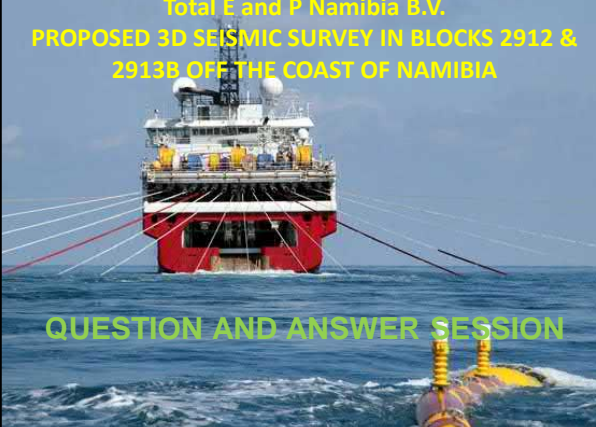
- Initial comments must reach SLR by **8 June 2020**
- Comments received will be included in the Final Scoping Report
- Draft EIA Report and ESMP will be distributed for 30-day comment period: **July 2020**

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Total E and P Namibia B.V.
PROPOSED 3D SEISMIC SURVEY IN BLOCKS 2912 & 2913B OFF THE COAST OF NAMIBIA



QUESTION AND ANSWER SESSION

24



**TOTAL E&P NAMIBIA B.V. (TEPNA) - ENVIRONMENTAL AND SOCIAL IMPACT
ASSESSMENT (ESIA) FOR 3D SEISMIC SURVEY IN BLOCKS 2912 / 2913B**

MINUTES OF FOCUS GROUP MEETING

DATE	26 May 2020	
VENUE:	Ministry of Fisheries and Marine Resources (MFMR), Lüderitz	
PROJECT:	Environmental and Societal Impact Assessment (ESIA) for a 3D Seismic Survey in Blocks 2912 / 2913B, Orange Basin, Southern Namibia	
SLR COMPANY:	SLR Environmental Consulting (Namibia) (Pty) Ltd	
PROJECT NUMBER:	733.20071.00002	
PURPOSE:	<p>The objectives of the meeting were to:</p> <ul style="list-style-type: none"> • Provide notification of project and ECC application • Provide a description of the 3D seismic survey • Provide a description of the EIA process • Provide an initial opportunity to be involved in the EIA and provide comment • Identify potential environmental issues and impacts • Describe the way forward, highlighting further opportunities to be involved in the EIA process. 	
ATTENDANCE:	Name:	Organisation:
	K. Grobler (KG)	MFMR
	J.P. Roux (JR)	Private (previously with MFMR)
	J. Kemper (JK)	Private (scientist)
	M. Sanzila (MS)	Marvin Environmental Projects Consultant
	W. Petrick (WP)	SLR
DISTRIBUTION	Attendees – Refer to Attendance Register in Appendix A	

NO.	NOTES	ACTION
1	WELCOME AND INTRODUCTION	
1.1	<p>The meeting commenced at 10h00. WP welcomed all to the Scoping Meeting. This was followed by a short introduction, which included the following:</p> <ul style="list-style-type: none"> • Apologies: TEPNA representative(s) not attending due to COVID-19 travel restrictions; • HSE moment, which included a brief discussion about wearing of face masks and social distancing requirements; • Meeting agenda; and • Objectives of the meeting. 	

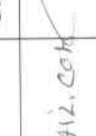
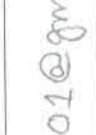



NO.	NOTES	ACTION
2	PRESENTATION	
2.1	<p>WP provided an overview of proposed project and EIA process. The presentation included the following aspects:</p> <ul style="list-style-type: none"> • Location and size of the two license blocks (1912 and 2913B); • TEPNA overview and shareholding in the two blocks; • Namibian Work Programme; • Proposed project activities (3D seismic survey); • EIA process; • Receiving environment; and • Key environmental and social issues. <p>Refer to presentation in Appendix B.</p>	
3	DISCUSSION (QUESTIONS / COMMENTS RAISED BY MFMR, JR and JK)	
3.1	<p>Question / comment:</p> <p><u>Tuna Fishing</u></p> <ul style="list-style-type: none"> • How will the proposed seismic activities impact the fishing sector, specifically the tuna sector? • This issue is usually not effectively taken into account. • The migration of tuna, and not only the specific areas where the fishing is undertaken, needs to be considered in the assessment. Little information (data) is available on the migration routes. The seismic activities could alter the migration route of the tuna, which could impact the tuna fishing sector. • Tuna fishing months commence in November and extend until April /May, with the peak between February / March. • Best time for the seismic activities would be between June to September. <p><u>Whales</u></p> <ul style="list-style-type: none"> • The migration of whales also needs to be taken into consideration in the impact assessment - this conflicts with the suggested survey period. • Southern Right whales would not be an issue as they migrate closer to shore. • Not much information (data) existing relating to the migration routes of other whale species (i.e. hump back whales). Over the last 5 to 6 years, more whales have been observed closer to the coast, also off-shore of southern Namibia. It is also thought that whales are now feeding during migration, which might not have been the case previously. 	
	<p>SLR Response:</p> <ul style="list-style-type: none"> • The potential impacts on the tuna fishing sector, amongst others, as well as the impact on whales will be assessed in the EIA Report. Tuna migration will also need to be considered. • With reference to the timing for the seismic activities, which will take approximately 100 days to complete, various factors need to be taken into account, including the weather and ocean conditions and the safety of the crew undertaking the activities, etc. 	

NO.	NOTES	ACTION
3.2	<p>Question / comment:</p> <ul style="list-style-type: none"> Is SLR also meeting with the Tuna Sector? <p>SLR Response:</p> <ul style="list-style-type: none"> SLR has liaised with relevant people in the Tuna Fishing sector through email correspondence and telephone calls and offered to arrange Focus Group meetings as and when required. It was noted that a meeting has been arranged with Jason Burges (tuna fishery) on 28 May 2020 in Lüderitz. 	
3.3	<p>Question / comment:</p> <ul style="list-style-type: none"> Is there any monitoring information (i.e. observations) available from the 2D survey previously undertaken? This could provide useful information. <p>SLR Response:</p> <ul style="list-style-type: none"> The 2D reconnaissance survey data was purchased in 2019. Since TEPNA was not involved with this survey, it does not have the MMO Reports, which highlight the observations / monitoring findings. <p>Comment:</p> <ul style="list-style-type: none"> TEPNA should try to obtain this information to be referred to in the EIA currently being undertaken. 	
3.4	<p>Comment:</p> <ul style="list-style-type: none"> The observations made by MMOs is only useful on the day in terms of the specific actions to be taken during the survey. The information that will be recorded by the observers can be very useful for future studies, etc. and needs to be shared with MFMR. It can provide a lot of value to others as well, i.e. when other companies plan to conduct exploration activities and want to buy the information. The MMOs must be well trained / qualified to be able to record accurate and sufficient data about the observations made, i.e. correct species, etc. Information should also be shared with international institutions, i.e. the International Whaling Commission to be incorporated onto a central database. 	
3.5	<p>Comment:</p> <ul style="list-style-type: none"> In the event that helicopters are used for crew changes, the overflight regulations of NIMPA need to be taken into consideration. This might require altering flight paths between land and the vessel. As a guideline, the minimum allowance is a 1 000 m from the protected islands. 	
4	THE WAY FORWARD	
4.1	<p>WP outlined the way forward as follows:</p> <ul style="list-style-type: none"> Initial comments on the DSR to reach SLR by 8 June 2020. Comments received will be included in the Final Scoping Report for submission to MME and MEFT. Draft EIA Report and ESMP will be distributed for 30-day comment period in July 2020. 	
5	CLOSE	
5.1	The meeting was closed at 11:30.	

APPENDIX A: ATTENDANCE REGISTER

SCOPING PHASE FOCUS GROUP MEETING: ATTENDANCE REGISTER

Date: 26/5/20 Time: 10:00 Venue: MFMR - Luderitz office

Name	Organisation	Postal address	Tel / Cell No.	E-mail	Signature
J P ROUX		PO Box 583 Luderitz	0813083949	JPROUXNAMIBIA@GMAIL.COM	
J. Kemper	private	"	0813231110	j.kemper01@gmail.com	
M. SANZICA	MARVIN ENV. PROJECT CONST. CC		0814778279	MARVINCONSULTANTS@OUTLOOK.CO	
K. GROBSLER	MFMR	Box 394 LUDERITZ	0812834888	Koletterg@gmail.com	
W. Petrick	SLR	PO Box 8127 Swak.	0811405968	wpetrick@slr.com.na	



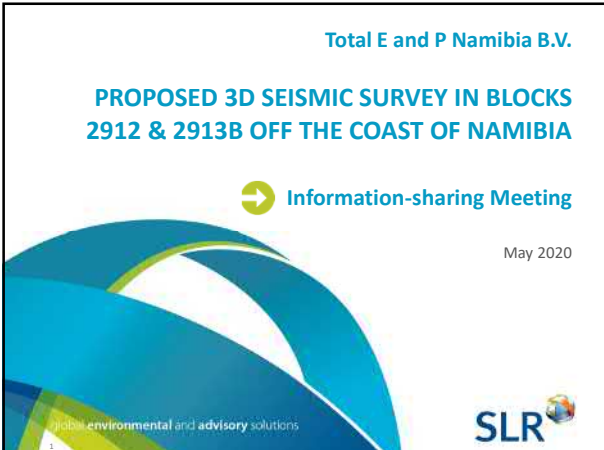
APPENDIX B: PRESENTATION

Total E and P Namibia B.V.

PROPOSED 3D SEISMIC SURVEY IN BLOCKS 2912 & 2913B OFF THE COAST OF NAMIBIA

Information-sharing Meeting

May 2020



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1

Agenda

- Introduction
 - > HSE moment
 - > Introduction
 - > Meeting Objectives
- Presentations
 - > TEPNA Overview
 - > Namibian Work Programme
 - > Seismic surveys
 - > Project Description
 - > EIA Overview
 - > Namibian Regulated EIA Process
 - > Receiving Environment
 - > Key Issues
- Way Forward and Next Opportunity to Comment
- Question and Answer Session



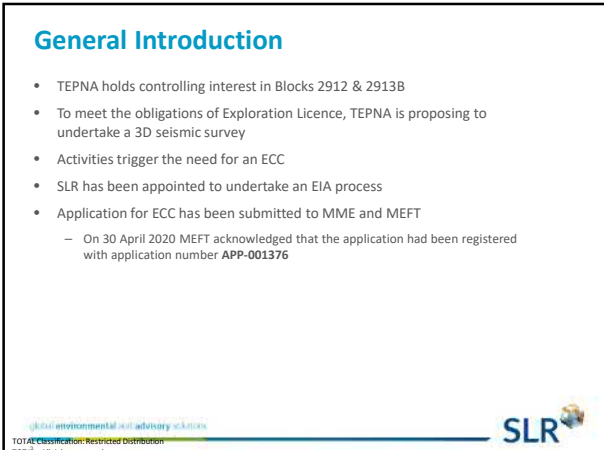

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2

General Introduction

- TEPNA holds controlling interest in Blocks 2912 & 2913B
- To meet the obligations of Exploration Licence, TEPNA is proposing to undertake a 3D seismic survey
- Activities trigger the need for an ECC
- SLR has been appointed to undertake an EIA process
- Application for ECC has been submitted to MME and MEFT
 - On 30 April 2020 MEFT acknowledged that the application had been registered with application number **APP-001376**




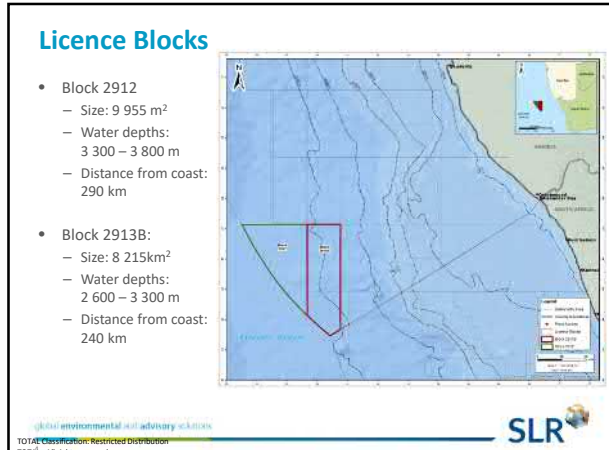
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3

Licence Blocks

- Block 2912
 - Size: 9 955 m²
 - Water depths: 3 300 – 3 800 m
 - Distance from coast: 290 km
- Block 2913B:
 - Size: 8 215km²
 - Water depths: 2 600 – 3 300 m
 - Distance from coast: 240 km

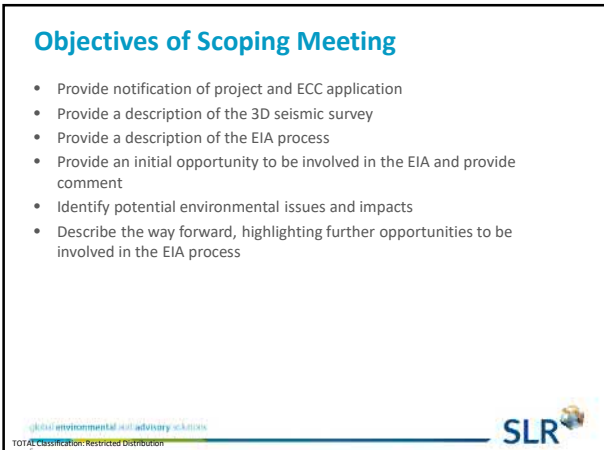
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Objectives of Scoping Meeting

- Provide notification of project and ECC application
- Provide a description of the 3D seismic survey
- Provide a description of the EIA process
- Provide an initial opportunity to be involved in the EIA and provide comment
- Identify potential environmental issues and impacts
- Describe the way forward, highlighting further opportunities to be involved in the EIA process




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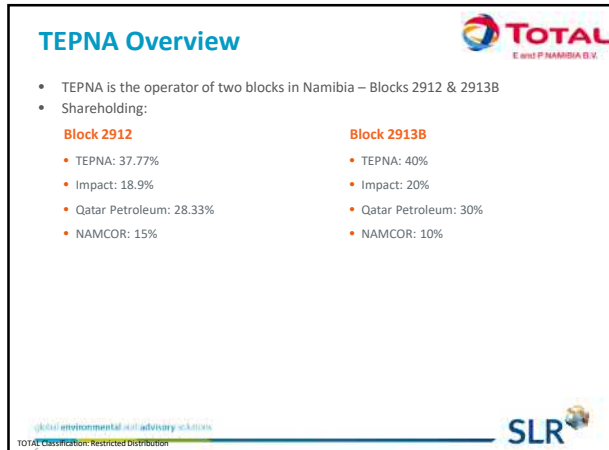
5

TEPNA Overview



- TEPNA is the operator of two blocks in Namibia – Blocks 2912 & 2913B
- Shareholding:

<p>Block 2912</p> <ul style="list-style-type: none"> • TEPNA: 37.77% • Impact: 18.9% • Qatar Petroleum: 28.33% • NAMCOR: 15% 	<p>Block 2913B</p> <ul style="list-style-type: none"> • TEPNA: 40% • Impact: 20% • Qatar Petroleum: 30% • NAMCOR: 10%
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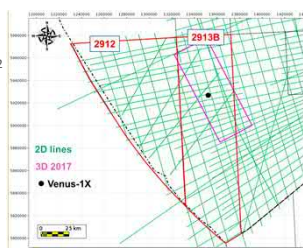
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Namibian Work Programme



- Preparatory studies:
 - 2913B: Metocean and Environmental Baseline Study in 2018 / 2019
- Data Purchase:
 - 2012-2014 : 2D seismic
 - 2017 : 3D seismic mainly over 2913B
 - 2019 : 1 097 km 2D mainly over 2912
- Exploration Well (2913B):
 - Venus-1: mid 2020
- Acquisition:
 - Proposed 3D seismic survey
 - Contingent to Venus-1 Well success



2D lines
3D 2017
● Venus-1X

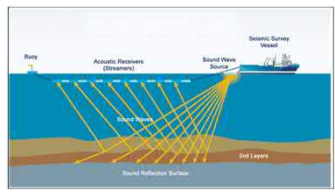
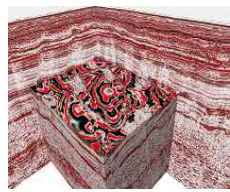
SLR

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Seismic Surveys

- Geophysical technique using acoustic energy to map the geological structures of the seabed and identify possible hydrocarbon reserves
- High-level, low frequency sounds are emitted from the sound source (owed airgun) towards the seabed
- The acoustic signal penetrates the seabed, then is reflected by the rock formations
- Reflected signals are recorded by towed receivers (or hydrophones)
- Analyses of the returned signals allow for interpretation of subsea geology


Principles of offshore seismic acquisition surveys

Example of 3D image

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Seismic Surveys



Example of a survey vessel, Polar Empress



Airgun array – 2 to 3 arrays; up to 8 m deep



Hydrophone streamer – 14 streamers up to 8 800 m long and 25 m deep




Tail buoy at end of streamer

SLR

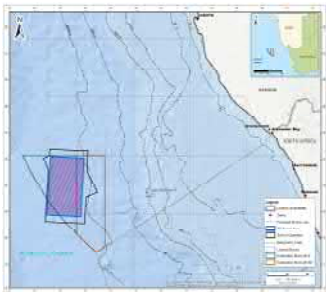
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Project Description



- Survey details:
 - Survey area: 6 474 km²
 - Operation area: 9 797 km²
 - Distance offshore: ± 265 km
 - Duration: 100 days
 - Commencement date: December 2020 / January 2021
- Vessels:
 - 1 x survey vessel
 - 1 x support vessel
 - 1 x escort vessel – maintain 500 m safety zone
- Possible helicopter support
- Onshore logistics base options:
 - Lüderitz (± 320 km)
 - Walvis Bay (± 690 km)

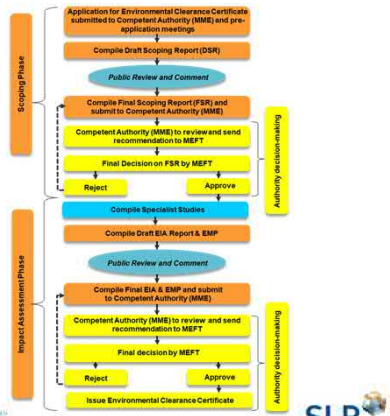


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Namibian Regulated EIA Process



Scoping Phase

- Application for Environmental Clearance Certificate submitted to Competent Authority (MME) and pre-application meetings
- Compile Draft Scoping Report (DSR)
- Public Review and Comment
- Compile Final Scoping Report (FSR) and submit to Competent Authority (MME)
- Competent Authority (MME) to review and send recommendation to MEFT
- Final Decision on FSR by MEFT
- Reject / Approve

Impact Assessment Phase

- Complete Specialist Studies
- Compile Draft EIA Report & EMP
- Public Review and Comment
- Compile Final EIA & EMP and submit to Competent Authority (MME)
- Competent Authority (MME) to review and send recommendation to MEFT
- Final decision by MEFT
- Reject / Approve
- Issue Environmental Clearance Certificate

Authority decision-making

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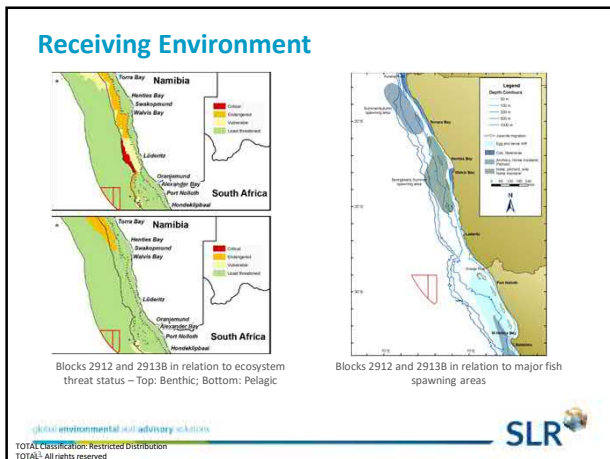
EIA Process - Anticipated EIA Programme

- Scoping Report
 - Distribute Draft Scoping Report for 30-day review: **8 May – 8 June 2020**
 - Submit Final Scoping report to MME / MEFT: **mid June 2020**
- EIA Report and ESMP
 - Distribute Draft EIA Report & ESMP for 30-day review: **July 2020**
 - Submit Final EIA Report & ESMP to MME / MEFT: **September 2020**

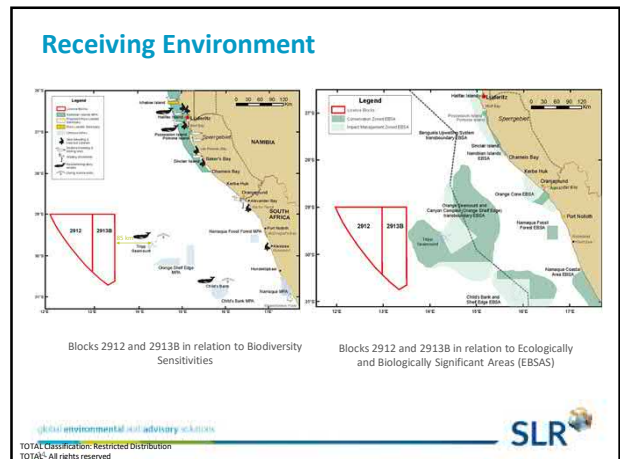
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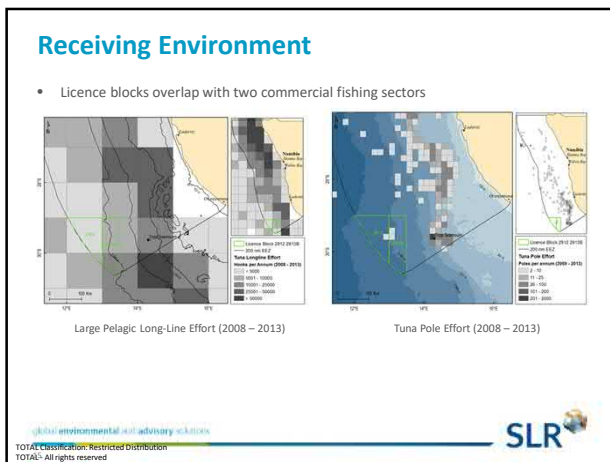
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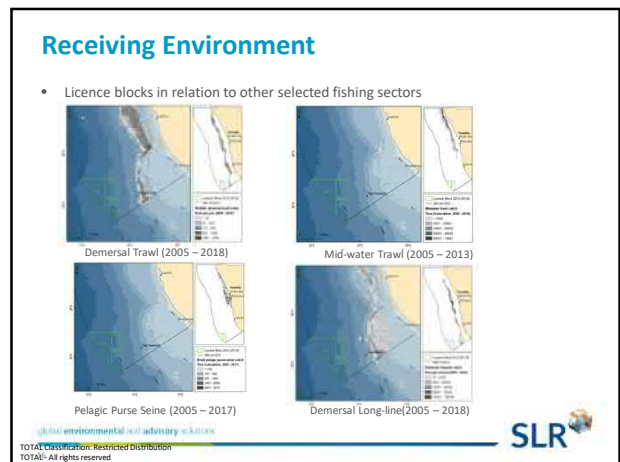
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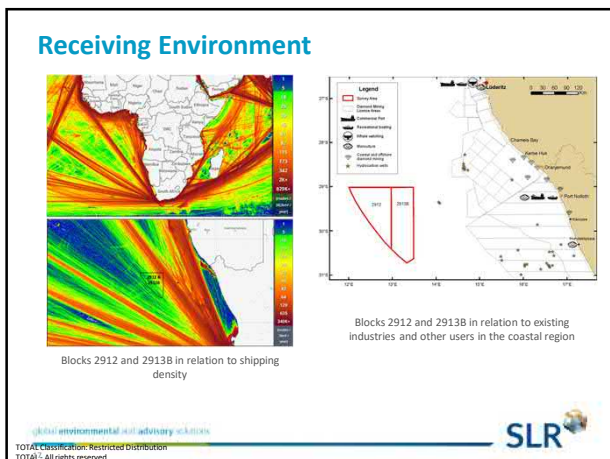
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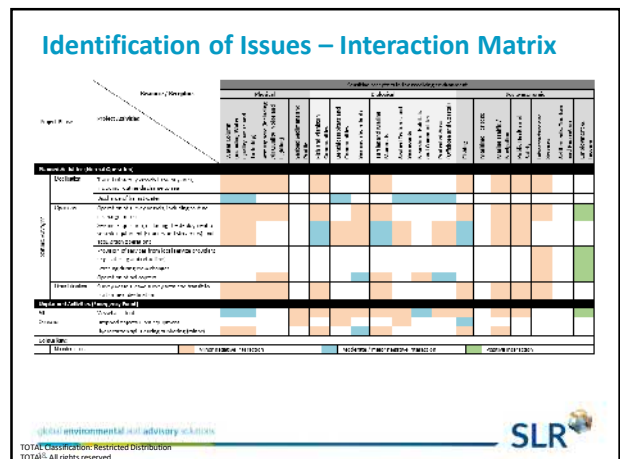
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17



18

Key Issues

- **Marine Ecology** – Potential Impacts
 - Normal discharges to air and sea, incl. sewage, galley waste, etc.
 - Introduction of alien invasive marine species through ballast water discharge
 - Seismic noise impact on marine fauna, including TTS, PTS and behaviour
 - Disturbance of marine fauna due to noise and lighting
 - Accidental oil / fuel spills
 - Lost equipment




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Key Issues

- **Fishing** – Potential Impacts
 - Disruption to fishing operations and temporary loss of access to fishing grounds due to the 500 m safety zone
 - Fish avoidance of survey area and changes in feeding behaviour due to seismic noise
 - Accidental oil / fuel spills
 - Lost equipment



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Key Issues

- **Socio-Economic** – Potential Impacts
 - Disruption of commercial fisheries (as per previous slide)
 - Short-term employment and business opportunities – 3- 4 months
 - Interference with shipping routes as a result of the 500 m safety zone



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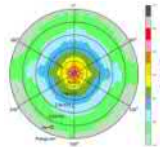
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Specialist Studies

- **Modelling studies:**
 - Noise modelling

This information will be used to inform the specialist assessments.
- **Specialist Assessments:**
 - Commercial fisheries impact assessment
 - Marine fauna impact assessment
 - Social Assessment



Assessments will include:

- ✓ Baseline description
- ✓ Assess potential impacts
- ✓ Identify management and mitigation measures

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Way Forward

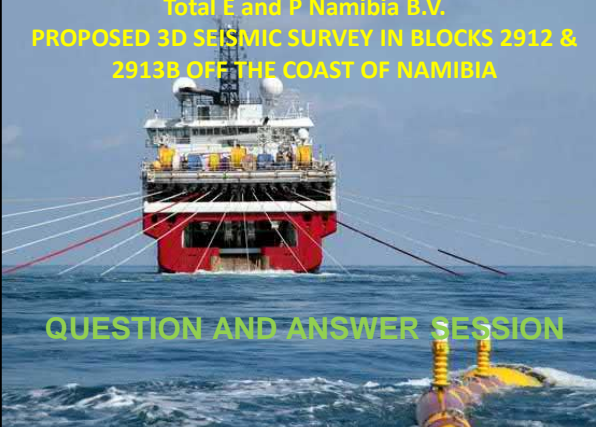
- Initial comments must reach SLR by **8 June 2020**
- Comments received will be included in the Final Scoping Report
- Draft EIA Report and ESMP will be distributed for 30-day comment period: **July 2020**

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Total E and P Namibia B.V.
PROPOSED 3D SEISMIC SURVEY IN BLOCKS 2912 & 2913B OFF THE COAST OF NAMIBIA



QUESTION AND ANSWER SESSION

24



TOTAL E&P NAMIBIA B.V. (TEPNA) - ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR 3D SEISMIC SURVEY IN BLOCKS 2912 / 2913B

MINUTES OF FOCUS GROUP MEETING

DATE	27 May 2020	
VENUE:	Lüderitz Town Council (LTC)	
PROJECT:	Environmental and Societal Impact Assessment (ESIA) for a 3D Seismic Survey in Blocks 2912 / 2913B, Orange Basin, Southern Namibia	
SLR COMPANY:	SLR Environmental Consulting (Namibia) (Pty) Ltd	
PROJECT NUMBER:	733.20071.00002	
PURPOSE:	<p>The objectives of the meeting were to:</p> <ul style="list-style-type: none"> • Provide notification of project and ECC application • Provide a description of the 3D seismic survey • Provide a description of the EIA process • Provide an initial opportunity to be involved in the EIA and provide comment • Identify potential environmental issues and impacts • Describe the way forward, highlighting further opportunities to be involved in the EIA process. 	
ATTENDANCE:	Name:	Organisation:
	R. Ochs (RO)	Lüderitz Town Council (LTC)
	L. Kaangundue (LK)	LTC
	E. DaFonseca (ED)	LTC
	I.N. Tjipune (IT)	LTC
	R. Beukes (RB)	LTC
	N. Khoa (NK)	LTC
	O. Shipenga (OS)	LTC
	M. Sanzila (MS)	Marvin Environmental Projects Consultant
W. Petrick (WP)	SLR	
DISTRIBUTION	Attendees – Refer to Attendance Register in Appendix A	

NO.	NOTES	ACTION
1	WELCOME AND INTRODUCTION	
1.1	<p>The meeting commenced at 9h30. WP welcomed all to the Scoping Meeting. This was followed by a short introduction, which included the following:</p> <ul style="list-style-type: none"> • Apologies: TEPNA representative(s) not attending due to COVID-19 travel restrictions; • HSE moment, which included a brief discussion about wearing of face masks and social distancing requirements and number of attendees at meetings; • Meeting agenda; and 	

NO.	NOTES	ACTION
	<ul style="list-style-type: none"> Objectives of the meeting. 	
2	PRESENTATION	
2.1	<p>WP provided an overview of proposed project and EIA process. The presentation included the following aspects:</p> <ul style="list-style-type: none"> Location and size of the two license blocks (1912 and 2913B); TEPNA overview and shareholding in the two blocks; Namibian Work Programme; Proposed project activities (3D seismic survey); EIA process; Receiving environment; and Key environmental and social issues. <p>Refer to presentation in Appendix B.</p>	
3	DISCUSSION (QUESTIONS / COMMENTS RAISED BY the LTC)	
3.1	<p>Question / comment:</p> <ul style="list-style-type: none"> It was noted that a Representative from TEPNA was in Lüderitz earlier in the year and discussed similar type activities. 	
	<p>SLR Response:</p> <ul style="list-style-type: none"> WP noted that it could have been discussions relating to the proposed exploration well that is planned to be drilled this year, i.e. Venus-1 (Reference was made to slide 7). SLR was, however, not part of this activities and meeting(s). The information relating to the proposed 3D Seismic Survey in Blocks 2912 / 2913B is only being shared now, as part of this EIA process being undertaken. 	
3.2	<p>Question / comment:</p> <ul style="list-style-type: none"> What will the average cost be per day for the proposed seismic actives? 	
	<p>SLR Response:</p> <ul style="list-style-type: none"> WP indicated that he does not have the answer to that question and that he would try obtain additional information and revert. 	
4	THE WAY FORWARD	
4.1	<p>WP outlined the way forward as follows:</p> <ul style="list-style-type: none"> Initial comments on the DSR to reach SLR by 8 June 2020. Comments received will be included in the Final Scoping Report for submission to MME and MEFT. Draft EIA Report and ESMP will be distributed for 30-day comment period in July 2020. 	
5	CLOSE	
5.1	The meeting was closed at 10:30.	

APPENDIX A: ATTENDANCE REGISTER

SCOPING PHASE FOCUS GROUP MEETING: ATTENDANCE REGISTER

Date: 27/5/49 Time: Venue: Luderitz Town Council

Name	Organisation	Postal address	Tel / Cell No.	E-mail	Signature
W. Petrick	SCR	P.O. Box 8127 Subkapfund	0811405968	wpetrick@namibian.com	
I.N. Jijp	LTC	P.O. Box 648 Luderitz	0811601115	ijijp@namibian.com	
C. Kaangundue	LTC	P.O. Box 19 Luderitz	0818390810	health-food@lhc.com.na	
E. Da Fonseca	LTC	Box 863 Lud	0813576681	dafonseca.edf@gmail.com	
R. Bentes	LTC	P.O. Box 1172 Luderitz	0816039582	christee@lhc.com.na	
Nazaria Khog	LTC	P.O. Box 19 Luderitz	0812740826	NKhor@outlook.com	
M. SANZICA	MARVIN	Box 807, Subkapfund	0814788279	MARVINCONSULTANTS@OUTLOOK.COM	
O. Shipenge	LTC	P.O. Box 1000 Luderitz	0811601113	cahr@lhc.com.na	
Reinhardt Osh	ATC	P.O. Box 19 Luderitz	0811658330	ccc@lhc.com.na	

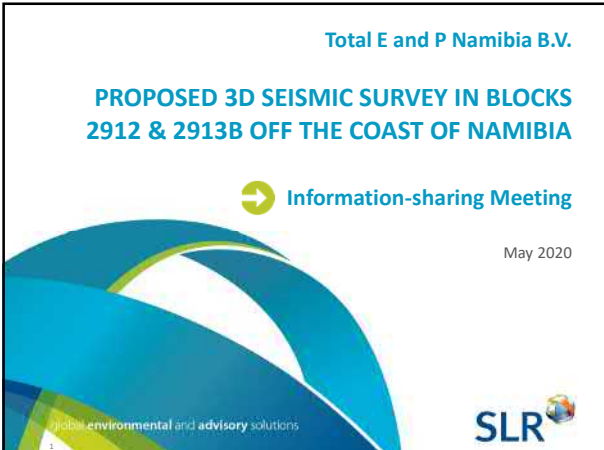
APPENDIX B: PRESENTATION

Total E and P Namibia B.V.

PROPOSED 3D SEISMIC SURVEY IN BLOCKS 2912 & 2913B OFF THE COAST OF NAMIBIA

Information-sharing Meeting

May 2020



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1

Agenda

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 - > Seismic surveys
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 - > Namibian Regulated EIA Process
 - > Receiving Environment
 - > Key Issues
- Way Forward and Next Opportunity to Comment
- Question and Answer Session





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- TEPNA holds controlling interest in Blocks 2912 & 2913B
- To meet the obligations of Exploration Licence, TEPNA is proposing to undertake a 3D seismic survey
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4

Objectives of Scoping Meeting

- Provide notification of project and ECC application
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- Shareholding:

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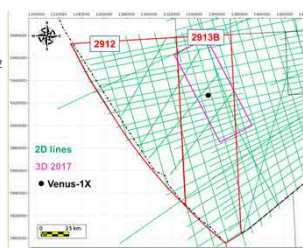
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2D lines
3D 2017
● Venus-1X

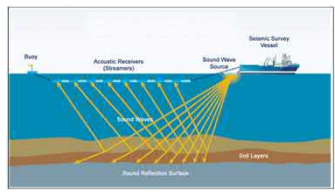
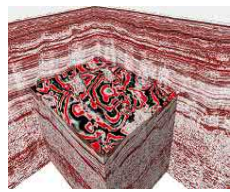
SLR

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- Analyses of the returned signals allow for interpretation of subsea geology

Principles of offshore seismic acquisition surveys

Example of 3D image

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Seismic Surveys



Example of a survey vessel, Polar Empress



Airgun array – 2 to 3 arrays; up to 8 m deep



Hydrophone streamer – 14 streamers up to 8 800 m long and 25 m deep




Tail buoy at end of streamer

SLR

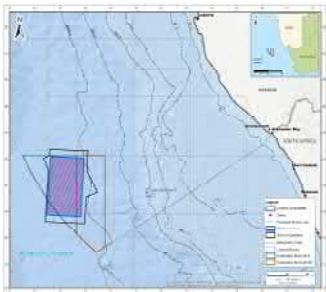
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Project Description



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 - Lüderitz (± 320 km)
 - Walvis Bay (± 690 km)

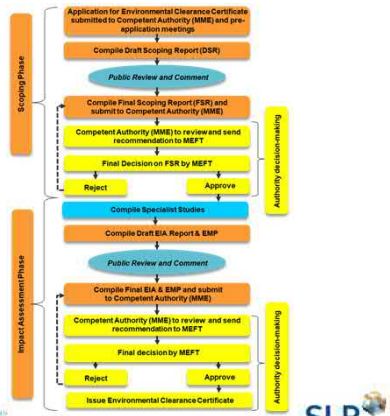


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Namibian Regulated EIA Process



Scoping Phase

- Application for Environmental Clearance Certificate submitted to Competent Authority (MME) and pre-application meetings
- Compile Draft Scoping Report (DSR)
- Public Review and Comment
- Compile Final Scoping Report (FSR) and submit to Competent Authority (MME)
- Competent Authority (MME) to review and send recommendation to MEFT
- Final Decision on FSR by MEFT
- Reject / Approve

Authority decision-making

Impact Assessment Phase

- Complete Specialist Studies
- Compile Draft EIA Report & EMP
- Public Review and Comment
- Compile Final EIA & EMP and submit to Competent Authority (MME)
- Competent Authority (MME) to review and send recommendation to MEFT
- Final decision by MEFT
- Reject / Approve
- Issue Environmental Clearance Certificate

Authority decision-making

SLR

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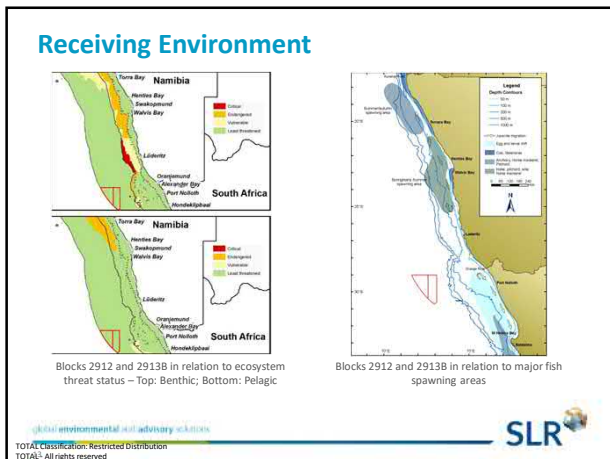
EIA Process - Anticipated EIA Programme

- Scoping Report
 - Distribute Draft Scoping Report for 30-day review: **8 May – 8 June 2020**
 - Submit Final Scoping report to MME / MEFT: **mid June 2020**
- EIA Report and ESMP
 - Distribute Draft EIA Report & ESMP for 30-day review: **July 2020**
 - Submit Final EIA Report & ESMP to MME / MEFT: **September 2020**

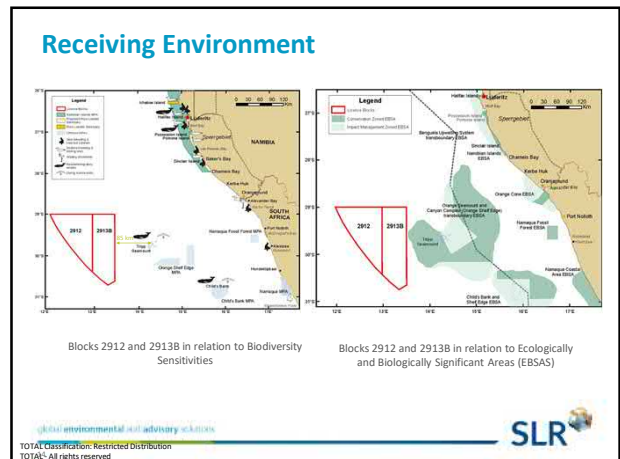
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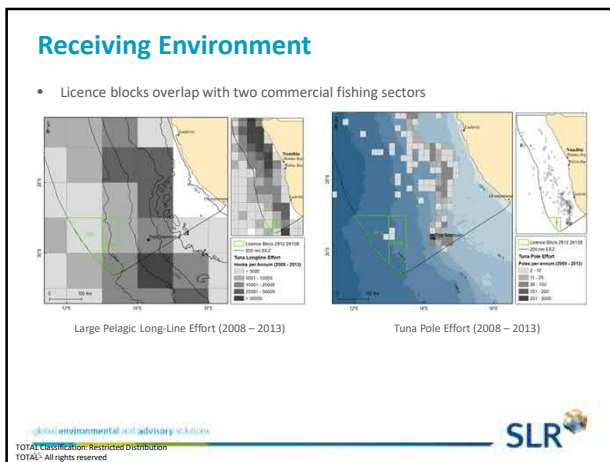
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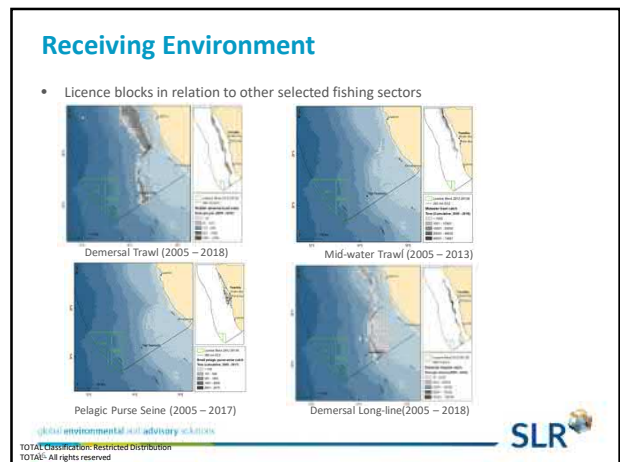
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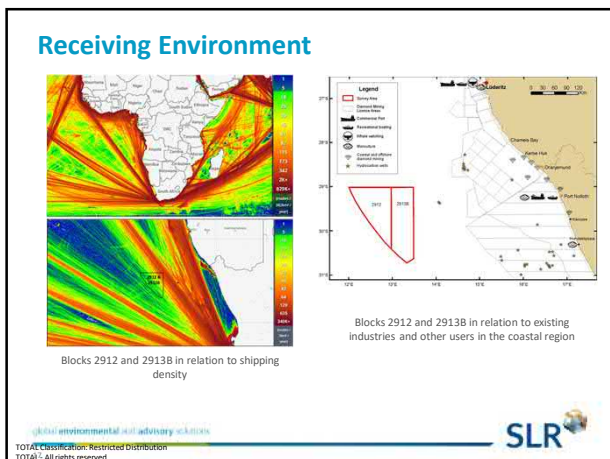
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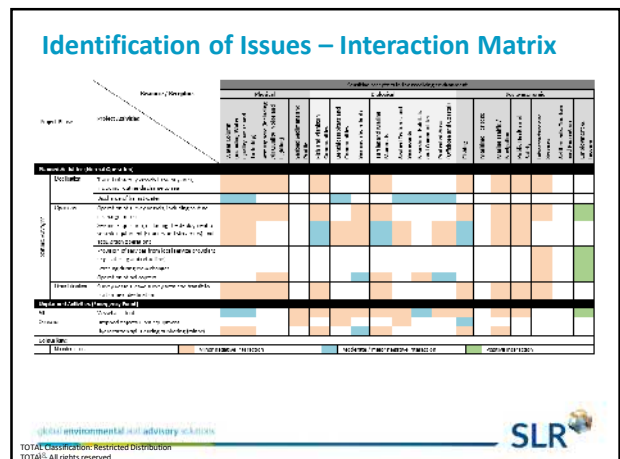
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16




17



18

Key Issues

- **Marine Ecology** – Potential Impacts
 - Normal discharges to air and sea, incl. sewage, galley waste, etc.
 - Introduction of alien invasive marine species through ballast water discharge
 - Seismic noise impact on marine fauna, including TTS, PTS and behaviour
 - Disturbance of marine fauna due to noise and lighting
 - Accidental oil / fuel spills
 - Lost equipment




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Key Issues

- **Fishing** – Potential Impacts
 - Disruption to fishing operations and temporary loss of access to fishing grounds due to the 500 m safety zone
 - Fish avoidance of survey area and changes in feeding behaviour due to seismic noise
 - Accidental oil / fuel spills
 - Lost equipment



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Key Issues

- **Socio-Economic** – Potential Impacts
 - Disruption of commercial fisheries (as per previous slide)
 - Short-term employment and business opportunities – 3- 4 months
 - Interference with shipping routes as a result of the 500 m safety zone



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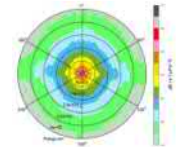
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21

Specialist Studies

- **Modelling studies:**
 - Noise modelling

This information will be used to inform the specialist assessments.
- **Specialist Assessments:**
 - Commercial fisheries impact assessment
 - Marine fauna impact assessment
 - Social Assessment



Assessments will include:

- ✓ Baseline description
- ✓ Assess potential impacts
- ✓ Identify management and mitigation measures

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Way Forward


- Initial comments must reach SLR by **8 June 2020**
- Comments received will be included in the Final Scoping Report
- Draft EIA Report and ESMP will be distributed for 30-day comment period: **July 2020**

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Total E and P Namibia B.V.
PROPOSED 3D SEISMIC SURVEY IN BLOCKS 2912 & 2913B OFF THE COAST OF NAMIBIA



QUESTION AND ANSWER SESSION

24



**TOTAL E&P NAMIBIA B.V. (TEPNA) - ENVIRONMENTAL AND SOCIAL IMPACT
ASSESSMENT (ESIA) FOR 3D SEISMIC SURVEY IN BLOCKS 2912 / 2913B**

MINUTES OF FOCUS GROUP MEETING

DATE	28 May 2020	
VENUE:	Lüderitz – Desert Deli	
PROJECT:	Environmental and Societal Impact Assessment (ESIA) for a 3D Seismic Survey in Blocks 2912 / 2913B, Orange Basin, Southern Namibia	
SLR COMPANY:	SLR Environmental Consulting (Namibia) (Pty) Ltd	
PROJECT NUMBER:	733.20071.00002	
PURPOSE:	<p>The objectives of the meeting were to:</p> <ul style="list-style-type: none"> • Provide notification of project and ECC application • Provide a description of the 3D seismic survey • Provide a description of the EIA process • Provide an initial opportunity to be involved in the EIA and provide comment • Identify potential environmental issues and impacts • Describe the way forward, highlighting further opportunities to be involved in the EIA process. 	
ATTENDANCE:	Name:	Organisation:
	J. Burgess (JB)	Tuna 3 JV Southern Wolf Holding
	W. Petrick (WP)	SLR
DISTRIBUTION	Attendees – Refer to Attendance Register in Appendix A	

NO.	NOTES	ACTION
1	WELCOME AND INTRODUCTION	
1.1	<p>The meeting commenced at 9h00. WP thanked JB for his attendance to the (informal) Scoping Meeting. This was followed by a short introduction, which included the following:</p> <ul style="list-style-type: none"> • Apologies: TEPNA representative(s) not attending due to COVID-19 travel restrictions; • Objectives of the meeting. 	
2	PRESENTATION	
2.1	<p>WP provided a brief overview of proposed project and EIA process. JB raised comments / questions while WP presented the following aspects:</p> <ul style="list-style-type: none"> • Location and size of the two license blocks (1912 and 2913B); • TEPNA overview and shareholding in the two blocks; • Namibian Work Programme; • Proposed project activities (3D seismic survey); • EIA process; • Receiving environment; and 	

NO.	NOTES	ACTION
	<ul style="list-style-type: none"> Key environmental and social issues. Refer to presentation in Appendix B.	
3	QUESTIONS / COMMENTS RAISED BY JB	
3.1	Question / comment: <ul style="list-style-type: none"> This year was an exceptional good year in terms of tuna catch and it could be that no seismic activities were recently undertaken. Even though the licence blocks are relatively far from Tripp Seamount, tuna catch did extend quite far offshore and possibly overlapped with the licence blocks. Tuna fishing season extends from October/November until January / February. Best would (likely) be for the seismic activities to be conducted outside this period. However, the impacts could be worst if the activities are conducted prior to the next fishing season and cause the tuna to be diverted from the typical migration route. 	
3.2	Question / comment: <ul style="list-style-type: none"> Key will be close collaboration between TEPNA and their Exploration Contractors and the Fishing Sector – before and during the time the activities are being conducted. Information sharing is critical relating to the seismic activities and needs to be done on almost a daily basis. The Fishing sector needs to be ‘forewarned’. 	
3.4	Question / comment: <ul style="list-style-type: none"> The observations made by the MMOs needs to be reported and shared. 	
3.5	Question / comment: <ul style="list-style-type: none"> JB showed WP the “Marine Traffic Application” on his cell phone that tracks all shipping vessels in relevant areas. JB uses this to, amongst others, see where fishing vessels moves on a daily basis. 	
4	THE WAY FORWARD	
4.1	WP outlined the way forward as follows: <ul style="list-style-type: none"> Initial comments on the DSR to reach SLR by 8 June 2020. Comments received will be included in the Final Scoping Report for submission to MME and MEFT. Draft EIA Report and ESMP will be distributed for 30-day comment period in July 2020. 	
5	CLOSE	
5.1	The meeting was closed at approximately 9:30.	

APPENDIX A: ATTENDANCE REGISTER

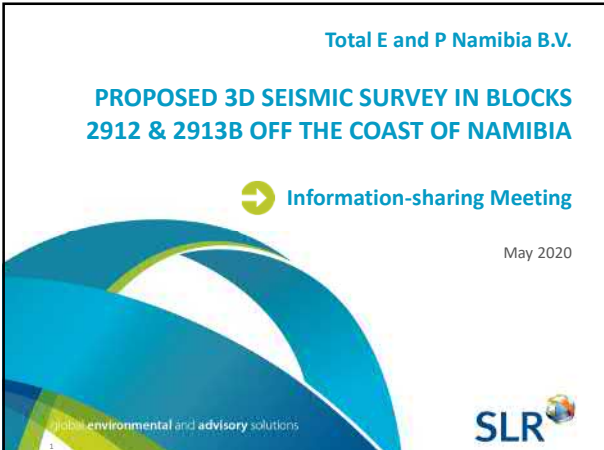
APPENDIX B: PRESENTATION

Total E and P Namibia B.V.

PROPOSED 3D SEISMIC SURVEY IN BLOCKS 2912 & 2913B OFF THE COAST OF NAMIBIA

Information-sharing Meeting

May 2020



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1

Agenda

- Introduction
 - > HSE moment
 - > Introduction
 - > Meeting Objectives
- Presentations
 - > TEPNA Overview
 - > Namibian Work Programme
 - > Seismic surveys
 - > Project Description
 - > EIA Overview
 - > Namibian Regulated EIA Process
 - > Receiving Environment
 - > Key Issues
- Way Forward and Next Opportunity to Comment
- Question and Answer Session



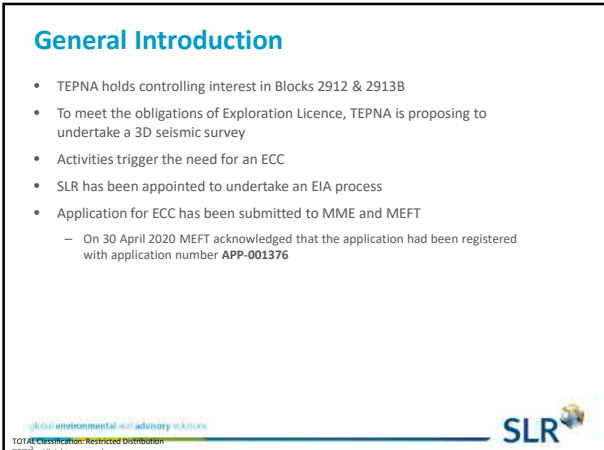

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2

General Introduction

- TEPNA holds controlling interest in Blocks 2912 & 2913B
- To meet the obligations of Exploration Licence, TEPNA is proposing to undertake a 3D seismic survey
- Activities trigger the need for an ECC
- SLR has been appointed to undertake an EIA process
- Application for ECC has been submitted to MME and MEFT
 - On 30 April 2020 MEFT acknowledged that the application had been registered with application number **APP-001376**




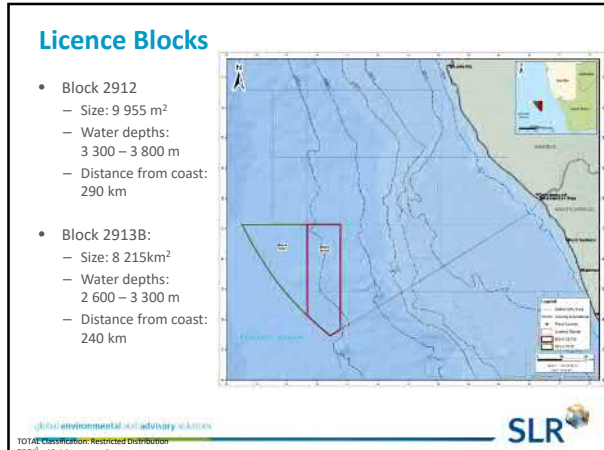
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3

Licence Blocks

- Block 2912
 - Size: 9 955 m²
 - Water depths: 3 300 – 3 800 m
 - Distance from coast: 290 km
- Block 2913B:
 - Size: 8 215km²
 - Water depths: 2 600 – 3 300 m
 - Distance from coast: 240 km

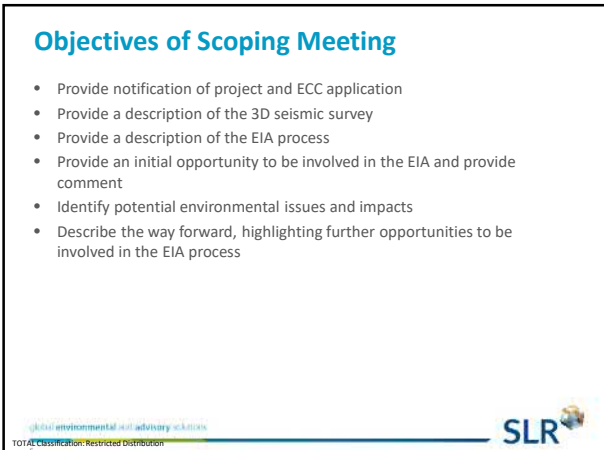
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4

Objectives of Scoping Meeting

- Provide notification of project and ECC application
- Provide a description of the 3D seismic survey
- Provide a description of the EIA process
- Provide an initial opportunity to be involved in the EIA and provide comment
- Identify potential environmental issues and impacts
- Describe the way forward, highlighting further opportunities to be involved in the EIA process




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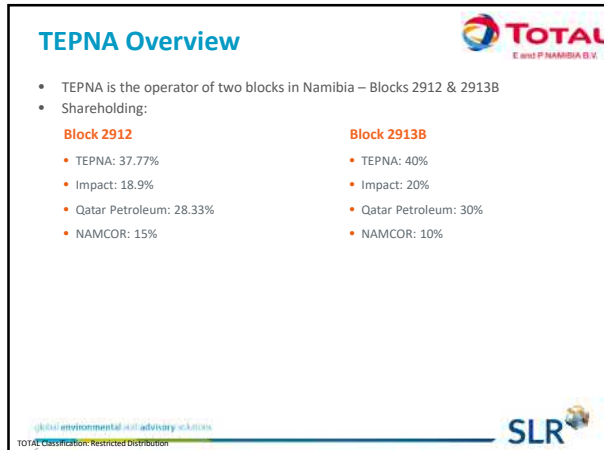
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TEPNA Overview



- TEPNA is the operator of two blocks in Namibia – Blocks 2912 & 2913B
- Shareholding:

<p>Block 2912</p> <ul style="list-style-type: none"> • TEPNA: 37.77% • Impact: 18.9% • Qatar Petroleum: 28.33% • NAMCOR: 15% 	<p>Block 2913B</p> <ul style="list-style-type: none"> • TEPNA: 40% • Impact: 20% • Qatar Petroleum: 30% • NAMCOR: 10%
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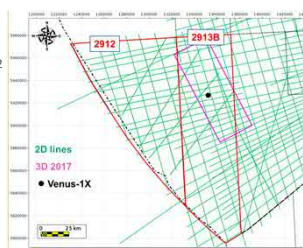
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6

Namibian Work Programme



- Preparatory studies:
 - 2913B: Metocean and Environmental Baseline Study in 2018 / 2019
- Data Purchase:
 - 2012-2014 : 2D seismic
 - 2017 : 3D seismic mainly over 2913B
 - 2019 : 1 097 km 2D mainly over 2912
- Exploration Well (2913B):
 - Venus-1: mid 2020
- Acquisition:
 - Proposed 3D seismic survey
 - Contingent to Venus-1 Well success



2D lines
3D 2017
● Venus-1X

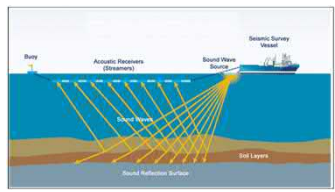
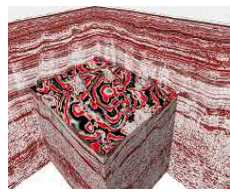
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Seismic Surveys

- Geophysical technique using acoustic energy to map the geological structures of the seabed and identify possible hydrocarbon reserves
- High-level, low frequency sounds are emitted from the sound source (owed airgun) towards the seabed
- The acoustic signal penetrates the seabed, then is reflected by the rock formations
- Reflected signals are recorded by towed receivers (or hydrophones)
- Analyses of the returned signals allow for interpretation of subsea geology

Principles of offshore seismic acquisition surveys

Example of 3D image

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Seismic Surveys



Example of a survey vessel, Polar Empress



Airgun array – 2 to 3 arrays; up to 8 m deep



Hydrophone streamer – 14 streamers up to 8 800 m long and 25 m deep




Tail buoy at end of streamer

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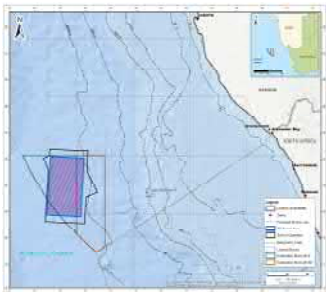
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Project Description



- Survey details:
 - Survey area: 6 474 km²
 - Operation area: 9 797 km²
 - Distance offshore: ± 265 km
 - Duration: 100 days
 - Commencement date: December 2020 / January 2021
- Vessels:
 - 1 x survey vessel
 - 1 x support vessel
 - 1 x escort vessel – maintain 500 m safety zone
- Possible helicopter support
- Onshore logistics base options:
 - Lüderitz (± 320 km)
 - Walvis Bay (± 690 km)

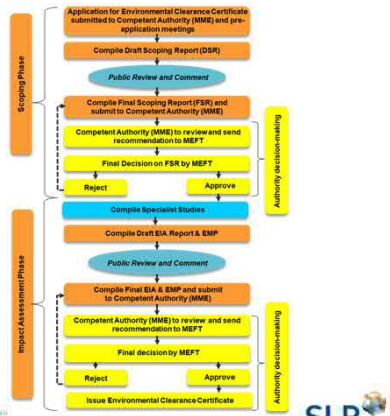


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Namibian Regulated EIA Process



Scoping Phase

- Application for Environmental Clearance Certificate submitted to Competent Authority (MME) and pre-application meetings
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- Issue Environmental Clearance Certificate

Authority decision-making

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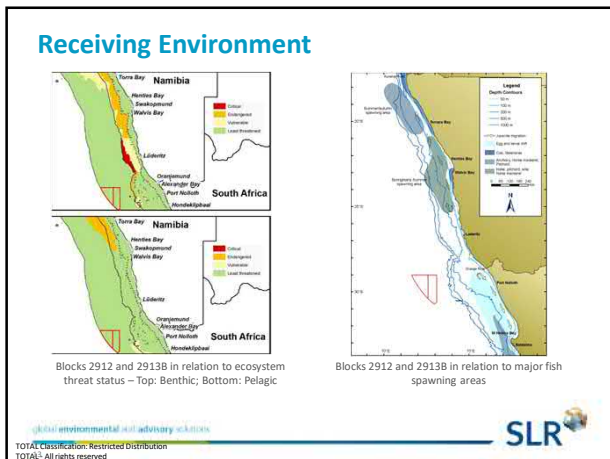
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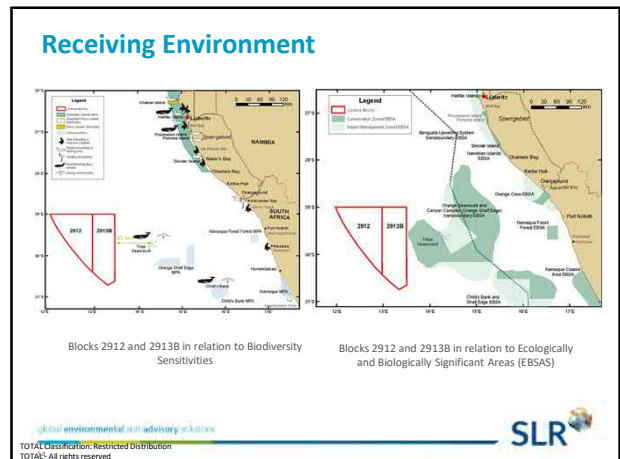
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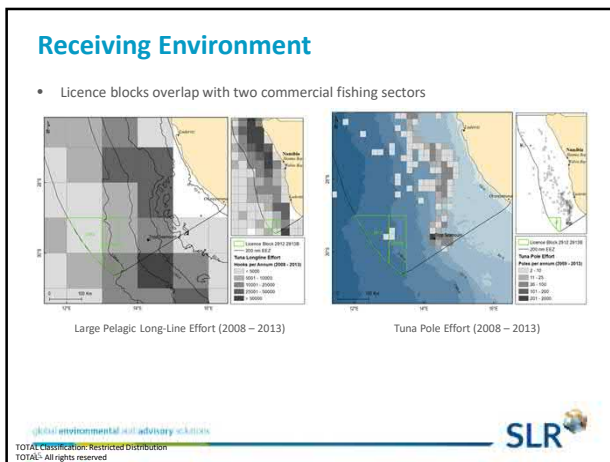
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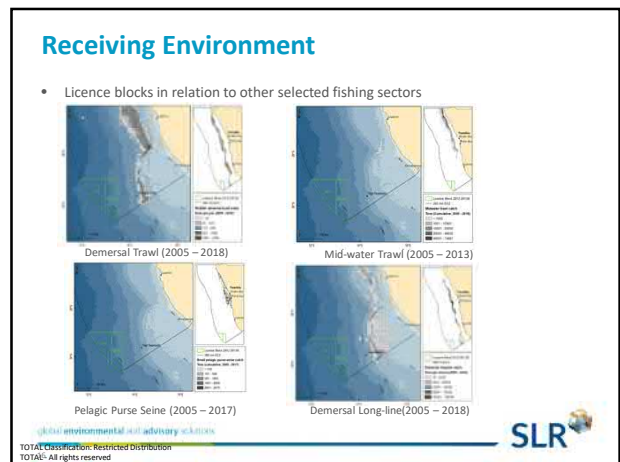
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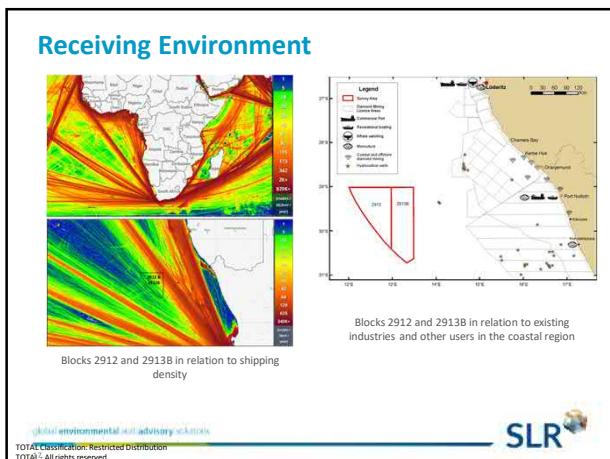
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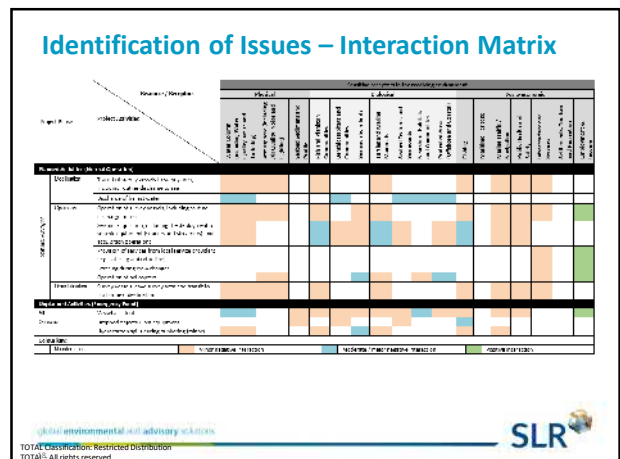
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Key Issues

- **Marine Ecology** – Potential Impacts
 - Normal discharges to air and sea, incl. sewage, galley waste, etc.
 - Introduction of alien invasive marine species through ballast water discharge
 - Seismic noise impact on marine fauna, including TTS, PTS and behaviour
 - Disturbance of marine fauna due to noise and lighting
 - Accidental oil / fuel spills
 - Lost equipment




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Key Issues

- **Fishing** – Potential Impacts
 - Disruption to fishing operations and temporary loss of access to fishing grounds due to the 500 m safety zone
 - Fish avoidance of survey area and changes in feeding behaviour due to seismic noise
 - Accidental oil / fuel spills
 - Lost equipment



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Key Issues

- **Socio-Economic** – Potential Impacts
 - Disruption of commercial fisheries (as per previous slide)
 - Short-term employment and business opportunities – 3- 4 months
 - Interference with shipping routes as a result of the 500 m safety zone



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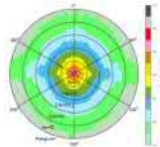
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Specialist Studies

- **Modelling studies:**
 - Noise modelling

This information will be used to inform the specialist assessments.
- **Specialist Assessments:**
 - Commercial fisheries impact assessment
 - Marine fauna impact assessment
 - Social Assessment



Assessments will include:

- ✓ Baseline description
- ✓ Assess potential impacts
- ✓ Identify management and mitigation measures

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Way Forward

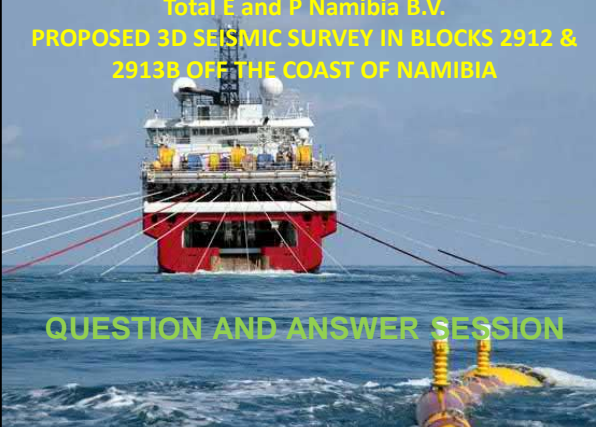
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Total E and P Namibia B.V.
PROPOSED 3D SEISMIC SURVEY IN BLOCKS 2912 & 2913B OFF THE COAST OF NAMIBIA



QUESTION AND ANSWER SESSION

24

APPENDIX 2.6:

**I&AP CORRESPONDENCE RECEIVED
DURING DSR COMMENT AND REVIEW PERIOD**

Jeremy Blood

Subject: FW: Autoreply to PROPOSED 3D SEISMIC SURVEY IN LICENCE BLOCKS 2912 AND 2913B, NAMIBIA: PROJECT NOTIFICATION AND AVAILABILITY OF DRAFT SCOPING REPORT FOR REVIEW AND COMMENT

-----Original Message-----

From: Director Civil Aviation NAMIBIA <director@dca.com.na>

Sent: Thursday, 07 May 2020 15:03

To: Candice Sadan <csadan@slrconsulting.com>

Subject: Autoreply to PROPOSED 3D SEISMIC SURVEY IN LICENCE BLOCKS 2912 AND 2913B, NAMIBIA: PROJECT NOTIFICATION AND AVAILABILITY OF DRAFT SCOPING REPORT FOR REVIEW AND COMMENT

To whom it may concern

Please note that my email address has changed to: director@ncaa.com.na

With kind regards

Executive Director

Jeremy Blood

Subject: FW: Out Of Office. Your Subject 'PROPOSED 3D SEISMIC SURVEY IN LICENCE BLOCKS 2912 AND 2913B, NAMIBIA:'

-----Original Message-----

From: Hashali_Hamukuaya <hashali@benguelacc.org>

Sent: Thursday, 07 May 2020 15:07

To: Candice Sadan <csadan@slrconsulting.com>

Subject: Out Of Office. Your Subject 'PROPOSED 3D SEISMIC SURVEY IN LICENCE BLOCKS 2912 AND 2913B, NAMIBIA:'

Good day,

Please note that Dr Hashali Hamukuaya has retired from the BCC as from 30 November 2018.

kindly address all future correspondence to the Acting Executive Secretary, Ms Thandiwe Gxaba at thandiwe@benguelacc.org.

Regards,
Benguela Current Convention

Jeremy Blood

Subject: FW: PROPOSED 3D SEISMIC SURVEY IN LICENCE BLOCKS 2912 AND 2913B, NAMIBIA: PROJECT NOTIFICATION AND AVAILABILITY OF DRAFT SCOPING REPORT FOR REVIEW AND COMMENT

Attachments: ESIA_Na Seismic 2912_13B_DSR_200507_Rev4_Executive_Summary.pdf; TEPNA Seismic ESIA - I&AP letters (Eng & Afr).pdf

From: David Uushona <DUushona@walvisbaycc.org.na>
Sent: Thursday, 07 May 2020 16:29
To: General Managers <GMs@walvisbaycc.org.na>; Managers <managers@walvisbaycc.org.na>; Nangula Amutenya <NAmutenya@walvisbaycc.org.na>; Lovisa Hailaula <LHailaula@walvisbaycc.org.na>; Durith Tjarokua <DTjarokua@walvisbaycc.org.na>; Ephraim Nambahu <ENambahu@walvisbaycc.org.na>; Jamie-Lee Lawrence <JLawrence@walvisbaycc.org.na>
Cc: Candice Sadan <csadan@slrconsulting.com>; wpetrick@namisun.com
Subject: FW: PROPOSED 3D SEISMIC SURVEY IN LICENCE BLOCKS 2912 AND 2913B, NAMIBIA: PROJECT NOTIFICATION AND AVAILABILITY OF DRAFT SCOPING REPORT FOR REVIEW AND COMMENT

Dear Colleagues – note attachments and email below F.Y.I.

Nangula – Please share with WEMAF.

Kindest regards,

David DH Uushona (CMP)

Manager: Solid Waste and Environmental Management,
Municipality of Walvis Bay

Offices of Water, Waste & Environmental Management
Rikumbi Kandanga Road
Walvis Bay, Namibia
Tel: +264 64 214 304 Fax: +264 64 214 310 Mobile: +264 81 122 0814
E: duushona@walvisbaycc.org.na W: www.walvisbaycc.org.na



From:
Candice
Sadan

[<mailto:csadan@slrconsulting.com>]

Sent: Thursday, May 7, 2020 3:05 PM
To: Candice Sadan <csadan@slrconsulting.com>
Cc: wpetrick@namisun.com

Subject: PROPOSED 3D SEISMIC SURVEY IN LICENCE BLOCKS 2912 AND 2913B, NAMIBIA: PROJECT NOTIFICATION AND AVAILABILITY OF DRAFT SCOPING REPORT FOR REVIEW AND COMMENT

Dear Sir/ Madam

This email and attached letter provides notification under the Environmental Management Act, 2007 and the Environmental Impact Assessment (EIA) Regulations of an application by Total E and P Namibia B.V. for an Environmental Clearance Certificate (ECC) to undertake a proposed three-dimensional (3D) seismic survey off the coast of southern Namibia. SLR Environmental Consulting (Namibia) (Pty) Ltd has been appointed to undertake the EIA process for the proposed project.

As part of this process, notice is given that the Draft Scoping Report (DSR) compiled for the above-mentioned project is available for a 30-day review and comment period from 8 May to 8 June 2020. A copy of the Executive Summary of the DSR is attached for your reference.

Refer to the attached letter for further details.

Jeremy Blood

Subject: FW: PROPOSED 3D SEISMIC SURVEY IN LICENCE BLOCKS 2912 AND 2913B, NAMIBIA: PROJECT NOTIFICATION AND AVAILABILITY OF DRAFT SCOPING REPORT FOR REVIEW AND COMMENT

From: Matthew Hambuda <matthew.possessions@gmail.com>

Sent: Thursday, 07 May 2020 16:50

To: Candice Sadan <csadan@slrconsulting.com>

Cc: wpetrick@namisun.com

Subject: RE: PROPOSED 3D SEISMIC SURVEY IN LICENCE BLOCKS 2912 AND 2913B, NAMIBIA: PROJECT NOTIFICATION AND AVAILABILITY OF DRAFT SCOPING REPORT FOR REVIEW AND COMMENT

Dear Candice

Noted with thanks.

Kind regards

Matthew Hambuda

From: Candice Sadan [<mailto:csadan@slrconsulting.com>]

Sent: 07 May 2020 15:05

To: Candice Sadan <csadan@slrconsulting.com>

Cc: wpetrick@namisun.com

Subject: PROPOSED 3D SEISMIC SURVEY IN LICENCE BLOCKS 2912 AND 2913B, NAMIBIA: PROJECT NOTIFICATION AND AVAILABILITY OF DRAFT SCOPING REPORT FOR REVIEW AND COMMENT

Dear Sir/ Madam

This email and attached letter provides notification under the Environmental Management Act, 2007 and the Environmental Impact Assessment (EIA) Regulations of an application by Total E and P Namibia B.V. for an Environmental Clearance Certificate (ECC) to undertake a proposed three-dimensional (3D) seismic survey off the coast of southern Namibia. SLR Environmental Consulting (Namibia) (Pty) Ltd has been appointed to undertake the EIA process for the proposed project.

As part of this process, notice is given that the Draft Scoping Report (DSR) compiled for the above-mentioned project is available for a 30-day review and comment period from 8 May to 8 June 2020. A copy of the Executive Summary of the DSR is attached for your reference.

Refer to the attached letter for further details.

Should you have any queries in this regard please do not hesitate to contact the undersigned (wpetrick@slrconsulting.com).

Yours sincerely



Jeremy Blood

Subject: FW: PROPOSED 3D SEISMIC SURVEY IN LICENCE BLOCKS 2912 AND 2913B, NAMIBIA: PROJECT NOTIFICATION AND AVAILABILITY OF DRAFT SCOPING REPORT FOR REVIEW AND COMMENT

From: Antonio Fonseca <antonio.fonseca@galp.com>

Sent: Friday, 22 May 2020 17:06

To: Werner Petrick <wpetrick@slrconsulting.com>

Cc: Candice Sadan <csadan@slrconsulting.com>

Subject: FW: PROPOSED 3D SEISMIC SURVEY IN LICENCE BLOCKS 2912 AND 2913B, NAMIBIA: PROJECT NOTIFICATION AND AVAILABILITY OF DRAFT SCOPING REPORT FOR REVIEW AND COMMENT

Dear Sir

We acknowledge good reception of the notice related with the Draft Scoping Report (DSR) compiled for the above-mentioned.

After analysing the copy of the Executive Summary of the DSR at this stage we do not have any comments. We thank for the consultation made and appreciate if we could be consulted in the upcoming phase.

Kind regards

António Fonseca

From: Candice Sadan <csadan@slrconsulting.com>

Sent: 7 de maio de 2020 14:05

To: Candice Sadan <csadan@slrconsulting.com>

Cc: wpetrick@namisun.com

Subject: PROPOSED 3D SEISMIC SURVEY IN LICENCE BLOCKS 2912 AND 2913B, NAMIBIA: PROJECT NOTIFICATION AND AVAILABILITY OF DRAFT SCOPING REPORT FOR REVIEW AND COMMENT

Dear Sir/ Madam

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Refer to the attached letter for further details.

Should you have any queries in this regard please do not hesitate to contact the undersigned (wpetrick@slrconsulting.com).

APPENDIX 2.7:
COMMENTS AND RESPONSES REPORT

COMMENTS AND RESPONSES REPORT

1. INTRODUCTION

This Comments and Responses Report has been compiled as part of the Environmental Impact Assessment (EIA) process that is being undertaken for a three-dimensional (3D) seismic survey in Licence Blocks 2912 and 2913B, Orange Basin, off the coast of southern Namibia.

This document is a record of all written comments received from and issued raised by Interested and Affected Parties (I&APs) during the Scoping Phase. Where applicable, responses to comments and questions are given or cross-referenced to the relevant section of text in the Final Scoping Report (FSR).

2. PUBLIC PARTICIPATION PROCESS

Tasks undertaken during the initial public participation process are summarised in Chapter 4 of the FSR.

Four focus group meetings were held during the scoping phase (see Table 2-1). The minutes of these meetings are presented in Appendix 2.5 of the FSR.

A total of **five** written submissions were received during the Draft Scoping Report (DSR) review and comment period (see Table 2-2). A copy of all written submissions is provided in Appendix 2.6 of the FSR (in no particular order of importance). As far as possible, comments are presented verbatim from written submissions.

TABLE 2-1: LIST OF FOCUS GROUP MEETINGS HELD DURING THE SCOPING PHASE

1	MFMR, Swakopmund
2	MFMR, Lüderitz
3	Lüderitz Town Council, Lüderitz
4	Jason Burgess (Tuna 3 JV Southern Wolf Holding), Lüderitz

TABLE 2-2: LIST OF I&APS THAT SUBMITTED WRITTEN CORRESPONDENCE

1	Ministry of Works and Transport: Civil Aviation (Executive Director)
2	Municipality of Walvis Bay, David Uushona (Manager: Solid Waste and Environmental Management)
3	Benguela Current Commission
4	Matthew Hambuda (previous Chairman of the Large Pelagic and Hake Longlining Association)
5	Galp Energia S.A. / Windhoek PEL28 B.V., António Fonseca (HSE Manager)

3. ISSUES AND RESPONSES TRAIL

NO.	ISSUE	ORGANISATION AND CONTACT PERSON	METHOD AND DATE	COMMENT	RESPONSE
3.1	EXPLORATION PROGRAMME AND PROJECT DESCRIPTION				
3.1.1	Overall exploration programme	MFMR, Swakopmund	Focus Group Meeting, 15 May 2020	TEPNA is planning to drill in 2020. However, the future COVID-19 restrictions could influence the timing of the drilling.	TEPNA initially proposed to drill an exploration well (Venus-1), which received Environmental Clearance in 2019, in mid-2020. However, due to the COVID-19 pandemic the drilling of this well has been postponed until Q4 2020.
3.1.2	2D reconnaissance survey	MFMR, Swakopmund	Focus Group Meeting, 15 May 2020	How long did the 2019 2D seismic survey take to acquire (i.e. how many months)?	The 2D seismic survey undertaken in 2019 was not undertaken by TEPNA. Since TEPNA purchased this data, it does not have the survey specific information (including how long the survey took to acquire).
3.1.3	2D reconnaissance survey	MFMR, Swakopmund	Focus Group Meeting, 15 May 2020	Are there any lessons that can be learnt or information that can be used from this survey for future surveys, e.g. behavioural impacts that were noted / monitored?	TEPNA was not involved with this 2019 survey and thus does not have the Marine Mammal Observer (MMO) Reports, which highlight the observations / monitoring findings. TEPNA did undertake marine fauna observations during the October/November 2018 environmental field survey, as well as a specific campaign in April 2019. This information has been used to inform the baseline description in terms of confirmation of species occurring in the area. Total also has experience of seismic surveys worldwide, including in west Africa offshore, which will be considered during the assessment and mitigation of impacts.
3.1.4	Standard management and mitigation measures	MFMR, Swakopmund	Focus Group Meeting, 15 May 2020	What are the general mitigation measures that will be applied during the execution of the 3D seismic survey?	The management and mitigation measures will be developed as an outcome of the specialist studies. These measures will be included in the Environmental Management Plan (EMP). However, typical (key) management and mitigation measures include the following: <ul style="list-style-type: none"> • 30-minute pre-watch survey by MMO and Passive Acoustic Monitoring (PAM) Observer – confirm presence of mammals and turtles within the 500 m mitigation zone around the airgun. • 20-minute soft start - ramp-up of noise over a period of 20 minutes. • If animal(s) are confirmed to be in the 500 m mitigation zone when

NO.	ISSUE	ORGANISATION AND CONTACT PERSON	METHOD AND DATE	COMMENT	RESPONSE
					the airguns are active, the MMO or PAM operator will request for temporary termination of activities. Thereafter, the start-up procedures will again be implemented.
3.1.5	Survey cost	Lüderitz Town Council	Focus Group Meeting, 27 May 2020	What will the average cost be per day for the proposed seismic actives?	The cost to undertake a seismic survey depends on the survey vessel contracted and number of support and escort vessels. Since the seismic contractor and vessels have not been selected, the cost is unknown. This said, a 3D seismic survey is estimated to cost in the order of USD 190 000 - USD 235 000 per day for a seismic fleet.
3.2	BIOPHYSICAL				
3.2.1	Ecosystem threat status	MFMR, Swakopmund	Focus Group Meeting, 15 May 2020	What does the "critical (i.e. red area) ecosystem" in the ecosystem threat status map entail?	The benthic habitats have been assigned an ecosystem threat status ('Least Threatened', 'Vulnerable', 'Endangered' or 'Critically Endangered') based on their level of protection. The red area relates to the Lüderitz Shelf Edge, which has been designated a " Critical Endangered' status.
3.2.2	Impact on tuna migration	MFMR, Lüderitz	Focus Group Meeting, 26 May 2020	The seismic activities could alter the migration route of the tuna, which could impact the tuna fishing sector. The migration of tuna, and not only the specific areas where the fishing is undertaken, needs to be considered in the assessment.	Tuna migration will be considered in the Marine Fauna Impact Assessment. Also Refer to Response 3.3.6 below. Concerns that seismic survey activities in southern Namibia and the Australian Bight are responsible for changes in the migration patterns, and consequently reduced catches of albacore and southern bluefin tuna, still need to be substantiated. In Namibia, the respective Ministries have agreed that additional research is needed on the subject before policy decisions on seismics and fisheries can be made.
3.3	SOCIO-ECONOMIC				
3.3.1	Employment and business opportunities	MFMR, Swakopmund	Focus Group Meeting, 15 May 2020	Considering the potential socio-economic benefits, how many people will be employed through the proposed 3D seismic survey project?	The survey vessel will accommodate up to 60 people working on 12-hour rotations. In addition, the support and escort vessels will include a crew of approximately 6 to 10 people each. However, the vessel contractors will have their own specialized crew and unfortunately will not result in many local employment opportunities. Various "indirect" business

NO.	ISSUE	ORGANISATION AND CONTACT PERSON	METHOD AND DATE	COMMENT	RESPONSE
					<p>opportunities will, however, be possible due to the need for supplies (equipment, fuel, food and water), material to be loaded / unloaded, support vessels, accommodation requirements onshore, etc.</p> <p>The potential impact of these employment and business opportunities will be assessed in the Social Impact Assessment.</p>
3.3.2	Deep-water trawl fishery	MFMR, Swakopmund	Focus Group Meeting, 15 May 2020	The executive summary states that deep-water trawl fishery is currently closed. What does this refer to?	The deep-water trawl fishery is a small fishing sector targeting orange roughly and alfonsino. The fishery has been closed since 2007.
3.3.3	Fisheries data	MFMR, Swakopmund	Focus Group Meeting, 15 May 2020	Some of the fishing effort data presented in the DSR are relatively old data, i.e. only up to 2013. A question (directed to MFMR) is whether more recent data cannot be provided to SLR.	<p>Based on the meeting held with MFMR on 15 May 2020, a written request dated 21 May 2020 was submitted to the Permanent Secretary / Executive Director of MFMR requesting updated fisheries data (catch and effort) for various commercial fishing sectors (refer to letter in Appendix 2.4 of the FSR).</p> <p>Should this data be received from MFMR before the completion of the Commercial Fisheries Impact Assessment, it will be used to inform the assessment.</p>
3.3.4	Impact on commercial fishing	MFMR, Lüderitz	Focus Group Meeting, 26 May 2020	How will the proposed seismic activities impact the fishing sector, specifically the tuna sector?	The impact on commercial fishing will be assessed as part of the Commercial Fisheries Impact Assessment - refer to Section 9.3.4 of the FSR for the terms of reference for this study.
3.3.5		Jason Burgess (Tuna 3 JV Southern Wolf Holding), Lüderitz	Focus Group Meeting, 28 May 2020	<p>2020 was an exceptional good year in terms of tuna catch and it could be that no seismic activities were recently undertaken.</p> <p>Even though the licence blocks are relatively far from Tripp Seamount, tuna catch did extend quite far offshore and possibly overlapped with the licence blocks.</p>	

NO.	ISSUE	ORGANISATION AND CONTACT PERSON	METHOD AND DATE	COMMENT	RESPONSE
3.3.6	Impact on commercial fishing	MFMR, Lüderitz	Focus Group Meeting, 26 May 2020	The seismic activities could alter the migration route of the tuna, which could impact the tuna fishing sector. The migration of tuna, and not only the specific areas where the fishing is undertaken, needs to be considered in the assessment.	Refer to Response 2.2.2 above.
3.3.7	Survey timing	MFMR, Lüderitz	Focus Group Meeting, 26 May 2020	Tuna fishing months commence in November and extend until April /May, with the peak between February / March. Best time for the seismic activities would be between June to September.	The EIA will need to take cognisance of peak tuna catch period and the key cetacean migration and breeding period, which extends from the beginning of June to the end of November. The recommendations from the Marine Fauna Impact Assessment and the Commercial Fisheries Impact Assessment will be evaluated and weighed up in the EIA.
3.3.8		Jason Burgess (Tuna 3 JV Southern Wolf Holding), Lüderitz	Focus Group Meeting, 28 May 2020	Tuna fishing season extends from October/November until January / February. Best would (likely) be for the seismic activities to be conducted outside this period. However, the impacts could be worst if the activities are conducted prior to the next fishing season and cause the tuna to be diverted from the typical migration route.	
3.4	EIA AND PUBLIC PARTICIPATION PROCESS				
3.4.1	Public Participation Process	MFMR, Swakopmund	Focus Group Meeting, 15 May 2020	How will SLR handle the EIA process and specifically the public participation, taking into consideration that no (open) public meetings can be held as part of EIA processes due to the current COVID-19 restrictions?	During the planning phase of the EIA (Stakeholder Engagement Plan), SLR developed various possible public participation strategies, depending on the “lockdown” requirements and possible further restrictions or relaxations. The tasks undertaken during the Scoping Phase are presented in Section 4.2.2 of the FSR. Based on the COVID-19 restrictions at the time, no public meetings were scheduled; however, smaller Focus Group Meetings (less than 10 people) were held. This was in addition to the other public participation tasks, including newspaper adverts, email correspondence, the distribution of the Draft Scoping Report (DSR) for

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					comment via e-mail, telephone calls, site notices, etc. The public participation tasks planned for the Impact Assessment Phase are presented in Section 4.3 of the FSR. These proposed tasks will be subject to any COVID-19 restrictions at that time.
3.4.2	I&AP notification	MFMR, Swakopmund	Focus Group Meeting, 15 May 2020	SLR could also consider radio announcements or interviews in future.	Radio announcements are sometimes an effective tool for public participation and could be considered during the Impact Assessment Phase as a form of notification, if necessary, depending on possible future COVID-19 restrictions.
3.4.3	I&AP database	Ministry of Works and Transport: Civil Aviation, Executive Director	Email, 7 May 2020	Please note that my email address has changed to: director@ncaa.com.na.	The project database has been updated accordingly.
3.4.4	I&AP database	Benguela Current Convention	Email, 7 May 2020	Please note that Dr Hashali Hamukuaya has retired from the BCC as from 30 November 2018. Kindly address all future correspondence to the Acting Executive Secretary, Ms Thandiwe Gxaba at thandiwe@benguelacc.org.	The project database has been updated accordingly.
3.4.5	Distribution of information	Municipality of Walvis Bay, David Uushona (Manager: Solid Waste and Environmental Management)	Email, 7 May 2020	Dear Colleagues – note attachments and email below F.Y.I. Nangula – Please share with WEMAF.	Internal distribution of email notification is noted.
3.4.6	Distribution of information	Jason Burgess (Tuna 3 JV Southern Wolf Holding), Lüderitz	Focus Group Meeting, 28 May 2020	The observations made by the MMOs needs to be reported and shared.	During a seismic survey, daily reports are normally emailed to key stakeholders, including the fishing industry. These reports provide, amongst other, an indication of the vessel location, percentage completion, vessel interaction and MMO observations.

NO.	ISSUE	ORGANISATION AND CONTACT PERSON	METHOD AND DATE	COMMENT	RESPONSE
					At the end of the survey a close-out report is prepared for submission to MME. This report will include the MMO report, which will include all daily reports of observations, etc.
3.4.7	Acknowledgment of receipt	Possessions Fishing, Matthew Hambuda	Email, 7 May 2020	Noted with thanks.	This comment is noted.
3.4.8	Acknowledgment of receipt	Galp Energia S.A. / Windhoek PEL28 B.V., António Fonseca (HSE Manager)	Email, 22 May 2020	We acknowledge good reception of the notice related with the Draft Scoping Report (DSR) compiled for the abovementioned. After analysing the copy of the Executive Summary of the DSR at this stage we do not have any comments.	This comment is noted.
3.4.9	Information request	MFMR, Swakopmund	Focus Group Meeting, 15 May 2020	Can we please get a copy of the presentation?	An electronic copy (in PDF) of the presentation was supplied to MFMR after the meeting.
3.4.10	Focus Group Meetings	MFMR, Lüderitz	Focus Group Meeting, 26 May 2020	Is SLR also meeting with the Tuna Sector?	SLR notified various fishing associations and companies (see I&AP database) of the availability of the DSR and the opportunity to attend virtual or focus group meetings. Three telephonic discussions were also held with stakeholders from the fishing industry to inform them of the proposed project and to offer an opportunity to attend virtual or focus group meetings. A focus group meeting was held with Jason Burges (tuna fishery) on 28 May 2020. Minutes are attached in Appendix 2.5 of the FSR.

