SCOPING REPORT FOR AN EIA FOR A PROSPECTING RIGHT APPLICATION FOR OFFSHORE SEA CONCESSIONS 13C, 15C, 16C, 17C & 18C, WEST COAST

Prepared for: Belton Park Trading 127 (Pty) Ltd

DMRE Authority References:
WC30/5/1/1/2/10319PR
WC30/5/1/1/2/10320PR
WC30/5/1/1/2/10321PR
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NOTE:

This Scoping Report has deviated from the standard Department of Mineral Resources and Energy (DMRE) Scoping Report template in order to present a format to assist with Interested & Affected Party (I&AP) interaction.

In order to comply with DMRE reporting requirements, the SAMRAD Scoping Report Template has been completed for the proposed project and is attached as Appendix A to this report. The content of the report complies with the requirements of Appendix 2 of the EIA Regulations 2014 (as amended).

EXECUTIVE SUMMARY

1. INTRODUCTION

On 17 December 2019 Belton Park Trading 127 (Pty) Ltd (BPT127) lodged an application for a Prospecting Right with the Department of Mineral Resources and Energy (DMRE) to undertake offshore prospecting activities in Sea Concessions 13C, 15C, 16C, 17C and 18C, located off the West Coast of South Africa. The application was lodged in terms of Section 16 of the Mineral and Petroleum Resources Development Act, 2002 (No. 28 of 2002) (MPRDA), as amended.

Sea Concessions 13C, 15C, 16C, 17C and 18C are situated approximately 180 km north of Cape Town, with the inshore boundaries ranging from approximately 4 km seaward of the high water mark along the coast north of Doring Bay (Concession 13C) to as much as 41 km to the west of Rocher Pan in St Helena Bay (Concession 18C) (see Figure 1).

BPT127 proposes to undertake prospecting operations for various minerals (specifically diamond, gemstones, heavy minerals, industrial minerals, precious metals, ferrous and base metals) within each of the Sea Concession areas. The proposed prospecting operations would entail geophysical surveys, drill sampling and bulk (trench) sampling.

For the geophysical surveys, the total line kilometres to be surveyed per concession would be between 600 and 1 200 km. The total footprint of disturbance associated with the drill sampling and bulk (trench) sampling would be approximately 20.4 ha in total. The duration of each exploration activity would be four days per annum in each concession area.

The proposed prospecting activities require Environmental Authorisation (EA) in terms of the National Environmental Management Act, 1998 (No. 107 of 1998) (NEMA), as amended and a Prospecting Right has to be obtained in terms of the MPRDA. A requirement for obtaining a Prospecting Right is that an applicant must comply with Chapter 5 of NEMA with regards to consultation and reporting. In this regard, an application for EA is also required. In order for DMRE to consider an application for EA for the proposed prospecting operations, a Scoping and Environmental Impact Assessment (EIA) process must be undertaken.

SLR Consulting (South Africa) (Pty) Ltd (SLR) has been appointed by BPT127 as the independent environmental consultancy to undertake the EIA process. SLR is required to ensure that the EIA meets the relevant requirements of the NEMA and the EIA Regulations 2014, as amended.

2. OPPORTUNITY TO COMMENT

This Scoping Report has been distributed for a 30-day comment period from **10 January to 10 February 2020** in order to provide interested and affected parties (I&APs) with an opportunity to comment on any aspect of the proposed project and the findings of the EIA project to date. Copies of the full report have been made available on the SLR website (at https://slrconsulting.com/za/slr-documents/) and at the offices of SLR.

Any comments should be forwarded to SLR at the address, telephone or e-mail addresses shown below. For comments to be included in the updated Scoping Report, comments should reach SLR by no later than **10 February 2020**.

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3. SCOPING AND EIA PROCESS

The key steps in the Scoping and EIA process are described below.

3.1. SCOPING PHASE

3.1.1. Application for Environmental Authorisation

An "Application Form for Environmental Authorisation" form was submitted to DMRE at the same time as the Prospect Right application was submitted (on 17 December 2019).

3.1.2. Compilation and review of the Scoping Report

This draft version of the Scoping Report has been prepared in compliance with Appendix 2 of the EIA Regulations 2014 (as amended). This report provides an opportunity for I&APs to comment on the proposed project and the scope of work for the next phase of the EIA.

3.1.3. Completion of the Scoping Phase

After closure of the comment period, the Scoping Report will be updated to incorporate comments received. The updated Scoping Report will be submitted to DMRE for acceptance. If the Scoping Report is accepted, the project will proceed onto the EIA Phase.

3.2. EIA PHASE

3.2.1. Specialist Studies

Three specialist studies will be undertaken to address the key issues and detailed assessment of the planned prospecting activities. These studies are: (1) an Underwater Heritage Impact Assessment, (2) a Marine Faunal Assessment, and (3) a Fisheries Impact Assessment. The specialist studies will involve the gathering of data relevant to identifying and assessing environmental impacts that may occur as a result of the proposed geophysical surveying, drill sampling and bulk (trench) sampling activities. These impacts will be assessed according to pre-defined rating scales. The studies will also recommend appropriate mitigation or optimisation measures to minimise potential impacts or enhance potential benefits, respectively.

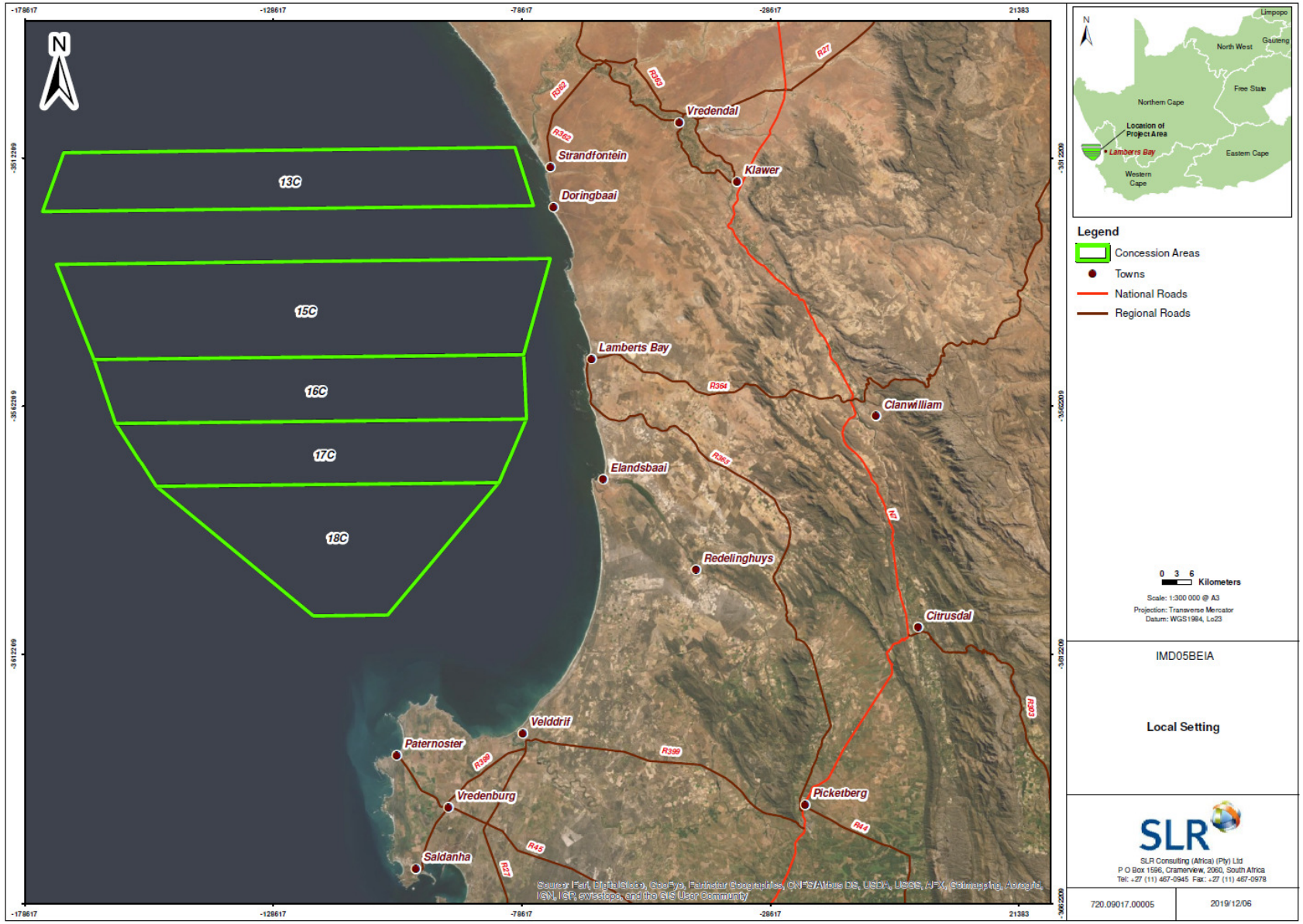

FIGURE 1: LOCATION OF THE 13C, 15C, 16C, 17C AND 18C SEA CONCESSION AREAS, OFF THE WEST COAST OF SOUTH AFRICA.

3.2.2. Integration and Assessment

Information from the specialists, desktop analysis, and the generic EMP prepared for marine diamond mining off the West Coast, will be integrated into an Environmental Impact Report (EIR), which will include an Environmental Management Programme (EMPr). The EIR will be released for a 30-day comment period and all I&APs on the project database will be notified of when the EIR will be available for comment.

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

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

4. PROJECT DESCRIPTION

4.1 GENERAL INFORMATION

The proposed prospecting activities would be undertaken within Sea Concessions 13C, 15C, 16C, 17C and 18C off the West Coast of South Africa. The minerals targeted by the proposed operations would be diamonds, gemstones, heavy minerals, industrial minerals, precious metals, ferrous and base metals.

4.2 NEED AND DESIRABILITY

In the recently published DMRE Strategic Plan 2014-2019, the foreword by the Minister of Mineral Resources notes that the Department "*will continue to promote mineral value addition to strengthen the interface between extractive industries and national socio-economic developmental objectives*".

This project aims to undertake prospecting operations within Sea Concessions 13C, 15C, 16C, 17C and 18C in order to identify economically viable diamond deposits on the continental shelf off the coast of the Western Cape. The intention is to derive value from the identified offshore mineral resources in the future and to contribute to the existing diamond mining sector in the Western Cape.

4.3 PROJECT OVERVIEW

The proposed prospecting programme would entail geophysical surveying, drill sampling and bulk (trench) sampling activities. The principal objective of the proposed prospecting activities is to identify and estimate the potential mineral resources within each Sea Concession area for possible future mining. The proposed activities may be divided into stages subject to data reviews and follow-up sampling. Each of the proposed prospecting activities are described below.

4.3.1 Geophysical Surveys

The geophysical surveying will be undertaken using the group-owned dedicated survey vessel, the *DP Star* which has a length of 45 m. The vessel is equipped with:

- a multibeam echosounder designed to produce high resolution digital terrain models of the seafloor in a wide swath below the vessel; and
- a sub-bottom profiler which can generate profiles up to 60 m beneath the seafloor, thereby giving a cross section view of the sediment layers.

Sound levels from the acoustic equipment would range between 190 to 220 dB re 1 µPa at 1 m. The proposed surveys would be undertaken in specific priority areas in each of the concessions, at water depths between approximately 45 - 200 m. The surveys would have a line spacing of between 100 to 1 000 m apart. The total line kilometres surveyed per concession will be between 600 and 1 200 km. The planned duration for the proposed geophysical surveys would be a total of four days per concession area (20 days in total) per year over a four year period (i.e. the duration of the validity of the prospecting right).

In general terms, sound sources that have high sound pressure and low frequency will travel the greatest distances in the marine environment. Conversely, sources that have high frequency will tend to have greater attenuation over distance due to interference and scattering effects (Anon 2007). It is for this reason that the acoustic footprint of the above-mentioned sonar survey tools is considered to be much lower than that of deeper penetration low frequency seismic surveys and in addition have lower sound pressure levels. It should be noted that a decibel is a logarithmic scale of pressure where each unit of increase represents a tenfold increase in the quantity being measured.

4.2.2 Drill Sampling

The proposed drill sampling activities would be undertaken using the group-owned dedicated sampling vessel, the *MV The Explorer* which has an overall length of 114.4 m. The vessel is equipped with a subsea sampling tool, which can be operated in water depths up to 200 m. The sampling tool comprises a 2.5 m diameter drill bit operated from a drill frame structure, which is launched through the moon pool of the support vessel and positioned on the seabed.

The drill bit can penetrate sediments up to 12 m depth above bedrock. The sediments are fluidised with strong water jets and airlifted to the support vessel where they are treated in the onboard mineral recovery plant. All oversized and undersized tailings are discharged back to the sea on site.

A sample spacing of as little as 20 m can be achieved by the dynamically positioned vessel. Depending on sea and the subseabed geotechnical conditions, up to 60 samples can be successfully taken per day. The samples would be undertaken at intervals of 50 to 500 m. With a planned duration for the proposed drill sampling of four days per year for each concession area, the total number of drill samples that would be obtained during the prospecting right period would be up to a maximum of 4 800. As the drill has a footprint of 5 m^2, a total area of 2.4 ha would be sampled.

4.3.3 Bulk Sampling

Following analysis of the drill samples and establishment of a potential resource, bulk trench sampling may be conducted to confirm the economic viability of the resource for mining. Trenching would be undertaken by a seabed crawler, deployed off the group-owned dedicated mining vessel, the *MV Ya Toivo* which has a length of

150 m. The vessel is equipped with a track-mounted subsea crawler capable of working to depths up to 200 m below sea level. The crawler, which is fitted with highly accurate acoustic seabed navigation and imaging systems, and equipped with an anterior suction system, is lowered to the seabed and is controlled remotely from the surface support vessel through power and signal umbilical cables. Water jets in the crawler's suction loosen seabed sediments, and sorting bars filter out oversize boulders. The sampled sediments are pumped to the surface for shipboard processing. The area of the seabed to be sampled by crawler can only be determined following analysis of drill samples and development of a resource model.

It is proposed that up to ten trenches, each 180 m long and 20 m wide would be excavated within each concession area. Thus, the area to be disturbed in each concession would be 3.6 ha and for all five concessions 18 ha. The planned duration of the proposed bulk sampling would be a total of four days per a concession area over a two year period. It is noted that the trenches will not be contiguous, but located in the prospective areas derived from the drill sampling results. The aim of the trench sampling is to determine the geotechnical characteristics of the footwall and overburden which is essential in establishing the optimal approach to mining in these areas.

4.4 NO-GO ALTERNATIVE

The No-Go alternative is the non-occurrence of the proposed project. The negative implications of not going ahead with the proposed project are as follows:

- Loss of opportunity to establish whether further viable offshore diamond resources exist;
- Prevention of any socio-economic benefits associated with the continuation of prospecting activities; and
- Lost economic opportunities.

The positive implications of the no-go option are that there would be no effects on the biophysical environment in the area proposed for the bulk sampling activities.

5. AFFECTED ENVIRONMENT

5.1 PHYSICAL ENVIRONMENT

The sea concession areas lie within the southern zone of the Benguela Current region and is characterised by the cool Benguela upwelling system. The dominant southerly and south-easterly winds in summer drive the massive offshore movement of surface water, resulting in strong upwelling of nutrient-rich bottom waters. Nutrient-rich upwelled water enhances primary production, and the West Coast region consequently supports substantial pelagic fisheries.

5.2 BIOLOGICAL OCEANOGRAPHY

The sea concession areas fall into one of the nine bioregions, namely the cold temperate Namaqua Bioregion. 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).

The demersal fish species likely to be encountered in the general project area occupy waters of <100 m depth and include species such as various skate species, St Joseph, Houndshark, Soupfin shark, Tigar catshark and Bramble

shark. Small pelagic species occurring beyond the surfzone and generally within the 200 m contour include the sardine/pilchard, anchovy, chub mackerel, horse mackerel and round herring. Large pelagic species such as tunas, billfish and pelagic sharks, migrate throughout the southern oceans, between surface and deep waters (> 300 m). The distribution of these species is dependent on food availability in the mixed boundary layer between the Benguela and warm central Atlantic waters. Concentrations of large pelagic species are also known to occur associated with underwater feature such as canyons and seamounts as well as meteorologically induced oceanic fronts.

Most seabirds in the region reach highest densities offshore of the shelf break (200 to 500 m depth) and are likely to be encountered. Marine mammals likely to be encountered include sperm whales, migrating humpback and southern right whales and various baleen and toothed whales known to frequent offshore waters.

5.3 HUMAN UTILISATION

The commercial fisheries sectors that could be affected by the proposed prospecting operations are the small pelagic purse-seine, tuna pole, traditional line-fish, West Coast Rock Lobster and gillnet fisheries. The majority of shipping traffic is located on the outer edge of the continental shelf with traffic inshore of the continental shelf along the South-West Coast largely comprising fishing vessels. The majority of the shipping traffic would be limited to the western edge of the Sea Concessions.

Exploration for oil and gas is currently undertaken in a number of licence blocks off the West Coast. The Sea Concession areas overlap with Block 3A/4A for which PetroSA and Sasol are the licence holders. There is no current development or production from the South African West Coast offshore. However, a subsea production pipeline to export gas from the iBhubesi Gas Field to a location on the Saldanha peninsula and Grotto Bay has been approved for development by Sunbird SA. A number of proposed prospecting areas for phosphate are located off the West Coast, these overlap with the western edge of the Sea Concession areas. A number of marine diamond mining right and prospecting concession areas are also located in proximity to the Sea Concession areas under this application.

6. KEY PROJECT ISSUES

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

Potential impact on marine fauna:

- Normal discharges to the marine environment from a variety of sources, including deck drainage, machinery space drainage, sewage and galley wastes from survey and support vessels;
- Potential impacts of multi-beam bathymetry and or sub-bottom profiler noise / pulses on marine fauna. Potential impacts could include physiological injury, behavioural avoidance of the survey area, masking of environmental sounds and communication, and indirect impacts due to effects on prey.
- Localised disturbance of marine fauna due to noise and lighting from the prospecting vessel(s), seabed crawler and support vessels;
- Physical damage to the seabed, alteration of sediment structure, alteration in benthic faunal community composition and potential reduction in benthic biodiversity due to drill and bulk sampling activities;
- Impacts on benthic fauna due to the discharge of processed sediments, including direct mortality, smothering of relatively immobile or sedentary species; and

- Accidental oil spills during normal operations (e.g. bunkering at sea). Oil spilled in the marine environment would have an immediate detrimental effect on water quality.

Potential impact on fishing:

- Decreased fishing effort and / or loss of catch due to:
  - Disruption to fishing operations;
  - Loss of access to fishing grounds in the vicinity of the prospecting vessel areas over the duration of the prospecting operations; and
  - Fish avoidance (flight response) of the prospecting area and changes in feeding behaviour.
- Possible loss of income due to the decreased fishing effort and / or loss of catch.

Potential impact on other marine prospecting/mining and exploration operations:

- Disruption of activities as a result of the imposition of a statutory safety zone around the prospecting vessels.

Potential impact on marine transport routes:

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

Potential socio-economic impacts:

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

Potential impacts on underwater cultural heritage material:

- Disturbance and damage to underwater cultural heritage material located on the seabed, particularly historical shipwrecks and other palaeontological or rare geological objects.

Specialist studies will be undertaken to address those issues that require further investigation and detailed assessment.

The remainder of the issues will be assessed based on experience gained from the environmental assessment of similar operations elsewhere in the region and information from the generic EMP prepared for marine diamond mining off the West Coast of South Africa (Lane and Carter 1999) and desktop analysis.

7. SPECIALIST STUDIES

Three specialist studies have been identified for the EIA phase, namely: (1) the impact on marine fauna, (2) the impact on fisheries and (3) the impact on underwater cultural heritage material. The specific terms of reference for these studies are presented below.

7.1 MARINE FAUNA

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

- Provide a general description of the local marine fauna (including cetaceans, seals, turtles, seabirds, fish, invertebrates and plankton species) within the Sea Concession areas and greater West Coast. The description to be based on, *inter alia*, a review of existing information and data from the international scientific literature, the Generic EMP prepared for marine diamond mining off the West Coast of South Africa and information sourced from the internet;
- Identify, describe and assess the significance of potential impacts of the proposed operations on the local marine fauna, including but not limited to:
    - physiological injury;
    - physical damage to the seabed, alteration of sediment structure, alteration in benthic fauna community composition and potential reduction in benthic biodiversity due to prospecting activities;
    - impacts on benthic fauna due to the discharge of processed sediments, including direct mortality, smothering of relatively immobile or sedentary species and biochemical effects (e.g. direct toxicity and bioaccumulation);
    - behavioural avoidance of the prospecting area;
    - masking of environmental sounds and communication; and
    - indirect impacts due to effects on prey.
- Identify practicable mitigation measures to avoid/reduce any negative impacts and indicate how these could be implemented in the start-up and management of the proposed project.

7.2 FISHERIES

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

- Provide a general description of the fishing activities expected in the Sea Concession areas and along the greater West Coast;
- Undertake a spatial and temporal assessment of expected fishing effort and catch in the Sea Concession areas for each sector identified;
- Assess the impact of the operations on the different fishing sectors;
- Assess the impact of the proposed exclusion zones around the prospecting vessels and potential disturbance of fish on the fishing activities based on the estimated percentage loss of catch and effort; and
- Make recommendations for mitigation measures that could be implemented to minimise or eliminate negative impacts on and enhance any benefits to the fishing industry.

7.3 UNDERWATER CULTURAL HERITAGE MATERIAL

The specific terms of reference for the Underwater Heritage Impact Assessment are as follows:

- Undertake a desktop study of the database of known and suspected wrecks in the area ascertained through the study of available written and oral resources;
- Identify potential Maritime and Underwater Cultural Heritage (MUCH) sites within the designated area; and
- Recommend management measures for sites before and during development.

CONTENTS

APPENDICES

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ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Definition
AEL	Air Emissions Licence
BCC	Benguela Current Commission
BPT127	Belton Park Trading 127 (Pty) Ltd
CBA	Critical Biodiversity Areas
CBD	Convention of Biological Diversity
CITES	Convention on International Trade in Endangered Species
DEFF	Department of Environment, Forestry and Fisheries
DMRE	Department of Mineral Resources and Energy
EA	Environmental Authorisation
EBSA	Ecologically or Biologically Significant Areas
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMPr	Environmental Management Programme
GN	Government Notice
ha	Hectares
I&AP	Interested and Affected Party
IUCN	International Union for Conservation of Nature
MARPOL	International Convention for the Prevention of Pollution from Ships, 1973/1978
MMO	Marine Mammal Observer
MPA	Marine Protected Area
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (No. 28 of 2002)
MUCH	Maritime and Underwater Cultural Heritage
NEMA	National Environmental Management Act, 1998 (Act 107 of 1998)
NEM: AQA	National Environmental Management: Air Quality Act, 2004 (No. 39 of 2004)
NEM: WA	National Environmental Management: Waste Act, 2008 (No. 59 of 2008)
nm	Nautical mile
ROV	Remote Operated Vehicle
SAHRA	South African Heritage Resources Agency
SAMSA	South African Maritime Safety Authority
SAN	South African Navy
SANBI	South African National Biodiversity Institute

Acronym / Abbreviation	Definition
SLR	SLR Consulting (South Africa) (Pty) Ltd
TAC	Total Allowable Catch
TAE	Total Applied Effort
UNCLOS	United Nations Convention on Law of the Sea
VME	Vulnerable Marine Ecosystem

1 INTRODUCTION

This chapter describes the purpose of this report, provides a brief description of the project background, summarises the legislative authorisation requirements and terms of reference, describes the structure of the report.

1.1 BACKGROUND TO THE PROPOSED PROJECT

On 17 December 2019 Belton Park Trading 127 (Pty) Ltd (BPT127) lodged an application for a Prospecting Right with the Department of Mineral Resources and Energy (DMRE) to undertake offshore prospecting activities in Sea Concessions 13C, 15C, 16C, 17C and 18C, located off the West Coast of South Africa. The application was lodged in terms of Section 16 of the Mineral and Petroleum Resources Development Act, 2002 (No. 28 of 2002) (MPRDA), as amended.

Sea Concessions 13C, 15C, 16C, 17C and 18C are situated approximately 180 km north of Cape Town, with the inshore boundaries ranging from approximately 4 km seaward of the high water mark along the coast north of Doring Bay (Concession 13C) to as much as 41 km to the west of Rocher Pan in St Helena Bay (Concession 18C) (see Figure 1-1).

BPT127 proposes to undertake prospecting operations for various minerals (specifically diamond, gemstones, heavy minerals, industrial minerals, precious metals, ferrous and base metals) within each of the Sea Concession areas. The proposed prospecting operations would entail:

- Geophysical surveys;
- Drill sampling; and
- Bulk (trench) sampling.

1.2 AUTHORISATION REQUIREMENTS

The proposed prospecting activities require Environmental Authorisation (EA) in terms of the National Environmental Management Act, 1998 (No. 107 of 1998) (NEMA), as amended and a Prospecting Right has to be obtained in terms of the MPRDA. These two regulatory processes are summarised below and presented in more detail in Section 2.1.

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

In terms of the Environmental Impact Assessment (EIA) Regulations 2014 (as amended), promulgated in terms of Chapter 5 of NEMA, an application for a Prospecting Right requires EA from the competent authority, the Minister of Mineral Resources and Energy (or delegated authority), to carry out the proposed prospecting operations. In order for DMRE to consider an application for EA for the proposed prospecting operations, a Scoping and EIA process must be undertaken.

SLR Consulting (South Africa) (Pty) Ltd (SLR) has been appointed by BPT127 as the independent environmental consultancy to undertake the EIA process. SLR is required to ensure that the EIA meets the relevant requirements of the NEMA and the EIA Regulations 2014, as amended.

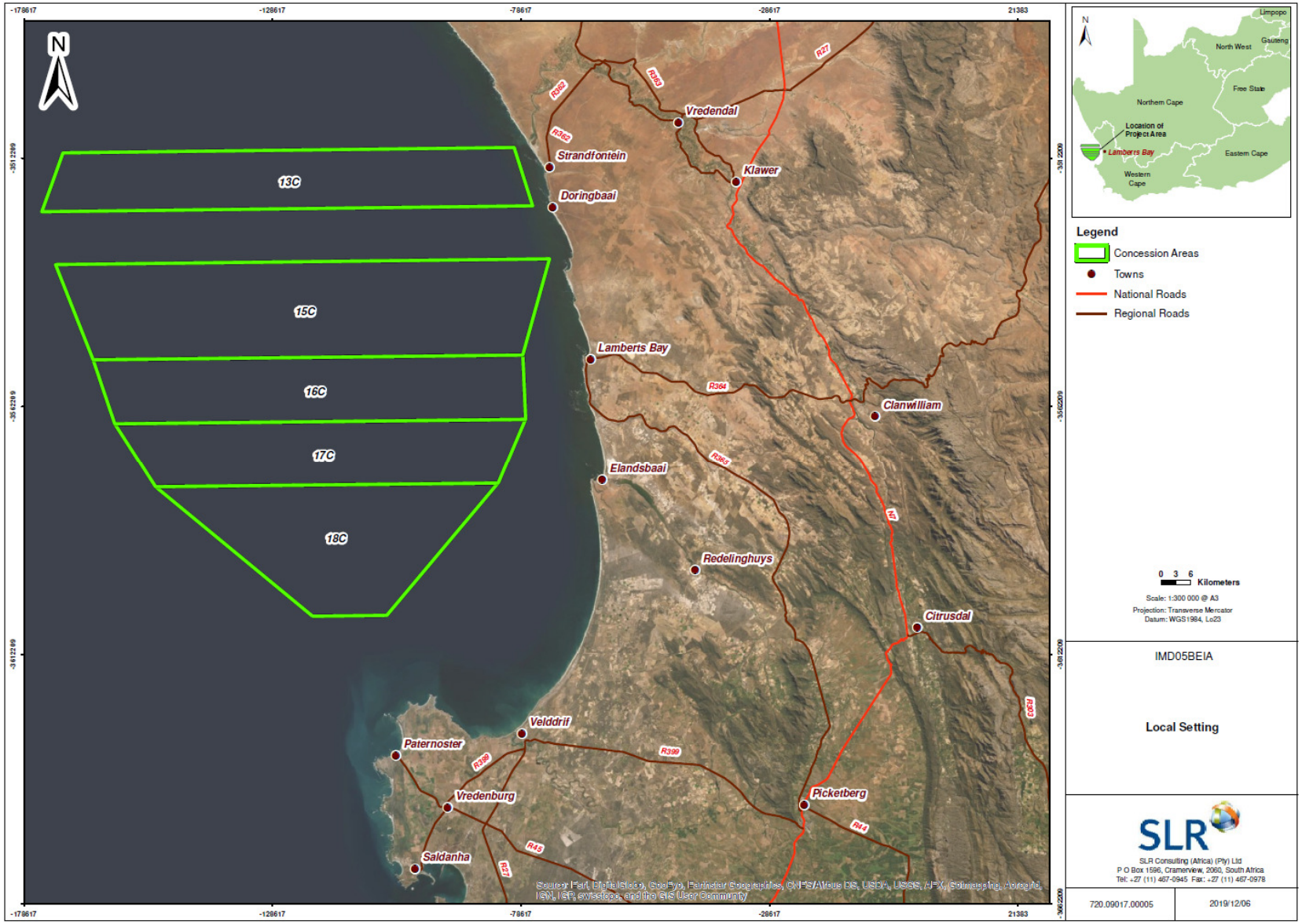

FIGURE 1-1: LOCATION OF THE 13C, 15C, 16C, 17C AND 18C SEA CONCESSION AREAS, OFF THE WEST COAST OF SOUTH AFRICA.

1.3 TERMS OF REFERENCE

The terms of reference for the Scoping and EIA are as follows:

1. Ensure the Scoping and EIA is undertaken in accordance with the requirements of NEMA and the EIA Regulations, 2014 (as amended);
2. Ensure the Scoping and EIA is undertaken in an open, participatory manner to ensure that all potential impacts are identified;
3. Undertake a formal public participation process, which specifically addresses the distribution of information to Interested & Affected Parties (I&APs) and provides the opportunity for I&APs to raise any concerns/issues, as well as an opportunity to comment on all Scoping and EIA documentation;
4. Commission specialists to undertake studies, identified during the scoping process, to assess key issues and concerns; and
5. Integrate all the information, including the finding of the specialist studies, into an Environmental Impact Report (EIR) to allow an informed decision to be taken concerning the proposed project.

1.4 STRUCTURE OF THIS REPORT

This report consists of seven sections and four appendices, the contents of which are outlined below.

Section	Contents
Executive Summary	Provides an overview of the main findings of the Scoping Report.
Section 1	**Introduction** Describes the purpose of this report, provides a brief description of the project background, summarises the legislative authorisation requirements, presents the terms of reference of the Scoping and EIA, and describes the structure of the report and the opportunity to provide comment.
Section 2	**Scoping approach and methodology** Outlines the key legislative requirements applicable to the proposed bulk sampling activities and outlines the methodology and I&AP consultation process followed in the study.
Section 3	**Project description** Provides general project information, describes the need and desirability for the proposed project and project alternatives, as well as provides an overview of the proposed prospecting activities.
Section 4	**Description of the affected environment** Describes the existing biophysical and social environment that could be affected by the proposed project.
Section 5	**Key project issues and preliminary impact assessment** Describes key issues associated with the proposed project. It also presents mitigation or optimisation measures that could be used to reduce the significance of any negative impacts or enhance any benefits, respectively.
Section 6	**Proposed specialist studies** Identifies the proposed specialist studies that would be undertaken in the next phase of the Scoping and EIA and provides their terms of reference.
Section 7	**References** Provides a list of the references used in compiling this report.

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	Appendix B:	I&AP Database
	Appendix C:	Undertaking of Environmental Assessment Practitioner
	Appendix D:	Screening reports for the Sea Concession areas

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Any comments should be forwarded to SLR at the address, telephone or e-mail addresses shown below. For comments to be included in the updated Scoping Report, comments should reach SLR by no later than **10 February 2020**.

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2 LEGISLATIVE REQUIREMENTS AND EIA PROCESS

This chapter outlines the key legislative requirements applicable to the proposed prospecting activities and outlines the methodology and I&AP consultation process followed in the Scoping and EIA process.

2.1 LEGISLATIVE REQUIREMENTS

2.1.1 Mineral and Petroleum Resources Development Act, 2002

In terms of the MPRDA, a Prospecting Right must be obtained prior to the commencement of any prospecting activities. A requirement for obtaining a Prospecting Right is that an applicant must submit an application in terms to Section 16(1) of the MPRDA to the Regional Manager, who must accept the application within 14 days if, *inter alia*, no other person holds a Prospecting Right, Mining Right, Mining Permit or Retention Permit for the same mineral and land. If the application for a Prospecting Right is accepted, the Regional Manager must request that the applicant comply with Chapter 5 of NEMA with regards to consultation and reporting (see Section 2.1.2 below).

As mentioned previously, BPT127 has lodged an application for a Prospecting Right in terms of the MPRDA and an Application for Environmental Authorisation in terms of NEMA with DMRE.

2.1.2 National Environmental Management Act, 1998

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

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

The EIA Regulations 2014 (as amended) promulgated in terms of Chapter 5 of NEMA, and published in Government Notice (GN) No. R982 (as amended), provides for the control of certain listed activities. These activities are listed in GN No. R983 (Listing Notice 1), R984 (Listing Notice 2) and R985 (Listing Notice 3) of 4 December 2014 (as amended), and are prohibited until EA has been obtained from the competent authority. The Minister of Mineral Resources and Energy remains responsible for the granting of an EA for the proposed prospecting activities in terms of NEMA. Such EA, which may be granted subject to conditions, will only be considered once there has been compliance with GN No. R982.

GN No. R982 sets out the procedures and documentation that need to be complied with when applying for EA. A Basic Assessment process must be applied to an application if the authorisation applied for is in respect of an activity(ies) listed in Listing Notice 1 and / or 3 and a Scoping and EIA process must be applied to an application if the authorisation applied for is in respect of an activity(ies) listed in Listing Notice 2.

The inclusion of bulk sampling activities as part of prospecting operations (which include offshore diamonds) would trigger listed activity 19 of Listing Notice 2 (GN No. R984 of 4 December 2014, as amended) of the EIA Regulations 2014 (as amended). Thus, a full Scoping and EIA process must be undertaken in order for DMRE to consider the application in terms of NEMA and make a decision as to whether to grant EA or not. All the listed activities triggered by the proposed project are indicated in Table 2-1 below.

TABLE 2-1: LIST OF APPLICABLE ACTIVITIES IN TERMS OF LISTING NOTICE 1 AND 2.

Activity No.	Activity Description	Description of activity in relation to the proposed project
GN No. R983: Listing Notice 1		
19A	*"The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from:* *(iii) the sea. …"*	The proposed sampling activities would result in various forms of disturbance to the seafloor and would result in more than 5 m^3 of sediment being disturbed and moved.
20	*"Any activity including the operation of that activity which requires a prospecting right in terms of section 16 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including* *(a) associated infrastructure, structures and earthworks, directly related to prospecting of a mineral resource; or* *(b) the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing;* *but excluding the secondary processing of a mineral resource, including the smelting, beneficiation, reduction, refining, calcining or gasification of the mineral resource in which case activity 6 in Listing Notice 2 applies."*	The proposed project entails the removal and primary processing of seabed sediments to determine the presence of the proposed target minerals, thus the proposed sampling activities would trigger this listed activity.
22	*"The decommissioning of any activity requiring-* *(i) a closure certificate in terms of section 43 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002); or* *(ii) a …prospecting right… where the throughput of the activity has reduced by 90% or more over a period of 5 years excluding where the competent authority has in writing agreed that*	On completion of the proposed prospecting operation, BPT127 would be required to apply to the DMRE for a closure certificate. The process of applying for a Closure Certificate would trigger this listed activity.

Activity No.	Activity Description	Description of activity in relation to the proposed project
	such reduction in throughput does not constitute closure."	
GN No. R984: Listing Notice 2		
19	*"The removal and disposal of minerals contemplated in terms of section 20[1] of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks, directly related to prospecting of a mineral resource; the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing; but excluding the secondary processing of a mineral resource, including the smelting, beneficiation, reduction, refining, calcining or gasification of the mineral resource in which case activity 6 in this Notice applies."*	The proposed bulk sampling would involve the removal and disposal of, amongst other minerals, marine diamonds and would include extraction, screening and washing during the bulk sampling operations.

2.1.3 National Environmental Management: Air Quality Act, 2004

The National Environmental Management: Air Quality Act, 2004 (No. 39 of 2004) (NEM:AQA) regulates all aspects of air quality, including prevention of pollution, providing for national norms and standards and including a requirement for an Atmospheric Emissions Licence (AEL) for listed activities, which result in atmospheric emissions and have or may have a significant detrimental effect on the environment.

Activities that require an AEL are listed in GN No. 893 (22 November 2013), published in terms of Section 21(1)(b) of the NEM: AQA. In terms of Section 22 of NEM: AQA no person may conduct a listed activity without an AEL. The incineration of waste is a listed activity (Category 8.1 – Thermal treatment of Hazardous and General Waste) and requires an AEL for all installations treating 10 kg or more of waste per day.

In terms of Section 36 of the Act, the metropolitan and district municipalities are charged with implementing the AEL system. However, as the offshore area of activity and the Exclusive Economic Zone (EEZ) do not fall within the borders of any municipality or province of South Africa as set out in the Constitution, there is no formal means in terms of NEM: AQA by which application can be made for incineration from vessels in the offshore. Furthermore, the on-board incineration of waste is permitted in terms of the International Convention for the Prevention of Pollution from Ships, 1973/1978 (MARPOL), to which South Africa is a signatory. Thus, there is uncertainty of the applicability of NEM: AQA to offshore operations, given that MARPOL, an international convention, allows for the on-board incineration of waste and there is no formal implementing authority for AEL applications associated with offshore operations.

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[1] Section 20 (2) of the Mineral and Petroleum Resources Development Act (MPRDA), 2002 (Act 28 of 2002) states that "*the holder of a prospecting right must obtain the Minister's written permission to remove and dispose for such holder's own account of diamonds and bulk samples of any other minerals found by such holder in the course of prospecting operations.*"

2.1.4 National Environmental Management: Waste Act, 2008

The National Environmental Management: Waste Act, 2008 (No. 59 of 2008) (NEM: WA) regulates all aspects of waste management and has an emphasis on waste avoidance and minimisation. NEM: WA creates a system for listing and licensing waste management activities. Listed waste management activities above certain thresholds are subject to a process of impact assessment and licensing. Activities listed in Category A require a Basic Assessment, while activities listed in Category B require a Scoping and EIA process.

The Department of Environment, Forestry and Fisheries (DEFF, previously Department of Environmental Affairs) has indicated that NEM: WA is not applicable to offshore activities. Thus, a Waste Management Licence would not be required for offshore waste management activities, such as those related to sewage. These aspects would be managed in terms of and comply with the requirements of the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78).

2.1.5 Other Relevant Legislation

In addition to the foregoing, BPT127 must also comply with the provisions of other relevant conventions and legislation, which includes, amongst others, the following:

International Marine Pollution Conventions

- International Convention for the Prevention of Pollution from Ships, 1973/1978 (MARPOL);
- Amendment of the International Convention for the Prevention of Pollution from Ships, 1973/1978 (MARPOL) (Bulletin 567 – 2/08);
- International Convention on Oil Pollution Preparedness, Response and Co-operation, 1990 (OPRC Convention);
- United Nations Convention on Law of the Sea, 1982 (UNCLOS);
- Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 (the London Convention) and the 1996 Protocol (the Protocol);
- International Convention relating to Intervention on the High Seas in case of Oil Pollution Casualties (1969) and Protocol on the Intervention on the High Seas in Cases of Marine Pollution by substances other than oil (1973);
- Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal (1989); and
- Convention on Biological Diversity (1992).

Other South African Legislation

- Carriage of Goods by Sea Act, 1986 (No. 1 of 1986);
- Hazardous Substances Act, 1983 and Regulations (No. 85 of 1983);
- Marine Living Resources Act, 1998 (No. 18 of 1998);
- Marine Traffic Act, 1981 (No. 2 of 1981);
- Marine Pollution (Control and Civil Liability) Act, 1981 (No. 6 of 1981);
- Marine Pollution (Prevention of Pollution from Ships) Act, 1986 (No. 2 of 1986);
- Marine Pollution (Intervention) Act, 1987 (No. 65 of 1987);
- Maritime Safety Authority Act, 1998 (No. 5 of 1998);
- Maritime Safety Authority Levies Act, 1998 (No. 6 of 1998);

- Maritime Zones Act 1994 (No. 15 of 1994);
- Merchant Shipping Act, 1951 (No. 57 of 1951);
- Mine Health and Safety Act, 1996 (No. 29 of 1996);
- National Environmental Management: Biodiversity Act, 2004 (No. 10 of 2004);
- National Environmental Management: Integrated Coastal Management Act, 2008 (No. 24 of 2008);
- National Environmental Management: Protected Areas Act, 2003 (No. 57 of 2003)
- National Heritage Resources Act, 1999 (No. 25 of 1999);
- National Ports Act, 2005 (No. 12 of 2005);
- National Water Act, 1998 (No. 36 of 1998);
- Occupational Health and Safety Act, 1993 (No. 85 of 1993) and Major Hazard Installation Regulations;
- Sea Birds and Seals Protection Act, 1973 (No. 46 of 1973);
- Ship Registration Act, 1998 (No. 58 of 1998);
- South African Maritime Safety Authority Act, 1998 (No. 5 of 1998);
- South African Maritime Safety Authority Levies Act, 1998 (No. 6 of 1998); and
- Wreck and Salvage Act, 1995 (No. 94 of 1995).

2.2 LEGISLATION CONSIDERED IN THE PREPARATION OF THE SCOPING REPORT

In accordance with the EIA Regulations 2014 (as amended), all legislation and guidelines that have been considered in the EIA process must be documented.

Table 2-2 below provides a summary of the applicable legislative context and policy.

TABLE 2-2: LEGAL FRAMEWORK.

Applicable legislation and guidelines	Relevance or reference
Mineral and Petroleum Resources Development Act, 2002 (No. 28 of 2002)	Refer to Section 2.1.2.
National Environmental Management Act, 1998 (No. 107 of 1998) (NEMA)	Refer to Section 2.1.1.
EIA Regulations 2014, as amended (GN No. R982), Listing Notice 1 (GN No. R983), Listing Notice 2 (GN No. R984).	Refer to Section 2.1.2 and Table 2-1. The proposed project triggers activities listed in Listing Notice 1 and Listing Notice 2 and, therefore, requires a Scoping and EIA process to inform the application for EA. This Scoping Report has been compiled in accordance with Appendix 2 of the EIA Regulations 2014 (as amended).

2.3 GUIDELINES AND POLICIES

The guidelines and policies listed in Table 2-3 have been / or will be taken into account during the Scoping and EIA process.

TABLE 2-3: GUIDELINES AND POLICIES RELEVANT TO THE PROPOSED PROJECT.

Guideline	Governing body	Applicability
Specialist Studies, Integrated Environmental Management, Information Series 4 (2002)	DEFF	This guideline was consulted to ensure adequate development of terms of reference for specialist studies.
Impact significance, Integrated Environmental Management, Information Series 5 (2002)	DEFF	This guideline was consulted to inform the assessment of significance of impacts of the proposed project.
Cumulative Effects Assessment, Integrated Environmental Management, Information Series 7 (2004)	DEFF	This guideline will be consulted to inform the consideration of potential cumulative effects of the proposed project.
Criteria for determining Alternatives in EIA, Integrated Environmental Management, Information Series 11 (2004)	DEFF	This guideline was consulted to inform the consideration of alternatives.
Environmental Management Plans, Integrated Environmental Management, Information Series 12 (2004)	DEFF	This guideline will be consulted to ensure that the Environmental Management Programme (EMP) has been adequately compiled.
Environmental Impact Reporting, Integrated Environmental Management, Information Series 15 (2004)	DEFF	This guideline was consulted to inform the approach to impact reporting.
Guideline on need and desirability (2017)	DEFF	This guideline informed the consideration of the need and desirability aspects of the proposed project.
Public Participation guideline in terms of NEMA (2017)	DEFF	The purpose of these guidelines is to ensure that an adequate public participation process was undertaken during the EIA process.

2.4 SCOPING AND EIA PROCESS

2.4.1 Details of the EIA project team

As noted in Section 1, SLR has been appointed as the independent EAP to undertake the EIA for the proposed prospecting operations. The details of the EIA project team that were involved in the preparation of this Scoping Report are provided in Table 2-4 below.

SLR has no vested interest in the proposed project other than fair payment for consulting services rendered as part of the EIA process and has declared its independence as required by the EIA Regulations 2014, as amended (see Appendix C).

TABLE 2-4: DETAILS OF THE EIA PROJECT TEAM.

General				
Organisation	SLR Consulting (South Africa) (Pty) Ltd			
Postal address	PO Box 10145, CALEDON SQUARE, 7905			
Tel No.	+27 (0)21 461 1118 / 9			
Fax No.	+27 (0)21 461 1120			
Jonathan Crowther	M.Sc. (Env. Sci.), University of Cape Town	Pr.Sci.Nat., Member IAIAsa	31	Project leader and quality control.
Jeremy Blood	M.Sc. (Cons. Ecol.), University of Stellenbosch	EAPASA, Pr.Sci.Nat., Member IAIAsa	20	Registered Environmental Assessment Practitioner and review.
Nicholas Arnott	Hons. (Earth & Geog. Sci.), University of Cape Town	Pr.Sci.Nat., Member IAIAsa	13	Management of the EIA process, including process review, specialist study review and report compilation.

2.4.2 Qualifications and Experience of the EAPs

Jonathan Crowther has been involved in environmental consulting since 1988 and is currently a Lead Environmental Consultant with SLR Consulting (South Africa) (Pty) Ltd. He has expertise in a wide range of environmental disciplines, including EIAs, Environmental Management Plans / Programmes, Environmental Planning & Review, Environmental Control Officer services, and Public Consultation & Facilitation. He has project managed a number of offshore oil and gas EIAs for various exploration and production activities in South Africa and Namibia. He also has extensive experience in projects related to roads, property developments and landfill sites.

Jeremy Blood holds a Master's Degree in Conservation Ecology and has over 20 years of experience in a range of environmental disciplines, including EIAs, EMPs, Environmental Auditing and Monitoring in South Africa, Namibia, Mozambique and Kenya. He has expertise in a wide range of projects, including mining, oil / gas and infrastructure. He is a Registered Professional Natural Scientists and a Registered Environmental Assessment Practitioner.

Nicholas Arnott has worked as an environmental assessment practitioner since 2006 and has been involved in a number of projects covering a range of environmental disciplines, including Basic Assessments, Environmental Impact Assessments and Environmental Management Programmes. He has gained experience in a wide range of projects relating to mining and prospecting, infrastructure projects (e.g. roads), housing and industrial developments.

2.4.3 Assumptions and Limitations

The Scoping and EIA assumptions and limitations are listed below:

- The Scoping and EIA assumes that SLR has been provided with all relevant project information and that it was correct and valid at the time it was provided;

- Specialists will be provided with all the relevant project information in order to produce accurate and unbiased assessments;
- There will be no significant changes to the project description or surrounding environment between the completion of the EIR and implementation of the proposed project that could substantially influence findings, recommendations with respect to mitigation and management, etc.; and
- The assessment will be based, to a large extent, on a generic description of the proposed prospecting activities, as the specific details were not available at the time of writing this report (e.g. exact timing and duration, sound levels, etc.).

These assumptions and limitations, however, are not considered to have any negative implications in terms of the credibility of the results of the scoping process.

2.5 SCOPING PHASE

2.5.1 Objectives

In accordance with Appendix 2 of GN No. R982 (as amended), the objectives of the Scoping process are:

- To identify the relevant policies and legislation relevant to the activity;
- To present the need and desirability of the proposed activity and its preferred location;
- To identify feasible alternatives related to the project proposal;
- To ensure that all potential key environmental issues and impacts that would result from the proposed project are identified;
- To provide a reasonable opportunity for I&APs to be involved in the Scoping and EIA process;
- To assess potential impacts of the proposed project alternatives during the different phases of project development;
- To present appropriate mitigation or optimisation measures to minimise potential impacts or enhance potential benefits, respectively; and
- Through the above, to ensure informed, transparent and accountable decision-making by the relevant authorities.

The Scoping process consists of a series of steps to ensure compliance with these objectives and the EIA Regulations 2014, as amended, as set out in GN No. R982 (as amended) (see Table 2-5). The process involves an open, participatory approach to ensure to ensure that all impacts are identified and that decision-making takes place in an informed, transparent and accountable manner. A flowchart indicating the Scoping and EIA process is presented in Figure 2-1.

TABLE 2-5: REQUIREMENTS OF A SCOPING REPORT IN TERMS OF THE EIA REGULATIONS 2014 (AS AMENDED).

No.	Content of Scoping Report	Completed (Y/N or N/A)	Location in report
2(a)	*(i & ii) Details and expertise of the Environmental Assessment Practitioner (EAP) who prepared the report.*	Y	Table 2-4
(b)	*The location of the activity, including:*	Y	Section 3.1.2
	(i) the 21 digit Surveyor General code of each cadastral land parcel; or	N/A	

No.	Content of Scoping Report	Completed (Y/N or N/A)	Location in report
	(ii) where available, the physical address and farm name	N/A	
	(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	Y	
(c)	*A plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is:*	Y	Figure 1-1
	(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or	N/A	
	(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken.	N/A	
(d)	*A description of the scope of the proposed activity, including:*	Y	Table 2-2
	(i) all listed and specified activities triggered;		
	(ii) a description of the activities to be undertaken, including associated structures and infrastructure.	Y	Section 3
(e)	*A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process.*	Y	Section 1.5
(f)	*A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location.*	Y	Section 3.2
(h)	*A full description of the process followed to reach the proposed preferred activity, site and location within the site, including:*	Y	Section 3.3
	(i) details of all the alternatives considered;		
	(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	N	Section 2.5.2
	(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	Y	Section 2.5.5
	(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Y	Section 4
	(v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts *(aa) can be reversed;* *(bb) may cause irreplaceable loss of resources; and* *(cc) can be avoided, managed or mitigated.*	Y	Section 5
	(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	Y	Section 6.3
	(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Y	Section 4

No.	Content of Scoping Report	Completed (Y/N or N/A)	Location in report
	(viii) the possible mitigation measures that could be applied and level of residual risk;	Y	Section 4
	(ix) the outcome of the site selection matrix;	N/A	Section 3.3
	(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and	Y	
	(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity.	Y	
(i)	*a plan of study for undertaking the environmental impact assessment process to be undertaken, including:*	Y	Section 6
	(i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity;		
	(ii) a description of the aspects to be assessed as part of the environmental impact assessment process;		
	(iii) aspects to be assessed by specialists;		
	(iv) a description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists;		
	(v) a description of the proposed method of assessing duration and significance;		
	(vi) an indication of the stages at which the competent authority will be consulted;		
	(vii) particulars of the public participation process that will be conducted during the environmental impact assessment process; and		
	(viii) a description of the tasks that will be undertaken as part of the environmental impact assessment process;		
	(ix) identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.		
(i)	*An undertaking under oath or affirmation by the EAP in relation:*	Y	Appendix C
	(i) the correctness of the information provided in the report;		
	(ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; and		
	(iii) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;		
(k)	*an undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and interested and affected parties on the plan of study for undertaking the environmental impact assessment*	Y	Appendix C
(l)	*Where applicable, any specific information required by the competent authority.*	N/A	-
(m)	*Any other matter required in terms of section 24(4)(a) and (b) of the Act.*	N/A	-

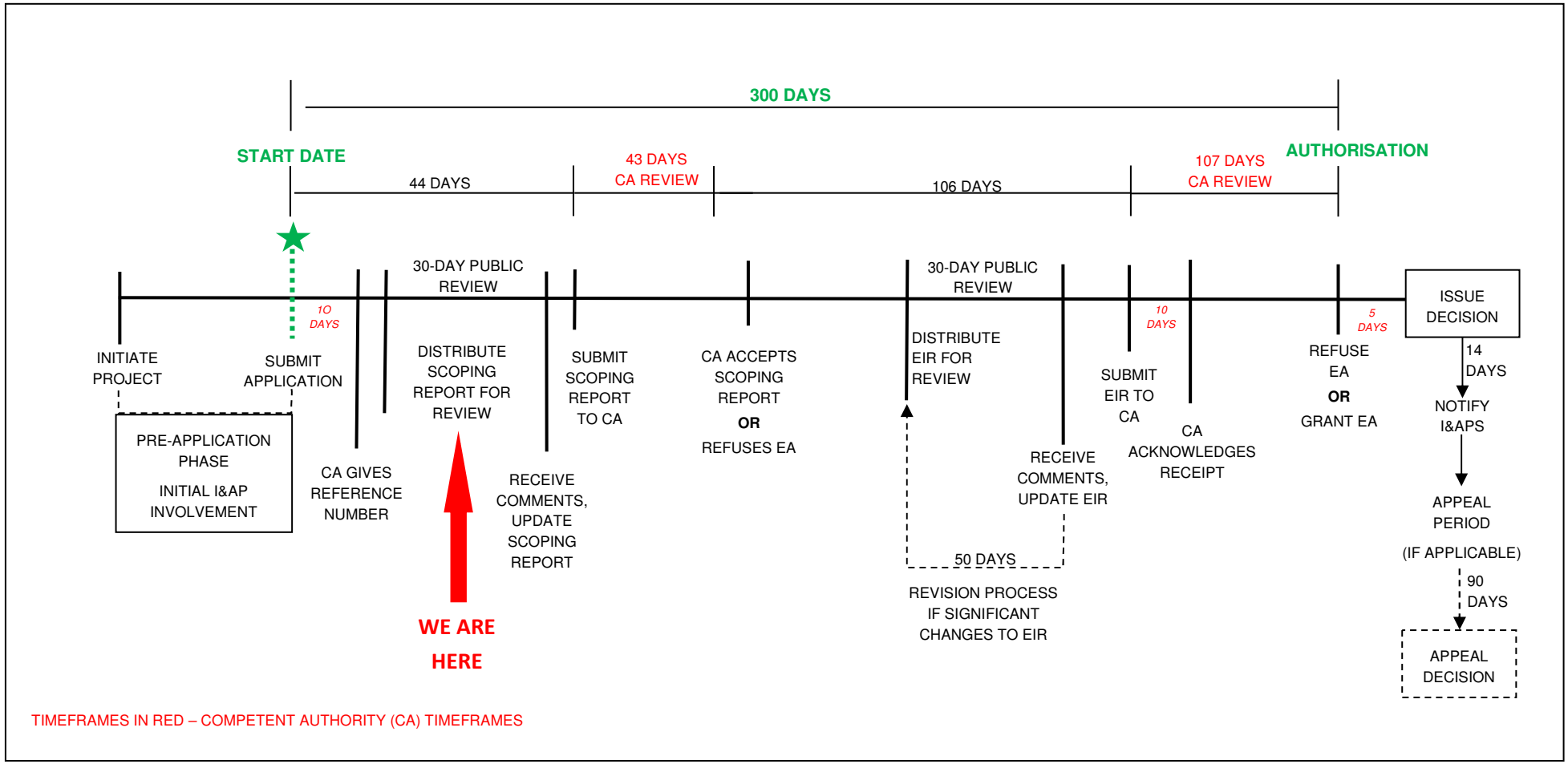

FIGURE 2-1: FLOW DIAGRAM SHOWING THE SCOPING AND EIA PROCESS.

2.5.2 Public Participation

The scoping phase public participation process provided an opportunity to:

(i) notify key stakeholders of the proposed project;
(ii) raise any initial issues or concerns regarding the proposed project; and
(iii) review and comment on the draft Scoping Report.

The steps undertaken during the pre-application public participation process are summarised in Box 2-1 and all supporting information is presented in appendices to this report.

BOX 2-1: TASKS UNDERTAKEN DURING THE PRE-APPLICATION PUBLIC PARTICIPATION PROCESS

- **I&AP identification**
  A preliminary I&AP database of authorities (including State Departments with jurisdiction in the area, municipal offices and ward councillors), Organs of State, Non-Governmental Organisations, Community-based Organisations, adjacent landowners and other key stakeholders with a potential interest in the proposed project was compiled. To date 86 I&APs have been registered on the project database (see Appendix B).
- **I&AP Notification Letters**
  All identified I&APs have been notified of the proposed project, Application for EA and EIA process by means of a notification letter. The purpose of the notification letter was to convey information on the proposed project, EA process, as well as to invite I&APs to register on the project database and notify them of the availability of the draft Scoping Report for review and comment. The draft Scoping Report review and comment period is from 10 January to 10 February 2020.
- **Press advertisement**
  A press advertisement providing notification of the proposed project, EA process and availability of the Scoping Report for review and comment was placed in the "Die Burger" newspaper on 10 January 2020.

2.5.3 Application for Environmental Authorisation

An "Application Form for Environmental Authorisation" form was submitted to DMRE at the same time as submitting the prospecting right application to DMRE (on 17 December 2019).

2.5.4 National Screening Tool

In terms of Regulation 16 (1)(b)(v) of the EIA Regulations 2014 (as amended), a Screening Report for each Sea Concession area has been generated by the DEFF National Screening Tool and is attached in Appendix D. The related specialist assessments identified by the Screening Tool and the rationale for why they will or will not be undertaken in the EIA phases is provided in Table 2-6 below.

TABLE 2-6: SPECIALIST ASSESSMENTS IDENTIFIED BY THE NATIONAL SCREENING TOOL

Specialist Assessment Identified by National Screening Tool	Rationale for inclusion/ exclusion
Agricultural Impact Assessment	No assessment will be undertaken as the proposed project is located offshore and would not have any impact on

Specialist Assessment Identified by National Screening Tool	Rationale for inclusion/ exclusion
	agricultural activities.
Archaeological and Cultural Heritage Impact Assessment	An Underwater Heritage Impact Assessment will be undertaken in the EIA Phase (see Section 6.2.4).
Palaeontology Impact Assessment	
Terrestrial Biodiversity Impact Assessment	No assessment will be undertaken as the proposed project is located offshore and would not have any impact on terrestrial vegetation.
Aquatic Biodiversity Impact Assessment	A Marine Fauna Impact Assessment will be undertaken in the EIA Phase (see Section 6.2.2).
Noise Impact Assessment	An assessment of the potential impacts of geophysical survey noise and noise from the proposed sampling activities on marine fauna would be undertaken as part of the Marine Fauna Impact Assessment.
Radioactivity Impact Assessment	No assessment will be undertaken as the target mineral resources are not naturally radioactive.
Plant Species Assessment	No assessment will be undertaken as the proposed project is located offshore.
Animal Species Assessment	As noted above, a Marine Fauna Impact Assessment will be undertaken in the EIA Phase.

2.5.5 Compilation and Review of Scoping Report

This final version of the Scoping Report has been prepared in compliance with Appendix 2 of the EIA Regulations 2014, as amended, and provided an opportunity for I&APs to comment on the proposed project, findings of the scoping process and the scope of work for the next phase of the EIA.

2.5.6 Completion of the Scoping Phase

After closure of the comment period, the Scoping Report will be updated to incorporate the comments received. The updated Scoping Report will be submitted to DMRE for acceptance. If the updated Scoping Report is accepted, the project will proceed onto the EIA Phase.

2.6 EIA PHASE

2.6.1 Objectives

In accordance with Appendix 3 of GN R982 (as amended) the key activities of the EIA are to:

- Determine the policies and legislation relevant to the activity and document how the proposed activity complies with and responds to the policy and legislative context;
- Describe the need and desirability of the proposed activity in the context of the development footprint on the approved site as contemplated in the accepted Scoping Report;
- Identify feasible alternatives related to the project proposal;
- Ensure that all potential key environmental issues and impacts that would result from the proposed project are identified;

- Assess potential impacts of the proposed project alternatives during the different phases of project development;
- Identify the most ideal location of the activity within the development footprint of the approved site based on the lowest level of environmental sensitivity identified during the assessment;
- Present appropriate mitigation or optimisation measures to avoid, manage or mitigate potential impacts or enhance potential benefits, respectively;
- Identify residual risks that need to be managed and monitored; and
- Provide a reasonable opportunity for I&APs to be involved in the EIA process.

Through the above, ensure informed, transparent and accountable decision-making by the relevant authorities.

2.6.2 Specialist Studies

Three specialist studies will be undertaken to address the key issues that require further investigation and detailed assessment, namely: (1) the impact on marine fauna, (2) the impact on fishing, and (3) the impact on underwater cultural heritage materials. A list of the specialists and their details are provided in Table 2-7.

The specialist studies will involve the gathering of data relevant to identifying and assessing environmental impacts that may occur as a result of the proposed prospecting operations. These impacts will be assessed according to pre-defined rating scales (see Section 6.3). Specialists will also recommend appropriate mitigation or optimisation measures to minimise potential impacts or enhance potential benefits, respectively. The terms of reference for these studies are presented in Sections 6.2.1 to 6.2.4.

TABLE 2-7: LIST OF SPECIALIST STUDIES AND SPECIALISTS

No.	Specialist study	Specialist/s	Qualifications	Company	Terms of Reference
1	Marine Fauna	Dr Andrea Pulfrich	PhD, (Fisheries Biology), Christian-Albrechs University, Kiel, Germany	Pisces Environmental Services (Pty) Ltd	Section 6.2.2
2	Fisheries	Mr Dave Japp	MSc (Ichthyology and Fisheries Science), Rhodes University	Capricorn Marine Environmental (Pty) Ltd	Section 6.2.3
		Ms Sarah Wilkinson	BSc (Hons), (Botany), University of Cape Town		
3	Underwater Cultural Heritage Material	Mr John Gribble	Master of Arts, (Archaeology) University of Cape Town	ACO Associates cc	Section 6.2.4

2.6.3 Integration and Assessment

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

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

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

3 PROJECT DESCRIPTION

This section provides general project information, describes the need and desirability for the proposed project, considers alternatives, and provides information on the proposed prospecting activities.

3.1 GENERAL PROJECT INFORMATION

3.1.1 Applicant

Belton Park Trading 127 (Pty) Ltd is the applicant.

Address:	**Belton Park Trading 127 (Pty) Ltd** 19 Chain Avenue Montague Gardens Cape Town, 7405	
Responsible Persons:	**Mr Peter Looijen**	**Mr Bheki Ngcobo**
Telephone:	+27 (0) 21 510-1881	+27 (0) 21 510-1881
Facsimile:	+27 (0) 21 510-5035	+27 (0) 21 510-5035
Cell:	+27 (0) 83 375 2217	+27 (0) 83 322 2988

3.1.2 Details of the Sea Concession Area

The proposed prospecting operations would be undertaken within Sea Concessions 13C, 15C, 16C, 17C and 18C, located off the West Coast of South Africa (see Figure 3-1). The co-ordinates of the boundary points of the Sea Concessions are provided in Table 3-1 below.

TABLE 3-1: CO-ORDINATES OF THE BOUNDARY POINTS OF SEA CONCESSIONS 13C, 15C, 16C, 17C AND 18C.

Point	Latitude	Longitude	Total Area (km²)
Sea Concession Area 13C			
1	-31.7102757	17.1983337	1117.53 km²
2	-31.7104282	18.1555557	
3	-31.8165569	18.1941662	
4	-31.8163872	17.1511116	
Sea Concession Area 15C			
1	-31.9127789	17.1786118	1791.40 km²
2	-31.9129848	18.2290993	
3	-32.0871849	18.1708546	
4	-32.0866661	17.2552776	
Sea Concession Area 16C			
1	-32.0866661	17.2552776	1096.43 km²
2	-32.0871849	18.1708546	
3	-32.2041435	18.1752834	
4	-32.2036133	17.2991676	
Sea Concession 17C			
1	-32.2036133	17.2991676	976.69 km²
2	-32.2041435	18.1752834	
3	-32.3205872	18.1155205	
4	-32.3199997	17.3841667	

Point	Latitude	Longitude	Total Area (km²)
Sea Concession Area 18C			
1	-32.3199997	17.3841667	1104.42 km²
2	-32.3205872	18.1155205	
3	-32.5583382	17.875	
4	-32.5583344	17.7161121	

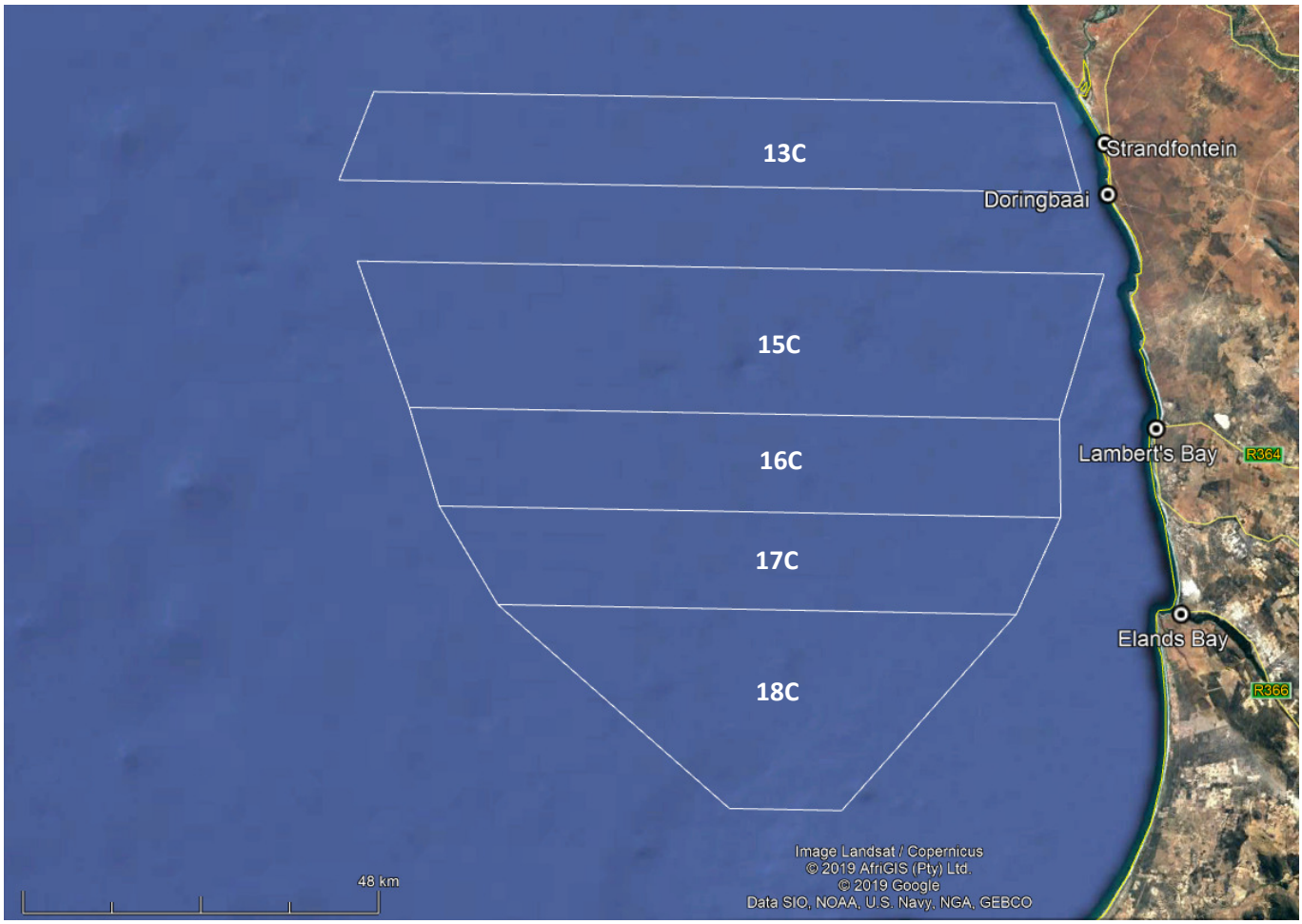

FIGURE 3-1: LOCATION OF THE 13C, 15C, 16C, 17C AND 18C SEA CONCESSION AREAS, OFF THE WEST COAST OF SOUTH AFRICA.

3.1.3 Target Mineral

The minerals targeted in the proposed prospecting operations include the following:

- Diamonds;
- Gemstones;
- Heavy minerals;
- Industrial minerals;
- Precious metals; and
- Ferrous and Base metals.

3.1.4 Financial Provision

In terms of Section 24P of NEMA and associated regulations pertaining to the financial provision (GN No. R1147), an applicant for EA relating to mining must, before the Minister of Mineral Resources and Energy issues the EA, comply with the prescribed financial provision for the rehabilitation, closure and ongoing post decommissioning management of negative environmental impacts.

BPT127 would put in place the required financial provision for the proposed prospecting activities and the contracted vessels would maintain appropriate insurance against operational risks. Such insurance would be held for and in relation to operations, against (*inter alia*) pollution damage, damage to property, the cost of removing wrecks or clean-up operations pursuant to an operational accident, injury to employees and other persons, in accord with good practice.

3.2 NEED AND DESIRABILITY

3.2.1 Background

In order for mining to continue to be a core contributor to the South African economy and in the pursuance of the sustainable development of the nation's mineral resources, it is necessary to identify new resources through prospecting activities. A key intent of the Minerals and Mining Policy of South Africa states that Government will: "promote exploration and investment leading to increased mining output and employment" (Minerals and Mining Policy of South Africa, 1998). The Policy states further that:

- "The South African mining industry, one of the country's few world-class industries, has the capacity to continue to generate wealth and employment opportunities on a large scale;
- Mining is an international business and South Africa has to compete against developed and developing countries to attract both foreign and local investment. Many mining projects in South Africa have tended to be unusually large and long term, requiring massive capital and entailing a high degree of risk; and
- South Africa has an exceptional minerals endowment, and in several major commodities has the potential to supply far more than the world markets can consume."

In the more recently published Department of Minerals Resources Strategic Plan 2014 – 2019, the foreword by the Minister of Mineral Resources and Energy notes that the Department "will continue to promote mineral value addition to strengthen the interface between extractive industries and national socio-economic developmental objectives" and "contribute towards decent employment, inclusive growth and industrialisation of South Africa". The West Coast District Municipality's (WCDM) Integrated Development Plan 2017 – 2022 (2019) notes that it has "*a vast number of mineral resources, of which some are currently not being exploited*" and deems that "*mining could potentially make an increased economic contribution to the WCDM economy when these unexploited resources are utilised in future"*.

In terms of the above, it is evident that the proposed prospecting activities are deemed to be important to the current national and provincial economies as future mining projects are a means to assist Government in meeting broader societal needs.

3.2.2 Rationale for Proposed Project

This project aims to undertake prospecting operations within Sea Concessions 13C, 15C, 16C, 17C and 18C in order to identify the presence of economically viable deposits of the intended target minerals (see Section 3.1.3) on the continental shelf off the coast of the Western Cape. The intention is to derive value from the identified offshore mineral resources in the future and to contribute to the existing mining sector in the Western Cape.

3.3 CONSIDERATION OF ALTERNATIVES

This section presents the various alternatives considered in this Scoping Report.

3.3.1 Location and Technology Alternatives

Alternatives, in relation to a proposed activity, are different ways of meeting the general purposes and requirements of the proposed activity, which may include alternatives to:

- the location where it is proposed to undertake the activity; and
- the technology to be used in the activity.

As the intention of the proposed prospecting operations is to determine the presence of economically viable mineral deposits that occur within Sea Concessions 13C, 15C, 16C, 17C and 18C, no further location alternatives are considered in the Scoping and EIA process.

The different prospecting activities being considered in the Scoping and EIA process are described in detail in Section 3.4 below.

3.3.2 The No-Go Alternative

The No-Go alternative is the non-occurrence of the proposed project. The negative implications of not going ahead with the proposed project are as follows:

- Loss of opportunity to establish whether further viable offshore target mineral deposits resources exist;
- Prevention of any socio-economic benefits associated with the continuation of bulk sampling activities; and
- Lost economic opportunities.

The positive implications of the no-go option are that there would be no effects on the biophysical environment in the area proposed for the drill and bulk sampling activities.

3.4 OVERVIEW OF PROSPECTING OPERATIONS

The principal objective of the proposed prospecting activities is to discover and estimate the potential mineral resources within each Sea Concession area for possible future mining. The proposed prospecting activities would entail undertaking geophysical surveys, drill sampling and bulk (trench) sampling. The proposed activities may be divided into stages subject to data reviews and follow-up sampling.

3.4.1 Geophysical Surveys

The geophysical surveying will be undertaken using the group-owned dedicated survey vessel, the *DP Star* (Figure 3-2) which has an overall length of 45.15 m and a gross tonnage of 498 t. The vessel is equipped with:

- a multibeam echosounder designed to produce high resolution digital terrain models of the seafloor (Figure 3-3, left) by transmitting a 30 kHz sounding in a wide swath below the vessel; and
- a parametric sub-bottom profiler (Topas system), which uses shallow (35 to 45 kHz) and medium penetration (1 to 10 kHz) "Chirp" seismic pulses to generate profiles up to 60 m beneath the seafloor (Figure 3-3, right), thereby giving a cross section view of the sediment layers.

Sound levels from the acoustic equipment would range between 190 to 220 dB re 1 µPa at 1 m. The proposed surveys would be undertaken in specific priority areas in each of the concessions, at water depths of between approximately 45 – 200 m. The surveys would have a line spacing of between 100 to 1 000 m apart. The total line kilometres surveyed per concession will be between 600 and 1 200 km. The planned duration for the proposed geophysical surveys would be a total of four days per concession area (20 days in total) per year over a four year period (i.e. the duration of the validity of the prospecting right).

FIGURE 3-2: THE PROPOSED SURVEY VESSEL DP STAR.

In general terms, sound sources that have high sound pressure and low frequency will travel the greatest distances in the marine environment. Conversely, sources that have high frequency will tend to have greater attenuation over distance due to interference and scattering effects (Anon 2007). It is for this reason that the acoustic footprint of the above-mentioned sonar survey tools is considered to be much lower than that of deeper penetration low frequency seismic surveys and in addition have lower sound pressure levels. It should be noted that a decibel is a logarithmic scale of pressure where each unit of increase represents a tenfold increase in the quantity being measured.

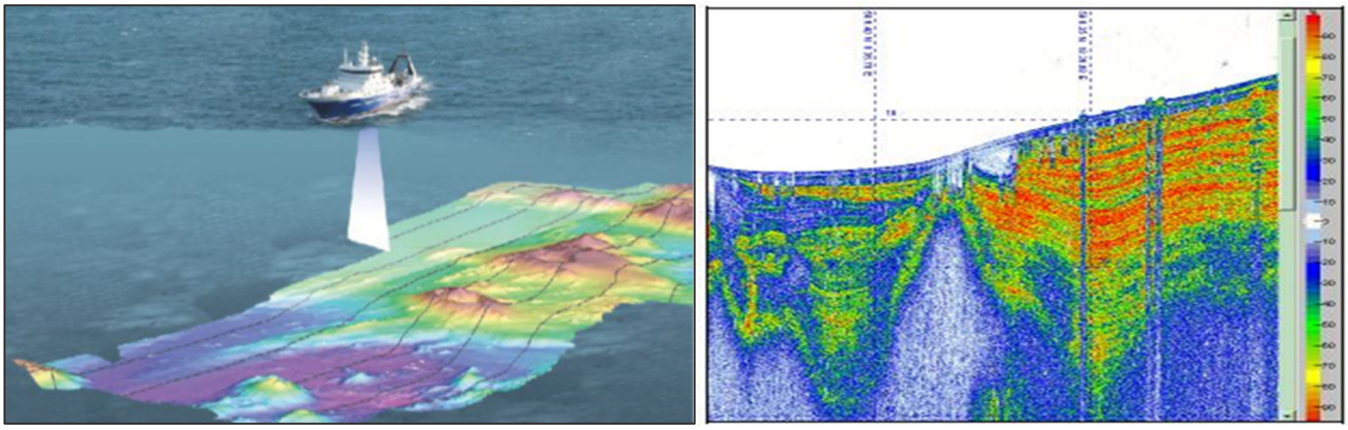

FIGURE 3-3: SWATH BATHYMETRY (LEFT) AND SUB-BOTTOM PROFILING (RIGHT) WILL BE THE GEOPHYSICAL SURVEY TECHNIQUES EMPLOYED DURING THE PROPOSED PROSPECTING OPERATIONS.

3.4.2 Drill Sampling

The proposed drill sampling activities would be undertaken using the group-owned dedicated sampling vessel, the *MV The Explorer* (Figure 3-4). The vessel has an overall length of 114.4 m, a gross tonnage of 4 677 t, and is equipped with a subsea sampling tool (Figure 3-5), which can be operated in water depths up to 200 m. The sampling tool comprises a 2.5 m diameter drill bit operated from a drill frame structure, which is launched through the moon pool of the support vessel and positioned on the seabed.

FIGURE 3-4: THE PROPOSED DRILL SAMPLING VESSEL *MV THE EXPLORER*.

FIGURE 3-5: THE 2.5 M DIAMETER DRILL BIT WITHIN THE DRILL FRAME STRUCTURE.

The drill frame structure has a base of 6.5 x 6.5 m, stands 23 m high and weighs 147 tons. The drill bit can penetrate sediments up to 12 m depth above the bedrock. The sediments are fluidised with strong water jets and airlifted to the support vessel where they are treated in the onboard mineral recovery plant. All oversized and undersized tailings are discharged back to the sea on site.

A sample spacing of as little as 20 m can be achieved by the dynamically positioned vessel. Depending on sea and the subseabed geotechnical conditions, up to 60 samples can be successfully taken per day. The samples would be undertaken at intervals of 50 to 500 m. With a planned duration for the proposed drill sampling of four days / year for each concession area, over a four year period, the total number of drill samples that could be obtained during the prospecting right period would be up to a maximum of 4 800. With the drill footprint of 5 m^2, a total area of 2.4 ha would be sampled.

3.4.3 Bulk Sampling

Following analysis of the drill samples and establishment of a potential resource, bulk trench sampling may be conducted to confirm the economic viability of the resource for mining. Trenching would be undertaken by a seabed crawler, deployed off the group-owned dedicated mining vessel, the *MV Ya Toivo* (Figure 3-6). The vessel has an overall length of 150 m and a gross tonnage of 9 111 t. It is equipped with a track-mounted subsea crawler (Figure 3-7) capable of working to depths up to 200 m below sea level. The crawler, which is fitted with highly accurate acoustic seabed navigation and imaging systems, and equipped with an anterior suction system, is lowered to the seabed and is controlled remotely from the surface support vessel through power and signal umbilical cables. Water jets in the crawler's suction loosen seabed sediments, and sorting bars filter out oversize boulders. The sampled sediments are pumped to the surface for shipboard processing. The area of the seabed to be sampled by the crawler can only be determined following analysis of drill samples and development of a resource model.

FIGURE 3-6: THE PROPOSED BULK SAMPLING VESSEL *MV YA TOIVO*.

FIGURE 3-7: THE MK2 SEABED CRAWLER.

It is proposed that up to ten trenches, each 180 m long and 20 m wide would be excavated within each concession area. Thus, the area to be disturbed in each concession would be 3.6 ha and 18 ha for all five concessions in total. The planned duration of the proposed bulk sampling would be a total of four days per a concession area over a two year period. It is noted that the trenches will not be contiguous, but located in the prospective areas derived from the drill sampling results. The aim of the trench sampling is to determine the geotechnical characteristics of the footwall and overburden which is essential in establishing the optimal approach to mining in these areas.

3.5 VESSEL EMISSIONS AND DISCHARGES

This section provides a brief description of the types of emissions and discharges that are expected from the proposed prospecting operations during normal operations. These would include:

- Discharges such as deck drainage, machinery space wastewater, sewage, etc.;
- Disposal of solid waste such as food waste; and
- Vessel machinery emissions.

These are discussed in more detail below.

3.5.1 Discharges to Sea

3.5.1.1 Vessel machinery spaces (bilges), ballast water and deck drainage

The concentration of oil in discharge water from any vessel (bilge and ballast) would comply with the MARPOL Regulation 21 standard of less than 15 ppm oil in water. Any oily water would be processed through a suitable separation and treatment system to meet the MARPOL Annex I standard before discharge overboard. Drainage from marine (weather) deck spaces would wash directly overboard.

3.5.1.2 Sewage

South Africa is a signatory to MARPOL Annex IV Regulations for the Prevention of Pollution by Sewage from Ships and contracted vessels would be required to comply with the legislated requirements of this Annex.

3.5.1.3 Food (galley) wastes

The disposal into the sea of food waste is permitted in terms of MARPOL Annex V when it has been comminuted or ground and the vessel is located more than 3 nautical miles (approximately 5.5 km) from land. Such comminuted or ground food wastes shall be capable of passing through a screen with openings no greater than 25 mm. Disposal overboard without macerating can occur greater than 12 nautical miles (approximately 22 km) from the coast. The daily discharge from a vessel is typically about 0.15 m^3.

3.5.1.4 Detergents

Detergents used for washing exposed marine deck spaces would be discharged overboard. The toxicity of detergents varies greatly depending on their composition. Water-based detergents are low in toxicity and are preferred for use. Preferentially biodegradable detergents would be used. Detergents used on work deck space would be collected with the deck drainage and treated as described under deck drainage (see Section 3.5.1.1 above).

3.5.1.5 Other

Vessels used during prospecting activities would have a certified antifouling coating system that is tin free.

3.5.2 Waste disposal to land

A number of other types of wastes generated during the bulk sampling activities would not be discharged at sea but would be transported onshore for ultimate disposal. Waste transported to land would be disposed at a

licenced municipal landfill facility or at an alternative approved site. Operators would co-operate with local authorities to ensure that waste disposal is carried out in an environmentally acceptable manner. A summary of these waste types generated by a vessel used during typical prospecting operations is given below.

3.5.2.1 General waste

This includes waste, paper, plastics, wood, glass, etc. Waste would be disposed of at an onshore landfill site in accordance with legal requirements.

3.5.2.2 Scrap Metal

Scrap metal would be stored and recycled / disposed of on land in accordance with legal requirements.

3.5.2.3 Drums and Containers

Empty drums containing residues, which may have adverse environmental effects (solvents, lubricating/gear oil, etc.), would be recycled / disposed of in a licenced landfill site in accordance with legal requirements.

3.5.2.4 Used Oil

This includes used lubricating and gear oil, solvents, hydrocarbon-based detergents and machine oil. Toxicity varies depending on oil type. All non-recycled waste oils would be securely stored, transported to shore and disposed of at a licenced landfill site acceptable to the relevant authorities.

3.5.2.5 Chemicals and hazardous wastes

Disposal of any unexpected chemical and hazardous substance (e.g. fluorescent tubes, toner cartridges, batteries, etc.) would be undertaken on a case-by-case basis and in a manner acceptable to appropriate regulatory authorities.

3.5.2.6 Infectious wastes

Infectious wastes include bandages, dressings, surgical waste, tissues, medical laboratory wastes, needles, and food wastes from persons with infectious diseases. Only minor quantities of medical waste are expected. Prevention of exposure to contaminated materials is essential, requiring co-operation with local medical facilities to ensure proper disposal. All such waste will be incinerated onboard or stored and brought onshore for disposal via a registered medical waste company.

3.5.2.7 Filters and filter media

This includes air, oil and water filters from machinery. Oily residue and used media in oil filters that may contain metal (e.g. copper) fragments, etc. are possibly toxic. Filters and media would be transported onshore and disposed of at a licensed landfill facility.

3.5.3 Discharges to air

Compliance with the requirements of MARPOL Annex VI - Prevention of Air Pollution from Ships will be required for all vessel engines and where vessels are fitted with garbage incinerators.

4 BASELINE ENVIRONMENT

This chapter provides a description of the biophysical and socio-economic environment likely to be affected by the proposed project in the study area. The information provided here is based on available baseline information for the area.

4.1 MARINE ENVIRONMENT

This section provides a general overview of the physical and biological oceanography and human utilisation of South African West Coast and, where applicable, detailed descriptions of the marine environment that may be directly affected by the proposed prospecting activities.

4.1.1 Geophysical Characteristics

4.1.1.1 Bathymetry

The continental shelf along the West Coast is generally wide and deep, although large variations in both depth and width occur. The shelf maintains a general north-north-west trend, widening north of Cape Columbine and reaching its widest off the Orange River (180 km). The shelf widens again south of Cape Point due to the presence of the Agulhas Bank.

Banks on the continental shelf include Child's Bank, situated approximately 150 km offshore at about 31°S. Child's Bank is the only known submarine bank within South Africa's Exclusive Economic Zone (EEZ), rising from a depth of 350 - 400 m water to less than 200 m at its shallowest point. The bank area has been estimated to cover some 1 450 km^2 (Sink *et al.* 2012).

4.1.1.2 Coastal and Inner-shelf Geology and Seabed Geomorphology

The inner shelf is underlain by Precambrian bedrock (Pre-Mesozoic basement), whilst the middle and outer shelf areas are composed of Cretaceous and Tertiary sediments (Dingle 1973; Dingle et al. 1987; 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 (see Figure 4-1).

An approximately 500 km long mud belt (up to 40 km wide, and of 15 m average thickness) is situated at water depths of between -30 m and -100 m over the innershelf slope between the Orange River and St Helena Bay (Birch et al. 1976). 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.

Present day sedimentation is limited to input from the Orange River. This sediment is generally transported northward. Most of the sediment in the area is therefore considered to be relict deposits by now ephemeral rivers active during wetter climates in the past. The Orange River, when in flood, still contributes largely to the mud belt as suspended sediment is carried southward by poleward flow. In this context, the absence of large

sediment bodies on the inner shelf reflects on the paucity of terrigenous sediment being introduced by the few rivers that presently drain the South African West Coast coastal plain.

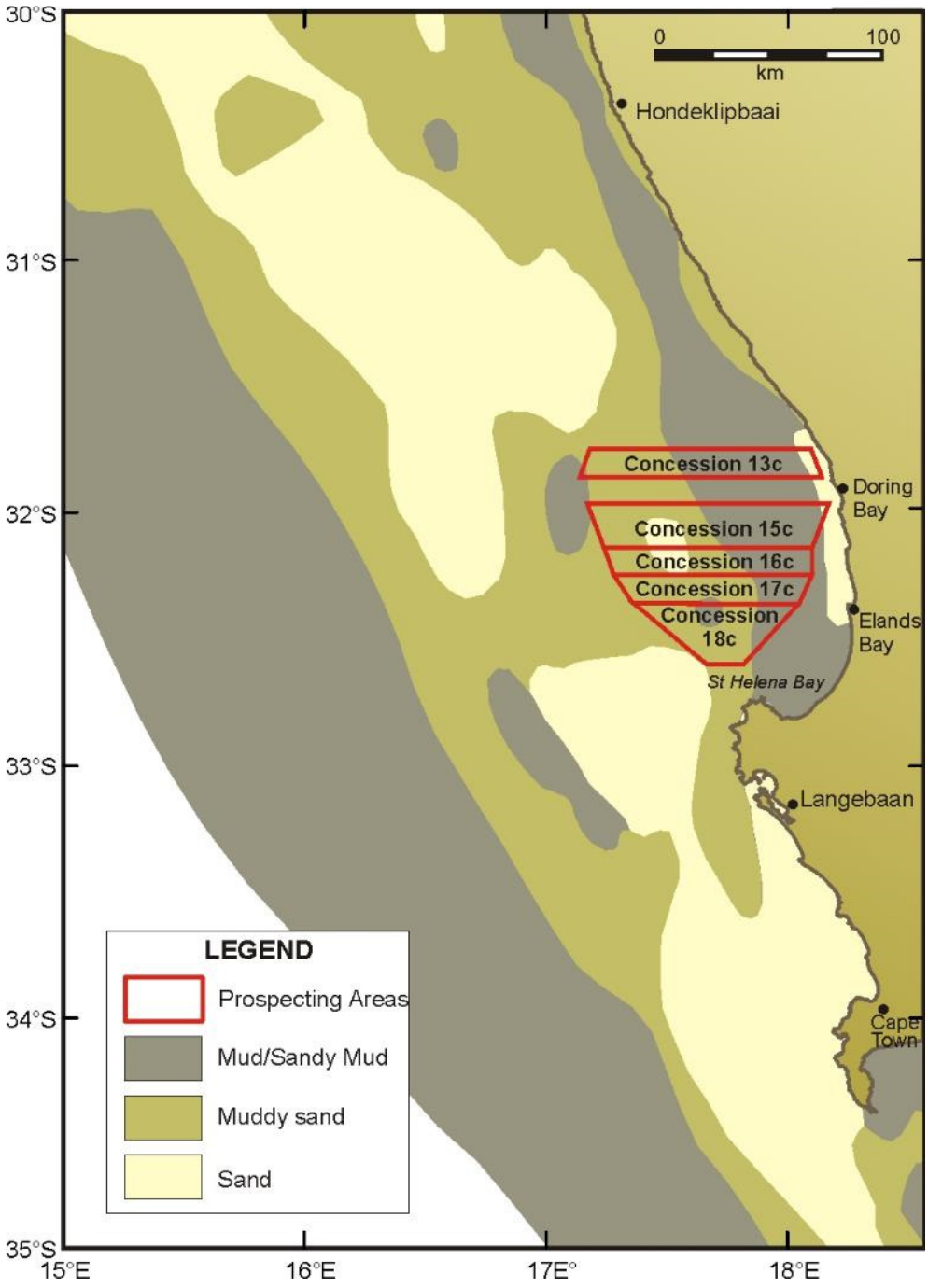

FIGURE 4-1: SEA CONCESSIONS 13C, 15C, 16C, 17C AND 18C IN RELATION TO THE REGIONAL BATHYMETRY AND SHOWING PROXIMITY OF PROMINENT SEABED FEATURES.

4.1.2 Biophysical Characteristics

4.1.2.1 Wind Patterns

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

These seasonal changes result in substantial differences between the typical summer and winter wind patterns in the region, as the southern hemisphere anti-cyclonic high-pressures system, and the associated series of cold fronts, moves northwards in winter, and southwards in summer. The strongest winds occur in summer (October to March), during which winds blow 98% of the time, and gales (winds exceeding 18 m/s or 35 kts) are frequent (CSIR 2006). Virtually all winds in summer come from the south to south-southeast, , averaging 20 - 30 kts and reaching speeds in excess of 100 km/h (60 kts) (Figure 4-2). The combination of these southerly/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 remains dominated by southerly to south-easterly winds, but the closer proximity of the winter cold-front systems results in a significant south-westerly to north-westerly component (Figure 4-2). 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 4% 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.

4.1.2.2 Large-Scale Circulation and Coastal Currents

The southern African West Coast is strongly influenced by the Benguela Current. Current velocities in continental shelf areas generally range between 10 – 30 cm/s (Boyd & Oberholster 1994), although localised flows in excess of 50 cm/s occur associated with eddies. On its western side, flow is more transient and characterised by large eddies shed from the retroflection of the Agulhas Current, resulting in considerable variation in current speed and direction over the domain. In the south, the Benguela current has a width of 200 km, widening rapidly northwards to 750 km.

The surface flows are predominantly wind-forced, barotropic and fluctuate between poleward and equatorward flow (Shillington *et al.* 1990; Nelson & Hutchings 1983). Current speeds decrease with depth, while directions rotate from predominantly north-westerly at the surface to south-easterly near the seabed. Near bottom shelf flow is mainly poleward with low velocities of typically <5 cm/s (Nelson 1989; Boyd & Oberholster 1994; Shannon & Nelson 1996).

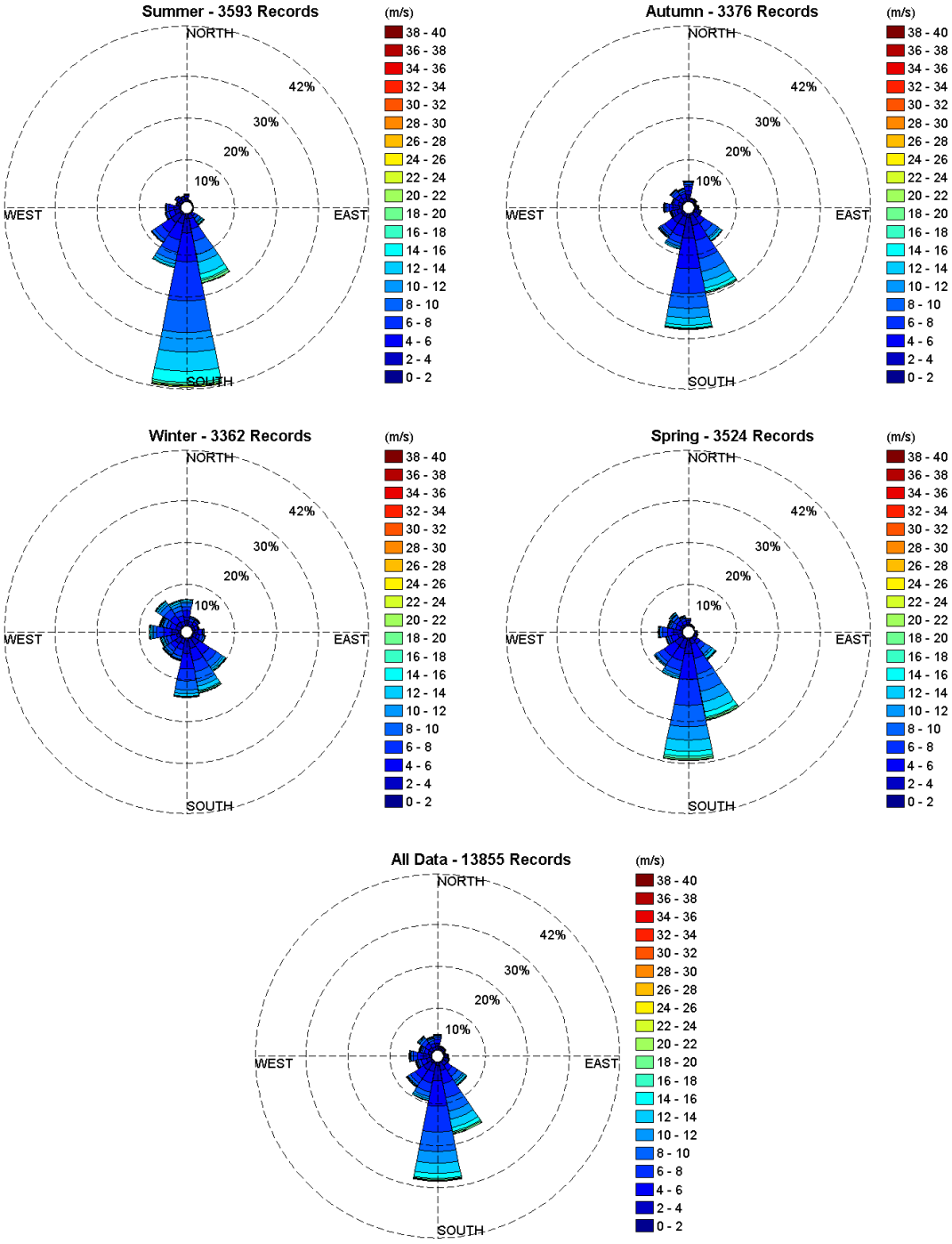

FIGURE 4-2: VOS WIND SPEED VS. WIND DIRECTION DATA FOR THE CAPE COLUMBINE AREA 32.0 TO 32.9 S AND 17.0 TO 17.9 E (1903-11-01 TO 2011-05-24; 13,855 RECORDS) (FROM CSIR).

The major feature of the Benguela Current is coastal upwelling (see Section 4.1.2.5). As a consequence, the high nutrient supply to surface waters leads to high primary phytoplankton production, which in turn, serves as the basis for a rich food chain. The prevailing longshore, equatorward winds move nearshore surface water northwards and offshore. To balance the displaced water, cold, nutrient-rich 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.

There are three upwelling centres in the southern Benguela, namely the Namaqua (30°S), Cape Columbine (33°S) and Cape Point (34°S) upwelling cells (Taunton-Clark 1985). Upwelling in these cells is seasonal, with maximum upwelling occurring between September and March. The Sea Concession areas all fall within the Cape Columbine upwelling cell. Upwelling in these cells is seasonal, with maximum upwelling occurring between September and March.

Where the Agulhas Current passes the southern tip of the Agulhas Bank (Agulhas Retroflection area), it may shed a filament of warm surface water that moves north-westward along the shelf edge towards Cape Point, and Agulhas Rings, which similarly move north-westwards into the South Atlantic Ocean. These rings may extend to the seafloor and west of Cape Town may split, disperse or join with other rings. The surface water of the Agulhas Current is generally >21°C, and its influence west of Cape Agulhas results in average sea surface temperatures in the southern Benguela of 16 - 20°C (Shannon 1985). During the process of ring formation, intrusions of cold sub-Antarctic water moves into the South Atlantic. The contrast in warm (nutrient-poor) and cold (nutrient-rich) water is thought to be reflected in the presence of cetaceans and large migratory pelagic fish species (Best 2007).

4.1.2.3 Waves and Tides

Most of the west coast of southern Africa is classified as exposed and experiences strong wave action, rated between 13-17 on the 20 point exposure scale (McLachlan 1980). Much of the coastline is therefore impacted 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 characteristic of the region. The peak wave energy periods fall in the range 9.7 – 15.5 seconds.

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 and south-southwest direction (see Figure 4-3). Winter swells are strongly dominated by those from south and south-southwest, 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 slightly more pronounced southerly swell component in summer. These southerly 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. 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.

4.1.2.4 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 & Hutchings 1983). Salinities range between 34.5 ‰ and 35.5 ‰ (Shannon 1985).

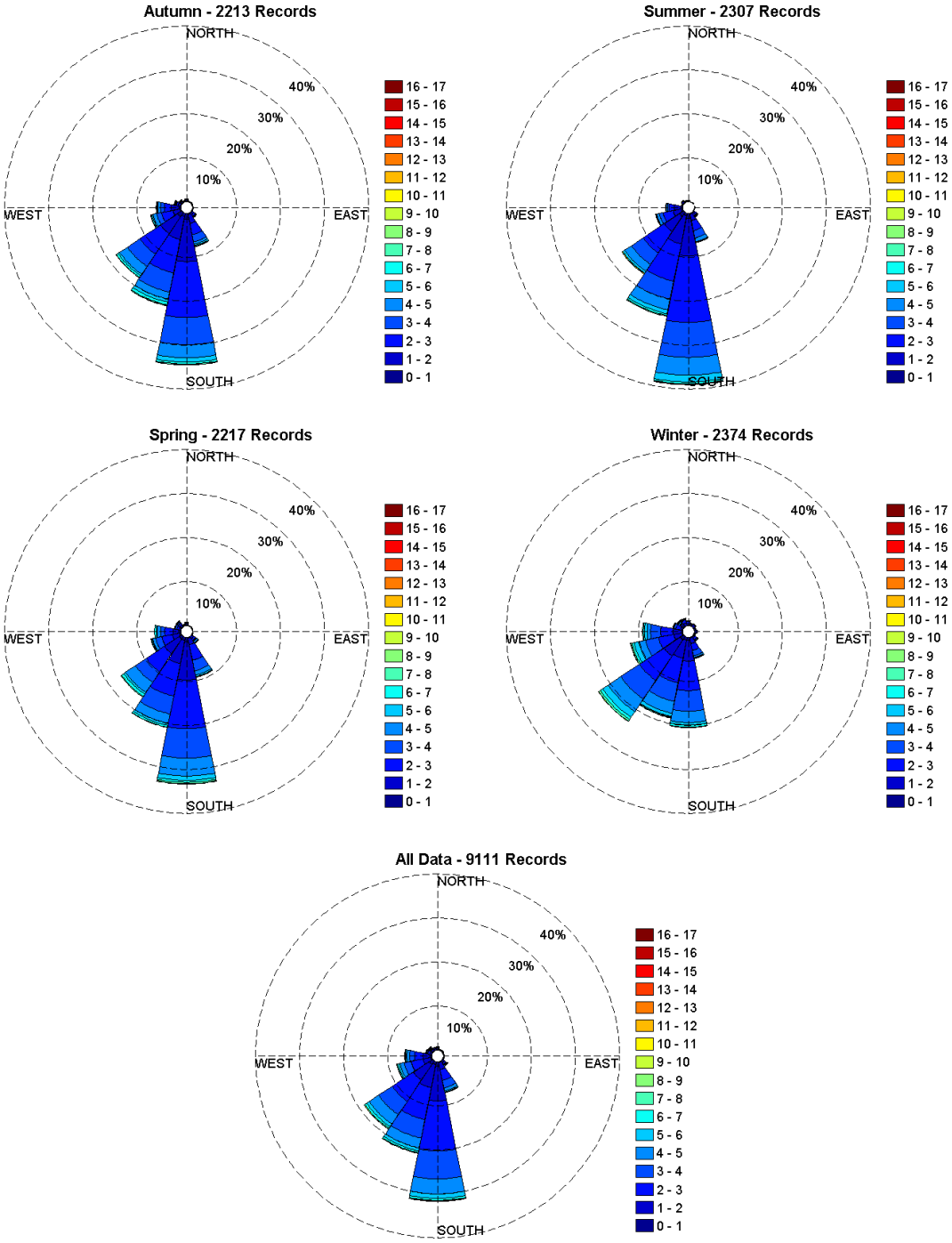

FIGURE 4-3: VOS WAVE HEIGHT VS. WAVE DIRECTION DATA FOR THE CAPE COLUMBINE AREA 32.0 TO 32.9 S AND 17.0 TO 17.9 E (1903-11-01 TO 2011-05-24; 9,111 RECORDS) (FROM CSIR).

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.

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 & Shannon 1985).

4.1.2.5 Upwelling & Plankton Production

During upwelling the comparatively nutrient-poor surface waters are displaced by enriched deep water, supporting substantial seasonal primary phytoplankton production. The cold, upwelled water is rich in inorganic nutrients, the major contributors being various forms of nitrates, phosphates and silicates (Chapman & Shannon 1985). 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. Biological decay of plankton blooms can in turn lead to "black tide" events, as the available dissolved oxygen is stripped from the water during the decomposition process. Subsequent anoxic decomposition by sulphur reducing bacteria can result in the formation and release of hydrogen sulphide (Pitcher & Calder 2000).

4.1.2.6 Organic Inputs

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

Balanced multispecies ecosystem models have estimated that the Benguela region supported biomasses of 76.9 tons/km^2 of phytoplankton and 31.5 tons/km^2 of zooplankton alone (Shannon *et al*. 2003). Thirty-six percent of the phytoplankton and 5% of the zooplankton are estimated to be lost to the seabed annually. This natural annual input of millions of tons of organic material onto the seabed has a substantial effect on the ecosystems of the Benguela region. It provides most of the food requirements of the particulate and filter-feeding benthic communities that inhabit the sandy-muds of this area, and results in the high organic content of the muds in the region. As most of the organic detritus is not directly consumed, it enters the seabed decomposition cycle, resulting in subsequent depletion of oxygen in deeper waters.

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

4.1.2.7 Low Oxygen Events

The continental shelf waters of the Benguela system are characterised by low oxygen concentrations with less than 40% saturation occurring frequently (e.g. Visser 1969; Bailey et al. 1985). The low oxygen concentrations are attributed to nutrient remineralisation in the bottom waters of the system (Chapman & Shannon 1985). The

absolute rate of this is dependent upon the net organic material build-up in the sediments, with the carbon rich mud deposits playing an important role. As the mud on the shelf is distributed in discrete patches there are corresponding preferential areas for the formation of oxygen-poor water. The two main areas of low-oxygen water formation in the southern Benguela region are in the Orange River Bight and St Helena Bay (Chapman & Shannon 1985; Bailey 1991; Shannon & O'Toole 1998; Bailey 1999; Fossing *et al*. 2000).

The spatial distribution of oxygen-poor water in each of the areas is subject to short- and medium-term variability in the volume of hypoxic water that develops. De Decker (1970) showed that the occurrence of low oxygen water off Lambert's Bay is seasonal, with highest development in summer/autumn. Bailey & Chapman (1991), on the other hand, demonstrated that in the St Helena Bay area daily variability exists as a result of downward flux of oxygen through thermoclines and short-term variations in upwelling intensity. Subsequent upwelling processes can move this low-oxygen water up onto the inner shelf, and into nearshore waters, often with devastating effects on marine communities.

Periodic low oxygen events in the nearshore region can have catastrophic effects on the marine communities leading to large-scale stranding of rock lobsters, and mass mortalities of marine biota and fish (Newman & Pollock 1974; Matthews & Pitcher 1996; Pitcher 1998; Cockcroft *et al*. 2000). The development of anoxic conditions as a result of the decomposition of huge amounts of organic matter generated by algal blooms is the main cause for these mortalities and walkouts. The blooms develop over a period of unusually calm wind conditions when sea surface temperatures were high. Algal blooms usually occur during summer-autumn (February to April) but can also develop in winter during the 'berg' wind periods, when similar warm windless conditions occur for extended periods.

4.1.2.8 Turbidity

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

Concentrations of suspended particulate matter in shallow coastal waters can vary both spatially and temporally, typically ranging from a few mg/l to several tens of mg/l (Bricelj & Malouf 1984; Berg & Newell 1986; Fegley *et al*. 1992). Field measurements of TSPM and PIM concentrations in the Benguela current system have indicated that outside of major flood events, background concentrations of coastal and continental shelf suspended sediments are generally < 12 mg/l, showing significant long-shore variation (Zoutendyk 1995). Considerably higher concentrations of PIM have, however, been reported from southern African West Coast waters under stronger wave conditions associated with high tides and storms, or under flood conditions. During storm events, concentrations near the seabed may even reach up to 10 000 mg/l (Miller & Sternberg 1988). In the vicinity of the

Orange River mouth, where river outflow strongly influences the turbidity of coastal waters, measured concentrations ranged from 14.3 mg/l at Alexander Bay just south of the mouth (Zoutendyk 1995) to peak values of 7 400 mg/l immediately upstream of the river mouth during the 1988 Orange River flood (Bremner *et al*. 1990). The major source of turbidity in the swell-influenced nearshore areas off the West Coast is the redistribution of fine inner shelf sediments by long-period Southern Ocean swells. The current velocities typical of the Benguela (10-30 cm/s) are capable of re-suspending 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 typical of those depths, and re-suspension and shoreward movement of these by wave-induced currents occur primarily under storm conditions (see also Drake *et al*. 1985; Ward 1985; De Decker 1986). Data from a Waverider buoy at Port Nolloth have indicated that 2 m waves are capable of re-suspending medium sands (200 µm diameter) at approximately 10 m depth, whilst 6 m waves achieve this at approximately 42 m depth. Low-amplitude, long-period waves will, however, penetrate even deeper. Most of the sediment shallower than 90 m can therefore be subject to re-suspension and transport by heavy swells (Lane & Carter 1999).

Mean sediment deposition is naturally higher near the seafloor due to constant re-suspension of coarse and fine PIM by tides and wind-induced waves. Aggregation or flocculation of small particles into larger aggregates occurs as a result of cohesive properties of some fine sediments in saline waters. The combination of re-suspension of seabed sediments by heavy swells, and the faster settling rates of larger inorganic particles, typically causes higher sediment concentrations near the seabed. Significant re-suspension of sediments can also occur up into the water column under stronger wave conditions associated with high tides and storms. Re-suspension can result in dramatic increases in PIM concentrations within a few hours (Sheng *et al.* 1994). Wind speed and direction have also been found to influence the amount of material re-suspended (Ward 1985).

Although natural turbidity of seawater is a global phenomenon, there has been a worldwide increase of water turbidity and sediment load in coastal areas as a consequence of anthropogenic activities. These include dredging associated with the construction of harbours and coastal installations, beach replenishment, accelerated runoff of eroded soils as a result of deforestation or poor agricultural practices, discharges from terrestrial, coastal and marine mining operations (Airoldi 2003), and sediment plumes as a result of bottom trawling fishery activities. Such increase of sediment loads has been recognised as a major threat to marine biodiversity at a global scale (UNEP 1995).

4.1.3 Biological Environment

Biogeographically, the Sea Concession areas 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) (see Figure 4-4). The coastal, wind-induced upwelling characterising the Western Cape coastline, is the principle physical process which shapes the marine ecology of the southern 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 West Coast is, however, characterized by low marine species richness and low endemicity (Awad *et al*. 2002).

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). The majority of the proposed prospecting right areas are located beyond the 65 m depth contour. The near- and offshore marine ecosystems comprise a limited range of habitats, namely unconsolidated seabed sediments, deep water reefs 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 mining activities.

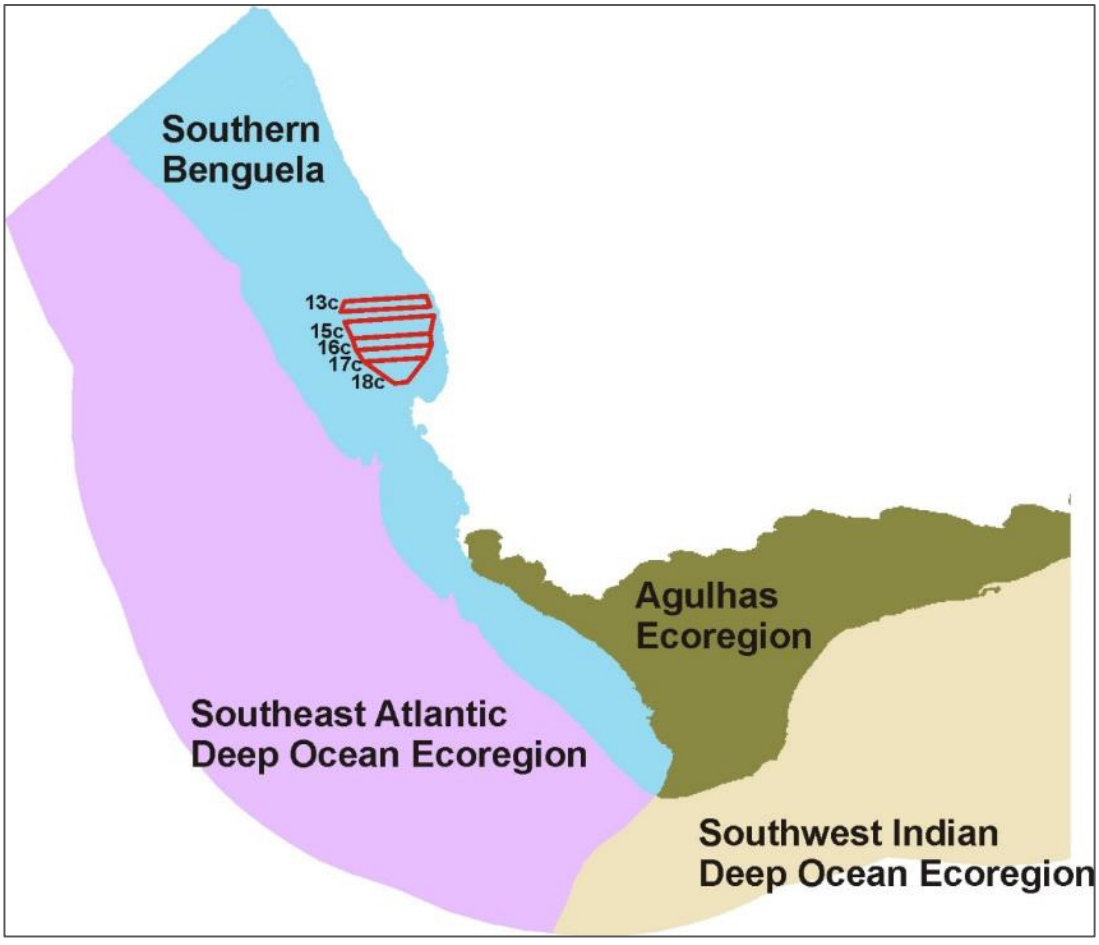

FIGURE 4-4: SEA CONCESSIONS 13C, 15C, 16C, 17C AND 18C (RED POLYGONS) IN RELATION TO THE SOUTH AFRICAN INSHORE AND OFFSHORE BIOREGIONS (ADAPTED FROM LOMBARD ET AL. 2004).

4.1.3.1 Demersal Communities

4.1.3.1.1 Nearshore and Offshore Unconsolidated Habits

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

Three macro-infauna communities have been identified on the inner- (i.e. 0-30 m depth) and midshelf (i.e. 30-150 m depth, Karenyi unpublished data). The inner-shelf community, which is affected by wave action, is characterised by various mobile predators (e.g. the gastropod *Bullia laevissima* and *polychaete Nereis* sp.), sedentary polychaetes and isopods. The mid-shelf community inhabits the mudbelt and is characterised by the mud prawns *Callianassa* sp. and *Calocaris barnardi.* A second mid-shelf sandy community occurring in sandy sediments, is characterised by various polychaetes including deposit-feeding *Spiophanes soederstromi* and *Paraprionospio pinnata.*

Polychaetes, crustaceans and molluscs make up the largest proportion of individuals, biomass and species on the West Coast. The distribution of species within these communities are inherently patchy reflecting the high natural spatial and temporal variability associated with macro-infauna of unconsolidated sediments (e.g. Kenny et al. 1998; Kendall & Widdicombe 1999; van Dalfsen et al. 2000; Zajac et al. 2000; Parry et al. 2003), with evidence of mass mortalities and substantial recruitments recorded on the South African West Coast (Steffani & Pulfrich 2004). Given the state of our current knowledge of South African macro-infauna it is not possible to determine the threat status or endemicity of macro-infauna species on the West Coast, although such research is currently underway (pers. comm. Ms N. Karenyi, South African National Biodiversity Institute (SANBI) and NMMU). However, the marine component of the 2018 National Biodiversity Assessment (Sink *et al.* 2019), rated portions of the outer continental shelf on the West Coast as 'vulnerable', 'endangered' and 'critically endangered', whereas the inner shelf areas between Hondeklipbaai and Cape Point are rated as either of 'least concern' or 'vulnerable' (see Figure 4-5). Those habitat types within the general project area and Sea Concessions 13C, 15C, 16C, 17C and 18C are illustrated in (Figure 4-6).

Generally species richness increases from the inner shelf across the mid shelf and is influenced by sediment type (Karenyi 2014). The highest total abundance and species diversity was measured in sandy sediments of the mid-shelf. Biomass is highest in the inshore (± 50 g/m^2 wet weight) and decreases across the mid-shelf averaging around 30 g/m^2 wet weight. This is contrary to Christie (1974) who found that biomass was greatest in the mudbelt at 80 m depth off Lamberts Bay, where the sediment characteristics and the impact of environmental stressors (such as low oxygen events) are likely to differ from those further offshore.

Benthic communities are structured by the complex interplay of a large array of environmental factors. Water depth and sediment grain size are considered the two major factors that determine benthic community structure and distribution on the South African west coast (Christie 1974, 1976; Steffani & Pulfrich 2004a, 2004b; 2007; Steffani 2007a; 2007b). However, studies have shown that shear bed stress - a measure of the impact of current velocity on sediment – oxygen concentration (Post et al. 2006; Currie et al. 2009; Zettler et al. 2009), productivity (Escaravage et al. 2009), organic carbon and seafloor temperature (Day et al. 1971) may also strongly influence the structure of benthic communities.

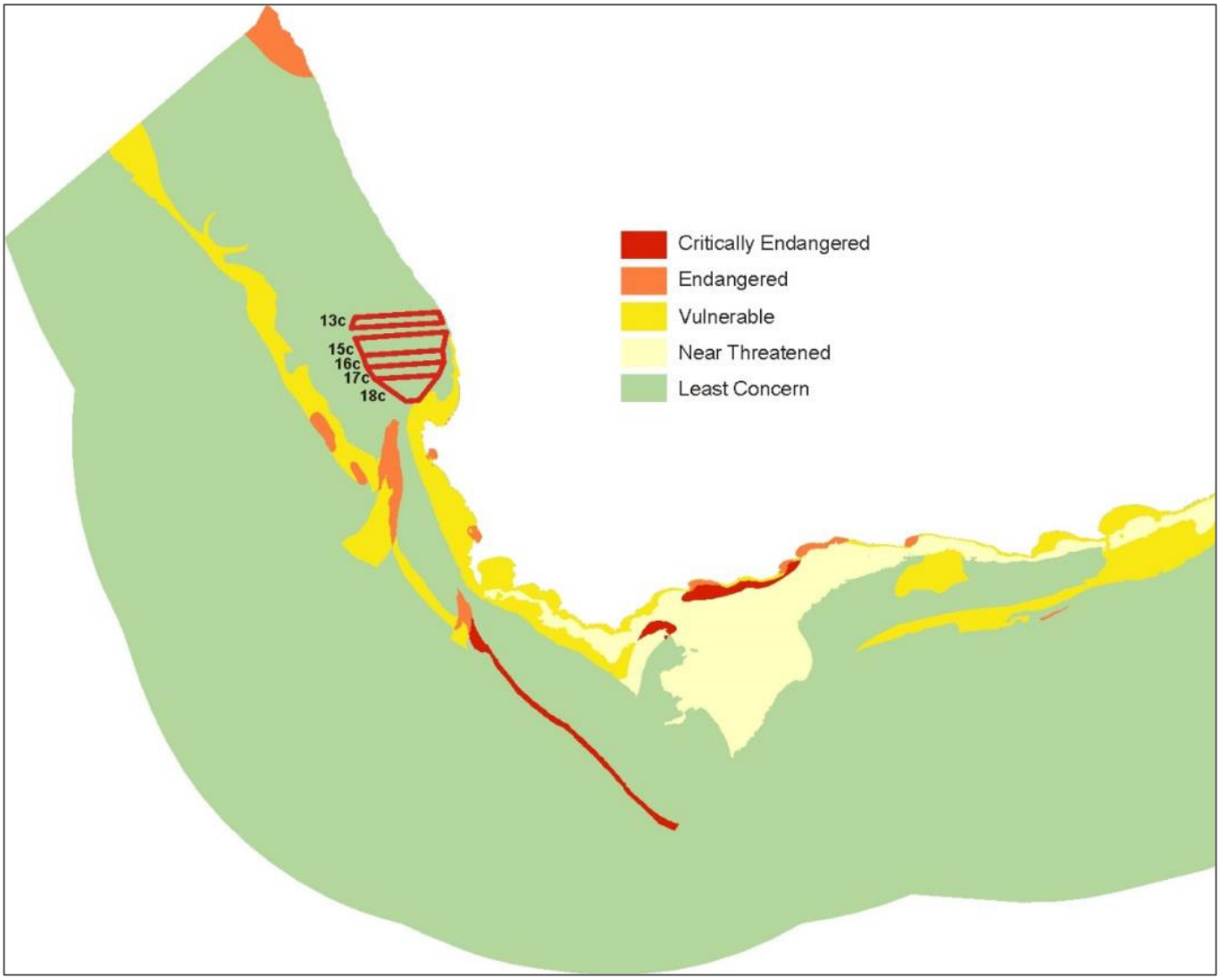

FIGURE 4-5: CONCESSIONS 13 C, 15C, 16C, 17C AND 18C (RED POLYGONS) IN RELATION TO THE ECOSYSTEM THREAT STATUS FOR COASTAL AND OFFSHORE BENTHIC HABITAT TYPES (LEFT), AND OFFSHORE PELAGIC HABITAT TYPES ON THE SOUTH AFRICAN WEST COAST (ADAPTED FROM SINK ET AL. 2019).

There are clearly other natural processes operating in the deepwater shelf areas of the West Coast that can override the suitability of sediments in determining benthic community structure, and 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). In areas of frequent oxygen deficiency, benthic communities will be characterised either by species able to survive chronic low oxygen conditions or colonising and fast-growing species able to rapidly recruit into areas that have suffered oxygen depletion. The combination of local, episodic hydrodynamic conditions and patchy settlement of larvae will tend to generate the observed small-scale variability in benthic community structure.

The invertebrate macrofauna are important in the marine benthic environment as they influence major ecological processes (e.g. remineralisation and flux of organic matter deposited on the sea floor, pollutant metabolism, sediment stability) and serve as important food source for commercially valuable fish species and other higher order consumers. As a result of their comparatively limited mobility and permanence over seasons, these animals provide an indication of historical environmental conditions and provide useful indices with which to measure environmental impacts (Gray 1974; Warwick 1993; Salas et al. 2006).

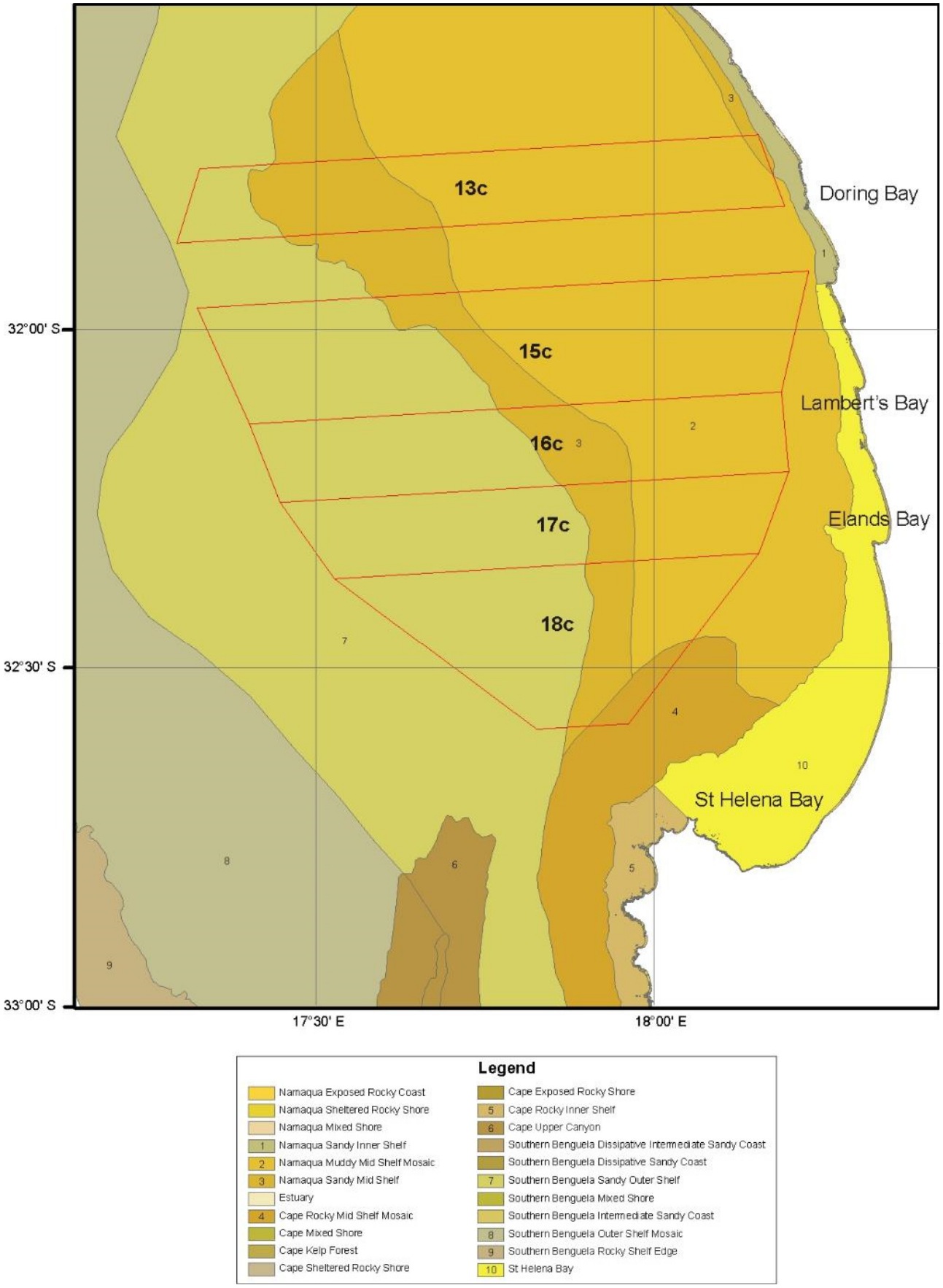

FIGURE 4-6: SEA CONCESSIONS 13C, 15C, 16C, 17C AND 18C (RED POLYGONS) IN RELATION TO BENTHIC AND COASTAL HABITAT TYPES.

Also associated with soft-bottom substrates are demersal communities that comprise epifauna and bottom-dwelling vertebrate species, many of which are dependent on the invertebrate benthic macrofauna as a food source. According to Lange (2012) a single epifaunal community exists between the depths of 100 m and 250 m characterised by the hermit crabs *Sympagurus dimorphus* and *Parapaguris pilosimanus*, the prawn *Funchalia woodwardi* and the sea urchin *Brisaster capensis*. Atkinson (2009) also reported numerous species of urchins and burrowing anemones beyond 300 m depth off the West Coast.

4.1.3.1.2 Rocky Subtidal Habitat and Kelp Beds

Biological communities of the rocky sublittoral can be broadly grouped into an inshore zone from the sublittoral fringe to a depth of about 10 m dominated by flora and an offshore zone below 10 m depth dominated by fauna. From the sublittoral fringe to a depth of between 5 and 10 m, the benthos is largely dominated by algae, in particular two species of kelp. The canopy forming kelp *Ecklonia maxima* extends seawards to a depth of about 10 m. The smaller *Laminaria pallida* forms a sub-canopy to a height of about 2 m underneath *Ecklonia*, but continues its seaward extent to about 30 m depth, although further north up the west coast increasing turbidity limits growth to shallower waters (10-20 m) (Velimirov *et al.* 1977; Jarman & Carter 1981; Branch 2008). *Ecklonia maxima* is the dominant species in the south forming extensive beds from west of Cape Agulhas to north of Cape Columbine, but decreasing in abundance northwards. *Laminaria* becomes the dominant kelp north of Cape Columbine and thus in the project area, extending from Danger Point east of Cape Agulhas to Rocky Point in northern Namibia (Stegenga *et al.* 1997; Rand 2006).

Kelp beds absorb and dissipate much of the typically high wave energy reaching the shore, thereby providing important partially-sheltered habitats for a high diversity of marine flora and fauna, resulting in diverse and typical kelp-forest communities being established. Through a combination of shelter and provision of food, kelp beds support recruitment and complex trophic food webs of numerous species, including commercially important rock lobster stocks (Branch 2008).

Growing beneath the kelp canopy, and epiphytically on the kelps themselves, are a diversity of understorey algae, which provide both food and shelter for predators, grazers and filter-feeders associated with the kelp bed ecosystem. Representative under-storey algae include *Botryocarpa prolifera*, *Neuroglossum binderianum*, *Botryoglossum platycarpum*, *Hymenena venosa* and *Rhodymenia* (=*Epymenia*) *obtusa*, various coralline algae, as well as subtidal extensions of some algae occurring primarily in the intertidal zones (Bolton 1986). Epiphytic species include *Polysiphonia virgata*, *Gelidium vittatum (=Suhria vittata)* and *Carpoblepharis flaccida*. In particular, encrusting coralline algae are important in the under-storey flora as they are known as settlement attractors for a diversity of invertebrate species. The presence of coralline crusts is thought to be a key factor in supporting a rich shallow-water community by providing substrate, refuge, and food to a wide variety of infaunal and epifaunal invertebrates (Chenelot *et al.* 2008).

The sublittoral invertebrate fauna is dominated by suspension and filter-feeders, such as the mussels *Aulacomya ater* and *Choromytilus meriodonalis*, and the Cape reef worm *Gunnarea capensis*, and a variety of sponges and sea cucumbers. Grazers are less common, with most herbivory being restricted to grazing of juvenile algae or debris-feeding on detached macrophytes. The dominant herbivore is the sea urchin *Parechinus angulosus*, with lesser grazing pressure from limpets, the isopod *Paridotea reticulata* and the amphipod *Ampithoe humeralis*. The

abalone *Haliotis midae*, an important commercial species present in kelp beds south of Cape Columbine is naturally absent north of Cape Columbine.

Key predators in the sub-littoral include the commercially important West Coast rock lobster (*Jasus lalandii*) and the octopus (*Octopus vulgaris*). The rock lobster acts as a keystone species as it influences community structure via predation on a wide range of benthic organisms (Mayfield *et al.* 2000). Relatively abundant rock lobsters can lead to a reduction in density, or even elimination, of black mussel (*Choromytilus meriodonalis*), the preferred prey of the species, and alter the size structure of populations of ribbed mussels (*Aulacomya ater*), reducing the proportion of selected size-classes (Griffiths & Seiderer 1980). Their role as predator can thus reshape benthic communities, resulting in large reductions in taxa such as black mussels, urchins, whelks and barnacles, and in the dominance of algae (Barkai & Branch 1988; Mayfield 1998).

Of lesser importance as predators, although numerically significant, are various starfish, feather and brittle stars, and gastropods, including the whelks *Nucella* spp. and *Burnupena* spp. Fish species commonly found in kelp beds off the West Coast include hottentot (*Pachymetopon blochii*), two tone finger fin (*Chirodactylus brachydactylus*), red fingers (*Cheilodactylus fasciatus*), galjoen (*Dichistius capensis*), rock suckers (*Chorisochismus dentex*) and the catshark (*Haploblepharus pictus*) (Branch *et al.* 2010).

There is substantial spatial and temporal variability in the density and biomass of kelp beds, as storms can remove large numbers of plants and recruitment appears to be stochastic and unpredictable (Levitt *et al.* 2002; Rothman *et al.* 2006). Some kelp beds are dense, whilst others are less so due to differences in seabed topography, and the presence or absence of sand and grazers.

4.1.3.1.3 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 deeper than 150 m with some species being recorded from as deep as 3 000 m. Some species form reefs while others are smaller and remain solitary. Corals add structural complexity to otherwise uniform seabed habitats thereby creating areas of high biological diversity (Breeze *et al*. 1997; MacIssac *et al*. 2001). Deep water corals establish themselves below the thermocline where there is a continuous and regular supply of concentrated particulate organic matter, caused by the flow of a relatively strong current over special topographical formations which cause eddies to form. Nutrient seepage from the substratum might also promote a location for settlement (Hovland *et al*. 2002). In the productive Benguela region, substantial areas on the shelf should thus potentially be capable of supporting rich, cold water, benthic, filter-feeding communities.

Deep water corals are known from the iBhubezi Reef to the east of the Gas Field. Furthermore, evidence from video footage taken on hard-substrate habitats in 100 - 120 m depth off southern Namibia and to the south-east of Child's Bank (De Beers Marine, unpublished data) suggest that vulnerable communities including gorgonians, octocorals and reef-building sponges do occur on the continental shelf.

A geological feature of note in the vicinity of the IBhubezi Gas Field is the carbonate mound (bioherm) Child's Bank (Dingle *et al.* 1987), which is located to the north of the Sea Concession areas. Composed of sediments and the calcareous deposits from an accumulation of carbonate skeletons of sessile organisms (e.g. cold-water coral,

foraminifera or marl), such features typically have topographic relief, forming isolated seabed knolls in otherwise low profile homogenous seabed habitats (Kopaska-Merkel & Haywick 2001; Kenyon *et al*. 2003; Wheeler *et al.* 2005; Colman *et al*. 2005). 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 up-welling 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 influences 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 deepwater 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; Kenyon *et al*. 2003). 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. South Africa's seamounts and their associated benthic communities have not been extensively sampled by either geologists or biologists (Sink & Samaai 2009).

4.1.3.1.4 Demersal Fish Species

Demersal fish are those species that live and feed on or near the seabed. As many as 110 species of bony and cartilaginous fish have been identified in the demersal communities on the continental shelf of the West Coast (Roel 1987). Changes in fish communities occur with increasing depth (Roel 1987; Smale et al. 1993; Macpherson & Gordoa 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). The shelf community (< 380 m) is dominated by the Cape hake *M. capensis*, and includes jacopever (*Helicolenus dactylopterus*), Izak catshark (*Holohalaelurus regain*), soupfin shark (*Galeorhinus galeus*) and whitespotted houndshark (*Mustelus palumbes*). The more diverse deeper water community is dominated by the deepwater hake (*Merluccius paradoxus*), monkfish (*Lophius vomerinus*), kingklip (*Genypterus capensis*), bronze whiptail (*Lucigadus ori*) and hairy conger (*Bassanago albescens*) and various squalid shark species. There is some degree of species overlap between the depth zones.

Roel (1987) showed seasonal variations in the distribution ranges shelf communities, with species such as the pelagic goby (*Sufflogobius bibarbatus*), and West Coast sole (*Austroglossus microlepis*) occurring in shallow water north of Cape Point during summer only. The deep-sea community was found to be homogenous both spatially and temporally. In a more recent study, however, Atkinson (2009) identified two long-term community shifts in demersal fish communities; the first (early to mid-1990s) being associated with an overall increase in density of many species, whilst many species decreased in density during the second shift (mid-2000s). These community shifts correspond temporally with regime shifts detected in environmental forcing variables (sea surface temperatures and upwelling anomalies) (Howard *et al.* 2007) and with the eastward shifts observed in small pelagic fish species and rock lobster populations (Coetzee *et al*. 2008, Cockcroft *et al*. 2008).

The diversity and distribution of demersal cartilagenous fishes on the West Coast is discussed by Compagno *et al*. (1991). The species that may occur on the continental shelf in the general project area in waters <100 m depth are listed in Table 4-1.

TABLE 4-1: DEMERSAL CARTILAGINOUS SPECIES FOUND ON THE CONTINENTAL SHELF ALONG THE WEST COAST, WITH APPROXIMATE DEPTH RANGE AT WHICH THE SPECIES OCCURS (COMPAGNO *ET AL.* 1991).

Common Name	Scientific name	Depth Range (m)
Bramble shark	*Echinorhinus brucus*	55-285
Shortnose spiny dogfish	*Squalus megalops*	75-460
Sixgill sawshark	*Pliotrema warreni*	60-500
Tigar catshark	*Halaelurus natalensis*	50-100
Soupfin shark/Vaalhaai	*Galeorhinus galeus*	<10-300
Houndshark	*Mustelus mustelus*	<100
Thorny skate	*Raja radiata*	50-600
Slime skate	*Raja pullopunctatus*	15-460
Rough-belly skate	*Raja springeri*	85-500

Common Name	Scientific name	Depth Range (m)
Yellowspot skate	*Raja wallacei*	70-500
Biscuit skate	*Raja clavata*	25-500
Spearnose skate	*Raja alba*	75-260
St Joseph	*Callorhinchus capensis*	30-380

4.1.3.2 Pelagic Communities

In contrast to demersal and benthic biota that are associated with the seabed, pelagic species live and feed in the open water column. The pelagic communities are typically divided into plankton and fish, and their main predators, marine mammals (seals, dolphins and whales), seabirds and turtles.

4.1.3.2.1 Plankton

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

Phytoplankton are the principle primary producers with mean productivity ranging from 2.5 - 3.5 g C/m^2/day for the midshelf region and decreasing to 1 g C/m^2/day inshore of 130 m (Shannon & Field 1985; Mitchell-Innes & Walker 1991; Walker & Peterson 1991). The phytoplankton is dominated by large-celled organisms, which are adapted to the turbulent sea conditions. The most common diatom genera are *Chaetoceros, Nitschia, Thalassiosira, Skeletonema, Rhizosolenia*, *Coscinodiscus* and *Asterionella* (Shannon & Pillar 1985). Diatom blooms occur after upwelling events, whereas dinoflagellates (e.g. *Prorocentrum, Ceratium* and *Peridinium*) are more common in blooms that occur during quiescent periods, since they can grow rapidly at low nutrient concentrations. In the surf zone, diatoms and dinoflagellates are nearly equally important members of the phytoplankton, and some silicoflagellates are also present.

Red-tides are ubiquitous features of the Benguela system (see Shannon & Pillar, 1986). The most common species associated with red tides (dinoflagellate and/or ciliate blooms) are *Noctiluca scintillans*, *Gonyaulax tamarensis, G. polygramma* and the ciliate *Mesodinium rubrum. Gonyaulax* and *Mesodinium* have been linked with toxic red tides. Most of these red-tide events occur quite close inshore although Hutchings *et al.* (1983) have recorded red-tides 30 km offshore.

The mesozooplankton (≥200 µm) is dominated by copepods, which are overall the most dominant and diverse group in southern African zooplankton. Important species are *Centropages brachiatus, Calanoides carinatus, Metridia lucens, Nannocalanus minor, Clausocalanus arcuicornis, Paracalanus parvus, P. crassirostris* and *Ctenocalanus vanus.* All of the above species typically occur in the phytoplankton rich upper mixed layer of the water column, with the exception of *M. lucens* which undertakes considerable vertical migration.

The macrozooplankton (≥1 600 µm) are dominated by euphausiids of which 18 species occur in the area. The dominant species occurring in the nearshore are *Euphausia lucens* and *Nyctiphanes capensis,* although neither species appears to survive well in waters seaward of oceanic fronts over the continental shelf (Pillar *et al.* 1991). Standing stock estimates of mesozooplankton for the southern Benguela area range from 0.2 - 2.0 g C/m^2, with maximum values recorded during upwelling periods. Macrozooplankton biomass ranges from 0.1 - 1.0 g C/m^2,

with production increasing north of Cape Columbine (Pillar 1986). Although it shows no appreciable onshore-offshore gradients, standing stock is highest over the shelf, with accumulation of some mobile zooplanktors (euphausiids) known to occur at oceanographic fronts. Beyond the continental slope biomass decreases markedly. Localised peaks in biomass may, however, occur in the vicinity of Child's Bank and Tripp seamount in response to topographically steered upwelling around such seabed features.

Zooplankton biomass varies with phytoplankton abundance and, accordingly, seasonal minima will exist during non-upwelling periods when primary production is lower (Brown 1984; Brown & Henry 1985), and during winter when predation by recruiting anchovy is high. More intense variation will occur in relation to the upwelling cycle; newly upwelled water supporting low zooplankton biomass due to paucity of food, whilst high biomasses develop in aged upwelled water subsequent to significant development of phytoplankton. Irregular pulsing of the upwelling system, combined with seasonal recruitment of pelagic fish species into West Coast shelf waters during winter, thus results in a highly variable and dynamic balance between plankton replenishment and food availability for pelagic fish species.

Although ichthyoplankton (fish eggs and larvae) comprise a minor component of the overall plankton, it remains significant due to the commercial importance of the overall fishery in the region. Various pelagic and demersal fish species are known to spawn in the inshore regions of the southern Benguela, (including pilchard, round herring, chub mackerel, lanternfish and hakes (Crawford *et al.* 1987) (see Figure 4-7), and their eggs and larvae form an important contribution to the ichthyoplankton in the region. Ichthyoplankton abundance within the Sea Concession areas is thus expected to be high.

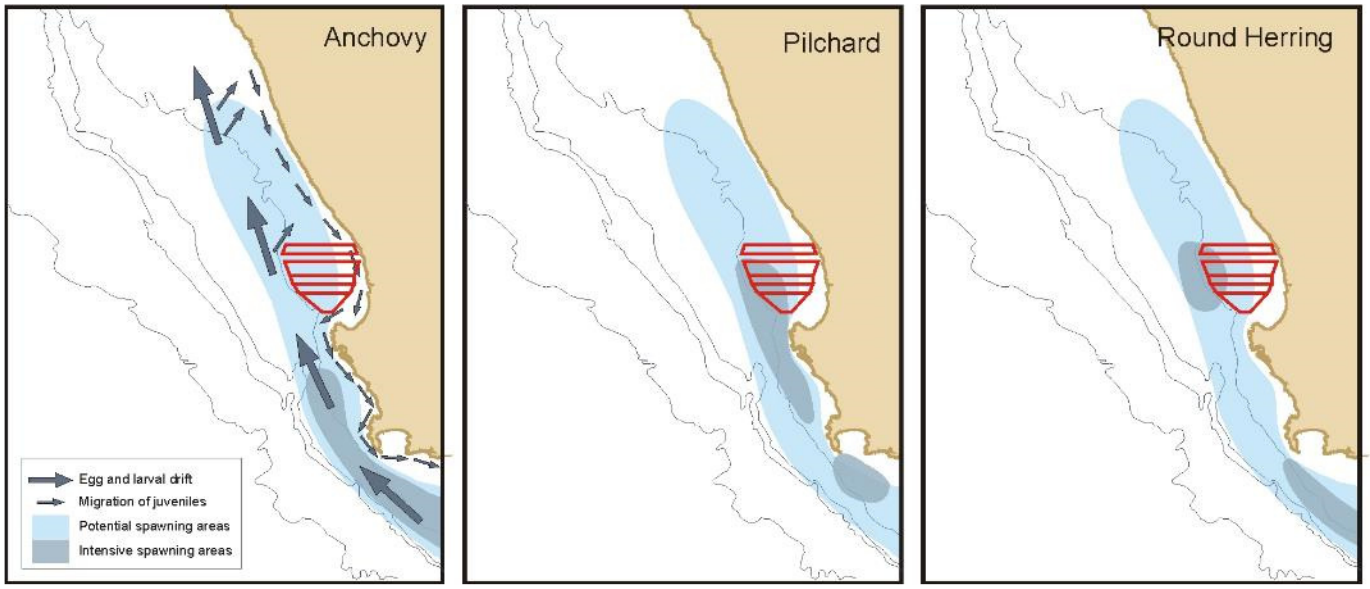

FIGURE 4-7: SEA CONCESSIONS 13C, 15C, 16C, 17C AND 18C (RED POLYGONS) IN RELATION TO THE MAJOR SPAWNING AREAS IN THE SOUTHERN BENGUELA REGION (ADAPTED FROM CRUIKSHANK 1990).

4.1.3.2.2 Cephalopods

Fourteen species of cephalopds have been recorded in the southern Benguela, the majority of which are sepiods/cuttlefish (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 epi-benthic 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 offshore portions of the Sea Concession areas 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 while the giant squid is usually found near continental and island slopes all around the world's oceans. Growing to in excess of 10 m in length, they are the principal prey of the sperm whale, and are also taken by beaked whaled, pilot whales, elephant seals and sleeper sharks. Nothing is known of their vertical distribution, but data from trawled specimens and sperm whale diving behaviour suggest they may span a depth range of 300 – 1 000 m. They lack gas-filled swim bladders and maintain neutral buoyancy through an ammonium chloride solution occurring throughout their bodies.

4.1.3.2.3 Pelagic Fish

The structure of the nearshore and surf zone fish community varies greatly with the degree of wave exposure. Species richness and abundance is generally high in sheltered and semi-exposed areas but typically very low off the more exposed beaches (Clark 1997a, 1997b).

The surf-zone and outer turbulent zone habitats of sandy beaches are considered to be important nursery habitats for marine fishes, however, composition and abundance of individual assemblages appears heavily dependent on wave exposure (Blaber & Blaber 1980, Potter et al. 1990, Clark 1997a, b). Surf-zone fish communities off the South African West Coast have relatively high biomass, but low species diversity. Typical surf-zone fish include harders (*Liza richardsonii*), white stumpnose (*Rhabdosargus globiceps*), Cape sole (*Heteromycteris capensis*), Cape gurnard (*Chelidonichthys capensis*), False Bay klipfish (*Clinus latipennis*), sandsharks (*Rhinobatos annulatus*), eagle ray (*Myliobatis aquila*), and smooth-hound (*Mustelus mustelus*) (Clark 1997b).

Fish species commonly found in kelp beds off the West Coast include hottentot (*Pachymetopon blochii*), twotone fingerfin (*Chirodactylus brachydactylus*), red fingers (*Cheilodactylus fasciatus*), galjoen (*Dichistius capensis*), rock suckers (*Chorisochismus dentex*), maned blennies (*Scartella emarginata*) and the catshark (*Haploblepharus pictus*) (Sauer *et al.* 1997; Brouwer *et al*. 1997; Branch *et al*. 2010).

Small pelagic species occurring beyond the surfzone and generally within the 200 m contour include the sardine/pilchard (*Sadinops ocellatus*), anchovy (*Engraulis capensis*), chub mackerel (*Scomber japonicus*), horse mackerel (*Trachurus capensis*) and round herring (*Etrumeus whiteheadi*). These species typically occur in mixed shoals of various sizes (Crawford *et al.* 1987), and exhibit similar life history patterns involving seasonal migrations between the west and south coasts. The spawning areas of the major pelagic species are distributed on the continental shelf and along the shelf edge from south of St Helena Bay to Mossel Bay on the South Coast (Shannon & Pillar 1986). They spawn downstream of major upwelling centres in spring and summer, and their

eggs and larvae are subsequently carried around Cape Point and up the coast in northward flowing surface waters.

At the start of winter every year, juveniles of most small pelagic shoaling species recruit into coastal waters in large numbers between the Orange River and Cape Columbine. They recruit in the pelagic stage, across broad stretches of the shelf, to utilise the shallow shelf region as nursery grounds before gradually moving southwards in the inshore southerly flowing surface current, towards the major spawning grounds east of Cape Point. Recruitment success relies on the interaction of oceanographic events, and is thus subject to spatial and temporal variability. Consequently, the abundance of adults and juveniles of these small, short-lived (1 - 3 years) pelagic fish is highly variable both within and between species.

Two species that migrate along the West Coast following the shoals of anchovy and pilchards are snoek *Thyrsites atun* and chub mackerel *Scomber japonicas*. Their appearance along the West and South-West coasts are highly seasonal. Snoek migrating along the southern African West Coast reach the area between St Helena Bay and the Cape Peninsula between May and August. They spawn in these waters between July and October before moving offshore and commencing their return northward migration (Payne & Crawford 1989). They are voracious predators occurring throughout the water column, feeding on both demersal and pelagic invertebrates and fish. Chub mackerel similarly migrate along the southern African West Coast reaching South-Western Cape waters between April and August. They move inshore in June and July to spawn before starting the return northwards offshore migration later in the year. Their abundance and seasonal migrations are thought to be related to the availability of their shoaling prey species (Payne & Crawford 1989).

Large pelagic species such as tunas, billfish and pelagic sharks, migrate throughout the southern oceans, between surface and deep waters (> 300 m). Species occurring off western southern Africa include the albacore/longfin tuna (*Thunnus alalunga*), yellowfin (*T. albacares*), bigeye (*T. obesus*), and skipjack (*Katsuwonus pelamis*) tunas, as well as the atlantic blue marlin (*Makaira nigricans*), the white marlin (*Tetrapturus albidus*) and the broadbill swordfish (*Xiphias gladius*) (Payne & Crawford 1989). The distribution of these species is dependent on food availability in the mixed boundary layer between the Benguela and warm central Atlantic waters. Concentrations of large pelagic species are also known to occur associated with underwater features such as canyons and seamounts, as well as meteorologically induced oceanic fronts (Penney *et al*. 1992). The Sea Concession areas do not overlap with any such underwater features. The Cape Canyon and Cape Valley lie some 30 km to the southwest of Sea Concession 18C, and Child's Bank lies some 180 km to the northwest of Sea Concession 13C. Seasonal association with Child's Bank (off Namaqualand) and Tripp Seamount (off southern Namibia) occurs between October and June, with commercial catches often peaking in March and April (www.fao.org/fi/fcp/en/NAM/body.htm; see CapMarine 2019 – Fisheries Specialist Study).

Many of the large migratory pelagic species are considered threatened by the IUCN, primarily due to overfishing. Tuna and swordfish are targeted by high seas fishing fleets and illegal overfishing has severely damaged the stocks of many of these species. Similarly, pelagic sharks, are either caught as bycatch in the pelagic tuna longline fisheries, or are specifically targeted for their fins, where the fins are removed and the remainder of the body discarded.

A number of species of pelagic sharks are also known to occur on the West Coast, including blue *Prionace glauca*, short-fin mako *Isurus oxyrinchus* and oceanic whitetip sharks *Carcharhinus longimanus*. Occurring throughout the

world in warm temperate waters, these species are usually found further offshore on the West Coast. Great whites *Carcharodon carcharias* and whale sharks *Rhincodon typus* may also be encountered in offshore areas, although the latter occurs more frequently along the South and East coasts.

4.1.3.2.4 Turtles

Three species of turtle occur along the West Coast, namely the Leatherback (*Dermochelys coriacea*), and occasionally the Loggerhead (*Caretta caretta*) and the Green (*Chelonia mydas*) turtle. Loggerhead and Green turtles are expected to occur only as occasional visitors along the West Coast. The Leatherback is the only turtle likely to be encountered in the offshore waters of west South Africa.

The Benguela ecosystem, especially the northern Benguela where jelly fish numbers are high, is increasingly being recognized as a potentially important feeding area for leatherback turtles from several globally significant nesting populations in the south Atlantic (Gabon, Brazil) and south east Indian Ocean (South Africa) (Lambardi *et al*. 2008, Elwen & Leeney 2011; SASTN 2011[2]). Leatherback turtles from the east South Africa population have been satellite tracked swimming around the west coast of South Africa and remaining in the warmer waters west of the Benguela ecosystem (Lambardi *et al*. 2008).

Leatherback turtles inhabit deeper waters and are considered a pelagic species, travelling the ocean currents in search of their prey (primarily jellyfish). While hunting they may dive to over 600 m and remain submerged for up to 54 minutes (Hays *et al.* 2004). Their abundance in the study area is unknown but expected to be low. Leatherbacks feed on jellyfish and are known to have mistaken plastic marine debris for their natural food. Ingesting this can obstruct the gut, lead to absorption of toxins and reduce the absorption of nutrients from their real food. Leatherback Turtles are listed as "Critically Endangered" worldwide by the IUCN and are in the highest categories in terms of need for conservation in CITES (Convention on International Trade in Endangered Species), and Convention on Migratory Species. Loggerhead and green turtles are listed as "Endangered". As a signatory of the Convention on Migratory Species, South Africa has endorsed and signed an International Memorandum of Understanding specific to the conservation of marine turtles. South Africa is thus committed to conserve these species at an international level.

4.1.3.2.5 Seabirds

Large numbers of pelagic seabirds exploit the pelagic fish stocks of the Benguela system. Of the 49 species of seabirds that occur in the Benguela region, 14 are defined as resident, 10 are visitors from the northern hemisphere and 25 are migrants from the southern Ocean. The 18 species classified as being common in the southern Benguela are listed in Table 4-2. The area between Cape Point and the Orange River supports 38% and 33% of the overall population of pelagic seabirds in winter and summer, respectively. Most of the species in the region reach highest densities offshore of the shelf break (200 – 500 m depth) with highest population levels during their non-breeding season (winter). Pintado petrels and Prion spp. show the most marked variation here.

[2] *SASTN Meeting - Second meeting of the South Atlantic Sea Turtle Network, Swakopmund, Namibia, 24-30 July 2011.*

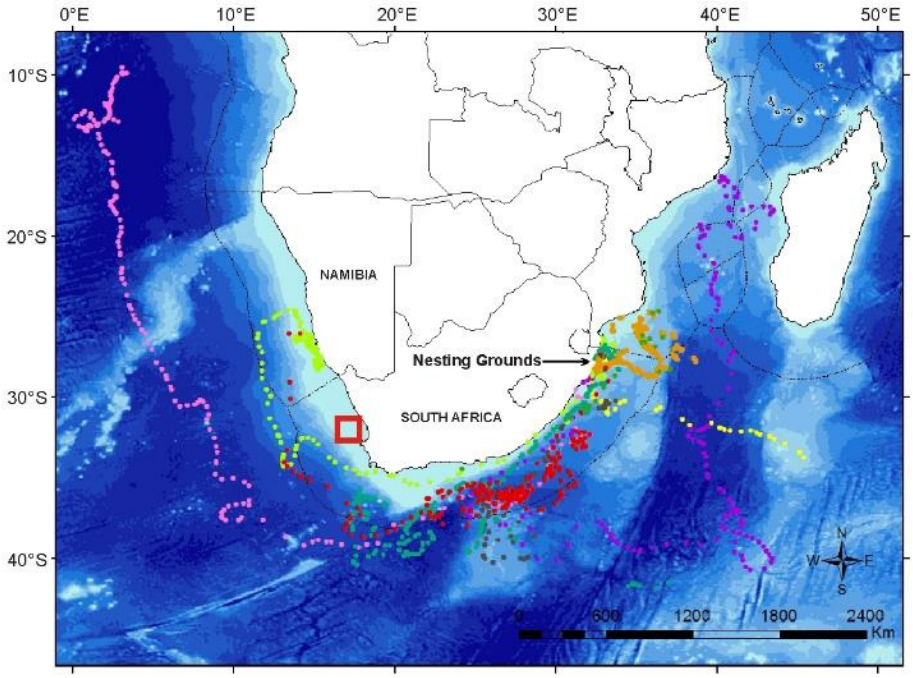

FIGURE 4-8: THE APPROXIMATE THE LOCATION OF CONCESSIONS (RED POLYGON) IN RELATION TO POST-NESTING DISTRIBUTION OF NINE SATELLITE TAGGED LEATHERBACK FEMALES (1996 – 2006; OCEANS AND COAST, UNPUBLISHED DATA).

Fourteen species of seabirds breed in southern Africa; Cape Gannet, African Penguin, four species of Cormorant, White Pelican, three Gull and four Tern species (see Table 4-3). The breeding areas are distributed around the coast with islands being especially important. Breeding islands within the vicinity of the project area are Bird Island at Lambert's Bay, the Saldanha Bay islands, Dassen Island off Yzerfontein and Robben Island in Table Bay. The number of successfully breeding birds at the particular breeding sites varies with food abundance. Most of the breeding seabird species forage at sea with most birds being found relatively close inshore (10-30 km). Cape Gannets, however, are known to forage up to 140 km offshore (Dundee 2006; Ludynia 2007), and African Penguins have also been recorded as far as 60 km offshore.

Sea Concession areas 15C and 16C are located more than 12 km away from Lambert's Bay Bird Island which hosts the fourth largest breeding colony of Cape Gannet (approximately 8 500 breeding pairs). The mouth of the Verlorenvlei Estuary is located more than 19 km inshore of Sea Concession Area 17C. The Verlorenvlei Estuary is a declared an Important Bird Area.

TABLE 4-2: PELAGIC SEABIRDS COMMON IN THE SOUTHERN BENGUELA REGION (CRAWFORD *ET AL.* 1991).

Common Name	Species name	Global IUCN
Shy albatross	*Thalassarche cauta*	Near Threatened
Black browed albatross	*Thalassarche melanophrys*	Endangered[1]
Yellow nosed albatross	*Thalassarche chlororhynchos*	Endangered
Giant petrel sp.	*Macronectes halli/giganteus*	Near Threatened
Pintado petrel	*Daption capense*	Least concern
Greatwinged petrel	*Pterodroma macroptera*	Least concern
Soft plumaged petrel	*Pterodroma mollis*	Least concern

Common Name	Species name	Global IUCN
Prion spp	*Pachyptila spp.*	Least concern
White chinned petrel	*Procellaria aequinoctialis*	Vulnerable
Cory's shearwater	*Calonectris diomedea*	Least concern
Great shearwater	*Puffinus gravis*	Least concern
Sooty shearwater	*Puffinus griseus*	Near Threatened
European Storm petrel	*Hydrobates pelagicus*	Least concern
Leach's storm petrel	*Oceanodroma leucorhoa*	Least concern
Wilson's storm petrel	*Oceanites oceanicus*	Least concern
Blackbellied storm petrel	*Fregetta tropica*	Least concern
Skua spp.	*Catharacta/Stercorarius spp.*	Least concern
Sabine's gull	*Larus sabini*	Least concern

1. May move to Critically Endangered if mortality from long-lining does not decrease.

TABLE 4-3: BREEDING RESIDENT SEABIRDS PRESENT ALONG THE WEST COAST (CCA & CMS 2001).

Common name	Species name	Global IUCN Status
African Penguin	*Spheniscus demersus*	Endangered
Great Cormorant	*Phalacrocorax carbo*	Least Concern
Cape Cormorant	*Phalacrocorax capensis*	Endangered
Bank Cormorant	*Phalacrocorax neglectus*	Endangered
Crowned Cormorant	*Phalacrocorax coronatus*	Near Threatened
White Pelican	*Pelecanus onocrotalus*	Least Concern
Cape Gannet	*Morus capensis*	Vulnerable
Kelp Gull	*Larus dominicanus*	Least Concern
Greyheaded Gull	*Larus cirrocephalus*	Least Concern
Hartlaub's Gull	*Larus hartlaubii*	Least Concern
Caspian Tern	*Hydroprogne caspia*	Least Concern
Swift Tern	*Sterna bergii*	Least Concern
Roseate Tern	*Sterna dougallii*	Least Concern
Damara Tern	*Sterna balaenarum*	Near Threatened

4.1.3.2.6 Marine Mammals

The marine mammal fauna occurring off the southern African coast includes several species of whales and dolphins and one resident seal species. Thirty-five species of whales and dolphins are known (based on historic sightings or strandings records) or likely (based on habitat projections of known species parameters) to occur in these waters (see Table 4-4). The offshore areas have been particularly poorly studied with almost all available information from deeper waters (>200 m) arising from historic whaling records prior to 1970. Current information on the distribution, population sizes and trends of most cetacean species occurring on the west coast of southern Africa is lacking. Information on smaller cetaceans in deeper waters is particularly poor and the precautionary principal must be used when considering possible encounters with cetaceans in this area.

Records from stranded specimens show that the area between St Helena Bay (~32°S) and Cape Agulhas (~34°S, 20°E) is an area of transition between Atlantic and Indian Ocean species, as well as those more commonly associated with colder waters of the west coast (e.g. dusky dolphins and long finned pilot whales) and those of the warmer east coast (e.g. striped and Risso's dolphins) (Findlay *et al.* 1992). The location of the Sea Concessions lies north of this transition zone and can be considered to be truly on the 'west coast'.

However, the warmer waters that occur offshore of the Benguela ecosystem (more than approximately 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, Pan-tropical spotted dolphins and short finned pilot whales. Owing to the uncertainty of species occurrence offshore, species that may occur there have been included here for the sake of completeness.

The distribution of cetaceans 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 on the continental slope (200 – 2000 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.

Cetaceans comprise two taxonomic groups, the mysticetes (filter feeders with baleen) and the odontocetes (predatory whales and dolphins with teeth). The term 'whale' is used to describe species in both groups and is taxonomically meaningless (e.g. the killer whale and pilot whale are members of the Odontoceti, family Delphinidae and are thus dolphins). Due to differences in sociality, communication abilities, ranging behaviour and acoustic behaviour, these two groups are considered separately.

The cetaceans likely to be found within the project area, based on data sourced from: Findlay *et al.* (1992), Best (2007), Weir (2011), Dr J-P. Roux, (MFMR pers. comm.) and unpublished records held by the Namibian Dolphin Project are listed in Table 4-4. Of the 35 species listed, one is critically endangered, two are endangered and two are considered vulnerable (South African Red Data list Categories, 2016). Altogether nine species are listed as “data deficient” underlining how little is known about cetaceans, their distributions and population trends. The majority of data available on the seasonality and distribution of large whales in the project area is the result of commercial whaling activities mostly dating from the 1960s. Changes in the timing and distribution of migration may have occurred since these data were collected due to extirpation of populations or behaviours (e.g. migration routes may be learnt behaviours). Some data on species occurrence is available from newer datasets, mainly from marine mammal observers working on earlier seismic surveys, but these are almost all confined to the summer months.

TABLE 4-4: CETACEANS OCCURRENCE OFF THE WEST COAST OF SOUTH AFRICA, THEIR SEASONALITY, LIKELY ENCOUNTER FREQUENCY WITH PROPOSED PROSPECTING OPERATIONS AND IUCN CONSERVATION STATUS.

Common Name	Species	Shelf	Offshore	Seasonality	Likely encounter frequency	IUCN Conservation Status
Delphinids (14 spp)						
Dusky dolphin	*Lagenorhynchus obscurus*	Yes (0- 800 m)	No	Year round	Monthly	Data Deficient
Heaviside's dolphin	*Cephalorhynchus heavisidii*	Yes (0-200 m)	No	Year round	Very rare	Least Concern
Common bottlenose dolphin	*Tursiops truncatus*	Yes	Yes	Year round	<Weekly	Least Concern
Common dolphin	*Delphinus delphis*	Yes	Yes	Year round	<Weekly	Least Concern
Southern right whale dolphin	*Lissodelphis peronii*	Yes	Yes	Year round	Very rare	Least Concern
Striped dolphin	*Stenella coeruleoalba*	No	?	?	Very rare	Least Concern
Pantropical spotted dolphin	*Stenella attenuata*	Edge	Yes	Year round	Very rare	Least Concern
Long-finned pilot whale	*Globicephala melas*	Edge	Yes	Year round	<Weekly	Least Concern
Short-finned pilot whale	*Globicephala macrorhynchus*	?	?	?	Very rare	Least Concern
Rough-toothed dolphin	*Steno bredanensis*	?	?	?	Very rare	Least Concern
Killer whale	*Orcinus orca*	Occasional	Yes	Year round	Monthly	Least Concern
False killer whale	*Pseudorca crassidens*	Occasional	Yes	Year round	Monthly	Least Concern
Pygmy killer whale	*Feresa attenuata*	?	Yes	?	Rare	Least Concern
Risso's dolphin	*Grampus griseus*	Yes (edge)	Yes	?	Monthly	Least Concern
Sperm whales (3 spp)						
Pygmy sperm whale	*Kogia breviceps*	Edge	Yes	Year round	Rare	Data Deficient
Dwarf sperm whale	*Kogia sima*	Edge	?	?	Very rare	Data Deficient
Sperm whale	*Physeter macrocephalus*	Edge	Yes	Year round	Weekly	Vulnerable
Beaked whales (8 spp)						
Cuvier's	*Ziphius cavirostris*	No	Yes	Year round	Rare	Least Concern
Arnoux's	*Beradius arnouxii*	No	Yes	Year round	Rare	Data Deficient
Shepherd's	*Tasmacetus sheperdi*	No	Yes	Year Round	Rare	Not Assessed

Common Name	Species	Shelf	Offshore	Seasonality	Likely encounter frequency	IUCN Conservation Status
Southern bottlenose	*Hyperoodon planifrons*	No	Yes	Year round	Rare	Least Concern
Layard's	*Mesoplodon layardii*	No	Yes	Year round	Rare	Data Deficient
True's	*M. mirus*	No	Yes	Year round	Rare	Data Deficient
Gray's	*M. grayi*	No	Yes	Year round	Rare	Data Deficient
Blainville's	*M. densirostris*	No	Yes	Year round	Rare	Data Deficient
Baleen whales (10.5 spp)						
Antarctic Minke	*Balaenoptera bonaerensis*	Yes	Yes	>Winter	Monthly	Least Concern
Dwarf minke	*B. acutorostrata*	Yes	Yes	Year round	Occasional	Least Concern
Fin whale	*B. physalus*	Yes	Yes	MJJ & ON, rarely in summer	Monthly	Endangered
Blue whale (Antarctic)	*B. musculus intermedia*	No	Yes	?	Monthly	Critically Endangered
Sei whale	*B. borealis*	Yes	Yes	MJ & ASO	Monthly	Endangered
Bryde's (offshore)	*B. brydei*	Yes	Yes	Summer (JF)	Weekly	Data Deficient
Bryde's (inshore)	*B brydei (subspp)*	Yes	Yes	Year round	Rare	Vulnerable
Pygmy right	*Caperea marginata*	Yes	?	Year round	Very Rare	Least Concern
Humpback sp.	*Megaptera novaeangliae*	Yes	Yes	Year round, higher in SONDJF	Daily	Least Concern
Humpback B2 population	*Megaptera novaeangliae*	Yes	Yes	Spring Summer peak ONDJF	Daily	Vulnerable
Southern right	*Eubalaena australis*	Yes	No	Year round, higher in SONDJF	Daily*	Least Concern

TABLE 4-5: SEASONALITY OF BALEEN WHALES IN THE IMPACT ZONE BASED ON DATA FROM MULTIPLE SOURCES, PREDOMINANTLY COMMERCIAL CATCHES (BEST 2007 AND OTHER SOURCES) AND DATA FROM STRANDING EVENTS (NDP UNPUBL DATA).

	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

Values of High (H), Medium (M) and Low (L) of the particular species within each month are relative within each row (species) and not comparable between species. For abundance / likely encounter rate within the broader region (see Table 4-4).

A review of the distribution and seasonality of the key cetacean species likely to be found within the project area is provided below.

(a) Mysticete (Baleen) whales

The majority of mysticetes whales fall into the family Balaenopeteridae. Those occurring in the area include the blue, fin, sei, Antarctic minke, dwarf minke, humpback and Bryde's whales. The southern right whale (Family Balaenidae) and pygmy right whale (Family Neobalaenidae) are from taxonomically separate groups. The majority of mysticete species occur in pelagic waters with only occasional visits to shelf waters. All of these species show some degree of migration either to or through the latitudes encompassed by the broader project area 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 may be either unimodal, usually in winter months, or bimodal (e.g. May to July and October to 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. Because of the complexities of the migration patterns, each species is discussed separately below.

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 on the west coast is thus opposite to the majority of the balaenopterids with abundance likely to be highest in the broader Project area in January - March. The "inshore population" of Bryde's, which lives on the continental shelf and Agulhas Bank, is unique amongst baleen whales in the region by being non-migratory. It may move further north into the Benguela current areas of the west of coast of South Africa and Namibia, especially in the winter months (Best 2007).

Sei whales migrate through South African waters, where they were historically hunted in relatively high numbers, to unknown breeding grounds further north. Their migration pattern thus shows a bimodal peak with numbers west of Cape Columbine highest in May and June, and again in August, September and October. All whales were caught in waters deeper than 200 m with most deeper than 1 000 m (Best & Lockyer 2002). Almost all information is based on whaling records 1958-1963 and there is no current information on abundance or distribution patterns in the region. Sei whales are unlikely to be sighted in the Sea Concession areas due to their distribution further offshore.

Fin whales were historically caught off the West Coast, with a bimodal peak in the catch data suggesting animals were migrating further north during May-June to breed, before returning during August-October *en route* to Antarctic feeding grounds. Some juvenile animals may feed year round in deeper waters off the shelf (Best 2007). There are no recent data on the abundance or distribution of fin whales off the west coast, although a sighting in St Helena Bay in 2011 (Mammal Research Institute, unpubl. data) and several sightings in southern Namibia in 2014 and 2015 as well as a number of strandings and acoustic detections (Thomisch *et al.* 2017) in Namibia, confirm their contemporary occurrence in the region.

Antarctic and pygmy blue whales were historically caught in high numbers during commercial whaling activities, with a single peak in catch rates during July in Walvis Bay, Namibia and Namibe, Angola suggesting that in the

eastern South Atlantic these latitudes are close to the northern migration limit for the species (Best 2007). The two sub-species are difficult to differentiate at sea, so are considered as one species here. Evidence of blue whale presence in the South-East Atlantic is rapidly increasing. Recent acoustic detections of blue whales in the Antarctic peak between December and January (Thomisch *et al.* 2016) and in northern Namibia between May and July (Thomisch 2017) supporting observed timing from whaling records. Several recent (2014-2015) sightings of blue whales have occurred during seismic surveys off the southern part of Namibia in water >1 000 m deep confirming their current existence in the area and occurrence in Autumn months. Encounters in the Sea Concession areas are unlikely.

Two forms of minke whale occur in the southern Hemisphere, the Antarctic minke whale (*Balaenoptera bonaerensis*) and the dwarf minke whale (*B. acutorostrata* subsp.); both species occur in the Benguela (Best 2007). 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 migrate from the Southern Ocean (summer) to tropical/temperate waters (winter) to breed, some animals, especially juveniles, are known to stay in tropical/temperate waters year round. 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 minkes have a similar migration pattern to Antarctic minkes with at least some animals migrating to the Southern Ocean during summer. Dwarf minke whales occur closer to shore than Antarctic minkes. Both species are generally solitary and densities are likely to be low in the project area.

The Pygmy right whale (*Caperea marginata*) is the smallest of the baleen whales reaching only 6 m total length as an adult (Best 2007). The species is typically associated with cool temperate waters between 30°S and 55°S and records in Namibia are the northern most for the species with no confirmed records north of Walvis Bay. Its preference for cooler waters, suggests that it is likely to be restricted to the continental shelf areas within the Benguela system, and may occur in the deeper portions of the Sea Concession areas.

The most abundant baleen whales in the Benguela are Southern Right whales and Humpback whales. In the last decade, both species have been increasingly observed to remain on the west coast of South Africa well after the 'traditional' South African whale season (June – November) into spring and early summer (October – February) where they have been observed feeding in upwelling zones, especially off Saldanha and St Helena Bay (Barendse *et al.* 2011; Mate *et al.* 2011).

Humpback whales (*Megaptera novaeangliae*) are likely to be the most abundant whale occurring in the subregion (although good comparative data for most other species is lacking). The majority of humpback whales passing through the eastern South Atlantic are migrating to breeding grounds off tropical west Africa, between Angola and the Gulf of Guinea (Rosenbaum *et al*. 2009; Barendse *et al*. 2010). Those breeding in this area are defined as Breeding Stock B1 (BSB1) by the International Whaling Commission (IWC) and were estimated at 9 000 individuals in 2005 (IWC 2012). Animals feeding in the southern Benguela are defined as population BSB2 by the IWC and are genetically distinct from BSB1, although there are resightings of individuals between the areas and it remains unclear exactly how animals in BSB1 and BSB2 relate to each other. BSB2 was estimated as only 500 individuals in 2001-2002 (Barendse *et al*. 2011) and both populations have increased since this time at least 5 % per annum (IWC 2012). Humpback whales in the South-East Atlantic migrate north during early winter (June), meet and then follow the coast at varying places, so there is no clear migration 'corridor' on the west coast of South Africa.

On the southward migration, returning from tropical West Africa, many humpbacks follow the Walvis Ridge offshore after leaving Angola then head directly to high latitude feeding grounds, while others follow a more coastal route (including the majority of mother-calf pairs), lingering in the feeding grounds off west South Africa in summer (Elwen *et al.* 2014; Rosenbaum *et al.* in 2014, Findlay *et al*. 2017). The number of humpback whales feeding in the southern Benguela has increased substantially since estimates made in the early 2000's (Barendse et al. 2011). Since 2011, 'supergroups' of up to 200 individual whales have been observed feeding within 10 km from shore (Findlay *et al.* 2017) with many hundred more passing through and whales are now seen in all months of the year around Cape Town. In the first half of 2017 (when numbers are expected to be at their lowest) more than 10 humpback whales were reported stranded along the Namibian and west South African coasts. The cause of these deaths is not known, but a similar event off Brazil in 2010 was linked to possible infectious disease or malnutrition (Siciliano *et al*. 2013), which suggests the West African population may be undergoing similar stresses and caution should be taken in increasing stress through human activities. Humpback whales are thus likely to be the most frequently encountered baleen whale in the offshore portions of the Sea Concession areas with year-round presence but numbers peaking in July for the northwards migration and October to February during the southward migration and when animals from the BSB2 population are feeding in the Benguela Ecosystem. In December 2019, large super-groups of Humpback whales, with an estimated total number of up to 2 000 individuals, were recorded gathering off Dassen Island, some 45 kilometres south of Saldanha Bay (Caboz, 2019).

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 6.5% per annum (Brandaõ *et al.* 2018). Although the population is likely to have continued growing at this rate overall, there have been observations of major changes in the numbers of different classes of right whales seen; notably there has been a significant decrease in the number of adults without calves seen in near-shore waters since 2009 (Roux *et al*. 2015; Vinding *et al*. 2015). A large resurgence in numbers of right whales along the SA coast in 2018 and analysis of calving intervals suggests that these 'missing whales' are largely a result of many animals shifting from a 3 year to 4 year calving intervals (Brandaõ *et al*. 2018).

The reasons for this are not yet clear but may be related to broadscale shifts in prey availability in the Southern Ocean, as there has been a large El Nino during some of this period. Importantly, many right whales also feed in summer months in the Southern Benguela, notably St Helena Bay (Mate *et al*. 2011). Several animals fitted with satellite tags which fed in St Helena Bay took an almost directly south-west path from there when leaving the coast. There are no current data available on the numbers of right whales feeding in the St Helena Bay area but mark-recapture data from 2003-2007 estimated roughly one third of the South African right whale population at that time were using St Helena Bay for feeding (Peters *et al*. 2005). Pelagic concentrations of right whales were recorded in historic whaling records, in a band between 30°S and 40°S between Cape Town and Tristan da Cunha (Best 2007), well offshore of the Sea Concession areas. These aggregations may be a result of animals feeding in this band, or those migrating south west from the Cape. Given this high proportion of the population known to feed in the southern Benguela, and the historical records, it is highly likely that large numbers of right whales may pass through the Sea Concession areas between November and January.

(b) Odontocetes (toothed) whales

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

All information about sperm whales in the southern African sub-region results from data collected during commercial whaling activities prior to 1985 (Best 2007). 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 1000 m depth, although they occasionally come onto the shelf in water 500 - 200 m deep (Best 2007). They are considered to be relatively abundant globally (Whitehead 2002), although no estimates are available for South African waters. Seasonality of catches 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 are thus likely to be encountered in relatively high numbers in deeper waters (> 500 m), beyond the 13C, 15C, 16C, 17C and 18C Sea Concessions, predominantly in the winter months (April - October). 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 monitoring equipment such as Passive Acoustic Monitoring (PAM).

There are almost no data available on the abundance, distribution or seasonality of the smaller odontocetes (including the beaked whales and dolphins) known to occur in oceanic waters (>200 m) off the shelf of the southern African West Coast. Beaked whales are all considered to be true deep water species usually being seen in waters in excess of 1000 - 2000 m deep (see various species accounts in Best 2007). Presence in the Sea Concession areas may fluctuate seasonally, but insufficient data exist to define this clearly.

The genus *Kogia* currently contains two recognised species, the pygmy (*K. breviceps*) and dwarf (*K. sima*) sperm whales, both of which most frequently occur in pelagic and shelf edge waters, although their seasonality is unknown. The majority of what is known about Kogiidae whales in the southern African subregion results from studies of stranded specimens (e.g. Ross 1979; Findlay *et al.* 1992; Plön 2004; Elwen *et al.* 2013). Dwarf sperm whales are associated with the warmer waters south and west of St Helena Bay. They are recorded from both the Benguela and Agulhas ecosystem (Best 2007) in waters deeper than 1 000 m, and are thus unlikely to occur in the Sea Concession areas.

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

The false killer whale has a tropical to temperate distribution and most sightings off southern Africa have occurred in water deeper than 1 000 m, but with a few recorded close to shore (Findlay *et al.* 1992). They usually occur in groups ranging in size from 1 - 100 animals (Best 2007). 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 pilot 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 (MMOs) and fisheries observers and researchers. The distinction between long-finned and short-finned pilot whales is difficult to make at sea. As the latter are regarded as more tropical species (Best 2007), it is likely that the vast majority of pilot whales encountered in the Sea Concession areas will be long-finned.

The common dolphin is known to occur offshore in West Coast waters (Findlay *et al.* 1992; Best 2007), although the extent to which they occur in the project area is unknown, but likely to be low. Group sizes of common dolphins can be large, averaging 267 (± SD 287) for the South Africa region (Findlay *et al.* 1992). They are more frequently seen in the warmer waters offshore and to the north of the country, seasonality is not known.

In water <500 m deep, dusky dolphins are likely to be the most frequently encountered small cetacean as they are very "boat friendly" and often approach vessels to bow ride. The species is resident year round throughout the Benguela ecosystem in waters from the coast to at least 500 m deep (Findlay *et al.* 1992). Although no information is available on the size of the population, they are regularly encountered in near shore waters between Cape Town and Lamberts Bay (Elwen *et al.* 2010a; NDP unpubl. data) with group sizes of up to 800 having been reported (Findlay *et al.* 1992). A hiatus in sightings (or low density area) is reported between approximately 27°S and 30°S, associated with the Lüderitz upwelling cell (Findlay *et al.* 1992).

Heaviside's dolphins are relatively abundant in the Benguela ecosystem region with 10 000 animals estimated to live in the 400 km of coast between Cape Town and Lamberts Bay (Elwen *et al.* 2009). 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 (Elwen *et al.* 2010b), but this varies throughout the species range. Heaviside's dolphins are resident year round and likely to be frequently encountered in the Sea Concession areas.

Several other species of dolphins that might occur in deeper waters at low levels include the pygmy killer whale, Risso's dolphin, rough toothed dolphin, pan tropical spotted dolphin and striped dolphin (Findlay *et al.* 1992; Best 2007). Nothing is known about the population size or density of these species in the project area but encounters are likely to be rare.

Beaked whales were never targeted commercially and their pelagic distribution makes them the most poorly studied group of cetaceans. With recorded dives of well over an hour and in excess of 2 km deep, beaked whales are amongst the most extreme divers of any air breathing animals (Tyack *et al.* 2011). They also appear to be particularly vulnerable to certain types of anthropogenic noise, although reasons are not yet fully understood. All the beaked whales that may be encountered in the project area are pelagic species that tend to occur in small groups usually less than five, although larger aggregations of some species are known (MacLeod& D'Amico 2006; Best 2007).

(c) Pinnepeds

The Cape fur seal (*Arctocephalus pusillus pusillus*) is the only species of seal resident along the west coast of Africa, occurring at numerous breeding and non-breeding sites on the mainland and on nearshore islands and

reefs. 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).

There are a number of Cape fur seal colonies within the broader area: at Strandfontein Point (south of Hondeklipbaai), Elephant Rocks, Paternoster Rocks and Jacobs Reef at Cape Columbine, Robbesteen near Koeberg, and Seal Island in False Bay. Non-breeding colonies occur south of Hondeklip Bay at Strandfontein Point, on Bird Island at Lambert's Bay, at Paternoster Point at Cape Columbine and Duikerklip in Hout Bay. Sea Concessions 13C, 15C, 16C, 17C and 18C are offshore and located to the north or south of all these colonies.

All have important conservation value since they are largely undisturbed at present. 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). Seals are highly mobile animals with a general foraging area covering the continental shelf up to 120 nautical miles offshore (Shaughnessy 1979), with bulls ranging further out to sea than females. They are therefore likely to be encountered during prospecting activities in the Sea Concession areas.

4.1.4 Human Utilisation

4.1.4.1 Fisheries and Other Harvesting

The South African fishing industry consists of approximately 14 commercial sectors operating within the 200 nautical mile Exclusive Economic Zone (EEZ)[3]. The western coastal shelf is a highly productive upwelling ecosystem (Benguela current) and supports a number of fisheries.

Primary fisheries in terms of economic value and overall tonnage of landings are the demersal (bottom) trawl and long-line fisheries targeting the cape hakes *Merluccius paradoxus* and M. *capensis*, and the pelagic purse-seine fishery targeting pilchard (*Sardinops sagax*), anchovy (*Engraulis encrasicolus*) and red-eye round herring (*Etrumeus whitheadii*). Secondary commercial species in the hake-directed fisheries include an assemblage of demersal (bottom-dwelling) fish of which monk fish (*Lophius vomerinus*) and snoek (*Thyrsites atun*) are the most important commercial species. Other fisheries active on the West Coast are the pelagic long-line fishery for tunas and swordfish and the tuna pole and traditional line-fish sectors. West Coast rock lobster (*Jasus lalandi*) is an important trap fishery exploited close to the shoreline (waters shallower than 100 m) including the intertidal zone and kelp beds off the West Coast.

On the West Coast of South Africa, major fishing grounds tend to be centred along the shelf break which is located approximately along the 500 m isobath. Historically and currently the bulk of the main commercial fish stocks caught on the northern West Coast of South Africa have been landed and processed at the Western Cape ports of Cape Town and Saldanha (less than 1% of the South African commercial allowable catch is landed in the Northern Cape Province). The main reasons for this include lack of local infrastructure, distance to market and

[3] The Exclusive Economic Zone is the zone extending from the coastline out to a distance of 200 nautical miles within which South Africa holds exclusive economic rights.

relatively low volumes of fish landings. The main commercial sectors operating in the vicinity of the study area are discussed below:

4.1.4.1.1 Small Pelagic Purse-Seine

The South African small pelagic purse seine fishery is the largest fishery by volume and the second most important in terms of value. The pelagic purse-seine fishery targets small mid-water and surface-shoaling species such as sardine, anchovy, juvenile horse mackerel and round herring using purse-seine fishing techniques. Annual landings have fluctuated between 300 000 and 600 000 tons over the last decade, with landings of 391 000 tons recorded per annum between 2008 and 2012.

Once a shoal has been located the vessel steams around it and encircles it with a large net. The depth of the net is usually between 60 m and 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 (see Figure 4-9). 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. After the net is deployed the vessel has no ability to manoeuvre until the net has been fully recovered on board, which may take up to 1.5 hours. Vessels usually operate overnight and return to offload their catch the following day.

The South African fishery, consisting of approximately 101 vessels, is active all year round with a short break from mid-December to mid-January (to reduce impact on juvenile sardine), with seasonal trends in the specific species targeted. The geographical distribution and intensity of the fishery is largely dependent on the seasonal fluctuation and geographical distribution of the targeted species. Fishing grounds occur primarily along the Western Cape and Eastern Cape coast up to a distance of 100 km offshore, but usually closer inshore. The sardine-directed fishery tends to concentrate effort in a broad area extending from St Helena Bay, southwards past Cape Town towards Cape Point and then eastwards along the coast to Mossel Bay and Port Elizabeth. The anchovy-directed fishery takes place predominantly on the South-West Coast from St Helena Bay to Cape Point and is most active in the period from March to September. Round herring (non-quota species) is targeted when available and specifically in the early part of the year (January to March) and is distributed South of Cape Point to St Helena Bay. The spatial extent of the fishing grounds in relation to the Sea Concession areas are shown in Figure 4-10.

4.1.4.1.2 Demersal Trawl

The hake-directed trawl fishery is the most valuable sector of the South African fishing industry and is split into two sub-sectors: the offshore ("deep-sea") sector which is active off both the South and West Coasts, and the much smaller inshore trawl sector which is active off the South Coast. A fleet of 45 trawlers operate within the offshore sector targeting the Cape hakes (*Merluccius capensis* and *M. paradoxus*). Main by-catch species include monkfish (*Lophius vomerinus*), kingklip (*Genypterus capensis*) and snoek (*Thyrsites atun*).

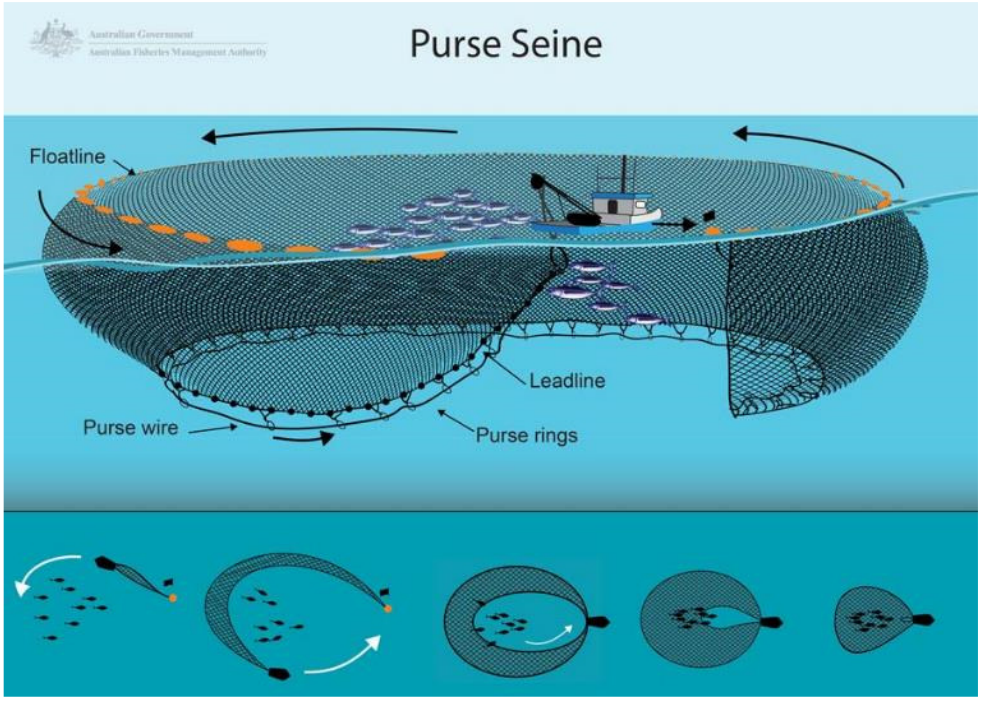

FIGURE 4-9: SCHEMATIC OF TYPICAL PURSE-SEINE GEAR DEPLOYED IN THE "SMALL" PELAGIC FISHERY. (SOURCE: HTTP:///WWW.AFMA.GOV.AU/PORTFOLIO-ITEM/PURSE-SEINE).

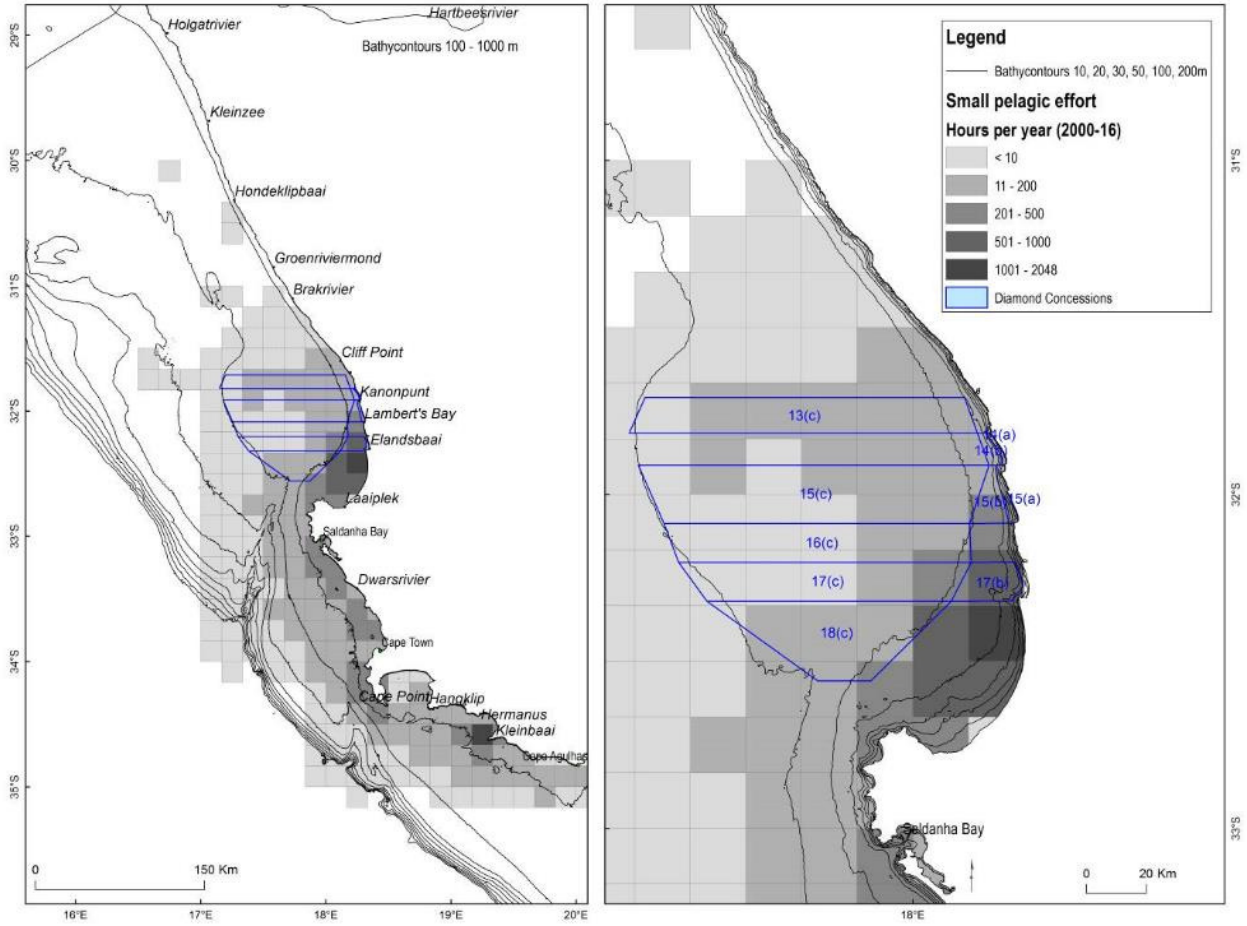

FIGURE 4-10: SEA CONCESSION AREAS 13C, 15C, 16C, 17C AND 18C IN RELATION TO THE SPATIAL DISTRIBUTION OF EFFORT REPORTED BY THE SOUTH AFRICAN SMALL PELAGIC PURSE-SEINE FISHERY (2000 – 2016).

Trawls are usually conducted along specific trawling lanes on "trawl friendly" substrate (flat, soft ground). On the West Coast, these grounds extend in a continuous band along the shelf edge between the 300 m and 1 000 m bathymetric contours. Monk-directed trawlers tend to fish shallower waters than hake-directed vessels on mostly muddy substrates. Trawl nets are generally towed along depth contours (thereby maintaining a relatively constant depth) running parallel to the depth contours in a north-westerly or south-easterly direction. Trawlers also target fish aggregations around bathymetric features, in particular seamounts and canyons (i.e. Cape Columbine and Cape Canyon), where there is an increase in seafloor slope and in these cases the direction of trawls follow the depth contours. Trawlers are prohibited from operating within five nautical miles of the coastline.

The offshore fleet is segregated into wetfish and freezer vessels which differ in terms of the capacity for the processing of fish at sea and in terms of vessel size and capacity. While freezer vessels may work in an area for up to a month at a time, wetfish vessels may only remain in an area for about a week before returning to port. Wetfish vessels range between 24 m and 56 m in length while freezer vessels are usually larger, ranging up to 80 m in length. The gear configurations are similar for both freezer and wet fish vessels. Trawl gear is deployed astern of the vessel.

The towed gear typically consists of trawl warps, bridles and trawl doors, a footrope, headrope, net and codend (see Figure 4-11). The monk-directed trawlers use slightly heavier trawl gear, trawl at slower speeds and for longer periods (up to eight hours) compared to the hake-directed trawlers (60 minutes to four hours). Monk gear includes the use of "tickler" chains positioned ahead of the footrope to chase the monk off the substrate and into the net.

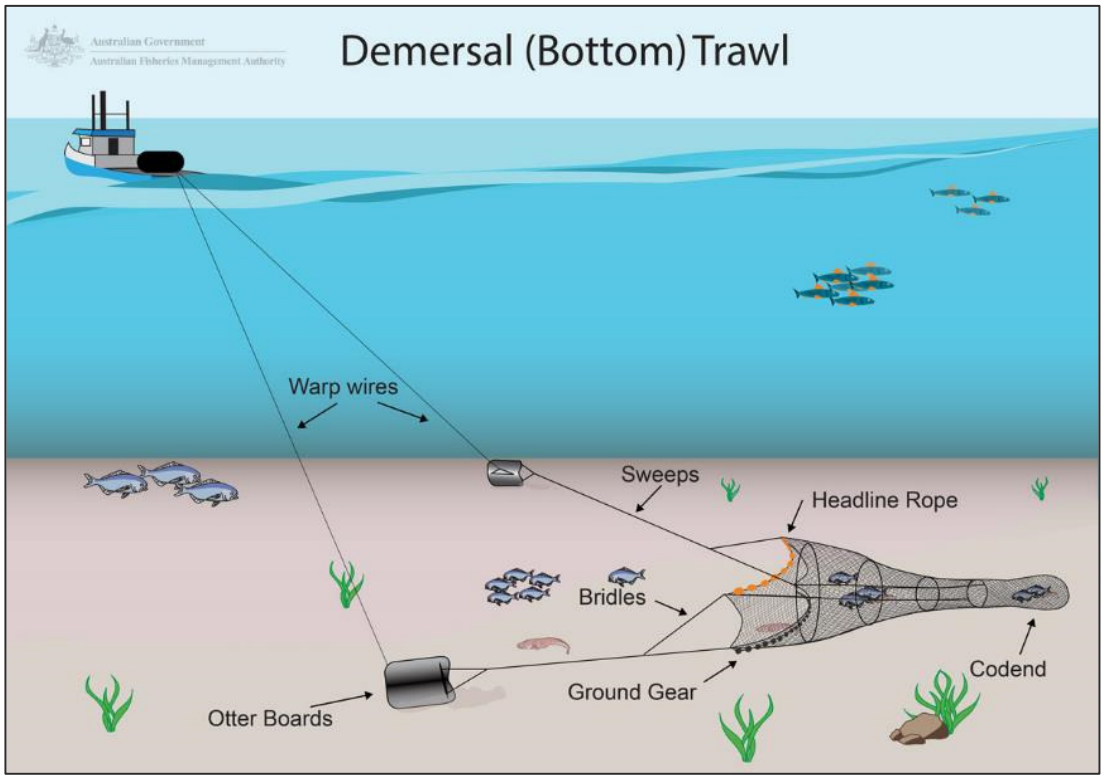

FIGURE 4-11: TYPICAL GEAR CONFIGURATION USED BY DEMERSAL TRAWLERS (OFFSHORE) TARGETING HAKE (SOURCE: HTTP:///WWW.AFMA.GOV.AU/FISHERIES-MANAGEMENT/METHODS-AND-GEAR/TRAWLING).

The demersal trawl effort and catch between 2008 and 2016 in relation to the area of interest is shown in Figure 4-12. The South African Deepsea Trawling Industry Association (SADSTIA) has implemented a self-imposed restriction which confines fishing effort to a designated area ("the historical footprint of the fishery"). This spatial restriction is also written into the permit conditions for the fishery. There is no direct overlap between trawling grounds and the Sea Concession areas, which are situated inshore of the trawling grounds. The Sea Concession areas do, however, coincide with spawning and recruitment areas for hake and other demersal species.

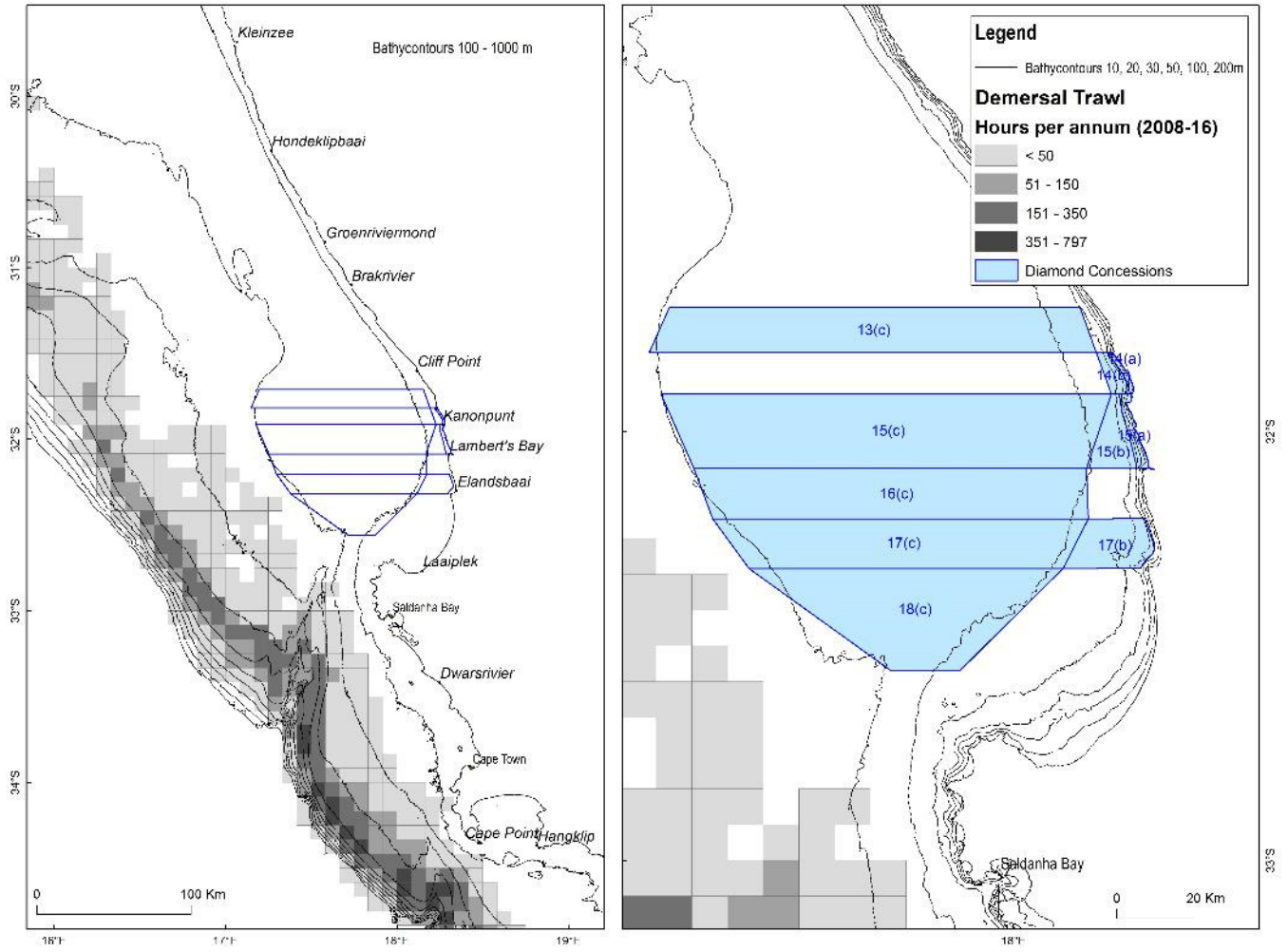

FIGURE 4-12: SEA CONCESSION AREAS 13C, 15C, 16C, 17C AND 18C IN RELATION TO THE SPATIAL DISTRIBUTION OF TRAWLING EFFORT EXPENDED BY THE DEMERSAL TRAWL SECTOR (2008 TO 2016).

4.1.4.1.3 Demersal Long-Line

The demersal long-line fishing technique is used to target bottom-dwelling species of fish. Like the demersal trawl fishery, the target species of the longline fishery is the Cape hakes, with a small amount of non-targeted commercial by-catch.

A demersal long-line vessel may deploy either a double or single line which is weighted along its length to keep it close to the seafloor (see Figure 4-13). Steel anchors, of 40 kg to 60 kg, are placed at the ends of each line to anchor it, and 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. Lines are typically between 10 km and 20 km in length, carrying between 6

900 and 15 600 hooks each. Baited hooks are attached to the bottom line at regular intervals (1 to 1.5 m) by means of a snood. Gear is usually set at night at a speed of between five and nine knots. Once deployed the line is left to soak for up to eight hours before it is retrieved. A line hauler is used to retrieve gear (at a speed of approximately one knot) and can take six to ten hours to complete. During hauling operations a demersal long-line vessel would be severely restricted in manoeuvrability. Currently 64 hake-directed vessels are active within the fishery, most of which operate from the harbours of Cape Town and Hout Bay.

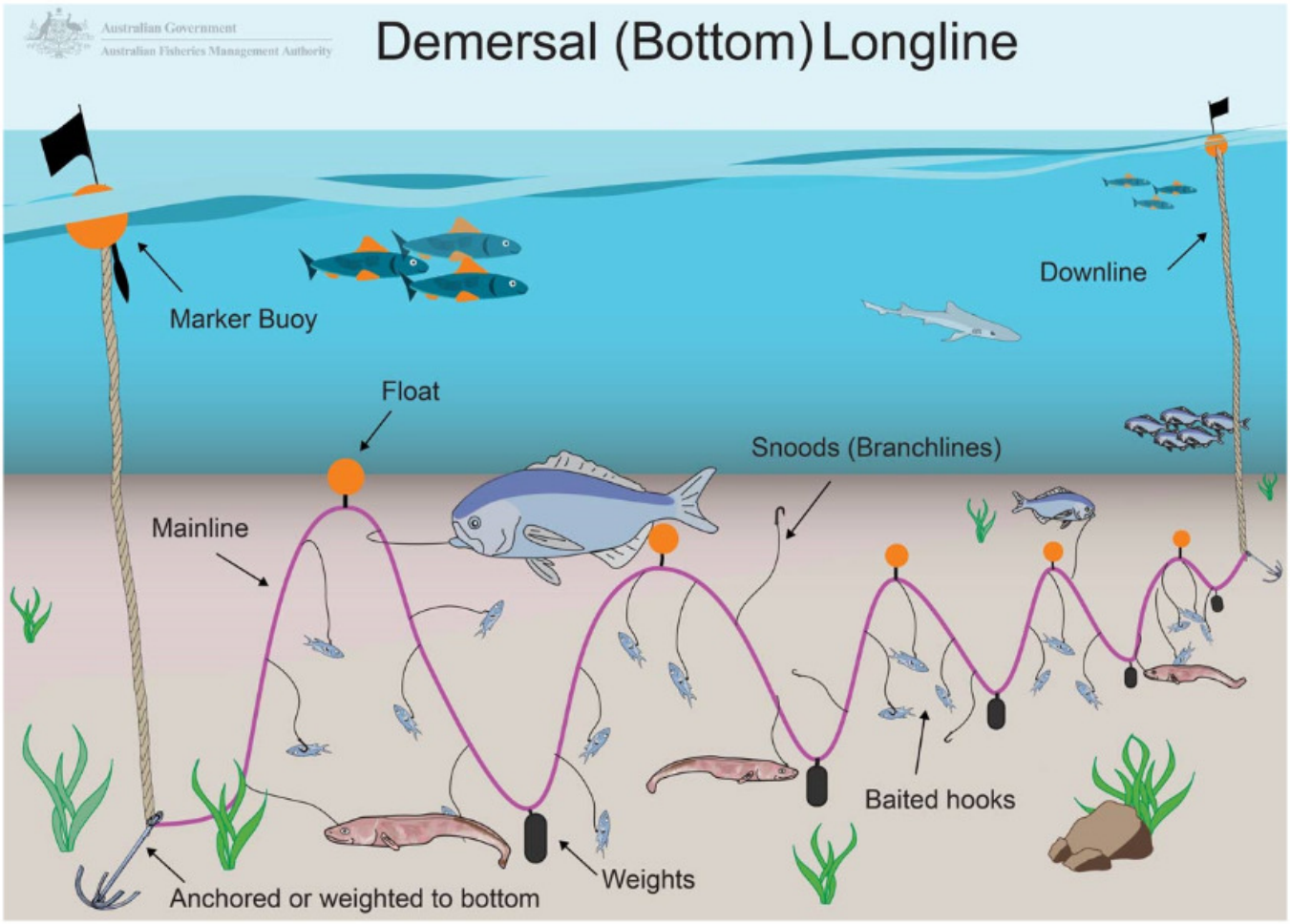

FIGURE 4-13: TYPICAL CONFIGURATION OF DEMERSAL (BOTTOM-SET) HAKE LONG-LINE GEAR USED IN SOUTH AFRICAN WATERS.

The target fishing grounds are similar to those targeted by the hake-directed trawl fleet. Off the West Coast, vessels target fish along the shelf break from Port Nolloth (15°E, 29°S) to the Agulhas Bank (21°E, 37°S) (see Figure 4-14). Off the West Coast (westward of 20°E) the fishery is prohibited from operating within five nautical miles of the coastline and effort is concentrated at about 300 m depth on areas of rough ground. The Sea Concession areas overlap with lower intensity fishing in the east of the fishing grounds. As noted above, the Sea Concession area overlaps spawning and recruitment areas for hake and other demersal species.

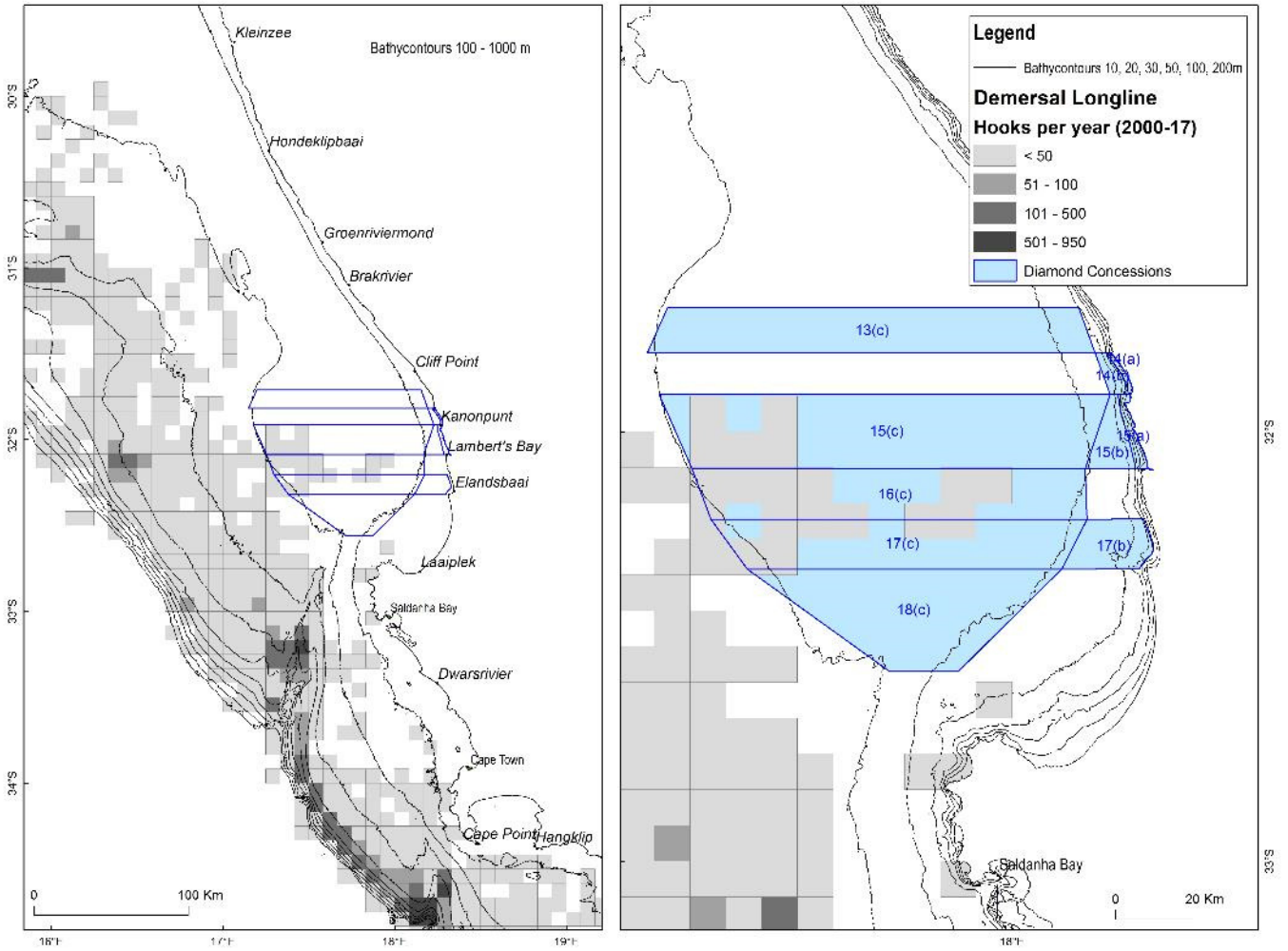

FIGURE 4-14: SEA CONCESSION AREAS 13C, 15C, 16C, 17C AND 18C IN RELATION TO THE SPATIAL DISTRIBUTION OF EFFORT EXPENDED BY THE DEMERSAL LONGLINE SECTOR (2008 TO 2016).

4.1.4.1.4 Large Pelagic Long-Line

The large pelagic long-line fishery operates year-round, extensively within the South African EEZ targeting primarily tuna and swordfish. Due to the highly migratory nature of these species, stocks straddle the EEZ of a number of countries and international waters. As such they are managed as a "shared resource" amongst various countries. There are currently 30 commercial large pelagic fishing rights issued for South African waters and there are 21 vessels active in the fishery.

Pelagic long-line vessels set a drifting mainline, which can be up to 100 km in length. The mainline is kept near the surface or at a certain depth (20 m below) by means of buoys connected via "buoy-lines", which are spaced approximately 500 m apart along the length of the mainline (see Figure 4-15). Hooks are attached to the mainline via 20 m long trace lines, which are clipped to the mainline at intervals of approximately 50 m. There can be up to 3 500 hooks per line. A single main line consists of twisted rope (6 to 8 mm diameter) or a thick nylon monofilament (5 to 7.5 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.

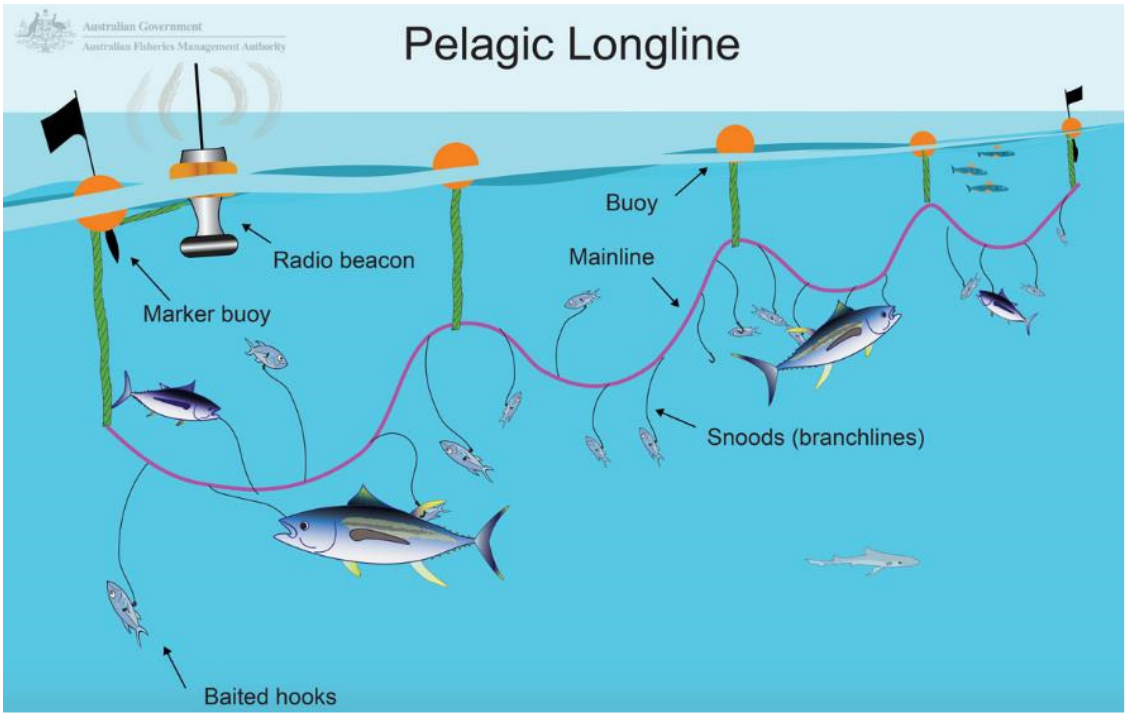

FIGURE 4-15: TYPICAL PELAGIC LONG-LINE CONFIGURATION TARGETING TUNA, SWORDFISH AND SHARK SPECIES (SOURCE: HTTP:///WWW.AFMA.GOV.AU/FISHERIES-MANAGEMENT/METHODS-AND-GEAR/LONGLINING).

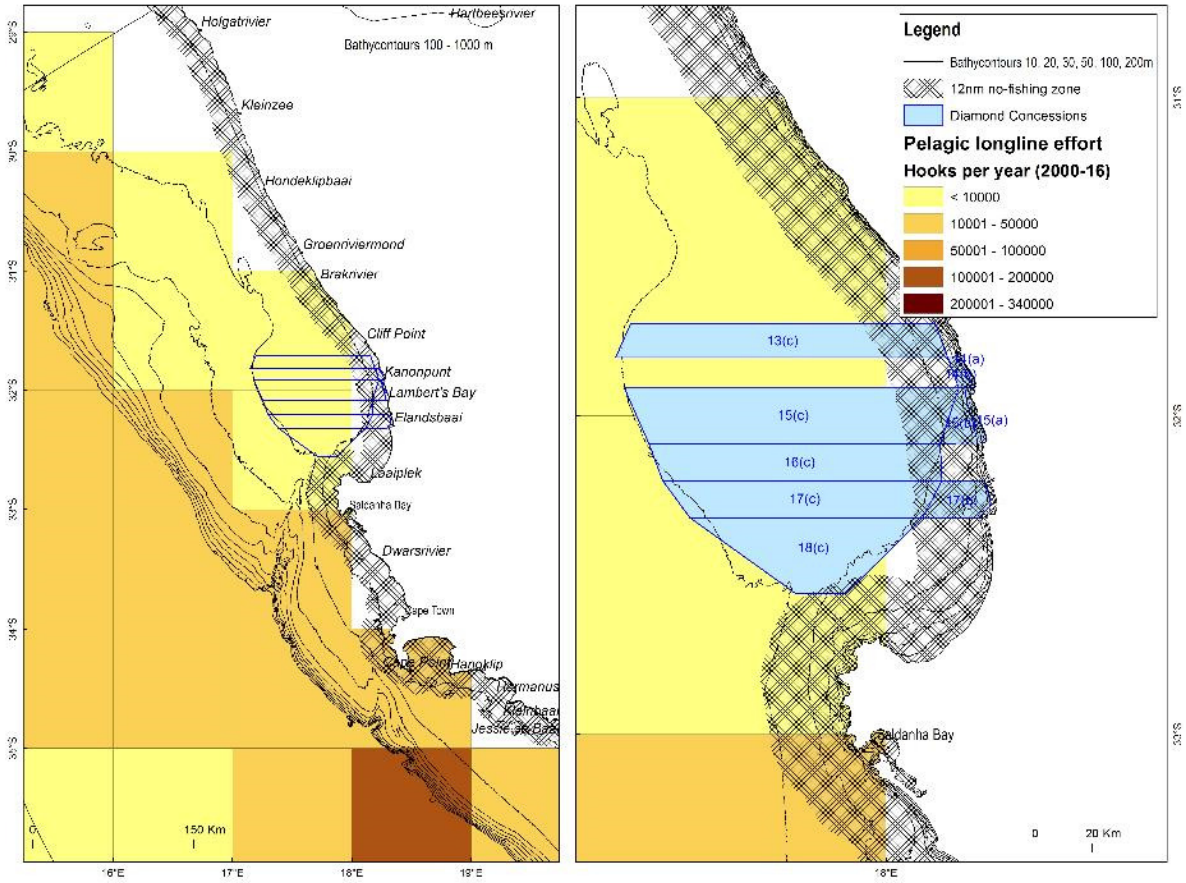

FIGURE 4-16: SEA CONCESSION AREAS 13C, 15C, 16C, 17C AND 18C IN RELATION TO THE SPATIAL DISTRIBUTION OF EFFORT EXPENDED BY PELAGIC LONG-LINE FISHERY (2000 – 2016).

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. As depicted in Figure 4-16 the Sea Concession areas overlap with lower intensity fishing grounds of the pelagic long-line fishery.

4.1.4.1.5 Tuna Pole

The tuna pole fishery is based on migratory species of tuna, predominantly Atlantic longfin tuna stock and a very small amount of skipjack tuna, yellowfin tuna and bigeye tuna. The South African fleet consists of approximately 128 pole-and-line vessels, which are based at the ports of Cape Town, Hout Bay and Saldanha Bay. The fishery is seasonal with vessel activity mostly between December and May and peak catches in February and March.

Vessels drift whilst attracting and catching shoals of pelagic tunas. Sonars and echo sounders are used to locate schools of tuna. Once a school is located, water is sprayed outwards from high-pressure nozzles to simulate small baitfish aggregating near the water surface. Live bait is then used 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 to 3 m poles are fitted with a short length of fishing line leading to a hook. 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 4-17). Vessels are relatively small (less than 25 m in length) and store catch on ice, thus staying at sea for short periods (approximately five days).

The nature of the fishery and communication between vessels often results in a large number of vessels operating in close proximity to each other at a time. The vessels fish predominantly during daylight hours and are highly manoeuvrable. However, at night in fair weather conditions the fleet of vessels may drift or deploy drogues to remain within an area and would be less responsive during these periods.

Fishing activity occurs along the entire West Coast beyond the 200 m bathymetric contour. Activity would be expected to occur along the shelf break with favoured fishing grounds including areas north of Cape Columbine and between 60 km and 120 km offshore from Saldanha Bay. The tuna pole effort and catch between 2007 and 2016 in relation to the area of interest is shown in Figure 4-18. The Sea Concession areas overlap with lower intensity fishing activity located to the east of the main fishing grounds.

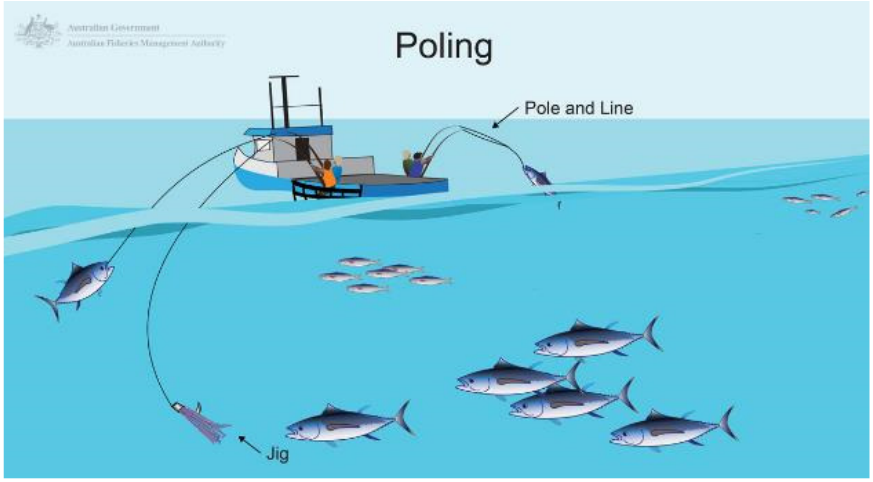

FIGURE 4-17: SCHEMATIC DIAGRAM OF POLE AND LINE OPERATION (SOURCE: HTTP:///WWW.AFMA.GOV.AU/PORTFOLIO-MANAGEMNT/MINOR-LINES).

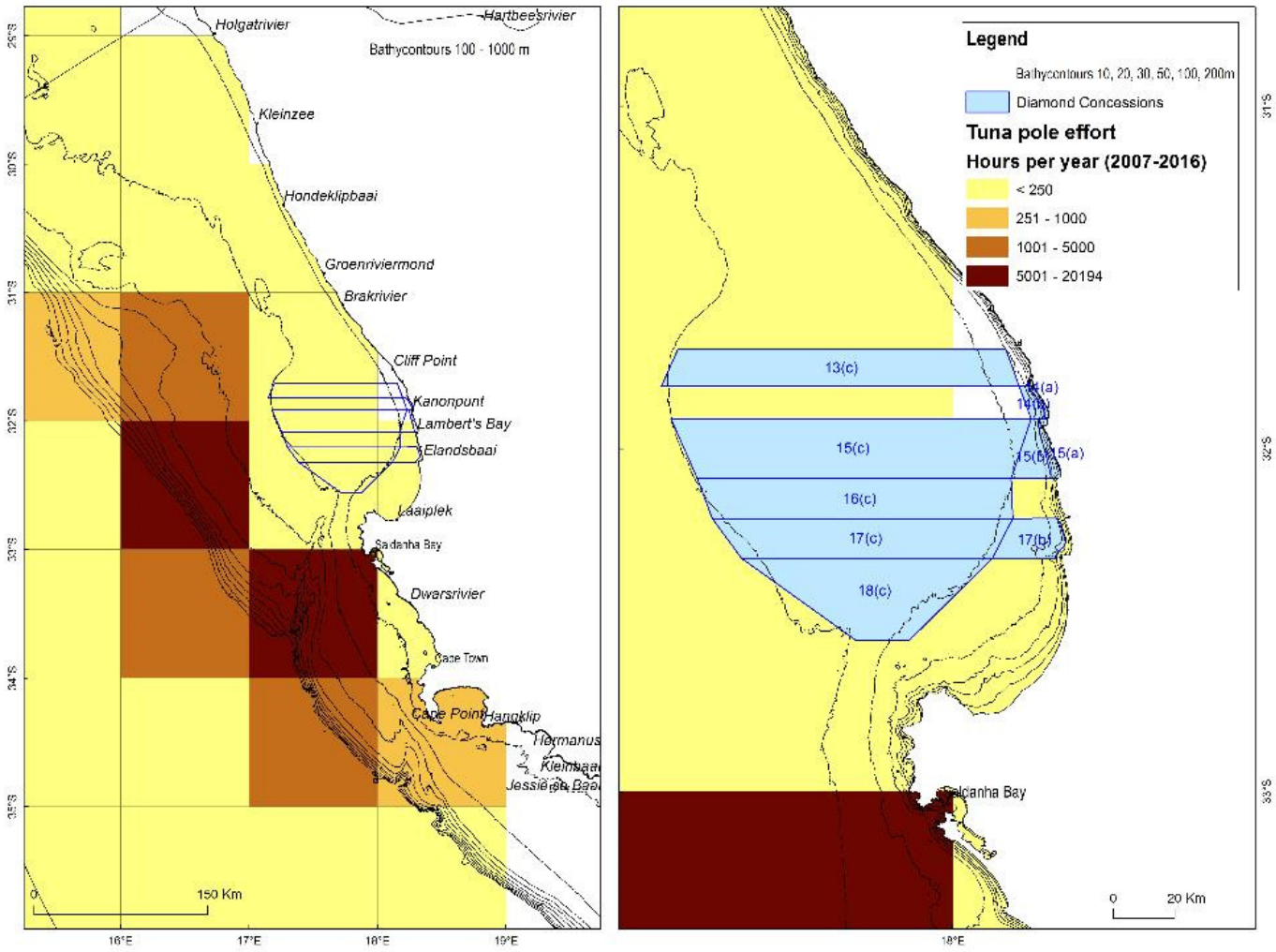

FIGURE 4-18: SEA CONCESSION AREAS 13C, 15C, 16C, 17C AND 18C IN RELATION TO THE SPATIAL DISTRIBUTION OF TUNA POLE CATCH (2007 TO 2016).

4.1.4.1.6 Traditional Line-Fish

The line-fishery is divided into the commercial and recreational sectors, with the subsistence sector now falling under the classification of small-scale fishing. The commercial (or traditional) line fishery is the country's third most important fishery in terms of total tons landed and economic value. The bulk of the fishery catch is made up of about 35 different species of reef fish as well as pelagic and demersal species which are mostly marketed locally as "fresh fish". In South Africa effort is managed geographically with the spatial effort of the fishery divided into three zones. The majority of the catch (up to 95%) is landed by the Cape commercial fishery, which operates on the continental shelf mostly up to a depth of 200 m from the Namibian border on the West Coast to the Kei River in the Eastern Cape.

The traditional line fishery is defined by the use of a simple hook-and-line fishing system (excluding the use of longlines and drumlines), with a limit of 10 hooks per line (DAFF 2017). There are 450 vessels operating in the fishery, making it the largest fishing fleet in South Africa. Vessels are monitored by Vessel Monitoring System (VMS) and permit conditions require that catch be reported for each fishing trip; however, logbook data are unverified and may underestimate total landings (da Silva et al., 2015).

The recreational line fishery includes shore- and boat-based fishing with the predominant use of rod and line. An estimated 500 000 participants are active in the recreational sector (Griffiths and Lamberth, 2002). Community-based fishing of line-fish species for subsistence purposes is now managed under South Africa's small-scale fishery policy which was implemented in 2016 (DAFF 2016). The reporting of fishing positions is not specific, but generally reported according to reference positions for different areas. It is assumed that fishing could take place within portions of the Sea Concession areas under consideration (see Figure 4-19).

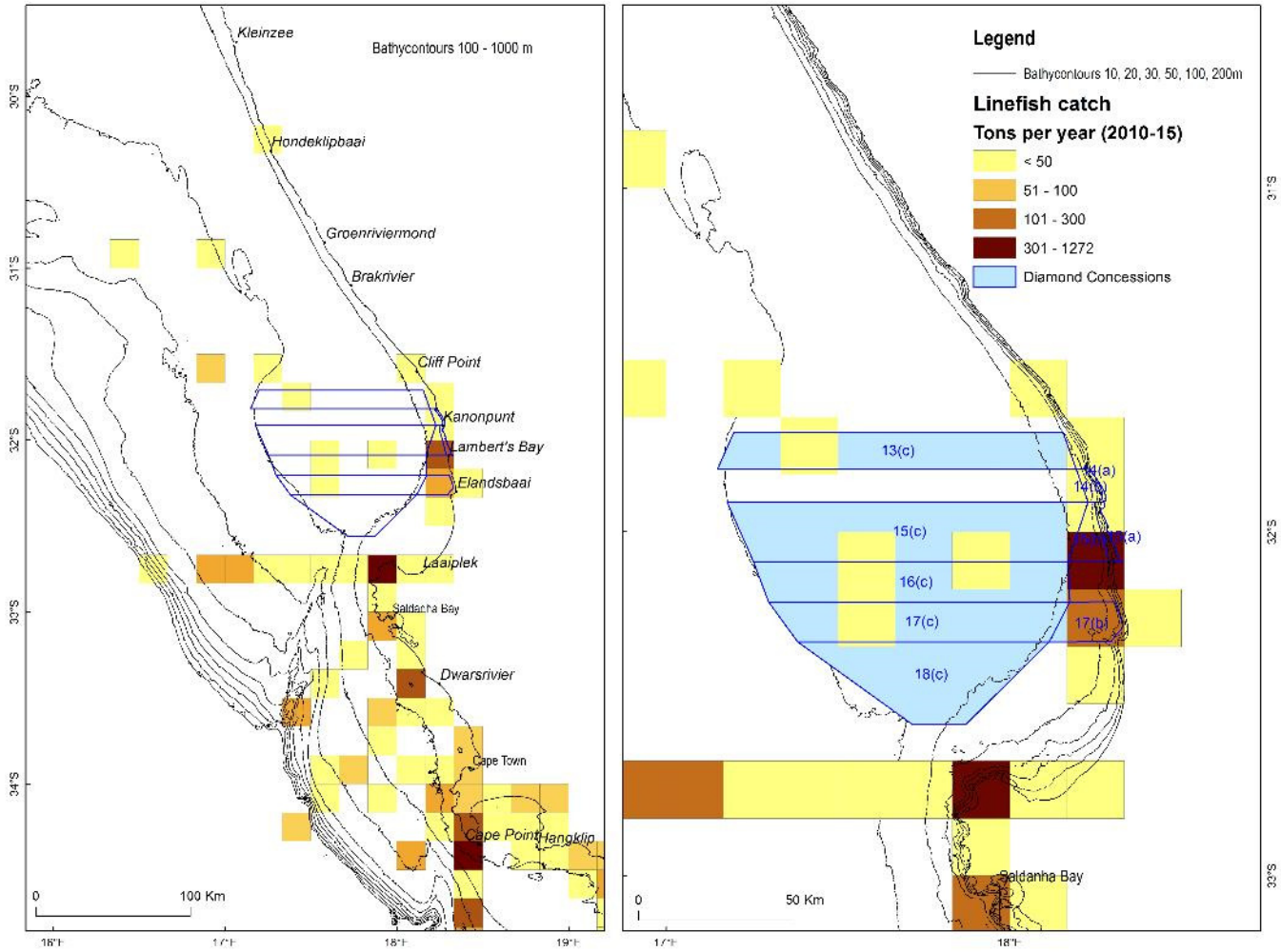

FIGURE 4-19: SEA CONCESSION AREAS 13C, 15C, 16C, 17C AND 18C IN RELATION TO SPATIAL DISTRIBUTION OF CATCH LANDED BY THE SOUTH AFRICAN TRADITIONAL LINE-FISH SECTOR (2000 – 2016).

4.1.4.1.7 West Coast Rock Lobster

The West Coast rock lobster occurs inside the 200 m depth contour along the West Coast from Namibia to East London on the East Coast of South Africa. In South Africa the fishery is divided into the offshore fishery and the near-shore fishery, both directed inshore of the 100 m bathymetric contour. The offshore sector operates in a water depth range of 30 m to 100 m whilst the inshore fishery is restricted by the type of gear used to waters shallower than 30 m in depth.

Fishing grounds are divided into Zones stretching from the Orange River mouth to east of Cape Hangklip in the South-Eastern Cape. Effort is seasonal with boats operating from the shore and coastal harbours. Catch is managed using a TAC set annually for different management areas. The fishery operates seasonally, with closed seasons applicable to different management zones. There is a small area of direct overlap with the proposed prospecting activities and the offshore sector (Figure 4-20).

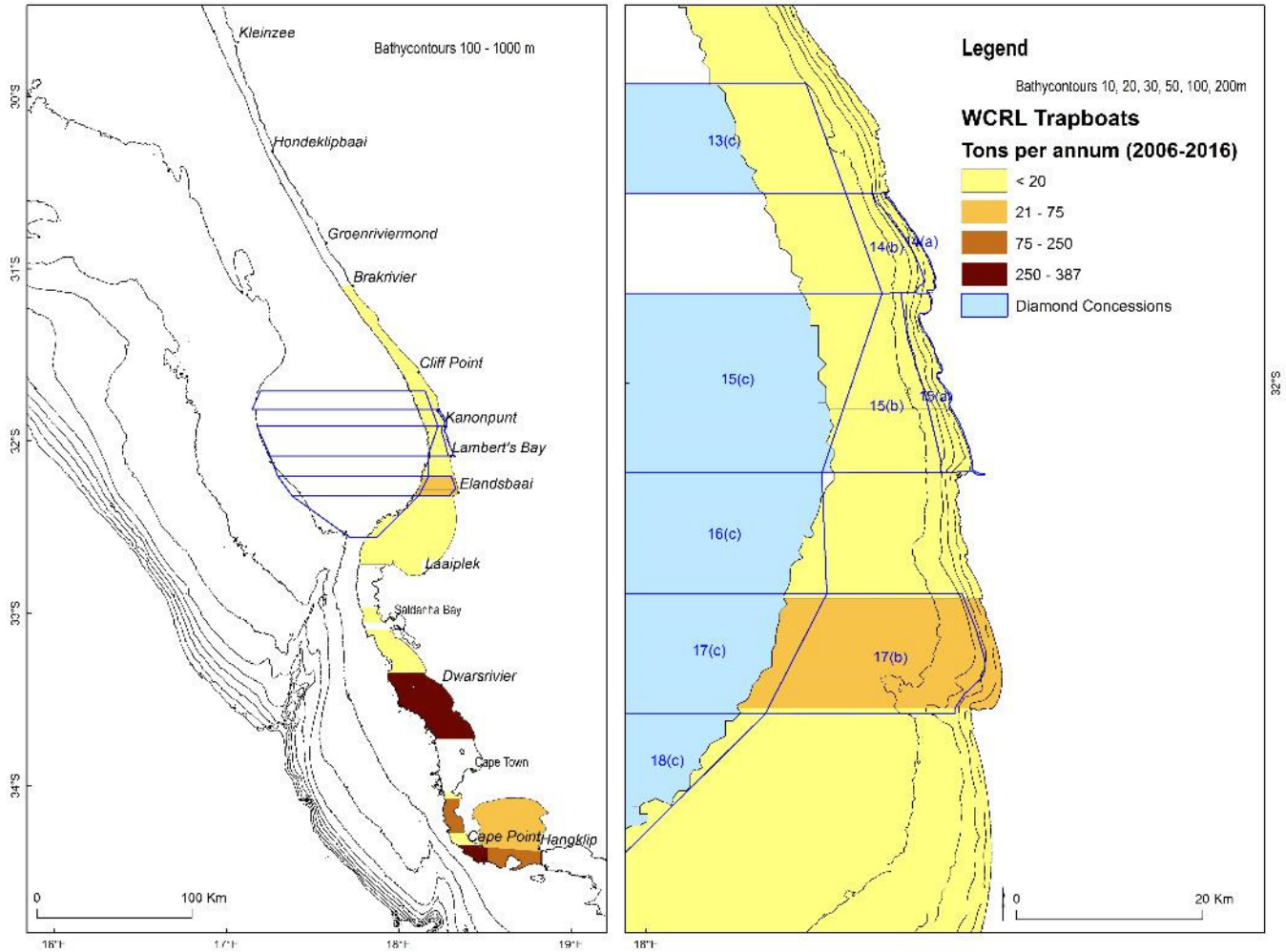

FIGURE 4-20: SEA CONCESSION AREAS 13C, 15C, 16C, 17C AND 18C IN RELATION TO THE AVERAGE CATCH PER SEASON (TONS WHOLE WEIGHT) BY THE OFFSHORE (TRAPBOATS) SECTOR OF THE WEST COAST ROCK LOBSTER FISHERY (2006 TO 2016).

4.1.4.1.8 Abalone Ranching

The Abalone (*Haliotus midae*), is endemic to South Africa with the natural population extending east from St Helena Bay in the Western Cape to Port St Johns on the east coast (Branch *et al*. 2010; Troell *et al* 2006). Seeding of abalone in designated areas (ranching) has led to the establishment of abalone outside this natural range, including sites along approximately 50 km of the Namaqualand coast in the Northern Cape. The potential to increase this seeded area to 175 km has been made possible through the issuing of "Abalone Ranching Rights" (Government Gazette No. 729 of 20 August 2010) in four concession zones between Alexander Bay and Hondeklipbaai (Diamond Coast Abalone 2016).

Kelp forests are a key habitat for abalone, as they provide a key food source for abalone as well as an ideal ecosystem for abalone's life cycle (Branch *et al.,* 2010). Light is a limiting factor for kelp beds, which are therefore limited to depths of 10 m on the Namaqualand coast (Anchor Environmental, 2012). In the wild, abalone may take 30 years to reach full size of 200 mm, but farmed abalone attain 100 mm in only 5 years, which is the maximum harvest size (Sales & Britz, 2001).

Abalone ranching was pioneered by Port Nolloth Sea Farms who were experimentally seeding kelp beds in Port Nolloth by 2000. Abalone ranching expanded in the area in 2013 when DEFF (then, the Department of Agriculture, Forestry and Fisheries - DAFF) issued rights for each of four Concession Area Zones. Two hatcheries exist in Port Nolloth producing up to 250 000 spat. To date, there has been no seeding in Zones 1 or 2. However, seeding has taken place in Zones 3 and 4, both of which are situated to the north of the Sea Concession areas. Abalone catch is shown in Figure 4-21.

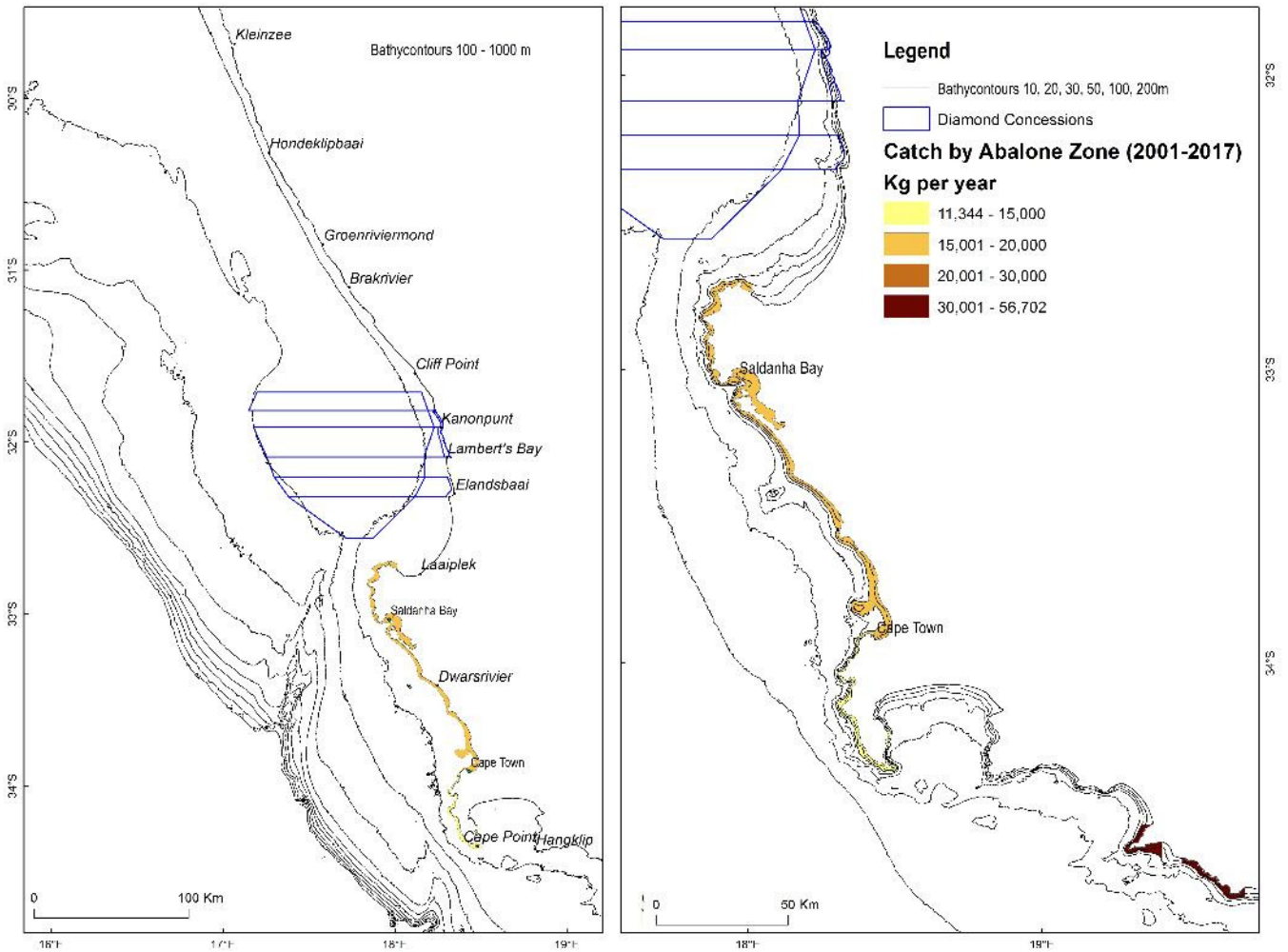

FIGURE 4-21: LOCATION OF SEA CONCESSION AREAS 13C, 15C, 16C, 17C AND 18C IN RELATION TO ABALONE CATCH EFFORT.

4.1.4.1.9 Beach-Seine and Gillnet Fisheries

There are a number of active beach-seine and gillnet operators throughout South Africa (collectively referred to as the "netfish" sector). Initial estimates indicate that there are at least 7 000 fishermen active in fisheries using beach-seine and gillnets, mostly (86%) along the West and South coasts. These fishermen utilise 1 373 registered

nets and report an average catch of about 1 600 tons annually, constituting 60% harders (also known as mullet, *Liza richardsonii*), 10% St Joseph shark (*Callorhinchus capensis*) and 30% "bycatch" species such as galjoen (*Dichistius capensis*), yellowtail (*Seriola lalandii*) and white steenbras (*Lithognathus lithognathus*).

The fishery is managed on a Total Allowable Effort (TAE) basis with a fixed number of operators in each of 15 defined areas. The number of Rights Holders for 2014 was listed as 28 for beach-seine and 162 for gill-net (DAFF, 2014a). Permits are issued solely for the capture of harders, St Joseph and species that appear on the 'bait list'. The exception is False Bay, where Right Holders are allowed to target line-fish species that they traditionally exploited.

The beach-seine fishery operates primarily on the West Coast of South Africa between False Bay and Port Nolloth (Lamberth 2006) with a few permit holders in KwaZulu-Natal targeting mixed shoaling fish during the annual winter migration of sardine (Fréon et al. 2010). Beach-seining is an active form of fishing in which woven nylon nets are rowed out into the surf zone to encircle a shoal of fish. They are then hauled shorewards by a crew of 6–30 persons, depending on the size of the net and length of the haul. Nets range in length from 120 m to 275 m. Fishing effort is coastal and net depth may not exceed 10 m (DAFF 2014b).

The gillnet fishery operates from Yzerfontein to Port Nolloth on the West Coast. Surface-set gillnets (targeting mullet) are restricted in size to 75 m x 5 m and bottom-set gillnets (targeting St Joseph shark) are restricted to 75 m x 2.5 m (da Silva et al. 2015) and are set in waters shallower than 50 m. The spatial distribution of effort is represented as the annual number of nets per kilometre of coastline and ranges up to a maximum of 15 off St Helena Bay. Of a total of 162 right holders, two operate within Area B (Hondeklipbaai).

Due to the limited offshore range of beach-seine activities (20 m) and gillnet fishing, there would be no overlap with the Sea Concession areas (Figure 4-22 and Figure 4-23).

4.1.4.1.10 Fisheries Research

Surveys of demersal fish resources are carried out in January (West Coast survey encompassing the area between the Namibian border and Cape Agulhas) and April/May (South Coast survey encompassing the area between Cape Agulhas and Port Alfred) each year by DAFF in order to set the annual TACs for demersal fisheries. Stratified, bottom trawls are conducted to assess the biomass, abundance and distribution of hake, horse mackerel, squid and other demersal trawl species on the shelf and upper slope of the South African coast. The gear configuration is similar to that of commercial demersal trawlers; however, nets are towed for a shorter duration of generally 30 minutes per tow. Trawl positions are randomly selected to cover specific depth strata that range from the coast to the 1 000 m bathymetric contour. Approximately 120 trawls are conducted during each survey over a period of approximately one month.

The biomass of small pelagic species is also assessed bi-annually by an acoustic survey. During these surveys the survey vessel travels pre-determined transects (perpendicular to bathymetric contours) running offshore from the coastline to approximately the 200 m bathymetric contour. The survey is designed to cover an extensive area from the Orange River on the West Coast to Port Alfred on the East Coast.

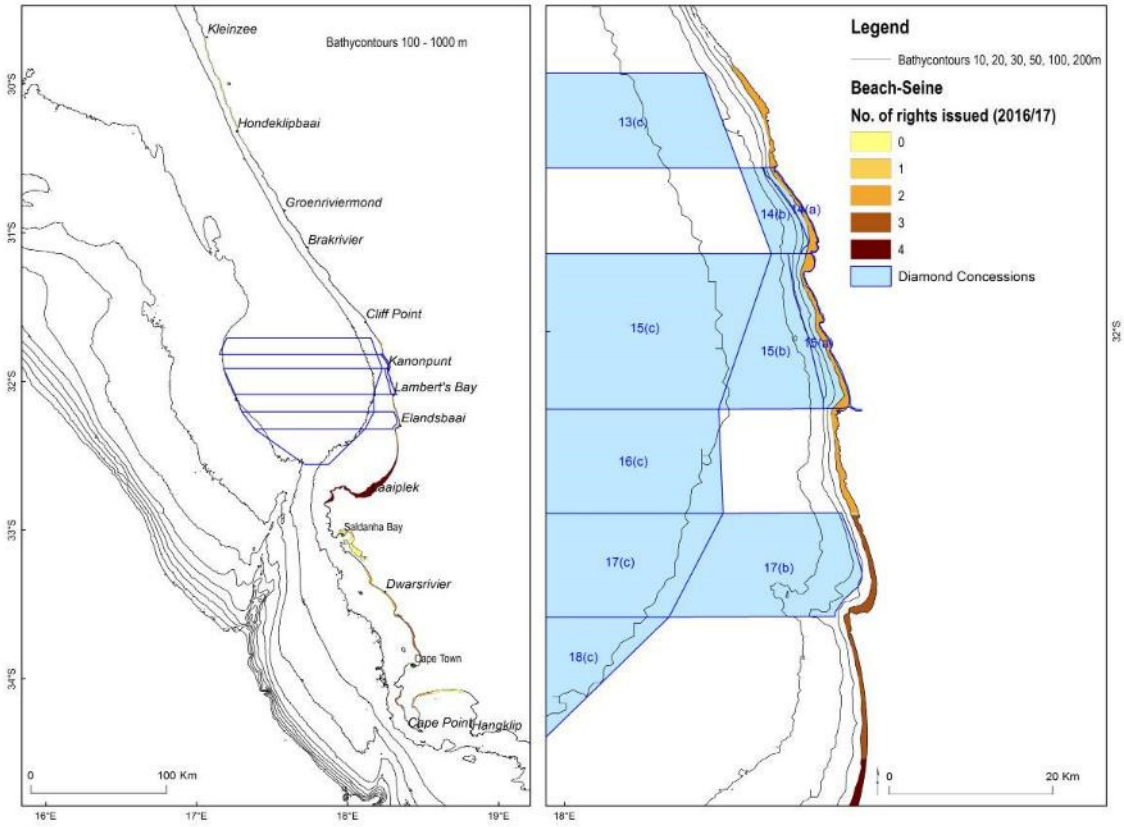

FIGURE 4-22: SEA CONCESSION AREAS 13C, 15C, 16C, 17C AND 18C IN RELATION TO BEACH-SEINE FISHING AREAS.

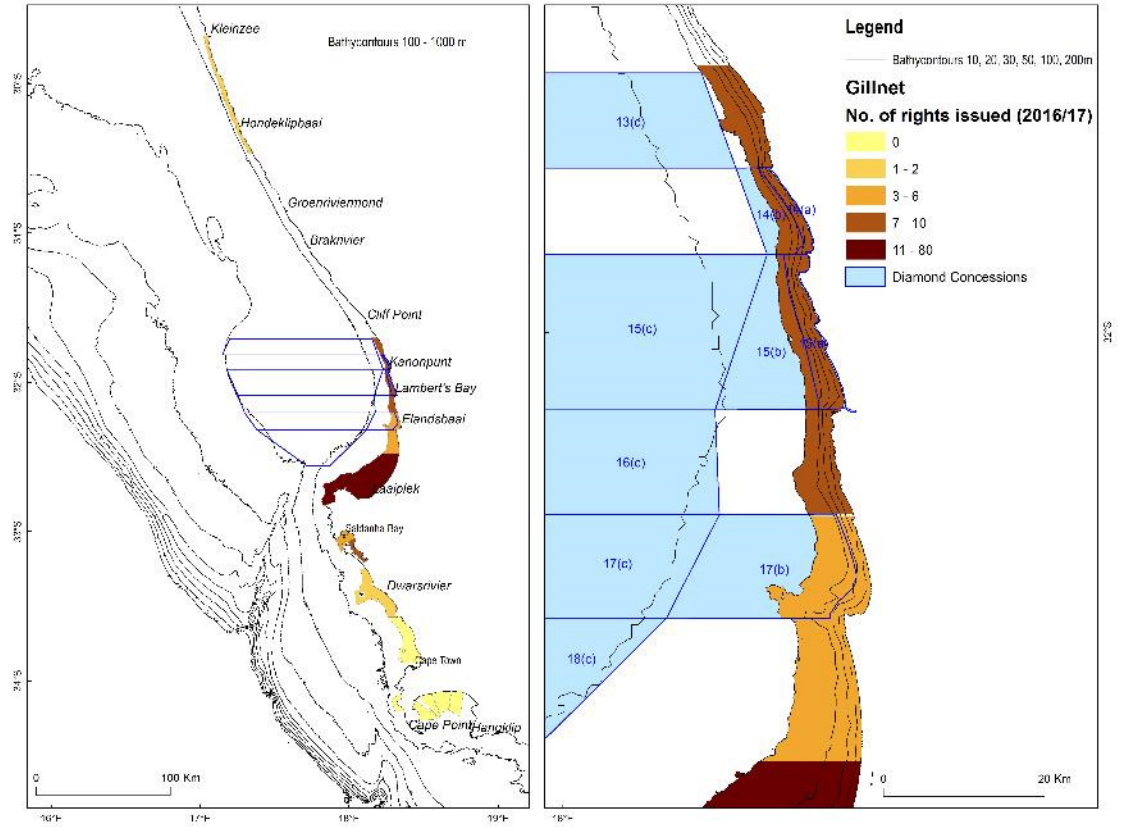

FIGURE 4-23: SEA CONCESSION AREAS 13C, 15C, 16C, 17C AND 18C IN RELATION TO GILLNET FISHING AREAS.

4.1.4.2 Shipping Transport

The majority of shipping traffic is located on the outer edge of the continental shelf with traffic inshore of the continental shelf along the West Coast largely comprising fishing and mining vessels, especially between Kleinsee and Oranjemund (see Figure 4-24). The main shipping lanes are located on the offshore edge of the Sea Concession.

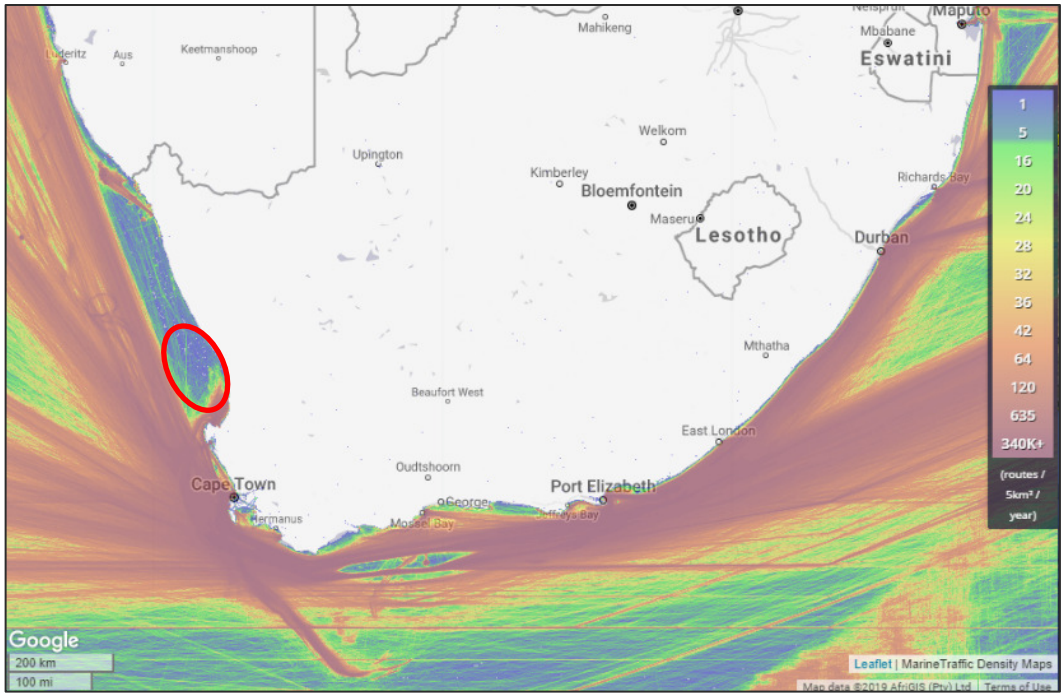

FIGURE 4-24: MAJOR SHIPPING ROUTES ALONG THE WEST COAST OF SOUTH AFRICA. APPROXIMATE LOCATION OF THE SEA CONCESSION AREAS IS ALSO SHOWN.

4.1.4.3 Oil and Gas Exploration and Production

Oil and gas exploration and production is currently undertaken in a number of licence blocks off the South and East coasts of South Africa (see Figure 4-25).

4.1.4.3.1 Exploration

The South African continental shelf and economic exclusion zone (EEZ) have similarly been partitioned into Licence blocks for petroleum exploration and production activities. Oil and gas exploration in the South African offshore commenced with seismic surveys in 1967. Since then numerous 2D and 3D seismic surveys have been undertaken in the West Coast offshore. The Sea Concession areas overlap with Block 3A/4A for which PetroSA and Sasol are the licence holders.

Approximately 40 exploration wells have been drilled since the 1960's. Prior to 1983, reliable technology was not available for removing wellheads from the seafloor. Since then, however, on completion of drilling operations, the well casing has been severed 3 m below the sea floor and removed from the seafloor together with the permanent and temporary guide bases. Of the approximately 40 wells drilled, 35 wellheads remain on the seafloor. Location and wellhead details are available from the Hydrographic office of the South African Navy (which issues the details to the public in a notice to mariners) or directly from PASA.

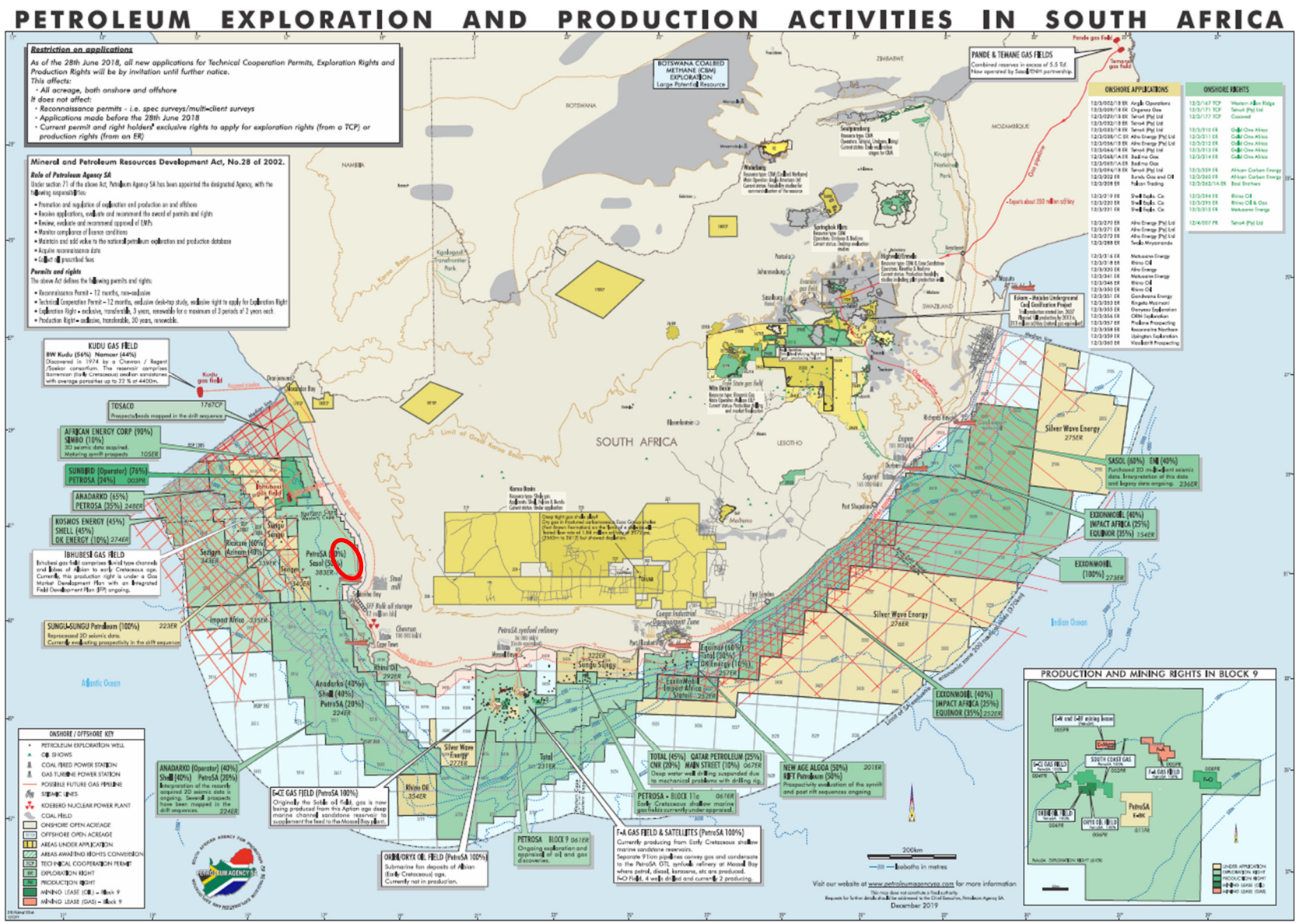

FIGURE 4-25: PETROLEUM LICENCE BLOCKS OFF THE WEST, SOUTH AND EAST COASTS OF SOUTH AFRICA (AFTER PASA, DECEMBER 2019).

4.1.4.3.2 Development and Production

There is no current development or production from the South African West Coast offshore. The IBhubezi Gas Field (Block 2A) and Kudu Gas Field (which lies several hundred kilometres to the north-west off the coast of southern Namibia) have been identified for development. In this regard, a subsea production pipeline to export gas from the iBhubesi Gas Field to a location on the Saldanha peninsula and Grotto Bay has been approved for development by Sunbird SA. A section of the proposed pipeline lies within the western extent of the Sea Concession areas.

4.1.4.4 Diamond Prospecting and Mining

The Sea Concession areas lie adjacent to a number of marine diamond concession areas. The marine diamond concession areas are split into four or five zones (Surf zone and (a) to (c) or (d)-concessions), which together extend from the high water mark out to approximately 500 m depth (see Figure 4-26).

On the Namaqualand coast marine diamond prospecting and mining activity is primarily restricted to the surf-zone and (a)-concessions. Nearshore shallow-water mining is typically conducted by divers using small-scale suction hoses operating either directly from the shore or from converted fishing vessels out to approximately 20 m depth. Diver-assisted mining is largely exploratory and highly opportunistic in nature, being dependent on suitable, calm sea conditions. The typically exposed and wave-dominated nature of the Namaqualand coast effectively limits the periods in which mining can take place to a few days per month. As shore-based divers cannot excavate a gravel depth much more than 0.5 m, mining rates are low, approximately 35 m^2 worked by each contractor per year. Because of the tidal cycle and limitations imposed by sea conditions, such classifiers usually operate for less than 4 hours per day for an average of 5-6 days per month, although longer periods may be feasible in certain protected areas. However, with reference to the Alexkor 2013 Annual Report, it is noted that the number of days had declined from 79 in 2003 to eight in 2012 and 23 in 2013.

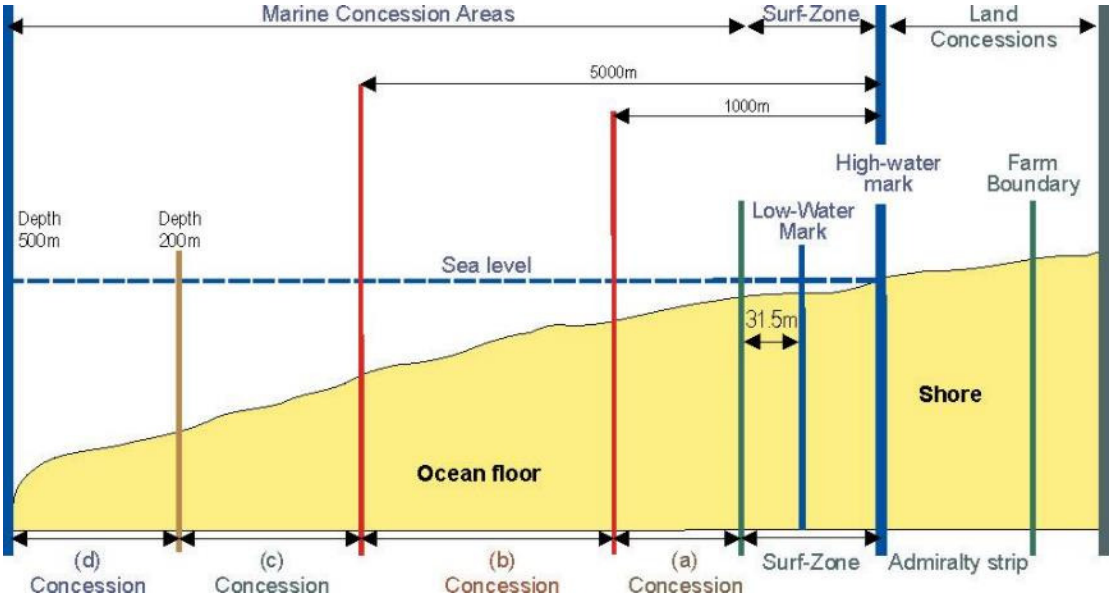

FIGURE 4-26: DIAGRAM OF THE ONSHORE AND OFFSHORE BOUNDARIES OF THE SOUTH AFRICAN (A) TO (D) MARINE DIAMOND CONCESSION AREAS.

Vessel-based diver-Appointed contractors usually work in the depth range immediately seaward of that exploited by shore-based divers, targeting gullies and potholes in the sub-tidal area just behind the surf-zone. A typical boat-based operation consists of a 10 - 15 m vessel, with the duration of their activities limited to daylight hours for 3 - 10 diving days per month. Estimated mining rates for vessel-based operations range from 300 m^2 – 1 000 m^2/year. However, over the past few years there has been a substantial decline in small-scale diamond mining operations due to the global recession and depressed diamond prices, although some vessels do still operate out of Alexander Bay and Port Nolloth.

Offshore diamond mining and prospecting in the "C" Concession areas is currently limited to operations by Belton Park Trading 127 (Pty) Ltd in concessions 2C and 3C for mining and De Beers Marine (Pty) Ltd for prospecting in Sea Concessions 4C, 5C and 6C.

These prospecting and mining operations are typically conducted in water depths of 70 m to 160 m from fully self-contained vessels with onboard sediment processing facilities, using either vertically mounted tools or seabed crawler technology. The vessels operate as semi-mobile platforms, anchored by a four anchor spread or held on station with a dynamic positioning system (DP). Computer-controlled positioning using DP or winches enable the vessels to locate themselves precisely over a prospecting or mining block of up to 400 m x 400 m. These vessels have limited manoeuvrability whilst in position and other vessels should remain at a safe distance.

4.1.4.5 Prospecting and Mining of Other Minerals

4.1.4.5.1 Heavy Minerals

Heavy mineral sands containing, amongst other minerals, zircon, ilmenite, garnet and rutile may be found offshore of the West Coast. Although a literature search has not identified any published studies that detail the distribution of heavy minerals offshore, concentrations are known to exist onshore. Tronox's Namakwa Sands is currently exploiting heavy minerals from onshore deposits near Brand-se-Baai (approximately 385 km north of Cape Town).

4.1.4.5.2 Glauconite and Phosphate

Glauconite pellets (an iron and magnesium rich clay mineral) and bedded and peletal phosphorite occur on the seafloor over large areas of the continental shelf on the West Coast. These represent potentially commercial resources that could be considered for mining as a source of agricultural phosphate and potassium (Birch 1979a & b; Dingle *et al*. 1987; Rogers and Bremner 1991).

A number of prospecting areas for glauconite and phosphorite / phosphate are located off the West Coast (see Figure 4-27), as shown there is an overlap between the western edge of the Sea Concession areas and the prospecting areas. Green Flash Trading received their prospecting rights for Areas 251 and 257 in 2012/2013.

4.1.4.5.3 Manganese Nodules in Ultra-Deep Water

Rogers (1995) and Rogers and Bremner (1991) report that manganese nodules enriched in valuable metals occur in deep water areas (>3 000 m) off the West Coast. The nickel, copper and cobalt contents of the nodules fall below the current mining economic cut-off grade of 2% over most of the area, but the possibility exists for mineral grade nodules in the areas north of 33°S in the Cape Basin and off northern Namaqualand.

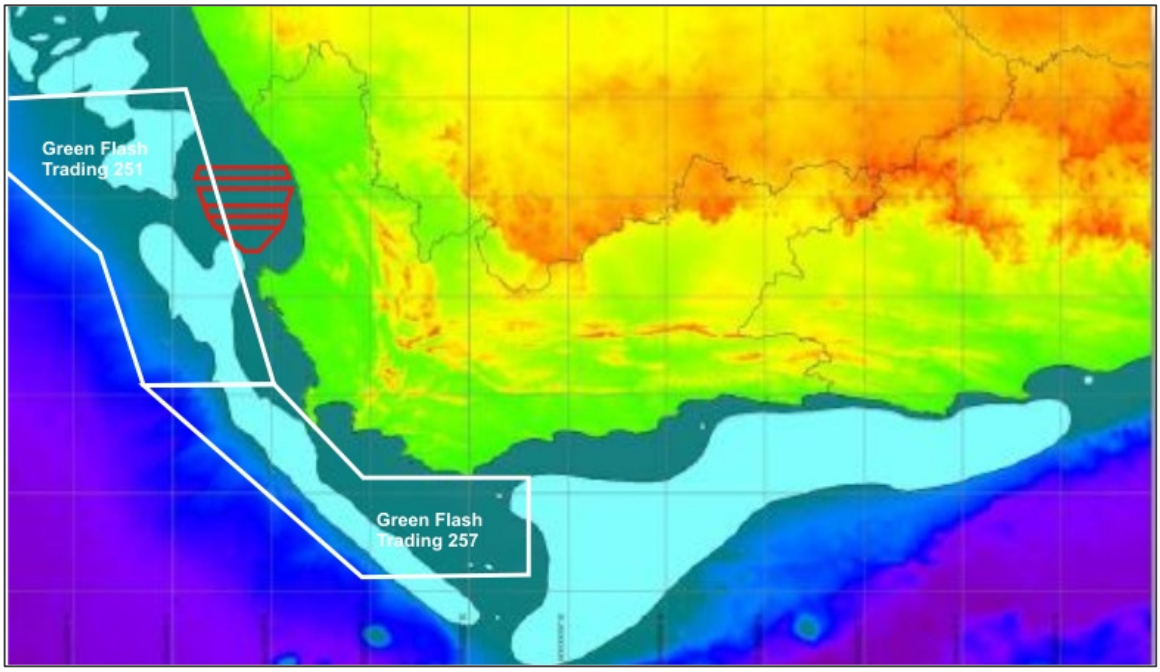

FIGURE 4-27: APPROXIMATE LOCATION OF SEA CONCESSIONS 13C, 15C, 16C, 17C AND 18C (RED POLYGONS) IN RELATION TO PHOSPHATE PROSPECTING AREAS (WHITE POLYGONS). LIGHT BLUE SHADED AREAS INDICATE THE DISTRIBUTION OF PHOSPHORITE HARD GROUND (ADAPTED FROM MORANT 2013).

4.1.4.5.4 Undersea Cables

There are a number of submarine telecommunications cable systems across the Atlantic and the Indian Ocean (see Figure 4-28), including *inter alia*:

- South Atlantic Telecommunications cable No.3 / West African Submarine Cable / South Africa Far East (SAT3/WASC/SAFE): This cable system is divided into two sub-systems, SAT3/WASC in the Atlantic Ocean and SAFE in the Indian Ocean. The SAT3/WASC sub-system connects Portugal (Sesimbra) with South Africa (Melkbosstrand). From Melkbosstrand the SAT-3/WASC sub-system is extended via the SAFE sub-system to Malaysia (Penang) and has intermediate landing points at Mtunzini South Africa, Saint Paul Reunion, Bale Jacot Mauritius and Cochin India (www.safe-sat3.co.za).
- Eastern Africa Submarine Cable System (EASSy): This is a high bandwidth fibre optic cable system, which connects countries of eastern Africa to the rest of the world. EASSy runs from Mtunzini (off the East Coast) in South Africa to Port Sudan in Sudan, with landing points in nine countries, and connected to at least ten landlocked countries.
- West Africa Cable System (WACS): WACS is 14 530 km in length, linking South Africa (Yzerfontein) and the United Kingdom (London). It has 14 landing points, 12 along the western coast of Africa (including Cape Verde and Canary Islands) and 2 in Europe (Portugal and England) completed on land by a cable termination station in London.
- African Coast to Europe (ACE): The ACE submarine communications cable is a 17 000 km cable system along the West Coast of Africa between France and South Africa (Yzerfontein).

There is an exclusion zone applicable to the telecommunication cables 1 nm (approximately 1.9 km) each side of the cable in which no anchoring is permitted.

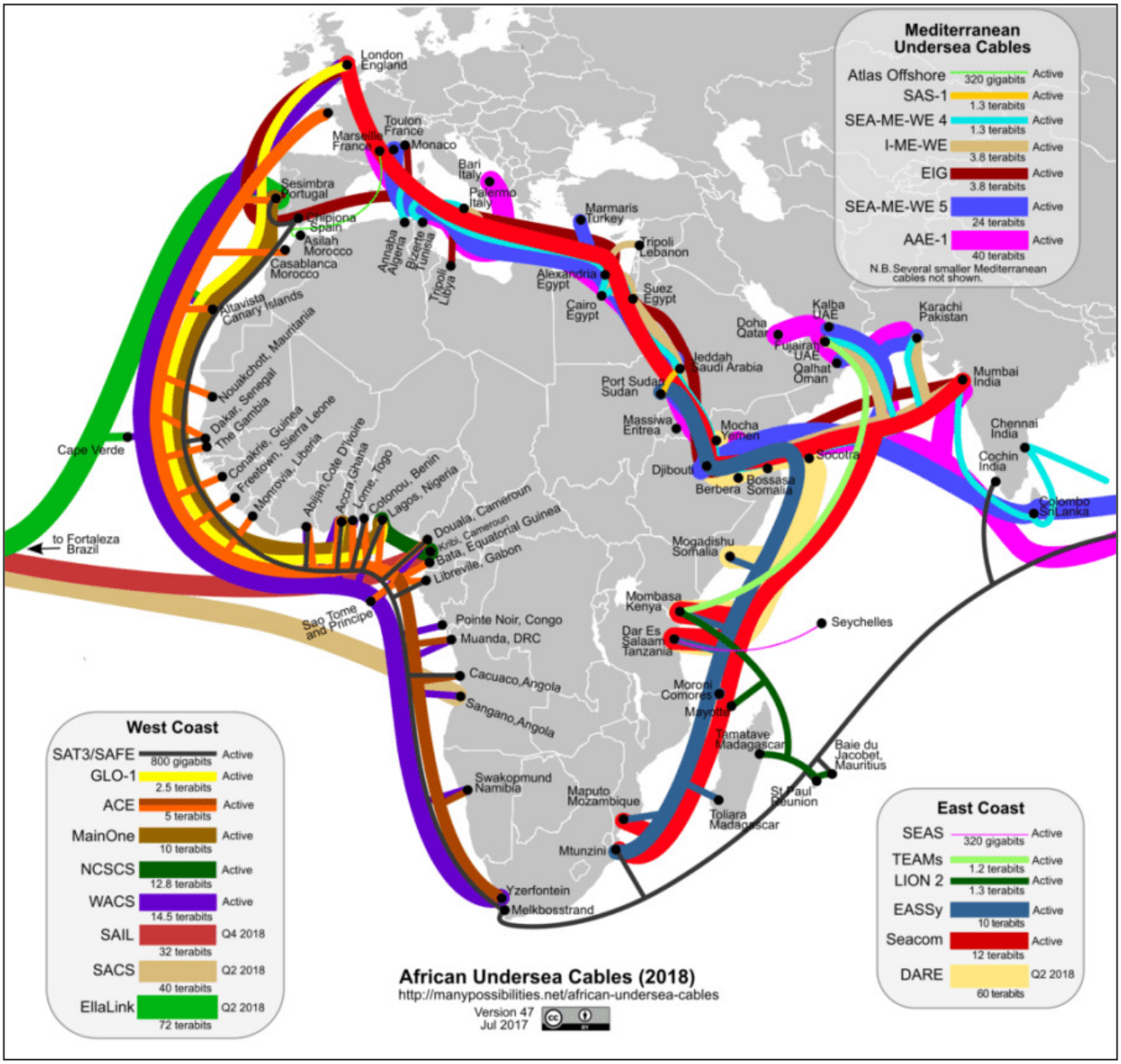

FIGURE 4-28: CONFIGURATION OF THE CURRENT AFRICAN UNDERSEA CABLE SYSTEMS, JULY 2018 (SOURCE: HTTP://WWW.MANYPOSSIBILITIES.NET).

4.1.4.5.5 Archaeological Sites

The majority of known wrecks along the West Coast are located in relatively shallow water close inshore (within the 100 m isobath). According to the South African Heritage Resources Information System, there are at least 89 ship wrecks recorded between the Berg and Orange Rivers, many of which were vessels involved in coastal trade and fishing. None of these wrecks are located within the Sea Concession areas (see Figure 4-29).

Of these, three (*Blue Bird* (1960), *Girl Devon* (1971) and *Boy Donald* (1983)) are currently less than 60 years of age and are thus not protected by the NHRA as heritage resources. In addition, the position of the wreck of HMS *Sybille* (1901) at Steenboksfontein south of Lamberts Bay is considered accurate and thus falls outside of the concession areas.

FIGURE 4-29: SHIPWRECKS POTENTIALLY LOCATED WITHIN THE BROADER PROJECT AREA.

With regards to the remaining five wrecks, the following is relevant:

- *Rosebud* (1859) was wrecked coming ashore on the coast (thus outside of the sea concession areas);
- There is no recorded information regarding the *Antoinette* (1854), thus it is assumed she was wrecked;
- *Lamberts Bay Packet* (1859) and *Shamrock* (1959) grounded, which usually implies that they were refloated and were recovered; and
- *Eros* (1918) is recorded as foundered, which implies a loss at sea rather than on the shore.

As the position of most of the wrecks mentioned above is approximate, and the available historical information surrounding each event is limited, it is considered possible that some remains may be present on the seabed in the sea concession areas. Furthermore, the remains of currently unknown wrecks could also be present in the sea concession areas.

4.1.4.6 Ammunition Dump Sites

Details of ammunition dumped at the ammunition dumpsites on the West Coast are given on the respective SAN charts. No ammunition dumps are located within the extent of the Sea Concession areas.

4.2 MARINE PROTECTED AREAS

4.2.1 Conservation Areas and Marine Protected Areas

Numerous conservation areas and a marine protected area (MPA) exist along the coastline of the Western Cape, although the majority of these located to the south of concessions 13C, 15C, 16C, 17C and 18C (see Figure 4-30).

Lambert's Bay Bird Island is located approximately 12 km in shore of Sea Concession 15C and is a declared Nature Reserve under the National Environmental Management: Protected Areas Act, 2003 (No. 57 of 2003). It is one of only six Cape Gannet breeding sites world-wide.

Sea Concession 17C is located approximately 19 km offshore of the estuary mouth of Verlorenvlei, a partially closed coastal estuarine lake and marsh system located at Elands Bay. Verlorenvlei is one of the largest natural wetlands along the West Coast and is a proclaimed RAMSAR site and Important Bird Area.

4.2.2 Threat Status and Vulnerable Marine Ecosystems

Rocky shore and sandy beach habitats are generally not particularly sensitive to disturbance and natural recovery occurs within 2-5 years. However, much of the Namaqualand coastline has been subjected to decades of disturbance by shore-based diamond mining operations (Penney *et al*. 2007). These cumulative impacts and the lack of biodiversity protection has resulted in most of the coastal habitat types in Namaqualand being assigned a threat status of 'critically endangered' (Lombard *et al*. 2004; Sink *et al*. 2012). Using the SANBI benthic and coastal habitat type GIS database, the threat status of the benthic habitats in the general area, and those potentially affected by proposed prospecting activities in concessions 13C, 15C, 16C, 17C and 18C, were identified (see Table 4-6). Of the habitat types that overlap with the concession areas, only the Cape Rocky Mid Shelf Mosaic habitat in the southern portion of concession 18C is considered 'vulnerable'.

TABLE 4-6: ECOSYSTEM THREAT STATUS FOR MARINE AND COASTAL HABITAT TYPES IN CONCESSIONS 13C, 15C, 16C, 17C AND 18C (ADAPTED FROM SINK *ET AL.* 2011). THOSE HABITATS POTENTIALLY AFFECTED BY THE PROPOSED PROSPECTING ACTIVITIES ARE SHADED.

Habitat Type	Total Size (km^2)	Threat Status
Namaqua Exposed Rocky Coast	42.49	Vulnerable
Namaqua Sheltered Rocky Coast	1.20	Vulnerable
Namaqua Mixed Shore	60.66	Vulnerable
Namaqua Kelp Forest	7.36	Vulnerable
Namaqua Sandy Inner Shelf	760.25	Least Concern
Namaqua Muddy Mid Shelf Mosiac	11 762.51	Least Concern
Namaqua Sandy Mid Shelf	2 853.16	Least Concern
Cape Rocky Mid Shelf Mosiac	3 940.95	Vulnerable
Cape Mixed Shore	33.74	Vulnerable
Cape Kelp Forest	9.79	Vulnerable
Cape Sheltered Rocky Shore	1.48	Endangered
Cape Exposed Rocky Coast	28.88	Vulnerable
Cape Rocky Inner Shelf	473.61	Vulnerable
Cape Upper Canyon	2 394.82	Endangered
Southern Benguela Intermediate Sandy Coast	32.34	Near Threatened
Southern Benguela Dissipative-Intermediate Sandy Coast	51.47	Least Concern
Southern Benguela Dissipative Sandy Coast	26.18	Least Concern
Southern Benguela Sandy Outer Shelf	36 057.07	Least Concern
Southern Benguela Outer Shelf Mosaic	19 508.71	Least Concern
Southern Benguela Rocky Shelf Edge	2 380.69	Vulnerable
St Helena Bay	980.82	Vulnerable

Using biodiversity data mapped for the 2004 and 2011 National Biodiversity Assessments a systematic biodiversity plan was developed for the West Coast with the objective of identifying coastal and offshore priority focus areas for MPA expansion (Sink *et al*. 2011; Majiedt *et al*. 2013). Potentially vulnerable marine ecosystems (VMEs) that were explicitly considered during the planning included the shelf break, seamounts, submarine canyons, hard grounds, submarine banks, deep reefs and cold water coral reefs. The biodiversity data were used to identify ten focus areas for protection on the West Coast between Cape Agulhas and the South African – Namibian border. These focus areas were carried forward during Operation Phakisa, which identified potential MPAs. Those approved MPAs offshore of the West Coast are shown in Figure 4-30. There is no overlap with any of these MPAs, or with any other coastal MPAs, sanctuaries or conservation areas.

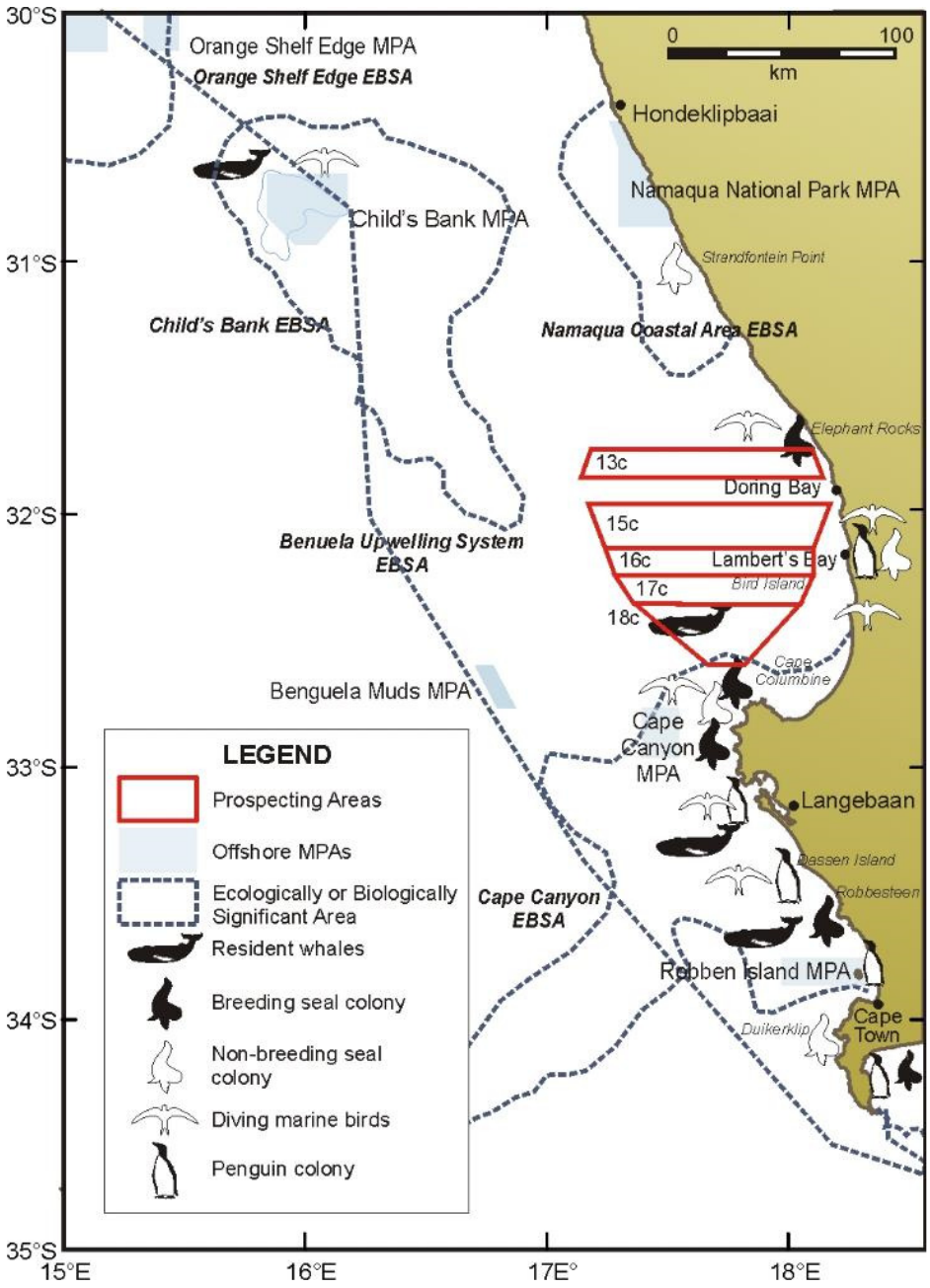

FIGURE 4-30: ENVIRONMENT INTERACTION POINTS ON THE WEST COAST, ILLUSTRATING THE LOCATION OF SEABIRD AND SEAL COLONIES AND RESIDENT WHALE POPULATIONS IN RELATION TO THE 13C, 15C, 16C, 17C AND 18C SEA CONCESSION AREAS. OFFSHORE MARINE PROTECTED AREAS AND EBSAS (AS OF 30 AUGUST 2019) ARE ALSO SHOWN.

As part of a regional Marine Spatial Management and Governance Programme (MARISMA; 2014-2020) the Benguela Current Commission (BCC) and its member states have identified a number of Ecologically or Biologically Significant Areas (EBSAs) both spanning the border between Namibia and South Africa and along the South African West and South Coasts, with the intention of implementing improved conservation and protection measures within these sites. Those areas identified as being of high priority for place-based conservation measures within the broad project area are shown in Figure 4-30. These EBSAs have been proposed and inscribed under the Convention of Biological Diversity (CBD). Concession areas 13C, 15C, 16C, 17C and 18C fall within the transboundary Benguela Upwelling System EBSA, and the southern portion of concession 18C just overlaps with the Cape Canyon EBSA.

The principal objective of these EBSAs is identification of features of higher ecological value that may require enhanced conservation and management measures. No specific management actions have been formulated for the various areas at this stage.

The 2018 National Biodiversity Assessment (Sink *et al.* 2019) provides a map illustrating MPAs, Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), based on the first national Coastal and Marine Spatial Biodiversity Plan (Harris and Sink 2019). Protected Areas, CBAs and ESAs together form a network of natural and semi-natural areas that enable ecologically functional seascapes in the long term, designed to be spatially efficient and wherever possible to avoid conflict with non-compatible ocean uses. Whereas CBAs should be kept in a natural or near natural state to support ecological sustainability, ESAs do not need to be entirely natural, but should be kept at least semi-natural so that they retain their ecological processes. These natural and semi-natural areas can co-exist in a matrix of multiple uses, including fisheries, mining and others.

As work is still underway to advance the CBA map, the data required for higher resolution project-interaction mapping are not yet available (Linda Harris, NMU, pers. comm). From the map provided in the 2018 NBA, it appears that there is no direct overlap between concession areas 13C, 15C, 16C, 17C and 18C and CBAs or ESAs, but such areas are present in St Helena Bay to the south of Concession 18C.

5 KEY PROJECT ISSUES

A number of key issues have been identified by the EIA project team during the scoping process to date. These are presented below, together with responses by the project team. No importance is to be assigned to the order in which these are presented.

5.1 EFFECT ON MARINE FAUNA

Issue: The proposed prospecting operations could result in a number of impacts on marine fauna. Potential impacts include:

- Normal discharges to the marine environment from a variety of sources, including deck drainage, machinery space drainage, sewage and galley wastes from survey and support vessels;
- Potential impacts of multi-beam bathymetry and or sub-bottom profiler noise / pulses on marine fauna. Potential impacts could include physiological injury, behavioural avoidance of the survey area, masking of environmental sounds and communication, and indirect impacts due to effects on prey.
- Localised disturbance of marine fauna due to noise and lighting from the prospecting vessel(s), seabed crawler and support vessels;
- Physical damage to the seabed, alteration of sediment structure, alteration in benthic faunal community composition and potential reduction in benthic biodiversity due to drill and bulk sampling activities;
- Impacts on benthic fauna due to the discharge of processed sediments, including direct mortality, smothering of relatively immobile or sedentary species; and
- Accidental oil spills during normal operations (e.g. bunkering at sea). Oil spilled in the marine environment would have an immediate detrimental effect on water quality.

Response: Potential impacts on marine fauna will be addressed in the marine faunal assessment (see Section 6.2.2). The marine faunal assessment has assessed the potential impacts relating to the proposed bulk prospecting activities on marine fauna (including cetaceans, seals, turtles, seabirds, fish, invertebrates and plankton species). The marine faunal assessment will be based on, *inter alia*, a review and collation of existing information and data from the international scientific literature, the Generic EMP prepared for marine diamond mining off the West Coast of South Africa and information sourced from the internet.

5.2 EFFECT ON FISHERIES

Issue: The proposed project could have an impact on commercial and recreational fishing activities, as a result of the legislated 500 m safety zones around the vessels during drill/bulk sampling operations. Impacts could include disruption to fishing activities and decreased fishing effort; loss-of-access to fishing grounds; and the subsequent loss of catch. Accidental oil spills during normal operations could also have an impact on fishing activities.

Response: A fishing industry assessment was commissioned to, *inter alia*, determine the fishing effort and catch (data sourced from the Department of Agriculture, Forestry and Fisheries) of all fisheries operating off the West Coast in relation to Sea Concessions 13C, 15C, 16C, 17C and 18C. All fishing sectors that operate within and adjacent to the proposed drill/bulk sampling areas could be impacted by the exclusion zone around the survey vessels. The terms of reference for the fishing industry assessment are presented in Section 6.2.3.

5.3 EFFECT ON OTHER MARINE PROSPECTING, MINING AND EXPLORATION ACTIVITIES

Issue: The presence of the drill/bulk sampling vessel with the associated 500 m safety zone could interfere with other prospecting, mining and exploration activities in the area.

Response: The location of Sea Concessions 13C, 15C, 16C, 17C and 18C in relation to existing exploration and marine mining and prospecting areas is presented in Section 4. This impact will be assessed using experience gained from the environmental assessment of similar operations elsewhere in the region and information from the Generic EMP prepared for marine diamond mining off the West Coast of South Africa.

5.4 EFFECT ON MARINE TRANSPORT ROUTES

Issue: The presence of the drill/bulk sampling vessel with the associated 500 m safety zone could interfere with shipping in the area.

Response: The majority of shipping traffic is located on the outer edge of the continental shelf with traffic inshore of the continental shelf along the West Coast largely comprising fishing and prospecting / mining vessels, especially between Kleinsee and Oranjemund. The majority of the shipping traffic *en route* to and from Cape Town passes offshore of the project area.

This impact will be assessed using experience gained from the environmental assessment of similar operations elsewhere in the region and information from the Generic EMP prepared for marine diamond mining off the West Coast of South Africa. Additional input from a specialist is not deemed necessary. It may be necessary to discuss this issue with the South African Maritime Safety Authority (maritime co-ordination centre), as they monitor the movement of vessels around the South African coast.

5.5 EFFECT ON SHIPWRECKS

Issue: Drill and bulk sampling activities and the deposition of processed sediments could disturb cultural heritage material on the seabed, particularly historical shipwrecks.

Response: The majority of known shipwrecks off the coast of South Africa occur in waters shallower than 100 m within 50 km of the coast. Thus, the likelihood of disturbing a shipwreck is expected to be very small considering the vast size of the South African offshore area. However, an Underwater Heritage Impact Assessment will be undertaken to confirm if there are any known shipwrecks in the area. The terms of reference for the Underwater Heritage Impact Assessment are presented in Section 6.2.4.

5.6 EFFECT ON SOCIO-ECONOMIC ENVIRONMENT

Issue: The proposed project could amongst others result in the following socio-economic impacts or benefits:

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

Response: Offshore prospecting is highly technical and requires specialised units and crews, most of which are based outside South Africa. There would, however, be opportunities for local companies to provide support services in Cape Town, e.g. vessel supplies, support vessels, catering, cleaning, security, etc. Therefore, job creation opportunities would be limited and of very short duration (approximately three weeks per survey).
Limited direct revenues would be generated as a result of the proposed activities. Revenue generating activities are related to the actual operations and could include refuelling, vessel / gear repair, port duties and hire of local fishing vessels as support vessel.

These potential benefits will be assessed using experience gained from the environmental assessment of similar operations elsewhere in the region. Additional input from a specialist is not deemed necessary.

6 PLAN OF STUDY FOR ENVIRONMENTAL IMPACT ASSESSMENT

This chapter provides the Plan of Study for EIA in accordance with the requirements of Section 2(i) of Appendix 2 of the EIA Regulations 2014 (as amended), which states that a Scoping Report must include a Plan of Study for EIA which sets out the proposed approach to the environmental impact assessment of the application. It includes information on specialist studies that will be undertaken during the EIA Phase and the terms of reference for these studies, as well as the predefined rating scales that will be used to assess potential impacts.

6.1 INTRODUCTION

If the Scoping Report is accepted by the DMRE, specialist studies that will be commissioned to address the effects of the prospecting activities on marine fauna, fisheries and shipwrecks (refer to Section 2.6) and will be integrated into the EIR.

The terms of reference for these studies are presented in Section 6.2 below. As part of these studies, specialists gathered data relevant to identifying and assessing environmental 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 rating scales (see Section 6.3). Specialists will also suggest ways in which negative impacts could be mitigated and benefits could be enhanced.

6.2 TERMS OF REFERENCE FOR THE SPECIALIST STUDIES

6.2.1 General Terms of Reference for the Specialist Studies

The following general terms of reference applied to the specialist studies:

- Describe the baseline conditions that exist in the study area and identify any sensitive areas that would need special consideration;
- Review the 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 operations;
- Identify and list all legislation and permit requirements that are relevant to the development proposal;
- 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 feasible ways in which impacts could be mitigated and benefits enhanced giving an indication of the likely effectiveness of such mitigation and how these could be implemented in the management of the proposed operation;
- To ensure that specialists use a common standard, the determination of the significance of the assessed impacts will be undertaken in accordance with a common Convention (see Section 6.3);
- Comply with any relevant guidelines as well as any other relevant guidelines on specialist study requirements for EIAs;
- Include specialist expertise and a signed statement of independence; and

- Comply with Regulation 12 and Appendix 6 of the EIA Regulations 2014 (as amended), which specifies requirements for all specialist reports.

6.2.2 Marine Fauna

The specific terms of reference used for the marine faunal assessment included the following:

- Provide a general description of the local marine fauna (including cetaceans, seals, turtles, seabirds, fish, invertebrates and plankton species) within Sea Concession Concessions 13C, 15C, 17C and 18C and greater West Coast. The description to be based on, *inter alia*, a review of existing information and data from the international scientific literature, the Generic EMP prepared for marine diamond mining off the West Coast of South Africa and information sourced from the internet;
- Identify, describe and assess the significance of potential impacts of the proposed prospecting operations on the local marine fauna, including but not limited to:
  - > physiological injury;
  - > physical damage to the seabed, alteration of sediment structure, alteration in benthic fauna community composition and potential reduction in benthic biodiversity due to prospecting activities;
  - > impacts on benthic fauna due to the discharge of processed sediments, including direct mortality);
  - > behavioural avoidance of the prospecting area;
  - > masking of environmental sounds and communication; and
  - > indirect impacts due to effects on prey.
- Identify practicable mitigation measures to avoid/reduce any negative impacts and indicate how these could be implemented in the start-up and management of the proposed project.

6.2.3 Fisheries

The specific terms of reference used for the fisheries assessment included the following:

- Provide a general description of the fishing activities expected in Sea Concession Concessions 13C, 15C, 16C, 17C and 18C and along the greater West Coast;
- Undertake a spatial and temporal assessment of expected fishing effort and catch in Sea Concession Concessions 13C, 15C, 16C, 17C and 18C for each sector identified;
- Assess the impact of the prospecting activities on the different fishing sectors;
- Assess the impact of the proposed exclusion zones around the prospecting vessels and potential disturbance of fish on the fishing activities based on the estimated percentage loss of catch and effort; and
- Make recommendations for mitigation measures that could be implemented to minimise or eliminate negative impacts on and enhance any benefits to the fishing industry.

6.2.4 Underwater Cultural Heritage Material

The specific terms of reference used for the Underwater Heritage Impact Assessment included the following:

- Undertake a desktop study of the database of known and suspected wrecks in the area ascertained through the study of available written and oral resources;
- Identify potential Maritime and Underwater Cultural Heritage (MUCH) sites within the designated area; and
- Recommend management measures for sites before and during development.

6.3 CONVENTION FOR ASSIGNING SIGNIFICANCE RATINGS TO IMPACTS

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 the proposed project. The process involves consideration of, *inter alia*: the purpose and need for the project; views and concerns of I&APs social and political norms, and general public interest.

6.3.1 Identification and Description of Impacts

Identified impacts are described in terms of the nature of the impact, compliance with legislation and accepted standards, receptor sensitivity and the significance of the predicted environmental change (before and after mitigation). Mitigation measures may be existing measures or additional measures that were identified through the impact assessment and associated specialist input. The impact rating system considers the confidence level that can be placed on the successful implementation of mitigation.

6.3.2 Evaluation of Impacts and Mitigation Measures

Impacts are assessed using SLR's standard convention for assessing the significance of impacts, a summary of which is provided below.

In assigning significance ratings to potential impacts before and after mitigation the approach presented below is to be followed.

1. **Determine the impact consequence rating:** This is a function of the "intensity", "duration" and "extent" of the impact (See Section 6.3.4). The consequence ratings for combinations of these three criteria are given below.
2. **Determine impact significance rating:** The significance of an impact is a function of the consequence of the impact occurring and the probability of occurrence (see Section 6.3.5). Significance is determined using the table in Section 6.3.5.
3. **Modify significance rating (if necessary):** Significance ratings are based on largely professional judgement and transparent defined criteria. In some instances, therefore, whilst the significance rating of potential impacts might be "low", the importance of these impacts to local communities or individuals might be extremely high. The importance/value which interested and affected parties attach to impacts will be highlighted, and recommendations should be made as to ways of avoiding or minimising these perceived negative impacts through project design, selection of appropriate alternatives and / or management.
4. **Determine degree of confidence of the significance assessment:** Once the significance of the impact has been determined, the degree of confidence in the assessment will be qualified (see Section 6.3.3). Confidence in the prediction is associated with any uncertainties, for example, where information is insufficient to assess the impact.

6.3.3 Criteria for Impact Assessment

The criteria for impact assessment are provided below.

Criteria	Rating	Description
Criteria for ranking of the INTENSITY (SEVERITY) of environmental impacts	**ZERO TO VERY LOW**	Negligible change, disturbance or nuisance. The impact affects the environment in such a way that natural functions and processes are not affected. People / communities are able to adapt with relative ease and maintain pre-impact livelihoods.
	LOW	Minor (Slight) change, disturbance or nuisance. The impact on the environment is not detectable or there is no perceptible change to people's livelihood.
	MEDIUM	Moderate change, disturbance or discomfort. Where the affected environment is altered, but natural functions and processes continue, albeit in a modified way. People/communities are able to adapt with some difficulty and maintain pre-impact livelihoods but only with a degree of support.
	HIGH	Prominent change, disturbance or degradation. Where natural functions or processes are altered to the extent that they will temporarily or permanently cease. Affected people/communities will not be able to adapt to changes or continue to maintain-pre impact livelihoods.
Criteria for ranking the DURATION of impacts	**SHORT TERM**	< 5 years.
	MEDIUM TERM	5 to < 15 years.
	LONG TERM	> 15 years, but where the impact will eventually cease either because of natural processes or by human intervention.
	PERMANENT	Where mitigation either by natural processes or by human intervention will not occur in such a way or in such time span that the impact can be considered transient.
Criteria for ranking the EXTENT / SPATIAL SCALE of impacts	**LOCAL**	Impact is confined to project or study area or part thereof, e.g. limited to the area of interest and its immediate surroundings.
	REGIONAL	Impact is confined to the region, e.g. coast, basin, catchment, municipal region, etc.
	NATIONAL	Impact is confined to the country as a whole, e.g. South Africa, etc.
	INTERNATIONAL	Impact extends beyond the national scale.
Criteria for determining the PROBABILITY of impacts	**IMPROBABLE**	Where the possibility of the impact to materialise is very low either because of design or historic experience, i.e. ≤ 30% chance of occurring.
	POSSIBLE	Where there is a distinct possibility that the impact would occur, i.e. > 30 to ≤ 60% chance of occurring.
	PROBABLE	Where it is most likely that the impact would occur, i.e. > 60 to ≤ 80% chance of occurring.
	DEFINITE	Where the impact would occur regardless of any prevention measures, i.e. > 80% chance of occurring.
Criteria for determining the DEGREE OF CONFIDENCE of the assessment	**LOW**	≤ 35% sure of impact prediction.
	MEDIUM	> 35% and ≤ 70% sure of impact prediction.
	HIGH	> 70% sure of impact prediction.

Criteria	Rating	Description
Criteria for the DEGREE TO WHICH IMPACT CAN BE MITIGATED - the degree to which an impact can be reduced / enhanced	**NONE**	No change in impact after mitigation.
	VERY LOW	Where the significance rating stays the same, but where mitigation will reduce the intensity of the impact.
	LOW	Where the significance rating drops by one level, after mitigation.
	MEDIUM	Where the significance rating drops by two to three levels, after mitigation.
	HIGH	Where the significance rating drops by more than three levels, after mitigation.
Criteria for LOSS OF RESOURCES - the degree to which a resource is permanently affected by the activity, i.e. the degree to which a resource is irreplaceable	**LOW**	Where the activity results in a loss of a particular resource but where the natural, cultural and social functions and processes are not affected.
	MEDIUM	Where the loss of a resource occurs, but natural, cultural and social functions and processes continue, albeit in a modified way.
	HIGH	Where the activity results in an irreplaceable loss of a resource.

6.3.4 Determining Consequence

Consequence attempts to evaluate the importance of a particular impact, and in doing so incorporates extent, duration and intensity. The ratings and description for determining consequence are provided below.

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 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.***

Rating	Description
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 to 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.

6.3.5 Determining Significance

The consequence rating is considered together with the probability of occurrence in order to determine the overall significance using the table below.

		PROBABILITY			
		IMPROBABLE	**POSSIBLE**	**PROBABLE**	**DEFINITE**
CONSEQUENCE	**VERY LOW**	**INSIGNIFICANT**	**INSIGNIFICANT**	**VERY LOW**	**VERY LOW**
	LOW	**VERY LOW**	**VERY LOW**	**LOW**	**LOW**
	MEDIUM	**LOW**	**LOW**	**MEDIUM**	**MEDIUM**
	HIGH	**MEDIUM**	**MEDIUM**	**HIGH**	**HIGH**
	VERY HIGH	**HIGH**	**HIGH**	**VERY HIGH**	**VERY HIGH**

In certain cases it may not be possible to determine the significance of an impact. In these instances the significance is **UNKNOWN**.

6.4 ALTERNATIVES TO BE CONSIDERED

The project scope to be considered and assessed in the EIA is the proposed prospecting operations within Sea Concessions 13C, 15C, 16C, 17C and 18C, as described in Section 3.3. A summary of the project alternatives that will be considered during the EIA is provided in Section 3.3.

6.5 DESCRIPTION OF THE ASPECTS TO BE ASSESSED

The environmental aspects relevant to the anticipated impacts as described in Section 4 will be considered and investigated in the EIA Phase.

6.6 CONSULTATION PROCESS DURING EIA PHASE

6.6.1 Consultation with the Competent Authority

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

The EIR (including EMPr) will be submitted to DMRE in both draft and final formats. Opportunities for consultation and participation in the EIA process are shown in Table 6-1.

6.6.2 Public Participation Process during the EIA Phase

A description of the tasks that will be undertaken during the EIA Phase, with specific reference to the opportunities for consultation and participation for I&APs is detailed below and shown in Table 6-1.

6.6.2.1 Notification of I&APs

All I&APs registered on the project database will be notified of relevant events in the EIA process via electronic mail or, if required, post. This will include when the EIR is available for public review; invitations to possible public feedback meetings/open days (if required); and notification of the authority decision.

6.6.2.2 Information to be provided to I&APs

The EIR (including specialist studies and EMPr) will be released for a 30-day review and comment period. The following tasks will be undertaken in order to notify I&APs of the release of the EIR:

- A notification letter (with an Executive Summary) will be sent to all registered I&APs to inform them of the release of the EIR and where the full report can be reviewed.
- Copies of the full report will be made available on the SLR website.

Once DMRE has issued a decision on the application, I&APs on the project database will be informed accordingly of the decision, the reasons therefore and the fact that an appeal may be lodged in terms of the National Appeals Regulations 2014.

6.6.2.3 Details of the engagement process

The stakeholder engagement process in the EIA Phase will include the following:

- Ongoing identification and notification stakeholders;
- Registration of parties as I&APs on the project database;
- Collation of issues and concerns into a Comments and Responses Report for inclusion in the EIR;
- Circulation of the EIR for public review (30 days);
- Executive Summaries will be made available (in English); and
- Notification of I&APs on the database of the decision and appeal process.

6.7 INTEGRATION AND ASSESSMENT

The specialist findings, recommendations and other relevant information will be integrated into an EIR. The full specialist studies will be included as appendices to the EIR.

6.8 MEASURES TO AVOID, REVERSE, MITIGATE OR MANAGE IDENTIFIED IMPACTS

An EMPr will be compiled and included in the EIR. The EMPr will be structured in terms of Appendix 4 of the EIA Regulations 2014 (as amended). The EMPr will provide recommendations on how to undertake the proposed project throughout all relevant phases of the project activities. The aim of the EMPr will be to ensure that the project activities are managed to avoid or reduce potential negative environmental impacts and enhance potential positive environmental impacts. The EMPr will detail the impact management objectives, outcomes and actions as required, the responsibility for implementation and the schedule and timeframe. Requirements for monitoring of environmental aspects, as well as compliance monitoring and reporting, will also be detailed. The EMPr will also include the required environmental awareness plan for the construction phase.
If approved by the relevant authorities, the provisions of the EMPr would be legally binding on the project applicant and all its contractors and suppliers.

6.9 DESCRIPTION OF TASKS AND INDICATIVE TIMING OF THE EIA PHASE

The EIA Phase has been developed to ensure that it complies with Section 23 and Appendices 3 and 4 to the EIA Regulations 2014 (as amended). The various tasks / activities (including the indicative timing thereof) that will be undertaken during the EIA Phase are described in Table 6-1.

TABLE 6-1: KEY TASKS (AND INDICATIVE TIMING) OF THE EIA PHASE.

Task No.	EAP activity	Indicative Schedule	Opportunities for consultation and participation
1	• Consultation with I&APs.	January - February 2020	✓
2	• Manage specialist activities and receive inputs for EIR. • Internal review specialist studies.	February - March 2020	
3	• Assess environmental impacts and identify management measures. • Compile EIR and EMPr.	March - April 2020	
4	• Release EIR to I&APs for 30-day comment period.	May - June 2020	✓ Comments on EIR to be sent to SLR
5	• Assimilate comments. • Finalise EIR and EMPr.	July 2020	
6	• Submit updated EIR to DEA&DP (within 106 days from acceptance of Scoping Report).	July 2020	

Task No.	EAP activity	Indicative Schedule	Opportunities for consultation and participation
7	• Notify I&APs of authority decision (which must be made within 107 days of submission of EIR) and associated appeal process.	September 2020	✓ Appeals to be sent to the Minister

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APPENDIX A: DMRE SCOPING REPORT TEMPLATE

mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

SCOPING REPORT

SCOPING REPORT FOR AN EIA FOR A PROSPECTING RIGHT APPLICATION FOR OFFSHORE SEA CONCESSIONS 13C, 15C, 16C, 17C & 18C, WEST COAST

SUBMITTED FOR ENVIRONMENTAL AUTHORISATION IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998, IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (MPRDA) (AS AMENDED).

NAME OF APPLICANT: Belton Park Trading 127 (Pty) Ltd

TEL NO: +27 (0) 21 510-1881

FAX NO: +27 (0) 21 510-5035

POSTAL ADDRESS: 19 Chain Avenue
Montague Gardens
Cape Town, 7405

PHYSICAL ADDRESS: Same as above.

FILE REFERENCE NUMBER SAMRAD: WC30/5/1/1/2/10319PR
WC30/5/1/1/2/10320PR
WC30/5/1/1/2/10321PR
WC30/5/1/1/2/10322PR
WC30/5/1/1/2/10323PR

IMPORTANT NOTICE

In terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002 as amended), the Minister must grant a prospecting or mining right if among others the mining "will not result in unacceptable pollution, ecological degradation or damage to the environment".

Unless an Environmental Authorisation can be granted following the evaluation of an Environmental Impact Assessment and an Environmental Management Programme report in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA), it cannot be concluded that the said activities will not result in unacceptable pollution, ecological degradation or damage to the environment.

In terms of section 16(3)(b) of the EIA Regulations 2014, any report submitted as part of an application must be prepared in a format that may be determined by the Competent Authority and in terms of Section 17(1)(c) the competent Authority must check whether the application has taken into account any minimum requirements applicable or instructions or guidance provided by the competent authority to the submission of applications.

It is, therefore, an instruction that the prescribed reports required in respect of applications for an environmental authorisation for listed activities triggered by an application for a right or permit are submitted in the exact format of, and provide all the information required in terms of, this template. Furthermore, please be advised that failure to submit the information required in the format provided in this template will be regarded as a failure to meet the requirements of the Regulation and will lead to the Environmental Authorisation being refused.

It is furthermore an instruction that the Environmental Assessment Practitioner must process and interpret his/her research and analysis and use the findings thereof to compile the information required herein. (Unprocessed supporting information may be attached as appendices). The EAP must ensure that the information required is placed correctly in the relevant sections of the Report, in the order, and under the provided headings as set out below, and ensure that the report is not cluttered with un-interpreted information and that it unambiguously represents the interpretation of the applicant.

OBJECTIVE OF THE SCOPING PROCESS

1) The objective of the scoping process is to, through a consultative process—

- identify the relevant policies and legislation relevant to the activity;
- motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- identify and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking process;
- identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;
- identify the key issues to be addressed in the assessment phase;
- agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and
- identify suitable measures to avoid, manage, or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

1. CONTACT PERSON AND CORRESPONDENCE ADDRESS

1.1 DETAILS OF THE EAP WHO PREPARED THE REPORT:

The details and role of the environmental assessment practitioner (EAPs) that were involved in the preparation of this scoping report are provided in Table 1-1 below.

Neither SLR Consulting (South Africa) (Pty) Ltd nor any of the specialists involved in the environmental assessment process have any interest in the project other than fair payment for consulting services rendered as part of the environmental assessment process.

Table 1-1: Details of the EAP

Name of the practitioner	Jeremy Blood (Registered Environmental Assessment Practitioner)
Tel No.:	021 461 1118/9
Fax No.:	021 461 1120
E-mail address	jblood@slrconsulting.com

1.2 EXPERTISE OF THE EAP

NAME	Jeremy Blood
RESPONSIBILITY ON PROJECT	Registered Environmental Assessment Practitioner and review
DEGREE	B.Sc. Hons (Bot.), M.Sc. (Cons. Ecol.)
PROFESSIONAL REGISTRATION	Pr.Sci.Nat., EAPASA
EXPERIENCE IN YEARS	20
EXPERIENCE	Jeremy Blood has been working as an environmental assessment practitioner since 1999 and has project managed a number of large-scale projects covering a range of environmental disciplines, including Environmental Impact Assessments, Environmental Management Plans/Programmes, Environmental Auditing & Monitoring and Environmental Control Officer related work in South Africa, Namibia, Mozambique and Kenya. He has expertise in a wide range of projects relating to mining (oil/gas, heavy mineral mining and borrow pits), housing/industrial developments and infrastructure projects (e.g. roads, railway line, power lines and pipelines).

NAME	Jonathan Crowther
RESPONSIBILITY ON PROJECT	Project leader and quality control.
DEGREE	M.Sc. (Env. Sci.), B.Sc. Hons (Geol.)
PROFESSIONAL REGISTRATION	Pr.Sci.Nat., Member IAIAsa
EXPERIENCE IN YEARS	31
EXPERIENCE	Jonathan Crowther has been involved in environmental consulting since 1988 and is currently a Lead Environmental Consultant with SLR Consulting (South Africa) (Pty) Ltd. He has expertise in a wide range of environmental disciplines, including Environmental Impact Assessments (EIA), Environmental Management Plans / Programmes, Environmental Planning & Review, Environmental Control Officer services, and Public Consultation & Facilitation. He has project managed a number of offshore oil and gas EIAs for various exploration and production activities in South Africa and Namibia. He also has extensive experience in projects related to roads, property developments and landfill sites.

NAME	Nicholas Arnott
RESPONSIBILITY ON PROJECT	Project consultant and report writing.
DEGREE	B.Sc. Hons (Earth and Geographical Science)
PROFESSIONAL REGISTRATION	Pri. Sci. Nat., Member IAIAsa
EXPERIENCE IN YEARS	13
EXPERIENCE	Nicholas Arnott has worked as an environmental assessment practitioner since 2006 and has been involved in a number of projects covering a range of environmental disciplines, including Basic Assessments, Environmental Impact Assessments and Environmental Management Programmes. He has gained experience in a wide range of projects relating to mining, infrastructure projects (e.g. roads), housing and industrial developments.

Proof of registrations of the EAP is provided in Appendix 1 and the relevant curricula vitae are attached in Appendix 2.

2. DESCRIPTION OF THE PROPERTY

The proposed prospecting operations would be undertaken within Sea Concessions 13C, 15C, 16C, 17C & 18C, located off the West Coast of South Africa.

Farm Name	N/A – The Sea Concession areas are located between approximately 14 km – 23 km offshore of the West Coast of South Africa.		
Corner of property point co-ordinates	**Sea Concession Area 13C**		
	1	-31.7102757	17.1983337
	2	-31.7104282	18.1555557
	3	-31.8165569	18.1941662
	4	-31.8163872	17.1511116
	Sea Concession Area 15C		
	1	-31.9127789	17.1786118
	2	-31.9129848	18.2290993
	3	-32.0871849	18.1708546
	4	-32.0866661	17.2552776
	Sea Concession Area 16C		
	1	-32.0866661	17.2552776
	2	-32.0871849	18.1708546
	3	-32.2041435	18.1752834
	4	-32.2036133	17.2991676
	Sea Concession Area 17C		
	1	-32.2036133	17.2991676
	2	-32.2041435	18.1752834
	3	-32.3205872	18.1155205
	4	-32.3199997	17.3841667
	Sea Concession Area 18C		
	1	-32.3199997	17.3841667
	2	-32.3205872	18.1155205
	3	-32.5583382	17.875
	4	-32.5583344	17.7161121
Application area (Ha)	Sea Concession Area 13C - 1117.53 km² Sea Concession Area 15C - 1791.40 km² Sea Concession Area 16C - 1096.43 km² Sea Concession Area 17C - 976.69 km² Sea Concession Area 18C - 1104.42 km²		
Magisterial district	N/A		

Distance and direction from nearest town	• Sea Concession 13C is located approximately 5 km west of Strandfontein; • Sea Concession 15C is located approximately 14 km north-west of Lamberts Bay; • Sea Concession 16C is located approximately 17 km west of Lamberts Bay; • Sea Concession 17C is located approximately 20 km west of Elands Bay; and • Sea Concession 18C is located approximately 23 km south-west of Elands Bay.
21 digit Surveyor General Code for each farm portion	N/A - the proposed project is located offshore.

3. LOCALITY MAP

A map showing the locality of the Sea Concession areas is provided in Figure 4-1.

4. DESCRIPTION OF THE SCOPE OF THE PROPOSED OVERALL ACTIVITY

4.1 LISTED AND SPECIFIED ACTIVITIES

The Environmental Impact Assessment (EIA) Regulations 2014 (as amended) promulgated in terms of Chapter 5 of National Environmental Management Act (NEMA), 1998 (Act 107 of 1998), and published in Government Notice (GN) No. R982 (as amended), provides for the control of certain listed activities. These activities are listed in GN No. R983 (Listing Notice 1), R984 (Listing Notice 2) and R985 (Listing Notice 3) of 4 December 2014 (as amended) and are prohibited until Environmental Authorisation (EA) has been obtained from the competent authority. The Minister of Mineral Resources and Energy remains responsible for the granting of EA for Prospecting Right Applications in term of NEMA. Such EA, which may be granted subject to conditions, will only be considered once there has been compliance with GN No. R982.

GN No. R982 sets out the procedures and documentation that need to be complied with when applying for EA. A *Basic Assessment* process must be applied to an application if the authorisation applied for is in respect of an activity(ies) listed in Listing Notice 1 and / or 3 and a *Scoping and EIA* process must be applied to an application if the authorisation applied for is in respect of an activity(ies) listed in Listing Notice 2.

The proposed project triggers, amongst others, Activity 19 contained in Listing Notice 2, thus a full Scoping and EIA process must be undertaken in order for the Department of Mineral Resources and Energy (DMRE) to consider the application in terms of NEMA and make a decision as to whether to grant EA or not. All the listed activities triggered by the proposed project are indicated in Table 4-1 below.

Table 4-1: List of activities/infrastructure associated with the proposed project

Activity No.	Activity Description	Description of activity in relation to the proposed project
GN No. R983: Listing Notice 1		
19A	*"The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from:* *(iii) the sea. …"*	The proposed sampling activities would result in various forms of disturbance to the seafloor and would result in more than 5 m^3 of sediment being disturbed and moved.
20	*"Any activity including the operation of that activity which requires a prospecting right in terms of section 16 of the Mineral and Petroleum Resources Development Act, 2002*	The proposed project entails the removal and primary processing of seabed sediments to determine the presence of the proposed target minerals, thus the proposed

Activity No.	Activity Description	Description of activity in relation to the proposed project
	(Act No. 28 of 2002), including *(a) associated infrastructure, structures and earthworks, directly related to prospecting of a mineral resource; or* *(b) the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing;* *but excluding the secondary processing of a mineral resource, including the smelting, beneficiation, reduction, refining, calcining or gasification of the mineral resource in which case activity 6 in Listing Notice 2 applies."*	sampling activities would trigger this listed activity.
22	*"The decommissioning of any activity requiring-* *(i) a closure certificate in terms of section 43 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002); or* *(ii) a …prospecting right… where the throughput of the activity has reduced by 90% or more over a period of 5 years excluding where the competent authority has in writing agreed that such reduction in throughput does not constitute closure."*	On completion of the proposed prospecting operation, BPT127 would be required to apply to the DMRE for a closure certificate. The process of applying for a Closure Certificate would trigger this listed activity.
GN No. R984: Listing Notice 2		
19	*"The removal and disposal of minerals contemplated in terms of section 20 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks, directly related to prospecting of a mineral resource; the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing; but excluding the secondary processing of a mineral resource, including the smelting, beneficiation, reduction, refining, calcining or gasification of the mineral resource in which case activity 6 in this Notice applies."*	The proposed bulk sampling would involve the removal and disposal of marine diamonds and would include extraction, screening and washing during the bulk sampling operations.

4.2 DESCRIPTION OF THE ACTIVITIES TO BE UNDERTAKEN

4.2.1 PROJECT OVERVIEW

The proposed prospecting programme would entail geophysical surveying, drill sampling and bulk (trench) sampling activities. The principal objective of the proposed prospecting activities is to identify and estimate the potential mineral resources within each Sea Concession area for possible future mining. The proposed activities may be divided into stages subject to data reviews and follow-up sampling. Each of the proposed prospecting activities are described below.

4.2.1.1 Geophysical Surveys

The geophysical surveying will be undertaken using the group-owned dedicated survey vessel, the *DP Star* which has an overall length of 45.15 m and a gross tonnage of 498 t. The vessel is equipped with:

- a multibeam echosounder designed to produce high resolution digital terrain models of the seafloor by transmitting a 30 kHz sounding in a wide swath below the vessel; and
- a parametric sub-bottom profiler (Topas system), which uses shallow (35 to 45 kHz) and medium penetration (1 to 10 kHz) "Chirp" seismic pulses to generate profiles up to 60 m beneath the seafloor, thereby giving a cross section view of the sediment layers.

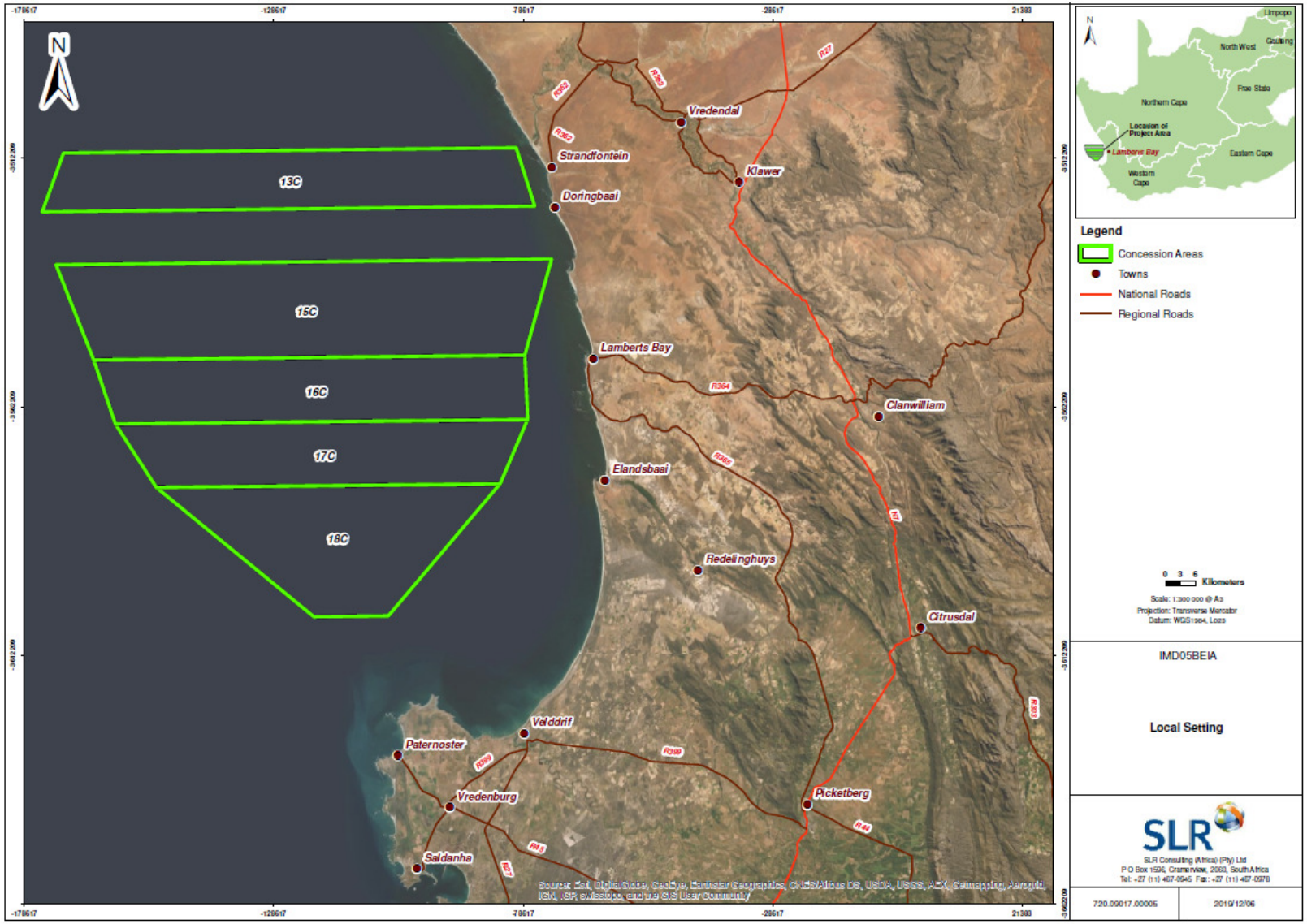


Figure 4-1: Location of the Prospecting Right areas, off the West Coast of South Africa.

Sound levels from the acoustic equipment would range between 190 to 220 dB re 1 µPa at 1 m. The proposed surveys would be undertaken in specific priority areas in each of the concessions, at water depths of between approximately 45 – 200 m. The surveys would have a line spacing of between 100 to 1 000 m apart. The total line kilometres surveyed per concession will be between 600 and 1 200 km. The planned duration for the proposed geophysical surveys would be a total of four days per concession area (20 days in total) / year over a four year period (i.e. the duration of the validity of the prospecting right).

In general terms, sound sources that have high sound pressure and low frequency will travel the greatest distances in the marine environment. Conversely, sources that have high frequency will tend to have greater attenuation over distance due to interference and scattering effects (Anon 2007). It is for this reason that the acoustic footprint of the above-mentioned sonar survey tools is considered to be much lower than that of deeper penetration low frequency seismic surveys and in addition have lower sound pressure levels. It should be noted that a decibel is a logarithmic scale of pressure where each unit of increase represents a tenfold increase in the quantity being measured.

4.2.1.2 Drill Sampling

The proposed drill sampling activities would be undertaken using the group-owned dedicated sampling vessel, the *MV The Explorer*. The vessel has an overall length of 114.4 m, a gross tonnage of 4 677 t, and is equipped with a subsea sampling tool, which can be operated in water depths up to 200 m. The sampling tool comprises a 2.5 m diameter drill bit operated from a drill frame structure, which is launched through the moon pool of the support vessel and positioned on the seabed.

The drill frame structure has a base of 6.5 x 6.5 m, stands 23 m high and weighs 147 tons. The drill bit can penetrate sediments up to 12 m depth above the bedrock. The sediments are fluidised with strong water jets and airlifted to the support vessel where they are treated in the onboard mineral recovery plant. All oversized and undersized tailings are discharged back to the sea on site.

A sample spacing of as little as 20 m can be achieved by the dynamically positioned vessel. Depending on sea and the subseabed geotechnical conditions, up to 60 samples can be successfully taken per day. The samples would be undertaken at intervals of 50 to 500 m. With a planned duration for the proposed drill sampling of four days / year for each concession area over a four year period, the total number of drill samples that could be obtained during the prospecting right period would be up to a maximum of 4 800. With a drill footprint of 5 m^2, a total area of 2.4 ha would be sampled.

4.2.1.3 Bulk Sampling

Following analysis of the drill samples and establishment of a potential resource, bulk trench sampling may be conducted to confirm the economic viability of the resource for mining. Trenching would be undertaken by a seabed crawler, deployed off the group-owned dedicated mining vessel, the *MV Ya Toivo* which has an overall length of 150 m and a gross tonnage of 9 111 t. The vessel is equipped with a track-mounted subsea crawler capable of working to depths up to 200 m below sea level. The crawler, which is fitted with highly accurate acoustic seabed navigation and imaging systems, and equipped with an anterior suction system, is lowered to the seabed and is controlled remotely from the surface support vessel through power and signal umbilical cables. Water jets in the crawler's suction loosen seabed sediments, and sorting bars filter out oversize boulders. The sampled sediments are pumped to the surface for shipboard processing. The area of the seabed to be sampled by crawler can only be determined following analysis of drill samples and development of a resource model.

It is proposed that up to ten trenches, each 180 m long and 20 m wide would be excavated within each concession area. Thus, the area to be disturbed in each concession would be 3.6 ha and 18 ha for all five concessions. The planned duration of the proposed bulk sampling would be a total of four days per a concession area over a two year period. It is noted that the trenches will not be contiguous, but located in the prospective areas derived from the drill sampling results. The aim of the trench sampling is to determine the geotechnical characteristics of the footwall and overburden which is essential in establishing the optimal approach to mining in these areas.

4.2.2 REHABILITATION

The immediate impact on the seabed entails the localised removal of the seabed habitat, with the fine sediment surface layers replaced with coarse sediments (boulders and gravels). The majority of the material that is pumped to the surface is returned directly to the sea after the primary screening process. Operations are designed such that the coarse tailings, and to some extent the finer sediments, discharged from the vessels land back into disturbed areas as far as possible. This avoids reprocessing the same sediments, minimises the disturbance footprint and provides material for re-establishment of habitat. Sediments typically settle rapidly, with most of the silt sinking within minutes. Mixing with descending seawater then results in dilution of the finer sediment, with the remaining particulate matter settling over a period of hours. Seabed research programs have demonstrated the re-establishment of the ecological functioning of the seabed after removal of the diamonds. Seabed recovery rates are linked to fine sediment infill, the rate of which is influenced by a range of factors including resuspension and settlement of sediments from adjacent areas by near-seabed currents, Orange River flooding etc. Recolonisation takes place by passive translocation of animals during storms or sediment slumping from nearby unaffected areas, active immigration of mobile species, and immigration and settlement of pelagic larvae and juveniles.

4.2.3 VESSEL EMISSIONS AND DISCHARGES

This section provides a brief description of the types of emissions and discharges that are expected from the bulk sampling and related activities. These would include:

- Discharges such as deck drainage, machinery space wastewater, sewage, etc.;
- Disposal of solid waste such as food waste; and
- Vessel machinery emissions.

These are discussed in more detail below.

4.2.3.1 Discharges to sea

<u>Vessel machinery spaces (bilges), ballast water and deck drainage</u>

The concentration of oil in discharge water from any vessel (bilge and ballast) would comply with the MARPOL Regulation 21 standard of less than 15 ppm oil in water. Any oily water would be processed through a suitable separation and treatment system to meet the MARPOL standard before discharge overboard. Drainage from marine (weather) deck spaces would wash directly overboard.

<u>Sewage</u>

Although South Africa is not yet a signatory to MARPOL Annex IV Regulations for the Prevention of Pollution by Sewage from Ships, the contracted vessels would be required to comply, wherever possible, with the requirements of this Annex.

Food (galley) wastes

The disposal into the sea of food waste is permitted in terms of MARPOL when it has been comminuted or ground and the vessel is located more than 3 nautical miles (approximately 5.5 km) from land. Such comminuted or ground food wastes shall be capable of passing through a screen with openings no greater than 25 mm. Disposal overboard without macerating can occur greater than 12 nautical miles (approximately 22 km) from the coast. The daily discharge from the vessel would be approximately 0.15 m^3.

Detergents

Detergents used for washing exposed marine deck spaces would be discharged overboard. The toxicity of detergents varies greatly depending on their composition. Water-based detergents are low in toxicity and are preferred for use. Preferentially biodegradable detergents would be used. Detergents used on work deck space would be collected with the deck drainage and treated as described under deck drainage.

Other

Vessels used during bulk sampling activities would have a certified antifouling coating system that is tin free.

4.2.3.2 Land Disposal

A number of other types of wastes generated during the bulk sampling activities would not be discharged at sea but would be transported onshore for ultimate disposal. Waste transported to land would be disposed at a licenced municipal landfill facility or at an alternative approved site. Operators would co-operate with local authorities to ensure that waste disposal is carried out in an environmentally acceptable manner. A summary of these waste types generated by a vessel used during a typical bulk sampling operation is given below.

General waste

This includes waste, paper, plastics, wood, glass, etc. Waste would be disposed of at an onshore landfill site in accordance with legal requirements.

Scrap metal

Scrap metal would be stored and recycled / disposed of on land in accordance with legal requirements.

Drums and containers

Empty drums containing residues, which may have adverse environmental effects (solvents, lubricating/gear oil, etc.), would be recycled / disposed of in a licenced landfill site in accordance with legal requirements.

Used oil

This includes used lubricating and gear oil, solvents, hydrocarbon-based detergents and machine oil. Toxicity varies depending on oil type. All non-recycled waste oils would be securely stored, transported to shore and disposed of at a licenced landfill site acceptable to the relevant authorities.

Chemicals and hazardous wastes

Disposal of any unexpected chemical and hazardous substance (e.g. fluorescent tubes, toner cartridges, batteries, etc.) would be undertaken on a case-by-case basis and in a manner acceptable to appropriate regulatory authorities.

Infectious wastes

Infectious wastes include bandages, dressings, surgical waste, tissues, medical laboratory wastes, needles, and food wastes from persons with infectious diseases. Only minor quantities of medical waste are expected. Prevention of exposure to contaminated materials is essential, requiring co-operation with local medical facilities to ensure proper disposal. All such waste will be incinerated onboard or stored and brought onshore for disposal via a registered medical waste company.

Filters and filter media

This includes air, oil and water filters from machinery. Oily residue and used media in oil filters that may contain metal (e.g. copper) fragments, etc. are possibly toxic. Filters and media would be transported onshore and disposed of at a licensed landfill facility.

4.2.3.3 Discharges to air

Compliance with the requirements of Marpol Annex VI - Prevention of Air Pollution from Ships will be required for all vessel engines and where vessels are fitted with garbage incinerators.

5. POLICY AND LEGISLATIVE CONTEXT

An overview of the key legislative requirements applicable to the proposed prospecting operations followed in the Scoping and EIA process is provided below.

5.1 LEGISLATIVE REQUIREMENTS

5.1.1 MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002

In terms of the Mineral and Petroleum Resources Development Act (MPRDA), a Prospecting Right must be obtained prior to the commencement of any prospecting activities. A requirement for obtaining a Prospecting Right is that an applicant must submit an application in terms to Section 16(1) of the MPRDA to the Regional Manager, who must accept the application within 14 days if, inter alia, no other person holds a Prospecting Right, Mining Right, Mining Permit or Retention Permit for the same mineral and land. If the application for a Prospecting Right is accepted, the Regional Manager must request that the applicant comply with Chapter 5 of NEMA with regards to consultation and reporting.

On 17 December 2019, BPT127 lodged an application with DMRE for a Prospecting Right in terms of the MPRDA and an Application for EA in terms of NEMA.

5.1.2 NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998

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

Chapter 5 of NEMA outlines the general objectives and implementation of Integrated Environmental Management (IEM), which provides a framework for the integration of environmental issues into the

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

A summary of the EIA Regulations 2014 (as amended) and an outline of the identified listed activities which are triggered in terms of the EIA Regulations 2014 (as amended) are provided in Section 4.1 above.

5.1.3 NATIONAL ENVIRONMENTAL MANAGEMENT: AIR QUALITY ACT, 2004

The National Environmental Management: Air Quality Act, 2004 (No. 39 of 2004) (NEM:AQA) regulates all aspects of air quality, including prevention of pollution, providing for national norms and standards and including a requirement for an Atmospheric Emissions Licence (AEL) for listed activities, which result in atmospheric emissions and have or may have a significant detrimental effect on the environment.

Activities that require an AEL are listed in GN No. 893 (22 November 2013), published in terms of Section 21(1)((b) of the NEM: AQA. In terms of Section 22 of NEM: AQA no person may conduct a listed activity without an AEL. The incineration of waste is a listed activity (Category 8.1 – Thermal treatment of Hazardous and General Waste) and requires an AEL for all installations treating 10 kg or more of waste per day.

In terms of Section 36 of the Act, the metropolitan and district municipalities are charged with implementing the AEL system. However, as the offshore area of activity and the Exclusive Economic Zone (EEZ) do not fall within the borders of any municipality or province of South Africa as set out in the Constitution, there is no formal means in terms of NEM: AQA by which application can be made for incineration from vessels in the offshore. Furthermore, the on-board incineration of waste is permitted in terms of the International Convention for the Prevention of Pollution from Ships, 1973/1978 (MARPOL), to which South Africa is a signatory. Thus, there is uncertainty of the applicability of NEM:AQA to offshore operations, given that MARPOL, an international convention, allows for the on-board incineration of waste and there is no formal implementing authority for AEL applications associated with offshore operations.

5.1.4 NATIONAL ENVIRONMENTAL MANAGEMENT: WASTE ACT, 2008

The National Environmental Management: Waste Act, 2008 (No. 59 of 2008) (NEM:WA) regulates all aspects of waste management and has an emphasis on waste avoidance and minimisation. NEM:WA creates a system for listing and licensing waste management activities. Listed waste management activities above certain thresholds are subject to a process of impact assessment and licensing. Activities listed in Category A require a Basic Assessment, while activities listed in Category B require a Scoping and EIA process.

DEFF (then the Department of Environmental Affairs) has indicated that NEM:WA is not applicable to offshore activities. Thus a Waste Management Licence would not be required for offshore waste management activities, such as those related to sewage. These aspects would be managed in terms of and comply with the requirements of the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78).

5.1.5 OTHER RELEVANT LEGISLATION

In addition to the foregoing, BPT127 must also comply with the provisions of other relevant conventions and legislation, which includes, amongst others, the following:

International Marine Pollution Conventions

- International Convention for the Prevention of Pollution from Ships, 1973/1978 (MARPOL);
- Amendment of the International Convention for the Prevention of Pollution from Ships, 1973/1978 (MARPOL) (Bulletin 567 – 2/08);
- International Convention on Oil Pollution Preparedness, Response and Co-operation, 1990 (OPRC Convention);
- United Nations Convention on Law of the Sea, 1982 (UNCLOS);
- Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 (the London Convention) and the 1996 Protocol (the Protocol);
- International Convention relating to Intervention on the High Seas in case of Oil Pollution Casualties (1969) and Protocol on the Intervention on the High Seas in Cases of Marine Pollution by substances other than oil (1973);
- Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal (1989); and
- Convention on Biological Diversity (1992).

Other South African legislation

- Carriage of Goods by Sea Act, 1986 (No. 1 of 1986);
- Dumping at Sea Control Act, 1980(No. 73 of 1980);
- Hazardous Substances Act, 1983 and Regulations (No. 85 of 1983);
- Marine Living Resources Act, 1998 (No. 18 of 1998);
- Marine Traffic Act, 1981 (No. 2 of 1981);
- Marine Pollution (Control and Civil Liability) Act, 1981 (No. 6 of 1981);
- Marine Pollution (Prevention of Pollution from Ships) Act, 1986 (No. 2 of 1986);
- Marine Pollution (Intervention) Act, 1987 (No. 65 of 1987);
- Maritime Safety Authority Act, 1998 (No. 5 of 1998);
- Maritime Safety Authority Levies Act, 1998 (No. 6 of 1998);
- Maritime Zones Act 1994 (No. 15 of 1994);
- Merchant Shipping Act, 1951 (No. 57 of 1951);
- Mine Health and Safety Act, 1996 (No. 29 of 1996);
- National Environmental Management: Biodiversity Act, 2004 (No. 10 of 2004);
- National Environmental Management: Integrated Coastal Management Act, 2008 (No. 24 of 2008);
- National Environmental Management: Protected Areas Act, 2003 (No. 57 of 2003)
- National Heritage Resources Act, 1999 (No. 25 of 1999);
- National Ports Act, 2005 (No. 12 of 2005);
- National Water Act, 1998 (No. 36 of 1998);
- Occupational Health and Safety Act, 1993 (No. 85 of 1993) and Major Hazard Installation Regulations;
- Sea-Shore Act, 1935 (No. 21 of 1935);
- Sea Birds and Seals Protection Act, 1973 (No. 46 of 1973);
- Ship Registration Act, 1998 (No. 58 of 1998);
- South African Maritime Safety Authority Act, 1998 (No. 5 of 1998);
- South African Maritime Safety Authority Levies Act, 1998 (No. 6 of 1998); and
- Wreck and Salvage Act, 1995 (No. 94 of 1995).

5.2 GUIDELINES AND POLICIES

The guidelines and policies listed in Table 5-1 below have been / or will be taken into account during the Scoping and EIA process.

Table 5-1: Guidelines and policies relevant to the proposed project.

Guideline	Governing body	Applicability
Guideline on need and desirability (March 2017)	DEFF	This guideline informed the consideration of the need and desirability aspects of the proposed project.
Public Participation guideline in terms of NEMA (2017)	DEFF	The purpose of these guidelines is to ensure that an adequate public participation process was undertaken during the EIA process.
Cumulative Effects Assessment, Integrated Environmental Management, Information Series 7 (2004)	DEFF	This guideline will be consulted to inform the consideration of potential cumulative effects of the proposed project.
Criteria for determining Alternatives in EIA, Integrated Environmental Management, Information Series 11 (2004)	DEFF	This guideline was consulted to inform the consideration of alternatives.
Environmental Management Plans, Integrated Environmental Management, Information Series 12 (2004)	DEFF	This guideline will be consulted to ensure that the Environmental Management Programme (EMP) has been adequately compiled.
Environmental Impact Reporting, Integrated Environmental Management, Information Series 15 (2004)	DEFF	This guideline was consulted to inform the approach to impact reporting.
Specialist Studies, Integrated Environmental Management, Information Series 4 (2002)	DEFF	This guideline was consulted to ensure adequate development of terms of reference for specialist studies.
Impact significance, Integrated Environmental Management, Information Series 5 (2002)	DEFF	This guideline was consulted to inform the assessment of significance of impacts of the proposed project.

6. NEED AND DESIRABILITY OF THE PROPOSED PROJECT

In order for mining to continue to be a core contributor to the South African economy and in the pursuance of the sustainable development of the nation's mineral resources, it is necessary to identify new resources through prospecting activities, such as bulk sampling in the case of this application. A key intent of the Minerals and Mining Policy of South Africa states that Government will: "promote exploration and investment leading to increased mining output and employment" (Minerals and Mining Policy of South Africa, 1998). The Policy states further that:

- "The South African mining industry, one of the country's few world-class industries, has the capacity to continue to generate wealth and employment opportunities on a large scale;
- Mining is an international business and South Africa has to compete against developed and developing countries to attract both foreign and local investment. Many mining projects in South Africa have tended to be unusually large and long term, requiring massive capital and entailing a high degree of risk; and
- South Africa has an exceptional minerals endowment, and in several major commodities has the potential to supply far more than the world markets can consume."

In the more recently published Department of Minerals Resources and Energy (then Department of Mineral Resources) Strategic Plan 2014 – 2019, the foreword by the Minister of Mineral Resources and Energy notes that the Department "will continue to promote mineral value addition to strengthen the interface between extractive industries and national socio-economic developmental objectives" and "contribute towards decent employment, inclusive growth and industrialisation of South Africa".

The West Coast District Municipality's (WCDM) Integrated Development Plan 2017 – 2022 (2019) notes that it has "*a vast number of mineral resources, of which some are currently not being exploited*" and deems that *"mining could potentially make an increased economic contribution to the WCDM economy when these unexploited resources are utilised in future"*.

In terms of the above, it is evident that the proposed prospecting activities are deemed to be important to the current national and provincial economies as future mining projects are a means to assist Government in meeting broader societal needs.

7. PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED

The overall prospecting programme would run over a five-year period.

8. DESCRIPTION OF THE PROCESS FOLLOWED TO REACH THE PREFERRED SITE ALTERNATIVE

NEMA prescribes that every application for EA must include, *inter alia*, an investigation of the potential consequences or impacts of the alternatives to the activity on the environment and assessment of the significance of those potential consequences or impacts, including the option of not implementing the activity (i.e. No-Go Alternative).

"Alternatives", in relation to a proposed activity, are different ways of meeting the general purposes and requirements of the proposed activity, which may include alternatives to:

- the location where it is proposed to undertake the activity;
- the type of activity to be undertaken;
- the technology to be used in the activity; and
- the option of not implementing the activity.

This section presents the various alternatives considered in this Scoping Report.

8.1 LOCATION AND TECHNOLOGY ALTERNATIVES

Alternatives, in relation to a proposed activity, are different ways of meeting the general purposes and requirements of the proposed activity, which may include alternatives to:

- the location where it is proposed to undertake the activity; and
- the technology to be used in the activity.

As the intention of the proposed prospecting operations is to determine the presence of economically viable diamond deposits that occur within the Sea Concession areas, no further location alternatives are considered in the Scoping and EIA process.

The different prospecting methodologies being considered in the Scoping and EIA process are described in detail in Section 4.2.1 above.

8.2 NO-GO ALTERNATIVE

The No-Go alternative is the non-occurrence of the proposed project. The negative implications of not going ahead with the proposed project are as follows:

- Loss of opportunity to establish whether further viable ore bodies of the offshore target minerals exist;
- Prevention of any socio-economic benefits associated with the continuation of prospecting activities; and
- Lost economic opportunities.

The positive implications of the no-go option are that there would be no effects on the biophysical environment in the area proposed for the prospecting activities

8.3 DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED

8.3.1 PRE-APPLICATION PUBLIC PARTICIPATION PROCESS

The scoping phase public participation process provided an opportunity to:

(i) notify key stakeholders of the proposed project;
(ii) raise any initial issues or concerns regarding the proposed project; and
(iii) review and comment on the draft Scoping Report.

The steps undertaken during the pre-application public participation process are summarised in Box 8-1 below and all supporting information is presented in appendices to this report.

BOX 8-1: TASKS UNDERTAKEN DURING THE PRE-APPLICATION PUBLIC PARTICIPATION PROCESS

- **I&AP identification**
  A preliminary I&AP database of authorities (including State Departments with jurisdiction in the area, municipal offices and ward councillors), Organs of State, Non-Governmental Organisations, Community-based Organisations, adjacent landowners and other key stakeholders with a potential interest in the proposed project was compiled. To date 86 I&APs have been registered on the project database (see Appendix B of the main Scoping Report).
- **I&AP Notification Letters**
  All identified I&APs have been notified of the proposed project, Application for EA and EIA process by means of a notification letter. The purpose of the notification letter was to convey information on the proposed project, EA process, as well as to invite I&APs to register on the project database and notify them of the availability of the draft Scoping Report for review and comment. The draft Scoping Report review and comment period is from 10 January to 10 February 2020.
- **Press advertisement**
  A press advertisement providing notification of the proposed project, EA process and availability of the Scoping Report for review and comment was placed in the “Die Burger” newspaper.

8.4 SUMMARY OF ISSUES RAISED BY I&APS

This will be provided in the final Scoping Report.

8.5 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE SITES

A detailed description of the biophysical and socio-economic environment likely to be affected by the proposed project in the study area is provided in Section 4 of the main Scoping Report. It provides a general

overview of the physical and biological oceanography and human utilisation of South African West Coast and, where applicable, detailed descriptions of the marine environment that may be directly affected by the proposed prospecting activities.

8.6 IMPACTS IDENTIFIED

A number of key issues have been identified by the Scoping and EIA project team. These are presented in Section 5 of the main Scoping Report. These include:

- Effect on marine fauna;
- Effect on fisheries;
- Effect on marine mining and exploration activities;
- Effect on marine transport routes;
- Effect on shipwrecks; and
- Effect on socio-economic environment.

8.7 METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF ENVIRONMENTAL IMPACTS

The methodology to be used to determine the significance of environmental impacts is detailed in the Plan of Study for EIA and presented in Section 6 of the main Scoping Report. A summary of the methodology to be followed is provided in Section 9.4 below.

8.8 POSITIVE AND NEGATIVE IMPACTS THAT THE PROPOSED ACTIVITY (IN TERMS OF THE INITIAL SITE LAYOUT) AND ALTERNATIVES WILL HAVE ON THE ENVIRONMENT AND THE COMMUNITY THAT MAY BE AFFECTED

As indicated above, the key issues that have been identified by the Scoping and EIA project team are provided in Section 5 of the main Scoping Report.

A detailed assessment of the identified potential impacts and confirmation of their significance (with input from the specialist investigations, where required) will be undertaken as part of the EIA phase.

8.9 THE POSSIBLE MITIGATION MEASURES THAT COULD BE APPLIED AND THE LEVEL OF RISK

The table below provides a list of likely project activities and possible management and mitigation measures that could be implemented for the identified project activities, as well as a preliminary assessment of the potential for residual risk. A detailed impact assessment and comprehensive set of proposed mitigation measures, incorporating specialist inputs, will be provided in the Environmental Impact Report and Environmental Management Programme to be prepared in the EIA phase.

Table 8-1: Possible mitigation measures and potential for residual risk

ACTIVITIES	POTENTIAL IMPACT	TYPICAL MITIGATION MEASURES	POTENTIAL FOR RESIDUAL RISK
Vessel operations	Deck drainage into the sea	Compliance with environmental management programme and Marpol 73/78 standards.	Low
	Machinery space drainage into the sea		
	Sewage effluent into the sea		

ACTIVITIES	POTENTIAL IMPACT	TYPICAL MITIGATION MEASURES	POTENTIAL FOR RESIDUAL RISK
	Galley waste disposal into the sea		
	Solid waste disposal into the sea		
Impact on marine fauna	Sediment removal	Mining activities should avoid rocky outcrop areas or other identified sensitive habitats in the concession areas. Use dynamically positioned sampling vessels are used in preference to vessels requiring anchorage.	Medium – Low
	Physical crushing of benthic biota		
	Generation of suspended sediment plumes		
	Smothering of benthos in redepositing tailings		
	Noise associated with prospecting activities		
Impact on other users of the sea	Fishing industry	Notification and communication with key stakeholders.	Medium - Low
	Fisheries research		
	Marine mining and prospecting		
	Petroleum exploration		
	Marine transport routes		
Impact on cultural heritage material	Impact on palaeontological material	Exclude areas where shipwreck sites are identified from the drill and bulk sampling programmes, prior to undertaking sampling activities.	Low
	Impact on historical shipwrecks		

8.10 THE OUTCOME OF THE SITE SELECTION MATRIX FINAL SITE LAYOUT PLAN

Not applicable.

8.11 MOTIVATION WHERE NO ALTERNATIVE SITES WERE CONSIDERED

The location of the proposed prospecting activities is ultimately determined by BPT127's application for a Prospecting Right in Sea Concession areas 13C, 15C, 16C, 17C and 18C.

8.12 STATEMENT MOTIVATING THE PREFERRED SITE

See Section 8.11 above.

9. PLAN OF STUDY FOR THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

In accordance with the requirements of Section 2(i) of Appendix 2 of the EIA Regulations 2014, a detailed Plan of Study for EIA is presented in Section 6 of the main Scoping Report. The Plan of Study for EIA sets out the proposed approach to the environmental impact assessment of the application.

9.1 DESCRIPTION OF ALTERNATIVES TO BE CONSIDERED INCLUDING THE OPTION OF NOT GOING AHEAD WITH THE ACTIVITY.

A description of the alternatives to be considered in the EIA Phase is provided in Section 8 above.

9.2 DESCRIPTION OF THE ASPECTS TO BE ASSESSED AS PART OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

A detailed description of the aspects to be assessed as part of the EIA process is presented in Section 5 of the main Scoping Report. The following aspects of the proposed project will be addressed in the EIA:

- Discharges/disposal to the sea;
- Deck and machinery space drainage;
- Sewage, galley and solid waste;
- Effect of multi-beam bathymetry and or sub-bottom profiler noise / pulses on marine fauna;
- Sediment removal;
- Generation of suspended sediment plumes;
- Smothering of benthos in redepositing tailings; and
- Project interactions with the fishing industry, other marine prospecting / mining activities, petroleum exploration and shipping.

9.3 DESCRIPTION OF ASPECTS TO BE ASSESSED BY SPECIALISTS

A detailed description of the aspects to be assessed by specialists is presented in Section 5 of the main Scoping Report. In summary, it is anticipated that the specialists would assess potential impacts on marine fauna and fisheries linked to the physical prospecting operations, deposition of tailings, vessel emissions and discharges, and the presence of the prospecting vessels within the Sea Concession areas.

9.4 PROPOSED METHOD OF ASSESSING THE ENVIRONMENTAL ASPECTS INCLUDING ALTERNATIVES

The proposed method for the assessment of environmental issues is set out in Section 6.3 of the Plan of Study for EIA, presented in Section 6 of the main Scoping Report. The assessment methodology will consider the following rating scales when assessing the significance of potential impacts:

- Extent of impact;
- Duration of impact;
- Intensity of impact;
- Consequence of impact;
- Status of impact;
- Probability of impact occurring;
- Significance of impact;
- Degree to which impact can be mitigated;
- Degree to which a resource is lost; and
- Degree of confidence of assessment.

9.5 THE PROPOSED METHOD OF ASSESSING DURATION SIGNIFICANCE

Refer to Section 9.4 above.

9.6 THE STAGES AT WHICH THE COMPETENT AUTHORITY WILL BE CONSULTED

9.6.1 COMPLETION OF THE SCOPING PHASE

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

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

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

9.6.2 EIA PHASE

9.6.2.1 Specialist studies

Three specialist studies will be undertaken to address the key issues that require further investigation and detailed assessment, namely: (1) the impact on marine fauna, (2) the impact on fishing, and (3) the impact on cultural heritage material. The specialist studies involve the gathering of data relevant to identifying and assessing environmental impacts that may occur as a result of the proposed project. These impacts will be then assessed according to pre-defined rating scales (see Section 9.4 above). Specialists will also recommend appropriate mitigation or optimisation measures to minimise potential impacts or enhance potential benefits, respectively. The terms of reference used for these studies are presented in Section 6 of the main Scoping Report.

9.6.2.2 Integration and Assessment

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

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

9.7 PARTICULARS OF THE PUBLIC PARTICIPATION PROCESS WITH REGARD TO THE IMPACT ASSESSMENT PROCESS THAT WILL BE CONDUCTED

9.7.1 STEPS TO BE TAKEN TO NOTIFY INTERESTED AND AFFECTED PARTIES

Project information in the form of an executive summary will be provided to I&APs on the project database. A copy of the report will be made available on the SLR website. I&APs will be notified when the EIR is available for public review via electronic mail and post (where necessary).

9.7.2 DETAILS OF THE ENGAGEMENT PROCESS TO BE FOLLOWED

As outlined in Section 9.6 above, the EIR will be released for a 30-day comment period and all I&APs on the project database will be notified when the EIR is available for comment. After closure of the comment period, all comments received on the draft report will be incorporated and responded to in a Comments and Responses Report. The draft report will then be updated and submitted to DMRE for consideration and decision-making. Registered I&APs on the project database will be informed that the revised EIR has been submitted to DMRE and a copy of the report will be made available on the SLR website for information-purposes.

After the Minister of Mineral Resources and Energy has reached a decision, all I&APs on the project database will be notified of the outcome of the application and the reasons for the decision. A statutory appeal period in terms of the National Appeal Regulations (GN No. R993) will follow the issuing of the decision.

9.7.3 DESCRIPTION OF THE INFORMATION TO BE PROVIDED TO INTERESTED AND AFFECTED PARTIES

See Section 9.7.1 and 9.7.2 above.

9.8 DESCRIPTION OF THE TASKS THAT WILL BE UNDERTAKEN DURING THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

See Section 9.7 above.

9.9 MEASURES TO AVOID, REVERSE, MITIGATE, OR MANAGE IDENTIFIED IMPACTS AND TO DETERMINE THE EXTENT OF THE RESIDUAL RISKS THAT NEED TO BE MANAGED AND MONITORED

See Section 9.4 above.

9.10 OTHER INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

Not Applicable.

9.10.1 IMPACT ON THE SOCIO-ECONOMIC CONDITIONS OF ANY DIRECTLY AFFECTED PERSON

A description of the baseline socio-economic environment likely to be affected by the proposed project in the study area is provided in Section 5 of the main Scoping Report. A detailed assessment of the identified potential impacts and confirmation of their significance (with input from the specialist investigations) will be undertaken as part of the EIA phase.

9.10.2 IMPACT ON ANY NATIONAL ESTATE REFERRED TO IN SECTION 3(2) OF THE NATIONAL HERITAGE RESOURCES ACT

A description of the maritime and underwater cultural heritage resources likely to be affected by the proposed project in the study area is provided in Section 5 of the main Scoping Report.

It was noted that the likelihood of disturbing a shipwreck would be very low considering the vast size of the South African offshore area.

In the event that any cultural heritage material is destroyed, the impact would be of very high significance. However, as the location of possible shipwrecks could be confirmed through the use of various seafloor survey techniques, these areas could be avoided. A detailed assessment of the identified potential impacts and confirmation of their significance (with input from the specialist investigations) will be undertaken as part of the EIA phase.

9.10.3 OTHER MATTERS REQUIRED IN TERMS OF SECTIONS 24(4)(A) AND (B) OF THE ACT

Not applicable.

10. UNDERTAKING BY THE EAP

The undertaking by the EAP is attached as Appendix C to the main Scoping Report.

APPENDIX 1: EAP PROOF OF REGISTRATION

EAPASA
Unit 19 Oxford Office Park
3 Bauhinia Street
Highveld Techno Park
Centurion
0157
Tel. (+27) 12 880 2154

Email: registrar@eapasa.org / Website: www.eapasa.org

Environmental Assessment Practitioners Association of South Africa
Advancing environmental assessment practice in South Africa

Mr Jeremy Blood
3 Gables Way
Rondebosch
Cape Town
7700

Sent by email to: jblood@slrconsulting.com

Dear Mr Blood

Registered Environmental Assessment Practitioner: Number 2019/1368
Jeremy Russell Blood : South African ID 7201125132081

The Environmental Assessment Practitioners Association of South Africa (EAPASA) herewith certifies that Jeremy Russell Blood is a Registered Environmental Assessment Practitioner (EAP) in accordance with the prescribed criteria of Regulation 15.(1) of the Section 24H Registration Authority Regulations (Regulation No. 849, Gazette No. 40154 of 22 July 2016, of the National Environmental Management Act (NEMA), Act No. 107 of 1998, as amended).

Your registration is duly authorised by EAPASA as the single Registration Authority for EAPs in South Africa (appointed as per Regulation No. 104, Gazette No. 41434 of 8 February 2018, in terms of section 24H(3)(a) of the NEMA). Your status as a Registered EAP is displayed in the 'EAP Register' - please find your name and contact email address at

https://registration.eapasa.org/registered-practitioners

Your registration is effective for a period of five years from 30 November 2019, and expires on 30 November 2024. The renewal of your registration in 2024 will be contingent on you having met the requirements of EAPASA's Continuing Professional Development (CPD) policy during each year of registration.

As a Registered EAP you are required to uphold the EAPASA Code of Ethical Conduct and Practice in your professional endeavours, towards the goal of quality assurance in environmental assessment practice.

Please accept my congratulations on your registration.

Best regards

RC Hill

Dr Richard Hill
Registrar
Date: 30 November 2019

APPENDIX 2: CV OF EAP

CURRICULUM VITAE

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
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. Jeremy's role included managing the EIA process and public participation process, specialist report review and EIA report writing.
Windhoek PEL28 BV - Exploration well drilling in Petroleum Exploration Licence 83, Namibia (2019)	EIA for the drilling of up to two exploration wells in Petroleum Exploration Licence 83 (PEL83) in the Orange Basin off the coast of Namibia. Jeremy's role included managing the EIA process and public participation process, specialist report review and EIA report writing.
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 1off 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-our 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 / EMPr 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 / EMPr 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 Kleinzee 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.
Umhlaba 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.
Southern Mining Corporation Ltd - Corridor Sands Heavy Mineral Mining Project, Gaza Province, Mozambique (1999-2002)	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.
BESC Consulting – Quarry, Willowvale, Transkei (1999)	Biological survey for a quarry near Willowvale in the Transkei. Jeremy compiled the biological survey report.
	Roads and related infrastructure
HHO Africa for the City of Cape Town - Broadway Boulevard Dualling Project, Western Cape, South Africa (2016)	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.
HHO Africa for WCG: Dept. of Transport and Public Works – Gansbaai-Bredasdorp Road Upgrade Project, Western Cape, South Africa (2016-2017)	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.
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)	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.
HHO Africa for WCG: Dept. of Transport and Public Works – Gansbaai-Bredasdorp Road Upgrade Project, Western Cape, South Africa (2014)	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.

EFG Engineers (Pty) Ltd for WCG: Dept. of Transport and Public Works – Hermanus – Stanford Road Upgrade Project, Western Cape, South Africa (2013-2014)	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.
HHO Africa (Pty) Ltd – Borrowpits for the Gansbaai-Bredasdorp Road Upgrade Project, Western Cape, South Africa (2012)	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.
Bergstan South Africa for WCG: Dept. of Transport and Public Works – Repair of flood damaged bridges, Western Cape, South Africa (2010)	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.
HHO Africa for WCG: Dept. of Transport and Public Works –Phase 3 of the Gansbaai-Bredasdorp Road Upgrade Project, Western Cape, South Africa (2010)	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.
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)	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.
PD Naidoo & Associates (Pty) Ltd for WCG: Dept. of Transport & Public Works – Borrowpit development, Overberg District, South Africa (2006-2008)	EMP for the development of 17 strategic borrowpits for the regravelling 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.
BKS (Pty) Ltd / Goba (Pty) Ltd JV for WCG: Dept. Transport and Public Works – Bridge and culvert rehabilitation, Western Cape, South Africa (2006-2008)	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.

HHO Africa for WCG: Dept. of Transport and Public Works –Phase 2 of the Gansbaai-Bredasdorp Road Upgrade Project, Western Cape, South Africa (2010)	EMP for Phase 2 of Gansbaai-Bredasdorp Road Upgrade Project. Jeremy acted as the project manager and was responsible for compiling the EMP.
BKS (Pty) Ltd / Goba (Pty) Ltd JV for WCG: Dept. Transport and Public Works – Bridge and culvert rehabilitation, Western Cape, South Africa (2005)	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.
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)	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.
HHO Africa for WCG: Dept. of Transport and Public Works –Phase 1 of the Gansbaai-Bredasdorp Road Upgrade Project, Western Cape, South Africa (2010)	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.
MBB Engineers – Kat River Causeway, Eastern Cape, South Africa (2000)	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.
Prestedge, Retief, Dresner & Wijnberg – Ngqura harbour dune stabilisation, Eastern Cape, South Africa (1999)	Stabilisation specifications for work areas and roads within the proposed Ngqura (ex Coega) harbour area. Jeremy was responsible for report writing.
	Renewables
Kokerboom Solar Generation (Pty) Ltd – Kokerboom Solar Project, Keetmanshoop, Namibia (2016)	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.
Solarhybrid AG, Germany - Skeyfontein Photovoltaic Power Plant, Northern Cape, South Africa (2011-2012)	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.

Business Venture Investments 1421 (Pty) Ltd - De Aar Photovoltaic Power Plant, Northern Cape, South Africa (2011-2012)	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.
IlangaPower (Pty) Ltd - Solar Cell Manufacturing Factory, Western Cape, South Africa (2008)	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.
	Landfill sites and waste water treatment works
V3 Consulting Engineers - Bedford sewage works upgrade, Eastern Cape, South Africa (1999)	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.
V3 Consulting Engineers - Bedford sewerage reticulation system, Eastern Cape, South Africa (1999)	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.
Department of Public Works - Hole-in-the-Wall car park and ablution facilities, Eastern Cape, South Africa (1999)	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.
Department of Public Works – Coffee Bay car park and ablution facilities, Eastern Cape, South Africa (1999)	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.
	Water and sewage pipelines
Velddrift Salt Company (Pty) Ltd – Seawater Augmentation Project, Velddrift, South Africa (2003-2009)	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.
City of Cape Town: Tygerberg Region - Durbanville North Bulk Water Supply Project, Western Cape, South Africa (2004-2005)	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.

	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, Sunnydale (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 pubic 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	
EAPASA	Registered Environmental Assessment Practitioner: Number 2019/1368
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

CURRICULUM VITAE

JONATHAN CROWTHER

OPERATIONS MANAGER

Environmental Management Planning & Approvals, Africa

QUALIFICATIONS

MSc	1988	Environmental Science
BSc (Hons)	1983	Geology
BSc	1982	Geology and Geography

EXPERTISE

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

Jonathan is the SLR Operations Manager for Environmental Management Planning & Approvals, Africa. He has over 29 years of experience with expertise in a wide range of environmental disciplines, including Environmental Impact and Social Assessments (ESIA), Environmental Management Plans/Programmes, Environmental Planning, Environmental Compliance & Monitoring, and Public Participation & Facilitation.

He has project managed a large number of offshore oil and gas ESIAs 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, ESIAs for waste landfill facilities, general industry and the built environment.

PROJECTS

	Oil and Gas
Shell Namibia Upstream BV – Application for deep water exploration 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)	SLR Consulting was appointed to undertake an 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 review and quality review.
Rhino Oil & Gas Exploration South Africa (Pty) Ltd - Various onshore gas exploration right applications, South Africa (2015 - 2017)	Individual ESIAs 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 rights for two offshore blocks, South Africa (2015 - 2017)	Appointed to undertake 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 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 – Rights application for 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.
	Infrastructure - Roads
GIBB (Pty) Ltd for Western Cape Government (WCG): Department of Transport & Public Works - Swartberg River Bridge, South Africa (2016-2017)	Basic Assessment process 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. Alterative 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 regravelling 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, regravel 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) – Grading 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 N1N2 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.

	Infrastructure - Landfill Sites and Waste Water Treatment Works
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.

	Infrastructure - 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.

	Infrastructure - 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.
	Industry and Mining
Irvin & Johnson Limited – Proposed abalone processing facility and expansion of existing abalone farm , Western Cape, South Africa (2017-ongoing)	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, Western Cape. Project director and quality control.
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.

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.
	Build Environment - Tourism/Resort
Meerenhof Properties (Pty) Ltd - Proposed expansion of dams on Uitsig Farm, Cape Town, South Africa (2016 – ongoing)	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 four 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 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

CEAPSA	Certified as an Environmental Practitioner with the Interim Certification Board for Environmental Assessment Practitioners of South Africa (2006)
ICB	Interim Certification Board member, since 1999
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.

CURRICULUM VITAE

NICHOLAS ARNOTT

ENVIRONMENTAL CONSULTANT

Environmental Management, Planning and Approvals, South Africa

QUALIFICATIONS

Pr.Sci.Nat.	2016	Professional Natural Scientist (Environmental Science) with the South African Council for Natural Scientific Professions
BSc (Hons)	2005	Earth and Geographical Sciences (Environmental Management)
BSc	2004	Earth and Geographical Sciences, Zoology

EXPERTISE

- Environmental Impact Assessment
- Environmental Management Programme
- Public Participation
- Environmental compliance & monitoring
- Management of specialists

During his time at SLR, Nicholas has been responsible for undertaking environmental assessment processes for various projects relating to the mining, oil & gas, roads and related infrastructure, housing and industrial sectors. He has been involved in a number of projects in South Africa and has experience working in the Democratic Republic of Congo (DRC), Zambia and Zimbabwe.

He has expertise in a wide range of environmental disciplines, including Environmental Impact Assessments (EIA), Environmental Management Plans / Programmes (EMP), Basic Assessment Reports, Maintenance Management Plans (MMP), Environmental Auditing & Monitoring, Section 24(G) Rectification Applications and Public Consultation & Facilitation.

PROJECTS

	Mining and Minerals
De Beers Marine (Pty) Ltd – Prospecting Right application for offshore marine Diamonds in Sea Concession 6C, West Coast, South Africa (Current)	SLR is in the process of completing an Environmental Impact Assessment process for the proposed offshore Bulk Sampling operations in the Sea Concession 6C, off the West Coast of South Africa. Nicholas is the project manager and is responsible for the compilation of the Scoping and Environmental Impact Reports, undertaking of the required public participation process and management of the appointed specialists.
Bilboes Holdings (PVt) – Proposed Isabella, McCays and Bubi Sulphide Gold Project, Zimbabwe (Current)	SLR is in the process of completing an Environmental and Social Impact Assessment (ESIA) for the proposed expansion of an existing gold mine complex located in Zimbabwe. Nicholas is the project assistant and compiled the Scoping Report, assisted with the undertaking of the required public participation process and management of the appointed specialists.

Copper Tree Minerals – Proposed Kitwe Tailings Retreatment Project, Zambia (Current)	SLR is in the process of completing an ESIA for the proposed retreatment of historical tailings dumps located within the town of Kitwe, Zambia. Nicholas is the project manager for the ESIA phase and is responsible for the compilation of the ESIA Report, undertaking of the required public participation process and management of the appointed specialists.
De Beers Marine (Pty) Ltd – Prospecting Right application for offshore marine Diamonds in Sea Concession 6C, West Coast, South Africa (2018)	SLR undertook a Basic Assessment process for the proposed offshore prospecting operations in the Sea Concession 6C, off the West Coast of South Africa. Nicholas compiled the Basic Assessment Report (including EMPr), undertook the required public participation process and managed the appointed specialists.
Impala Platinum Limited Unincorporated Joint Venture – EMP Performance Assessment and Closure Liability Estimate for Prospecting Operations (2017)	SLR undertook the EMP Performance Assessment and Closure Liability Estimate for the Klipgatkop 115-JQ prospecting operations. Nicholas was the project manager and compiled the EMP Performance Assessment and Closure Liability Estimate reports.
Belton Park Trading 127 (Pty) Ltd – Mining Right application for offshore marine Diamonds in Sea Concession 2C, West Coast, South Africa (2016 - 2017)	SLR undertook a Scoping and EIA process for the proposed offshore mining of marine diamonds in the Sea Concession 2C, off the West Coast of South Africa. Nicholas compiled the Scoping and EIA Reports (including EMP), undertook the required public participation process and managed the appointed specialists.
Belton Park Trading 127 (Pty) Ltd – Marine Sediment Sampling Activities in Sea Concessions 2C – 5C, West Coast (2014 - 2015)	SLR undertook a Basic Assessment process for the proposed drill and bulk sampling of marine sediments in Sea Concessions 2C, 3C, 4C and 5C, off the West Coast of South Africa. Nicholas compiled the BAR (including EMP), undertook the required public participation process and managed the appointed specialists.
Aquarius Platinum (SA) (Pty) Ltd – Prospecting rights application on the Farms Chieftains Plain 46-JT and Walhalla 1-JT (2014)	SLR was appointed to prepare the EMP for the proposed prospecting activities to be undertaken on the Farm Chieftains Plain 46-JT and Walhalla 1-JT. Nicholas was the project manager and compiled the EMP for both projects.
Aquarius Platinum (SA) (Pty) Ltd – Proposed Extension of the K5 Upper Underground Mining Area (2014)	SLR was appointed to manage the necessary environmental assessment process for the amendment of the existing K5 Upper Mining Right. Based on the strong public reaction to the project, AQPSA took the decision to place the project on hold. Nicholas was the project manager and undertook the initial public participation process.
Banro Corporation - Proposed Namoya Gold Mining Project, Maniema, DRC (2013)	SLR undertook an Environmental and Social Impact Assessment (ESIA) for the proposed construction of a greenfield gold mine located in the DRC. Nicholas was the project manager and compiled the ESIA Report (including EMP), undertook the required public participation process and managed the appointed specialists.

Aquarius Platinum (SA) (Pty) Ltd – Kroondal and Marikana EMP Consolidation (2013 - 2015)	SLR was appointed to consolidate the existing approved EMPs for the Kroondal and Marikana Platinum Mines, located in the North West Province. Nicholas was the project manager and compiled of the Consolidated EIA Report (including EMP) for each operation and managed the appointed specialists.
Aquarius Platinum (SA) (Pty) Ltd – WULA for the proposed extension of Everest Platinum Mine (2011 - 2012)	SLR undertook a Water Use License Application (WULA) process for the proposed expansion of the Everest Platinum Mine, located in Mpumalanga. Nicholas assisted in the compilation of the necessary WULA documentation, including the Integrated Water and Waste Management Plan (IWWMP) for the project.
Aquarius Platinum (SA) (Pty) Ltd – Proposed Extension of Everest Platinum Mine (2011 - 2012)	SLR undertook a Scoping and EIA process for the proposed expansion of the Everest Platinum Mine, located in Mpumalanga. Nicholas was the project manager and compiled of the Scoping and EIA Reports (including EMP), undertook the required public participation process and managed the appointed specialists.
Afplats (Pty) Ltd – EMP Performance Assessment for Prospecting Operations (2011)	SLR undertook the EMP Performance Assessment for the Wolwekraal 408-JQ and Kareepoort 407-JQ prospecting operations. Nicholas was the project manager and compiled the EMP Performance Assessment reports.
Aquarius Platinum (SA) (Pty) Ltd – Re-assessment of the Financial Provision for Closure for Everest Platinum Mine (2011)	SLR undertook the annual re-assessment of the closure cost estimate for the Everest Platinum Mine. Nicholas was the project manager and compiled the annual review of the mines Financial Provision for Closure for 2011.
Leeuw Mining and Exploration (Pty) Ltd – Proposed Underground Coal Mine (2011)	SLR undertook a Scoping and EIA process for the proposed underground coal mine located near Utrecht, Kwa-Zulu Natal. Nicholas was the project manager and compiled of the Scoping and EIA Report (including EMP), undertook the required public participation process and managed the appointed specialists.
	Oil and Gas
PGS Exploration (UK) Limited – Reconnaissance Permit Application to undertake a 2D and 3D seismic surveys offshore West Coast South Africa (2017)	SLR Consulting was appointed to undertake an Environmental Management Programme Amendment process for the proposal to undertake a 2D and 3D speculative seismic surveys offshore West Coast, South Africa. Nicholas was the project manager and compiled the EMP report, undertook the required public participation process and managed the appointed specialists.
PGS Exploration (UK) Limited – Reconnaissance Permit Application Amendment to undertake a 3D seismic survey offshore KwaZulu-Natal, South Africa (2017)	SLR Consulting was appointed to undertake an Environmental Management Programme Amendment process for the proposal to undertake a 3D speculative seismic surveys offshore of KwaZulu-Natal, South Africa. Nicholas was the project manager and compiled the Amended EMP report, undertook the required public participation process and managed the appointed specialists.

PGS Exploration (UK) Limited – Reconnaissance Permit Application to undertake 2D and 3D seismic surveys, South Africa (2017)	SLR Consulting was appointed to undertake an Environmental Management Programme process for a Reconnaissance Permit Application to undertake 2D and 3D speculative seismic surveys of the East Coast, South Africa. Nicholas was the project manager and compiled the EMP report, undertook the required public participation process and managed the appointed specialists.
Rhino Oil & Gas Exploration South Africa (Pty) Ltd – Proposed Exploration Activities in offshore Licence Blocks 3617 and 3717, South-West coast of South Africa (2015 -2016)	SLR undertook a Scoping and EIA process for the proposed offshore exploration activities in Licence Blocks 3617 and 3717, South-West coast of South Africa. Nicholas assisted in the compilation of the Scoping and EIA Reports (including EMP), undertook the required public participation process and managed the appointed specialists.
Rhino Oil & Gas Exploration South Africa (Pty) Ltd – Proposed Exploration Activities in Various Inshore Licence Blocks, South-West coast of South Africa (2015 -2016)	SLR undertook a Scoping and EIA process for the proposed exploration activities in various inshore Licence Blocks, South-West coast of South Africa. Nicholas assisted in the compilation of the Scoping and EIA Reports (including EMP), undertook the required public participation process and managed the appointed specialists.
Total E & P (SA) (Pty) Ltd - Proposed bathymetry survey and seabed sediment sampling in Block 11B/12B (2014 -2015)	SLR compiled an EMP Addendum for an application to undertake sonar surveys and seabed sediment sampling as part of the approved exploration programme for License Block 11B/12B. Nicholas was the project manager and compiled the EMP report, undertook the required public participation process and managed the appointed specialists.
	Infrastructure – Roads
GIBB (Pty) Ltd for Western Cape Government (WCG): Department of Transport & Public Works - Swart River Bridge, South Africa (2016 - 2017)	SLR undertook a Basic Assessment process 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. Nicholas was the project manager and compiled the Basic Assessment Report (BAR), undertook the required public participation process and managed the appointed specialist.
SMEC SA (Pty) Ltd for South African National Roads Agency SOC Ltd (SANRAL) - Proposed establishment of a Quarry, Ngquza Hill Local Municipality, Eastern Cape (2016 - ongoing)	SLR undertook a Scoping and EIA process for the proposed development of a quarry for the extraction of material for the construction of the Mthentu and Msikaba Bridges for the N2 Wild Coast Toll Highway. Nicholas compiled the Scoping and EIA Reports (including EMP), and project managed the required public participation process.

Hatch Goba (Pty) Ltd for WCG:DTPW- Maintenance Management Plan for flood damage repair of structures in the Ladismith West area (2016 - 2017)	SLR compiled a Maintenance Management Plan (MMP) for the proposed repairs to road infrastructure at fourteen different sites that were damaged during flood events in the Ladismith West area situated between Ladismith and Montagu. Nicholas was the project manager and compiled the MMP, undertook the required public participation process and managed the appointed specialist.
ERO Engineers (Pty) Ltd for WCG:DTPW - Proposed Repair and Reseal of Main Road (MR) 233 to Langebaan (2015)	SLR compiled a MMP for the proposed rehabilitation works of the MR 233 between the R 27 (km 6.80) and north of Langebaan (km 12.84). Nicholas was the project manager and compiled the MMP, undertook the required public participation process and managed the appointed specialist.
Ekurhuleni Metropolitan Municipality (Eastern Region) – Proposed Gauteng Road (P1894) (2007 - 2009)	The assignment entailed undertaking an EIA for the construction of a new road between Sam Smith Road (Tsakane) and Vlakfontein Road (Kwa-Thema), Ekurhuleni Metropolitan Municipality. Nicholas was the project manager and compiled the Scoping and EIA Report (including EMP), undertook the required public participation process and managed the appointed specialists.
	Infrastructure – Water and Wastewater
BVI Consulting Engineers WC (Pty) Ltd for the City of Cape Town: Transport for Cape Town – Proposed upgrade of the Bayside Canal (2015 -Ongoing)	SLR is currently undertaking a Basic Assessment process for the upgrade of the Bayside Canal Outfall System located in Tableview, Cape Town. Nicholas is the project manager and is responsible for compiling the BAR, undertaking the required public participation process and managing the appointed specialists.
Saldanha Bay Municipality - Maintenance Management Plans for the Bok and Mosselbank Rivers (2016 - 2017)	SLR compiled a Maintenance Management Plan (MMP) for the proposed maintenance activities to be undertaken within the Bok and Mosselbank Rivers. Nicholas was the project manager, compiled the MMPs and undertook the required public participation process.
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 (2015 -2016)	SLR undertook a 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. Nicholas was the project manager and compiled the BAR, undertook the required public participation process and managed the appointed specialists.
Arup - Proposed Sandspruit Rehabilitation for Stormwater Management of Melrose Arch, Sandton (2010)	The assignment entailed undertaking a Basic Assessment for the rehabilitation of the Sandspruit to facilitate the management of stormwater runoff emanating from the Melrose Arch precinct. Nicholas was the project manager and compiled the BAR (including EMP), undertook the required public participation process and managed the appointed specialists.

	Infrastructure – Solid Waste
Energy Omega Oils (Pty) Ltd – Audit of Blackheath Waste Storage Facility (2017)	SLR undertook an external audit of the Blackheath Waste Storage Facility in terms of the National Norms and Standards for the Storage of Waste (Government Notice No. 926 of 29 November 2013). Nicholas undertook and compiled the audit report.
Impala Platinum (Pty) Ltd - Proposed Central Salvage Yard (2011 - 2012)	SLR undertook a Basic Assessment process and Waste Management License application for the proposed construction of a salvage yard, and associated activities, located at Impala Platinum's Rustenburg operations. Nicholas compiled the BAR (including EMP), undertook the required public participation and waste management license application processes and managed the appointed specialists.
	Power - Solar
SolarReserve South Africa (Pty) Ltd – Proposed Kalkaar CSP and Photovoltaic Plants, Free State (2014 -2015)	SLR undertook a Scoping and EIA process for the proposed construction of a Concentrated Solar Thermal Plant (CSP) and a Photovoltaic Plant, located in the Free State Province. Nicholas was the project manager and compiled of the Scoping and EIA Reports (including EMP) for both projects, undertook the required public participation process and managed the appointed specialists.
	Built Environment – Residential
Luna Trust - Proposed Subdivision of Erf 177476, St James (2017 – Ongoing)	Basic Assessment process for the subdivision of Erf 177476 into five separate portions with the intent to sell four of the subdivided portions to third-parties for residential use. Nicholas is the project manager and is responsible for compiling the BAR, undertaking the required public participation process and managing the appointed specialists.
Mountain View Estate Shareblock Company Limited - Proposed Mountain View Estate (2009 - 2010)	The assignment entailed undertaking an EIA for a residential and aviation estate on the Farm Simonsview 490-JQ, and various portions of the Farms Kalkheuwel 493-JQ, Rhenosterspruit 495-JQ and Riverside 497-JQ, Gauteng and North West Province. Nicholas was the project manager and compiled of the Scoping and EIA Report (including EMP), undertook the required public participation process and managed the appointed specialists.
Lead Wood Development Company (Pty) Ltd - Proposed Leadwood Nature Estate (2008)	The assignment entailed undertaking an EIA for a residential and game estate on the Remainder of Portion 2 of The Farm Happyland 241-KT, Hoedspruit, Limpopo. Nicholas was the project manager and compiled of the Scoping and EIA Report (including EMP), undertook the required public participation process and managed the appointed specialists.
Hayes Matkovich Developments (Pty) Ltd – Proposed Standerton Country Estate (2008)	The assignment entailed undertaking an EIA for a golf estate on the Portions of the Farms Grootverlangen 409-IS and Langerwyl 410-IS, Standerton, Mpumalanga. Nicholas was the project manager and compiled of the Scoping and EIA Report (including EMP), undertook the required public participation process and managed the appointed specialists.

Sugar Creek Trading 33 (Pty) Ltd - Proposed Development of Zandspruit Estate (2007 -2008)	The assignment entailed undertaking an EIA for a residential, game and aviation estate on the Remainder of The Farm Happyland 241-KT, Hoedspruit, Limpopo. Nicholas was the project manager and compiled of the Scoping and EIA Report (including EMP), undertook the required public participation process and managed the appointed specialists.
C.J.Irons CC - Taemane Residential Estate (2007)	The assignment entailed undertaking a Basic Assessment for the proposed residential estate located on a Part of the Remainder of Portion 52 of the Farm Garstfontein 374-JR, Pretoria, Gauteng. Nicholas was the project manager and compiled the BAR (including EMP), undertook the required public participation process and managed the appointed specialists.
Riverspray Lifestyle Estate (Pty) Ltd - Proposed Riverspray Lifestyle Estate (2006)	The assignment entailed undertaking an EIA for a residential and lifestyle estate on bank of the Vaal River in Vanderbijlpark, Gauteng. Nicholas was the project manager and compiled of the Scoping and EIA Report (including EMP), undertook the required public participation process and managed the appointed specialists.
	Built Environment – Recreation
South African National Parks (SANParks) - Proposed Preekstoel Boardwalk Within the West Coast National Park (2009)	The assignment entailed undertaking a Basic Assessment for the establishment of boardwalks in the Preekstoel section of the West Coast National Park, (SANParks). Nicholas was the project manager and compiled the BAR (including EMP), undertook the required public participation process and managed the appointed specialists.
SANParks - Construction of a Walkway and Suspension Bridges in the Tsitsikamma National Park (2008)	The assignment entailed undertaking a Basic Assessment for the establishment of a walkway and additional suspension bridges in the Tsitsikamma National Park, South Africa. Nicholas was the project manager and compiled the BAR (including EMP), undertook the required public participation process and managed the appointed specialists.
	Other
City of Tshwane Metropolitan Municipality - Proposed Expansion of the Winterveld Cemetery (2007 - 2010)	The assignment entailed undertaking a Basic Assessment for the expansion of the existing Winterveld Cemetery located within the City of Tshwane Metropolitan Municipality. Nicholas was the project manager and compiled the BAR (including EMP), undertook the required public participation process and managed the appointed specialists.
City of Tshwane Metropolitan Municipality - Proposed Expansion of the Klipkruisfontein Cemetery (2007 - 2010)	The assignment entailed undertaking a Basic Assessment for the expansion of the existing Klipkruisfontein Cemetery located within the City of Tshwane Metropolitan Municipality. Nicholas was the project manager and compiled the BAR (including EMP), undertook the required public participation process and managed the appointed specialists.
Tolplan (Pty) Ltd for SANRAL – Proposed Central Operations Centre (COC), Midrand (2009)	The assignment entailed undertaking a Basic Assessment for the proposed construction of the SANRAL COC Building. Nicholas was the project manager and compiled the BAR (including EMP), undertook the required public participation process and managed the appointed specialists.

Erf5 Melrose Estate CC - Section 24G Rectification for a Roof Signboard (2008)	The assignment entailed undertaking a Rectification Application in terms of Section 24G (S24G) of the National Environmental Management Act, 1998 for the unlawful erection of a roof signboard on the corner of Juta and Eendracht Streets, Johannesburg. Nicholas was the project manager and compiled the Rectification Application (including EMP) and undertook the required public participation process.
Wideopen Leasing (Pty) Ltd – S24G Rectification for a Sky Sign, 78 Fox Street (2007)	The assignment entailed undertaking a Rectification Application in terms of S24G of the National Environmental Management Act, 1998 for the unlawful erection of a Sky Sign at 78 Fox Street, Johannesburg. Nicholas was the project manager and compiled the Rectification Application (including EMP) and undertook the required public participation process.

MEMBERSHIPS

International Association for Impact Assessment – South Africa (IAIAsa)	Member.

APPENDIX B: I&AP DATABASE

IMD05 - CEIA Phase 2

- - - - - - - - - -	Mr H Slabig
Abalone Farmers Association of Southern Africa	Mr W Barnes
ACO Associates	Mr J Gribble
Association of Small Hake Industries	Mr A Kaye
Belton Park Trading 127 (Pty) Ltd	Mr P Esposito
CapeNature	Ms A Duffell-Canham
Capricorn Marine Environment (CapMarine)	Mr D Japp
Capricorn Marine Environment (CapMarine)	Ms S Wilkinson
Cederberg Local Municipality	Mr E Alfred
Cederberg Local Municipality	Mr R Bent
Cederberg Local Municipality	Cllr W Farmer
Cederberg Local Municipality	Cllr F Sokuyeka
Cederberg Municipality	Ms D Joubert
Cederberg Municipality	Mr L Volschenk
Department of Env. Affairs & Development Planning	Ms A La Meyer
Department of Environment, Forestry and Fisheries	Ms J Coetzee
Department of Environment, Forestry and Fisheries	Ms S Dlomo
Department of Environment, Forestry and Fisheries	Mr D Durholtz
Department of Environment, Forestry and Fisheries	Mr S Malaza
Department of Environmental Affairs: Oceans&Coasts	Ms F Ditinti
Department of Mineral Resources and Energy	Ms L Njemla
Department of Mineral Resources and Energy	Mr P Swart
Doringbaai Public Library	Ms G Gal
Eland's Bay Public Library	Ms V Swarts
Fish SA	Mr S Salie
Fisheries Control	Mr W Basson
Fishing Industry News	Ms T Chandler
Fresh Tuna Exporters Association	Ms B Damons
GAC Shipping (SA) (Pty) Ltd	Mr H Venter
Green Flash Trading 251 (Pty) Ltd	Mr W Venter
Irvin & Johnson Limited	Mr G Nassar
Lamberts Bay Foods Company	Mr J Crous
Lamberts Bay Harbour Affairs	Mr A Gordon
Lamberts Bay Public Library	Mrs H van Zyl
Lusitania Trawling Services	Mr L De Freitas
Matzikama Local Municipality	Mr R Basson
Matzikama Local Municipality	Mnr D Jenner
Matzikama Local Municipality	Cllr A Job
Matzikama Local Municipality	Cllr K Louw
Matzikama Local Municipality	Mr D Lubbe
Matzikama Local Municipality	Mr J Orvis
Matzikama Local Municipality	Mr L Phillips
Oceana Group Limited	Mr M Copeland
Oceana Group Limited	Ms K Koen
Panda Marine	Mr K Pansegrouw
Petroleum Agency SA	Ms P Ngesi
PetroSA (SOC) Limited	Ms E Douse
Pioneer Fishing (Pty) Ltd	Mr M van den Heever
Pisces Environmental Services	Dr A Pulfrich
Prospect 35 (Pty) Ltd	Mr M Hirs
Saldanha Freight Services (Pty) Ltd	Mr R Lawrence
Sasol	Mr M Ginster
Sea Harvest Corporation Ltd	Mr R Hall
South African Commercial Fisherman Corp	Ms C Attwood
South African Commercial Line Fishing Association	Mnr W Croome
South African Commercial Line Fishing Association	The Manager
South African Deep Sea Angling Association	Mr C Hagan
South African Deep Sea Angling Association	Dr CBK Jones
South African Deep Sea Trawling Industry Ass.	Dr J Augustyn
South African Hake Longline Association	Mr C Bodenham
South African Heritage Resources Agency	Ms L Le Grange
South African Heritage Resources Agency	Ms B Williams
South African Maritime Safety Authority (SAMSA)	Mr N Campbell
South African Maritime Safety Authority (SAMSA)	Mr J Collocott
South African Maritime Safety Authority (SAMSA)	Mr G Louw
South African Maritime Safety Authority (SAMSA)	Capt R Naicker
South African National Biodiversity Institute	Dr K Sink
South African Navy Hydrographic Office	Lieutenant I Coetzer
South African Navy Hydrographic Office	Mr M Nelson
South African Navy Hydrographic Office	Commander TJ van Niekerk
South African Oil & Gas Alliance	Mr U Finckh
South African Oil & Gas Alliance	Ms R Williams
South African Pelagic Fishing Industry Association	Mr D de Villiers
South African Pelagic Fishing Industry Association	Mr P Foley
South African Tuna Longline Association	Mr D Lucas
Strandfontein Rate Payer's Association	Mr L Fouche
Sunbird Energy Ltd	Ms A Friedrichs
Sunbird Energy Ltd	Mr K Rana
Sunbird Energy Ltd	Mr N Rayner
The Wildlife and Environ. Society of South Africa	Mr T Burger
Trans Hex / Ocean Diamond Mining 14C (Pty) Ltd	Mr V Madlela

IMD05 - CEIA Phase 2

Viking Fishing	Mr N Bacon
WCG: Department of Economic Development & Tourism	S Fourie
West Coast District Municipality	Mr H Cleophas
West Coast District Municipality	Mr DC Joubert
West Coast District Municipality	Ms D Kotze
West Coast District Municipality	Mr W Markus
West Coast District Municipality	Mr H Matthee
West Coast District Municipality	Mr RW Strydom
West Coast Rock Lobster Industry Association	Mr D Grant

APPENDIX C: UNDERTAKING OF ENVIRONMENTAL ASSESSMENT PRACTITIONER

UNDERTAKING BY THE EAP

UNDERTAKING in terms of Appendix 2 (Section 2j and 2k) of the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended):

I, Jeremy Blood, the Registered Environmental Assessment Practitioner (EAP), undertake that:

- The information provided herein is correct;
- The comments and inputs from stakeholders and I&APs will be / have been correctly recorded;
- Information and responses provided to stakeholders and I&APs by the EAP is correct; and
- SLR agrees to implement the Plan of Study for EIA presented in the Scoping Report and that all comments from stakeholders and I&APs on the Plan of Study for EIA have been taken into consideration.

Signed on the 08 day of JANUARY 2020.

For and on behalf of SLR Consulting (South Africa) (Pty) Ltd

Jeremy Blood Pr. Sci. Nat. EAPASA
SLR Consulting (South Africa) (Pty) Ltd

APPENDIX D: SCREENING REPORTS FOR THE SEA CONCESSION AREAS

SCREENING REPORT FOR AN ENVIRONMENTAL AUTHORIZATION OR FOR A PART TWO AMENDMENT OF AN ENVIRONMENTAL AUTHORISATION AS REQUIRED BY THE 2014 EIA REGULATIONS – PROPOSED DEVELOPMENT FOOTPRINT ENVIRONMENTAL SENSITIVITY

EIA Reference number: To Be Confirmed

Project name: Sea Concession Areas 13C, 15C, 16C, 17C & 18C

Project title: EIA for a Prospecting Right Application for Offshore Sea Concessions, West Coast

Date screening report generated: 09/12/2019 14:30:50

Applicant: Belton Park Trading 127 (Pty) Ltd

Compiler: N. Arnott

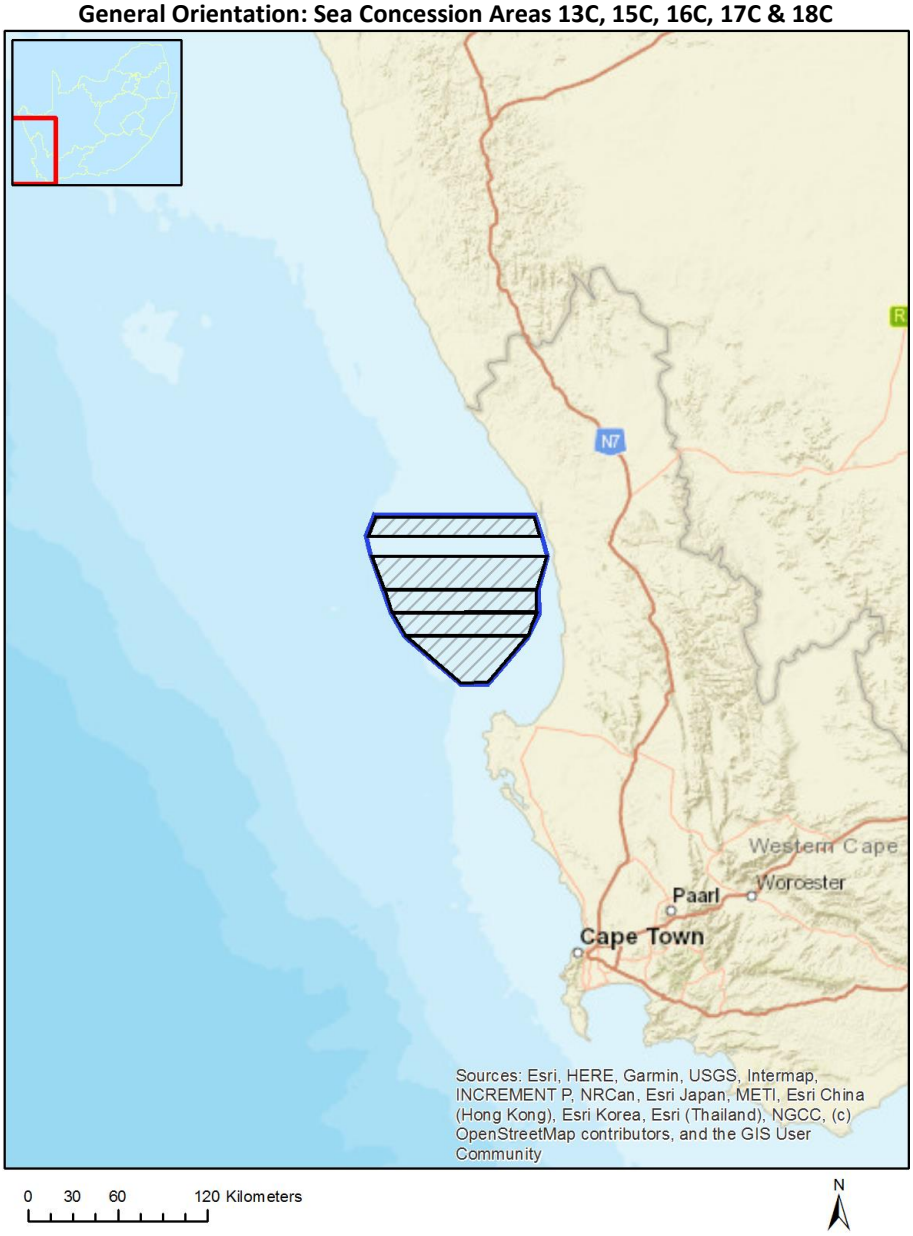
Compiler signature: .....

Table of Contents

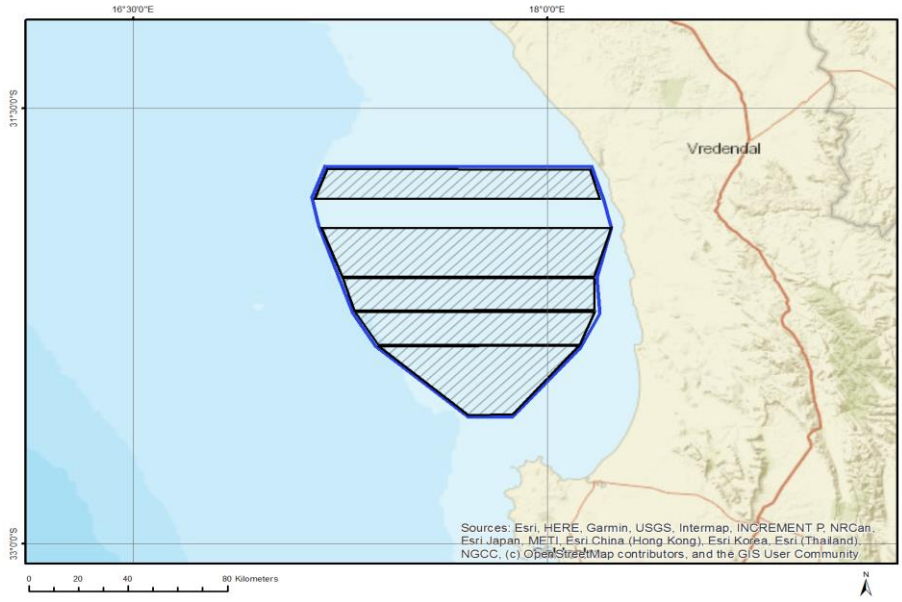
Proposed Project Location

Orientation map 1: General location

General Orientation: Sea Concession Areas 13C, 15C, 16C, 17C & 18C



Map of proposed site and relevant area(s)



Cadastral details of the proposed site

Property details:
No intersection with any properties found.

Development footprint[1] vertices:

Footprint	Latitude	Longitude
1	31°42'40.86S	17°12'8.01E
1	31°42'52.68S	18°9'12.86E
1	31°48'54.17S	18°11'21.41E
1	31°48'55.22S	17°9'21.78E
1	31°42'40.86S	17°12'8.01E
2	31°55'0.09S	17°10'52.7E
2	31°54'55.88S	18°13'49.8E
2	31°54'55.88S	18°13'49.8E
2	31°54'55.88S	18°13'49.8E
2	31°54'55.88S	18°13'49.8E
2	32°4'55.44S	18°10'7.32E
2	32°5'8.02S	17°15'24.61E
2	31°55'0.09S	17°10'52.7E
3	32°5'24.76S	17°15'34.5E
3	32°5'24.76S	18°10'7.32E
3	32°5'24.76S	18°10'7.32E
3	32°5'24.76S	18°10'7.32E
3	32°11'54.06S	18°10'12.27E
3	32°12'6.61S	17°18'2.81E
3	32°5'24.76S	17°15'34.5E

[1] "development footprint", means the area within the site on which the development will take place and incudes all ancillary developments for example roads, power lines, boundary walls, paving etc. which require vegetation clearance or which will be disturbed and for which the application has been submitted.

4	32°12'23.35S	18°10'12.27E
4	32°19'8.85S	18°6'59.46E
4	32°19'4.68S	17°23'9.33E
4	32°12'19.16S	17°18'12.7E
4	32°12'23.35S	18°10'12.27E
5	32°19'29.76S	17°23'24.16E
5	32°19'17.22S	18°6'49.57E
5	32°33'28.38S	17°52'24.4E
5	32°33'36.71S	17°42'50.91E
5	32°19'29.76S	17°23'24.16E

Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

No nearby wind or solar developments found.

Environmental Management Frameworks relevant to the application

No intersections with EMF areas found.

Environmental screening results and assessment outcomes

The following sections contain a summary of any development incentives, restrictions, exclusions or prohibitions that apply to the proposed development footprint as well as the most environmental sensitive features on the footprint based on the footprint sensitivity screening results for the application classification that was selected. The application classification selected for this report is:
Mining|Prospecting rights|Mining - Prospecting rights.

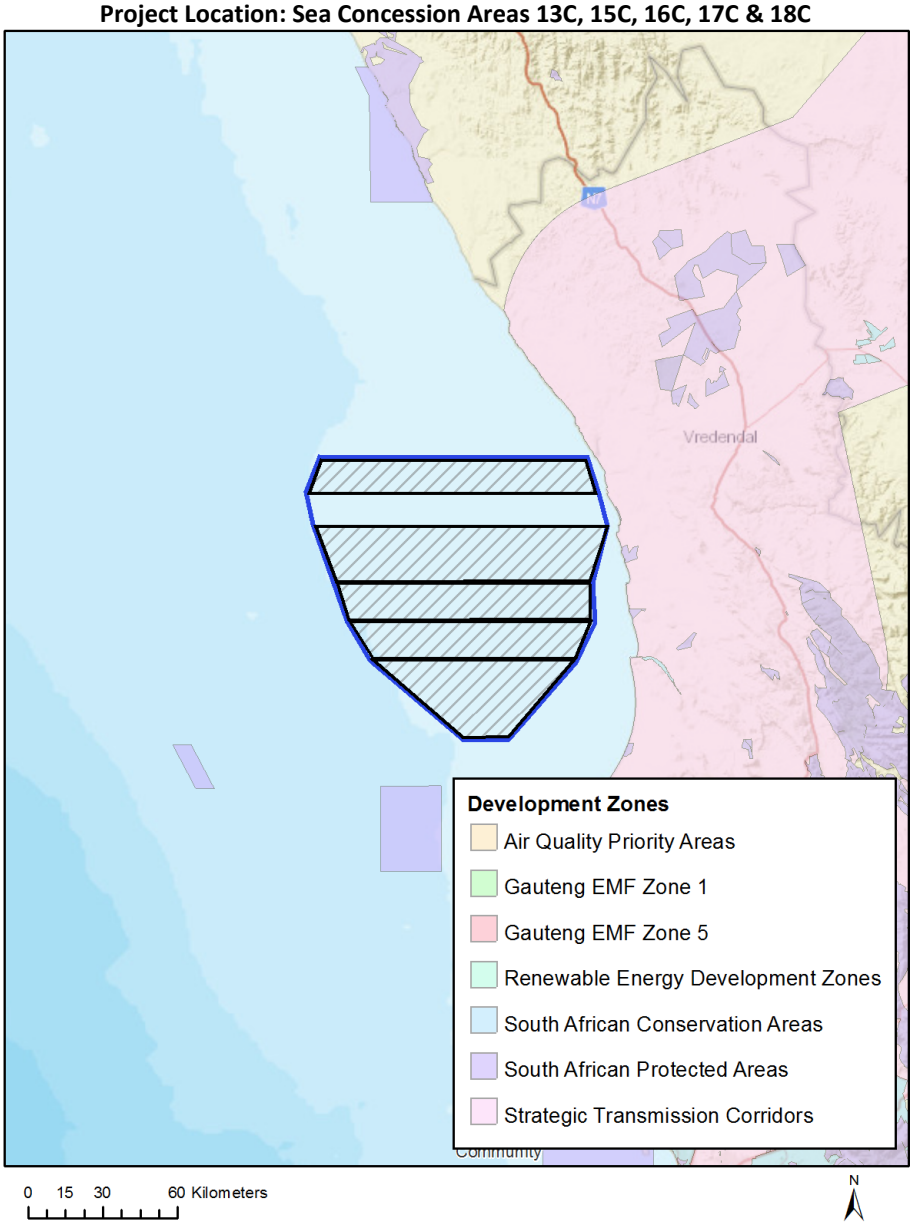
Relevant development incentives, restrictions, exclusions or prohibitions

The following development incentives, restrictions, exclusions or prohibitions and their implications that apply to this footprint are indicated below.

No intersection with any development zones found.

Map indicating proposed development footprint within applicable development incentive, restriction, exclusion or prohibition zones

Project Location: Sea Concession Areas 13C, 15C, 16C, 17C & 18C



Proposed Development Area Environmental Sensitivity

The following summary of the development footprint environmental sensitivities is identified. Only the highest environmental sensitivity is indicated. The footprint environmental sensitivities for the proposed development footprint as identified, are indicative only and must be verified on site by a suitably qualified person before the specialist assessments identified below can be confirmed.

No intersection with any sensitive areas found.

Specialist assessments identified

Based on the selected classification, and the environmental sensitivities of the proposed development footprint, the following list of specialist assessments have been identified for inclusion in the assessment report. It is the responsibility of the EAP to confirm this list and to motivate in the assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the footprint situation.

No	Specialist assessment	Assessment Protocol
1	Agricultural Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/DraftGazetted_Agriculture_Assessment_Protocols.pdf
2	Archaeological and Cultural Heritage Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/DraftGazetted_General_Requirement_Assessment_Protocols.pdf
3	Palaeontology Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/DraftGazetted_General_Requirement_Assessment_Protocols.pdf
4	Terrestrial Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/DraftGazetted_Terrestrial_Biodiversity_Assessment_Protocols.pdf
5	Aquatic Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/DraftGazetted_Aquatic_Biodiversity_Assessment.pdf
6	Noise Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/DraftGazetted_Noise_Impacts_Assessment_Protocols.pdf
7	Radioactivity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/DraftGazetted_General_Requirement_Assessment_Protocols.pdf
8	Plant Specie	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/DraftGazetted_General_Requirement_Assessment_Protocols.pdf

	s Assess ment	
9	Animal Specie s Assess ment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/DraftGazetted_General_Requirement_Assessment_Protocols.pdf

Results of the environmental sensitivity of the proposed area.

The following section represents the results of the screening for environmental sensitivity of the proposed footprint for relevant environmental themes associated with the project classification. It is the duty of the EAP to ensure that the environmental themes provided by the screening tool are comprehensive and complete for the project. Refer to the disclaimer.

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