ENVIRONMENTAL IMPACT 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:

WC30/5/1/1/3/2/1/10360

WC30/5/1/1/3/2/1/10361

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BASIS OF REPORT

EXECUTIVE SUMMARY

1. INTRODUCTION

Belton Park Trading 127 (Pty) Ltd (BPT127) lodged separate applications for Prospecting Rights 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 (See Figure 1). The applications were lodged in terms of Section 16 of the Mineral and Petroleum Resources Development Act, 2002 (No. 28 of 2002; MPRDA) (as amended by the Mineral and Petroleum Resources Development Amendment Act 49 of 2008).

In terms of the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended by GN40772 on 7 April 2017), promulgated in terms of the National Environmental Management Act (No. 107 of 1998; NEMA), an application for a prospecting right requires Environmental Authorisation (EA) from the competent authority, which in this case is the Minister of Mineral Resources and Energy, to carry out the proposed prospecting activities. The applications for EA, in terms of NEMA, was submitted to the DMRE at the same time as the prospecting right application. In terms of the EIA Regulations Listing Notices, a Scoping and Environmental Impact Assessment (EIA) process is required for the proposed prospecting activities.

SLR Consulting (South Africa) (Pty) Ltd (SLR) has been appointed by BPT127 as the independent Environmental Assessment Practitioner (EAP) to determine the biophysical, social and economic impacts, by means of the required EIA process, associated with undertaking the proposed prospecting activity. This report presents the process followed and the findings of the EIA.

2. OPPORTUNITY FOR COMMENT

<u>This draft Environmental Impact Report (EIR) was available to Interested and Affected Parties (I&APs) for a 30-day review and comment period from 27 August to 27 September 2021 in order to provide Interested and Affected Parties (I&APs) the opportunity to comment on the proposed project and the draft EIR. All comments have been included in the final EIR. It should be noted that all significant changes to the draft report are underlined and in a different font (Times New Roman) to the rest of the text.</u>

After DMRE has reached a decision, all registered I&APs 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, 2014 will follow the issuing of the decision.

3. SCOPING AND EIA PROCESS

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 applications were submitted. While five separate applications for EA have been submitted, DMRE has confirmed that one consolidated Scoping and EIA process could be undertaken for all five Sea Concession area applications. Accordingly, should DMRE decide to grant authorisation, a separate EA for each application would be issued (i.e., five EAs in total).

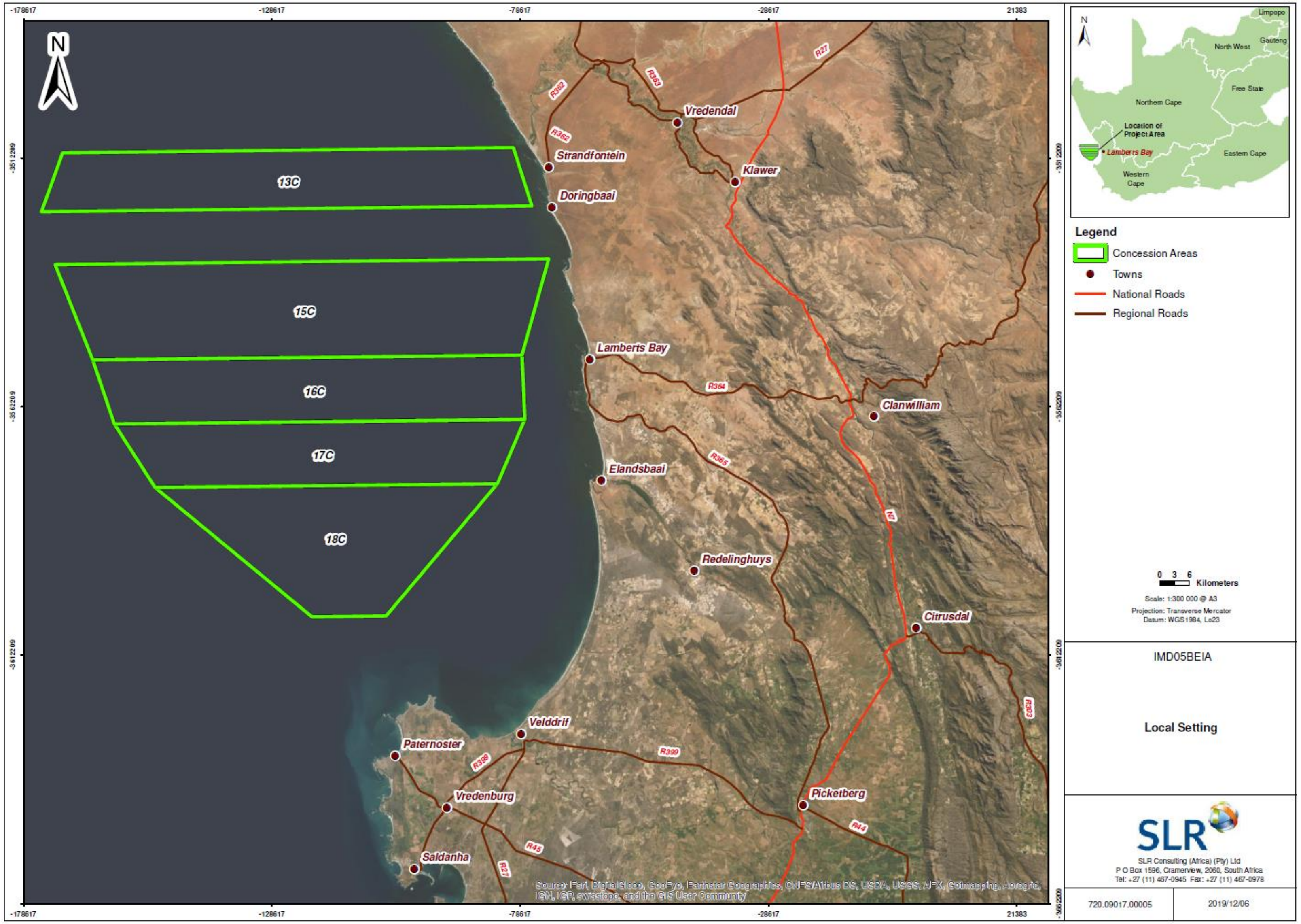

FIGURE 1: LOCATION OF THE 13C, 15C, 16C, 17C AND 18C SEA CONCESSION AREAS, OFF THE WEST COAST OF SOUTH AFRICA.

3.1.2. Compilation and review of the Scoping Report

The final Scoping Report was prepared in compliance with Appendix 2 of the EIA Regulations 2014 (as amended). Eight (8) submissions were received during the draft Scoping Report review and comment period. The submissions have been responded to in the Comments and Responses Report (see Appendix 3.2). The key issues raised relate to the potential impact of the proposed project on marine fauna (specifically seabirds and cetaceans), cultural heritage, and on the West Coast pelagic fishery. The Final Scoping Report was submitted and accepted by the DMRE.

3.2. EIA PHASE

3.2.1. Specialist Studies

The specialist studies commissioned to address the key issues and potential impacts were: (1) an Underwater Heritage Impact Assessment, (2) a Marine Faunal Assessment, and (3) a Fisheries Impact Assessment. The impacts in the studies were assessed according to a defined impact assessment methodology and the mitigation measures were defined to avoid or reduce negative impacts and enhance potential benefits.

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, have been integrated into this EIR and Environmental Management Programme (EMPr). As noted above, the draft EIR, including EMPr was made available for a 30-day public review and comment period. All comments received have been incorporated and responded to in a Comments and Responses Report (see Appendix 3.4). The EIR and EMPr has now been submitted to the DMRE for consideration and decision-making.

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. The proposed prospecting activities are summarised in the table below:

Prospecting activity	Maximum anticipated area of disturbance	Duration
Geophysical Surveys	600 - 1 200 km per concession area.	Four days per year for each concession area (i.e. 20 days per year for 4 years).
Drill Sampling	4 800 drill samples with a cumulative footprints of 2.4 ha per sea concession area.	Four days per year for each concession area (i.e. 20 days per year for 4 years).
Bulk Sampling	Ten trenches per concession area with a cumulative footprint of 3.6 ha per a concession area.	Six to seven days per year for each concession area (i.e. 35 days per year for 2 years).

4.2 NEED AND DESIRABILITY

The over-arching framework for considering the need and desirability of development in general is taken at the policy level and should be aligned with the content of regional and local plans, frameworks, and strategies. With respect to the national policy and planning framework, prospecting and mining is identified as a sector with substantial potential for growth stimulation and/or employment and is supported in numerous national planning instruments, such as the National Development Plan 2030 (2012), as well as Operation Phakisa (2014) and Mining Phakisa.

In the regional planning context, the West Coast District Municipality Spatial Development Framework (2020) notes that the District Municipality has a vast number of mineral resources, of which some are currently not being exploited. It is concluded that mining has the potential to make bigger contribution to the overall economy of the District Municipality, when unexploited resources are utilised in future. Thus, the proposed prospecting operations are considered to be aligned with the above-mentioned planning frameworks.

Marine mining at present contributes about 10% of South Africa's total diamond production. n 2019, about 7.2 million carats of diamonds were produced locally. Diamond revenues, levied through income tax on diamonds, mining leases, mining rights and diamond export duties, are put into the Central Revenue Fund from where they are allocated to various budgets by the South African Government.

Prospecting activities are needed to:

- Confirm and obtain additional information concerning potential targets through non-invasive activities (i.e. desk-top studies and geophysical surveys) and invasive activities (i.e. drilling).
- Assess if the resource can be extracted through future mining in an economically viable manner while being socially and environmentally responsible.

Should prospecting activities prove that there is a feasible mineral resource for mining, a new mining area could be developed, which would generate significant employment opportunities.

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 six to seven 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 Consideration of Alternatives

The project alternatives considered in this EIA are described below.

<table>
<tr><th>No.</th><th>Alternatives</th><th>Description</th></tr>
<tr><td colspan="3">1. Site / location alternatives</td></tr>
<tr><td>1.1</td><td>Exploration site</td><td>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.</td></tr>
<tr><td>1.2</td><td>Onshore logistics</td><td>The proposed prospecting operations are of such short duration (four days per concession per annum) that bunkering or provision of spares, consumables or crew changes would not be required. It is expected that once the required prospecting activity has been completed, the vessel would move off location and dock at the Port of Cape Town.</td></tr>
<tr><td colspan="3">2. Activity alternatives</td></tr>
<tr><td>2.1</td><td>Prospecting</td><td>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. Feasible and reasonable activity alternatives are limited by the proponent's motivation and intention to conduct prospecting to enhance the understanding of possible mineral resources occurring within the Sea Concession areas. Thus, no other activity alternatives for the proposed prospecting operations have been considered in this report.</td></tr>
<tr><td colspan="3">3. Design alternatives</td></tr>
<tr><td>3.1</td><td>Number of Sampling Cores, etc.</td><td rowspan="2">The dynamic nature of the proposed prospecting activities are such that the they may be divided into stages subject to outcomes of reviews of the results of the previous round of surveying/sampling. Consequently, the proposed works programme may be modified, extended or curtailed as data and results become available over the duration of the validity of the prospecting right period. Thus, the description of the proposed prospecting operations provided below is deemed to be the most realistic at this stage and is the anticipated maximum work scope that would be undertaken.</td></tr>
<tr><td>3.2</td><td>Scheduling</td></tr>
<tr><td colspan="3">4. Technology / process alternatives</td></tr>
<tr><td>4.1</td><td>Vessel</td><td>Offshore mineral exploration is highly specialised with a limited number of possible vessels equipped to carry out this work. BPT127 intends to contract the vessels as indicated in the section below to undertake the work.</td></tr>
<tr><td>4.2</td><td>Bulk Sampling</td><td>Feasible and reasonable technology alternatives for the proposed activity are constrained by the best available proven technology for conducting the proposed bulk sampling operations. There are two possible basic configurations of vessel available for bulk sampling: (i) the vertical method, utilising a vertically mounted tool on a drill string; and (ii) the horizontal method, using a seabed crawler. As the vessel BPT127 intend on contracting to undertake the bulk sampling activities makes use of the horizontal method, only this approach has been considered in this report.</td></tr>
</table>

No.	Alternatives	Description
5. No-Go alternative		
5.1	No-go	The No-Go alternative represents the option not to proceed with exploration, which leaves the project areas of influence in their current state except for variation by natural causes and other human activities. It thus represents the current status quo and the baseline against which all potential project-related impacts are assessed. While prospecting does not automatically lead to mining, it is an essential stage in the process, which might lead to further exploration and, thereafter mining, which results in long-term economic opportunities in mining sector, if commercial reserves can be exploited. The 'do nothing' or 'no-go' option forgoes these possible advantages. In addition, the implications of not going ahead with the proposed exploration are as follows: • South Africa would lose the opportunity to further establish the extent of offshore diamond reserves; • Lost economic opportunities related to sunken costs (i.e., costs already incurred) of exploration in the sea concession areas; and • If economic diamond reserves do exist and are not developed, South Africa would lose the opportunity to maximise the use of its own indigenous diamond reserves.

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 economically significant pelagic fisheries.

5.2 BIOLOGICAL OCEANOGRAPHY

The sea concession areas fall is in the cold temperate Namaqua Bioregion. The Namaqua Coastal Area is characterized by high productivity and community biomass along its shores. A large proportion of the area is characterized by habitat that is in relatively good (natural/pristine) condition. The Namaqua Coastal consists of coastal, inner, mid and outer shelf ecosystem types (Sink et al., 2019). The associated pelagic environment is characterized by very high productivity, high chlorophyll and very cold water (mean SST = 15.2°C) caused by upwelling (Lagabrielle 2009, Roberson et al., 2017), also serving as an important area for coastal fish (Turpie et al., 2000).

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. Most 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 oil and gas production offshore of the South African West Coast. 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 few proposed prospecting areas for phosphate are located off the West Coast, these overlap with the western edge of the Sea Concession areas. A few marine diamond mining right and prospecting concession areas are also located in proximity to the Sea Concession areas under this application.

While the sea concessions areas do not overlap any Marine Protected Areas, there is overlap with proposed Cape Canyon and Associated Islands, Bays and Lagoon Ecologically or Biologically Significant Areas (EBSA). The principal objective of EBSAs is the identification of features of higher ecological value that may require enhanced conservation and management measures, however, they currently carry no legal status.

6. ENVIRONMENTAL IMPACT ASSESSMENT

Table 1 provides a summary of the significance ratings assigned to each potential impact of the proposed prospecting activities.

Table 1: Summary of the significance of the potential impacts associated with the proposed prospecting activities and No-Go Alternative.

Potential impact	Significance	
	Without mitigation	With mitigation
Impact of the Vessel Discharges / Disposal to Sea		
Normal discharges	VL	VL
Noise from Survey/Sampling Vessel and Support Vessels	VL	VL

Potential impact		Significance: Without mitigation	Significance: With mitigation
Impact on Marine Fauna:			
Acoustic Impacts:			
Geophysical Surveys		VL	VL
Sampling Operations		VL	N/A
Crushing of Benthic Fauna During Sampling Operations		L	L
Generation of Sediment Plumes		VL	N/A
Smothering of Benthos in Redepositing Sediments:			
Redeposition of discarded sediments on soft-sediment macrofauna		VL	N/A
Redeposition of discarded sediments on rocky outcrop communities		L	VL
Impact on Other Users of the Sea:			
Fishing industry	Exclusion of fisheries	VL	VL
	Sediment plume impact on fish stock recruitment	INSIG	INSIG
	Acoustic Impacts of Geophysical Surveying on Fisheries	VL	VL
Marine mining and prospecting		INSIG	INSIG
Petroleum exploration		L - VL	VL
Marine transport routes		INSIG	INSIG
Socio-Economic Impact			
Impact on Cultural Heritage Material		M	INSIG
Impact related to Job creation and business opportunities		*VL+*	*VL+*
No-Go Alternative:			
Lost project and economic opportunity to establish whether or not a viable offshore diamond resources exists off the West Coast.		M	N/A
Cumulative Impact:			
Cumulative Impacts		L	L

VH=Very High H=High M=Medium L=Low VL=Very low INSIG = insignificant N/A= Not applicable

7. CONCLUSIONS

The impacts associated with the prospecting vessel operations would be of short-term duration and limited to the immediate areas where the prospecting activities are being undertaken. As a result, the impacts associated with the vessels are considered to be of VERY LOW significance after mitigation. Key mitigation includes ensuring that the vessels used comply with MARPOL 73/78 standards; prior notification is provided to key stakeholders (including fishing industry and adjacent rights holders); and Radio Navigation Warnings and Notices to Mariners are released prior to undertaking the prospecting activities.

Potential impacts on marine fauna as a result of the proposed prospecting activities would be of medium- to short-term duration and limited to the immediate area. As a result, the impacts on marine fauna associated with the sampling activities are considered to be of VERY LOW to LOW significance after mitigation. Key mitigation includes ensuring that a designated onboard Marine Mammal Observer (MMO) is aboard the survey vessel to ensure compliance with mitigation measures during geophysical surveying; terminating the survey if any marine mammals show affected behaviour within 500 m of the survey vessel or equipment; and avoiding undertaking sampling in rocky outcrop areas or other identified sensitive habitats in the concession areas.

Only two commercial fishing sectors could potentially be affected by the proposed prospecting activities, namely the small pelagic purse-seine and traditional linefish fisheries. It is recognised that elements of the Small Scale Fisheries may also be affected. Given the highly-localised nature of the prospecting operation over the short-term, the potential impact on these fisheries would be of VERY LOW significance with or without mitigation.

The likelihood of disturbing a shipwreck is expected to be very low considering the vast size of the South African offshore area. In the event that any cultural heritage material is disturbed during sampling operations, the impact would be at the national level, and of high intensity. Without mitigation this is of Medium significance. However, with the implementation of mitigation, cultural heritage sites can largely be avoided and if sampling is terminated in the unlikely event of encountering a shipwreck, the impact is regarded as INSIGNIFICANT.

The No-Go alternative represents the option not to proceed with exploration, which leaves the project areas of influence in their current state except for variation by natural causes and other human activities. While prospecting does not automatically lead to mining/production, it is an essential stage in the process, which might lead to further exploration and, thereafter mining, which results in significant employment opportunities in mining sector, if commercial reserves can be exploited. The 'do nothing' or 'no-go' option forgoes these possible advantages. In addition, the implications of not going ahead with the proposed exploration are that:

- South Africa would lose the opportunity to further establish the extent of offshore diamond reserves;
- Lost economic opportunities related to sunken costs (i.e. costs already incurred) of exploration in the licence area; and
- If economic diamond reserves do exist and are not developed, South Africa would lose the opportunity to maximise the use of its own indigenous diamond reserves.

This potential impact of the No-Go Alternative is considered to be of LOW significance.

8. KEY MITIGATION MEASURES

This section contains a summary of the key mitigation measures and contained in the EMPr which is attached as Appendix 1 to the main report.

8.1 COMPLIANCE WITH ENVIRONMENTAL MANAGEMENT PROGRAMME AND MARPOL 73/78 STANDARDS

- All phases of the proposed project must comply with the Environmental Management Programme presented in Chapter 7; and
- The vessels used during prospecting (including any required support vessels) must ensure compliance with MARPOL 73/78 standards.

8.2 NOTIFICATION AND COMMUNICATION WITH KEY STAKEHOLDERS

- As part of the stakeholder notification process, BPT127 should inform the Department of Forestry, Fisheries and the Environment (DFFE) fisheries research survey programme;
- Notify PetroSA and their contractors, as well as any other neighbouring petroleum exploration rights holders, as well as any companies undertaking marine prospecting or mining activities in the study area, prior to the commencement of activities.
- Liaise with PetroSA and any overlapping mineral prospecting rights holders to ensure that there is no overlapping of activities in the same area over the same time period.
- Prior to the commencement of the proposed survey and/or sampling activities the following key stakeholders should be notified and informed of the proposed activities (including navigational co-ordinates of the sampling areas, timing and duration of proposed activities) and the likely implications thereof:
  - Fishing industry / associations (these include South African Small Pelagic Fishing Industry Association, South African Tuna Association, South African Commercial Linefish Association, South African Hake Longline Association, South African Deepsea Trawling Industry Association, FishSA the West Coast Rock Lobster Association and the National SMME Fishing Forum);
  - Representatives of small-scale local fishing co-operatives; and
  - Other: DFFE, South African Maritime Safety Authority (SAMSA), South African Navy (SAN) Hydrographic office, overlapping and neighbouring exploration right holders and applicants, and Transnet National Ports Authority (ports of Cape Town and Saldanha Bay).
- The required safety zones around the prospecting vessels should be communicated via the issuing of Daily Navigational Warnings for the duration of the sampling operations through the South African Naval Hydrographic Office.
- The SAN Hydrographic office should be notified when prospecting activities are complete.

8.3 DISCHARGES

- Undertake training and awareness of crew in spill management to minimise contamination.
- Low-toxicity biodegradable detergents and reusable absorbent cloths should be used in cleaning of all deck spillage.
- All hydraulic systems should be adequately maintained.
- Minimise the discharge of galley waste material should obvious attraction of marine fauna be observed.

8.4 VESSEL SEAWORTHINESS AND SAFETY

- Vessels used during prospecting must be certified for seaworthiness through an appropriate internationally recognised marine certification programme (e.g. Lloyds Register, Det Norske Veritas).
- Collision prevention equipment should include radar, multi-frequency radio, foghorns, etc. Safety equipment and training of personnel to ensure the safety and survival of the crew in the event of an accident is a further legal requirement.
- A Notice to Mariners should provide the co-ordinates of the location of the planned areas in which prospecting is to take place.

8.5 GEOPHYSICAL ACTIVITIES

- A designated onboard Marine Mammal Observer (MMO) must ensure compliance with mitigation measures during geophysical surveying.

- The MMO should conduct visual scans for the presence of cetaceans around the survey vessel prior to the initiation of any acoustic impulses.
- Pre-survey scans should be of at least a 15-minute duration prior to the start of survey equipment.
- Where equipment permits, "soft starts" should be carried out for equipment with source levels greater than 210 dB re 1 µPa at 1 m over a period of 20 minutes to give adequate time for marine mammals to leave the vicinity. Where this is not possible, the equipment should be turned on and off over a 20 minute period to act as a warning signal and allow cetaceans to move away from the sound source.
- Pause the survey if any marine mammals show distressed behaviour within 500 m of the survey vessel or equipment until the mammal has vacated the area.
- Avoid planning geophysical surveys during the period for movement of migratory cetaceans (particularly baleen whales) from their southern feeding grounds into low latitude waters (beginning of June to end of November), and ensure that migration paths are not blocked by operations.
- Avoid undertaking prospecting activities during peak fishing periods of the small pelagic purse-seine sector. It is recommended that survey and sampling activities be carried out between mid-November and mid-January at a time when the small pelagic sector normally stops operations. This would also avoid possible impacts to the linefish fishery as linefish operations have a seasonal signal mostly driven by the availability of snoek in the winter period.
- For the months of June and November ensure that Passive Acoustic Monitoring (PAM) is incorporated into any survey programme.

8.6 SAMPLING ACTIVITIES

- Sampling activities of any kind should avoid rocky outcrop areas or other identified sensitive habitats in the concession area.
- Use should be made of geophysical data to conduct a pre-sampling geohazard analysis of the seabed, and near-surface substratum to map potentially vulnerable habitats and prevent potential conflict with the sampling targets.
- A buffer zone of 150 m will be established around any identified sensitive communities or rocky-outcrop areas.
- Avoid undertaking prospecting activities during peak fishing periods of the small pelagic purse-seine sector. It is recommended that survey and sampling activities be carried out between mid-November and mid-January at a time when the small pelagic sector normally stops operations. This would also avoid possible impacts to the linefish fishery as linefish operations have a seasonal signal mostly driven by the availability of snoek in the winter period.

8.7 CULTURAL HERITAGE MATERIAL

- Areas where shipwreck sites are identified during geophysical surveys must be excluded prior to undertaking sampling activities.
- <u>It is recommended that the onboard BPT127 representative must undergo a short induction on archaeological site and artefact recognition, as well as the process to follow should archaeological material be encountered during sampling.</u>
- The contractor must be notified that archaeological sites could be exposed during drill and bulk sampling activities, as well as the procedure to follow should archaeological material be encountered.
- If shipwreck material is encountered during the course of bulk sampling in the concession area, the following mitigation measure should be applied:

 - > Cease work in the directly affected area to avoid damage to the wreck until the South African Heritage Resources Agency (SAHRA) has been notified and the contractor/BPT127 has complied with any additional mitigation as specified by SAHRA; and
 - > Where possible, take photographs of them, noting the date, time, location and types of artefacts found. Under no circumstances may any artefacts be removed, destroyed or interfered on the site, unless under permit from SAHRA.

- The possibility of realising core log information and samples of the coarser fraction (i.e. gravel and stone between 20 mm and 150 mm) of sorted seabed sediment for assessment by an archaeologist for the presence of prehistoric lithic material should be considered by BPT127.

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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
DFFE	Department of Forestry, Fisheries and Environment
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

Acronym / Abbreviation	Definition
SAN	South African Navy
SANBI	South African National Biodiversity Institute
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, presents the assumptions and limitations of the report, provides a brief description of the project background, provides the terms of reference and presents an outline of the structure of the report. Information on the public participation process (PPP) is provided to Interested and Affected Parties (I&APs), along with details on how to submit comments on the draft Environmental Impact Report (EIR).

1.1 PURPOSE OF THIS REPORT

This EIR has been compiled and distributed for review and comment as part of the Scoping and Environmental Impact Assessment (EIA) process that is being undertaken for the proposal by Belton Park Trading 127 (Pty) Ltd (BPT127) to undertake offshore prospecting activities in Sea Concessions 13C, 15C, 16C, 17C and 17C ("the Sea Concession areas), located off the West Coast of South Africa, as part of a Prospecting Right application.

An application for a prospecting right requires Environmental Authorisation (EA) from the competent authority, which is the Minister of Mineral Resources and Energy, to carry out the proposed prospecting activities. The application for the EA, was submitted to the DMRE at the same time as the prospecting right application. In order for DMRE to consider this application for EA, an EIA process must be undertaken in terms of the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended), promulgated in terms of the National Environmental Management Act (No. 107 of 1998; NEMA).

SLR Consulting (South Africa) (Pty) Ltd (SLR) was appointed by BPT127 as the independent Environmental Assessment Practitioner (EAP) to undertake the Scoping and EIA process. This report presents the process followed and the findings of the EIA.

1.2 PROJECT BACKGROUND

Belton Park Trading 127 (Pty) Ltd (BPT127) lodged separate applications for Prospecting Rights 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 applications were made 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.

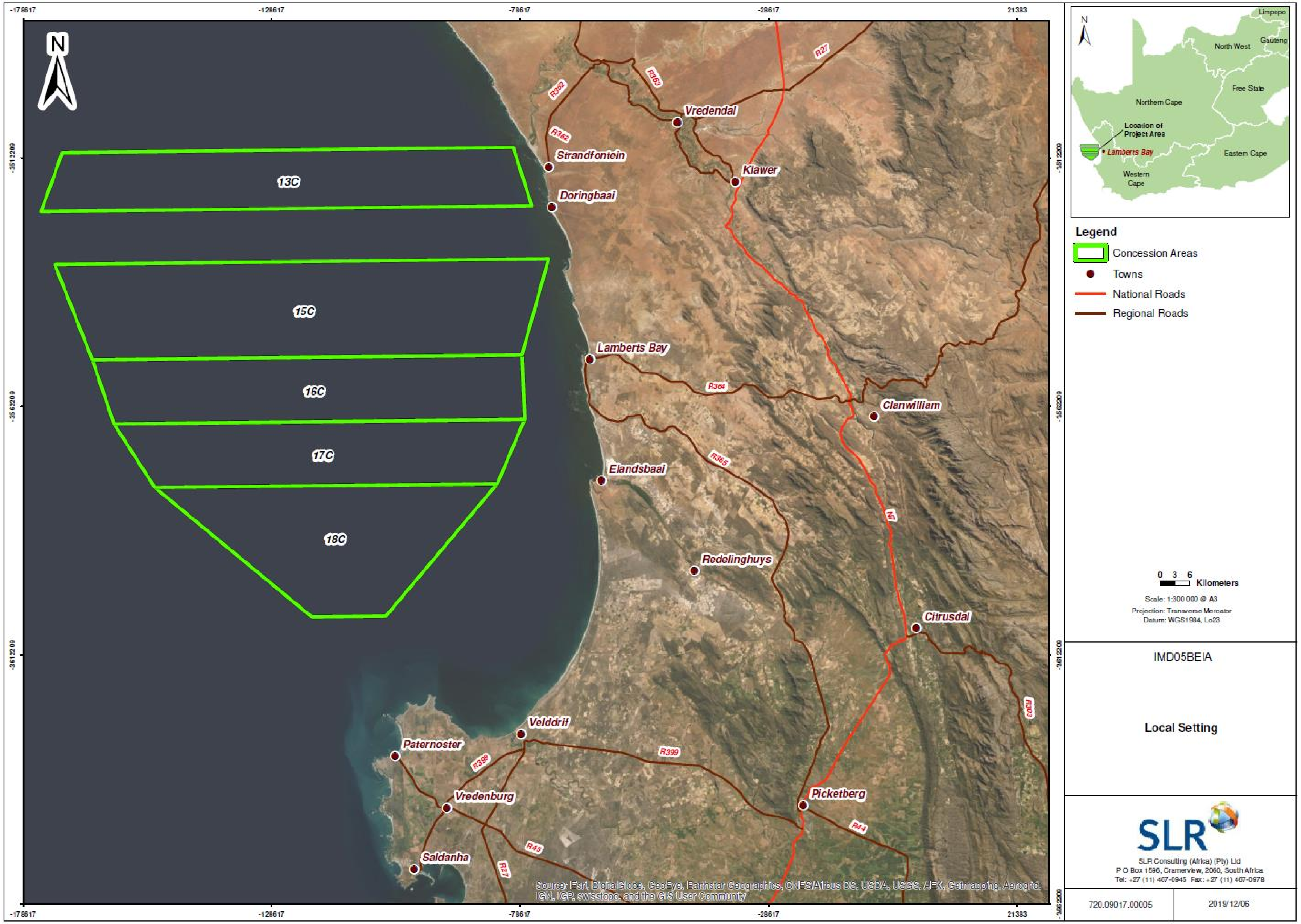


FIGURE 1-1: LOCATION OF THE 13C, 15C, 16C, 17C AND 18C SEA CONCESSION AREAS, OFF THE WEST COAST OF SOUTH AFRICA.

1.3 ASSUMPTIONS AND LIMITATIONS

The assumptions and limitations of this EIR are that:

- The assessment 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 the findings, recommendations with respect to mitigation and management; 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 and the actual specific locations of the sample sites); and
- The assessment assumes that all mitigatory measures incorporated into the project description would be implemented as proposed.

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.

1.4 TERMS OF REFERENCE

The terms of reference for the Scoping and EIA are to:

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 the Scoping and EIA documents;
4. Commission specialist studies, identified during the scoping process, to assess key risk and impacts arising from the proposed project; and
5. Integrate key information, including the finding of the specialist studies, into this EIR to allow an informed decision to be taken on the proposed project by the Competent Authority.

1.5 STRUCTURE OF THIS REPORT

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

Section	Contents
Executive Summary	Provides a summary of the EIR.
Chapter 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 EIA, and describes the structure of the report and the opportunity for

Section	Contents
	comment.
Chapter 2	Approach and Methodology Outlines the key legislative requirements applicable to the proposed mining activities and outlines the methodology and consultation process followed in the EIA process.
Chapter 3	Project overview Describes the need and desirability for the proposed project, provides general project information, an overview of the proposed mining activities and a description of the project alternatives.
Chapter 4	Description of the affected environment Describes the existing biophysical and social environment that could potentially be affected by the proposed project.
Chapter 5	Impact description and assessment Describes and assesses the potential impacts of the proposed project on the affected environment. It also presents mitigation or optimisation measures that could be used to reduce the significance of any negative impacts or enhance any benefits, respectively.
Chapter 6	Conclusion and recommendations Provides conclusions to the EIA and summarises the recommendations for the proposed project.
Chapter 7	Environmental Management Programme Provides an Environmental Management Programme for the proposed mining activities.
Chapter 8	References Provides a list of the references used in compiling this report.
Appendices	Appendix 1: EMPr Appendix 2: EAP Declaration and Curriculum Vitae Project Team Appendix 3: Public Participation Process Appendix 3.1: I&AP Database Appendix 3.2: Scoping Comments and Responses Report Appendix 3.3: I&AP Notifications Appendix 3.4: EIR Comments and Responses Report Appendix 4: Specialist studies Appendix 4.1: Convention for assigning significance ratings to impacts Appendix 4.2: Fisheries Assessment Appendix 4.3: Marine Faunal Assessment Appendix 4.4: Maritime Archaeological Impact Assessment Appendix 5: EAP Undertaking Appendix 6: Financial Provision

1.6 OPPORTUNITY TO COMMENT

This draft Environmental Impact Report (EIR) was available to Interested and Affected Parties (I&APs) for a 30-day review and comment period from 27 August to 27 September 2021 in order to provide Interested and Affected Parties (I&APs) the opportunity to comment on the proposed project and the draft EIR. All comments have been included in the final EIR. It should be noted that all significant changes to the draft report are underlined and in a different font (Times New Roman) to the rest of the text.

After DMRE has reached a decision, all registered I&APs 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, 2014 will follow the issuing of the decision.

2. APPROACH AND METHODOLOGY

In accordance with the EIA Regulations, 2014 (as amended), all legislation and guidelines that have been considered in the EIA process must be documented. This section outlines the legislative requirements of the EIA process, presents the project team, describes the EIA process undertaken to date and presents the way forward in the 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 consider 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. 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.

2.1.3 EIA Regulations, 2014 (as amended)

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 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.

2.1.4 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.

2.1.5 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

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."

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 Forestry, Fisheries and Environment (DFFE, 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).

2.1.6 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 Marine Pollution Conventions;
- MARPOL;
- Amendment of 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 GUIDELINES AND POLICIES

The guidelines listed in Table 2-2 have been taken into account in the EIA process.

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

Guideline	Governing body	Applicability
Specialist Studies, Integrated Environmental Management, Information Series 4 (2002)	DFFE	This guideline was consulted to ensure adequate development of terms of reference for specialist studies.
Impact significance, Integrated Environmental Management, Information Series 5 (2002)	DFFE	This guideline was consulted to inform the assessment of significance of impacts of the proposed project.
Cumulative Effects Assessment, Integrated Environmental Management, Information Series 7 (2004)	DFFE	This guideline will be consulted to inform the consideration of potential cumulative effects of the proposed project.
Criteria for determining Alternatives in EIA, Integrated Environmental Management, Information Series 11 (2004)	DFFE	This guideline was consulted to inform the consideration of alternatives.
Environmental Management Plans, Integrated Environmental Management, Information Series 12 (2004)	DFFE	This guideline will be consulted to ensure that the Environmental Management Programme (EMP) has been adequately compiled.
Environmental Impact Reporting, Integrated Environmental Management, Information Series 15 (2004)	DFFE	This guideline was consulted to inform the approach to impact reporting.

Guideline	Governing body	Applicability
Guideline on need and desirability (2017)	DFFE	This guideline informed the consideration of the need and desirability aspects of the proposed project.
Public Participation guideline in terms of NEMA (2017)	DFFE	The purpose of these guidelines is to ensure that an adequate public participation process was undertaken during the EIA process.

2.3 SCOPING AND EIA PROCESS

2.3.1 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 Environmental Impact Report are provided in Table 2-3 below.

TABLE 2-3: 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			
Nigel Rossouw	M.Sc. *Cum Laude* (Env. and Geog. Sci.), University of the Western Cape	Member of the International Association for Impact Assessment (South Africa) (IAIAsa)	25	Project Director, including Quality Control and process and report 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.

SLR has no vested interest in the proposed project other than fair renumeration for consulting services rendered as part of the EIA process. The EAP declaration, as required by the EIA Regulations, 2014 (as amended), is provided in Appendix 2, together with the Project Team curriculum vitae and professional registrations.

2.3.2 Project Team Experience

Nigel Rossouw: Nigel an Environmental and Social Specialist with 25 years of experience in the corporate, project implementation and consulting environments. Nigel has assisted clients and employers in the oil and gas, water, large infrastructure and public sectors in managing their Environmental, Social and Governance (environmental) risks and de-risking projects through the delivery of International Finance Corporation and Equator Principle standards.

Nicholas Arnott: Nicholas 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 BAs, EIAs and EMPs. He has gained experience in a wide range of projects relating to mining, infrastructure projects (e.g. roads), housing and industrial developments.

2.4 SCOPING PHASE

2.4.1 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 consisted of a series of steps to ensure compliance with these objectives and the EIA Regulations 2014 as set out in GN No. R982 (as amended by GN No. 326). The process involved an open, participatory approach to ensure that all potential impacts were identified and that decision-making takes place in an informed, transparent and accountable manner. A flowchart indicating the generic EIA process is presented in Figure 2-1. Box 2-1 describes the public participation tasks undertaken during the Scoping Phase.

2.4.2 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 Scoping process are summarised in Box 2-1. The key issues and concerns identified by the project team, with I&AP input, during the Scoping Phase are summarised in Box 2-2. This information provided the basis on which the specialist studies and associated terms of references were determined.

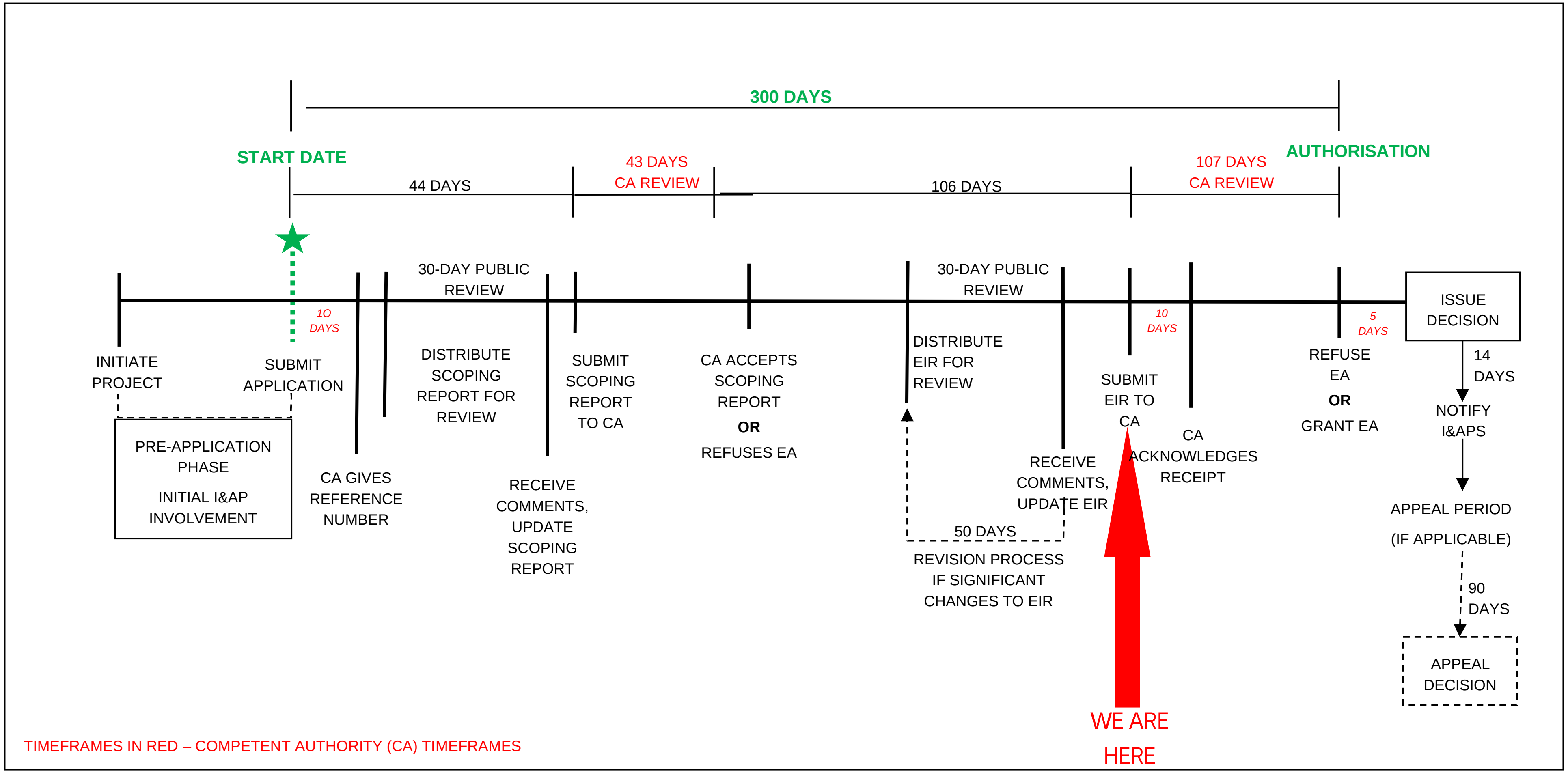


FIGURE 2-1: FLOW DIAGRAM SHOWING THE SCOPING AND EIA PROCESS.

BOX 2-1: TASKS UNDERTAKEN DURING THE SCOPING 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 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 was 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.

- Scoping Report availability

  The draft Scoping Report was made available on the SLR website (www.slrconsulting.com\za) and at the Cape Town offices of SLR for the duration of the review and comment period (14 October to 13 November 2019). Twelve submissions were received during the draft Scoping Report review and comment period.

- Telephonic Discussions

  Following the release of the draft Scoping Report, telephonic discussions were held with Ward Councillors and Municipal Managers for the nearest Wards, District and Local Municipalities. The purpose of these discussions was to provide additional information and to respond to any issues or comments that they may have had regarding the proposed project. The following stakeholders were contacted:

  - Ward Councillor for Ward 5, Cederberg Municipality (24 October 2019);
  - Ward Councillor for Ward 2, Matzikama Municipality (21 October 2019);
  - Ward Councillor for Ward 5, Matzikama Municipality (21 October 2019, 28 October 2019 and 29 October 2019);
  - Cederberg Local Municipality Municipal Manager (16 October 2019);
  - Matzikama Local Municipality Municipal Manager (16 October 2019); and
  - West Coast District Municipality Municipal Manager (21 October 2019 and 24 October 2019).

- Revise Scoping Report and submission to DMR for acceptance

  The Scoping Report was updated to include the submissions received during the Scoping Report review and comment period. The key issues raised related to the potential impact of the proposed project on marine fauna, cultural heritage and on the West Coast rock lobster, tuna pole- and line-fisheries. The submission was responded to in the updated Comments and Responses Report attached to the revised Scoping Report. As indicated above, the Scoping Report was accepted by DMRE on 27 February 2020.

- **Consultation with overlapping Petroleum Licence Block Holders**

  On 26 June 2020, BPT127 contacted representatives of Sasol and PetroSA who were the holders of petroleum and exploration rights over Block3A/4A (which overlap with the Sea Concession areas). On 30 June 2020, Mr Martin Ginster responded to confirm that Sasol had relinquished Blocks 3A/4A. To date no further correspondence has been received from PetroSA.

BOX 2-2: KEY ISSUES IDENTIFIED BY THE PROJECT TEAM, WITH I&APS INPUT, DURING THE SCOPING PHASE

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:

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

Potential impact on other marine mining and exploration operations:

- Disruption of activities because of statutory safety zone around the mining vessel.

Potential impact on marine transport routes:

- Interference with shipping routes because of statutory safety zone around the mining vessel.

Potential socio-economic impacts:

- Employment and business opportunities; and
- Generation of direct revenues.

2.5 EIA PHASE

2.5.1 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.

2.5.2 Specialist Studies

The specialist studies commissioned to address the key issues and potential impacts were: 1) Marine Fauna; 2) Commercial Fisheries; and 3) Underwater Cultural Heritage. The impacts in the studies were assessed according to a defined impact assessment methodology. The mitigation measures were defined to avoid or reduce negative impacts and enhance potential benefits. Details of the specialist studies, as well as the specialist that undertook the studies are provided in Table 2-4 below.

TABLE 2-4: LIST OF SPECIALIST STUDIES AND SPECIALISTS

No.	Specialist study	Specialist/s	Qualifications	Company
1	Marine Fauna	Dr Andrea Pulfrich	PhD, (Fisheries Biology), Christian-Albrechs University, Kiel, Germany	Pisces Environmental Services (Pty) Ltd
2	Fisheries	Mr Dave Japp	MSc (Ichthyology and Fisheries Science), Rhodes University	Capricorn Marine Environmental (Pty) Ltd
		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

2.5.3 Integration and Assessment

This Final EIR is compiled in compliance with Appendix 3 of the EIA Regulations, 2014 (as amended). The specialist findings and other relevant information were integrated into this EIR, which includes an EMPr.

This report aims to present all information in a clear and understandable format suitable for easy interpretation by I&APs and authorities, and provided an opportunity for I&APs to comments on all aspects of the proposed project, as well as findings of the impact assessment.

2.5.4 Completion of the EIA process

After the comment period, all comments received on the draft EIR have been collated and a Comments and Responses Report produced (see Appendix 3.4). This Final EIR has been submitted to DMRE for consideration and decision-making. After DMRE 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, 2014 (GN No. R993) will follow the issuing of the decision.

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 Paolo Esposito
Telephone:	+27 (0) 21 510-1881	+27 (0) 21 510-1881
Cell:	+27 (0) 83 375 2217	+27 (0) 78 419 5770

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 (km^2)
Sea Concession Area 13C			
1	-31.7102757	17.1983337	1117.53 km^2
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 km^2
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 km^2
2	-32.0871849	18.1708546	
3	-32.2041435	18.1752834	
4	-32.2036133	17.2991676	

Point	Latitude	Longitude	Total Area (km²)
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	
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	

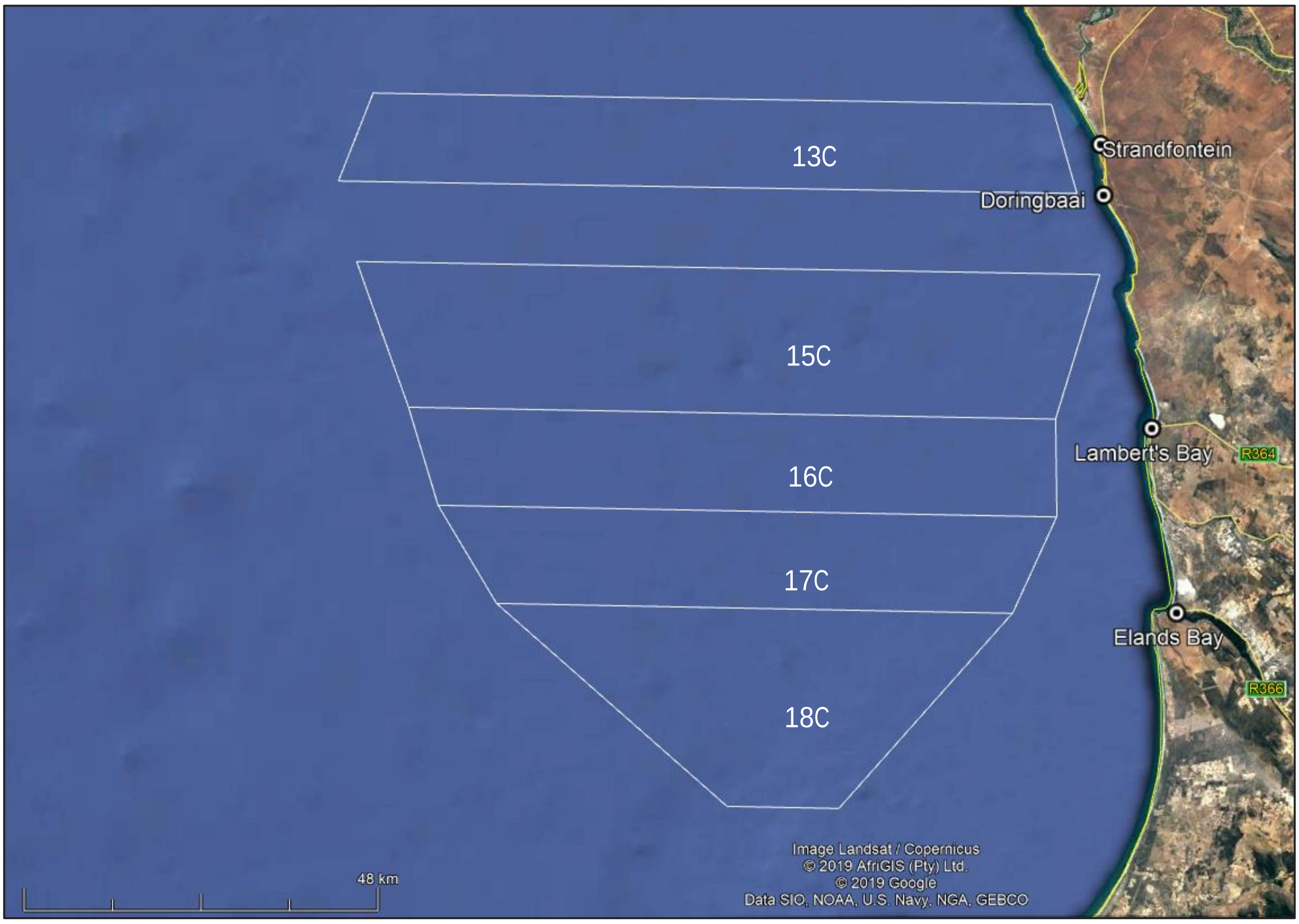


FIGURE 3-1: LOCATION OF THE 13C, 15C, 16C, 17C AND 18C SEA CONCESSION AREAS, OFF THE WEST COAST OF SOUTH AFRICA.

3.1.3 Target Minerals

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

The Integrated Environmental Management Guideline on Need and Desirability (2017) notes that while addressing the growth of the national economy through the implementation of various national policies and strategies, it is also essential that these policies take cognisance of strategic concerns such as climate change, food security, as well as the sustainability in supply of natural resources and the status of our ecosystem services. Thus, the over-arching framework for considering the need and desirability of development in general is taken at the policy level through the identification and promotion of activities / industries / developments required by civil society. The DFFE guideline further notes that at a project level (as part of an EIA process), the need and desirability of the project should take into consideration the content of regional and local plans, frameworks, and strategies.

Considering the above, and in alignment with the above-mentioned guideline (DFFE, 2017), this section aims to provide an overview of the need and desirability for the proposed project by highlighting how it is aligned with the strategic context of national development policy and planning, broader societal needs, and regional and local planning, as appropriate.

3.2.1 National Policy and Planning Framework

3.2.1.1 National Development Plan 2030 (2012)

The National Development Plan (NDP) 2030 (2012) provides the context for all growth in South Africa, with the overarching aim of eradicating poverty and inequality between people in South Africa through the promotion of development. The NDP provides a broad strategic framework, setting out an overarching approach to confronting poverty and inequality based on the six focused and interlinked priorities. One of the key priorities is "faster and more inclusive economic growth".

To transform the economy and create sustainable expansion for job creation, an average economic growth exceeding 5% per annum is required. One of the approaches to achieve this includes increasing exports by focusing on areas where South Africa already has natural endowments and comparative advantage, such as mining.

Notwithstanding the above, it is also acknowledged that environmental challenges conflict with some of these development initiatives. As such, it is emphasised that there is also a need to:

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

The NDP identifies the "minerals and metals cluster" (which encompasses all mining and quarrying activities, supplier industries to the mining sector, and downstream beneficiation of mined minerals) as a sector with substantial potential for growth stimulation and/or employment. It is pointed out that South Africa must exploit its mineral resources to create employment and generate foreign exchange and tax revenue. Thus, 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.

3.2.1.2 Operation Phakisa (2014)

Operation Phakisa was established in 2014 with the aim to accelerate execution of the NDP. The goal is to boost economic growth and create jobs to address poverty, unemployment, and inequality. It also aims to operate as a cross-sectoral programme for implementation of the NDP through improved cooperation between government, organised business, and organised labour. Two programme areas identified under Operation Phakisa which are of relevance for the proposed project include the Oceans Economy programme and the Mining Phakisa programme. It is noted that offshore mining is not specifically addressed under the Oceans Economy Lab of Operation Phakisa, however, it was included under the Mining Lab of Operation Phakisa (also referred to as the Mining Phakisa). These are discussed in more detail below.

3.2.1.2.1 Oceans Economy programme

Operation Phakisa has identified the oceans economy as a key programme area, on the premise that it has the potential to contribute up to R 177 billion to Gross Domestic Product (GDP) by 2033 (compared to R 54 billion in 2010) and to create up to one million jobs (compared to 316 000 in 2010). The following six growth areas were identified as key priorities for growing the ocean economy:

- Marine Protection Services and Ocean Governance;
- Marine Transport and Manufacturing;
- Offshore Oil and Gas;
- Aquaculture;
- Small Harbours Development; and
- Coastal and Marine Tourism.

Under the Marine Protection Services and Ocean Governance work stream, Government developed an overarching governance plan with the aim to protect the ocean environment from illegal activities and promote its socio-economic benefits. A key output of this workstream is the proclamation of 22 new Marine Protected Areas (MPAs) covering an area of 68 578 km^2 of the EEZ. These areas have been set aside for the long-term protection of marine ecosystems.

As a result of the Marine Transport and Manufacturing workstream, the port of Port Nolloth has been upgraded as part of a rehabilitation project undertaken by the Transnet National Ports Authority. The infrastructure upgrade included the refurbishment of the jetty structure, concrete, and quay infrastructure, as well as replacement of revetment works to address erosion of the shoreline. The aim of these improvements was to enable Port Nolloth to better support offshore activities.

3.2.1.2.2 Mining Phakisa

The goal of Mining Phakisa is to ensure that (1) the mining industry of South Africa remains economic sustainable during commodity price slumps, and (2) initiatives are put in place to position the mining cluster on a firm foundation to grow, transform, and optimize the contribution of the industry to the economic and social development of mining related communities and the country.

Five work streams were established as part of Mining Phakisa to address the challenges faced by the mining industry:

- Cluster Employment;
- Win-win Beneficiation;
- Sustainable Communities;
- Reviving Investment and Access to Affordable and Reliable Infrastructure; and
- Advancing the Cluster.

After the Phakisa Lab workshops, the Chamber of Mines South Africa (CoM) adopted an internal strategic framework for modernization - a process of transition and transformation of the mining industry. This process would, amongst others, involve using South Africa's mineral resources in the safest, most efficient, cost-effective, and sustainable manner possible, as well as promoting the conservation of natural resources, preservation, and restoration of the environment.

3.2.2 Regional and Local Policy and Planning Framework

This section aims to provide an overview of the regional and local policy and planning context relating to the proposed project. The Constitution assigns Provincial and regional planning as exclusive responsibilities of Provincial Government and each province is required to publish a spatial development framework which coordinates, integrates, and aligns provincial plans and development strategies with policies of National Government, Provincial departments, and municipalities. The Sea Concession areas are located offshore of the Matzikama and Cederberg Local Municipalities, both located within the West Coast District Municipality of the Western Cape Province.

As pointed out above, the offshore area of activity, as well as the EEZ, do not fall within the borders of any municipality or province of South Africa as set out in the Constitution. Thus, the related planning documentation, especially at the District and Local Municipality level, typically does not directly address offshore areas and activities in a significant level of detail. Notwithstanding the above, a discussion of the provincial, district and local municipality planning context, where available, for the proposed project is considered below.

3.2.2.1 Western Cape Provincial Spatial Development Framework (PSDF)

The Provincial Spatial Development Framework (PSDF) (2014) sets out a variety of policies to ensure that, amongst others, provincial spatial assets are used sustainably and safeguard them against risks by mitigating and/or adapting to current and looming risks. Of relevance to the proposed project is the "Oceans and coasts" theme. Under this theme, the PSDF sets out various objectives to fulfil "*Policy R2 – Safeguard Inland and Coastal Water Resources and Manage the Sustainable use of Water*".

Of the objectives set out under the policy, the following is applicable to the offshore environment:

"13. As most productive offshore habitats that support marine biodiversity are not formally protected, extend the current Marine Protected Area (MPA) network based on the strategic geographic priority areas that have been identified."

Subsequent the publication of the PSDF, the national MPA network was extended and various MPAs which were identified under Operation Phakisa were accepted and are now in place. The location of Sea Concession areas in relation to the MPAs is provided in Section 4.1.4 below.

3.2.2.2 West Coast District Municipality Spatial Development Framework

The West Coast District Spatial Development Framework (SDF) (2020) does not specifically address the offshore environment; however, it is noted that conservation and management of the coastline for the District is critically important. In this regard, the SDF sets out the following objectives to be considered in policy and regulatory frameworks:

- Reduce public liability;
- Reduce risk to human life;
- Prevent intensification of development in risk zones, but allow exercising of existing rights;
- Maintain coastal quality;
- Prevent encroachment that will impact on the integrity of the shoreline ecology; and
- Prevent densification of rural areas along the coastline.

Due to the location of the sea concession areas, the coastline would not be directly impacted by the proposed project.

With respect to mining activities, the SDF states that the District has a vast number of mineral resources, of which some are currently not being exploited. It is concluded that mining has the potential to make bigger contribution to the overall economy of the District, when unexploited resources are utilised in future. Nevertheless, it is pointed out that mining activities should be monitored to promote and ensure that the necessary precautionary environmental measures are implemented, activities and operations are responsibly managed, and ultimately that disturbed area be appropriately rehabilitated post-mining. It is further noted that a lack of adequate monitoring and enforcement of mining activities are currently a problem in the District.

3.2.3 Consistency with Policy and Planning Context

The previous sections have considered the policy and planning context at national and regional level which are relevant to the proposed project. There is a drive from national and provincial Government to stimulate development and grow the economy of South Africa with a strong focus on job creation in all sectors, whilst protecting the environment. Mining has been a long-term driver of economic growth and job creation for the country and still considered to be an important for the national economy.

The proposed prospecting activities would allow for the determination of the extent and economic viability of the mineral reserves in the Sea Concession areas. By gaining a better understanding of the extent, nature, and economic feasibility of extracting these potential resources, the viability of undertaking future mining operations within the concession area would be better understood.

However, the promotion of the mining sector could also be considered a contradiction with some other plans and policies, which identify the need to reduce the reliance on the extraction of non-renewable resources as they contribute to Green-House Gas emissions. Nevertheless, due to the limited overall economic growth within the country there is still a need to undertake mineral exploration and mining activities within the country.

Marine mining at present contributes about 10% of South Africa's total diamond production. n 2019, about 7.2 million carats of diamonds were produced locally. Diamond revenues, levied through income tax on diamonds, mining leases, mining rights and diamond export duties, are put into the Central Revenue Fund from where they are allocated to various budgets by the South African Government.

Prospecting activities are needed to:

- Confirm and obtain additional information concerning potential targets through non-invasive activities (i.e. desk-top studies and geophysical surveys) and invasive activities (i.e. drilling).
- Assess if the resource can be extracted through future mining in an economically viable manner while being socially and environmentally responsible.

Should prospecting activities prove that there is a feasible mineral resource for mining, a new mining area could be developed, which would generate significant employment opportunities.

3.2.4 DFFE Guideline on Need and Desirability

When considering an application for EA, the competent authority must comply with Section 24O of NEMA and must have regard for any guideline published in terms of Section 24J of the Act and any minimum requirements for the application. This includes the DFFE's Guideline on Need and Desirability (March 2017). Additionally, the EIA Regulations, 2014, (as amended) require EAPs who undertake environmental assessments, to have knowledge and consider relevant guidelines. A person applying for an EA must abide by the Regulations, which are binding on the applicant.

The DFFE's Guideline on Need and Desirability (March 2017) sets out a list of questions which should be addressed when considering need and desirability of a proposed development. These are divided into questions that relate to the aspects of ecological sustainability and justifiable economic and social development of the proposed project. Table 3-2 below sets out the list of questions as per the Guideline.

TABLE 3-2: QUESTIONS TO BE ENGAGED WITH WHEN CONSIDERING NEED AND DESIRABILITY, AS PER THE INTEGRATED ENVIRONMENTAL MANAGEMENT GUIDELINE ON NEED AND DESIRABILITY (MARCH 2017).

QUESTION	LOCATION IN REPORT
1. How will this development (and its separate elements / aspects) impact on the ecological integrity of the area?	
1.1 How were the ecological integrity considerations taken into account? 1.1.1. Threatened Ecosystems, 1.1.2. Sensitive, vulnerable, highly dynamic, or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure, 1.1.3. Critical Biodiversity Areas ("CBAs") and Ecological Support Areas ("ESAs"), 1.1.4. Conservation targets, 1.1.5 Ecological drivers of the ecosystem, 1.1.6. Environmental Management Framework, 1.1.7. Spatial Development Framework, and 1.1.8. Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.)	See Sections 3.2.1, 3.2.2, 4 and 5.
1.2 How will this development disturb or enhance ecosystems and / or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	See Sections 5 and 6.
1.3 How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	See Sections 5 and 6.
1.4 What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?	A description of the anticipated types of waste, associated volumes are provided in Section 3. The proposed management measures are included in Section 5.
1.5 How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	Refer to Sections 4.1.4.6 and 5.4.1.
1.6 How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and	The purpose of the proposed

QUESTION	LOCATION IN REPORT
equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	prospecting operations are to determine the extent and economic viability of the mineral reserves in the sea concession area for future exploitation. Thus, the proposed project could facilitate the future extraction of non-renewable mineral resources. Notwithstanding the above, due to the high costs of undertaking prospecting (and possible future mining) operations in the offshore environment, the location and extent of disturbed areas would be limited to only those areas targeted by the planned activities.
1.7 How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts? 1.7.1. Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life) 1.7.2. Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources this the proposed development alternative?) 1.7.3. Do the proposed location, type and scale of development promote a reduced dependency on resources?	
1.8 How were a risk-averse and cautious approach applied in terms of ecological impacts? 1.8.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)? 1.8.2. What is the level of risk associated with the limits of current knowledge? 1.8.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	See Section 1.4.
1.9. How will the ecological impacts resulting from this development impact on people's environmental right in terms following: 1.9.1. Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts? 1.9.2. Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?	See Section 5
1.10. Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socioeconomic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?	See Sections 4 and 5.
1.11. Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives/targets/considerations of the	See Section 5.

QUESTION	LOCATION IN REPORT
area?	
1.12. Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?	See Section 3.3.
1.13. Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?	See Section 5.
2.1. What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?: 2.1.1. The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area, 2.1.2. Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.), 2.1.3. Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and 2.1.4. Municipal Economic Development Strategy ("LED Strategy").	See Sections 3.2.2.
2.2. Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area? 2.2.1. Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	See Sections 3.2.2.
2.3. How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	See Sections 3.2.1, 3.2.2, 4 and 5.
2.4. Will the development result in equitable (intra- and inter-generational) impact distribution, in the short and long-term? Will the impact be socially and economically sustainable in the short- and long-term?	See Section 5.
2.5. In terms of location, describe how the placement of the proposed development will: 2.5.1. Result in the creation of residential and employment opportunities in close proximity to or integrated with each other, 2.5.2. Reduce the need for transport of people and goods, 2.5.3. Result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport), 2.5.4. Compliment other uses in the area, 2.5.5. Be in line with the planning for the area, 2.5.6. For urban related development, make use of underutilised land available with the urban edge,	Due to the offshore nature of the proposed project, these are not applicable.

QUESTION	LOCATION IN REPORT
2.5.7. Optimise the use of existing resources and infrastructure, 2.5.8. Opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement), 2.5.9. Discourage "urban sprawl" and contribute to compaction/densification, 2.5.10. Contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs, 2.5.11. Encourage environmentally sustainable land development practices and processes, 2.5.12. Take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.), 2.5.13. The investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential), 2.5.14. Impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area, and 2.5.15. In terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	
2.6. How were a risk-averse and cautious approach applied in terms of socio-economic impacts?: 2.6.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)? 2.6.2. What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge? 2.6.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	See Section 1.3.
2.7. How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following: 2.7.1. Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts? 2.7.2. Positive impacts. What measures were taken to enhance positive impacts?	See Sections 4 and 5.
2.8. Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socio-economic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	See Sections 5 and 6.
2.9. What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?	See Sections 5 and 6.
2.10. What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development	Due to the offshore nature of the proposed project, these are not

QUESTION	LOCATION IN REPORT
located appropriately)? Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?	applicable.
2.11. What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?	Due to the offshore nature of the proposed project no such issues are deemed to be likely to arise as a result of the proposed prospecting operations.
2.12. What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?	See Sections 5 and 6.
2.13. What measures were taken to: 2.13.1. Ensure the participation of all interested and affected parties, 2.13.2. Provide all people with an opportunity to develop the understanding, skills, and capacity necessary for achieving equitable and effective participation, 2.13.3. Ensure participation by vulnerable and disadvantaged persons, 2.13.4. Promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means, 2.13.5. Ensure openness and transparency, and access to information in terms of the process, 2.13.6. Ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge, and 2.13.7. Ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein were be promoted?	See Sections 2.4.2 and 2.5.3.
2.14. Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?	Due to the offshore nature of the proposed project no such issues are deemed to be likely because of the proposed project.
2.15. What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?	Project activities would comply with the BPT127's internal occupational health and safety policies and/or standards as well as national legislation.

QUESTION	LOCATION IN REPORT
2.16. Describe how the development will impact on job creation in terms of, amongst other aspects: 2.16.1. The number of temporary versus permanent jobs that will be created, 2.16.2. Whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area), 2.16.3. The distance from where labourers will have to travel, 2.16.4. The location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits), and 2.16.5. The opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).	See Section 5.4.2.
2.17. What measures were taken to ensure: 2.17.1. That there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment, and 2.17.2. That actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?	See Section 3.2.3.
2.18. What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?	See Appendix 1.
2.19. Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	See Appendix 1.
2.20. What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?	See Appendix 1.
2.21. Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?	See Sections 5 and 6.
2.22. Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?	See impact assessment included in Section 5.

3.3 CONSIDERATION OF ALTERNATIVES

A summary of the project alternatives considered in this EIA are described below.

No.	Alternatives	Description
1. Site / location alternatives		
1.1	Exploration site	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.
1.2	Onshore logistics	The proposed prospecting operations are of such short duration (four days per concession per annum) that bunkering or provision of spares, consumables or crew changes would not be required. It is expected that once the required prospecting activity has been completed, the vessel would move off location and dock at the Port of Cape Town.
2. Activity alternatives		
2.1	Prospecting	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. Feasible and reasonable activity alternatives are limited by the proponent's motivation and intention to conduct prospecting to enhance the understanding of possible mineral resources occurring within the Sea Concession areas. Thus, no other activity alternatives for the proposed prospecting operations have been considered in this report.
3. Design alternatives		
3.1	Number of Sampling Cores, etc.	The dynamic nature of the proposed prospecting activities are such that the they may be divided into stages subject to outcomes of reviews of the results of the previous round of surveying/sampling. Consequently, the proposed works programme may be modified, extended or curtailed as data and results become available over the duration of the validity of the prospecting right period. Thus, the description of the proposed prospecting operations provided below is deemed to be the most realistic at this stage and is the anticipated maximum work scope that would be undertaken.
3.2	Scheduling	
4. Technology / process alternatives		
4.1	Vessel	Offshore mineral exploration is highly specialised with a limited number of possible vessels equipped to carry out this work. BPT127 intends to contract the vessels as indicated in the section below to undertake the work.
4.2	Bulk Sampling	Feasible and reasonable technology alternatives for the proposed activity are constrained by the best available proven technology for conducting the proposed bulk sampling operations. There are two possible basic configurations of vessel available for bulk sampling: (i) the vertical method, utilising a vertically mounted tool on a drill string; and (ii) the horizontal method, using a seabed crawler. As the vessel BPT127 intend on contracting to undertake the bulk sampling activities makes use of the horizontal method, only this approach has been considered in this report.

No.	Alternatives	Description
5. No-Go alternative		
5.1	No-go	The No-Go alternative represents the option not to proceed with exploration, which leaves the project areas of influence in their current state except for variation by natural causes and other human activities. It thus represents the current status quo and the baseline against which all potential project-related impacts are assessed. While prospecting does not automatically lead to mining, it is an essential stage in the process, which might lead to further exploration and, thereafter mining, which results in long-term economic opportunities in mining sector, if commercial reserves can be exploited. The ‘do nothing’ or ‘no-go’ option forgoes these possible advantages. In addition, the implications of not going ahead with the proposed exploration are as follows: • South Africa would lose the opportunity to further establish the extent of offshore diamond reserves; • Lost economic opportunities related to sunken costs (i.e., costs already incurred) of exploration in the sea concession areas; and • If economic diamond reserves do exist and are not developed, South Africa would lose the opportunity to maximise the use of its own indigenous diamond reserves.

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 are 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.

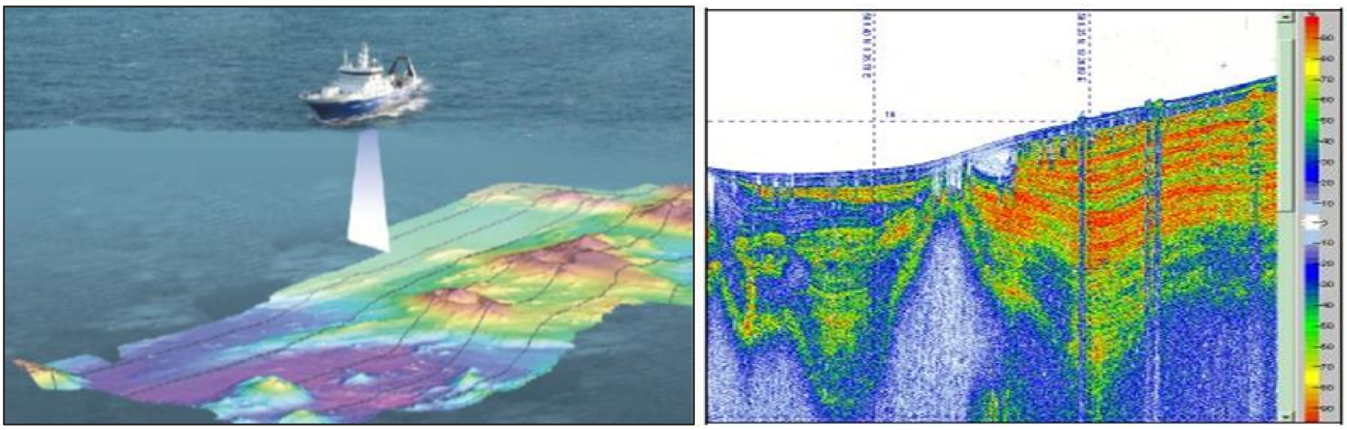


FIGURE 3-3: SWATH BATHYMETRY (LEFT) AND SUB-BOTTOM PROFILING (RIGHT) WILL BE THE GEOPHYSICAL SURVEY TECHNIQUES EMPLOYED DURING THE PROPOSED PROSPECTING OPERATIONS.

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 sub seabed 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 six to seven 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

Several 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 inner shelf 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.

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.

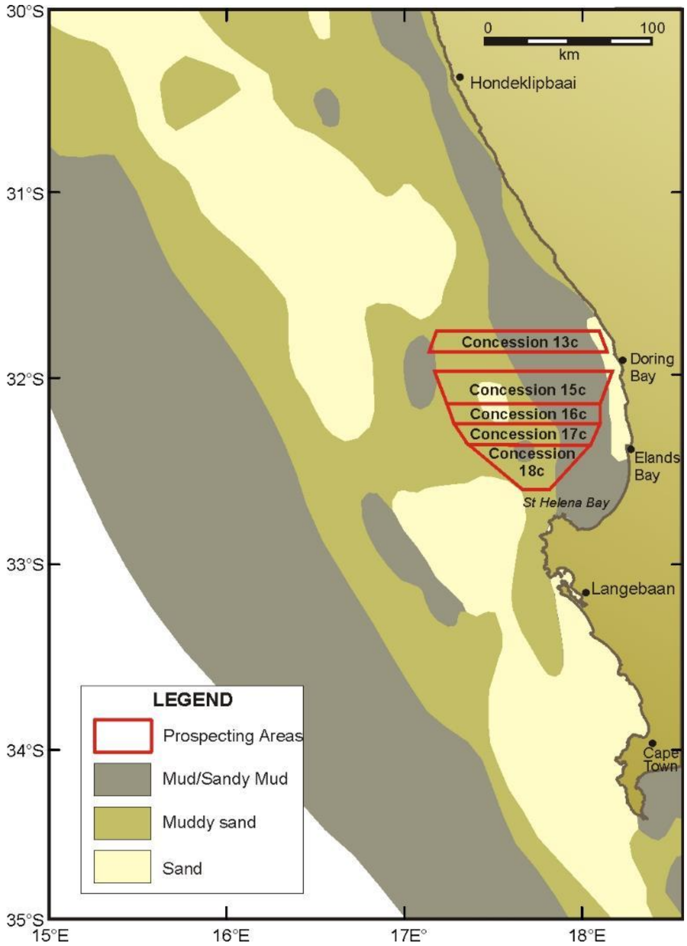


FIGURE 4-1: SEA CONCESSIONS 13C, 15C, 16C, 17C AND 18C IN RELATION TO THE REGIONAL BATHYMETRY AND SHOWING PROXIMITY OF PROMINENT SEABED FEATURES.

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.

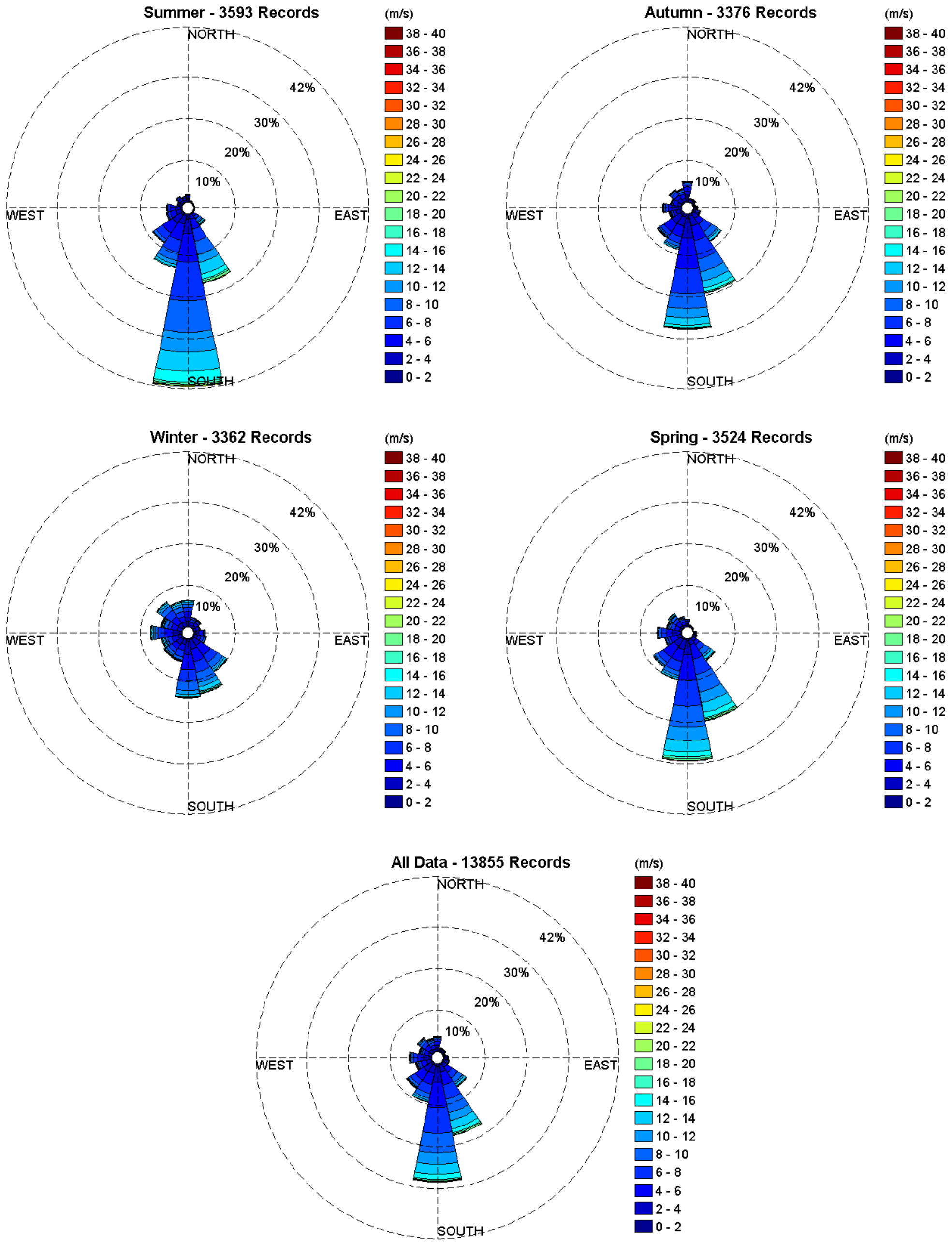


FIGURE 4-2: VOS WIND SPEED VS. WIND DIRECTION DATA FOR THE CAPE COLUMBINE AREA 32.0 TO 32.9 S AND 17.0 TO 17.9 E (1903-11-01 TO 2011-05-24; 13,855 RECORDS) (FROM CSIR).

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 more than 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).

The major feature of the Benguela Current is coastal upwelling. Consequently, 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 move 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

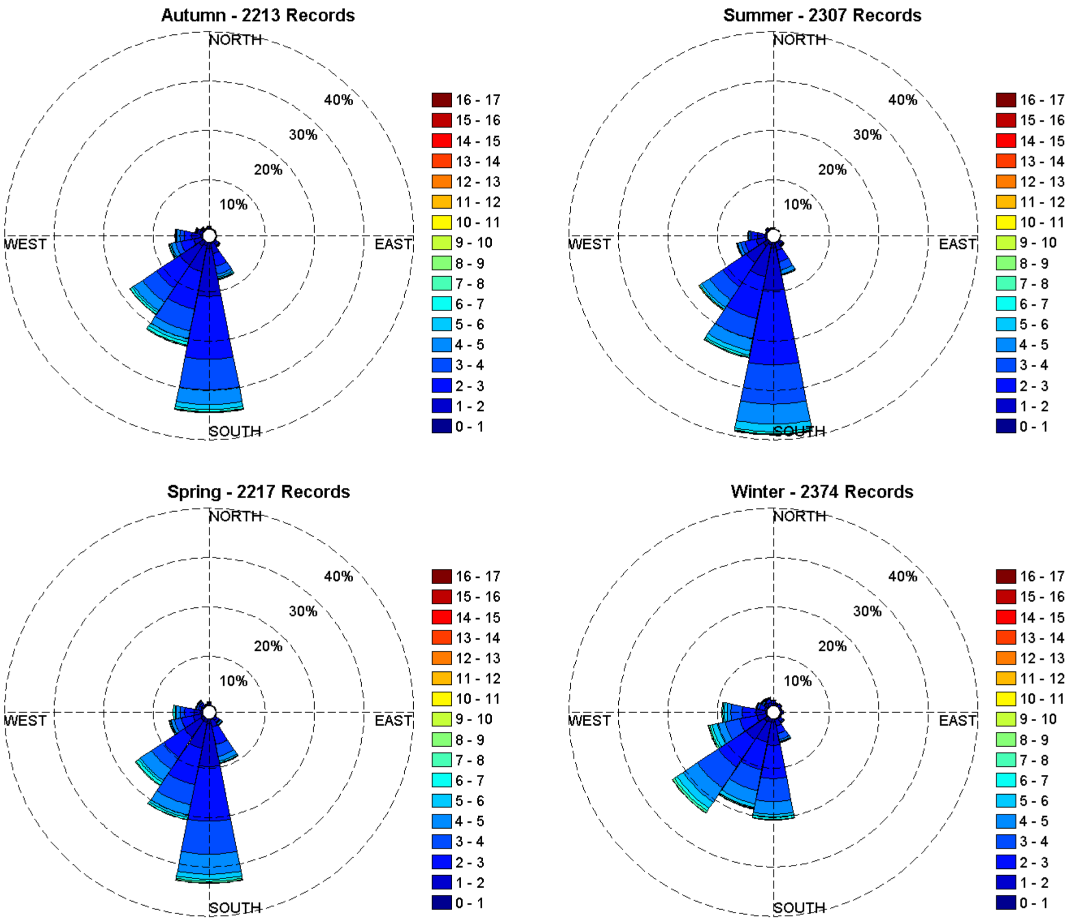
Most of the west coast of southern Africa is classified as exposed and experiences strong wave action, rated between 13-17 on the 20-point exposure scale (McLachlan 1980). Much of the coastline is therefore impacted by heavy south-westerly swells generated in the roaring forties, as well as significant 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).



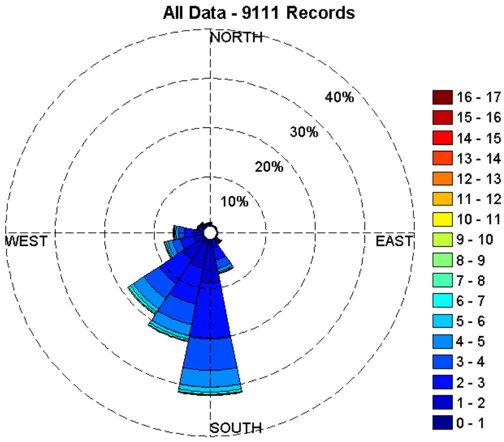


FIGURE 4-3: VOS WAVE HEIGHT VS. WAVE DIRECTION DATA FOR THE CAPE COLUMBINE AREA 32.0 TO 32.9 S AND 17.0 TO 17.9 E (1903-11-01 TO 2011-05-24; 9,111 RECORDS) (FROM CSIR).

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 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 exceptionally 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 because 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 because 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). Near 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 because 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 because of anthropogenic activities. These include dredging associated with the construction of harbours and coastal installations, beach replenishment, accelerated runoff of eroded soils because 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 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). Most 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.

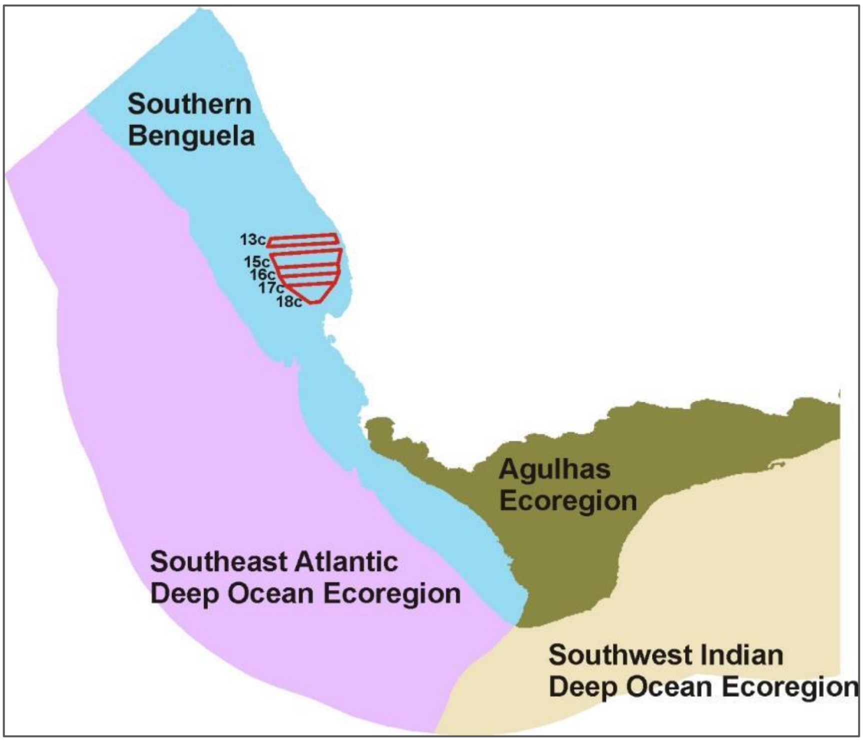


FIGURE 4-4: SEA CONCESSIONS 13C, 15C, 16C, 17C AND 18C (RED POLYGONS) IN RELATION TO THE SOUTH AFRICAN INSHORE AND OFFSHORE BIOREGIONS (ADAPTED FROM LOMBARD ET AL. 2004).

4.1.3.1 Demersal Communities

4.1.3.1.1 Nearshore and Offshore Unconsolidated Habits

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

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.

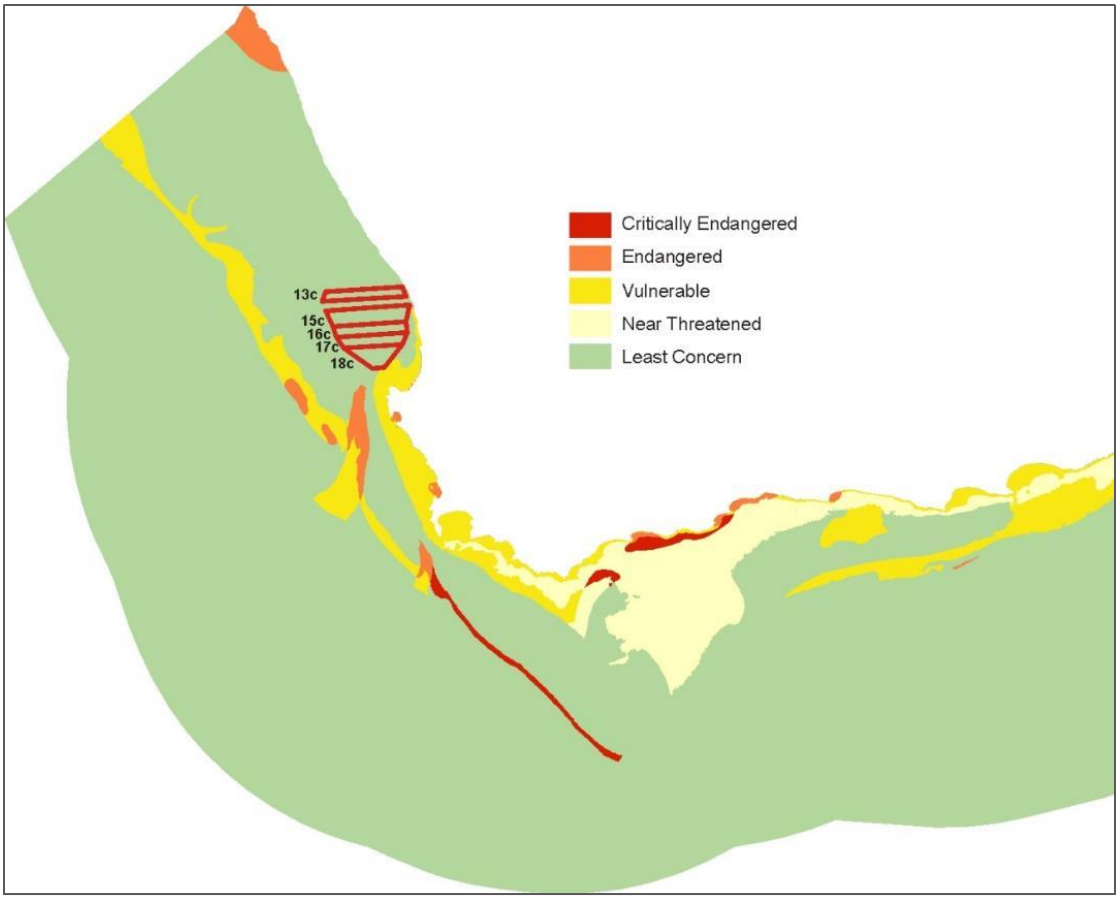


FIGURE 4-5: CONCESSIONS 13 C, 15C, 16C, 17C AND 18C (RED POLYGONS) IN RELATION TO THE ECOSYSTEM THREAT STATUS FOR COASTAL AND OFFSHORE BENTHIC HABITAT TYPES (LEFT), AND OFFSHORE PELAGIC HABITAT TYPES ON THE SOUTH AFRICAN WEST COAST (ADAPTED FROM SINK *ET AL.* 2019).

There are clearly other natural processes operating in the deep-water 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).

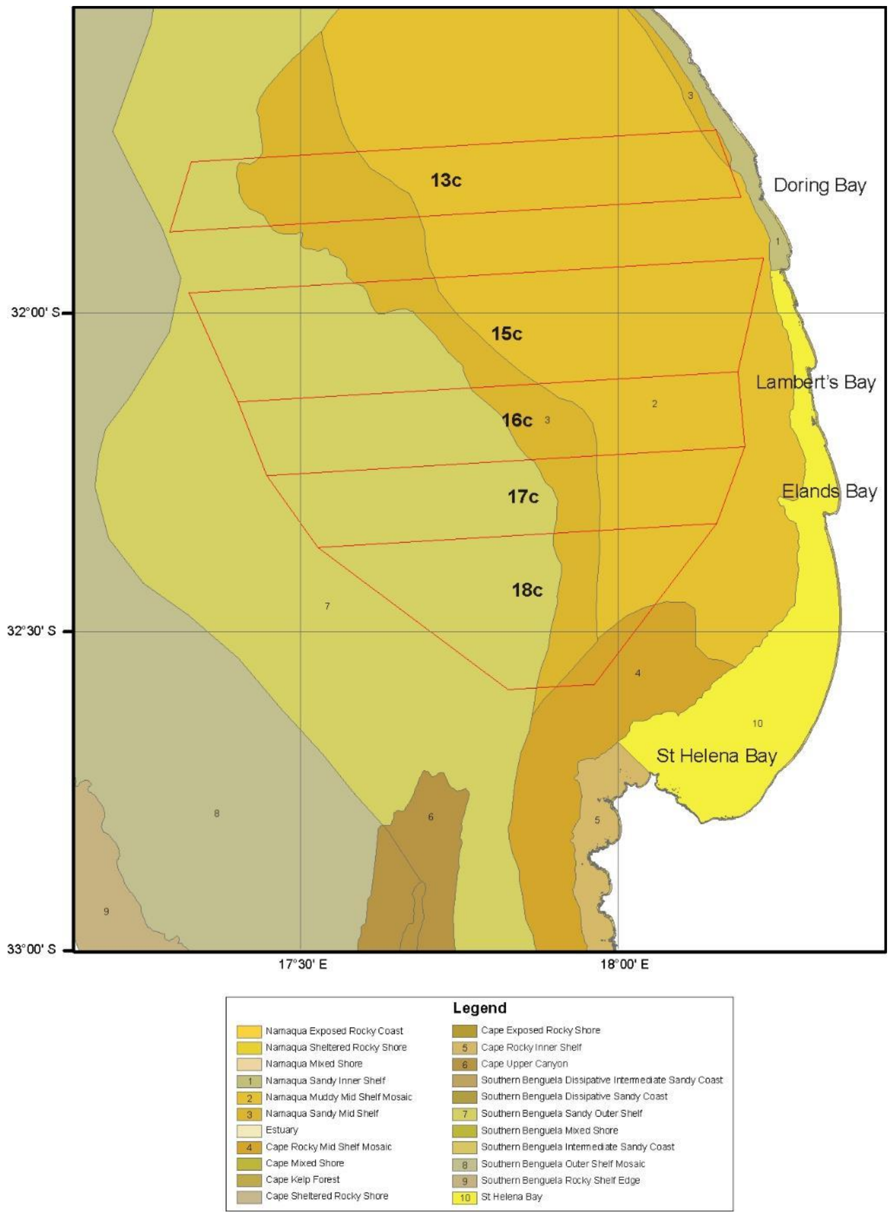


FIGURE 4-6: SEA CONCESSIONS 13C, 15C, 16C, 17C AND 18C (RED POLYGONS) IN RELATION TO BENTHIC AND COASTAL HABITAT TYPES.

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, 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*. 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 presents 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 many 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 cnidarian's 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 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 cartilaginous 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
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 the above species typically occur in the phytoplankton rich upper mixed layer of the water column, except for *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 zooplankton (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 after 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.

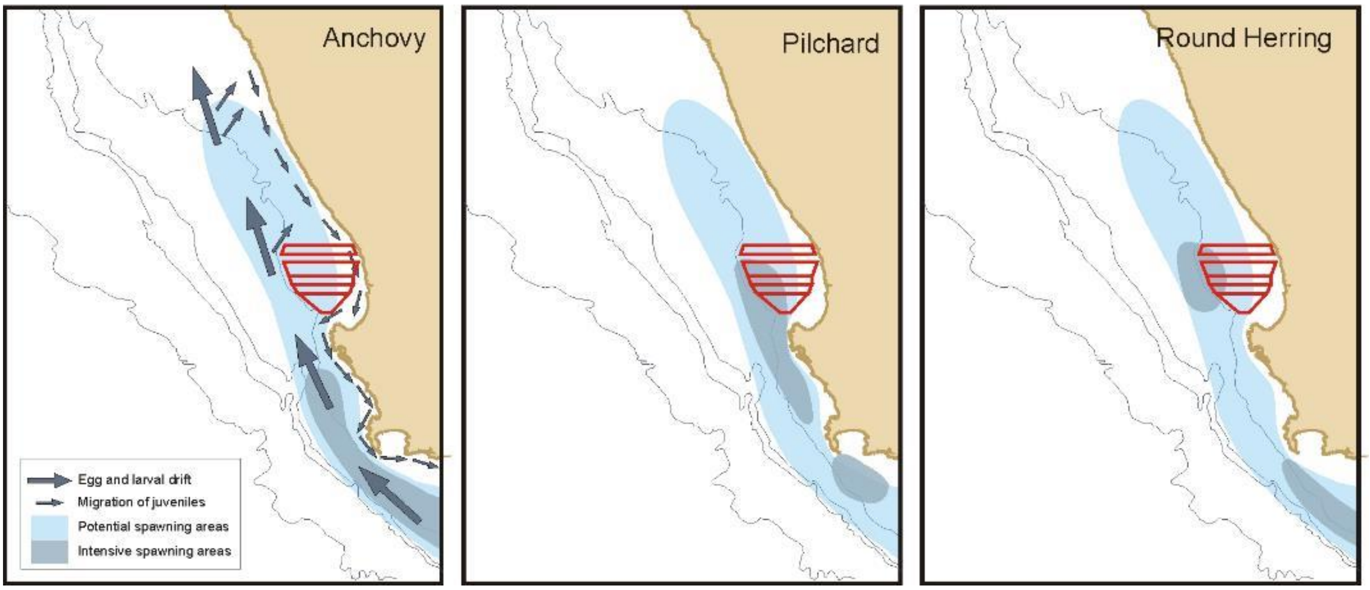


FIGURE 4-7: SEA CONCESSIONS 13C, 15C, 16C, 17C AND 18C (RED POLYGONS) IN RELATION TO THE MAJOR SPAWNING AREAS IN THE SOUTHERN BENGUELA REGION (ADAPTED FROM CRUIKSHANK 1990).

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 more than 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 extremely low off the more exposed beaches (Clark 1997a, 1997b).

The surf-zone and outer turbulent zone habitats of sandy beaches are 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 surf zone 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).

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

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.

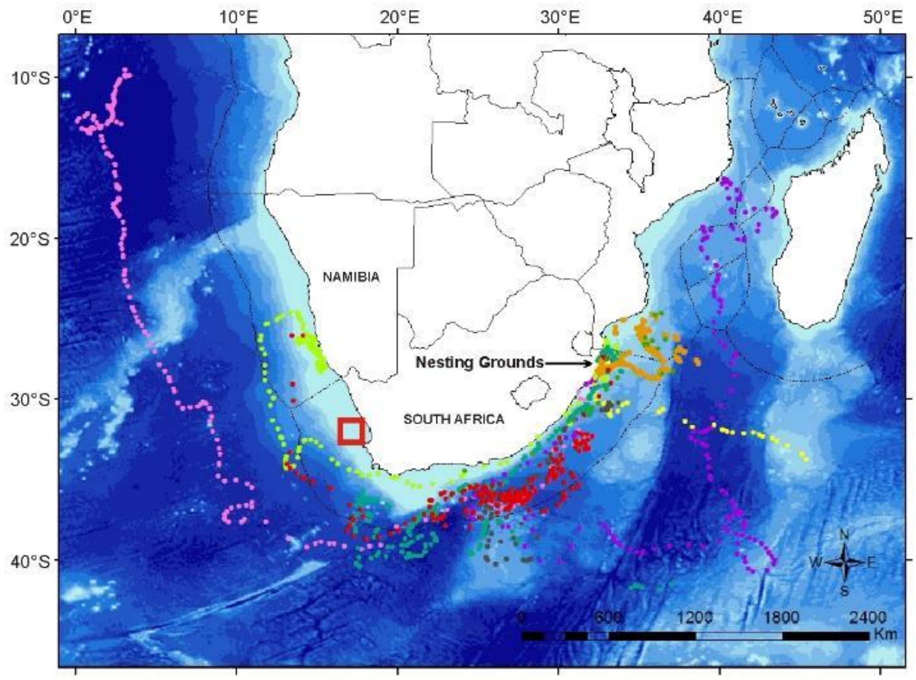


FIGURE 4-8: THE APPROXIMATE THE LOCATION OF CONCESSIONS (RED POLYGON) IN RELATION TO POST-NESTING DISTRIBUTION OF NINE SATELLITE TAGGED LEATHERBACK FEMALES (1996 – 2006; OCEANS AND COAST, UNPUBLISHED DATA).

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 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
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 stranding 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 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 generally 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. Most 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. 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 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.

- Bryde's whales: 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).

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

Common Name	Species	Shelf	Offshore	Seasonality	Likely encounter frequency	IUCN Conservation Status
Arnoux's	*Beradius arnouxii*	No	Yes	Year round	Rare	Data Deficient
Shepherd's	*Tasmacetus sheperdi*	No	Yes	Year Round	Rare	Not Assessed
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 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).

- 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 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: 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 several stranding and acoustic detections (Thomisch *et al.* 2017) in Namibia, confirm their contemporary occurrence in the region.
- Blue whales: 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.
- Minke whales: 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.
- Pygmy right whale 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: 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). Most 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 most 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).
- Southern right whales: The southern African population of Southern Right whales historically extended from southern Mozambique (Maputo Bay) to southern Angola (Baie dos Tigres) and is 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 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).

- Sperm whales: 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 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 makes 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 more than 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.

- Pygmy and Dwarf Sperm Whales: 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: 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).
- Pilot Whales: 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 most pilot whales encountered in the Sea Concession areas will be long-finned.
- Common dolphin: 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.
- Dusky dolphin: 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: 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 more than 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 several 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 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 4-10). 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.

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

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 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 4-9.

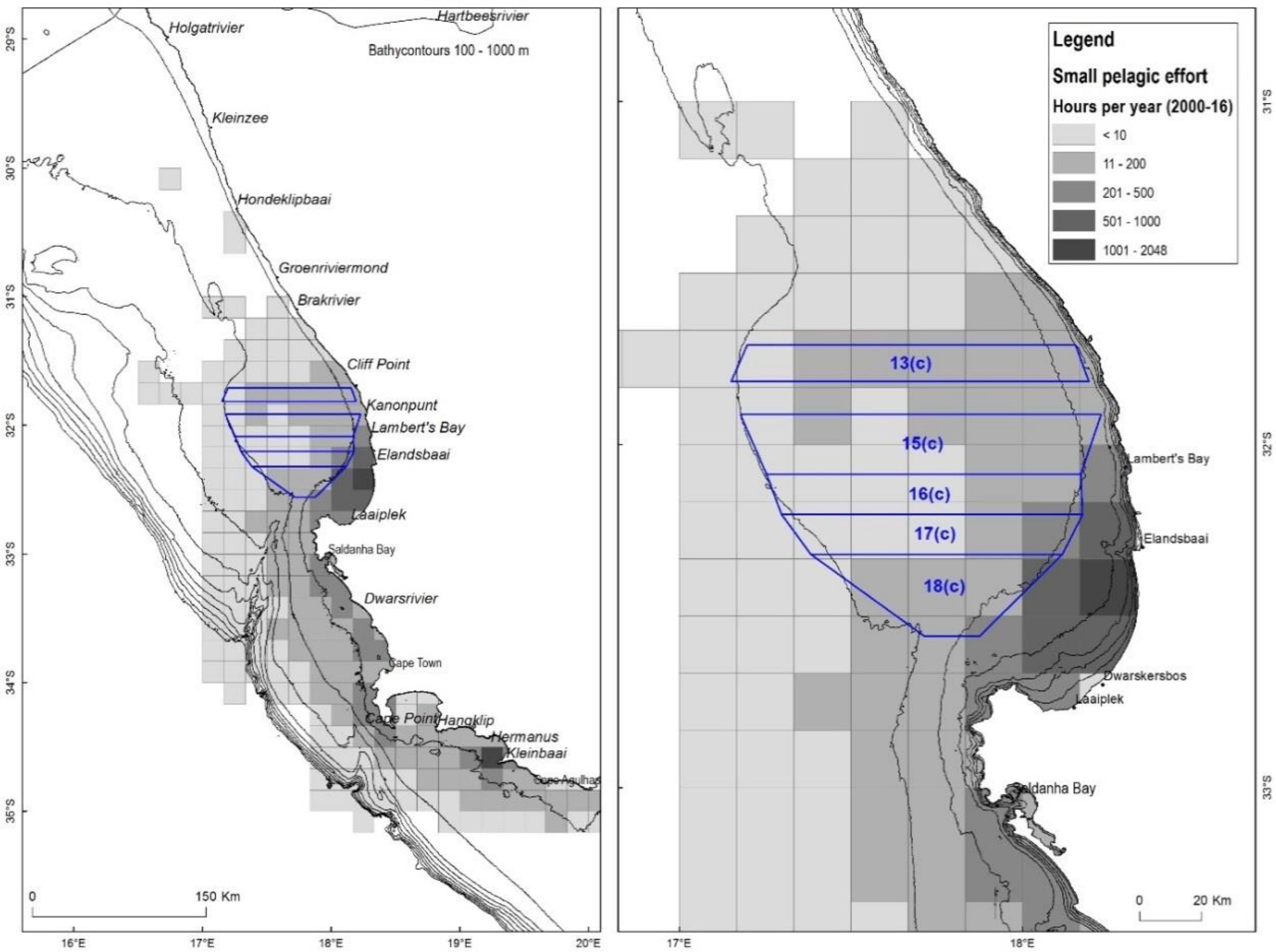


FIGURE 4-9: SEA CONCESSION AREAS 13C, 15C, 16C, 17C AND 18C IN RELATION TO THE SPATIAL DISTRIBUTION OF EFFORT REPORTED BY THE SOUTH AFRICAN SMALL PELAGIC PURSE-SEINE FISHERY (2000 – 2016).

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*).

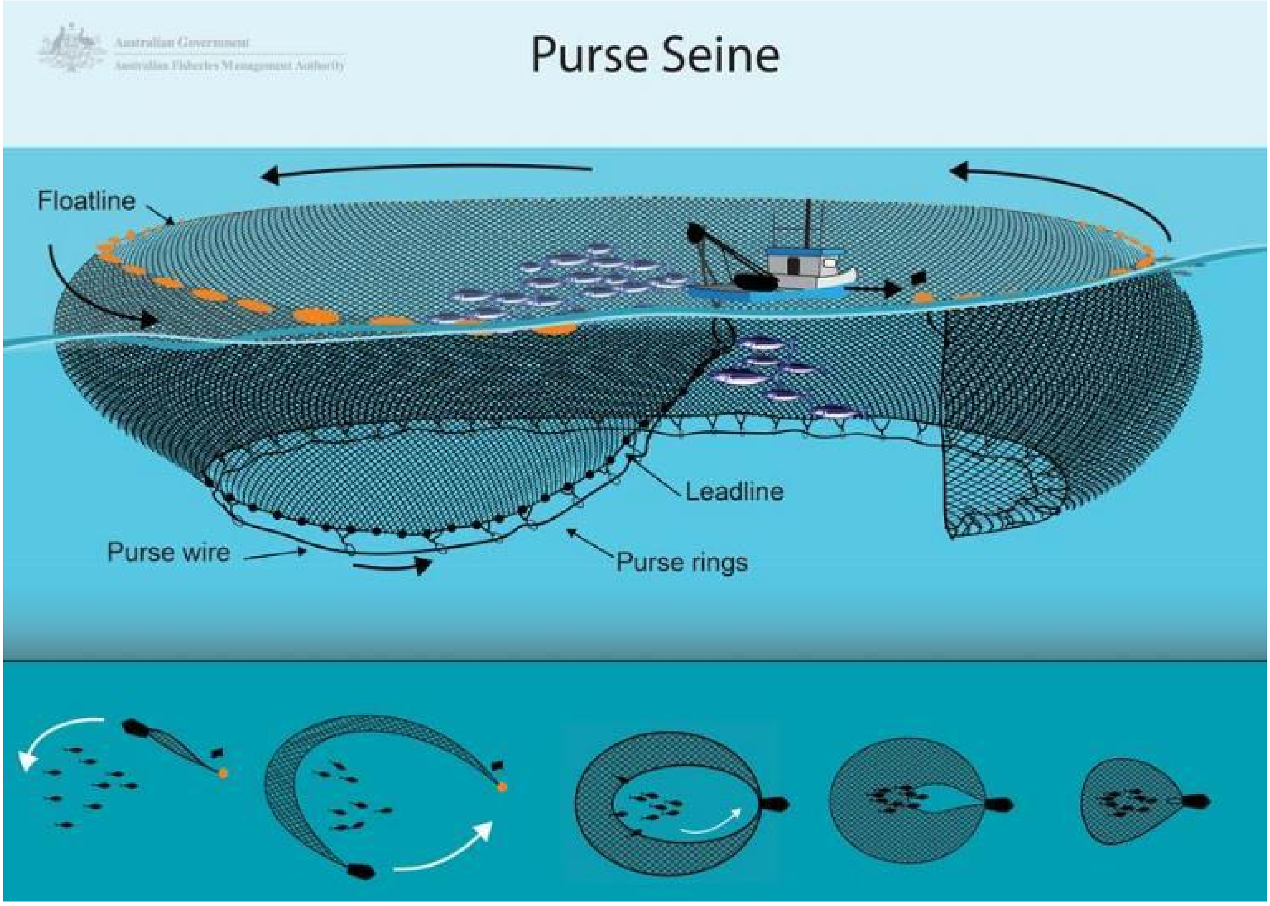


FIGURE 4-10: SCHEMATIC OF TYPICAL PURSE-SEINE GEAR DEPLOYED IN THE "SMALL" PELAGIC FISHERY. (SOURCE: HTTP:///WWW.AFMA.GOV.AU/PORTFOLIO-ITEM/PURSE-SEINE).

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.

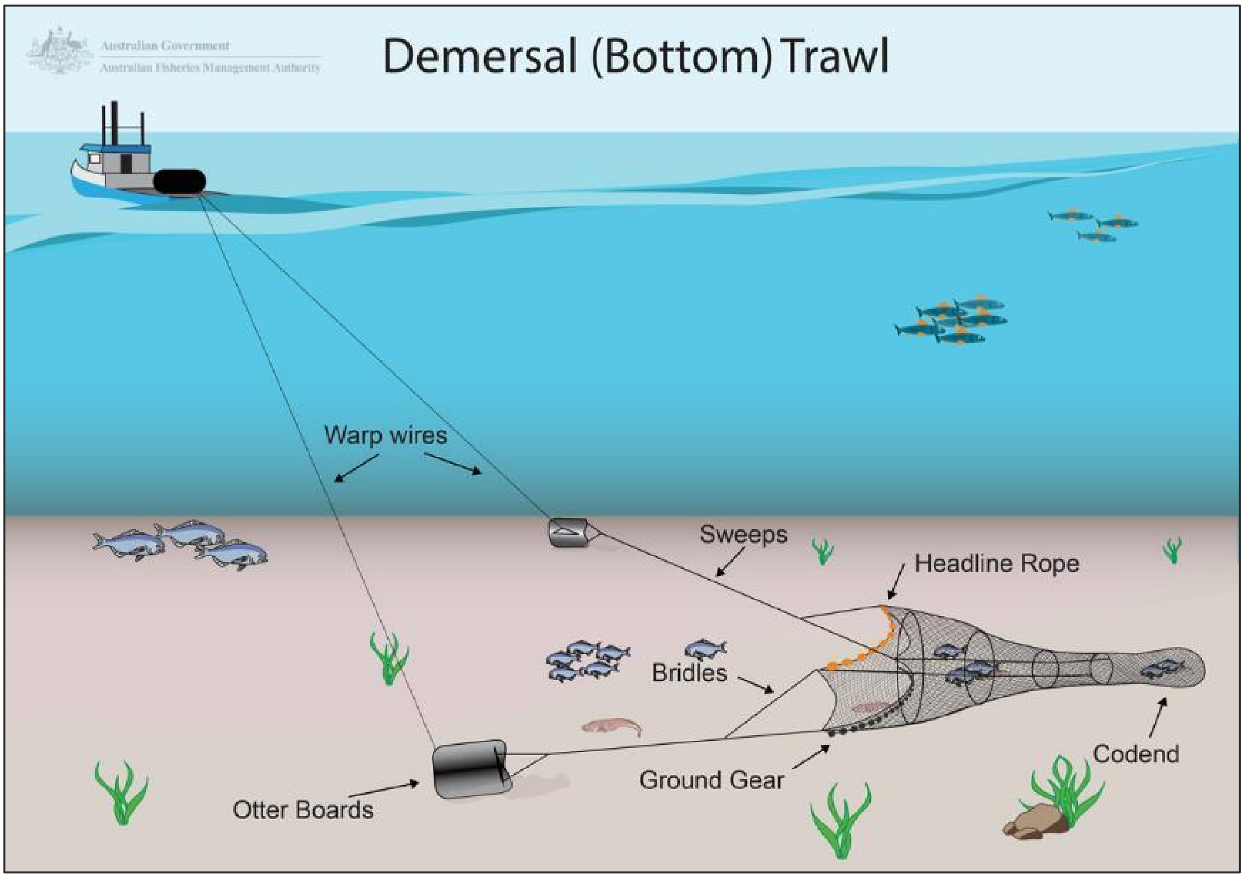


FIGURE 4-11: TYPICAL GEAR CONFIGURATION USED BY DEMERSAL TRAWLERS (OFFSHORE) TARGETING HAKE (SOURCE: HTTP:///WWW.AFMA.GOV.AU/FISHERIES-MANAGEMENT/METHODS-AND-GEAR/TRAWLING).

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.

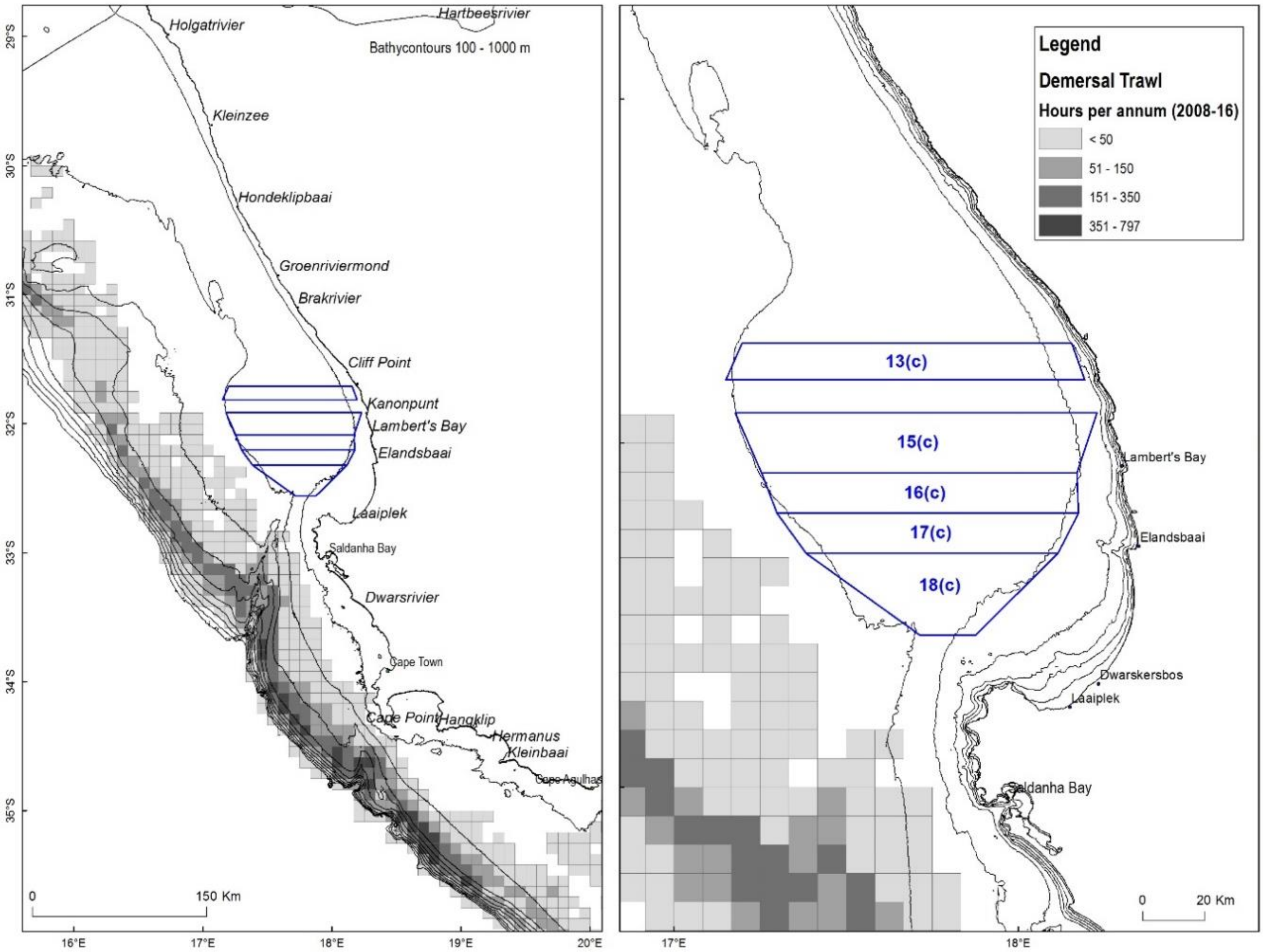


FIGURE 4-12: SEA CONCESSION AREAS 13C, 15C, 16C, 17C AND 18C IN RELATION TO THE SPATIAL DISTRIBUTION OF TRAWLING EFFORT EXPENDED BY THE DEMERSAL TRAWL SECTOR (2008 TO 2016).

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.

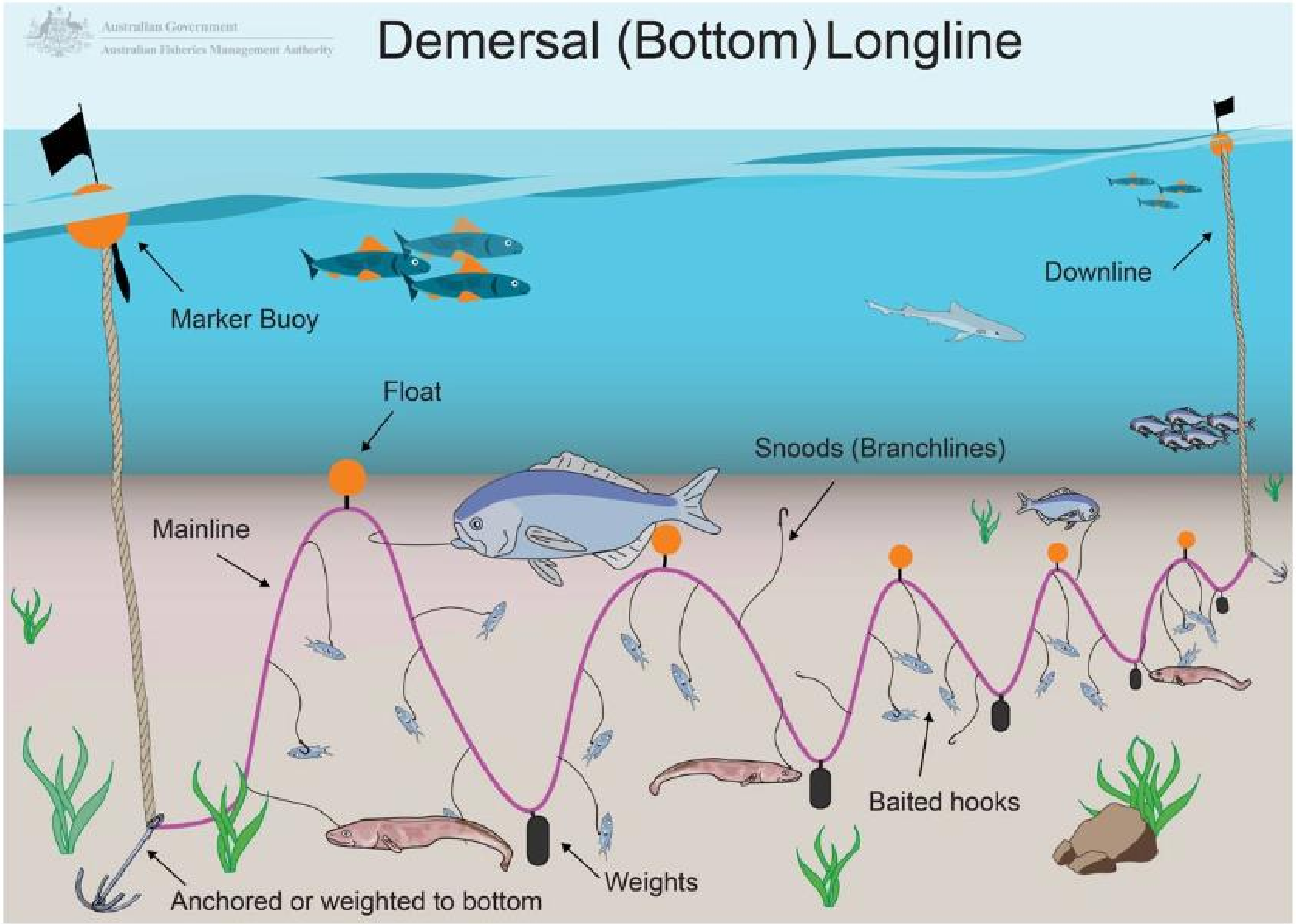


FIGURE 4-13: TYPICAL CONFIGURATION OF DEMERSAL (BOTTOM-SET) HAKE LONG-LINE GEAR USED IN SOUTH AFRICAN WATERS.

The target fishing grounds are like 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.

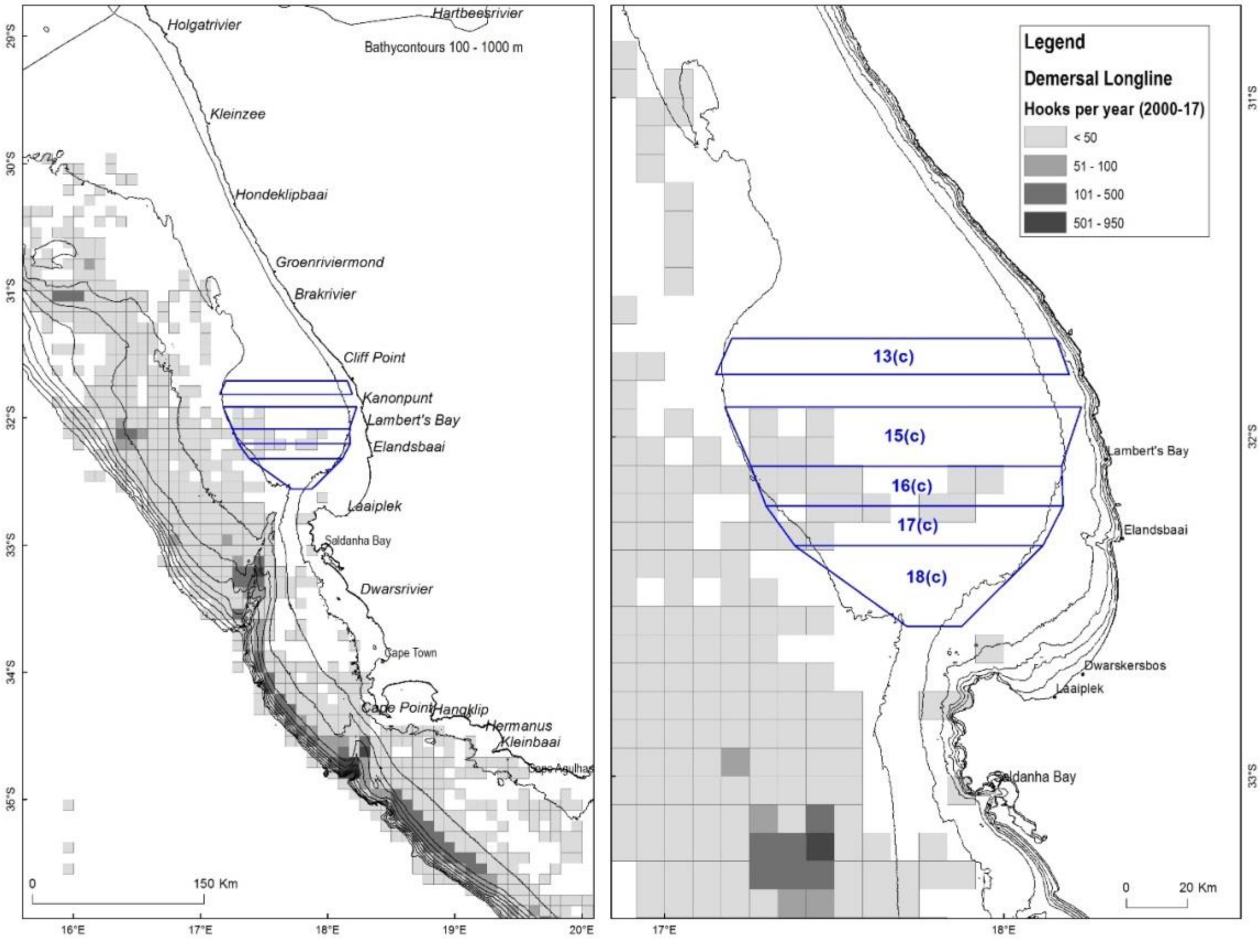


FIGURE 4-14: SEA CONCESSION AREAS 13C, 15C, 16C, 17C AND 18C IN RELATION TO THE SPATIAL DISTRIBUTION OF EFFORT EXPENDED BY THE DEMERSAL LONGLINE SECTOR (2008 TO 2016).

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.

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.

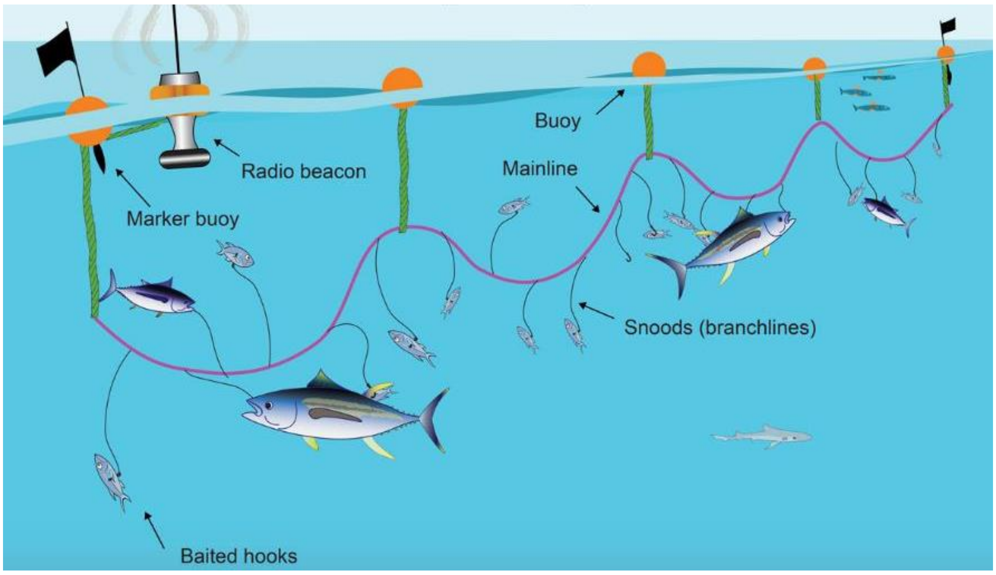


FIGURE 4-15: TYPICAL PELAGIC LONG-LINE CONFIGURATION TARGETING TUNA, SWORDFISH AND SHARK SPECIES (SOURCE: HTTP:///WWW.AFMA.GOV.AU/FISHERIES-MANAGEMENT/METHODS-AND-GEAR/LONGLINING).

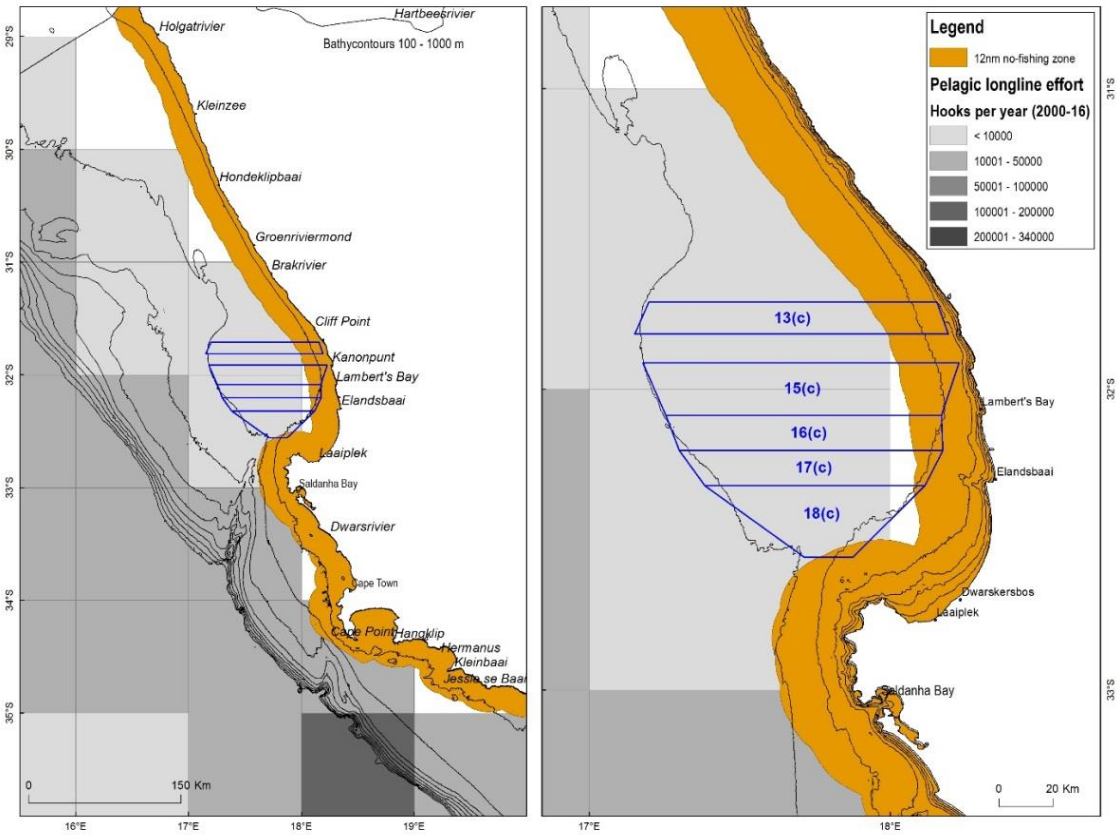


FIGURE 4-16: SEA CONCESSION AREAS 13C, 15C, 16C, 17C AND 18C IN RELATION TO THE SPATIAL DISTRIBUTION OF EFFORT EXPENDED BY PELAGIC LONG-LINE FISHERY (2000 – 2016).

4.1.4.1.5 Tuna Pole

The tuna pole fishery is based on migratory species of tuna, predominantly Atlantic longfin tuna stock and an exceedingly 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 is 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. 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 many 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. For Tuna pole specifically, the target species (longfin tuna) is reported to move systematically northwards from the southern Benguela into the northern Benguela into the waters of southern Namibia. This annual movement of albacore tuna is typical of this and other species of tuna. There is no evidence however to suggest that in the nearshore environment in the concession area that these tuna migrations occur or that if they do there will be a disruption of the tuna pole fishing operations. There is therefore no expected overlap of the concession area with spawning and recruitment areas of large pelagic species.

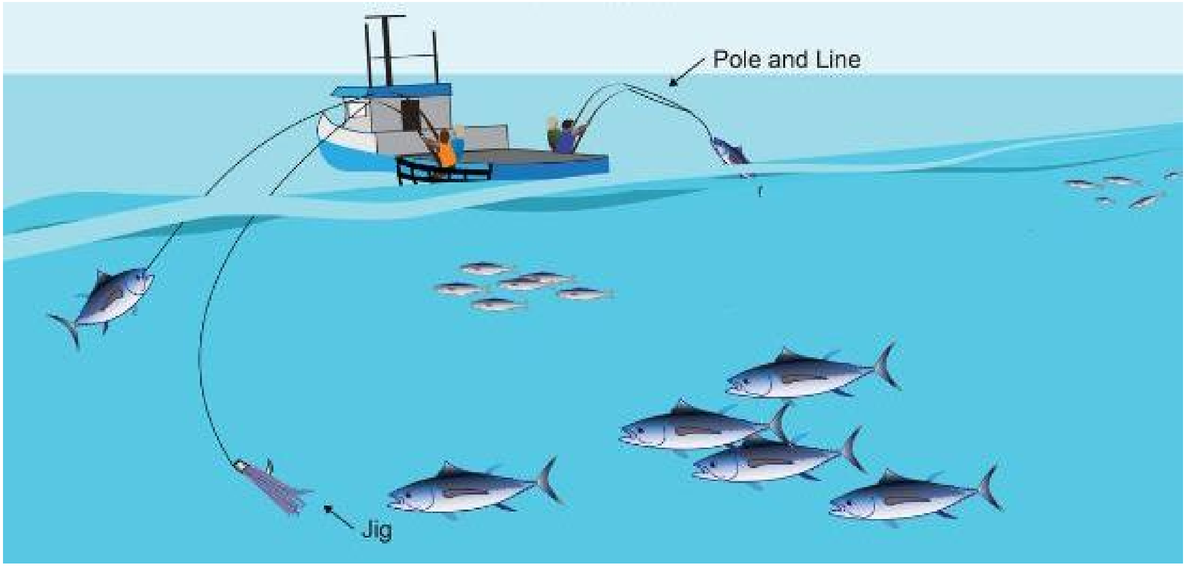


FIGURE 4-17: SCHEMATIC DIAGRAM OF POLE AND LINE OPERATION (SOURCE: HTTP:///WWW.AFMA.GOV.AU/PORTFOLIO-MANAGEMNT/MINOR-LINES).

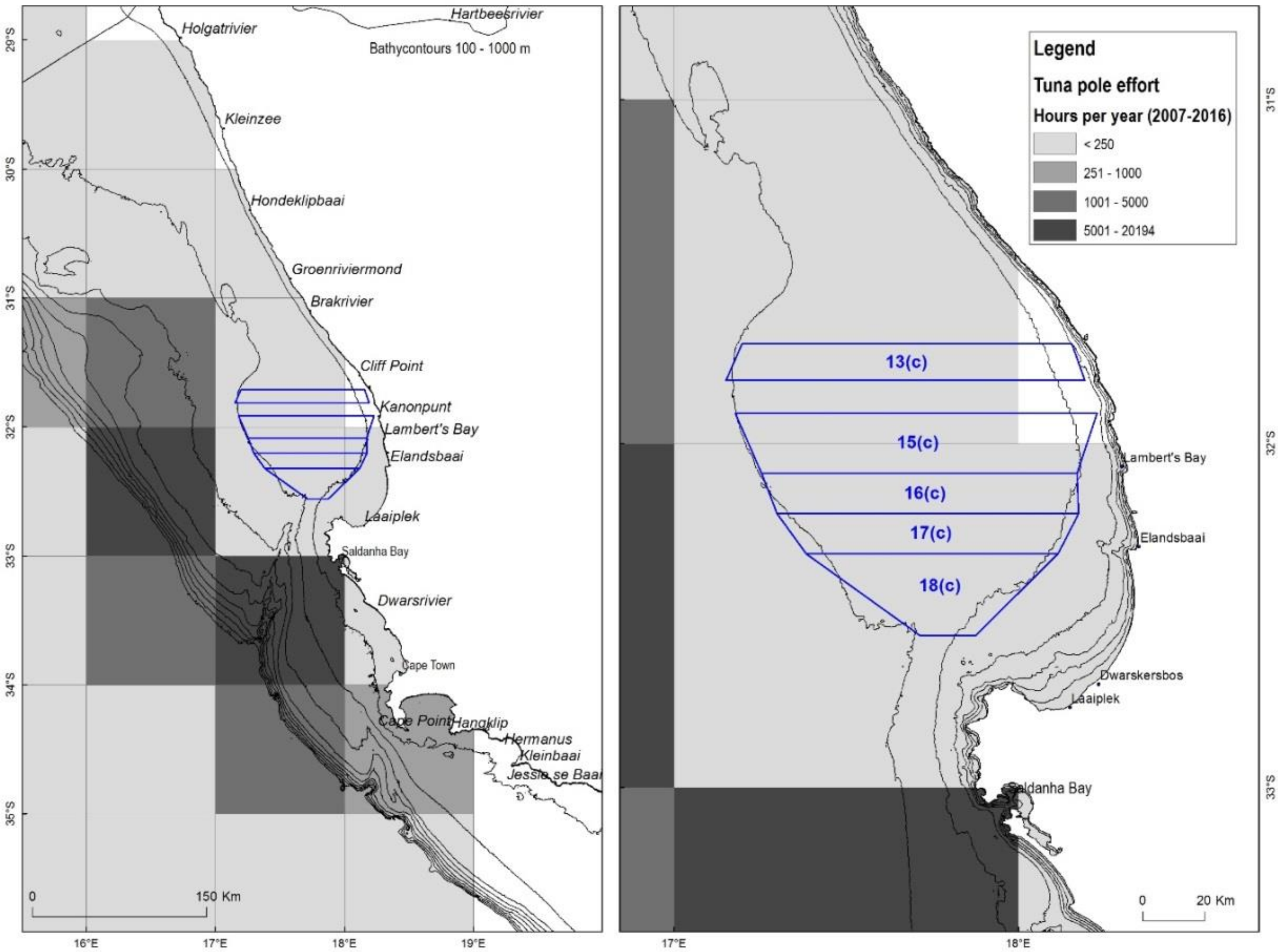


FIGURE 4-18: SEA CONCESSION AREAS 13C, 15C, 16C, 17C AND 18C IN RELATION TO THE SPATIAL DISTRIBUTION OF TUNA POLE CATCH (2007 TO 2016).

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. Most 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 using 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).

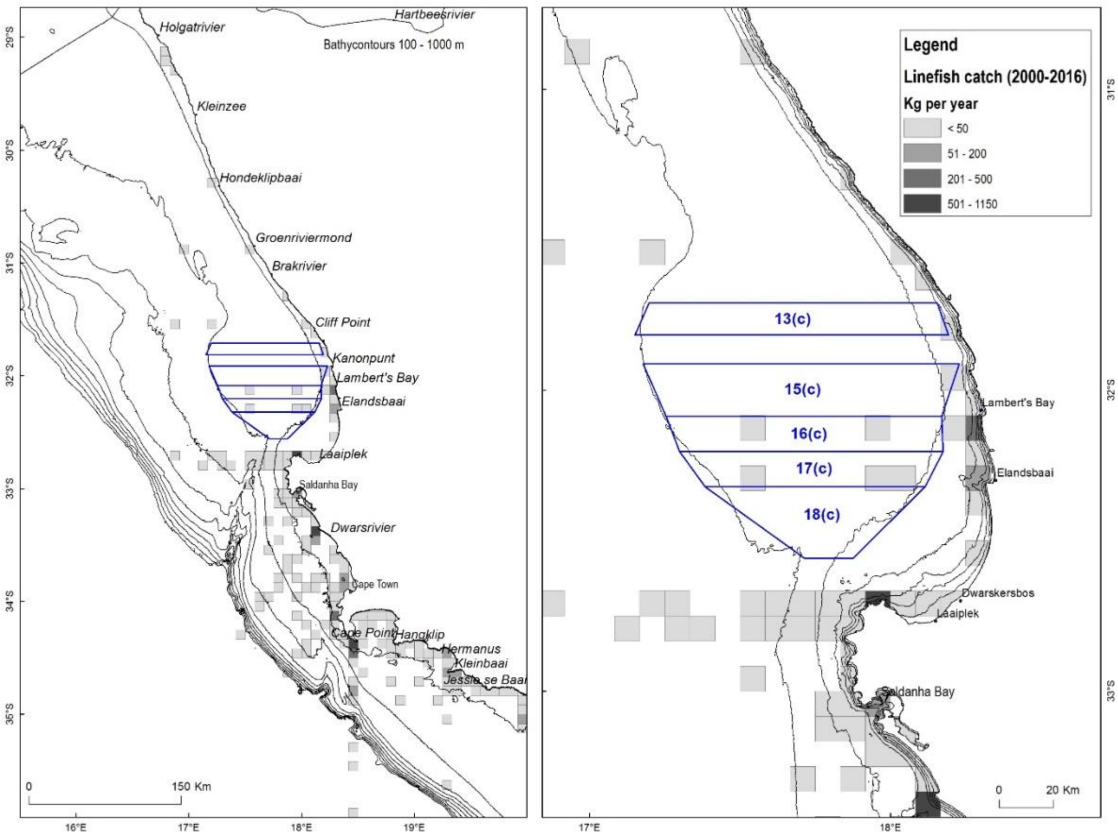


FIGURE 4-19: SEA CONCESSION AREAS 13C, 15C, 16C, 17C AND 18C IN RELATION TO SPATIAL DISTRIBUTION OF CATCH LANDED BY THE SOUTH AFRICAN TRADITIONAL LINE-FISH SECTOR (2000 – 2016).

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).

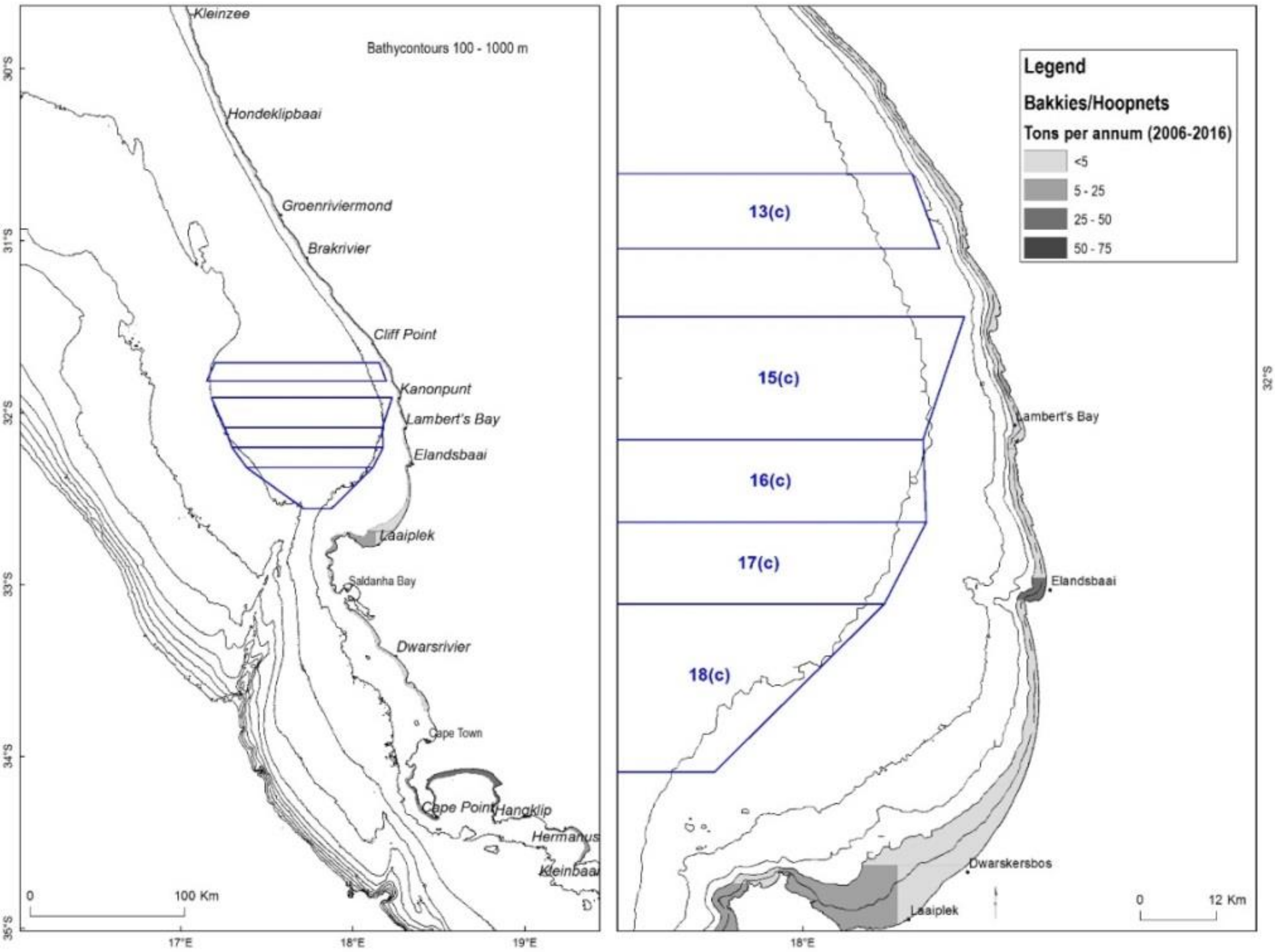


FIGURE 4-20: SEA CONCESSION AREAS 13C, 15C, 16C, 17C AND 18C IN RELATION TO THE AVERAGE CATCH PER SEASON (TONS WHOLE WEIGHT) BY THE NEARSHORE (BAKKIE) SECTOR OF THE WEST COAST ROCK LOBSTER FISHERY (2006 TO 2016).

The Sea Concession areas falls within Zone B, Management Area Lamberts Bay and Elands Bay where, over the period 2006 to 2017 the trap boat sector landed 95.4 tons (6.1% of their total catch). Thus, there is a degree of overlap between the Sea Concession areas and the inshore sector (see Figure 4-22). However, it is likely that the majority of the catch was taken in shallower waters, inshore of the Sea Concession Areas.

It is noted that the resource stock status has declined and the West Coast Rock Lobster Stock is deemed to be severely overexploited. The lobster stocks that are above the legal limit are now below 2% (down from 3.5% in 2012) of pristine levels (98% depleted)[4].

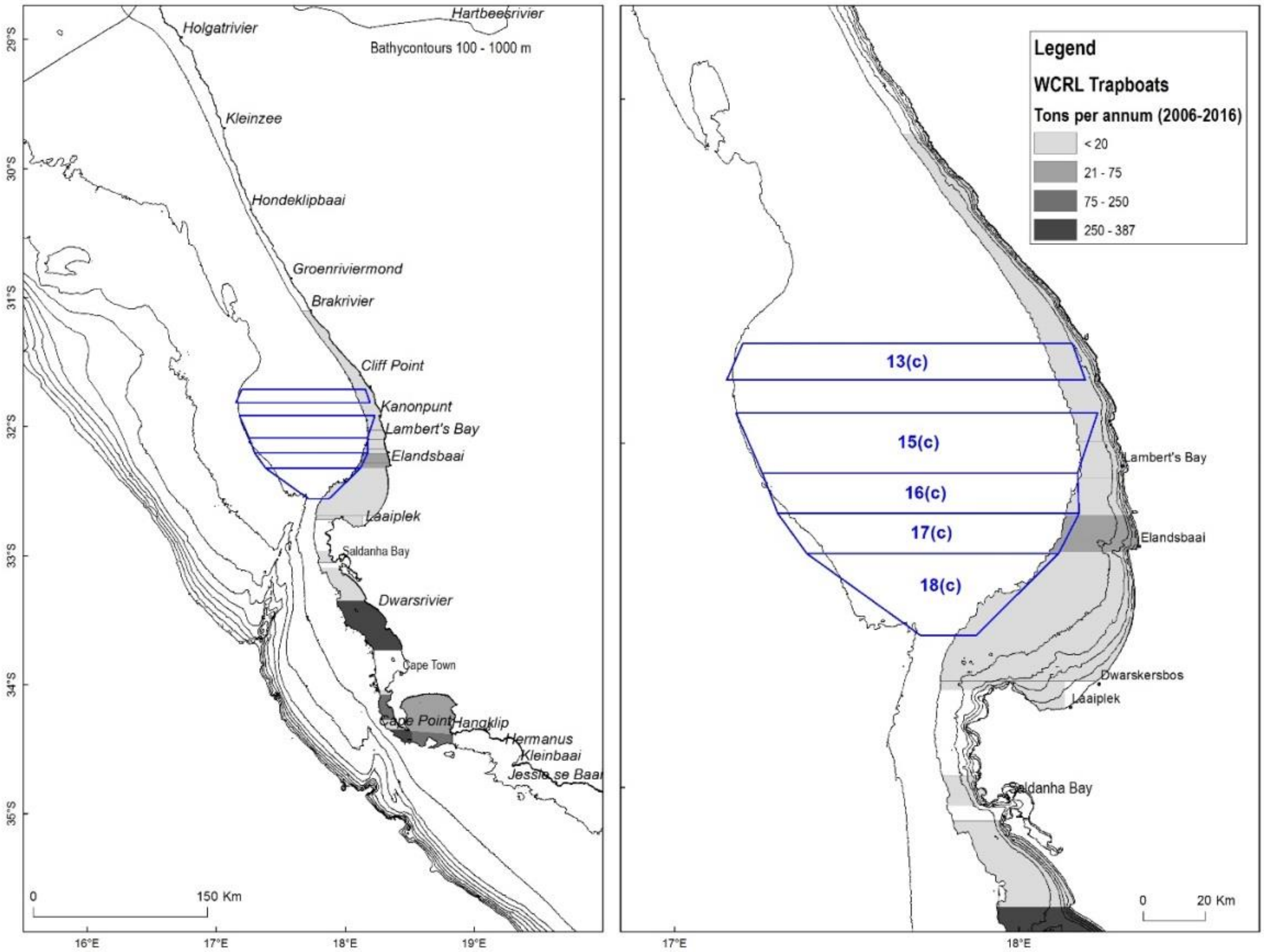


FIGURE 4-21: SEA CONCESSION AREAS 13C, 15C, 16C, 17C AND 18C IN RELATION TO THE AVERAGE CATCH PER SEASON (TONS WHOLE WEIGHT) BY THE NEARSHORE (TRAPBOATS) SECTOR OF THE WEST COAST ROCK LOBSTER FISHERY (2006 TO 2016).

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

[4] Note: As reported by DFFE to the parliamentary portfolio committee in November 2020.

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 DFFE (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 4-22.

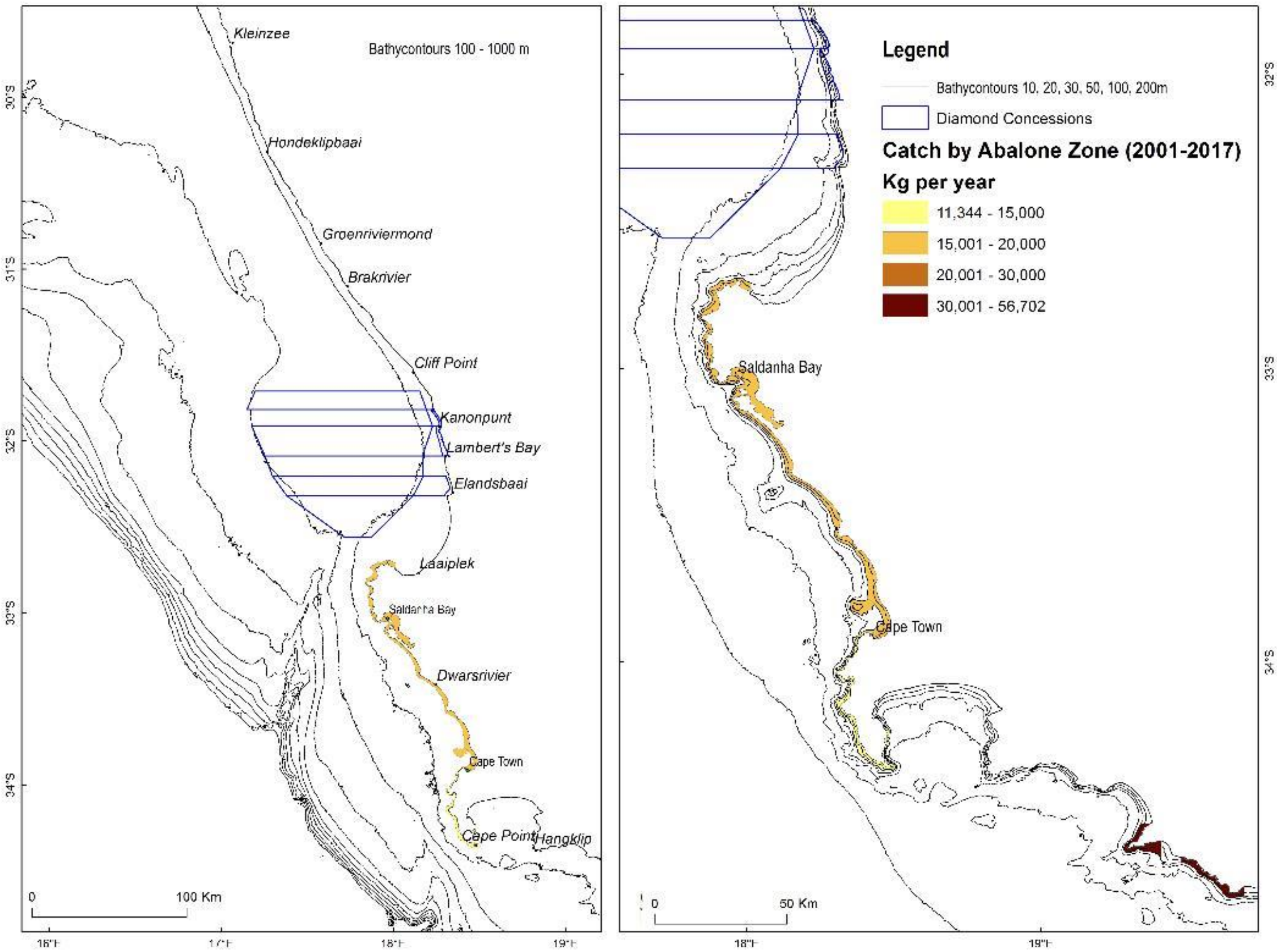


FIGURE 4-22: LOCATION OF SEA CONCESSION AREAS 13C, 15C, 16C, 17C AND 18C IN RELATION TO ABALONE CATCH EFFORT.

4.1.4.1.9 Small-scale fisheries

Small-scale fishers using traditional fishing gear have historically harvested marine resources along the coastline of South Africa for consumptive use, livelihoods, and medicinal purpose. However, this group of people was not recognised in terms of the Marine Living Resources Act and were further marginalised through commercial fishing rights allocation processes. In 2007 government was compelled to redress the inequality suffered by the small-scale fishers by means of an order from the Equality Court. Through extensive consultative processes the small-scale fisheries policy was finalised in 2012 with the implementation plan approved in 2013. The small-scale fishery policy implementation plan was initiated in 2016 (DFFE 2016).

Small-scale fishers fish to meet food and basic livelihood needs, and may be directly involved in harvesting, processing and distribution of fish for commercial purposes. These fishers traditionally operate on nearshore fishing grounds, using traditional low technology or passive fishing gear to harvest marine living resources on a full-time, part-time or seasonal basis. Fishing trips are usually a single day in duration and fishing/harvesting techniques are labour intensive. The equipment used by small-scale fishers includes rowing boats in some areas, motorized boats on the south and west coast and simple fishing gear including hands, feet, screw drivers, hand lines, prawn pumps, rods with reels, gaffs, hoop nets, gill nets, seine/trek nets and semi-permanently fixed kraal traps. Distances fished from the shore are constrained by boat size and maritime safety requirements and as a general rule are not expected to be more than 3nm from the coastline.

Small-scale fishers are an integral part of the rural and coastal communities in which they reside and this is reflected in the socio-economic profile of such communities. In the Western Cape small-scale fishers live predominantly in urban and peri-urban areas. Resources are managed in terms of a community-based co-management approach that aims to ensure that harvesting and utilisation of the resource occurs in a sustainable manner in line with the ecosystems approach.

The small-scale fisheries policy proposes that certain areas on the coast be prioritized and demarcated as small-scale fishing areas. In some areas access rights could be reserved exclusively for use by small-scale fishers. The community, once they are registered as a community-based legal entity, could apply for the demarcation of these areas and should conflict arise, it should be referred to conflict resolution under the Policy. The policy also requires a multi-species approach to allocating rights, which will entail allocation of rights for a basket of species that may be harvested or caught within particular designated areas. DFFE recommends five basket areas: 1. Basket Area A – The Namibian border to Cape of Good Hope – 57 different resources 2. Basket Area B – Cape of Good Hope to Cape Infanta – 109 different resources 3. Basket Area C – Cape Infanta to Tsitsikamma – 107 different resources 4. Basket Area D – Tsitsikamma to the Pondoland MPA – 138 different resources 5. Basket Area E – Pondoland MPA to the Mozambican border – 127 different resources. The communities as designated into cooperatives are shown in Figure 4-23 and extracted from the DFFE lists for the Saldanha Bay to Port Nolloth area in Table 4-6.

Those SSF communities that are in process of, or have formed, cooperatives adjacent to the concession area are indicated in Table 4-6 below (source: DFFE). Note that the main SSF cooperatives that might be impacted are in the Lamberts Bay area as shown in Figure 4-23. Sea Concession 13C, 15C, 16C, 17C & 18C falls within the area demarcated as Basket Area A, with 623 fishers registered with the relevant local municipalities of Berg River, Saldanha Bay, Cederberg and Matzikama. These are the closest access points for participants in the small-scale fishing sector.

To the north of the concession areas there are 2 cooperatives in the Port Nolloth area and to the south there are also cooperatives in the Saldanha Bay area, but these are not considered relevant to this assessment as they are outside of the potential impacted area. Nevertheless, as the SSF implementation is currently in process, there is no certainty as to the extent and modus operandi of these cooperatives[5].

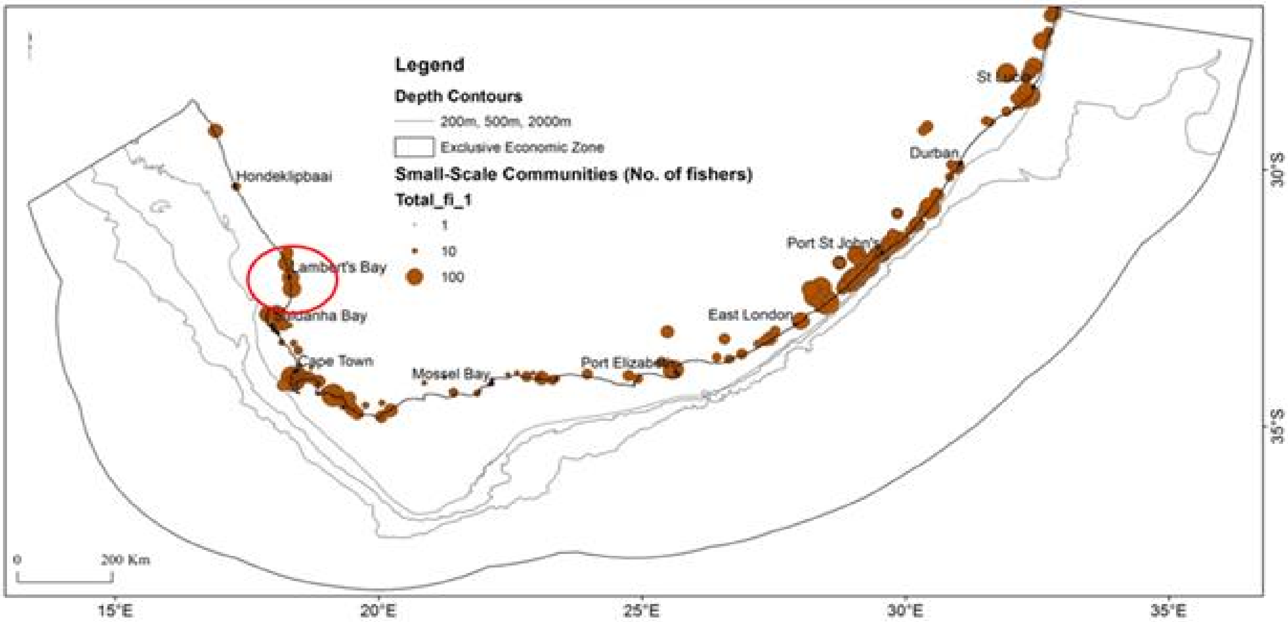


FIGURE 4-23. DESIGNATED SMALL SCALE FISHERY COOPERATIVES AROUND THE SOUTH AFRICAN COAST. THE SPECIFIC AREA ADJACENT TO THE CONCESSION AREA IS DEMARCATED (RED CIRCLE).NOTE THE SCALE (TOTAL) AND THE SIZE OF THE BUBBLES REFERS TO THE RELATIVE NUMBERS OF SS FISHERS IN EACH DESIGNATED AREA

TABLE 4-6: TABLE OF SMALL-SCALE FISHERY COOPERATIVES ADJACENT TO THE CONCESSION AREA (EXTRACT FROM DFFE, 2020)

local Municipality	Sub total	Community	Nearest Town	Total fishers
Berg rivier	30	Velddrif	Saldanha bay	30
Saldanha bay	384	Steenberg's Cove	Saldanha bay	21
		pneusbaai/Columbine/Duyker Isl	Saldanha bay	21
		Langebaan	Saldanha bay	38
		Vredenberg	Saldanha bay	43
		Paternoster	Saldanha bay	100
		Saldanha Bay	Saldanha bay	50
		Saldanha Bay, White City	Saldanha Bay	2
		Sandy Point	Saldanha Bay	1
		Yzerfontein	Saldanha Bay	16
		Laingville	Saldanha bay	92
Cederberg	221	Lamberts Bay	Lamberts Bay	103
		Elandsbaai	Lamberts Bay	118
Matzikama	158	Lutzville wes	Doringbaai	1
		Doringbaai	Lamberts Bay	88
		Ebenheaser	Lamberts Bay	58
		Papendorp	Doringbaai	11
Swartland	17	Darling	City of Cape Town	17
Saldanha bay	10	Hopefield	City of Cape Town	10
Richtersveld	75	Port Nolloth	Port Nolloth	75
Kamiesberg	28	Hondeklipbaai	Port Nolloth	28
	923			923

5 Note this assessment has prepared Figure 4-25 to support this assessment – there is no as yet official designation by DFFE of active SSF cooperative and it is premature to assume areas of overlap with the concession areas.

4.1.4.1.10 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 gillnet (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 can 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 4-24 and Figure 4-25).

4.1.4.1.11 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 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 like 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.

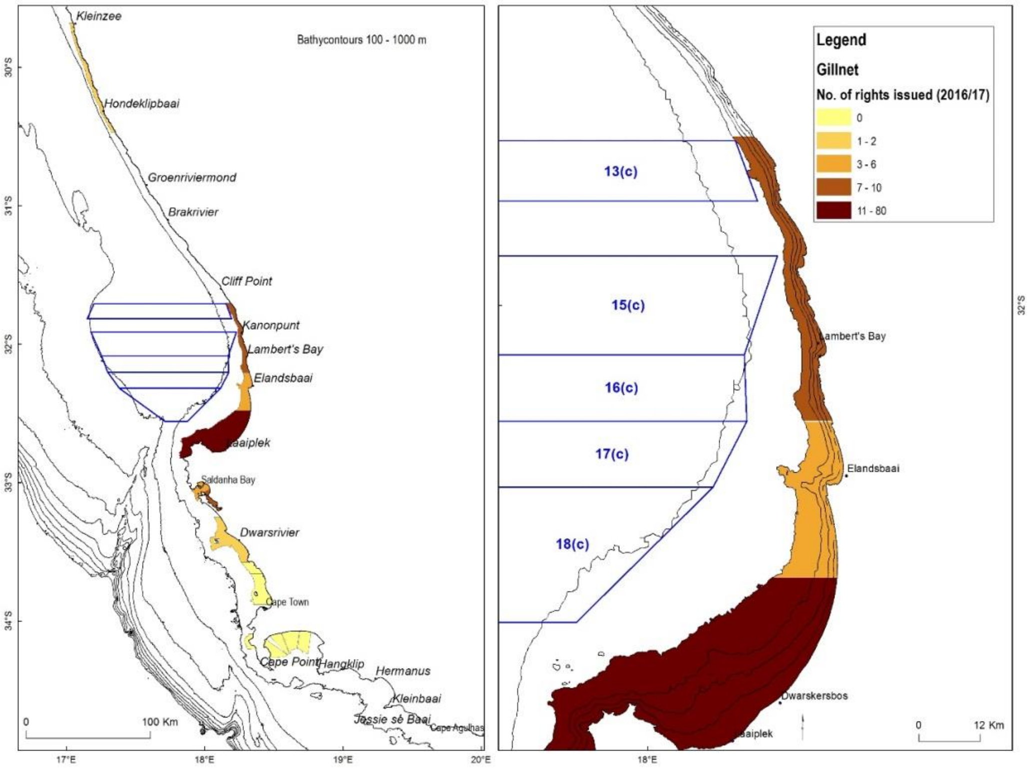


FIGURE 4-24: SEA CONCESSION AREAS 13C, 15C, 16C, 17C AND 18C IN RELATION TO NUMBER OF RIGHTS ISSUED FOR GILLNET FISHING AREAS A AND B TO A MAXIMUM DEPTH OF 50 M.

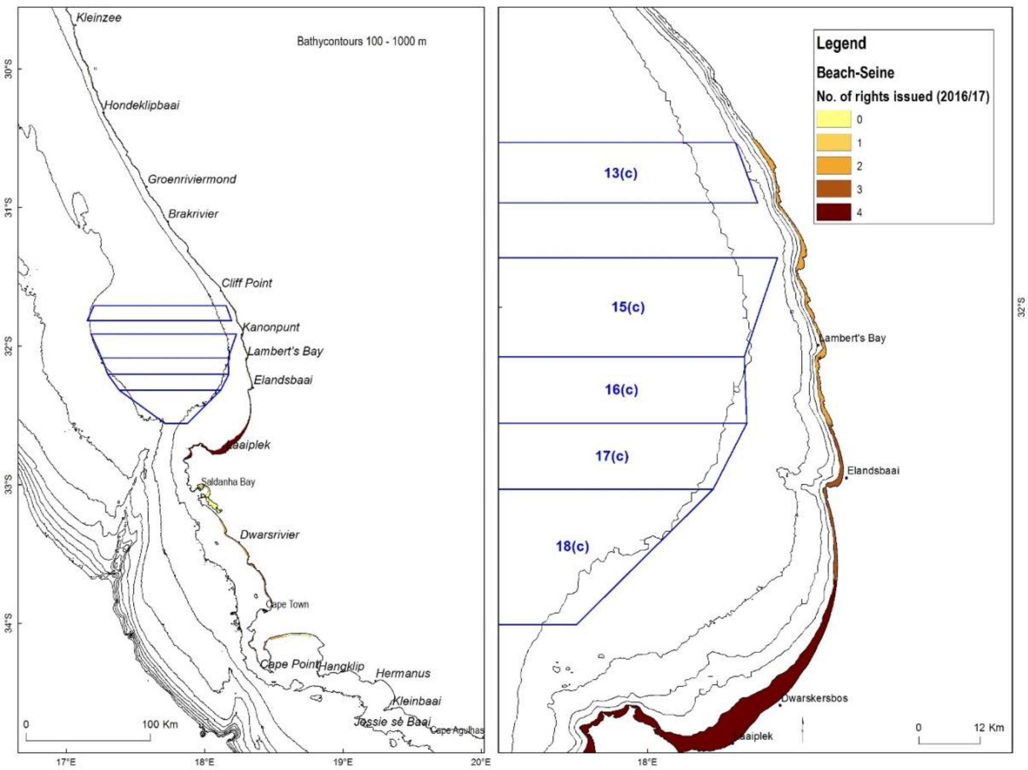


FIGURE 4-25: SEA CONCESSION AREAS 13C, 15C, 16C, 17C AND 18C IN RELATION TO NUMBER OF RIGHTS ISSUED FOR BEACH SEINE FISHING AREAS A AND B TO A MAXIMUM DEPTH OF 50 M.

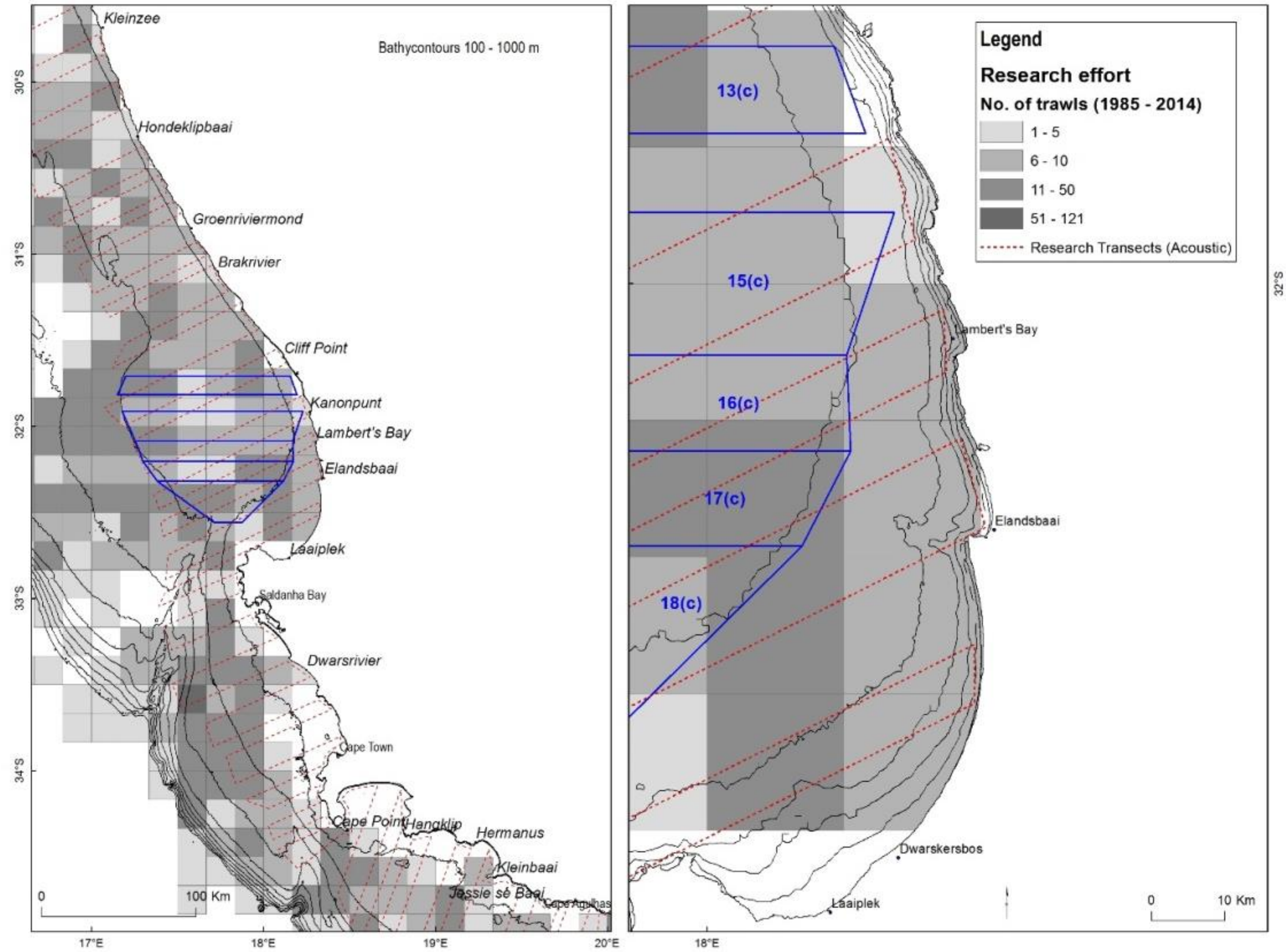


FIGURE 4-26: SPATIAL DISTRIBUTION OF TRAWLING EFFORT AND ACOUSTIC SURVEY TRACKS UNDERTAKEN BY DFFE TO ASCERTAIN BIOMASS OF DEMERSAL FISH SPECIES AND SMALL PELAGIC SPECIES IN RELATION TO SEA CONCESSION 13C, 15C, 16C, 17C & 18C.

4.1.4.2 Shipping Transport

Most of the 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 Kleinzee and Oranjemund (see Figure 4-27).

While ship traffic around South Africa is not high in global terms compared to say the Panama or Suez Canal, ship traffic is considerable (Gründlingh *et al.* 2006). Approximately 120 million tonnes of oil and substantial volumes of bunker fuel are estimated to pass through South African waters every year which indicates that South Africa has one of the highest concentrations of oil tankers and cargo ships in the world (IMO, 2005). Although the majority of vessel traffic, including commercial and fishing vessels, remains relatively close inshore North- and south-bound cargo vessels usually remain over the mid-shelf (100 m isobath), while tankers and bulk carriers usually remain further offshore. The latter do, however, move closer inshore to escape extremely rough conditions that develop within the Agulhas Current. Some offshore commercial traffic departs east off the East Coast. Charted Traffic Separation Schemes, which are International Maritime Organisation (IMO) adapted and other relevant information are listed in the South African Annual Notice to Mariners No 5, of 2010. The safe shipping routes along the South African coast are shown in Figure 4-28.

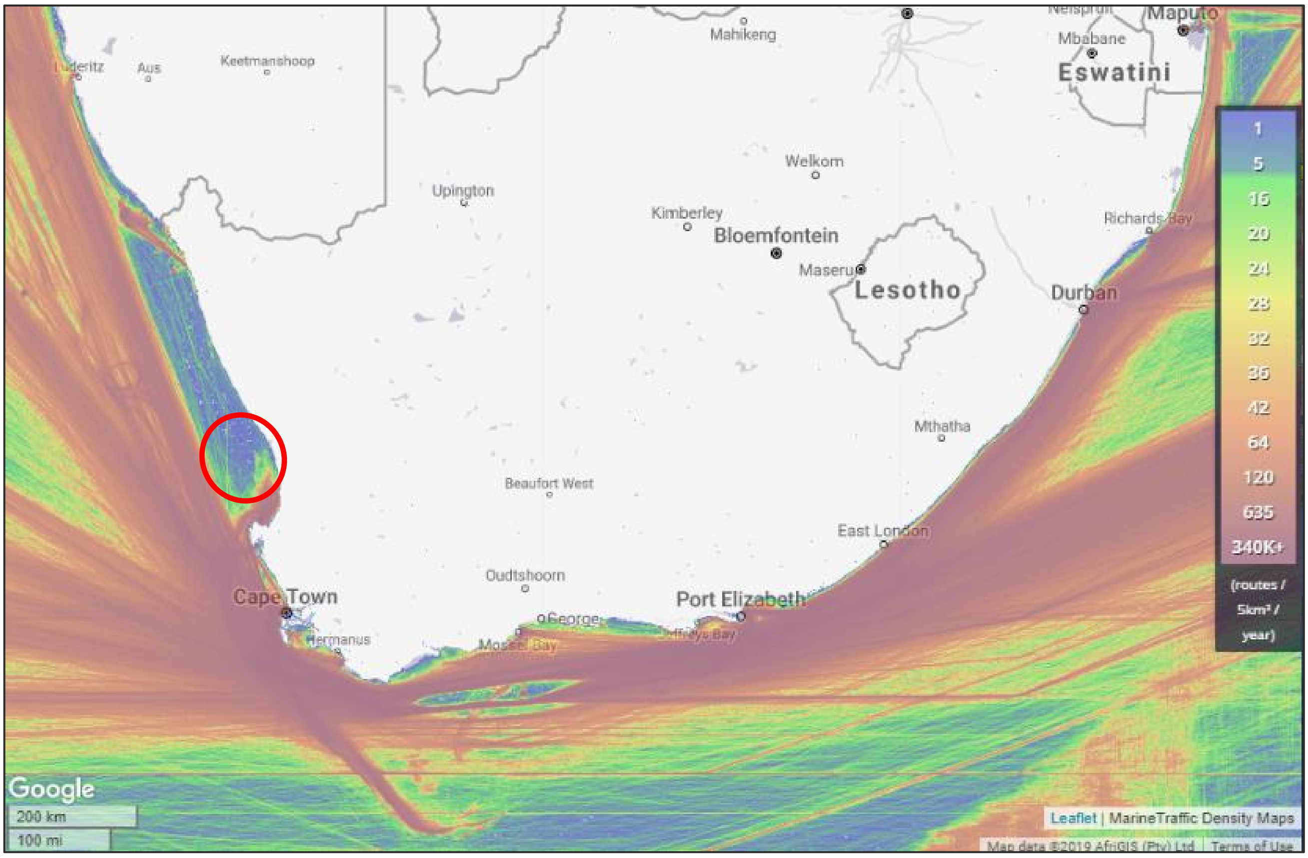


FIGURE 4-27: MAJOR SHIPPING ROUTES ALONG THE WEST COAST OF SOUTH AFRICA. APPROXIMATE LOCATION OF THE SEA CONCESSION AREAS IS ALSO SHOWN.

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 4-29).

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.

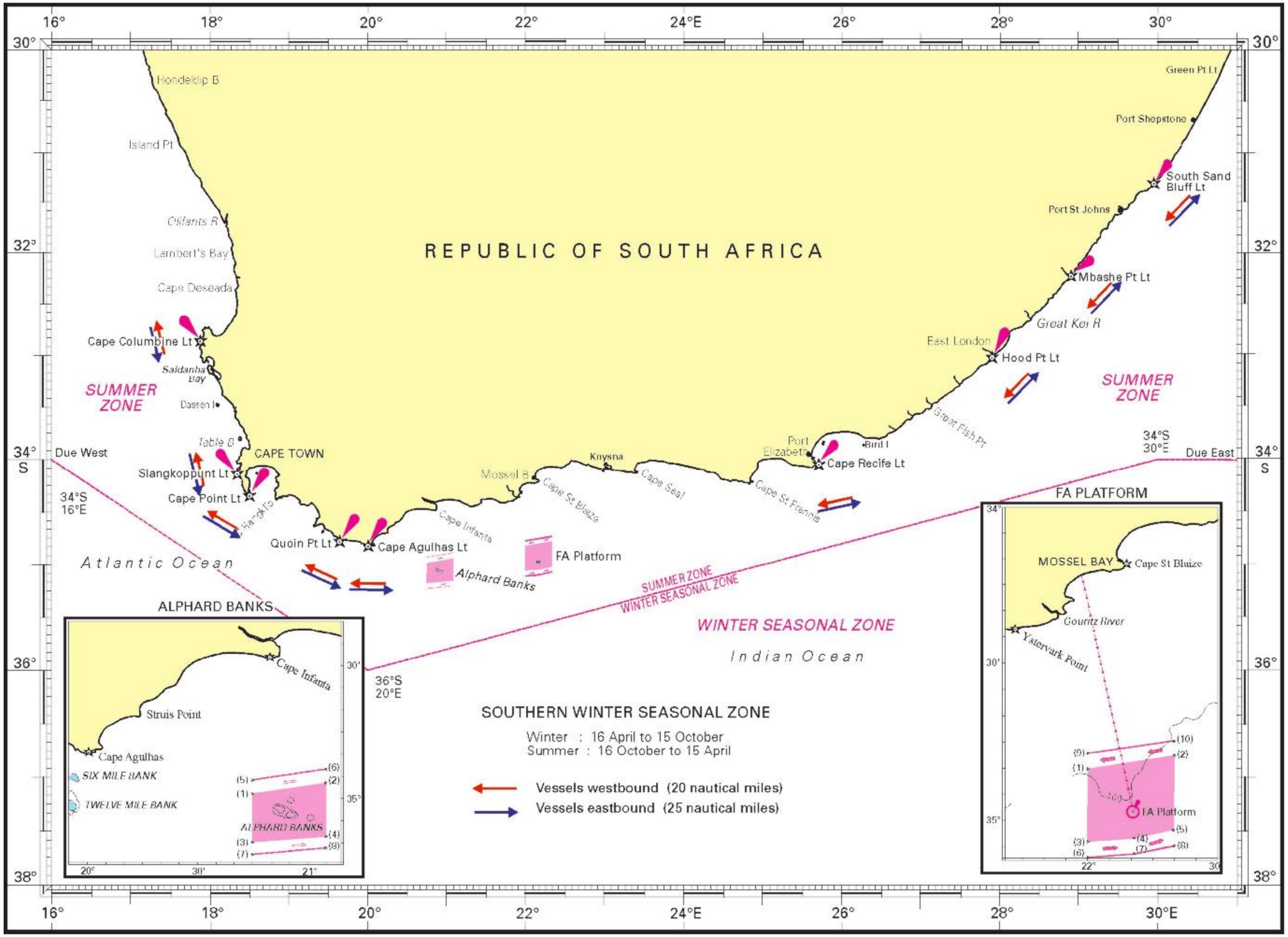


FIGURE 4-28: SAFE SHIPPING ROUTES AROUND THE COAST OF SOUTH AFRICA

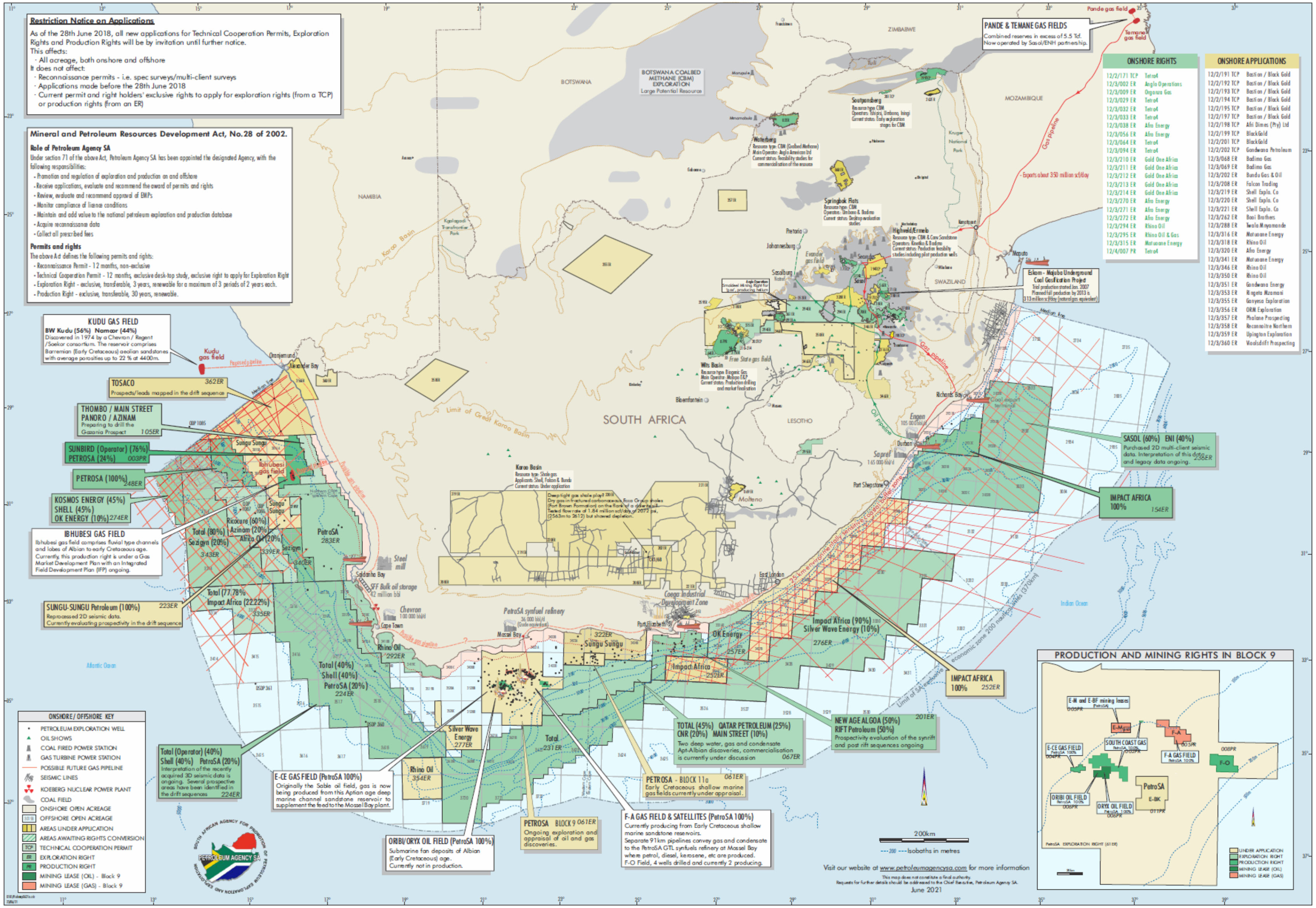


FIGURE 4-29: PETROLEUM LICENCE BLOCKS OFF THE WEST, SOUTH AND EAST COASTS OF SOUTH AFRICA (AFTER PASA, JUNE 2020).

SLR

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 other 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 4-30).

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.

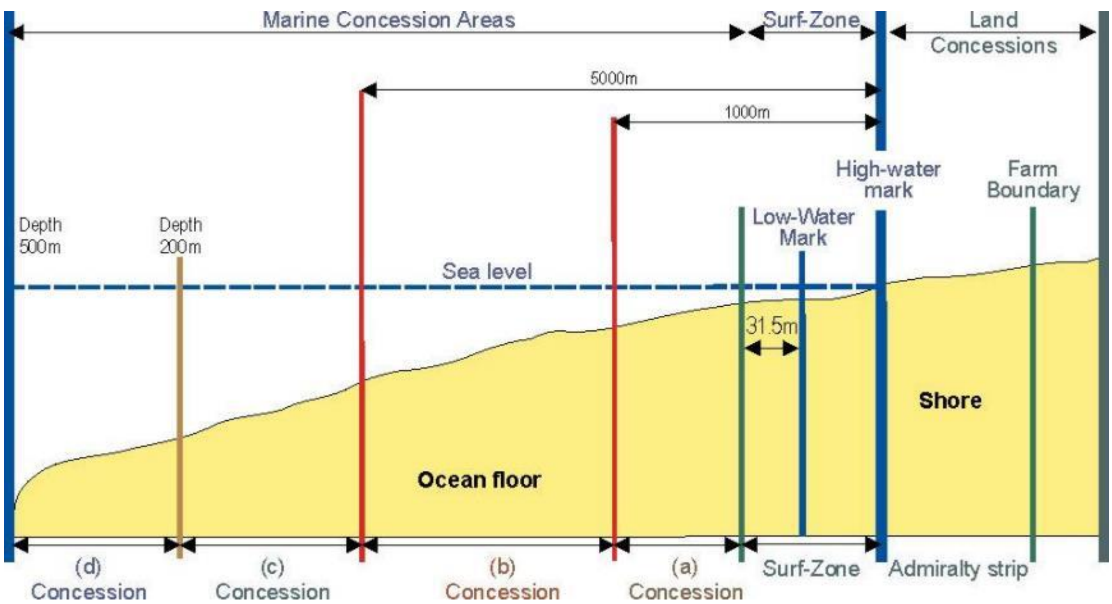


FIGURE 4-30: DIAGRAM OF THE ONSHORE AND OFFSHORE BOUNDARIES OF THE SOUTH AFRICAN (A) TO (D) MARINE DIAMOND CONCESSION AREAS.

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 concession 2C and 3C for mining (see Figure 4-31) and De Beers Marine (Pty) Ltd for prospecting in Sea Concessions 4C, 5C and 6C. BPT127 has also submitted a prospecting right application for Sea Concession areas 14B, 15B and 17B.

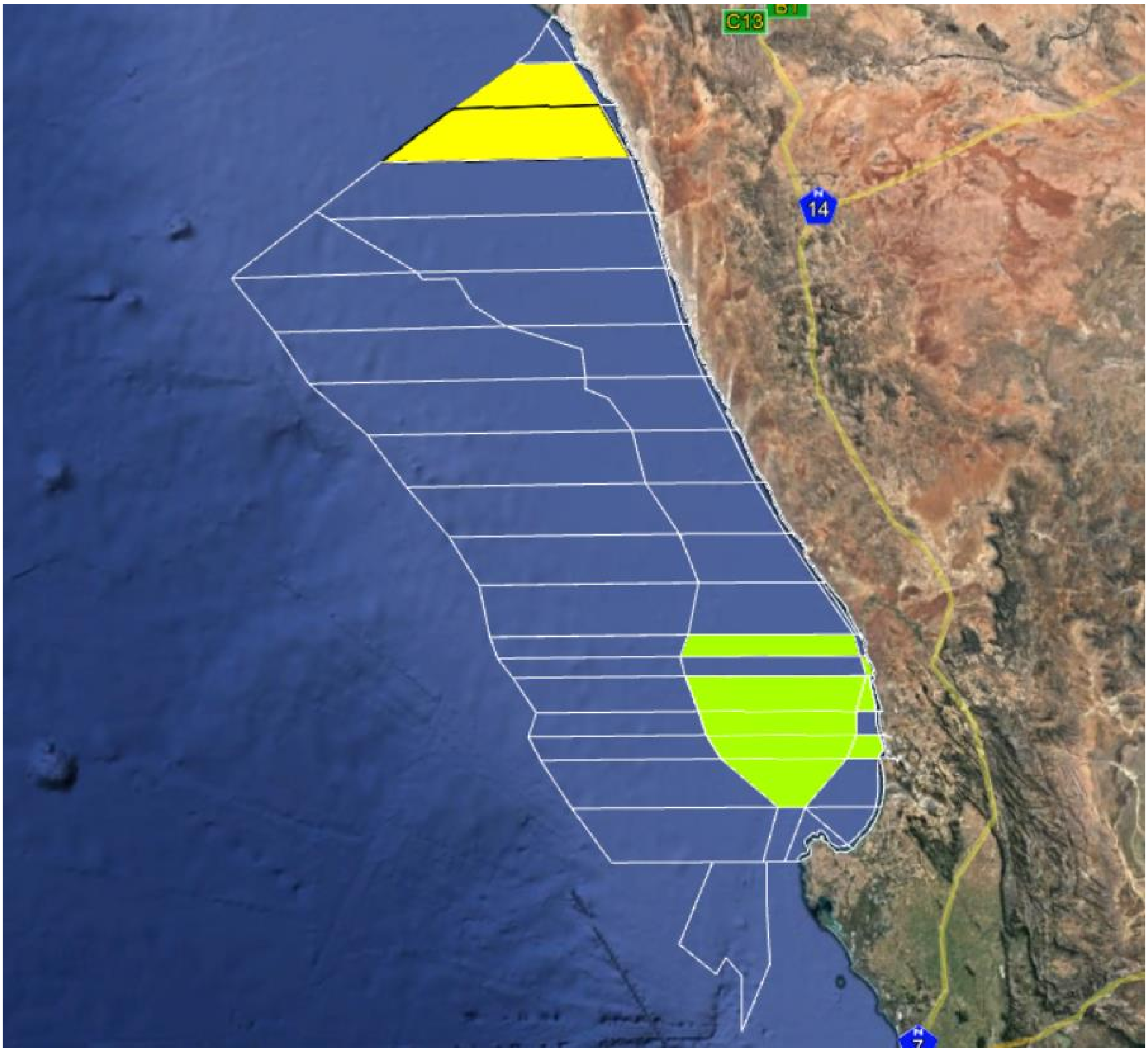


FIGURE 4-31: DESIGNATED SEA CONCESSION AREAS LOCATED OF THE WEST COAST SHOWING BPT127'S CURRENT MINING RIGHTS (YELLOW) AND PROPOSED PROSPECTING RIGHTS (GREEN).

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 4-32), 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.

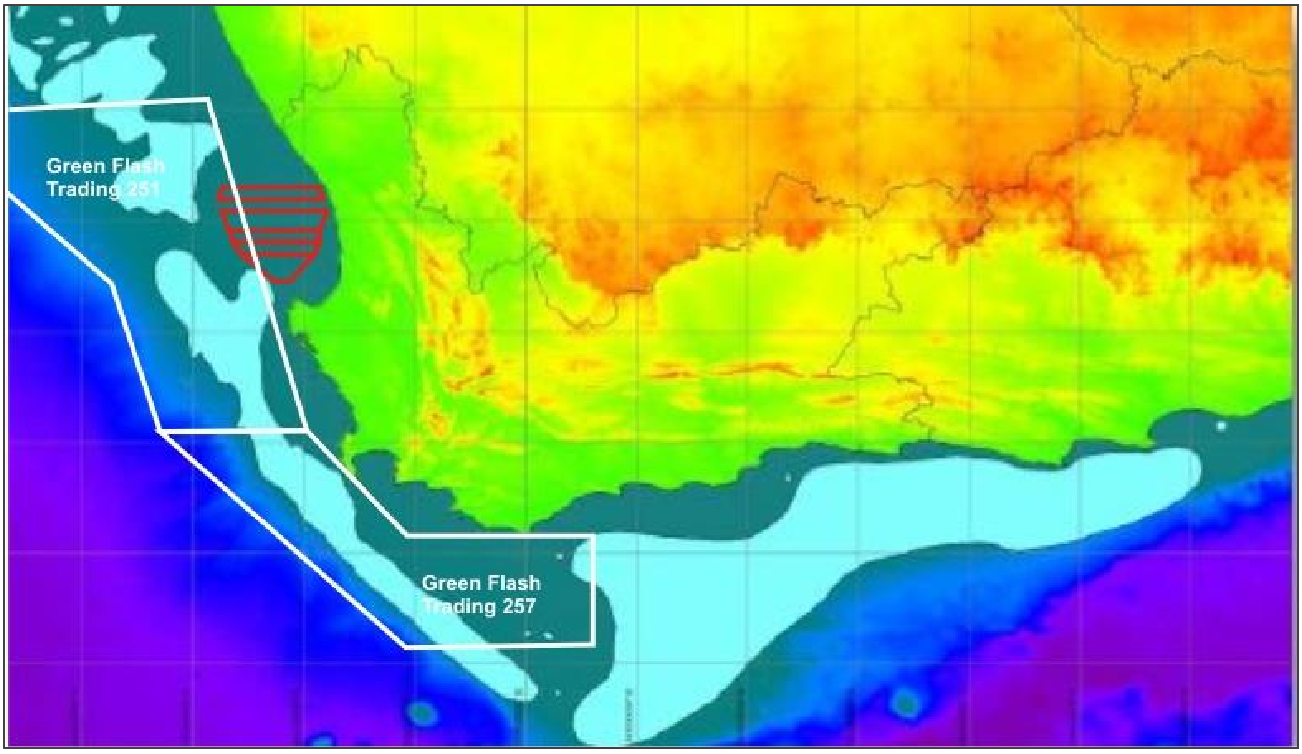


FIGURE 4-32: APPROXIMATE LOCATION OF SEA CONCESSIONS 13C, 15C, 16C, 17C AND 18C (RED POLYGONS) IN RELATION TO PHOSPHATE PROSPECTING AREAS (WHITE POLYGONS). LIGHT BLUE SHADED AREAS INDICATE THE DISTRIBUTION OF PHOSPHORITE HARD GROUND (ADAPTED FROM MORANT 2013).

4.1.4.5.3 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.

4.1.4.5.4 Undersea Cables

There are several submarine telecommunications cable systems across the Atlantic and the Indian Ocean (see Figure 4-33), 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.

4.1.4.6 Archaeological Sites

Most known wrecks along the West Coast are 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 shipwrecks recorded between the Berg and Orange Rivers, many of which were vessels involved in coastal trade and fishing.

There are twelve wrecks located within or close to concession areas 13C and 15C – 18C (see Figure 4-34). Three of these wrecks, the Girl Devon (1971), Boy Donald (1983) and Jenny-Lee (1992) are currently less than 60 years of age and are thus not protected by the NHRA as heritage resources. Of the three, only the Jenny-Lee, which is recorded as having foundered 52 nautical miles west of Lamberts Bay, is likely to be within the concession areas (potentially Area 15C or 16C). Although these wrecks are not heritage resources, they can pose a risk to prospecting equipment and for that reason have been retained in the overall count of sites that may lie within the concession areas.

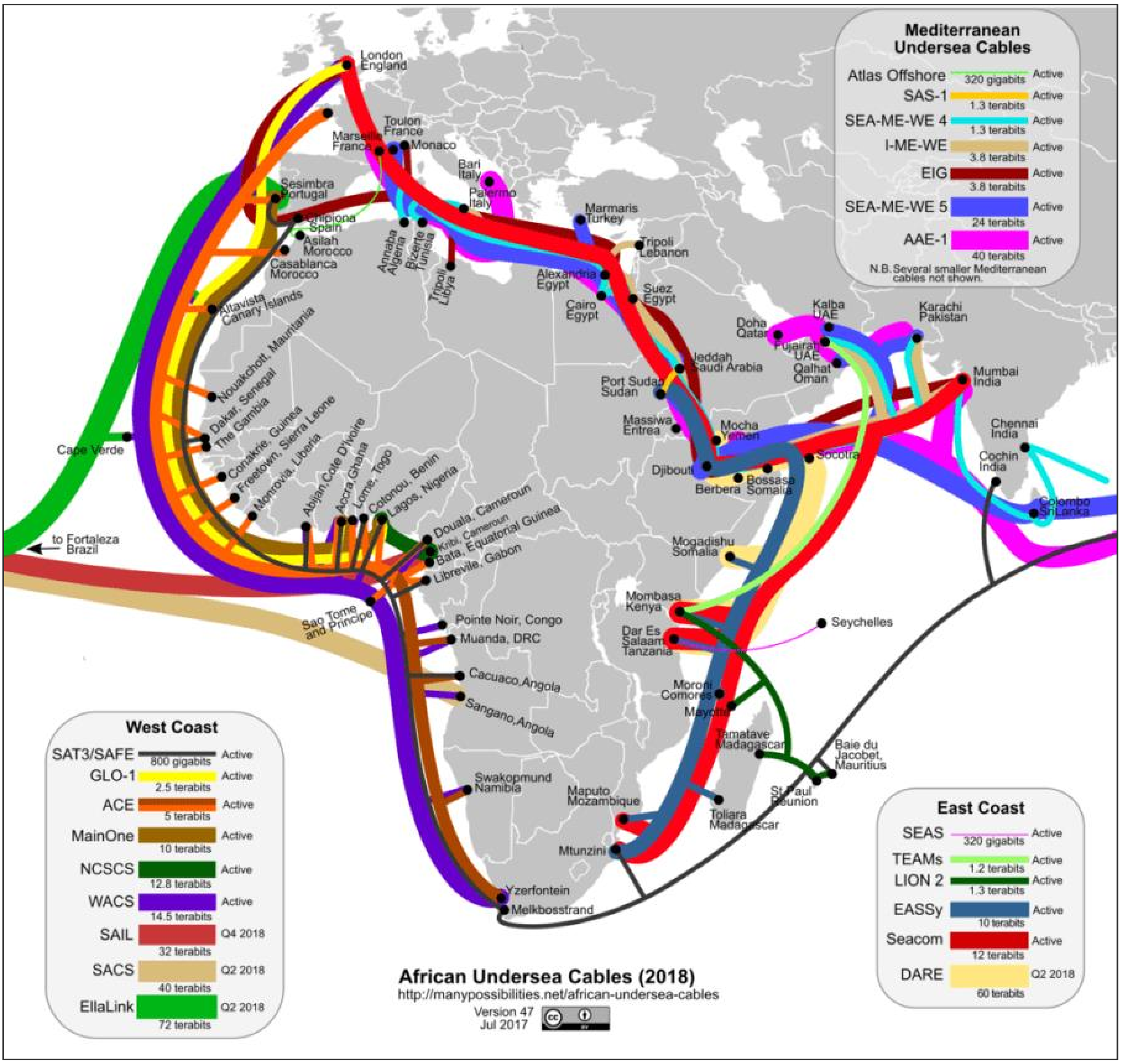


FIGURE 4-33: CONFIGURATION OF THE CURRENT AFRICAN UNDERSEA CABLE SYSTEMS, JULY 2018 (SOURCE: HTTP://WWW.MANYPOSSIBILITIES.NET).

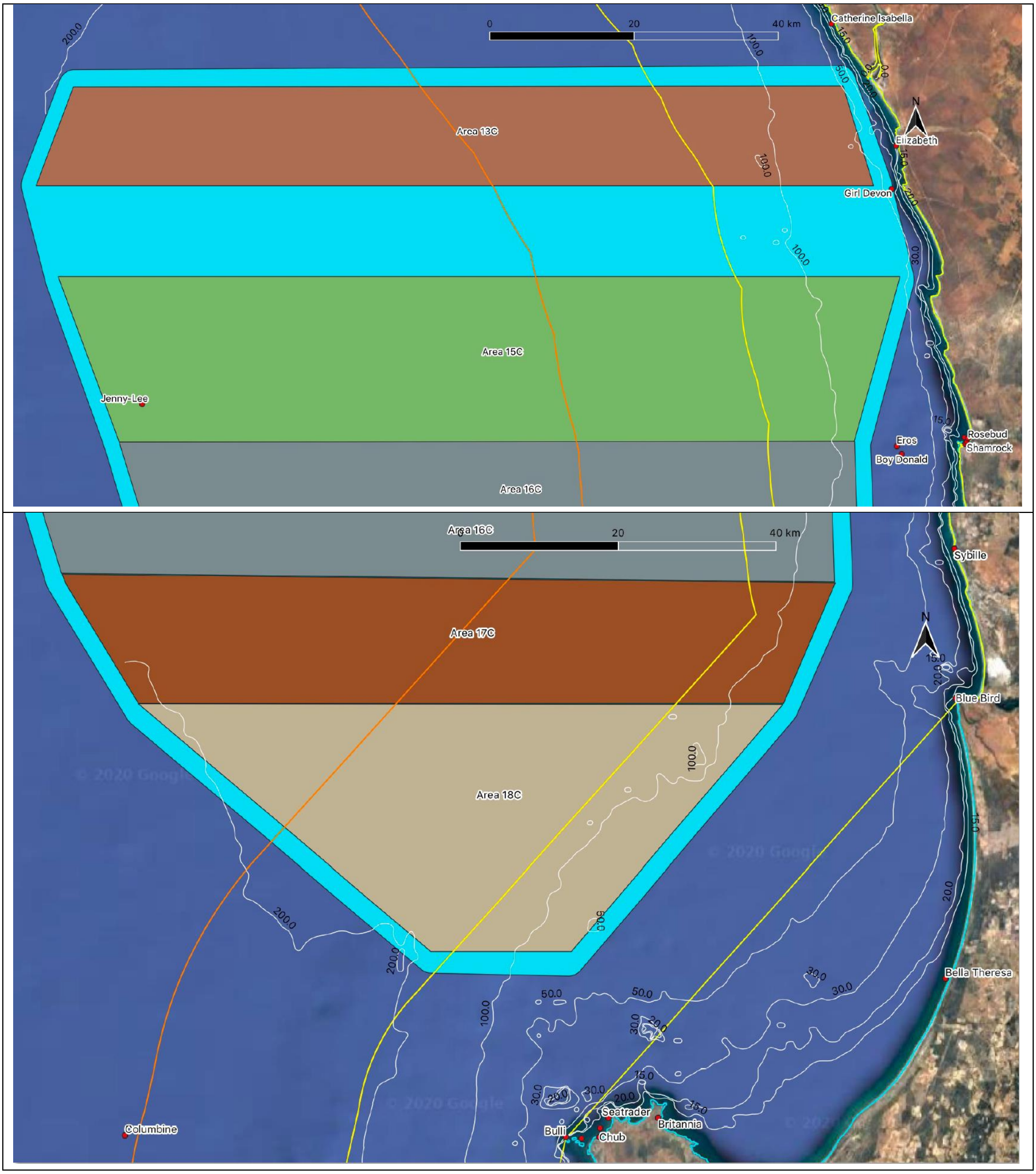


FIGURE 4-34: SHIPWRECKS POTENTIALLY LOCATED WITHIN THE BROADER PROJECT AREA.

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

- The wreck of *HMS Sybille* (1901) at Steenboksfontein south of Lamberts Bay is well known (see Gribble & Athiros 2008) and its position on the seabed accurately recorded. This site can be excluded from this assessment because it is well outside any of the concession areas;
- *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 and could possibly could be present in any of the sea concession areas.
- As there is no indication in the available records of how or where *Antoinette* (1854) and *Blue Bird* (1960) were lost, it must be assumed that either or both could potentially lie within the Sea Concession areas.

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 the remains of Eros, Antoinette, Blue Bird and Jenny-Lee could be present on the seabed in the concession areas. While Blue Bird and Jenny-Lee are of limited, current historical interest, Eros and Antoinette are older wrecks and hold greater potential archaeological interest. Furthermore, the remains of currently unknown wrecks could also be present in the sea concession areas.

4.1.4.7 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 4-35).

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 Ecologically or Biologically Significant Areas (EBSAs)

As part of a regional Marine Spatial Management and Governance Programme (MARISMA) the Benguela Current Commission (BCC) and its member states have identified a number of Ecologically and Biologically Significant Areas (EBSAs) both spanning the border between Namibia and South Africa and along the South African West, South and East Coasts, with the intention of implementing improved conservation and protection measures within these sites. South Africa currently has 11 EBSAs solely within its national jurisdiction with a further four having recently been proposed. It also shares five trans-boundary EBSAs with Namibia (3) and Mozambique (2).

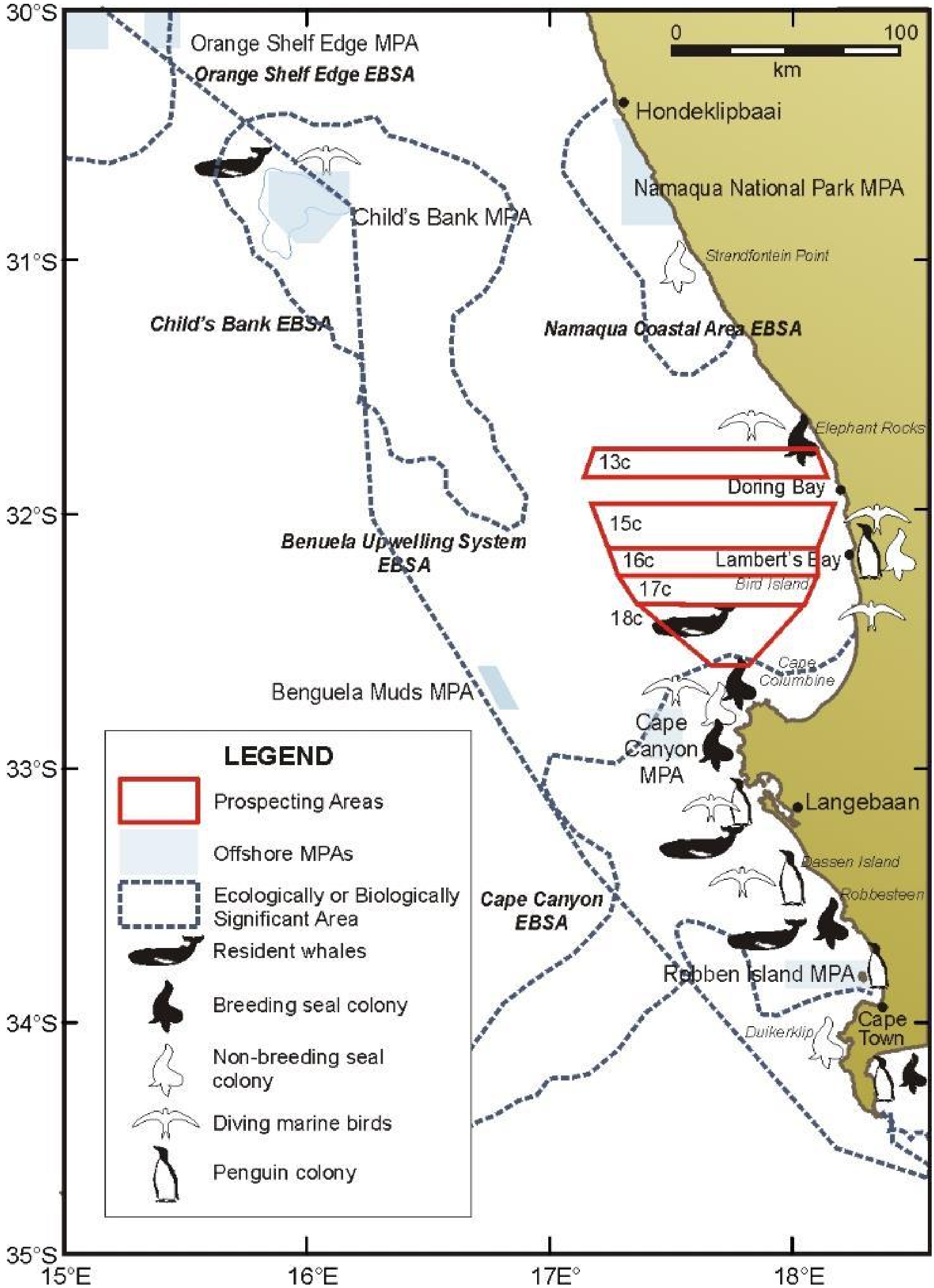


FIGURE 4-35: ENVIRONMENT INTERACTION POINTS ON THE WEST COAST, ILLUSTRATING THE LOCATION OF SEABIRD AND SEAL COLONIES AND RESIDENT WHALE POPULATIONS IN RELATION TO THE 13C, 15C, 16C, 17C AND 18C SEA CONCESSION AREAS. OFFSHORE MARINE PROTECTED AREAS AND EBSAS ARE ALSO SHOWN.

The principal objective of these EBSAs is identification of features of higher ecological value that may require enhanced conservation and management measures. They currently carry no legal status. Although no specific management actions have as yet been formulated for the EBSAs, they have been considered as part of the National Coastal and Marine Spatial Biodiversity Plan and the development of the Critical Biodiversity Map (CBA) which is addressed in the next section.

There is direct overlap between Sea Concession 18C and the Conservation Zone of the Cape Canyon and Associated Islands, Bays and Lagoon ESBA (refer to Figure 4-35). This EBSA includes Cape Canyon (one of two submarine canyons off the west coast of South Africa) and a broader area, including St Helena Bay, which has been recognized as important in three systematic conservation plans. Both benthic and pelagic features are included, and the area is important for pelagic fish, foraging marine mammals and several threatened seabird species. The area is also important for threatened ecosystem types; there are nine Endangered and 12 Vulnerable ecosystem types, and two that are Near Threatened. There is evidence that the submarine canyon hosts fragile habitat-forming species, and there are other unique and potentially vulnerable benthic communities in the area. There are several small coastal MPAs within the EBSA.

4.2.3 Biodiversity Priority Areas

The latest version of National Coastal and Marine Spatial Biodiversity Plan (v1.0 (Beta 2) was released on 26th February 2021) (Harris *et al.* (2020)). This National Coastal and Marine Spatial Biodiversity Plan is intended to be used by managers and decision-makers in those national government departments whose activities occur in the coastal and marine space, e.g., environment, fishing, transport (shipping), petroleum, mining, and others. It is relevant for the Marine Spatial Planning Working Group where many of these departments are participating in developing South Africa's emerging marine spatial plans. It is also intended for use by relevant managers and decision-makers in the coastal provinces and coastal municipalities, EIA practitioners, organisations working in the coast and ocean, civil society, and the private sector.

The biodiversity priority areas and management objectives of each category have been defined and mapped as part of the marine spatial planning process. CBA Map categories are as follows: Protected Area, Critical Biodiversity Area 1 (CBA 1), Critical Biodiversity Area 2 (CBA 2), and Ecological Support Area (ESA). Sea-use guidelines are then proposed, with the Conservation Zones likely to comprise a Strict Biodiversity Conservation Zone (including Marine Protected Areas, and Other Effective Area-Based Conservation Measures (OECMs) as two separate types), and an Environmental Impact Management Zone. Protected areas will be managed according to their gazetted regulations. The intention is that the CBA Map (CBAs and ESAs) and sea-use guidelines inform the MSP Conservation Zones and management regulations, respectively.

Activities within these management zones are classified into those that are compatible (Y for Yes), those that are incompatible (N for No), and those that may be compatible subject to certain conditions (C for Conditional).

Non-destructive prospecting activities are compatible in ESAs and may be compatible, subject to certain conditions, in CBAs. Destructive prospecting activities with localised impact, e.g. bulk sampling, may be compatible, subject to certain conditions, in CBAs and ESAs. Mining construction and operations are classified as incompatible in CBAs but may be compatible, subject to certain conditions, in ESAs (Harris et.al., 2020).

These zones have been incorporated into the most recent iteration of the national Coastal and Marine Critical Biodiversity Area (CBA) Map (v1.0 (Beta 2) released 26th February 2021) (Harris *et al.* (2020)) (see Figure 4-36). This indicates that there is overlap between mapped CBA 1 (red) and CBA 2 (orange) and the Sea Concession

Areas. CBA 1 indicates irreplaceable or near-irreplaceable sites that are required to meet biodiversity targets with limited, if any, option to meet targets elsewhere, whereas CBA 2 indicates optimal sites that generally can be adjusted to meet targets in other areas. Ecological Support Areas (ESAs) represent EBSAs outside of MPAs and not already selected as CBAs. Sea-use within the CBAs and ESAs reflect those specified by the EBSA biodiversity conservation and management zones described above.

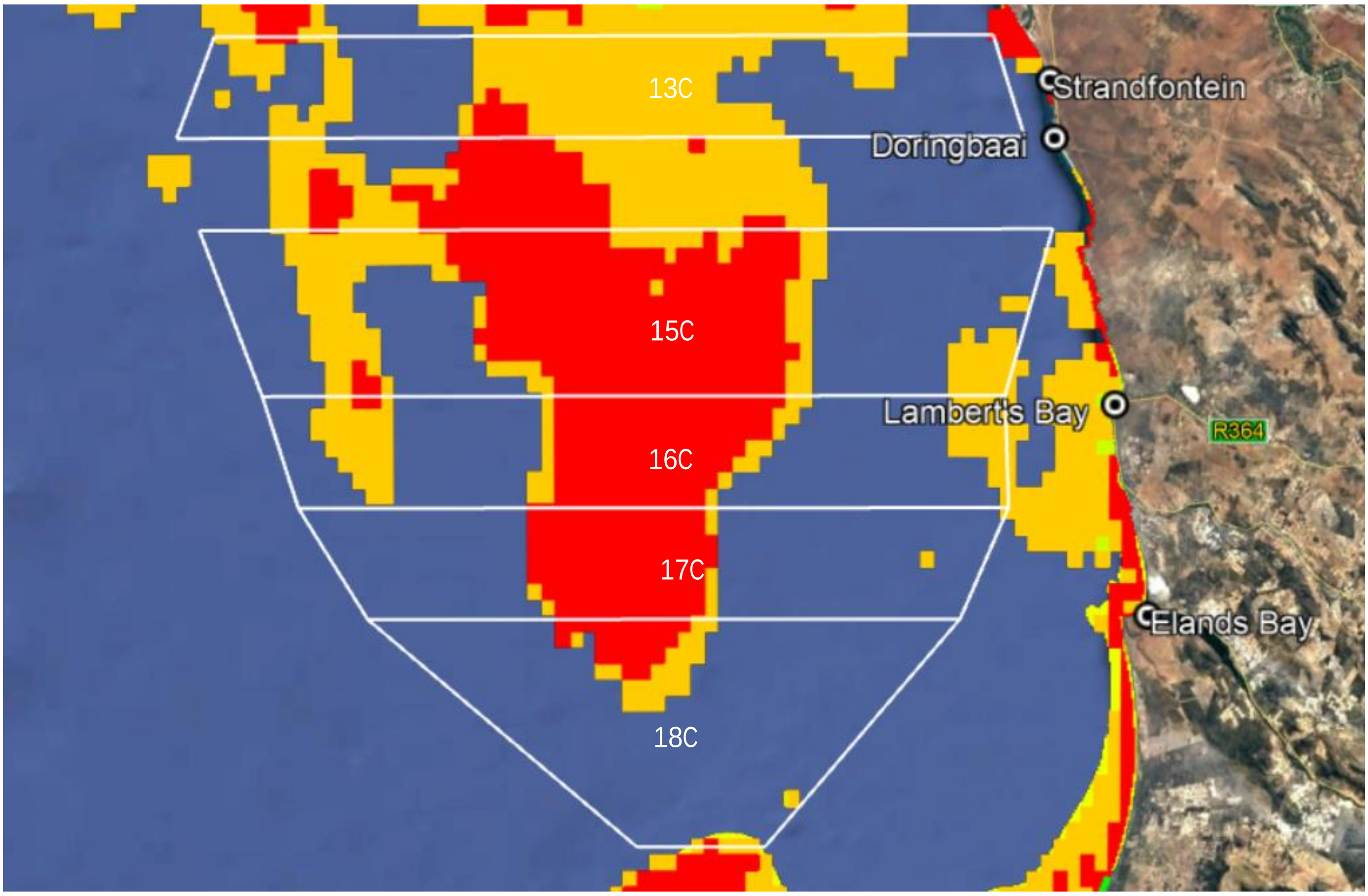


FIGURE 4-36: THE NATIONAL COSTAL AND MARINE CBAS (VERSION 1.0 (BETA 2)) IN RELATION TO THE SEA CONCESSION AREAS (ADAPTED FROM HARRIS *ET AL.* 2020).

4.2.4 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 4-7). 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 4-7: 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

5. IMPACT DESCRIPTION AND ASSESSMENT

This chapter describes and assesses the significance of potential impacts related to the proposed offshore prospecting activities in the Sea Concession areas. All impacts are systematically assessed and presented according to predefined rating scales (see Appendix 4.1). Mitigation or optimisation measures are proposed which could ameliorate the negative impacts or enhance potential benefits, respectively. The status of all impacts should be negative unless otherwise indicated. The significance of impacts with and without mitigation is also assessed.

Specialist input was provided to address the likely effect of the proposed prospecting activities on fisheries (Appendix 4.2), marine fauna (Appendix 4.3) and underwater cultural and heritage resources (Appendix 4.4). In addition, this assessment used as a basis the issues identified in the Generic EMP prepared for marine diamond mining off the West Coast of South Africa (Lane and Carter 1999) and similar studies.

Sections 5.1 to 5.3 assess impacts related to the proposed project and associated alternatives on the benthic environment, marine fauna, and other users of the sea. The identified potential socio-economic impacts of the project are described in Section 5.4. The implications of not going ahead with the proposed project (i.e. the No-Go Alternative) are assessed in Section 5.5.

5.1 IMPACT OF THE PROSPECTING VESSELS

5.1.1 Discharges/Disposal to the Sea

Description of impact

Discharges to the marine environment include deck drainage, machinery space drainage, sewage, galley wastes and solid wastes from the geophysical survey and sediment sampling vessels. These discharges would result in the local reduction in water quality, which could impact marine fauna in a number of different ways:

- Physiological effects: Ingestion of hydrocarbons, detergents and other waste could have adverse effects on marine fauna, which could ultimately result in mortality;
- Increased food source: The discharge of galley waste and sewage would result in an additional food source for opportunistic feeders, speciality pelagic fish species; and
- Increased predator - prey interactions: Predatory species, such as sharks and pelagic seabirds, may be attracted to the aggregation of pelagic fish attracted by the increased food source.

Assessment

The geophysical survey and sediment sampling vessels would have the necessary sewage treatment systems, oil/water separators and food waste macerators to ensure compliance with MARPOL 73/78 standards. Compliance with MARPOL 73/78 means that discharges introduce relatively small amounts of nutrients and organic material to oxygenated surface waters, which would result in only a minor contribution to local marine productivity and possibly of attracting some opportunistic feeders. The intermittent discharge of sewage is likely to contain a low level of residual chlorine following treatment, but this is expected to have a minimal effect on seawater quality given the relatively low total discharge and considering dilution in the surface waters.

Based on the relatively small discharge volumes, high energy sea conditions and compliance with MARPOL 73/78 requirements, the potential impact of normal discharges from the vessels would remain of low intensity across the prospecting area over the short-term and is considered to be of VERY LOW significance with or without mitigation.

Although most solid waste would be transported to shore for disposal, certain non-toxic combustible wastes (e.g., galley waste) may be incinerated on the vessels, creating smoke (particulate matter) emissions. The volumes of solid waste that may be incinerated on board, and hence also the volumes of atmospheric emissions, would be minimal. The remainder of solid waste would be stored on board and then transported onshore for disposal on land, and consequently would have no impact on the marine environment. Waste containers would be transported to work boats for onward handling in port and removed by a waste contractor for disposal at a permitted landfill site. Recycling would occur on board and the solid waste would be sorted in separate containers before being taken to an appropriate onshore recycling facility. Specialist waste disposal contractors would dispose of hazardous waste.

Mitigation

- Compliance with Marpol 73/78 standards.
- Good International Industry Practice should be applied in the storage and handling of fuels and chemicals so as to prevent release of pollutants overboard.
- Low-toxicity biodegradable detergents and reusable absorbent cloths should be used in cleaning of all deck spillage.
- All hydraulic systems should be adequately maintained.
- Minimise the discharge of waste material should obvious attraction of marine fauna be observed.
- Ensure all crew are trained in spill response management.

TABLE 5-1: IMPACT OF NORMAL DISCHARGES ON MARINE FAUNA.

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Extent	Local	Local
Duration	Short-term	Short-term
Intensity	Low	Low
Probability	Highly Probable	Highly Probable
Confidence	High	High
Consequence	Very Low	Very Low
Significance	Very Low	VERY LOW
Cumulative impact	None	None
Nature of cumulative impact	The nominal quantity of deck drainage that would enter the sea would not result in a cumulative impact.	
Degree to which impact can be reversed	Fully reversible - discharges would be quickly dispersed and diluted by the high wind and wave energy of the offshore sea environment.	
Degree to which impact may cause irreplaceable loss of resources	N/A	
Degree to which impact can be mitigated	Very Low	

5.1.2 Noise from Survey/Sampling Vessel and Support Vessels

Impact description

The noise from the survey/sampling and/or support vessel(s) could result in localised disturbance of marine fauna (note: noise from the actual survey and sampling activities is assessed in Section 5.2).

Impact assessment

Noise from the prospecting vessels and/or support vessel(s) is likely to be no higher than those from other shipping vessels in the region. Underwater noise from these vessels is not considered to be of sufficient amplitude to cause direct harm to marine life.

The potential impact of noise generated by the vessels on marine fauna is considered to remain localised, of low intensity for the duration of the proposed prospecting operations (short-term). This impact therefore remains of VERY LOW significance with and without mitigation (see Table 5-2).

Mitigation measures

No measures are deemed necessary to mitigate noise impacts from survey/sampling and/or support vessel(s).

TABLE 5-2: IMPACT OF NOISE FROM SURVEY/SAMPLING AND SUPPORT VESSEL OPERATIONS.

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Intensity	Low	Low
Duration	Short-term	Short-term
Extent	Local	Local
Consequence	Very Low	Very Low
Probability	Probable	Probable
Significance	Very Low	VERY LOW
Status	Negative	Negative
Confidence	Medium	Medium
Nature of cumulative impact	Other vessels operating in the same area at the same time would result in a cumulative increased of noise. The associated cumulative impact is considered to be of LOW significance.	
Degree to which impact can be reversed	Fully reversible.	
Degree to which impact may cause irreplaceable loss of resources	N/A	
Degree to which impact can be mitigated	Very Low	

5.2 IMPACT ON MARINE FAUNA

5.2.1 NOISE ASSOCIATED WITH GEOPHYSICAL SURVEYS AND SAMPLING ACTIVITIES

Description of impact

Potential impacts associated with the proposed geophysical surveys on marine fauna (mainly cetaceans) could include temporary physiological injury and behavioural avoidance of the survey area. During sampling operations, the sampling tool of choice could generate underwater noise, which may have an impact on macrobenthic communities, fish and marine mammals in the area.

Impact assessment

The various geophysical survey techniques considered for prospecting are outlined in Section 3.4.1. The acoustic equipment to be utilised during the proposed geophysical surveys falls within the hearing range of most fish and marine mammals and, at sound levels of between 190 to 230 dB re 1 μPa at 1 m, will be audible for considerable distances (in the order of tens of km) before attenuating to below threshold levels of marine fauna.

Unlike the noise generated by deeper penetration low frequency airguns during seismic surveys, underwater noise emitted during the proposed geophysical surveys is not considered to be of sufficient amplitude to cause auditory or non-auditory trauma in marine fauna. It is anticipated that only within meters of the source (i.e. directly below the acoustic equipment) the sound pressure would be in the 230 dB range where exposure would result in trauma.

Similarly, the sound level generated by drilling and seabed crawler operations fall within the 120-190 dB re 1 μPa range at the sampling unit, with main frequencies between 3 – 10 Hz. Underwater noise from sampling operations may induce localised behavioural changes in some marine mammals, it is unlikely that such behavioural changes would impact on the wider ecosystem.

Noise sources from sampling activities would largely be stationary for the duration of the operations. As most pelagic species likely to be encountered are highly mobile, they would be expected to flee and move away from the either sound sources (geophysical survey vessel or sampling tool) before trauma could occur.

In light of the above, the impact of noise emissions from the proposed geophysical surveys on marine fauna is considered to be localised, short-term (for duration of survey i.e. weeks) and of medium intensity. The significance of the impact is considered of VERY LOW significance both without and with mitigation.

The impact of underwater noise generated during sampling operations are of low intensity in the target area and for the duration of the sampling campaign. Thus, the significance of the impact of underwater noise is considered of VERY LOW significance without and with mitigation.

Mitigation

- A designated onboard Marine Mammal Observer (MMO) must ensure compliance with mitigation measures during geophysical surveying.
- The MMO should conduct visual scans for the presence of cetaceans around the survey vessel prior to the initiation of any acoustic impulses.
- Pre-survey scans should be of at least a 15-minute duration prior to the start of survey equipment.
- Where equipment permits, "soft starts" should be carried out for equipment with source levels greater than 210 dB re 1 μPa at 1 m over a period of 20 minutes to give adequate time for marine mammals to

leave the vicinity. Where this is not possible, the equipment should be turned on and off over a 20-minute period to act as a warning signal and allow cetaceans to move away from the sound source.

- Terminate the survey if any marine mammals show affected behaviour within 500 m of the survey vessel or equipment until the mammal has vacated the area.
- Avoid planning geophysical surveys during the movement of migratory cetaceans (particularly baleen whales) from their southern feeding grounds into low latitude waters (beginning of June to end of November), and ensure that migration paths are not blocked by sonar operations.
- For the months of June and November ensure that Passive Acoustic Monitoring (PAM) is incorporated into any survey programme.

TABLE 5-3: IMPACT OF NOISE ASSOCIATED WITH THE GEOPHYSICAL SURVEYS

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Intensity	Medium	Low
Duration	Short-term	Short-term
Extent	Local	Local
Consequence	Very Low	Very Low
Probability	Probable	Probable
Significance	Very Low	VERY LOW
Status	Negative	Negative
Confidence	Medium	Medium
Nature of cumulative impact	As seismic survey activities have recently been conducted in the area, some cumulative impacts could be anticipated. However, any direct impact is likely to be at individual level rather than at species level.	
Degree to which impact can be reversed	Fully reversible – any disturbance of behaviour, auditory “masking” or reductions in hearing sensitivity that may occur as a result of survey noise below 220 dB would be temporary.	
Degree to which impact may cause irreplaceable loss of resources	Negligible	
Degree to which impact can be mitigated	Very Low	

TABLE 5-4: IMPACT OF NOISE ASSOCIATED WITH THE SAMPLING

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Intensity	Low	No mitigation is proposed for this impact.
Duration	Short-term	
Extent	Local	
Consequence	Very Low	
Probability	Definite	
Significance	Very Low	
Confidence	High	

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Nature of cumulative impact	None.	
Degree to which impact can be reversed	Fully reversible – any disturbance of behaviour, auditory "masking" or reductions in hearing sensitivity that may occur would be temporary	
Degree to which impact may cause irreplaceable loss of resources	N/A.	
Degree to which impact can be mitigated	No possible mitigation identified.	

5.2.2 Crushing of Benthic Fauna and Sediment Removal

Description of impact

The proposed drill and bulk sampling operations are expected to result in the disturbance and loss of benthic fauna within the sampling footprint due to crushing (as a result of the drill frame structure or weight of the seabed crawler) and the removal of seafloor sediments (by the drill bit and crawler suction head).

Following the disturbance, the rate of ecological recovery would depend on the magnitude of the disturbance, the type of community that inhabits the sediments, the extent to which the community is naturally adapted to disturbance, the sediment character (grain size) that remains following the disturbance, and physical factors such as depth and exposure (waves, currents) of the habitat.

Assessment

The crushing and removal of sediment from the seafloor is anticipated to result in the mortality of a large proportion of the benthic infaunal and epifaunal biota within the sampling footprint. Information from previous mining operations has demonstrated that on the southern African continental shelf, natural rehabilitation of the seabed takes place subsequent to disturbances through a process involving influx of sediments and recruitment of invertebrates into previously disturbed areas. Recovery rates of impacted communities were observed to be variable and dependent on the approach, sediment influx rates and the influence of natural disturbances on succession communities. It is pointed out that the proposed drill and bulk sampling operations would takes place on a significantly smaller scale that the above-mentioned historic mining operations.

Results of on-going research (Parkins & Field 1998; Pulfrich & Penney 1999; Steffani 2012) on the southern African West Coast suggest that differences in biomass, biodiversity or community composition following mining below the wave base may endure beyond the medium term (6-15 years). However, other research suggests that the physical disturbance resulting from mining may be no more stressful than the regular naturally occurring anoxic events typical of the West Coast continental shelf area.

As the proposed sampling activities would be undertaken in depths beyond the wave base (>40 m), near-bottom sediment transport is expected to be less than in shallower waters affected by swell. Thus, the excavations may persist for extended periods (years) due to slow infill rates. Long-term or permanent changes in grain size characteristics of sediments in these areas may occur which could potentially result in a shift in benthic fauna community structure if the original community is unable to adapt to the new conditions. However, slumping of adjacent unconsolidated sediments into the excavations could occur over the very short-term. Although this may result in localised disturbance of macrofauna associated with these sediments and alteration of sediment structure, it also serves as a means of natural recovery of the sampled areas. It is further noted that the sampling footprints would be much smaller than that of the mining operations for which natural rehabilitation of the seabed has been demonstrated (as indicated above).

Furthermore, many of the macrofaunal species serve as a food source for demersal and epibenthic fish, cascade effects on higher order consumers may result. However, considering the available area of similar habitat on the continental shelf of the West Coast, this reduction in benthic biodiversity can be considered negligible and impacts on higher order consumers are thus unlikely.

The impact on the offshore benthos as a result of the removal of sediments during the sampling activities is considered to be of medium intensity within the sampling target areas. Recovery within the sampling footprints is expected to take place within the medium term, as the excavations would have slow infill rates and may persist for extended periods (years). Furthermore, biomass often remains reduced for several years as long-lived species like molluscs and echinoderms need longer to re-establish the natural age and size structure of the population. While the impact on the associated communities is unavoidable within the sampling footprints, it would be extremely localised with a total footprint of approximately 0.3 km^2, assuming all the anticipated samples are taken (which constitutes approximately 0.00001% of the overall area of the sea concession areas). This impact is assessed to be of LOW significance with and without mitigation (see Table 5-5).

Mitigation

No direct mitigation measures are possible or considered necessary for the indirect loss of benthic macrofauna due to crushing by the drill-frame structure and/or crawler. However, it is the following is recommended:

- Sampling activities of any kind should avoid rocky outcrop areas or other identified sensitive habitats in the concession areas; and
- Where possible, dynamically positioned sampling vessels are implemented in preference to vessels requiring anchorage.

TABLE 5-5: IMPACT OF CRUSHING AND SEDIMENT REMOVAL ON OFFSHORE BENTHIC COMMUNITIES

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Intensity	Medium	Medium
Duration	Medium-term	Medium-term
Extent	Local	Local
Consequence	Very Low	Very Low
Probability	Definite	Definite
Significance	Low	LOW
Status	Negative	Negative
Confidence	High	High
Nature of cumulative impact	No cumulative impacts are anticipated.	
Degree to which impact can be reversed	Full reversible. The recovery would occur over the short term through recruitment and immigration from adjacent areas.	
Degree to which impact may cause irreplaceable loss of resources	Negligible considering the total surface area of seabed affected.	
Degree to which impact can be mitigated	No possible mitigation identified.	

5.2.3 Generation of Sediment Plumes

Description of impact

As part of the sampling operations, the seabed sediments are pumped to the surface and discharged onto sorting screens on the sampling vessel for screening. The unwanted material is discarded overboard from where the heavy portion settles on the seafloor in the excavated areas and the finer portion forms a suspended sediment plume in the water column which dissipates with time. The remaining material is mixed with a high-density ferrosilicon (FeSi) slurry and pumped under pressure into a Dense Medium Separation (DMS) plant resulting in a high-density concentrate. Most of the ferrosilicon is magnetically recovered for re-use in the DMS plant and the fine tailings (2 mm) from the DMS process are similarly deposited overboard. This finer material would also generate suspended sediment plumes in the water column.

The main effect of sediment plumes is an increase in water column turbidity, leading to a reduction in light penetration with potential adverse effects on the photosynthetic capability of phytoplankton. Other potential impacts include inhibiting pelagic visual predators due to poor visibility, egg and/or larval development impairment and reduction of benthic bivalve filter-feeding efficiencies. Negative impacts may also occur when heavy metals or contaminants associated with fine sediments are remobilised.

Assessment

The total suspended Particulate Inorganic Matter (PIM) off Namaqualand (particularly in nearshore waters) is strongly related to natural inputs from the Orange River or from 'berg' wind events. These natural concentrations are naturally increased under stronger wave conditions associated with high tides and storms, or under flood conditions. 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. Thus, there is a natural variation in turbidity and sediment load within the waters off the West Coast.

From previous offshore sampling operations, it has been observed that the suspended sediments in plumes settle rapidly (within hours) and results from water sampling confirmed that contaminant levels in the plumes are well below water quality guideline levels (Carter 2008).

Given that the marine environment within the Sea Concession areas is naturally exposed to large variations in turbidity and sediment load and that possible contaminant levels of the plumes are below water quality guideline levels, the impact of suspended sediment plumes in the water column are deemed to be of low intensity, persist only over the short-term, and would be extremely localised around the sampling vessel. This impact is assessed to be of VERY LOW significance (see Table 5-6).

Mitigation

No mitigation measures are possible or considered necessary for the discharge of material from the sampling vessel.

TABLE 5-6: IMPACT OF THE GENERATION OF SUSPENDED SEDIMENT PLUMES

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Intensity	Low	No mitigation is proposed for this impact.
Duration	Short-term	
Extent	Local	

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Consequence	Very Low	
Probability	Definite	
Significance	Very Low	
Status	Negative	
Confidence	High	
Nature of cumulative impact	None	
Degree to which impact can be reversed	Fully Reversible	
Degree to which impact may cause irreplaceable loss of resources	N/A	
Degree to which impact can be mitigated	Very Low	

5.2.4 Smothering of Benthos by Redepositing Sediments

Description of impact

As mentioned above, the over-sized material and processed sediments are discarded overboard and settle back onto the seabed largely beneath the vessel within the previously excavated area. However, some of the material could fall onto areas outside of the sampling footprints, where they could result in smothering of benthic communities on the seafloor.

Assessment

Smothering-related impacts on benthic communities involve physical crushing, a reduction in nutrients and oxygen, clogging of feeding apparatus, as well as affecting choice of settlement site, and post-settlement survival. Generally, rapid deposition of coarser material is likely to have more of an impact on the soft-bottom benthic community than gradual sedimentation of fine sediments to which benthic organisms are adapted and able to respond. In contrast, sedentary communities may be adversely affected by both rapid and gradual deposition of sediment.

Of greater concern is that sediments discarded during sampling operations may impact rocky-outcrop communities potentially located adjacent to sampling target areas and potentially hosting sensitive deep-water coral communities. Within the sampling target areas, such communities would be expected in the Namaqua Inshore Hard Ground habitat (see Figure 4-6). As deep-water corals tend to occur in areas with low sedimentation rates, these benthic suspension-feeders and their associated faunal communities are likely to show particular sensitivity to increased turbidity and sediment deposition associated with tailings discharges.

Discarding of excess sediment may result in limited smothering effects on the seabed. However, considering the available area of unconsolidated seabed habitat, the reduction in biodiversity of macrofauna can be considered negligible. The impacts would be of low intensity but highly localised and short-term, as recolonization would occur rapidly. The potential impact of smothering on communities in unconsolidated habitats is consequently deemed to be of VERY LOW significance (see Table 5-7).

In the case of rocky-outcrop communities, impacts would be of medium intensity and highly localised, but potentially enduring over the medium-term due to the slow recovery rates of these communities. The potential impact of smothering on rocky-outcrop communities is consequently deemed to be of Medium significance without mitigation. If the rocky-outcrop areas are avoided during sampling, there would be no direct impact, however the tailings plume may still result in possible smothering impacts should any such communities be located in proximity to sampling areas. This is deemed to be of VERY LOW significance (see Table 5-8).

Mitigation

- Sampling activities of any kind should avoid rocky outcrop areas or other identified sensitive habitats in the concession area;
- Use should be made of geophysical data to conduct a pre-sampling geohazard analysis of the seabed, and near-surface substratum to map potentially vulnerable habitats and prevent potential conflict with the sampling targets; and
- A buffer zone of 150 m will be established around any identified sensitive communities or rocky-outcrop areas.

TABLE 5-7: SMOTHERING OF SOFT-SEDIMENT MACROFAUNA

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Intensity	Low	No mitigation is proposed
Duration	Short-term	
Extent	Local	
Consequence	Very Low	
Probability	Probable	
Significance	Very Low	
Status	Negative	
Confidence	High	
Nature of cumulative impact	None	
Degree to which impact can be reversed	Fully Reversible	
Degree to which impact may cause irreplaceable loss of resources	N/A	
Degree to which impact can be mitigated	Very Low	

TABLE 5-8: SMOTHERING OF ROCKY-OUTCROP COMMUNITIES

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Intensity	Medium	Low
Duration	Medium-term	Short-term
Extent	Local	Local
Consequence	Low	Very Low
Probability	Probable	Improbable

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Significance	Low	VERY LOW
Status	Negative	Negative
Confidence	High	High
Nature of cumulative impact	None	
Degree to which impact can be reversed	Fully Reversible	
Degree to which impact may cause irreplaceable loss of resources	N/A	
Degree to which impact can be mitigated	Very Low	

5.3 IMPACT ON OTHER USERS OF THE SEA

5.3.1 Potential Impact on Fishing Industry

5.3.1.1 Exclusion of Fishing and Research Operations

Description of impact

While the sampling vessels are operational at a given location, a temporary 500 m operational safety zone around the unit would be in force, i.e. no other vessels (except the support vessels) may enter this area. A vessel conducting sampling operations would typically operate on a 3 or 4 anchor spread with unlit anchor mooring buoys. For the duration of sampling operations a coastal navigational warning would be issued by the South African Navy Hydrographic Office (SANHO) requesting a 2 nautical mile clearance from the sampling vessel.

The safety zones aim to ensure the safety both of navigation and of the sampling vessel, avoiding or reducing the probability of accidents caused by the interaction of fishing boats and gears and the vessel. The exclusion of vessels from entering the safety zone around the sampling vessel would pose a direct impact to fishing operations in the form of loss of access to fishing grounds where overlap occurs.

Assessment

The extent of commercial fishing in and around the Sea Concession areas is described in detail in Section4.1.4.1. Based on the assessment undertaken by the fisheries specialist, the proposed prospecting operations are expected to have NO IMPACT on the following sectors:

- *Demersal trawl*: There is no spatial overlap of the Sea Concession Areas with fishing grounds of the demersal trawl sector.
- *Large pelagic (Tuna longline)*: The typical fishing areas (located approximately 80 km offshore of the sea concession areas) of the Large pelagic (Tuna longline) sector.
- *Abalone ranching, netfish and seaweed sectors*: Although the Sea Concession areas are located adjacent to each of these fishery areas, the depths and range of the fisheries is highly unlikely to overlap with the Sea Concession areas. Thus, no impacts on the fisheries area expected.
- *Fisheries research*: Demersal surveys are random depth-stratified and adaptable. Approximately five trawls per year are undertaken within this area between depths of 50 m and 200 m and it is possible that demersal

fisheries research could be affected by exclusion from this area if it were to coincide with the designated survey timing. The nature of the random selection of survey trawl sites is such that if a selected sampling station coincided with an exclusion area, an alternative survey area could be randomly selected. Further, acoustic survey transects for small pelagic species are pre-determined and liaison between DFFE and the prospecting operations will only be required if there is a short-term temporal overlap (which is unlikely) requiring a temporary cessation of prospecting activities in the sea concession areas.

- *Demersal longline:* The Sea Concession areas are not located in priority fishing areas for hake. Fishing activity reported between 2000 and 2017 shows minimal amounts of fishing activity within the Sea Concessions amounting to 23 000 hooks (or two set lines) per year resulting in 5.1 tons of hake catch. This is equivalent to 0.06% of the overall national catch landed by the sector. Given the limited fishing activity within the Sea Concession areas, as well the very short-term duration of the proposed prospecting activities there is unlikely to be any temporal overlap between the prospecting and demersal longline fishing in the Sea Concession areas. However, it is noted that the Sea Concession areas do overlap with spawning and recruitment areas for hake and other demersal species.
- *Tuna Pole*: Over the period 2007 to 2016, an average of 238 fishing hours were reported within the concession area per year with a cumulative catch of 15.1 tons of albacore over this period. This is equivalent to 0.6% of the total albacore landed by the sector (nationally) over this period. Given the limited fishing activity within the Sea Concession areas, as well the very short-term duration of the proposed prospecting activities there is unlikely to be any temporal overlap between the prospecting and demersal longline fishing in the Sea Concession areas. Furthermore, there is no expected overlap of the concession area with spawning and recruitment areas of large pelagic species.
- *West Coast rock lobster:* The Sea Concession areas falls within Zone B, Management Area Lamberts Bay and Elands Bay where, over the period 2006 to 2017 the trap boat sector landed 95.4 tons (6.1% of their total catch). The sea concessions do not coincide with areas fished by hoopnet and the minimum depth of the mining operation (65 m) precludes any interaction with these two sub-sectors of the west coast rock lobster fishery.

The potential impacts on the remaining fisheries are described and assessed below.

Small pelagic purse-seine

This fishery is a highly variable fishery centred in the Saldanha Bay, St Helena Bay and Lamberts Bay areas. The Sea Concession areas are adjacent to the main landing points of the fishery from which a significant fleet of purse seine vessels operate. Further, the seasonal nature of the fishery means that fishing in the St Helena Bay area and northwards will occur and interaction / avoidance of the fishery with the prospecting operation can be expected.

Within the Sea Concession areas, an average of 952 hours of fishing activity per year were recorded and catch taken within the area amounted to 20 023 tons. The species composition of catch within the area was recorded as predominantly anchovy (72%) and red-eye round herring (18%).

Small pelagic shoals of sardine, anchovy, horse mackerel and lantern and lightfish occur seasonally in the Sea Concession areas and these are targeted by the small pelagic fleets when they are identified. Further, sediment plumes associated with the sampling operations may result in displacement and disaggregation of small pelagic shoals targeted by the fleet for short periods when the sampling occurs. While the disturbance would be very localised in both time and space, the overall impact could be significant if they occur at times that the small pelagic fleet identifies target shoals in the Sea Concession areas.

Traditional linefish (which might include elements of the Small Scale Fisheries)

Fishing activity is reported by landing point. In the vicinity of the Sea Concession areas, Lambert's Bay is the closest landing point and in the most southerly area, at Sandy Point harbour. Over the period 2000 to 2016, an average of 392 tons per year were reported for the area which is equivalent to approximately 4.3% of the overall national landings of the sector. 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 across the extent of Sea Concession areas, but as with the small pelagic sector, disturbance will be very low as it is highly unlikely that there would be any spatial and temporal overlap of with the proposed prospecting periods.

The potential impact of the proposed sampling activities on the above-mentioned fisheries would be of local extent, short-term and of low to medium intensity. The significance of impact is thus considered to be VERY LOW with and without mitigation (see Table 5-9).

Mitigation

- The most effective means of mitigation would be to ensure that the proposed activities do not coincide with peak fishing periods of the small pelagic purse-seine sector. It is recommended that survey and sampling activities be carried out between mid-November and mid-January at a time when the small pelagic sector normally stops operations. Linefish operations also have a seasonal signal mostly driven by the availability of snoek in the winter period. Therefore the mitigation of possible impacts to the linefish fishery by undertaking the surveys in the November to January periods coincides with the small pelagic mitigation option.
- It is recommended that prior to the commencement of the proposed activities, BPT127 consult with the small pelagic fishing sector on fishery operational status to minimise potential operational impacts to the fishery.
- Prior to the commencement of the proposed prospecting activities the following key stakeholders should be consulted and informed of the proposed activities (including navigational co-ordinates of the survey/sampling areas, timing and duration of proposed activities) and the likely implications thereof:
  - Fishing industry / associations (these include South African Small Pelagic Fishing Industry Association, South African Tuna Association, South African Commercial Linefish Association, South African Hake Longline Association, South African Deepsea Trawling Industry Association, FishSA the West Coast Rock Lobster Association and the National SMME Fishing Forum);
  - Other: DFFE, South African Maritime Safety Authority (SAMSA), South African Navy (SAN) Hydrographic office, overlapping and neighbouring exploration right holders and applicants, and Transnet National Ports Authority (ports of Cape Town and Saldanha Bay); and
  - Representatives of small-scale local fishing co-operatives.
- The required safety zones around the prospecting vessels should be communicated via the issuing of Daily Navigational Warnings for the duration of the sampling operations through the South African Naval Hydrographic Office;
- The SAN Hydrographic office should be notified when the programme is complete;
- Any fishing vessel targets at a radar range of 12 nautical miles from the sampling vessel should be called via radio and informed of the navigational safety requirements; and
- Affected parties should be notified through fishing industry bodies when the programme is complete.

TABLE 5-9: ASSESSMENT OF THE POTENTIAL IMPACT RELATING TO INCREASED FISHING EFFORT AND DISRUPTION TO THE SMALL PELAGIC PURSE-SEINE, TRADITIONAL LINEFISH AND SMALL SCALE FISHERIES.

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Extent	Local	Local
Duration	Short-term	Short-term
Intensity	Medium (*Small pelagic purse-seine*) Low (*Traditional Line-Fish and Small-scale fisheries*)	Low to Medium (*Small pelagic purse-seine*) Low (*Traditional Line-Fish and Small-scale fisheries*)
Probability	Probable	Probable
Confidence	Medium	Medium
Consequence	Very Low	Very Low
Significance	Very Low	VERY LOW
Cumulative impact	No	No
Nature of cumulative impact	N/A	
Degree to which impact can be reversed	Fully reversible	
Degree to which impact may cause irreplaceable loss of resources	Negligible	
Degree to which impact can be mitigated	Medium Very Low (Traditional Line-Fish and Small-scale fisheries)	

5.3.1.2 Impact of Sediment Plume on Fish Stock Recruitment

<u>Description of impact</u>

The proposed bulk sampling operations would entail the excavation of trenches, which would not be contiguous, but located in the prospective areas derived from the drill sampling results. The overall disturbance footprint in each concession would be 3.6 ha and 18 ha for all the concessions.

The sampled seabed sediments are pumped to the surface and discharged onto sorting screens on the sampling vessel. The screens separate the fine sandy silt and large gravel, cobbles and boulders from the size fraction of interest, the 'plantfeed' (usually 2 - 20 mm). The fine sediments are immediately discarded overboard where they form a suspended sediment plume in the water column which dissipates with time. The 'plantfeed' is mixed with high density ferrosilicon (FeSi) slurry and pumped under pressure into a Dense Medium Separation (DMS) plant resulting in a high density concentrate. The majority of the ferrosilicon is magnetically recovered for re-use in the DMS plant and the fine tailings (-2 mm) from the DMS process are similarly deposited overboard. Furthermore, fine sediment re-suspension by the sampling tools will generate suspended sediment plumes near the seabed. The main effect of plumes is an increase in water column turbidity. The relevance of this in terms of effects on fisheries is the potential impairment of egg and/or larval development through high sediment loading in the water column. This in turn could have an impact on fish stock recruitment.

Assessment

Typically fisheries stock recruitment is highly variable spatially and temporally. Spawning and recruitment of small pelagic species, as well as of many demersal species, occurs primarily well to the south of the Sea Concession areas.

The spawn products from these fisheries typically drift northwards with the prevailing Benguela Current and larval development mainly occurs nearshore and in bays along the West Coast of South Africa, referred to as nursery areas. These areas provide a suitable niche for development of juveniles of these species. Most of the species potentially impacted are broadcast spawners, with large volumes of spawn products being dispersed over large areas. This would apply equally, for example, to west coast rock lobster, hake, anchovy and sardine.

The Sea Concession areas are situated offshore of the 65 m depth contour. Relative to the location of the nursery areas, the sediment plumes generated during benthic sampling would be expected to predominantly disperse northwards and offshore of the nursery areas.

The impact on fish recruitment is considered to be improbable, localised (due to the localised nature of the proposed prospecting activities events in relation to fish nursery areas) and of medium intensity over the short-term. The impact is thus considered to be INSIGNIFICANT without mitigation (see Table 5-10).

TABLE 5-10: ASSESSMENT OF THE POTENTIAL IMPACT ON FISH STOCK RECRUITMENT DUE TO SEDIMENT PLUMES.

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Extent	Local	Local
Duration	Short-term	Short-term
Intensity	Medium	Medium
Probability	Improbable	Improbable
Confidence	Medium	Medium
Consequence	Very Low	Very Low
Significance	Insignificant	INSIGNIFICANT
Cumulative impact	No	No
Nature of cumulative impact	None.	
Degree to which impact can be reversed	Fully reversible	
Degree to which impact may cause irreplaceable loss of resources	Negligible	
Degree to which impact can be mitigated	None	

5.3.2 Acoustic Impacts of Geophysical Surveying on Fisheries

Description of impact

The ocean is a naturally noisy place and marine animals are continually subjected to both physically produced sounds from sources such as wind, rainfall and breaking waves or biologically produced sounds generated during reproductive displays, territorial defence, feeding, or in echolocation. Such acoustic cues are thought to be important to many marine animals in the perception of their environment as well as for navigation purposes, predator avoidance, and in mediating social and reproductive behaviour.

Anthropogenic sound sources in the ocean may thus interfere directly or indirectly with such activities. Of all human-generated sound sources, the most persistent in the ocean is the noise of shipping. Depending on size and speed, the sound levels radiating from vessels range from 160 to 220 dB re 1 µPa at 1 m.

As most pelagic species likely to be encountered within the concessions are highly mobile, they would be expected to flee and move away from the sound source before trauma could occur. This in turn could affect the overall catch rates of fisheries operating within the Sea Concession areas.

Assessment

No mitigation measures are possible, or considered necessary for the generation of noise by the geophysical surveys and vessels. The effects of geophysical surveys on catchability of fish is considered to be localised, short-term (for duration of survey i.e. weeks) and of medium intensity. The significance of the impact is considered to be VERY LOW (see Table 5-11).

Mitigation

No mitigation measures are possible, or considered necessary for this impact.

TABLE 5-11: ASSESSMENT OF THE IMPACTS OF MULTI-BEAM AND SUB-BOTTOM PROFILING SONAR ON CATCHABILITY OF FISH

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Extent	Local	Local
Duration	Short-term	Short-term
Intensity	Low	Low
Probability	Probable	Improbable
Confidence	High	High
Consequence	Very Low	Very Low
Significance	Very Low	VERY LOW
Cumulative impact	Yes	Yes
Nature of cumulative impact	N/A	
Degree to which impact can be reversed	Fully reversible	
Degree to which impact may cause irreplaceable loss of resources	N/A	
Degree to which impact can be mitigated	Very Low	

5.3.3 Potential Impact on Other Marine Prospecting / Mining Operations

Description of impact

The presence of the sampling vessel(s) could interfere with other marine mining or prospecting operations in the neighbouring concession areas.

Assessment

Offshore mining/prospecting operations are predominately active to the north of the Sea Concession areas. Diver-assisted diamond mining is concentrated around Port Nolloth and Alexander Bay and typically confined to the inshore areas in the A-concession areas, in depths less than 20 m. Further offshore, BPT 127 are undertaking mining operations in Sea Concession 2C and 3C, while De Beers hold a prospecting right for Sea Concessions 6C and have applied for prospecting rights in Sea Concession 4C and 5C. Trans Hex undertake shallow water operations based at De Punt and Port Nolloth using contracted sea vessels, shallow water shore-units and beach-mining units. The majority of these contractors are derived from the surrounding local communities, with the vessels based at Lamberts Bay, Doring Bay, Hondeklip Bay and Kleinzee.

No activities are currently taking place in the 'D' concession areas, located to the west of the study area.

As the Sea Concession areas do not overlap with any other marine mining operations, the impact of the planned prospecting operations on other mining activities would be localised, in the short term and of low intensity. The significance of impact is consequently INSIGNIFICANT with or without mitigation (see Table 5-12).

Mitigation

- Contact any companies undertaking marine prospecting or mining activities within the study area prior to prospecting in order to notify them of the planned activities.

TABLE 5-12: ASSESSMENT OF THE POTENTIAL IMPACT ON MARINE PROSPECTING / MINING.

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Extent	Local	Local
Duration	Short-term	Short-term
Intensity	Low	Low
Probability	Improbable	Improbable
Confidence	High	High
Consequence	Very Low	Very Low
Significance	Insignificant	INSIGNIFICANT
Cumulative impact	None	None
Nature of cumulative impact	No cumulative impacts are anticipated	
Degree to which impact can be reversed	Fully reversible	
Degree to which impact may cause irreplaceable loss of resources	N/A	
Degree to which impact can be mitigated	Very Low	

5.3.4 Potential Impact on Petroleum Exploration and Production

Description of impact

The proposed prospecting activities could affect petroleum exploration and future production activities, that overlap with the concession areas, and vice versa.

Assessment

The Sea Concession areas overlaps with Block 3A/4A held by the Petroleum Oil and Gas Corporation of South Africa (Pty) Ltd (PetroSA) (refer to Figure 4-29 in Section 4). The proposed prospecting activities could affect and disrupt activities in this block if the activities occur coincidentally in the same area. However, the likelihood of this happening is low.

The impact on petroleum exploration would be localised, short term and of low to medium intensity. The significance of impact is consequently very low to low, without mitigation and VERY LOW with mitigation (see Table 5-13).

Mitigation

- Notify PetroSA and their contractors, as well as any other neighbouring petroleum exploration rights holders, prior to the commencement of activities; and
- Inform overlapping mineral prospecting rights holders to ensure that there is no overlapping of activities in the same area over the same time period.

TABLE 5-13: ASSESSMENT OF THE POTENTIAL IMPACT ON PETROLEUM EXPLORATION ACTIVITIES.

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Extent	Local	Local
Duration	Short-term	Short-term
Intensity	Low to Medium	Low
Probability	Probable	Probable
Confidence	High	High
Consequence	Very Low to Low	Very Low
Significance	Very Low to Low	VERY LOW
Cumulative impact	No	No
Nature of cumulative impact	No cumulative impacts are expected.	
Degree to which impact can be reversed	Fully reversible	
Degree to which impact may cause irreplaceable loss of resources	N/A	
Degree to which impact can be mitigated	Low	

5.3.5 Potential Impact on Marine Transport Routes

Description of impact

The presence of the sampling vessel(s) could interfere with shipping in the area.

Assessment

The majority of shipping traffic is located on the outer edge of the continental shelf, to the west of the concession areas. However there is also a high density of vessel traffic traversing the coast between Lamberts Bay and St Helena Bay. This partially overlaps with Sea Concessions 15B and 17B. The inshore traffic of the continental shelf along the West Coast is largely comprised of fishing and mining vessels. (see Figure 4-27).

While it is unlikely that shipping transport routes would be affected by the proposed prospecting activities, interaction with other vessels is possible. The impact on shipping traffic is considered to be localised, of low intensity in the short-term. The significance of this impact is therefore assessed to be INSIGNIFICANT with and without mitigation (Table 5-14).

Mitigation

- Prior to the commencement of activities, the vessel operator must notify relevant bodies including: DMRE, DFFE, SAMSA, the SAN Hydrographic Office and relevant Port Captains, providing the navigational coordinates of the prospecting areas;
- The prospecting vessel(s) must be certified for seaworthiness through an appropriate internationally recognised marine certification programme (e.g. Lloyds Register, Det Norske Veritas). The certification, as well as existing safety standards, requires that safety precautions should be taken to minimise the possibility of an offshore accident. Collision prevention equipment should include radar, multi-frequency radio, foghorns, etc. Safety equipment and training of personnel to ensure the safety and survival of the crew in the event of an accident is a further legal requirement; and
- A Notice to Mariners should provide the co-ordinates of the prospecting areas.

TABLE 5-14: ASSESSMENT OF INTERFERENCE WITH MARINE TRANSPORT ROUTES

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Intensity	Low	Low
Duration	Short-term	Short-term
Extent	Local	Local
Consequence	Very Low	Very Low
Probability	Improbable	Improbable
Significance	Insignificant	INSIGNIFICANT
Status	Negative	Negative
Confidence	High	High
Nature of cumulative impact	No cumulative impacts are expected.	
Degree to which impact can be reversed	Fully reversible	
Degree to which impact may cause irreplaceable loss of resources	N/A	

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Degree to which impact can be mitigated	Very Low	

5.4 SOCIO-ECONOMIC IMPACT

5.4.1 Impact on Cultural Heritage Material

Description of impact

The proposed drill and bulk sampling activities could disturb cultural heritage material on the seabed, such as palaeontological and historical shipwrecks.

Assessment

As noted in Section 4.1.4.6, there is potential for archaeological material to be located on palaeo-landsurfaces within seabed sediments and in association with now submerged palaeo-channels. Although no geophysical data for the concession areas are available it is also likely that the rivers that presently debouch into the sea along the stretch of coastline adjacent to the concession areas will have palaeo-channels which extend offshore across the present seabed of the concession areas. The relatively small footprint of the proposed sampling activities means that the potential for interaction with or impact on submerged prehistoric archaeological material in the concession areas will be small.

The likelihood of disturbing a shipwreck is expected to be very small considering the vast size of the South African offshore area. In the area under consideration, there are at least three vessels that could possibly have been wrecked in the vicinity of the concession area (see Section 4.1.4.6). However, the precise location of these wrecks is unknown. In the event that a shipwreck site is disturbed during sampling activities, the impact would be at the national level, permanent and of high intensity. The significance of impact is consequently Medium, without mitigation. With the implementation of mitigation, shipwreck sites can be largely avoided and if sampling is terminated in the unlikely event of encountering a shipwreck, the impact is regarded as INSIGNIFICANT (see Table 5-15).

Mitigation

- Areas where shipwreck sites are identified during geophysical surveys must be excluded prior to undertaking sampling activities.
- It is recommended that the onboard BPT127 representative must undergo a short induction on archaeological site and artefact recognition, as well as the process to follow should archaeological material be encountered during sampling.
- The contractor must be notified that archaeological sites could be exposed during drill and bulk sampling activities, as well as the procedure to follow should archaeological material be encountered.
- If shipwreck material is encountered during the course of bulk sampling in the concession area, the following mitigation measure should be applied:
  - > Cease work in the directly affected area to avoid damage to the wreck until the South African Heritage Resources Agency (SAHRA) has been notified and the contractor/BPT127 has complied with any additional mitigation as specified by SAHRA; and
  - > Where possible, take photographs of them, noting the date, time, location and types of artefacts found. Under no circumstances may any artefacts be removed, destroyed or interfered on the site, unless under permit from SAHRA.

- The possibility of realising core log information and samples of the coarser fraction (i.e. gravel and stone between 20 mm and 150 mm) of sorted seabed sediment for assessment by an archaeologist for the presence of prehistoric lithic material should be considered by BPT127.

TABLE 5-15: ASSESSMENT OF POTENTIAL IMPACT ON PALAEONTOLOGICAL MATERIAL AND SHIPWRECKS

CRITERIA	WITHOUT MITIGATION	WITH MITIGATION
Extent	National	National
Duration	Short-term	Short-term
Intensity	Medium	Low
Probability	Improbable	Improbable
Confidence	High	High
Consequence	Medium	Low
Significance	Medium	INSIGNIFICANT
Cumulative impact	No	No
Nature of cumulative impact	No cumulative impacts are expected.	
Degree to which impact can be reversed	Irreversible	
Degree to which impact may cause irreplaceable loss of resources	Medium	
Degree to which impact can be mitigated	High	

5.4.2 Impact Related to Job Creation and Business Opportunities

Description of impact

The proposed project would create a small number of local employment and business opportunities. Direct revenues would be generated as a result of the proposed prospecting activities. Revenue generating activities are related to the actual prospecting operations and include refuelling, vessel / gear repair, port dues, hire of support vessel(s).

Assessment

Offshore prospecting is highly technical and requires specialised vessels and crews. Thus, job opportunities during the activities would be limited. There would, however, be opportunities for local companies to provide support services during the course of operations, e.g. vessel supplies, support vessels, etc.

The overall positive impact of job creation and the generation of direct revenues are considered to be local in extent and of low intensity over the short-term. Thus, the potential impact of job creation is considered to be *LOW (positive)* with and without mitigation (see Table 5-16). Should the prospecting operations be successful, future job creation and business opportunities would arise where the operations advance to mining (which would require a separate application for environmental authorisation).

Mitigation

The use of local companies for support services should be promoted as far as possible.

TABLE 5-16: IMPACT OF JOB CREATION AND THE GENERATION OF DIRECT REVENUES.

RATING SCALES	WITHOUT MITIGATION	WITH MITIGATION
Extent	Local	Local
Duration	Short-term	Short-term
Intensity	Low	Low
Consequence	Very Low	Very Low
Significance	*Very Low*	*VERY LOW*
Status	Positive	Positive
Probability	Probable	Probable
Confidence	Medium	Medium
Cumulative impact	Yes	Yes
Nature of cumulative impact	Other activities that may contribute to the cumulative impact of job creation and the generation of direct revenues include other exploration and mining activities off the coast of South Africa. As there are relatively few of these other activities currently being undertaken off the West Coast, the cumulative impact is considered to be of LOW (positive) significance.	
Degree to which impact can be reversed	Fully reversible	
Degree to which impact may cause irreplaceable loss of resources	N/A	
Degree to which impact can be mitigated	None	

5.5 NO-GO ALTERNATIVE

Description of impact

The implications of not going ahead with the proposed prospecting operations are as follows:

- South Africa would lose the opportunity to further establish the extent of offshore diamond reserves;
- Lost economic opportunities related to sunken costs (i.e. costs already incurred) of exploration in the licence area; and
- If economic diamond reserves do exist and are not developed, South Africa would lose the opportunity to maximise the use of its own indigenous diamond reserves.

Assessment

The potential impact related to the lost opportunity to further delineate the offshore diamond resource on the west coast and maximise the use of South Africa's own resources is considered to be of LOW significance (see Table 5-17). The positive implications on the no-go option are that there would be no effects on the biophysical environment in the area proposed for the prospecting activities.

TABLE 5-17: ASSESSMENT OF IMPACT RELATED TO NO-GO ALTERNATIVE.

CRITERIA	WITHOUT MITIGATION
Extent	Regional
Duration	Permanent
Intensity	Low
Probability	Improbable
Confidence	Low
Consequence	Medium
Significance	LOW
Cumulative impact	Yes
Nature of cumulative impact	Potential loss of opportunity to expand South Africa's own mineral resources.
Degree to which impact can be reversed	Reversible
Degree to which impact may cause irreplaceable loss of resources	N/A
Degree to which impact can be mitigated	N/A

5.6 CUMULATIVE IMPACTS

Description of impact

Prospecting, marine mining, trawl fisheries and hydrocarbon exploration in the West Coast has historically had and will continue to have an impact on benthic faunal communities. The primary impacts associated with the geophysical exploration and sediment sampling in the Namaqua Bioregion on the West Coast of South Africa, relate to cumulative anthropogenic noise (above natural ocean noise ambient levels), physical disturbance of the seabed, discharges of sediments to the benthic environment, and associated vessel presence. Even considering the number of seismic surveys recently conducted in the wider West Coast area, there would be cumulative noise impacts as the seismic surveys are of short duration, widely spaced apart and there are therefore no synergistic and chronic effects from intermittent seismic surveys.

Assessment

In addition to the proposed prospecting operations in Sea Concessions 13C, 15C, 16C, 17C and 18C, BPT127 have also submitted applications for Prospecting Rights to undertake the same offshore prospecting activities (i.e.

geophysical surveys, drill sampling and bulk sampling) in Sea Concessions 14B, 15B and 17B. A separate EIA process has been conducted for the activities in these Sea Concession areas.

With respect to noise emissions from the proposed geophysical surveys, as the same vessel would be used for the planned geophysical surveys in the above-mentioned B- and C-Concession areas, the surveys would only take place in any one location at a time. Nevertheless, considering the number of seismic surveys recently conducted in the general project area, some cumulative impacts could be anticipated. Should there be surveys that overlap temporally, the intensity of the associated noise impacts would likely be of higher intensity, for the duration of the surveys over the combined extent of the survey areas. As pointed out in Section 5.2.1, the noise generated during the proposed geophysical surveys is only likely to cause auditory or non-auditory trauma in marine fauna within a few meters of the source (i.e., directly below the acoustic equipment). Thus, any direct noise impact on marine fauna is likely to be at individual level rather than at species level.

With respect to the sampling operations, the cumulative footprint of all the prospecting operations proposed by BPT127 would be approximately <0.34 km^2 in the Namaqua Bioregion, which can be considered an insignificant percentage of the Southern Benguela Shelf ecoregion. It is pointed out that the decision to undertake bulk sampling would be determined following analysis of the drill samples and development of the inferred resource model (i.e., bulk sampling may not take place should the results not be favourable).

The disturbance footprint associated with BPT127 operations would be in addition to, amongst other disturbances, the development of hydrocarbon wells and other existing prospecting and mining operations located in the vicinity of the Sea Concession areas.

As noted in Section 5.3.1, the commercial fishing sectors which could be impacted upon by the proposed prospecting operations are small pelagic purse-seine, traditional linefish and potentially elements of the small-scale fisheries (as the concession areas fall within 'Basket A' as set out in the Small-Scale Fishery policy). For the duration of sampling operations, a coastal navigational warning would be issued by the South African Navy Hydrographic Office (SANHO) requesting a 2 nautical mile clearance from the prospecting vessel. The exclusion of fishing vessels from entering the safety zone around the prospecting vessel would pose a direct impact to fishing operations in the form of loss of access to fishing grounds where overlap occurs spatially, as well as temporarily (i.e. where the fishing activity takes place at the same time as the proposed prospecting operations). However, as fishing vessels would be able to undertake fishing activities at the same time as the prospecting operations anywhere else within the Sea Concession area outside of the above-mentioned safety zone the likelihood of such spatial and temporal overlaps is considered to be very low. Especially in light of the very short duration of the proposed prospecting operations.

With respect to the development of hydrocarbon wells approximately 40 wells have been drilled in the Namaqua Bioregion since 1976. The majority of these occur in the iBhubesi Gas field in Block 2A well to the north the sea concessions. Prior to 1983, technology was not available to remove wellheads from the seafloor. Of the approximately 40 wells drilled on the West Coast, 35 wellheads remain on the seabed. Cumulative impacts from other hydrocarbon ventures in the area are likely to remain insignificant.

When considering the above collectively, and the fact that the proposed bulk sampling activities would be highly localised and of short-term duration, the cumulative impact because of the proposed prospecting activities is, thus considered to be LOW.

6. CONCLUSIONS AND RECOMMENDATIONS

The impacts associated with the prospecting vessel operations would be of short-term duration and limited to the immediate areas where the prospecting activities are being undertaken. As a result, the impacts associated with the vessels are considered to be of VERY LOW significance after mitigation. Key mitigation includes ensuring that the vessels used comply with MARPOL 73/78 standards; prior notification is provided to key stakeholders (including fishing industry and adjacent rights holders); and Radio Navigation Warnings and Notices to Mariners are released prior to undertaking the prospecting activities.

Potential impacts on marine fauna as a result of the proposed prospecting activities would be of medium- to short-term duration and limited to the immediate area. As a result, the impacts on marine fauna associated with the sampling activities are considered to be of VERY LOW to LOW significance after mitigation. Key mitigation includes ensuring that a designated onboard Marine Mammal Observer (MMO) is aboard the survey vessel to ensure compliance with mitigation measures during geophysical surveying; terminating the survey if any marine mammals show affected behaviour within 500 m of the survey vessel or equipment; and avoiding undertaking sampling in rocky outcrop areas or other identified sensitive habitats in the concession areas.

Only two commercial fishing sectors could potentially be affected by the proposed prospecting activities, namely the small pelagic purse-seine and traditional linefish fisheries. It is recognised that elements of the Small Scale Fisheries may also be affected. Given the highly-localised nature of the prospecting operation over the short-term, the potential impact on these fisheries would be of VERY LOW significance with or without mitigation.

The likelihood of disturbing a shipwreck is expected to be very low considering the vast size of the South African offshore area. In the event that any cultural heritage material is disturbed during sampling operations, the impact would be at the national level, and of high intensity. Without mitigation this is of Medium significance. However, with the implementation of mitigation, cultural heritage sites can largely be avoided and if sampling is terminated in the unlikely event of encountering a shipwreck, the impact is regarded as INSIGNIFICANT.

The No-Go alternative represents the option not to proceed with exploration, which leaves the project areas of influence in their current state except for variation by natural causes and other human activities. While prospecting does not automatically lead to mining/production, it is an essential stage in the process, which might lead to further exploration and, thereafter mining, which results in significant employment opportunities in mining sector, if commercial reserves can be exploited. The 'do nothing' or 'no-go' option forgoes these possible advantages. In addition, the implications of not going ahead with the proposed exploration are that:

- South Africa would lose the opportunity to further establish the extent of offshore diamond reserves;
- Lost economic opportunities related to sunken costs (i.e. costs already incurred) of exploration in the licence area; and
- If economic diamond reserves do exist and are not developed, South Africa would lose the opportunity to maximise the use of its own indigenous diamond reserves.

This potential impact of the No-Go Alternative is considered to be of LOW significance.

6.1.1 OPINION OF ENVIRONMENTAL ASSESSMENT PRACTITIONER

SLR's opinion is framed using the sustainability framework of ecological integrity, economic efficiency, and equity and social justice.

- Ecological integrity[6]

The disturbance of benthic fauna and associated biodiversity is considered to be of high intensity as the benthic biota within the sampling footprints would be lost or disturbed. However, the area of disturbance (0.1224 km^2) is considered to be relatively small in comparison to the total available area of similar habitat in the Namaqua bioregion, and full recovery of benthic biodiversity within the disturbed footprints would take place within the medium term due to natural sedimentation processes and recolonization by benthic communities.

In summary, the proposed prospecting project would result in the loss of an insignificant amount of ecological integrity in the study area, which is considered to be a localised and medium-term under normal operating conditions.

- Economic efficiency

As noted in Section 3.2.2, various national and provincial policy and planning documents have identified the mining sector as one with substantial potential for growth stimulation and/or employment. The National Development Plan 2030 (2012) notes that South Africa must exploit its mineral resources to create employment and generate foreign exchange and tax revenue. In order to achieve this, it is necessary to identify new resources through prospecting activities.

The proposed prospecting activities could result in temporary impacts on fishing as a result of the safety zones around the survey vessels (i.e. loss of access to fishing grounds), as well as short-term fish avoidance of the survey/sampling area. However, the demersal longline, pole-and-line, traditional linefish and small-scale fisheries are the only fisheries that could potentially be affected by the proposed project and given the short-term duration of prospecting and that relatively low levels of fishing activity generally occur within the sea concession areas, the impact of the proposed project on fisheries is considered to be negligible.
Although offshore prospecting is highly technical and requires specialised vessels and crews, there would be a few opportunities for local companies to provide support services during the proposed operations, e.g. vessel supplies, support vessels, etc. As opportunities would be limited, the regional economic benefits (job creation and generation of direct revenues) associated with the project are considered to be only of *LOW (positive)* significance.

On the basis of the above, the proposed project is considered to be economically efficient, as it provides an opportunity to maximise the use of South Africa's own natural resources off the West Coast of South Africa while at the same time only having a negligible impact on two fishing sectors.

- Equity and social justice

Due to the extent and offshore location of the proposed project, it would not unfairly discriminate, directly or indirectly, against any one party nor result in an unequal distribution of negative impacts.

With the implementation of the proposed mitigation measures, the nature and extent of the proposed prospecting activities are anticipated to have generally VERY LOW to LOW significant impacts. While the impact of crushing, sediment removal and generation of suspended sediment plumes on benthic macrofauna is assessed to be of VERY LOW to LOW significance, full recovery within the sampling footprints is expected to take place within the medium term due to the high energy environment of the West Coast and natural oceanographic processes leading to recolonisation by benthic communities. Given this, as well as the sustainability criteria

[6] Ecological integrity is the abundance and diversity of organisms at all levels, and the ecological patterns, processes, and structural attributes responsible for that biological diversity and for ecosystem resilience.

described above, and the findings of the specialist studies, it is the opinion of SLR that a positive decision being made by the Minister of Mineral Resources (or delegated authority) regarding the approval of the proposed project can be supported.

6.2 RECOMMENDATIONS FOR MITIGATION

6.2.1 Compliance with Environmental Management Programme and MARPOL 73/78 standards

- All phases of the proposed project must comply with the Environmental Management Programme presented in Chapter 7; and
- The vessels used during prospecting (including any required support vessels) must ensure compliance with MARPOL 73/78 standards.

6.2.2 Notification and communication with key stakeholders

- Prior to the commencement of the proposed activities, BPT127 should consult with the managers of the DFFE research survey programmes to discuss their respective programmes and the possibility of altering the prospecting programme in order to minimise or avoid disruptions to both parties, where required.
- Notify PetroSA and their contractors, as well as any other neighbouring petroleum exploration rights holders, as well as any companies undertaking marine prospecting or mining activities in the study area, prior to the commencement of activities.
- Liaise with PetroSA and any overlapping mineral prospecting rights holders to ensure that there is no overlapping of activities in the same area over the same time period.
- Prior to the commencement of the proposed survey and/or sampling activities the following key stakeholders should be notified and informed of the proposed activities (including navigational co-ordinates of the sampling areas, timing and duration of proposed activities) and the likely implications thereof:
  - Fishing industry / associations (these include South African Small Pelagic Fishing Industry Association, South African Tuna Association, South African Commercial Linefish Association, South African Hake Longline Association, South African Deepsea Trawling Industry Association, FishSA the West Coast Rock Lobster Association and the National SMME Fishing Forum); and
  - Other: DFFE, South African Maritime Safety Authority (SAMSA), South African Navy (SAN) Hydrographic office, overlapping and neighbouring exploration right holders and applicants, and Transnet National Ports Authority (ports of Cape Town and Saldanha Bay).
- The required safety zones around the prospecting vessels should be communicated via the issuing of Daily Navigational Warnings for the duration of the sampling operations through the South African Naval Hydrographic Office.
- The SAN Hydrographic office should be notified when prospecting activities are complete.

6.2.3 Discharges

- Undertake training and awareness of crew in spill management to minimise contamination.
- Low-toxicity biodegradable detergents and reusable absorbent cloths should be used in cleaning of all deck spillage.
- All hydraulic systems should be adequately maintained.
- Minimise the discharge of galley waste material should obvious attraction of marine fauna be observed.

6.2.4 Vessel seaworthiness and safety

- Vessels used during prospecting must be certified for seaworthiness through an appropriate internationally recognised marine certification programme (e.g. Lloyds Register, Det Norske Veritas).
- Collision prevention equipment should include radar, multi-frequency radio, foghorns, etc. Safety equipment and training of personnel to ensure the safety and survival of the crew in the event of an accident is a further legal requirement.
- A Notice to Mariners should provide the co-ordinates of the location of the planned areas in which prospecting is to take place.

6.2.5 Geophysical Activities

- A designated onboard Marine Mammal Observer (MMO) must ensure compliance with mitigation measures during geophysical surveying.
- The MMO should conduct visual scans for the presence of cetaceans around the survey vessel prior to the initiation of any acoustic impulses.
- Pre-survey scans should be of at least a 15-minute duration prior to the start of survey equipment.
- Where equipment permits, “soft starts” should be carried out for equipment with source levels greater than 210 dB re 1 μPa at 1 m over a period of 20 minutes to give adequate time for marine mammals to leave the vicinity. Where this is not possible, the equipment should be turned on and off over a 20 minute period to act as a warning signal and allow cetaceans to move away from the sound source.
- Terminate the survey if any marine mammals show affected behaviour within 500 m of the survey vessel or equipment until the mammal has vacated the area.
- Avoid planning geophysical surveys during the movement of migratory cetaceans (particularly baleen whales) from their southern feeding grounds into low latitude waters (beginning of June to end of November), and ensure that migration paths are not blocked by sonar operations.
- For the months of June and November ensure that Passive Acoustic Monitoring (PAM) is incorporated into any survey programme.

6.2.6 Sampling Activities

- Sampling activities of any kind should avoid rocky outcrop areas or other identified sensitive habitats in the concession area.
- Use should be made of geophysical data to conduct a pre-sampling geohazard analysis of the seabed, and near-surface substratum to map potentially vulnerable habitats and prevent potential conflict with the sampling targets.
- A buffer zone of 150 m will be established around any identified sensitive communities or rocky-outcrop areas.

6.2.7 Cultural Heritage Material

- Areas where shipwreck sites are identified during geophysical surveys must be excluded prior to undertaking sampling activities.
- It is recommended that the onboard BPT127 representative must undergo a short induction on archaeological site and artefact recognition, as well as the process to follow should archaeological material be encountered during sampling.
- The contractor must be notified that archaeological sites could be exposed during drill and bulk sampling activities, as well as the procedure to follow should archaeological material be encountered.

- If shipwreck material is encountered during the course of bulk sampling in the concession area, the following mitigation measure should be applied:
  - Cease work in the directly affected area to avoid damage to the wreck until the South African Heritage Resources Agency (SAHRA) has been notified and the contractor/BPT127 has complied with any additional mitigation as specified by SAHRA; and
  - Where possible, take photographs of them, noting the date, time, location and types of artefacts found. Under no circumstances may any artefacts be removed, destroyed or interfered on the site, unless under permit from SAHRA.
- The possibility of realising core log information and samples of the coarser fraction (i.e. gravel and stone between 20 mm and 150 mm) of sorted seabed sediment for assessment by an archaeologist for the presence of prehistoric lithic material should be considered by BPT127.

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APPENDIX 1: EMPR

ENVIRONMENTAL MANAGEMENT PROGRAMME FOR A PROSPECTING RIGHT APPLICATION FOR OFFSHORE SEA CONCESSIONS 13C, 15C, 16C, 17C & 18C, WEST COAST

Prepared for: Belton Park Trading 127 (Pty) Ltd

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BASIS OF REPORT

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ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Definition
BA	Basic Assessment
BPT127	Belton Park Trading 127 (Pty) Ltd
CITES	Convention on International Trade of Wild Fauna and Flora Endangered Species
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
DEFF	Department of Environment, Forestry and Fisheries
DMRE	Department of Mineral Resources and Energy
GHG	Greenhouse Gas
IAEA	International Atomic Energy Agency
IAIAsa	International Association for Impact Assessments South Africa
ICRP	International Commission on Radiological Protection
MARPOL	The International Convention for the Prevention of Pollution from Ships
MMO	Marine Mammal Observer
MoU	Memorandum of Understanding
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (No. 28 of 2002)
NEMA	National Environmental Management Act, 1998 (No. 107 of 1998)
P&I	Protection and Indemnity
PAM	Passive Acoustic Monitoring
PASA	Petroleum Agency of South Africa
Pr. Sci. Nat.	Professional Natural Scientist
SAHRA	South African Heritage Resources Agency
SAMSA	South African Maritime Safety Authority
SAN	South African Navy
SMME	Small, Medium and Micro-Enterprise
SOPEP	Shipboard Oil Pollution Emergency Plan
SLR	SLR Consulting (South Africa) (Pty) Ltd
UNCLOS	The United Nations Convention on the Law of the Sea

1. INTRODUCTION

1.1 PROJECT BACKGROUND

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 & 18C, located off the West Coast of South Africa (see

FIGURE 1-1). 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).

In terms of the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended), promulgated in terms of the National Environmental Management Act (No. 107 of 1998; NEMA), an application for a prospecting right requires Environmental Authorisation (EA) from the competent authority, the Minister of Mineral Resources and Energy (or delegated authority), to carry out the proposed prospecting activities. An application for EA, in terms of NEMA, was submitted to the DMRE at the same time as the prospecting right application. In order for DMRE to consider an application for EA, an Environmental Impact Assessment (EIA) process must be undertaken and an Environmental Management Programme (EMPr) must be compiled.

SLR Consulting (South Africa) (Pty) Ltd (SLR) has been appointed as the independent environmental assessment practitioner (EAP) to undertake the EIA process and compile the EMPr for the proposed project.

1.2 PROJECT DESCRIPTION

The target minerals for the prospecting activities are diamonds, gemstones, heavy minerals, industrial minerals, precious metals and ferrous and base metals. 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.

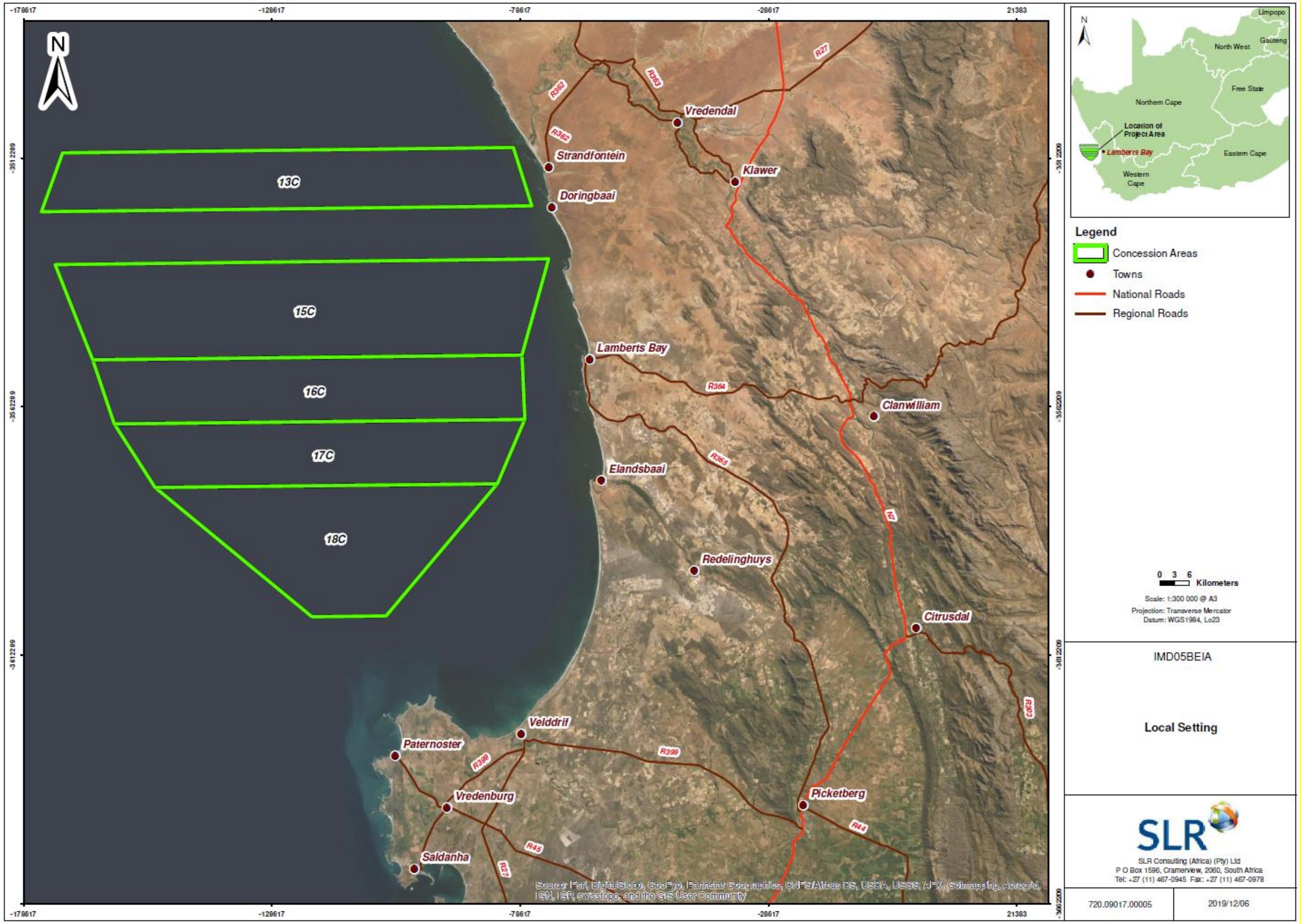

FIGURE 1-1: LOCATION OF THE 13C, 15C, 16C, 17C & 18C SEA CONCESSION AREAS, OFF THE WEST COAST OF SOUTH AFRICA.

1.3 SOUTH AFRICAN LEGAL REQUIREMENT OF THE EMPR

The purpose of the EMPr is to ensure that negative impacts associated with the proposed project are avoided or kept to a minimum and that potential positive impacts are enhanced, where possible. In particular, the EMPr sets out environmental outcomes and actions for BPT127 (and any nominated or selected Sub-contractors) and associated indicators against which BPT127's performance can be measured during the planning, establishment, operational and end of prospecting phases of the proposed project.

This document will form the basis for the environmental specifications that BPT127 will be obliged to adhere to during the duration of the proposed project.

This EMPr has been prepared in compliance with Appendix 4 of the EIA Regulations, 2014 (as amended), the contents of which are outlined in Table 1-1 below.

TABLE 1-1: REQUIREMENTS OF AN EMPR IN TERMS OF THE EIA REGULATIONS, 2014 (AS AMENDED).

ITEM	CONTENT OF CONSOLIDATED EMPR	COMPLETED (Y/N or N/A)	LOCATION IN CONSOLIDATED EMPR
1 a)	i) Details of the EAP who prepared the EMPr;	Y	Section 2
	ii) Details of the expertise of that EAP to prepare an EMPr, including a curriculum vitae;	Y	Section 2 and Appendix A
b)	A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Y	Sections 1.1, 1.2 and 4
c)	A map at an appropriate scale which superimposes the proposed activity, its associated infrastructure, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	Y	Appendix B
d)	A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including -	Y	Table 4-1 - Table 4-4
	i) planning and design;		
	ii) pre-construction activities;		
	iii) construction activities;		
	iv) rehabilitation of the environmental after construction and where applicable post closure; and		
	v) where relevant, operation activities;		
e)	[Deleted by amendments to the EIA Regulations, 2014]		
f)	A description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraphs (d) will be achieved, and must, where applicable, include actions -	Y	Table 4-1 - Table 4-4
	i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;		

ITEM	CONTENT OF CONSOLIDATED EMPR	COMPLETED (Y/N or N/A)	LOCATION IN CONSOLIDATED EMPR
	ii) comply with any prescribed environmental management standards or practices;		
	iii) comply with any applicable provisions of the Act regarding closure, where applicable; and		
	iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;		
g)	The method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Y	Table 4-1 - Table 4-4
h)	The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Y	Section 4
i)	An indication of the persons who will be responsible for the implementation of the impact management actions;	Y	Table 4-1 - Table 4-4
j)	The time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Y	Table 4-1 - Table 4-4
k)	The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Y	Table 4-1 - Table 4-4
l)	A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Y	Table 4-1 - Table 4-4
m)	An environmental awareness plan describing the manner in which -		Section 3.4
	i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and	Y	
	ii) risk must be dealt with in order to avoid pollution or the degradation of the environment;	Y	
n)	Any specific information that may be required by the competent authority;	N/A	
2)	Where a government notice gazetted by the Minister provides for a generic EMPr, such generic EMPr as indicated in such notice will apply.	N/A	

1.4 INTERNATIONAL OBLIGATIONS

1.4.1 The United Nations Convention on the Law of the Sea

The United Nations Convention on the Law of the Sea (UNCLOS) of 1982 requires member states to adopt legislation to reduce marine pollution from sea-bed activities in the Exclusive Economic Zone and on the continental shelf (Articles 208 and 214) and from land based sources (Articles 194 and 207). It also contains provisions relating to marine pollution resulting from dumping of waste at sea (Articles 210 and 216). The convention deals with the prevention of marine pollution and the compensation for damage caused by this pollution. It contains provisions relating to the prescription and enforcement of pollution standards and provides for contingency plans against pollution.

1.4.2 The International Convention for Prevention of Marine Pollution for Ships

The International Convention for the Prevention of Pollution from Ships, 1973 was adopted in 1973 (MARPOL 73) and subsequently modified by the Protocol of 1978 (MARPOL 78). It is therefore referred to as MARPOL 73 / 78. It provides regulations covering the various sources of ship-generated pollution (IMO, 1992). South Africa acceded to MARPOL 73/78 and to all the Annexes I, II, III, IV, V and VI of MARPOL 73/78. The various Annexes are applicable to the proposed survey and sampling activities. Guidance on the various provisions of the MARPOL 73/78 with respect to the proposed exploration activities are summarised as follows:

- Annex I: Regulation for prevention of pollution by oil (October 1983). Regulations for the Prevention of Pollution by Oil, Regulation 9 (1) (b) Control of discharge of oil. Any discharge into the sea of oil or oily mixtures from ships to which this Annex applies shall be prohibited except when all the following conditions are satisfied.
- Annex II: Regulations for control of pollution by Noxious Liquid Substance in bulk (April 1987).
- Annex III: Regulation for prevention of pollution by harmful substance carried at sea in packaged form (July 1992).
- Annex IV: Regulation for prevention of pollution by sewage from ships (Sep 2003). Regulations for the Prevention of Pollution by Sewage from ships, Regulation 8 Discharge of sewage. Refer to the Recommendation on International Performance and Test Specifications for Oily-Water Separating Equipment and Oil Content Meters adopted by the Organization by resolution A.393 (X).
- Annex V: Regulation for prevention of pollution by Garbage from ships (Dec 1998). Regulations for the Prevention of Pollution by Garbage from Ships, Regulation 3(1)(b), (1)(b)(ii) and (1)(c) Disposal of garbage outside special areas;
- Annex VI: Regulation for prevention of Air pollution from ships (May 2005). Regulations for the Prevention of Air Pollution from Ships Regulation 12: Ozone Depleting Substances.

All ships flagged under countries that are signatories to MARPOL are subject to its requirements, regardless of where they sail, and member nations are responsible for vessels registered on their national ship registry.

1.4.3 Other

TABLE 1-2: OTHER CONVENTIONS / AGREEMENTS APPLICABLE TO THE PROPOSED PROJECT

NO.	TITLE	DESCRIPTION
International Marine Pollution Conventions		
1	International Convention on Oil Pollution Preparedness, Response and Co-operation, 1990 (OPRC Convention)	OPRC Convention is an international maritime convention establishing measures for dealing with marine oil pollution incidents nationally and in co-operation with other countries.

NO.	TITLE	DESCRIPTION
2	Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 (the London Convention) and the 1996 Protocol (the Protocol)	The London Convention is an agreement to control pollution of the sea from dumping and to encourage regional agreements supplementary to the Convention. It covers the deliberate disposal at sea of wastes or other matter from vessels, aircraft and platforms. It does not cover discharges from land-based sources, such as pipes and outfalls, wastes generated incidental to normal operation of vessels, or placement of materials for purposes other than mere disposal, providing such disposal is not contrary to aims of the Convention.
3	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	This Convention is an international maritime convention affirming the right of a coastal State to "take such measures on the high seas as may be necessary to prevent, mitigate or eliminate grave and imminent danger to their coastline or related interests from pollution or threat of pollution of the sea by oil, following upon a maritime casualty or acts related to such a casualty”.
4	International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2017 (BWM)	This Convention aims to prevent the spread of harmful aquatic organisms from one region to another, by establishing standards and procedures for the management and control of ships' ballast water and sediments.
5	Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal, 1989	This Convention is an international treaty that was designed to reduce the movements of hazardous waste between nations, and specifically to prevent transfer of hazardous waste from developed to less developed countries. It does not, however, address the movement of radioactive waste.
6	International Convention on the Control of Harmful Anti-fouling Systems on Ships, 2001	The Convention prohibits the use of harmful compounds in anti-fouling paints used on ships and rigs and establishes a mechanism to prevent the potential future use of other harmful substances in anti-fouling systems.
Air and Atmosphere		
7	Kyoto Protocol on the Framework Convention on Climate Change, 1997	This Protocol was the key instrument on which the 1992 United National Framework Convention on Climate Change is based. It is the first legally binding global agreement setting out specific obligations for the reduction of the amount of greenhouse gases (GHG).
8	Montreal Protocol on Substances that Delete the Ozone Layer, 1987	This Protocol lays down a timetable for the reduction of controlled substances that deplete the ozone layer and have adverse effects on health and the environment.
9	Vienna Convention for the Protection of the Ozone Layer, 1985	The Convention is the first global agreement that recognised that the ozone was a serious enough problem to warrant international regulation.
10	United Nations Framework Convention on Climate Change, 1992	The objective of the Convention is to "stabilise GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system”.

NO.	TITLE	DESCRIPTION
11	Paris Agreement (United Nations Framework Convention on Climate Change), 2016	South Africa signed the Paris Agreement on 22 April 2016. This Agreement aims to strengthen the global response to the threat of climate change by limiting the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels. Parties aim to reach global peaking of GHG emissions as soon as possible, recognising that peaking will take longer for developing country Parties, and to undertake rapid reductions thereafter in accordance with best available science, so as to achieve a balance between anthropogenic emissions by sources and removals by sinks of GHGs in the second half of this century.
Flora, Fauna and Protected Areas		
12	Revised African Convention for the Conservation of Nature and Natural Resources, 2017	The objectives of this Convention are to enhance environmental protection, to foster the conservation and sustainable used of natural resources, and to harmonise and coordinate polices in these fields.
13	United Nations Convention on Biological Diversity, 1992	This Convention has three main goals: (1) conservation of biological diversity (or biodiversity); (2) sustainable use of its components; and (3) fair and equitable sharing of benefits arising from genetic resources. Its objective is to develop national strategies for the conservation and sustainable use of biological diversity.
14	Convention on the Conservation of Migratory Species of Wild Animals, 1983 (Bonn Convention)	This Convention aims to conserve terrestrial, marine and avian migratory species throughout their range.
15	Memorandum of Understanding (MoU) on the Conservation of Migratory Sharks, 2010	The MoU was founded under the auspices of the Bonn Convention and serves as an international instrument for the conservation of migratory shark species, including species occurring off the South Coast of South Africa.
16	The MoU on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia, 2001	The MoU is an intergovernmental agreement that aims to protect, conserve, replenish and recover sea turtles and their habitats in the Indian Ocean and South-East Asian region.
17	Agreement on the Conservation of Albatrosses and Petrels, 2004 (ACAP)	The Agreement protects all the world's albatross species, seven southern hemisphere petrel and two shearwater species. A number of these occur off the South Coast of South Africa.
18	International Convention for the Conservation of Atlantic Tunas (ICCAT)	This Convention provides for the management and conservation of tuna and tuna-like species in the Atlantic Ocean and adjacent seas.
19	Convention on International Trade of Wild Fauna and Flora Endangered Species, 1973 (CITES)	CITES is a multilateral treaty to protect endangered plants and animals.

NO.	TITLE	DESCRIPTION
Archaeology and Cultural Heritage		
20	Convention concerning the Protection of the World Cultural and Natural Heritage (Paris, 1972)	This Convention provides for the identification, protection and conservation of the cultural and natural heritage for future generations.
21	United Nations Educational, Scientific and Cultural Organization (UNESCO) Convention on the Protection of the Underwater Cultural Heritage, 2001	This Convention is intended to protect all traces of human existence having a cultural, historical or archaeological character, which have been under water for over 100 years. This extends to the protection of shipwrecks, sunken cities, prehistoric artwork, treasures that may be looted, sacrificial and burial sites, and old ports that cover the oceans' floors.
Marine Safety		
22	Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREGS)	This Convention sets an international standard for shipping and navigation. It deals with safety at sea issues and prescribes international standards for shipping, particularly to reduce the risk of collisions at sea. The rules for the prevention of collisions at sea apply to all vessels using the high seas.
23	International Convention for the Safety of Life at Sea, 1974 (SOLAS) with its protocol of 1978	This Convention is an international maritime treaty which requires signatory flag states to ensure that ships flagged by them comply with minimum safety standards in construction, equipment and operation.
24	The International Convention on Load Lines, 1966 and its protocol of 1988	This Protocol was adopted to harmonise the survey and certification requirement of the 1966 Convention with those contained in SOLAS and MARPOL 73/78. All assigned load lines must be marked amidships on each side of the ships engaged in international voyages.
25	International Commission on Radiological Protection (ICRP)	ICRP is an independent, international non-governmental organisation providing recommendations and guidance on radiation protection.
26	International Atomic Energy Agency (IAEA) Regulations for the Safe Transport of Radioactive Material, 1984	IAEA is an international organisation that seeks to promote the peaceful use of nuclear energy, and to inhibit its use for any military purpose, including nuclear weapons. These regulations provide international standards and approaches to safety promote consistency, help to provide assurance that nuclear and radiation related technologies are used safely, and facilitate international technical cooperation and trade.
Human Rights and Labour		
27	International Labour Organisation Conventions	C029 - Forced Labour Convention, 1930 (No. 29) - 05 Mar 1997 C087 - Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87) C098 - Right to Organise and Collective Bargaining Convention, 1949 (No. 98) C100 - Equal Remuneration Convention, 1951 (No. 100) C105 - Abolition of Forced Labour Convention, 1957 (No. 105) C111 - Discrimination (Employment and Occupation) Convention, 1958 (No. 111) C138 - Minimum Age Convention, 1973 (No. 138) C182 - Worst Forms of Child Labour Convention, 1999 (No. 182)

NO.	TITLE	DESCRIPTION
		C081 - Labour Inspection Convention, 1947 (No. 81) C144 - Tripartite Consultation (International Labour Standards) Convention, 1976 (No. 144) C002 - Unemployment Convention, 1919 (No. 2) C004 - Night Work (Women) Convention, 1919 (No. 4) C019 - Equality of Treatment (Accident Compensation) Convention, 1925 (No. 19) C026 - Minimum Wage-Fixing Machinery Convention, 1928 (No. 26) C027 - Marking of Weight (Packages Transported by Vessels) Convention, 1929 (No. 27) C041 - Night Work (Women) Convention (Revised), 1934 (No. 41) C042 - Workmen's Compensation (Occupational Diseases) Convention (Revised), 1934 (No. 42) C045 - Underground Work (Women) Convention, 1935 (No. 45) C063 - Convention concerning Statistics of Wages and Hours of Work, 1938 (No. 63) C080 - Final Articles Revision Convention, 1946 (No. 80) C089 - Night Work (Women) Convention (Revised), 1948 (No. 89) C116 - Final Articles Revision Convention, 1961 (No. 116) C155 - Occupational Safety and Health Convention, 1981 (No. 155) C176 - Safety and Health in Mines Convention, 1995 (No. 176) MLC 2006 - Maritime Labour Convention, 2006 (MLC 2006) C188 - Work in Fishing Convention, 2007 (No. 188) C189 - Domestic Workers Convention, 2011 (No. 189)

2. EXPERTISE OF THE EAP

The details and roles of the EAPs who were involved in the preparation of this EMPr are provided in Table 2-1 below. Curricula Vitae of the Project Team are attached as Appendix A.

SLR has no interest in the proposed project other than fair remuneration for consulting services rendered as part of the EIA process.

TABLE 2-1: EXPERTISE OF THE EAP.

Nigel Rossouw	
Responsibility	Project director, reviewer and quality control
Qualification	MSc (Envi. & Geog. Sci.)
Professional Registration	International Association for Impact Assessments South Africa (IAIAsa)
Experience in years	25
Experience	Nigel Rossouw is an environmental and social specialist with 25 years of experience in the corporate, project implementation and consulting environments. Nigel has diverse experience spanning the energy, extractives, infrastructure and natural resource sectors. Nigel has in-depth project experience in working in coastal, marine and deep-water environments. Nigel has worked in South African, Namibia, Botswana, Mozambique, Kenya, Tanzania, Uganda, Ethiopia, Egypt, Reunion Island, India, Thailand, Malaysia, Indonesia, Philippines and the United Arab Emirates.
Nicholas Arnott	
Responsibility	Project Manager
Qualification	Hons (Earth & Geog. Sci.)
Professional Registration	Professional Natural Scientist (Pri.Sci.Nat.); IAIAsa
Experience in years	15
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.

3. PROJECT GOVERNANCE

3.1 ENVIRONMENTAL GOVERNANCE

The governance structure for environmental management is presented below. All official communication and reporting lines including instructions, directives and information shall be channelled according to the organisational structure presented in Figure 3-1 below.

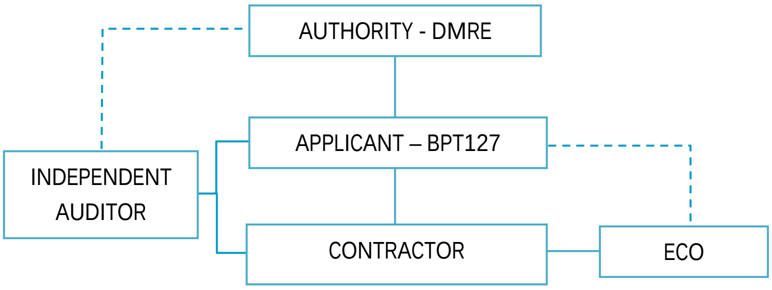

FIGURE 3-1: CONSOLIDATED EMPR IMPLEMENTATION GOVERNANCE STRUCTURE.

3.2 ROLES AND RESPONSIBILITIES

The implementation of this EMPr requires the involvement of several role players, each fulfilling a different but vital role to ensure sound environmental management during the implementation of the proposed project.

3.2.1 Department of Mineral Resources and Energy (DMRE)

DMRE is the designated authority responsible for authorising this EMPr. DMRE has the authority to enforce legal action if BPT127 does not comply with the relevant legislation, conditions of the EA, prospecting right permits, and this EMPr.

DMRE would need to approve any amendments that may be required to the management outcomes of the EMPr and may also perform inspections to assess compliance with the relevant legislation, the EA, prospecting right permits and the EMPr.

3.2.2 Belton Park Trading 127 (Pty) Ltd (BPT127)

BPT127, as the Applicant, has overall environmental accountability to ensure compliance with the relevant legislation, the EA, prospecting right permits, and this EMPr. BPT127 is also accountable for the financial cost of all environmental management measures. BPT127 must ensure that any person acting on their behalf complies with the relevant legislation, the EA, prospecting rights permits, and this EMPr.

BPT127 is accountable for the appointment of the Contractor, Environmental Control Officer (ECO) and independent auditor and shall address any issues pertaining to the environment at the request of the ECO. BPT127 must also designate a focal point for environmental matters / performance e.g. Environmental Officer. This person must collaborate and interact with the ECO on environmental matters.

BPT127 is accountable for designing a system to ensure compliance by the Contractor and their Subcontractors.

3.2.3 Contractor

The Contractor shall have the following responsibilities:

- To adhere to the provisions of the EA, prospecting right permits and EMPr (if the Contractor encounters difficulties with specifications, they must discuss alternative approaches with BPT127 prior to proceeding);
- To ensure that relevant staff are aware with the EA, prospecting right permits and EMPr requirements;
- To ensure that the relevant environmental requirements are addressed as part of the process of contracting service providers;
- To monitor and verify that negative environmental impacts are avoided or where it cannot be avoided, minimized;
- To make personnel aware of environmental issues and ensure they show adequate consideration of the environmental aspects of the project;
- To report any incidents of non-compliance with the EA, prospecting right permits and Consolidated EMPr to the ECO;
- To ensure appropriate corrective actions are implemented immediately to rectify identified incidents of non-compliance; and
- To, where possible, rehabilitate any environmental damage arising from unplanned events.

Failure to comply with the EA, prospecting right permits and EMPr may result in suspending the operation causing the non-compliance.

3.2.4 Environmental Control Officer (ECO)

BPT127 will appoint a suitably qualified ECO to ensure adherence to the conditions of the EA and prospecting right permits and any additional environmental licences or permits issued for the project, and the requirement of the approved EMPr. The ECO must be appointed at the planning phase. The ECO shall perform monitoring for the full duration of the proposed project (i.e. virtual monitoring). The ECO's duties shall include, *inter alia*, the following:

- Verifying that all the required environmental licences and permits have been obtained, as appropriate;
- Monitoring environmental performance within the defined project area;
- Conducting environmental awareness training session with the relevant management staff;
- Keeping a record of progress from an environmental perspective;
- Keeping a record / log of all environmental incidents and non-compliances;
- Providing a report back on the environmental issues at meetings (if required); and
- Compiling environmental reports on compliance with the relevant conditions of the EA, prospecting right permits and any additional environmental licences or permits issued for the project, and the requirements of the EMPr after every sampling / survey campaign. The ECO shall submit the reports to DMRE, if requested.

The ECO is allowed to interact directly with the Contractor. Should problems arise that cannot be resolved between the ECO and the Contractor, the ECO shall take the matter up with BPT127.

At the conclusion of the project, a final close-out report shall be compiled and submitted to DMRE. This report shall be compiled by the ECO. It will outline the implementation and associated level of compliance with the requirements of the relevant conditions of the EA, prospecting right permits and conditions of additional environmental licences or permits, the EMPr, provide assurance that there are no outstanding issues relevant to the contract and identify any environmental issues which will need ongoing monitoring/auditing and action during the maintenance / operational phase of the project.

3.2.5 Independent Auditor

The independent auditor will be an environmental consultant appointed by BPT127 to compile an Environmental Audit Report in compliance with Section 54(A)(2) of the EIA Regulations, 2014 (as amended), promulgated under NEMA. The terms of reference of the Environmental Audit Report are provided in Appendix 7 of the EIA Regulations, 2014 (as amended) and are to consider the following:

- Report on the level of compliance with the conditions of the EMPr;
- Report on the extent to which the avoidance, management and mitigation measures provided for in the EMPr achieve the objectives and outcomes of the EMPr;
- Identify and assess any new impacts and risks as a result of undertaking the activity;
- Evaluate the effectiveness of the EMPr;
- Identify shortcomings in the EMPr;
- Identify the need for any changes to the avoidance, management and mitigation measures provided for in the EMPr; and
- Report on any changes to the mitigation measures / actions contained in the EMPr.

The independent auditor shall undertake audits at the end of the prospecting operations, and the Environmental Audit Report will be submitted to the DMRE, as the competent authority.

3.3 EMPR ADMINISTRATION

Copies of the EA, prospecting permits and this EMPr shall be kept onboard any vessel undertaking work in the prospecting rights area. All relevant personnel shall be required to familiarise themselves with the contents of this document.

Any recommended amendments to the EMPr outcomes must be approved by DMRE and communicated to the relevant stakeholders, as per the EIA Regulations, 2014 (as amended) before the amendments to the EMPr are implemented. BPT127 shall identify the need for any amendments to the EMPr document. Records will be kept in the document indicating changes that have been made.

3.4 ENVIRONMENTAL AWARENESS TRAINING

Before the commencement of the mobilisation phase of the proposed project, the project team shall attend an environmental awareness training course, presented by the ECO.

Prior to commencement of a survey or sampling campaign, an environmental awareness training course shall be presented by ECO to the subcontractors onboard the vessel who are responsible for compliance with activities identified in the EMPr, including any new employees coming onto the vessel after the initial training course. As a minimum, training shall include:

- Explanation of the importance of complying with the EA, prospecting right permits and EMPr;

- Discussion of the potential environmental impacts of the proposed project;
- Explanation of the management structure for the administration and regulation of the environmental obligations associated with the project;
- Explanation of the requirements of the EA, prospecting right permits and EMPr
- Employees' roles and responsibilities, including emergency preparedness; and
- Explanation of the mitigation measures that must be implemented when carrying out their activities.

The ECO shall keep records of all environmental training sessions, including names of attendees, dates of their attendance and the information presented to them. Records of environmental training sessions shall be submitted to BPT127.

3.5 INSPECTION PROCEDURES

The day-to-day monitoring and verification that the EA, prospecting right permits and EMPr are being adhered to shall be undertaken by BPT127.

The ECO shall ensure that adequate procedures are being implemented and that BPT127 is complying with the EA, prospecting right permits and EMPr requirements. The ECO shall address any queries to BPT127.

3.6 RECORD OF ACTIVITIES

The ECO shall keep a record of activities on location, including but not limited to:

- Meetings attended;
- Internal audits;
- Monitoring results;
- Issues arising on location;
- Penalties / fines issued;
- Cases of non-compliance with the EA, prospecting right permits and EMPr;
- Complaints received and corrective action taken; and
- Environmental incidents / non-compliances and corrective actions taken.

3.7 MANAGING NON-COMPLIANCE

BPT127 shall develop a procedure for dealing with non-compliance to the EMPr by its Contractors.

For new Contracts, BPT127 shall include environmental compliance clauses in its Contracts with its Contractors. For existing Contracts, BPT127 shall develop Amending Agreements that specifically make provision for environmental compliances.

When non-compliances are identified, BPT127 shall issue a formal written instruction for the Contractor to correct the non-compliance within a specified period of time.

The Contractor shall respond in writing indicating by means of a Method Statement how the non-compliances will be addressed, and compliance achieved.

If the specific non-compliance persists through inaction on the part of the Contractor, BPT127 needs to use contractual remedies to ensure that the Contractor becomes compliant with the EMPr.

The contractual remedies for failing to comply with or contravening an approved environmental management programme may include penalties or withholding payment of a proportion of completed work limited to the maximum quantum of fine applicable for offences under NEMA.

4. ENVIRONMENTAL MANAGEMENT OUTCOMES AND ACTIONS

Various activities / aspects associated with the planning, establishment, operation and end of prospecting phases of the proposed project have been identified. For each activity / aspect, a set of impact management outcomes and associated management actions have been prescribed (see Table 4-1 - Table 4-4).

In order to facilitate monitoring and auditing, the tables have been structured to indicate the identified environmental outcomes, management actions to be implemented, responsible parties for implementation, timing of implementation, records / indicators of compliance to be obtained and the monitoring requirements associated with the various activities / aspects, as appropriate.

Project activities / aspects covered by this EMPr include the following:

- Preparation of subsidiary plans;
- Stakeholder consultation and notification;
- Permits / exemptions;
- Financial provisions;
- Compliance with the EMPr;
- Environmental awareness training;
- Notifying other users of the sea;
- Onboard observers;
- Adherence to the EMPr and environmental awareness;
- Prevention of emergencies;
- Communication with other users of the sea and resource managers;
- Dealing with emergencies including major oil spills;
- Survey activities;
- Sampling activities;
- Pollution control and waste management;
- Equipment loss;
- Oil bunkering / refuelling at sea;
- Acoustic emissions;
- Vessel lighting;
- Monitoring and auditing;
- Final waste disposal;
- Rehabilitation and closure; and
- Information sharing.

4.1 ENVIRONMENTAL OUTCOMES AND ACTIONS APPLICABLE TO THE PLANNING PHASE

TABLE 4-1: ENVIRONMENTAL OUTCOMES AND ACTIONS APPLICABLE TO THE PLANNING PHASE

Project activities:	Aspect	Environmental and Social Performance Objectives:	Impact Management Outcomes or Targets	Mitigation and Impact Management Actions	Responsibility	Frequency / timing:	Monitoring and record keeping requirements
4.1.1 PREPARATION OF SUBSIDIARY PLANS	Mobilisation	Preparation for any emergency that could result in an environmental impact	All plans to be finalised before start of mobilisation	Ensure the following plans are prepared and in place for any vessel contracted to undertake a campaign: • Certificate of Registry. • Certificate of Class. • Document of Compliance. • Shipboard Oil Pollution Emergency Plan (SOPEP) as required by MARPOL; • Emergency Response Plan (including MEDIVAC plan); • Waste Management Plan as required by MARPOL (see contents in Section 4.3.7).	BPT127 and Appointed contractor	Prior to commencement of operation	A copy of all plans Confirm compliance and justify and omissions
4.1.2 FINALISATION OF SAMPLING AREA	Disturbance of sensitive features	Protection of sensitive features	No disturbance of sensitive features	• Use should be made of geophysical data to conduct a pre-sampling geohazard analysis of the seabed, and near-surface substratum to map potentially vulnerable habitats and prevent potential conflict with the sampling targets. • Avoid mining in any areas where sensitive habitats, such as rocky outcrops, and any other structural habitat feature are located. • Establish buffer zones for the proposed sampling activities of at least 150 m around rocky outcrop areas (or other identified sensitive habitats). • Exclude any areas where shipwrecks are identified (during geophysical surveys) from a planned sampling area. • The possibility of realising core log information and samples of the coarser fraction (i.e. gravel and stone between 20 mm and 150 mm) of sorted seabed sediment for assessment by an archaeologist for the presence of prehistoric lithic material should be considered by BPT127.	BPT127 and Appointed contractor	Prior to commencement of sampling	Geophysical survey data Mapping of completed sampling footprints

Project activities:	Aspect	Environmental and Social Performance Objectives:	Impact Management Outcomes or Targets	Mitigation and Impact Management Actions	Responsibility	Frequency / timing:	Monitoring and record keeping requirements
4.1.3 STAKEHOLDER CONSULTATION AND NOTIFICATION	Interaction, engagement and communication with key stakeholders	DMRE notification	Notify authority of upcoming activities	Compile the specific details of the prospecting operations into a Notification and submit to the DMRE. The notification should provide, *inter alia*, the details on the following: • Expected commencement date of the Prospecting Work Programme; and • Contractor details.	BPT127 and Appointed contractor	30 days prior to commencement of operations or as required by DMRE	Provide copies of all correspondence
		Stakeholder notification	Minimise disruption to the survey and other users of the sea	• Consult with the managers of the Department of Forestry, Fisheries and Environment (DFFE) research survey programmes to discuss their respective programmes and the possibility of altering the prospecting programme in order to minimise or avoid disruptions to both parties, where required. • Notify relevant government departments and other key stakeholders of the commencement of survey or sampling operations (including navigational co-ordinates, timing and duration of proposed activities) and the restrictions related to the operation. Stakeholders include: – Fishing industry / associations: > South African Tuna Association; > South African Tuna Longline Association; > South African Deepsea Trawling Industry Association (SADSTIA); > South African Linefish Associations; > SA Marine Linefish Management Association (SAMLMA); > Hake Longline Association; > National Small, Medium and Micro-Enterprise (SMME) Fishing Forum > West Coast Rock Lobster Sea Management Association (if any activities are activated within the 100 m contour line). – Representatives of small-scale local fishing co-operatives; – South African Maritime Safety Authority (SAMSA); – DFFE, including the fisheries research managers and the Vessel Monitoring, Control and Surveillance (VMS) Unit;	BPT127	30 days prior to commencement of operations	Provide copy of notification and list of those to whom it was sent

Project activities:	Aspect	Environmental and Social Performance Objectives:	Impact Management Outcomes or Targets	Mitigation and Impact Management Actions	Responsibility	Frequency / timing:	Monitoring and record keeping requirements
				– Transnet National Ports Authority (ports of Cape Town or Saldanha Bay, as may be applicable); and – Prior to the commencement of activities, notify overlapping and neighbouring petroleum rights holders, as well as any neighbouring mineral prospecting or mining rights holders, to ensure that there is no overlapping of activities in the same area over the same time period. • Any dispute arising with adjacent prospecting / exploration right holders should be referred to the DMRE or Petroleum Agency of South Africa (PASA) for resolution. • Ensure that the vessel master is aware of the requirement to record sightings of and interactions with other vessels to note potential conflicts over right of passage and access to resources.			
4.1.4 PERMITS / EXEMPTIONS	Permitting	Compliance with legislative requirements	Receipt of required permits	If necessary, apply to DFFE for an exemption to approach or remain within 300 m of whales (see note below). <u>Note:</u> In terms of the Marine Living Resources Act, 1998 (No. 18 of 1998): • No person may approach within 300 metres of a whale by vessel, aircraft or other means without a permit; • A vessel approached by a whale is required to distance itself at 300 m from the whale, unless in possession of a permit; • A vessel may not proceed directly through a school of dolphins or porpoises; and • No person shall attempt to feed, harass, disturb or kill great white sharks, dolphins, seals or turtles.	BPT127 and Appointed contractor	Prior to commencement of operations	Provide copies of relevant documentation

Project activities:	Aspect	Environmental and Social Performance Objectives:	Impact Management Outcomes or Targets	Mitigation and Impact Management Actions	Responsibility	Frequency / timing:	Monitoring and record keeping requirements
4.1.5 FINANCIAL PROVISION	Permitting	Compliance with legislative requirements	Confirmation of Financial Provision from DMRE	• Ensure that the requirements of NEMA in terms of financial provision for remediation of environmental damage are met by: – Allocating operational costs to meet EMPr requirements; – Ensure that the survey / sampling vessels maintain adequate Protection and Indemnity (P&I) Insurance Cover to allow for clean-ups in the event of a hydrocarbon spill and other eventualities; and – Providing sufficient funds to execute the EMPr in the event of premature closure or in the event that, on closure, the EMPr has not been successfully executed.	BPT127 and Appointed contractor	Prior to commencement of operations	Provide copies of relevant documentation/ correspondence from DMRE

4.2 ENVIRONMENTAL OUTCOMES AND ACTIONS APPLICABLE TO THE MOBILISATION PHASE

TABLE 4-2: ENVIRONMENTAL OUTCOMES AND ACTIONS APPLICABLE TO THE MOBILISATION PHASE

Project activities:	Aspect	Environmental and Social Performance Objectives:	Impact Management Outcomes or Targets	Mitigation and Impact Management Actions	Responsibility	Frequency / timing:	Monitoring and record keeping requirements
4.2.1 COMPLIANCE WITH EMPR	Training and allocation of responsibilities	BPT127 to commit to adherence to EMPr	Applicable staff receive training as part of their induction, refresher training and an ongoing awareness	• Verify that a copy of the approved EMPr is supplied to the appointed contractor and is on board the survey and sampling vessels during the operation. • Verify procedures and systems for compliance are in place. • Verify correct equipment and personnel are available to meet the requirements of the EMPr. • Ensure compliance with the International Maritime Organisation's International Safety Management Code developed for the proper development, implementation and assessment of safety and pollution prevention management in accordance with good practice.	BPT127 and Appointed contractor	Prior to commencement of operation	Provide copies of relevant documentation

Project activities:	Aspect	Environmental and Social Performance Objectives:	Impact Management Outcomes or Targets	Mitigation and Impact Management Actions	Responsibility	Frequency / timing:	Monitoring and record keeping requirements
4.2.2 ENVIRONMENTAL AWARENESS TRAINING		Ensure personnel are appropriated trained	and behaviour system	• Undertake Environmental Awareness Training to ensure the relevant vessel's personnel are appropriately informed of the purpose and requirements of the EMPr. • Verify responsibilities are allocated to the relevant personnel.	Appointed contractor	Before new staff commence with the start of work on the project	Copy of attendance register and training records
4.2.3 NOTIFYING OTHER USERS OF THE SEA	Presence of survey / sampling vessel	Ensure that other users are aware of the survey / sampling programme	Zero maritime incidents	• Release Radio Navigation Warnings and Notices to Mariners throughout the survey / sampling period. The Notice to Mariners should give notice of (1) the co-ordinates of the surveying / sampling, (2) an indication of the proposed surveying / sampling timeframes, (3) an indication of the 500 m safety zone around the sampling vessel, and (4) provide details on the movements of support vessels servicing the operation.	Appointed contractor	As operations progress	Provide copies of written notices and list of those to whom it was sent
4.2.4 ONBOARD OBSERVER OR MMO AND PAM OPERATOR, WHERE REQUIRED	Increase in underwater noise levels	Protect offshore marine fauna	Zero disturbance to cetaceans	• A designated onboard Marine Mammal Observer (MMO) shall ensure compliance with mitigation measures during geophysical surveying. • Appoint a Passive Acoustic Monitoring (PAM) operator for any surveying taking place between June and November.	BPT127	Prior to commencement of operations	MMO (and PAM, when used) operator reports
4.2.5 EMPR AMENDMENTS	EMPr documentation	Ensure adequate / appropriate management actions and outcomes	Zero redundant / inappropriate management actions and outcomes	• On an ongoing basis, identify and address new activities and remove obsolete ones, particularly when new or changed surveying and prospecting method and / or equipment are used. Amend the EMPr as required and submit to DMRE for approval.	BPT127	As applicable	Reflected in Environmental Audit Reports

4.3 ENVIRONMENTAL OUTCOMES AND ACTIONS APPLICABLE TO THE OPERATIONAL PHASE

TABLE 4-3: ENVIRONMENTAL OUTCOMES AND ACTIONS APPLICABLE TO THE OPERATIONAL PHASE

Project activities:	Aspect	Environmental and Social Performance Objectives:	Impact Management Outcomes or Targets	Mitigation and Impact Management Actions	Responsibility	Frequency / timing:	Monitoring and record keeping requirements
4.3.1 ADHERENCE TO THE EMPR AND ENVIRONMENTAL AWARENESS	Implementation of EMPr	Operate in an environmentally responsible manner	Compliance with EMPr	• Undertake Environmental Awareness Training (including spill management) to ensure the relevant vessel's personnel are appropriately informed of the purpose and requirements of the EMPr. • Ensure the onboard BPT127 representative undergoes a short induction on archaeological site and artefact recognition, as well as the process to follow should archaeological material be encountered during sampling. • Comply fully with the EMPr (compliance would mean that all activities were undertaken successfully, and details recorded).	BPT127 and Appointed contractor	Prior to and throughout operation	Provision of environmental training records and attendance registers
4.3.2 PREVENTION OF EMERGENCIES	Presence of survey / sampling vessel	Minimise the chance of emergency and subsequent damage to the environment occurring	Zero maritime incidents	• Prevent collisions by ensuring that the survey and sampling vessels display correct signals by day and lights by night (including twilight), by visual radar watch and standby vessel(s). • Maintain 500 m safety zone around sampling vessel through Notices to Mariners and Navigation Warnings. • Call any vessels that are deemed to be a risk to the survey/sampling and / or survey/sampling vessel via radio and inform them of the navigational safety requirements. • Ensure all hazardous materials are correctly labelled, stored, packed and sealed with proper markings for shipping.	Appointed contractor	Throughout operation	Provide record of any incidents and interaction with other vessels
				• Establish lines of communication with the following emergency response agencies / facilities: SAMSA, SAN Hydrographic Office (Silvermine), DFFE (Directorate of Marine Pollution) and DMRE.	BPT127 and Appointed contractor	During operations as required	Provide record of any communications
4.3.3 CONTINUE TO COMMUNICATE WITH OTHER USERS OF THE SEA AND	Interaction, engagement and communication with key stakeholders	Promote co-operation and successful multiple use of the sea, including	Zero maritime incidents	• Through normal communication channels, Radio Navigation Warnings and Notices to Mariners, keep relevant government departments and other key stakeholders (see Section 4.1.3) updated on the prospecting programme.	BPT127 and Appointed contractor	During operations as required	Provide record of any communications
				• Co-operate with other legitimate users of the sea to minimise disruption to other marine activities.	BPT127 and Appointed contractor	During operations as required	

Project activities:	Aspect	Environmental and Social Performance Objectives:	Impact Management Outcomes or Targets	Mitigation and Impact Management Actions	Responsibility	Frequency / timing:	Monitoring and record keeping requirements
RESOURCE MANAGERS		promotion of safe navigation		• Keep constant watch for approaching vessels during the prospecting operation and warn by radio and support vessel, if required. • Keep a record of any interaction with other vessels.			
4.3.4 DEALING WITH EMERGENCIES INCLUDING OIL SPILLS (OWING TO COLLISION, VESSEL BREAK-UP, REFUELLING ETC.)	Diesel spills from refuelling or from tank rupture (e.g. vessel collision	Minimise damage to the environment by implementing response procedures efficiently	Zero spills or leaks	• Adhere to obligations regarding other vessels in distress. • Maintain all emergency procedures as legally required. • Notify SAMSA about wrecked vessels (safety and pollution) and the Department of Finance with regard to salvage, customs and royalties). Provide location details to SAN hydrographer. • In the event of an oil spill immediately implement emergency plans (see Section 4.1.1). In the case of an oil spill to sea with serious potential consequences to marine and human life notify (a) the Principal Officer of the nearest SAMSA office, (b) the DEFF Chief Directorate of Marine & Coastal Pollution Management in Cape Town, and (c) PASA. Information that should be supplied when reporting a spill includes: – Name and contact details of person reporting the incident; – The type and circumstances of incident, ship type, port of registry, nearest agent representing the ships company; – Date and time of spill; – Location (co-ordinates), source and cause of pollution; – Type and estimated quantity of oil spilled and the potential and probability of further pollution; – Weather and sea conditions; – Action taken or intended to respond to the incident; – Persons already informed of the spill; and – Supply vessels must have the necessary spill response capability to deal with accidental spills in a safe, rapid, effective and efficient manner. • Where diesel, which evaporates relatively quickly, has been spilled, the water should be agitated or mixed using a propeller boat / dinghy to aid dispersal and evaporation. This is only to be undertaken where it does not pose a health and safety risk. • In the event of an emergency including fire, grounding or sinking, or collision, ensure that approved Shipboard Oil	BPT127 and Appointed contractor	In event of spill	Record of all spills (Spill Record Book), including spill reports; emergency exercise reports; audit reports. Incident log

Project activities:	Aspect	Environmental and Social Performance Objectives:	Impact Management Outcomes or Targets	Mitigation and Impact Management Actions	Responsibility	Frequency / timing:	Monitoring and record keeping requirements
				Pollution Emergency Plan and Emergency Response Manuals are followed, which include: – Ensure safety of personnel onboard; – Stabilisation the ship and limit damages; – Containing the spill, if possible; and – Immediately reporting accidental spills to the relevant authorities and professional bodies providing full details of the incident. • Notification to Alexkor, Transhex Operations and Belton Park Trading 127 of the occurrence of any Moderate to Major overboard spills during prospecting activities.			
4.3.5 SURVEY ACTIVITIES	Increased ambient underwater noise levels	Reduce disturbance of marine fauna, particularly cetaceans (whales and dolphins).	Minimise disturbance to cetaceans Zero fatalities or injury of cetaceans	• Ensure that geophysical survey activities are conducted in compliance with the following: – Avoid planning geophysical surveys during the movement of migratory cetaceans (particularly baleen whales) from their southern feeding grounds into low latitude waters (beginning of June to end of November), and ensure that migration paths are not blocked by survey operations. As no seasonal patterns of abundance are known for odontocetes occupying the proposed exploration area, a precautionary approach to avoiding impacts throughout the year is recommended. – The MMO should conduct visual scans for the presence of cetaceans around the survey vessel prior to the initiation of any acoustic impulses. – Pre-survey visual scans should be of least a 15-minute duration prior to the start of survey equipment. – Terminate the survey if any marine mammals show affected behaviour within 500 m of the survey vessel or equipment until the mammal has vacated the area. – "Soft starts" should be carried out for equipment with source levels greater than 210 dB re 1 μPa at 1 m over a period of 20 minutes. Equipment of source levels greater than 210 dB re 1 μPa at 1 m not capable of "soft starts" would be run	BPT127 and Appointed contractor	Throughout surveying operations	MMO / PAM Operator Reports Record information on faunal observations, survey activities and any mitigation actions taken

Project activities:	Aspect	Environmental and Social Performance Objectives:	Impact Management Outcomes or Targets	Mitigation and Impact Management Actions	Responsibility	Frequency / timing:	Monitoring and record keeping requirements
				concurrently with equipment that can be soft started and only switched on once the soft-start has been completed. – Ensure that PAM is incorporated into any surveying taking place between June and November.			
				• All vessel operators should keep watch for marine mammals and turtles in the path of the vessel. • Ensure vessel transit speed between the survey area and port is a maximum of 12 knots (22 km/hr), except within 25 km of the coast where it is reduced further to 10 knots (18 km/hr) as well as when sensitive marine fauna are present in the vicinity. • A non-dedicated marine mammal observer (MMO) must keep watch for marine mammals behind the vessel when tension is lost on the towed equipment. Either retrieve or regain tension on towed gear as rapidly as possible. • Should a cetacean become entangled in towed gear, contact the South African Whale Disentanglement Network (SAWDN) formed under the auspices of DEFF to provide specialist assistance in releasing entangled animals.	Appointed contractor	Throughout surveying operations	MMO / PAM Operator Reports Record information on faunal observations, survey activities and any mitigation actions taken
4.3.6 SAMPLING ACTIVITIES	Impact of sampling operations	Reduce disturbance of sampling activities on benthic biodiversity	No impact on sensitive habitats in rocky-outcrop areas	• Implement buffer zones as per section 4.1.2 No bulk sampling may take place within the buffer area. • Where possible make available non-confidential data to relevant agencies / regional or national programmes involved in biodiversity conservation / evaluation and management of marine ecosystems.	BPT127 and Appointed contractor	Throughout sampling operations	Geophysical survey data
		Protection of heritage and cultural features	Limit disturbance of cultural heritage material	• Avoid sampling in any areas where identified shipwrecks (from geophysical data) are located. • The contractor must be notified that archaeological sites could be exposed during drill and bulk sampling activities, as well as the procedure to follow should archaeological material be encountered • The onboard BPT127 representative must undergo a short induction on archaeological site and artefact recognition, as well as the process to follow should archaeological material be encountered during sampling	BPT127 and Appointed contractor	In the event a shipwreck is encountered	Records of interactions with SAHRA and identified shipwreck material

Project activities:	Aspect	Environmental and Social Performance Objectives:	Impact Management Outcomes or Targets	Mitigation and Impact Management Actions	Responsibility	Frequency / timing:	Monitoring and record keeping requirements
				• If shipwreck material is encountered during the course of sampling in the concession area, the following mitigation measure will be apply: – Cease work in the directly affected area to avoid damage to the wreck until SAHRA has been notified and the contractor/BPT127 has complied with any additional mitigation as specified by SAHRA; and – Where possible, take photographs of artefacts found, noting the date, time, location and types. Under no circumstances may any artefacts be removed, destroyed or interfered on the site, unless under permit from SAHRA. • The possibility of realising core log information and samples of the coarser fraction (i.e. gravel and stone between 20 mm and 150 mm) of sorted seabed sediment for assessment by an archaeologist for the presence of prehistoric lithic material should be considered by BPT127.			
4.3.7 POLLUTION CONTROL AND WASTE MANAGEMENT OF PRODUCTS DISPOSED OF: INTO THE AIR (EXHAUSTS, CFCS AND INCINERATORS), TO SEA (SEWAGE, FOOD, OILS), TO LAND (USED OILS ETC, METALS, PLASTICS, GLASS, ETC.)	Discharge of liquid and solid waste to sea	Minimise pollution, and maximise recycling by implementing and maintain pollution control and waste management procedures at all times	Compliance with MARPOL standards	• Ensure that the vessel implements a Waste Management Plan (see Section 7.1.1). The plan must comply with legal requirements (including MARPOL) for waste management and pollution control (for air and water quality levels at sea) and ensure "good housekeeping" and monitoring practices: – General solid waste: > Initiate a waste minimisation system. > No waste should be disposed overboard. – Ensure on-board solid waste storage is secure. – Galley (food) waste: > Ensure compliance with MARPOL Annex V standards. > No disposal within 3 nm of the coast. > Disposal between 3 nm and 12 nm of the coast shall to be comminuted to particle sizes smaller than 25 mm. > Minimise the discharge of waste material should obvious attraction of fauna be observed. – Deck drainage: > Ensure that weather decks are kept free of spillage. > Low-toxicity biodegradable detergents should be used in cleaning of all deck spillage.	BPT127 and Appointed contractor	Throughout prospecting operations	Provide summary of waste record book / schedule and receipts. Manifest required for all shipments to shore. Report occurrence of minor oil spills and destination of wastes.

Project activities:	Aspect	Environmental and Social Performance Objectives:	Impact Management Outcomes or Targets	Mitigation and Impact Management Actions	Responsibility	Frequency / timing:	Monitoring and record keeping requirements
				> Ensure compliance with MARPOL standards. – Machinery space drainage: > Vessels must comply with international agreed standards regulated under MARPOL. All machinery space drainage would pass through an oil / water filter to reduce the oil in water concentration to less than 15 ppm. – Sewage: > Ensure compliance with MARPOL Annex IV standards. > Use approved treatment plants to MARPOL standards, where applicable. > No disposal within 4 nm of the coast. > Disposal further than 4 nm of the coast needs to be comminuted and disinfected prior to disposal into the sea. – Medical waste: > Seal in aseptic containers for appropriate disposal onshore. – Metal: > Send to shore for recycling or disposal. – Other waste: > Dispose of remaining solid waste at a licensed landfill facility or an alternative approved facility. Ensure waste disposal is carried out in accordance with appropriate laws and ordinances. – Waste oil: > Return used oil to a port with a registered facility for processing or disposal. – Minor oil spill: > Use oil absorbent. – Emissions to the atmosphere: > Ensure compliance with MARPOL Annex VI standards. > Properly tune and maintain all engines, motors, generators and all auxiliary power to contain the minimum of soot and unburned diesel.			

Project activities:	Aspect	Environmental and Social Performance Objectives:	Impact Management Outcomes or Targets	Mitigation and Impact Management Actions	Responsibility	Frequency / timing:	Monitoring and record keeping requirements
				> Implement leak detection and repair programmes for valves, flanges, fittings, seals, etc. – Other hazardous waste: > Ensure compliance with MARPOL Annex V standards. > Record types and volumes of chemical and hazardous wastes (e.g. radioactive devices/materials, neon lights, fluorescent tubes, toner cartridges, batteries, etc.) and destination thereof. > Send to designated onshore hazardous disposal site. Retain waste receipts. • Ensure all crew is trained in spill management.			
4.3.8 EQUIPMENT LOSS	Dropped or lost equipment	Minimise hazards left on the seabed or floating in the water column, and inform relevant parties	Zero loss and retrieval, where possible	• Where possible, attempt the recovery of any items lost overboard. The benefits of retrieval of debris or equipment must first be weighed up against the potential environmental impacts, health and safety risks. • Keep a record of lost equipment and all items lost overboard and not recovered and provide to the relevant authority if requested. • When any items that constitute a seafloor or navigational hazard are lost on the seabed, or in the sea: – Complete a standard form / record sheet, which records the location, date and cause of loss, details of equipment type, weather, sea state, etc.; – Notify SAMSA and SAN Hydrographer; and – Request that SAN Hydrographer send out a Notice to Mariners with this information.	BPT127 and Appointed contractor	Throughout sampling operation	Establish a hazards database listing: • the type of gear lost • date of loss / HSE decision to leave equipment • location; and • where applicable, the dates of retrieval
4.3.9 USE OF HELICOPTERS FOR CREW CHANGES, SERVICING, ETC.	Increased ambient noise levels	Minimise disturbance / damage to marine and coastal fauna.	Zero incidents of disturbance to bird and seal colonies and whale breeding areas	• Use flight paths that do not pass over coastal reserves and seal colonies (see Appendix B). • Report deviations from set flight plans. • Low altitude coastal flights (< 762 m [2 500 ft] and within 1 nm of the shore) should also be avoided, particularly during the winter / spring (June to November inclusive) whale migration period and during the November to January seal breeding season. • Brief all pilots on ecological risks associated with flying at a low level along the coast or above marine mammals.	BPT127 and aircraft / helicopter contractor	As required	Copy of flight path (including altitude). Helicopter logs Records of any deviations from set flight paths

Project activities:	Aspect	Environmental and Social Performance Objectives:	Impact Management Outcomes or Targets	Mitigation and Impact Management Actions	Responsibility	Frequency / timing:	Monitoring and record keeping requirements
				• Comply with aviation and authority guidelines and rules.			
4.3.10 OIL BUNKERING / REFUELLING AT SEA	Spill of hydrocarbons to sea during bunkering	Minimise disturbance / damage to marine life.	Zero spills or leaks	• No discharge of any oil whatsoever is permitted. • Offshore bunkering is not permitted within the economic zone (i.e. 200 nm from the coast) without permission from SAMSA. • Submit an application in terms of Regulation 14 of GN R1276 under the Marine Pollution (Control and Civil Liability) Act, 1981 (No. 6 of 1981) to the Principal Officer at the port nearest to where the transfer is to take place. • Inform SAMSA of location, supplier and timing, 5 days prior to refuelling at sea.	BPT127 / Vessel Captain	As required, 5 days prior to refuelling	Copy of notice sent to SAMSA
4.3.11 VESSEL LIGHTING	Artificial lighting	Minimise attraction of marine fauna to sampling vessel.	No unnecessary visual impacts	• Lighting on-board prospecting vessels should be reduced to the minimum required for safety levels to minimise stranding of pelagic seabirds on the vessels at night. • Any stranded seabirds must be retrieved and released during daylight hours.	Appointed contractor	As required	Records of any seabird strandings
4.3.12 MONITORING AND AUDITING	Compliance with authorisation conditions	Ensure compliance with monitoring and auditing requirements for prospecting operations.	No non-compliance	• Undertake internal audits at the end of each survey/sampling campaign to determine the level of compliance with the EMPr requirements and conditions of the environmental authorisation. • Prepare an environmental audit report and submit to the DMRE at intervals as indicated in the environmental authorisation. The audit report must comply with legal requirements contained in Appendix 7 of the 2014 EIA Regulations, as amended (or any amendments thereto). • Calculate and report on annual and cumulative sampled areas.	BPT127 must appoint an independent auditor to prepare the Environmental Audit Report	Audit at the end of prospecting campaign. Submit to DMRE at the end of prospecting operation.	Copies of Environmental Audit Reports

4.4 ENVIRONMENTAL OUTCOMES AND ACTIONS APPLICABLE TO THE END OF PROSPECTING PHASE

TABLE 4-4: ENVIRONMENTAL OUTCOMES AND ACTIONS APPLICABLE TO THE END OF PROSPECTING PHASE

Project activities:	Aspect	Environmental and Social Performance Objectives:	Impact Management Outcomes or Targets	Mitigation and Impact Management Actions	Responsibility	Timing:	Monitoring and record keeping requirements
4.4.1 SURVEY/ SAMPLING VESSEL TO LEAVE AREA	Presence of survey vessel	Ensure navigational safety	Zero maritime incidents	• Where possible, attempt the recovery of any items lost overboard during the operation phase that could not be recovered at the time. The benefits of retrieval of debris or equipment must first be weighed up against the potential environmental impacts, health and safety risks • Prepare a final record of lost equipment that could not be recovered from the prospecting area. • Where any items that could not be recovered constitute a seafloor or navigational hazard ensure that actions listed in 4.3.8 have been implemented: – Complete a standard form / record sheet, which records the location, date and cause of loss, details of equipment type, weather, sea state, etc. – Notify SAMSA and SAN Hydrographer. – Request that SAN Hydrographer send out a Notice to Mariners with this information..	BPT127 and Appointed contractor	On completion of surveying / sampling	Copy of hazards database (see Section 4.3.8)
4.4.2 INFORM RELEVANT PARTIES OF PROSPECTING COMPLETION	Presence of survey vessel	Ensure that relevant parties are aware that the prospecting operation is complete	All maritime stakeholders on project database notified	• Notify the SAN Hydrographic office when the campaign is complete so that the Navigational Warning can be cancelled.	Appointed contractor and vessel's Master	Within four weeks after completion of prospecting campaign	Copies of notifications

Project activities:	Aspect	Environmental and Social Performance Objectives:	Impact Management Outcomes or Targets	Mitigation and Impact Management Actions	Responsibility	Timing:	Monitoring and record keeping requirements
4.4.3 REHABILITATION AND CLOSURE	Seabed disturbance	Ensure compliance with EMPr	Issuing of a prospecting right closure certificate from DMRE	• Apply for closure, submit the following documentation to the DMRE: – A final layout plan; – A Closure Plan (if required); – An Environmental Risk Report; – A Final Audit Report; and – A completed application form to transfer environmental responsibilities and liabilities, if such transfer has been applied for.	BPT127	On completion of prospecting	Copy of prospecting right closure certificate
4.4.4 INFORMATION SHARING	Increasing available information of benthic environment	Expand knowledge base	Increasing knowledge base of South Africa's benthic environment	• Where feasible share non-confidential data collected during the prospecting programme, if requested, to resource managers (including DFFE, South African National Biodiversity Institute and appropriate research institutes).	BPT127	On completion of prospecting	Records of relevant interactions

APPENDIX A: CURRICULA VITAE OF THE PROJECT TEAM

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CURRICULUM VITAE

NIGEL ROSSOUW

PRINCIPAL ENVIRONMENTAL CONSULTANT

SLR Consulting Africa Pty Ltd

QUALIFICATIONS

MSc	1998	Environmental and Geographical Science
BSc (Hons)	1993	Physical Geography

EXPERTISE

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

Nigel is an Environmental and Social Specialist with 25 years of experience in the corporate, project implementation and consulting environments. Nigel has assisted clients and employers in the oil and gas, water, large infrastructure and public sectors in managing their Environmental, Social and Governance (ENVIRONMENTAL) risks and de-risking projects through the delivery of International Finance Corporation (IFC) and Equator Principle standards. Nigel has worked in South African, Namibia, Botswana, Mozambique, Kenya, Tanzania, Uganda, Ethiopia, Egypt, Reunion Island, India, Thailand, Malaysia, Indonesia, Philippines and the United Arab Emirates. Nigel worked for eight years in Shell where he gained an in-depth experience of the energy sector working across the Upstream, Mid-stream and Project & Technology lines of business providing environmental and social advise to a portfolio of large energy ventures and projects in the Africa and Asia Pacific regions.

Nigel's areas of experience covers: Environmental and Social Impact Assessment, Strategic Environmental Assessment, Options Analysis, Environmental and Social Planning and Management, Environmental and Social Due Diligence, Monitoring and Auditing, Training and Capacity Building.

AWARDS & KEY ACHIEVEMENTS

- Most Promising Young Scientist Award – Council for Scientific and Industrial Research (1997)
- Invited Keynote Speaker by the Swedish International Development Agency for the International Conference on Integrating Environmental Aspects into Planning in Stockholm (2000)
- Invited International Guest Speaker by the Swedish Environmental Protection Agency for the International Conference on Sustainable Development in Malmö (2001)
- Achiever of the Year Award - Council for Scientific and Industrial Research (2002)
- Invited international contributor and assurance reviewer for the British Department for International Development's (DfID) strategy workshop in London on the revisions to DfIDs environmental sustainability policies (2002)
- National Award by the South African Black Technical and Allied Careers Organisation (SABTACO) for professional excellence in environmental management (2002)
- Invited Keynote Speaker by the Southern African Institute for Environmental Assessment for the Windhoek workshop on EIA and SEA in the SADC region (2003)
- Elected to serve as President of the South African affiliate of the International Association for Impact Assessment (2003)
- Appointed by the Department of Environmental Affairs and Tourism to serve on a panel of experts to review the process and documentation of the development of Strategic Environmental Assessment guidelines (2006).
- Appointed by the Department of Environmental Affairs and Tourism to serve on a review panel of experts for the project on EIA Effectiveness and Efficiency (2007).
- IAIAsa Premier Award for the application of innovating environmental and social practices for the implementation of the Berg River Dam (2008)
- Invited expert guest speaker for the Water Security Africa Conference on the management of water resources and infrastructure, held at Hartebeespoort (2009).
- Invited guest speaker on the sustainability of large infrastructure at the South African Institute for Civil Engineers conference, held at CSIR Convention Centre (2010).
- Appointed to the Shell Global Environmental Expertise Group (2017)

PROJECTS

Oil and Gas, Marine and Mining

Tullow Oil Environmental Impact Assessment for 3D Marine Seismic Operations in Namibia (2021)

Project Lead for the Environmental Impact Assessment for Tullow Oil's 3D Marine seismic survey campaign in Nambia. Role: Project director, reviewer and quality control

Environmental Support and Advisory to Impact Oil & Gas for their portfolio of offshore exploration Blocks in South Africa (2021)	Ongoing strategic and operational environmental support, advisory and environmental planning under the Master Services Framework Agreement for Impact Oil & Gas. Role: Project Manager
Saldehco Saldanha Ship-to-Ship Bunkering Operations Bunkering Operations Environmental Management Plan (2020)	HAZOP, Spill Modelling and Ecological Risk Assessment of marine fuel ship-to-ship bunkering operations in Saldanha. Development of Bunkering Operations Environmental Management Plan. Role: Project Manager and report author.
Storage of hazardous substances at the Saldanha Bay IDZ and construction of multi-product fuel pipeline to the Port of Saldanha (2020)	Development of multi-product fuel pipeline Environmental Management Plan. Role: Project Manager and Report author.
De Beers Marine consolidated Environmental Management Programme for geophysical survey and bulk sampling activities in Sea Concessions 4C, 5C and 6C, West Coast, South Africa	Development of Environmental Management Programme. Role: Project Director, reviewer and quality control
Shell Oman Onshore Gas Full Field Development IFC Performance Review Due Diligence (2020)	Due Diligence and IFC Performance Standards compliance assessment and assurance. Provide Assurance, Advise and Support to Shell Oman team leading the Environmental Impact Assessment and development of the operations Environmental Social Health Management Plan. Role: Conduct E&S Risk Assessment, environmental, social and human rights Due Diligence Review and Environmental Assurance
Shell Indonesia Small Scale LNG Environmental and Social Impact Assessment (2019 - 2020)	Provide Assurance and Advise to Shell team leading the Environmental Impact Assessment. Assure that Shell's Control Framework and IFC Performance Standards are applied. Role: Environmental Assurance
Shell Egypt Deep Water Exploration Environmental and Social Impact Assessment (2019 - 2020)	Conduct E&S Risk Assessment, environmental, social and human rights Due Diligence Review. Accountable for environmental Due Diligence and IFC Performance Standards implementation. Develop Environmental Impact Assessment Scope of Work and procure services of environmental consultancy. Integrate environmental objectives into design and operational plan. Manage regulatory and permitting requirements. Lead stakeholder engagement. Operational environmental management advise and support. Compliance auditing of Environmental Mitigation Plan and reporting to Regulators. Role: Environmental Planner and Impact Assessment Lead.

Shell Philippines Malampaya Deep Water Production Drilling & subsea infrastructure Environmental and Social Impact Assessment (2019 - 2020)	Conduct E&S Risk Assessment, environmental, social and human rights Due Diligence Review. Accountable for ENVIRONMENTAL Due Diligence and IFC Performance Standards implementation. Develop Environmental Impact Assessment Scope of Work and procure services of environmental consultancy. Integrate environmental objectives into design and operational plan. Manage regulatory and permitting requirements. Lead stakeholder engagement. Operational environmental management advise and support. Compliance auditing of Environmental Mitigation Plan and reporting to Regulators. Role: Environmental Planner and Impact Assessment Lead.
Shell Asia Pacific Trading and Supply Operations (Thailand, Indonesia, Malaysia and Singapore). Health Safety Security and Environment Audit (2018)	Health Safety Security and Environment Audit. Role: Audit team member responsible for Environment Risk component (Biodiversity, Greenhouse Gas, Energy Management, Waste, Water, Ozone Depleting Substances, Soil and Groundwater, Flaring and Venting, Sulphur Oxides and Nitrogen Oxides).
Shell India Hazira Liquified Natural Gas. Health Safety Security and Environment Audit (2018)	Health Safety Security and Environment Audit. Role: Audit team member responsible for Environment Risk component (Biodiversity, Greenhouse Gas, Energy Management, Waste, Water, Ozone Depleting Substances, Soil and Groundwater, Flaring and Venting, Sulphur Oxides and Nitrogen Oxides).
Shell United Arab Emirates, Abu Dhabi Onshore Exploration Environmental and Social Impact Assessment (2018)	Conduct E&S Risk Assessment, environmental, social and human rights Due Diligence Review. Accountable for ENVIRONMENTAL Due Diligence and IFC Performance Standards implementation. Develop Environmental Impact Assessment Scope of Work. Integrate environmental objectives into design and operational drilling plan. Manage regulatory and permitting requirements. Lead stakeholder engagement. Operational environmental management advise and support. Compliance auditing of Environmental Mitigation Plan and reporting to Regulators. Role: Environmental Planner and Impact Assessment Lead.
Shell Indonesia Abadi Onshore Liquified Natural Gas Environmental and Social Impact Assessment (2018)	Conduct E&S Risk Assessment, environmental, social and human rights Due Diligence Review. Accountable for environmental Due Diligence and IFC Performance Standards implementation. Assess environmental and social (including resettlement) impacts, risks, and opportunities. Conduct due diligence and cost mitigation and enhancement measures. Assist Shell's local team in determining requirements and scope for Environmental and Social Health Impact Assessments; Environmental and Social Management Plans under Indonesian Regulations and international lender requirements. Provide guidance to Shell's local team and the local Consultants. Role: Environmental Planner and Impact Assessment Lead.
Shell Mozambique Afungi Gas-To-Liquid plant Environmental Planning (2018)	Conduct E&S Risk Assessment, environmental, social and human rights Due Diligence Review. Develop Environmental Impact Assessment Scope of Work. Integrate environmental objectives and criteria into design and options analysis. Manage regulatory and permitting requirements. Participate in stakeholder engagement. Manage and implement Relocation Action Plan and Biodiversity Action Plan. Operational environmental management advise. Support and build capacity of local staff. Role: Environmental Planner and Impact Assessment Lead.

Shell South Africa Liquified Natural Gas import and Regasification (2014 - 2018)	Conduct E&S Risk Assessment, environmental, social and human rights Due Diligence. Review Accountable for environmental Due Diligence and IFC Performance Standards implementation. Develop Environmental Impact Assessment Scope of Work. Integrate environmental objectives and criteria into design and options analysis. Manage regulatory and permitting requirements. Participate in stakeholder engagement. Operational environmental management advise and support. Role: Environmental Planner and Impact Assessment Lead.
Shell Namibia Deep Water Exploration: seismic survey and exploration drilling Environmental Planning (2014 - 2020)	Conduct E&S Risk Assessment, environmental, social and human rights Due Diligence Review. Accountable for environmental Due Diligence and IFC Performance Standards implementation. Develop Environmental Impact Assessment Scope of Work. Integrate environmental objectives into design and operational drilling plan. Manage regulatory and permitting requirements. Participate in stakeholder engagement. Operational environmental management advise and support. Compliance auditing of Environmental Mitigation Plan and reporting to Regulators. Role: Environmental Planner and Impact Assessment Lead.
Shell South Africa Orange Basin Deep Water Exploration: seismic survey and exploration drilling Environmental Planning (2014 - 2018)	Conduct E&S Risk Assessment, environmental, social and human rights Due Diligence Review. Accountable for environmental Due Diligence and IFC Performance Standards implementation. Develop Environmental Impact Assessment Scope of Work. Integrate environmental objectives into design and operational drilling plan. Manage regulatory and permitting requirements. Participate in stakeholder engagement. Operational environmental management advise and support. Compliance auditing of Environmental Mitigation Plan and reporting to Regulators. Role: Environmental Planner and Impact Assessment Lead.
Shell South Africa unconventional exploration drilling in the Karoo, Environmental Planning (2014 - 2018)	Conduct E&S Risk Assessment, environmental, social and human rights Due Diligence Review. Accountable for environmental Due Diligence and IFC Performance Standards implementation. Develop Environmental Impact Assessment Strategy and Scope of Work. Integrate environmental objectives into engineering design and commercial plans. Manage regulatory and permitting requirements. Operational environmental management advise and support. Compliance auditing of Environmental and Social Mitigation Plan and reporting to Regulators. Role: Environmental Planner and Impact Assessment Lead.
Strategic Fuel Fund Environmental Impact Assessment of the Proposed Upgrade of the Milnerton, Cape Town Oil Storage Tank Farm (1997 - 1999)	Environmental Impact Assessment of the Proposed Upgrade of the SFF Milnerton Tank Farm and the Associated Development of a Single Point Mooring Facility in Table Bay, Cape Town for SFF Association. Role: Project Manager and report writer.
	Infrastructure
Confidential Client, Transactional Environmental Due Diligence, Waste Management Facilities, South Africa (2021)	Nigel was part of a team conducting an environmental due diligence of a selection of waste management facilities in South Africa. Nigel's role was to lead the due diligence site visits and produce the Environmental Due Diligence Report to a private Fund Management company intending to invest in the growth of a waste management company.

Witwatersrand Acid Mine Drainage Emergency Works Environmental Planning (2010 - 2012)	The first phase involved emergency works entailing the construction of high-density sludge treatment plants, aimed at reducing the concentration of metals and neutralise Acid Mine Drainage in the Western, Central and Eastern Basins of the Witwatersrand. The second phase involved the treatment of water from the first phase to a potable or industrial water standard for sale to consumers. Role: Head of the Environment Department at Trans Caledon Tunnel Authority. Conduct E&S Risk Assessment. Accountable for environmental Due Diligence and IFC Performance Standards implementation. Development of the environmental component of the contract specifications for the Design and Supervising Engineer and Construction Contractors. Line Manager and support to the Site Environmental Manager. Oversight and assurance role. Review and assurance of the Environmental Management Plan. Environmental and Social performance reporting to the TCTA Board. Responsible for managing land acquisition processes.
Mokolo Crocodile Water Augmentation Project Environmental Planning (2007 - 2012)	The project comprises the construction of a 46 km pipeline and a pump station transferring water from the existing Mokolo Dam to supply water to EXXARO Grootegeluk Mine, Eskom's Matimba Power Station, Lephalale Municipality and to supply the new Medupi Power Station. Role: Head of the Environment Department at Trans Caledon Tunnel Authority. Conduct E&S Risk Assessment. Accountable for ENVIRONMENTAL Due Diligence and IFC Performance Standards implementation. Development of the environmental component of the contract specifications for the Design and Supervising Engineer and Construction Contractors. Line Manager and support to the Site Environmental Manager. Oversight and assurance role. Review and assurance of the Environmental Management Plan. Environmental and Social performance reporting to the TCTA Board. Responsible for managing land acquisition, economic displacement and compensation processes.
Olifants River Water Resource Development Project Environmental Planning (2007 - 2012)	Project entails the construction of a bulk water pipeline to meet the water supply requirements of new mining developments in Limpopo province as well as community needs. Role: Head of the Environment Department at Trans Caledon Tunnel Authority. Conduct E&S Risk Assessment. Accountable for ENVIRONMENTAL Due Diligence and IFC Performance Standards implementation. Development of the environmental component of the contract specifications for the Design and Supervising Engineer and Construction Contractors. Line Manager and support to the Site Environmental Manager. Oversight and assurance role. Review and assurance of the Environmental Management Plan. Environmental and Social performance reporting to the TCTA Board. Responsible for managing land acquisition, economic displacement and compensation processes.
Komati Water Scheme Augmentation Project Environmental Planning (2007 - 2012)	Project entails water supply to Eskom's Duvha and Matla power stations and involved construction of a pump station and water supply pipelines to the power stations. Role: Head of the Environment Department at Trans Caledon Tunnel Authority. Conduct E&S Risk Assessment. Accountable for ENVIRONMENTAL Due Diligence and IFC Performance Standards implementation. Development of the environmental component of the contract specifications for the Design and Supervising Engineer and Construction Contractors. Line Manager and support to the Site Environmental Manager. Oversight and assurance role. Review and assurance of the Environmental Management Plan. Environmental and Social performance reporting to the TCTA Board. Responsible for managing land acquisition, economic displacement and compensation processes.

Mooi-Mgeni Water Infrastructure Transfer Scheme Phase 2 Environmental Planning (2007 - 2012)	Project involved construction of the Spring Grove dam and the associated transfer system (a pumpstation and a pipeline) to supplement the yield of the water supply system to the Durban Metro, district and local municipalities. Role: Head of the Environment Department at Trans Caledon Tunnel Authority. Conduct E&S Risk Assessment. Accountable for ENVIRONMENTAL Due Diligence and IFC Performance Standards implementation. Development of the environmental component of the contract specifications for the Design and Supervising Engineer and Construction Contractors. Line Manager and support to the Site Environmental Manager. Oversight and assurance role. Review and assurance of the Environmental Management Plan. Environmental and Social performance reporting to the TCTA Board. Responsible for managing land acquisition, economic displacement and compensation processes.
Vaal River Eastern Sub-System Water Infrastructure Augmentation Environmental Planning (2007 - 2012)	Project involved emergency water transfer scheme to abstract water from the Vaal Dam and pump it to over a distance of 115 kilometres via 2m diameter pipes for the supply of water to Eskom and Sasol. Role: Head of the Environment Department at Trans Caledon Tunnel Authority. Conduct E&S Risk Assessment. Accountable for ENVIRONMENTAL Due Diligence and IFC Performance Standards implementation. Development of the environmental component of the contract specifications for the Design and Supervising Engineer and Construction Contractors. Line Manager and support to the Site Environmental Manager. Oversight and assurance role. Review and assurance of the Environmental Management Plan. Environmental and Social performance reporting to the TCTA Board. Responsible for managing land acquisition, economic displacement and compensation processes.
Equator Principles Compliance Review of the Komati Water Scheme Augmentation Project (2010)	ENVIRONMENTAL Due Diligence and Equator Principles Compliance Review. Assurance report prepared for the private banks funding the project. Role: Conduct E&S Risk Assessment environmental, social and human rights Due Diligence Review and Environmental Assurance.
Construction of the Berg River Dam Environmental Planning (2004 - 2007)	Role: Site Environmental Manager for the Trans Caledon Tunnel Authority. Conduct E&S Risk Assessment. Accountable for ENVIRONMENTAL Due Diligence and IFC Performance Standards implementation. Monitoring and oversight of the implementation of the environmental component of engineering and construction specifications. Managed the implementation of the Environmental Management Plan, the Social Performance Strategy, the Sustainable Utilisation Plan, the Social and Environmental Monitoring Programmes and the Local Content Strategy. Managed the implementation of the Heritage Plan which included relocation of graves and archaeological investigations. Managed the social monitoring process which included applying techniques such as qualitative interviews, quantitative surveys, longitudinal studies and Appreciative Inquiry.
Environmental Impact Assessment of the Installation of a Submarine Fibre Optic Cable on the Indian Ocean Island of Reunion (2000)	Environmental Impact Assessment of the Installation of a Submarine Fibre Optic Cable on the Indian Ocean Island of Reunion. Client: TyCom Ltd. Role: Project Manager and report writer.

Strategic Environmental Assessment of the East London Industrial Development Zone (1997)	Strategic Environmental Assessment of the Proposed Industrial Development Zone at the West Bank in East London for the Border Metropolitan Development Corporation. Role: Part of Project Management team and report writer.
Strategic Environmental Assessment of the Coega Industrial Development Zone (1997)	Strategic Environmental Assessment of the Proposed Industrial Development Zone and Harbour at Coega in the Eastern Cape for the Coega IDZ Initiative. Role: Part of Project Management team and report writer.
Environmental Impact Assessment and Environmental Management Plan of the Construction of a New Quay at the Port of Lüderitz, Namibian (1997)	Environmental Assessment and Environmental Management Plan of the Construction of a New Quay at the Port of Lüderitz, for the Namibian Ports Authority. Role: Project Manager and report writer.
Environmental Management Plan for the Century City Development, Cape Town (1996)	Environmental Management Plan for the Incorporation of a Wetland into the Century City Development at Milnerton, Cape Town for Monex Development Company. Role: Project Manager and report writer.
Environmental Management Plan for the Thesen Island Development, Knysna (1996)	Environmental Management Plan for the Thesen Island Residential and mix-use development, Knysna. Role: Project Manager and report writer.
	Natural Resource and Heritage
Development and implementation of the Environmental Management and Heritage Conservation Management Plan for Robben Island (1998 - 1999)	Development and implementation of the Environmental Management Plan and Integrated Conservation Management Plan for Robben Island. Managed Robben Island's environmental and biodiversity programs. Contributor in the submission of documents for World Heritage Site Status. Produced Robben Island State of Environment Report. Produced Waste Management Plan. Ensuring compliance with the environmental requirements of The United Nations Educational, Scientific and Cultural Organization. Role: Environmental Manager and report writer.
	Policy, Regulatory Reviews and Best Practice Guides
Performance review of the Environmental Impact Assessment system in South African for the Department of Environmental Affairs (2007)	Appointed by the Department of Environmental Affairs and Tourism to serve on a review panel of experts for the project on South Africa's EIA Effectiveness and Efficiency.
Performance review of the Strategic Environmental Assessment system in South African for the Department of Environmental Affairs (2006)	Appointed by the Department of Environmental Affairs and Tourism to serve on a panel of experts to review the performance of SEA in South African and review the development of Strategic Environmental Assessment guidelines.

Integrated Environmental Management Information Documents for the South African Department of Environmental Affairs (2002 - 2004)	Production of 16 Integrated Environmental Management Technical Guideline Documents for the South African Department of Environmental Affairs. Role: Project Manager, editorial review and author.
Review of South African EIA Performance as part of SADC EIA country review (2002)	Review of EIA Performance of SADC countries. Role: Project leader and main author for the South African country report. Client: World Bank and the Southern African Institute of Environmental Assessment.

MEMBERSHIPS

INTERNATIONAL ASSOCIATION FOR IMPACT ASSESSMENT SOUTH AFRICA (IAIASA)	Member

PUBLICATIONS

2021	Susie Brownlie, Jo Treweek, Pippa Howard, Nigel Rossouw, Liza van der Merwe, Gabriela Factor and Jessica Hughes (2021) Connecting people's wellbeing and biodiversity in impact assessment. Fastips, International Association for Impact Assessment, http://www.iaia.org/fasttips.php
2018	Susie Brownlie, Liza van der Merwe, Nigel Rossouw, Ilse Aucamp, Jo Treweek, Asha Rajvanshi and Francesca Viliani (2018) Induced Impacts. Fastips, No. 17, International Association for Impact Assessment, http://www.iaia.org/fasttips.php
2017	Burns, M., Atkinson, D., Barker, O., Davis, C., Day, L., Dunlop, A., Esterhuyse, S., Hobbs, P., McLachlan, I., Neethling, H., Rossouw, N., Todd, S., Snyman-Van der Walt, L., Van Huyssteen, E., Adams, S., de Jager, M., Mowzer, Z. & Scholes, B. (2016) Scenarios and activities. shale gas development in the central karoo: a scientific assessment of the opportunities and risks, ed. Scholes, R., Lochner, P., Schreiner, G., Snyman-Van der Walt, L. and de Jager, M. Pretoria: CSIR, 2016. ISBN: 978-0-7988-5631-7.
2015	Rossouw, N.J. (2015) A review of methods for determining impact significance, in: Thomas Fischer (editor) Environmental Assessment: Critical Concepts in Built Environment, Routledge.
2010	Haas, L., Mazzei, L., O'Leary, D. and Rossouw, N. (2010) Communication Practices for Governance and Sustainability Improvement – Berg Water Project, World Bank Working Paper No. 199, Washington DC, http://documents.worldbank.org/curated/en/106841468102896113/Berg-Water-Project-communication-practices-for-governance-and-sustainability-improvement
2010	Rossouw, N.J. (2010) The Berg Water Project: Charting the Future for Large Dams, in: Impact Assessment Case Studies from Southern African, Southern African Institute for Environmental Assessment, Windhoek, pp. 1-11, https://irp-cdn.multiscreensite.com/2eb50196/files/uploaded/17%20BergWaterProject.pdf

2008	Rossouw, N.J. and Grobler, D. (2008) Berg River Dam: designed with rivers in mind, The Water Wheel, 7 (4), 33-37, http://www.wrc.org.za/wp-content/uploads/mdocs/WaterWheel_2008_04_12%20Berg%20p%2033-37.pdf
2008	Rossouw, N.J. and Grobler, D. (2008) How has the ecological reserve influenced the design and operation of the Berg River Dam, Civil Engineering, 16 (6), 12-15.
2007	Rossouw, N.J. and Malan, S. (2007) The importance of theory in shaping social impact monitoring: lessons from the Berg River Dam, South Africa, Impact Assessment and Project Appraisal, 25(4), 291-299.
2005	Rossouw, N. 2005: Environmental Monitoring Committees, Integrated Environmental Management Series No. 21, Department of Environmental Affairs and Tourism (DEAT), Pretoria, https://www.environment.gov.za/sites/default/files/docs/series21environmental_monitiring_committees.pdf
2004	Rossouw, N.J. and Wiseman, K. (2004) Learning from the implementation of environmental public policy instruments after the first ten years of democracy in South Africa, Impact Assessment and Project Appraisal, 22 (2), 1-10.
2003	Rossouw, N.J. (2003) A review of methods and generic criteria for determining impact significance, African Journal of Environmental Assessment and Management, 6, 44-61.
2003	Rossouw, N.J. and Govender, K. (2003) Strategic Environmental Assessment and development planning in South Africa, Environmental Assessment Outlook, 3, 70-73.
2002	Rossouw, N. 2002: Impact Significance, Integrated Environmental Management Series No. 5, Department of Environmental Affairs and Tourism (DEAT), Pretoria, https://www.environment.gov.za/sites/default/files/docs/series5_impact_significance.pdf
2002	Rossouw, N. and Pero, L. 2002: Specialist Studies, Integrated Environmental Management Series No. 4, Department of Environmental Affairs and Tourism (DEAT), Pretoria, https://www.environment.gov.za/sites/default/files/docs/series4_speialist_studies.pdf

2001	Rossouw, N.J. (2001) The status of Strategic Environmental Assessment and Environmental Impact Assessment in South Africa, EIA Yearbook, 1 (1), 22-24.
2000	Rossouw, N.J., Audioun, M., Lochner, P., Wiseman, K. and Heather-Clarke, S. (2000) The Development of Strategic Environmental Assessment in South Africa, Impact Assessment and Project Appraisal, 18(3), 217-223.
1999	Weaver, A., Rossouw, N.J., and Grobler, D. (1999) Scoping and issues focussed Environmental Impact Assessment in South Africa, African Journal of Environmental Assessment and Management, vol. 1, no. 1, 1-11.
1997	Rossouw, N.J. (1997) Mapping vegetation and erosion changes on the northern slopes of Table Mountain using multi-temporal aerial photography and GIS, 1944-1992, South African Geographical Journal, Special Issue, 79 (2), 136-146.

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
Belton Park Trading 127 (Pty) Ltd – Prospecting Right application for Sea Concessions 13C, 15C, 16C, 17C & 18C, West Coast, South Africa (Current)	Environmental Impact Assessment (EIA) process for the proposed offshore prospecting operations in Sea Concessions 13C, 15C, 16C, 17C and 18C, off the West Coast of South Africa. Nicholas compiled the Scoping Report, undertook the required public participation process and managed the appointed specialists.
Belton Park Trading 127 (Pty) Ltd – Prospecting Right application for Sea Concessions 14B, 15B & 17B, West Coast, South Africa (Current)	Environmental Impact Assessment (EIA) process for the proposed offshore prospecting operations in Sea Concessions 14B, 15B and 17B, off the West Coast of South Africa. Nicholas compiled the Scoping Report, undertook the required public participation process and managed the appointed specialists.

SLR

De Beers Marine (Pty) Ltd – Environmental Impact Assessment for Bulk Sampling Activities for Offshore Marine Diamonds, West Coast, South Africa (Current)	EIA 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 (2018 - 2020)	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.
Zevocept (Pty) Ltd – Development of a borrow pit, Western Cape, South Africa (2019 - 2020)	Basic Assessment process for the proposed development of a borrow pit on Farm Modder Rivier, Western Cape. Nicholas assisted in the compilation of the BAR, overseeing the required public participation process and the management of the appointed specialists.
De Beers Marine (Pty) Ltd – Pre-Scope Environmental Input for Offshore Geophysical Survey, Greenland (2019)	Undertake an initial evaluation of the anticipated impacts associated with planned geophysical surveys to be undertaken off the west coast of Greenland and compile environmental input to be included into a Pre-Scope submission to the Greenland Minerals Authority. Nicholas undertook the management of the appointed specialists.
Copper Tree Minerals – Proposed Kitwe Tailings Retreatment Project, Zambia (2017 - 2019)	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)	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.
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. Nicholas undertook the update of the existing financial provision and prepared the assessment report.
Impala Platinum Limited Unincorporated Joint Venture – EMP Performance Assessment and Closure Liability Estimate for Prospecting Operations (2017)	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.

SLR

Belton Park Trading 127 (Pty) Ltd – Mining Right application for offshore marine Diamonds in Sea Concession 2C, West Coast, South Africa (2016 - 2017)	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)	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)	Environmental Management Programme (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)	EIA amendment process for the existing K5 Upper Mining Right to provide for the extension of the K5 Upper underground mining area. 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)	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)	Consolidation of 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)	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)	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)	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)	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)	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
Total E & P (SA) (Pty) Ltd - Proposed Seismic Surveys and Additional Exploration Activities in Block Deep Western Orange Basin off the West Coast of South Africa (Current)	EIA process for the proposed offshore exploration activities in the Block Deep Western Orange Basin, West Coast of South Africa. Nicholas is the project manager for the EIA Process and is responsible for compiling the Scoping and EIA Reports (including EMP), undertaking the required public participation process and managing the appointed specialists.
New Age Energy Algoa (Pty) Ltd – Environmental Audit Algoa-Gamtoos Block, East Coast of South Africa (2020)	Environmental Audit undertaken in compliance with Section 54 (A)(2) of the EIA Regulations, 2014 (as amended) for the exploration activities conducted in the Algoa-Gamtoos Block. Nicholas was the project manager and responsible for undertaking the required audit and compiling the audit report.
PGS Exploration (UK) Limited – Reconnaissance Permit Application for 2D and 3D seismic surveys offshore West Coast South Africa (2018)	EMP process for the proposal to undertake 2D and 3D speculative seismic surveys offshore of the 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) Ltd – 2D and 3D seismic surveys compliance, South and East Coasts, South Africa (2015-2016)	EMP Compliance and audit services for speculative 2D and 3D seismic surveys off the South and East Coasts of South Africa. Nicholas' role included managing the audit process and compiling the survey close-out reports, which outlined the implementation of the EMP (compliance) and highlighted any problems and non-compliance issues that arose during each survey.
PGS Exploration (UK) Limited – Reconnaissance Permit Application Amendment to undertake a 3D seismic survey offshore KwaZulu-Natal, South Africa (2018)	EMP Amendment process for the proposal to undertake a 3D speculative seismic survey 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)	EMP 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)	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)	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)	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
Aurecon South Africa (Pty) Ltd for the South African National Roads Agency SOC Limited - Upgrade of N1/4 and development of borrow pits (Current)	Basic Assessment process for the proposed upgrade of a 17 km stretch of the N1 Section 4 from Monument River (km 46.00) to Doornfontein (km 63.00), including the improvement of the Matjiesfontein intersection and development of additional borrow pits. Nicholas is the project manager and responsible for the compilation of the Basic Assessment Report (BAR), undertaking the required public participation process and managing the appointed specialists.
AECOM SA for Western Cape Government (WCG): Department of Transport & Public Works - Upgrading of TR31/2 between Ashton and Montagu, Cogmanskloof Pass (2018 - 2019)	ECO services for the upgrading of Trunk Road 31 Section 2, Cogmanskloof Pass, between Ashton and Montagu, including the main roads through the two towns. Nicholas served as the ECO during the interim contract phase and provided monthly ECO audit reports.
GIBB (Pty) Ltd for WCG:DTPW – Construction of Erosion Protection Measures for the Swart 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. 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, Eastern Cape (2016 - 2018)	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)	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)	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)	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)	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.
Meerenhof Properties (Pty) Ltd - Expansion of dams, South Africa (2017 – ongoing)	Construction and expansion of irrigation dams on Uitsig Farm, Constantia, Cape Town. Nicholas is fulfilling the role of ECO and provides monthly ECO audit reports.
Saldanha Bay Municipality - Maintenance Management Plans for the Bok and Mosselbank Rivers (2016 - 2017)	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)	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)	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)	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)	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
South Africa Mainstream Renewable Power Developments (Pty) Ltd – Proposed Scaffell Custer Photovoltaic Plants, Free State Province (Current)	Four separate EIA processes for the proposed construction of Photovoltaic Plants with a combined generating capacity of up to 475 MW, located in the Free State Province. Nicholas is the project manager and is responsible for the review and compilation of the Scoping and EIA Reports (including EMP) for all projects, undertaking the required public participation processes and managed the appointed specialists.
SolarReserve South Africa (Pty) Ltd – Proposed Kalkaar CSP and Photovoltaic Plants, Free State (2014 -2015)	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)	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)	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)	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)	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)	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)	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)	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)	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
Richmond Park Development Company (Pty) Ltd - Proposed establishment of a fuel station on Erf 38333, Milnerton, Cape Town (Current)	Basic Assessment for the establishment of a fuel station on Erf 38333, Milnerton, Cape Town. Nicholas was the project manager and compiled the BAR (including EMP), undertook the required public participation process and managed the appointed specialists.
We Buy Cars Properties (Pty) Ltd – The construction of a warehouse, Brackenfell (2019)	ECO services for the construction of the We Buy Cars warehouse in Brackefell, Western Cape. Nicholas acted as the [project manager and was responsible for reviewing the monthly ECO reports.
City of Tshwane Metropolitan Municipality - Proposed Expansion of the Winterveld Cemetery (2007 - 2010)	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)	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)	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)	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)	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)	Western Cape Branch Committee Secretary (2019 – 2021).

APPENDIX B: ENVIRONMENTAL SENSITIVITY MAPS

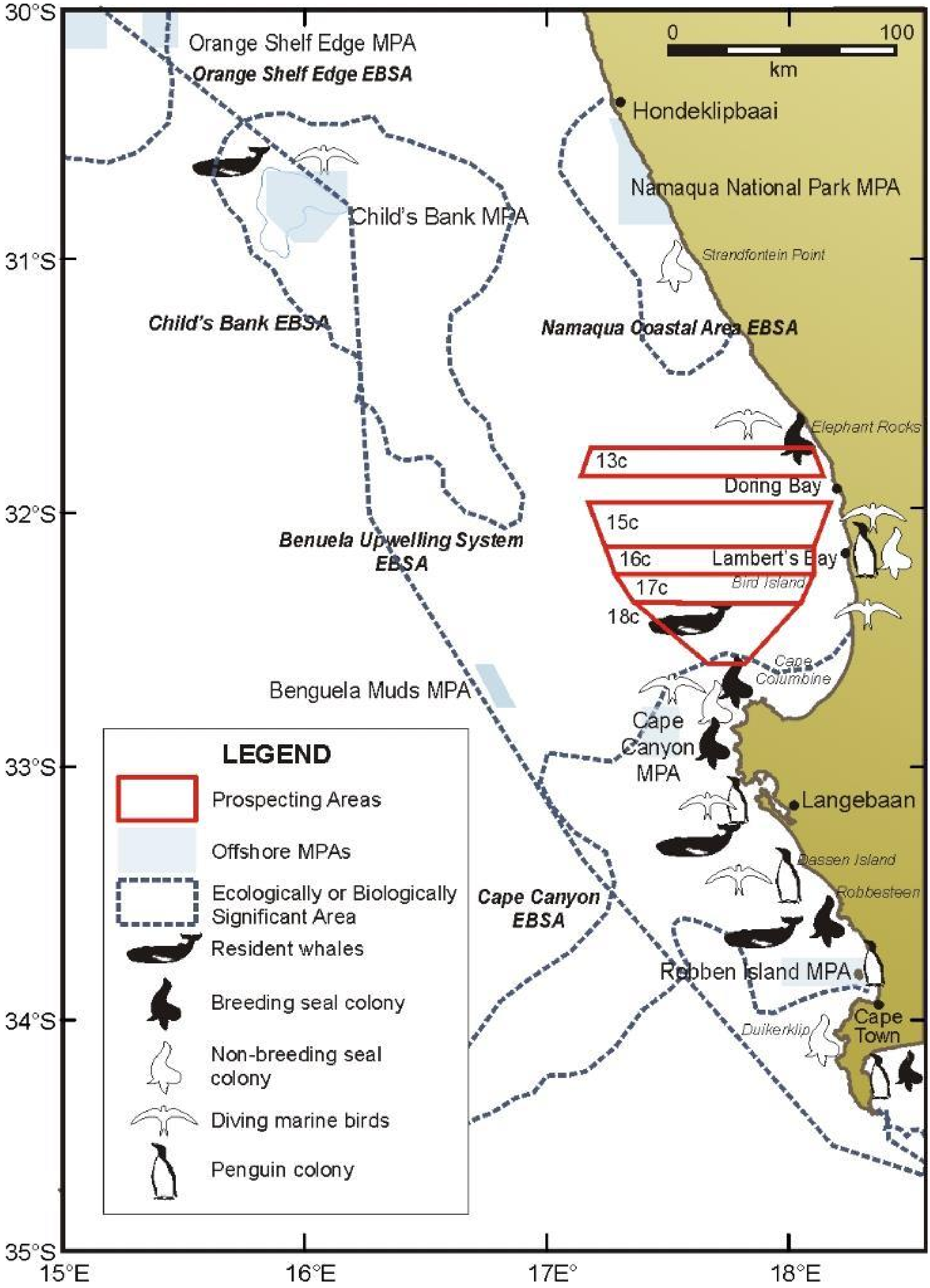

FIGURE 1: PROJECT - ENVIRONMENT INTERACTION POINTS ON THE WEST COAST, ILLUSTRATING THE LOCATION OF SEABIRD AND SEAL COLONIES AND RESIDENT WHALE POPULATIONS IN RELATION TO THE 13C, 15C, 16C, 17C & 18C SEA CONCESSION AREAS. OFFSHORE MARINE PROTECTED AREAS AND EBSAS (AS OF 30 AUGUST 2019) ARE ALSO SHOWN.

AFRICAN OFFICES

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APPENDIX 2: DMRE ACCEPTANCE OF SCOPING REPORT

mineral resources
& energy

Department:
Mineral Resources and Energy
REPUBLIC OF SOUTH AFRICA

Private Bag X 09, Roggebaai, 8001, **Tel:** 021 427 1056, **Fax:** 021 427 1046
09 Atterbury House, Corner Lower Burg and Riebeeck Street, Cape Town 8000
Enquiries: Mr. BP Mohasoa **E-Mail Address:** Peter.Mohasoa@dmre.gov.za
Ref: (WC) 30/5/1/1/3/2/1/10360, (WC) 30/5/1/1/3/2/1/10361, (WC) 30/5/1/1/3/2/1/10362, (WC) 30/5/1/1/3/2/1/10363, (WC) 30/5/1/1/3/2/1/10364
Sub-Directorate: Mine Environmental Management

BY E-MAIL

The Directors
Belton Park Trading 127 (Pty) Ltd
19 Chain Avenue
Cape Town
7405

Attention : Mr. P Esposito
Tel : 021 510 1881
Email : pe@imdhgroup.com

Dear Sir

ACKNOWLEDGEMENT OF AN APPLICATION FOR ENVIRONMENTAL AUTHORISATION LODGED IN TERMS OF SECTION 24 OF NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT 107 OF 1998) AS AMENDED, READ WITH REGULATION 21 OF THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REGULATIONS, 2014 AS AMENDED, FOR PROSPECTING RIGHT APPLICATION FOR DIAMOND, AMETHYST (GEMSTONE), BERYL (GEMSTONE), CORUNDUM (GEMSTONE), EMERALD (GEMSTONE), EPDOTE (GEMSTONE), TOURMALINE (GEMSTONE), ZIRCON (GEMSTONE), SILVER ORE, GOLD ORE, GARNET (GEMSTONE), GEMSTONES EXCEPT DIAMONDS, AQUAMARINE (GEMSTONES), FELDSPAR (GEMSTONE) RUBY (GEMSTONE), ROSE QUARTZ (GEMSTONE), COPPER ORE, RARE EARTHS, TIN ORE, MANGANESE ORE, LITHIUM ORE, BERYLLIUM ORE, COBALT, IRON ORE, NICKEL ORE, TANTALUM/NIOBIUM ORE, ZINC ORE, ZIRCONIUM ORE, GRAVEL, PGM, TITANIUM, HEAVY MINERALS (GENERAL) ON IN THE MAGISTERIAL DISTRICT OF VAN RHYNSDORP: WESTERN CAPE REGION.

I refer to the abovementioned matter and confirm that your application for an **Environmental Authorisation** (hereinafter referred to as EA) lodged on **31 May 2021** is hereby acknowledged.

1. In accordance to Regulation 21(1) "If S&EIR must be applied to an application, the applicant must, within 44 days of receipt of the application by the competent authority, submit to the competent authority a scoping report which has been subjected to a public participation process of at least 30 days and which reflects the incorporation of comments received, including any comments of the competent authority". The Scoping Reports must be in accordance with **Appendix 2** of the 2014 EIA Regulations as amended.

2. It is noted that the applications are by the same applicant for the same development with accepted Scoping Reports, as previously *applied for* and *lapsed* in the following applications: (WC) 30/5/1/1/3/2/1/**10319**, (WC) 30/5/1/1/3/2/1/**10320**, (WC) 30/5/1/1/3/2/1/**10321**, (WC) 30/5/1/1/3/2/1/**10322** and (WC) 30/5/1/1/3/2/1/**10323.** Therefore, **Belton Park Trading 127 (Pty) Ltd** can continue with the Environmental Impact Assessment (EIA) phase subject to compliance with Regulation 21 (2)(a)-(d).

3. You must within **106** days of receipt of applications by the competent authority, submit an Environmental Impact Report inclusive of any specialist reports, and an Environmental Management Programme, which must have been subjected to a Public Participation Process of at least 30 days and which reflects the incorporation of comments received, including any comments of the competent authority. The Impact Assessment Report must also address the comments submitted for the Final Scoping Report.

4. Public participation must be conducted in accordance with Chapter 6 of the 2014 Environmental Impact Assessment Regulations as amended. In terms of Regulation 7(2) "the competent authority or EAP must consult with every organ of state that administers a law relating to a matter affecting the environment relevant to that application for an environmental authorisation when such competent authority considers the application and unless agreement to the contrary has been reached the EAP will be responsible for such consultation".

5. The EAP is therefore requested to consult environmental impact report inclusive of specialist reports, and an EMPr/closure Plan with every organ of state that administers a law relating to a matter affecting the environment as stipulated on regulation 7(2) of 2014 EIA Regulations as amended and to notify the Department of Mineral Resources and Energy of such consultation with the organ of state and include all the comments from all relevant stakeholders and must be

presented in a tabular format that includes the EAP's response to all the issues raised. Should you be unable to obtain comments, proof of the attempts that were made to obtain comments must be enclosed in the EIR to be submitted to the department.

6. State Organs must include but not limited to Provincial Heritage Resources Authority (Heritage Western Cape), Cape Nature, Department of Environmental Affairs and Development Planning (DEA&DP), Department of Agriculture (DoA), Department of Water and Sanitation (DWS), Local Municipality and Department of Environment, Forestry and Fisheries (National Department).

5. With regards to the submission of the EIR; in a case where there are significant changes in the information that was previously submitted; you will need to notify the Department in writing of such changes within the **106** days stated above and submit an environmental impact report within **156** days of receipt of applications by the competent authority.

6. Please ensure that the EIR includes the A3 size locality maps of the area and illustrates the exact location of the proposed development. The maps must be of acceptable quality and associated infrastructure and sensitive environmental features must be reflected.

7. Should an application for Environmental Authorisation be subjected to any permits or authorisations in terms of the provisions of any Specific Environmental Management Acts (SEMAs) and other legislations, proof of such application will be required.

8. You are requested to upload the EIR and EMPr onto SAMRAD online and submit two (2) hard copies of the EIR and EMPr for **each** application including a CD to this Regional Office.

9. Your attention is brought to Section 24F of the NEMA which stipulates "that no activity may commence prior to an environmental authorisation being granted by the competent.

Please note that acknowledgement of your application does not grant you permission to commence with mining activity. Commencement of a listed activity without an environmental authorisation constitutes an offence in terms of Section 49A (1) (a) of NEMA, 1998 (Act 107 of 1998) as amended and upon conviction for such an offence, a person is liable to a fine not exceeding R10 million or to imprisonment for a period not exceeding ten years, or to both such fine and such imprisonment.

Please note that the NEMA timeframes will be triggered by an Acceptance Letter issued in terms of the Minerals and Petroleum Recourses Development Act (MPRDA), for your Prospecting Right application. Should your application be accepted, your scoping and environmental assessment must focus on properties and commodities indicated in the Acceptance Letter. However, should the application for a Prospecting Right be rejected, administration of your EA application will be discontinued.

NB: Regulation 45 of 2014 EIA Regulations stipulates that "an application in terms of these Regulations lapses and a competent authority will deem the application as having lapsed, if the applicant fails to meet any of the time-frames prescribed in terms of these Regulations, unless extension has been granted in terms of regulation 3(7)."

Templates for the above-mentioned documents can be obtained on the Department of Mineral Resources website (www.dmr.gov.za) or from this Regional office on request.

Kind Regards,

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REGIONAL MANAGER: MINERAL REGULATION
WESTERN CAPE REGION
DATE: 9/6/2021

mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

Private Bag X 09, Roggebaai, 8001, Tel: 021 427 1056, Fax: 021 427 1046
09 Atterbury House, Cnr Lower Burg and Riebeeck Street, Cape Town 8000

Enquiries: Mr. BP Mohasoa **E-Mail Address:** Peter.Mohasoa@dmr.gov.za

Ref: (WC) 30/5/1/1/3/2/1/10319
(WC) 30/5/1/1/3/2/1/10320
(WC) 30/5/1/1/3/2/1/10321
(WC) 30/5/1/1/3/2/1/10322
(WC) 30/5/1/1/3/2/1/10323
Sub-Directorate: Mine Environmental Management

The Directors
Belton Park Trading 127 (Pty) Ltd
19 Chain Avenue
Cape Town
7405

Attention : Mr. P Esposito
Tel : 021 510 1881
Email : pe@imdhgroup.com

COMMENTS ON THE FINAL SCOPING REPORT SUBMITTED FOR THE ENVIRONMENTAL AUTHORISATION LODGED IN TERMS OF SECTION 24 OF NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT 107 OF 1998) AS AMENDED, READ WITH REGULATION 21 OF THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REGULATIONS, 2014 AS AMENDED, FOR PROSPECTING RIGHT APPLICATION FOR DIAMOND, AMETHYST (GEMSTONE), BERYL (GEMSTONE), CORUNDUM (GEMSTONE), EMERALD (GEMSTONE), EPDOTE (GEMSTONE), TOURMALINE (GEMSTONE), ZIRCON (GEMSTONE), SILVER ORE, GOLD ORE, GARNET (GEMSTONE), GEMSTONES EXCEPT DIAMONDS, AQUAMARINE (GEMSTONES), FELDSPAR (GEMSTONE) RUBY (GEMSTONE), ROSE QUARTZ (GEMSTONE), COPPER ORE, RARE EARTHS, TIN ORE, MANGANESE ORE, LITHIUM ORE, BERYLLIUM ORE, COBALT, IRON ORE, NICKEL ORE, TANTALUM/NIOBIUM ORE, ZINC ORE, ZIRCONIUM ORE, GRAVEL, PGM, TITANIUM, HEAVY MINERALS (GENERAL) IN THE MAGISTERIAL DISTRICT OF VAN RHYNSDORP: WESTERN CAPE REGION.

1. Your scoping report was examined by the Department and found that it meets the requirements stated in the Environmental Impact Assessment Regulations of 2014 as amended. Therefore, it is accepted

and you are advised to continue with the tasks contemplated in the plan of study for environmental impact assessment.

2. You must within 106 days of the acceptance of the scoping report submit an environmental impact report inclusive of any specialist reports, and an environmental management programme, which must have been subjected to a public participation process of at least 30 days and which reflects the incorporation of comments received, including any comments of the competent authority. **Your 106 days additional of 30 days as per the Directives contained GNR 650 of 05 June 2020 published by Department of Environment, Forestry and Fisheries, beginning from 22nd June 2020 will lapse on the 7th November 2020.** Please note that this is inclusive of weekends but exclusive of public holidays and the period from 15 December 2020 to 05 January 2021.

3. In addition to this, you are requested to address the comments raised by the Department in the letter dated **27th February 2020** on your draft Scoping Report. For ease of reference, the comments were as follows:

Consultation must be extended to the following potential parties:

- Since the activities involve heavy minerals, consultation must be extended to National Nuclear Regulation. You may contact Mr. Mohajane, e-mail address: pemohajane@nnr.co.za or call 012 674 7130.
- Since the activities will impact on the marine living resources, consultation must also be extended to the Department of Environment, Forestry and Fisheries. You are requested to endeavor to locate the relevant divisions within this Department.
- Since the proposed mining location (according to Figure 4 -30) is situated adjacent to Ecologically or Biologically Significant Areas (EBSAs) (to the West, South and especially North), consultation must be extended to the South African National Biodiversity Institute (SANBI).
- Since the sea concession areas overlap with Block 3A/4A for which PetroSA and Sasol are the license holders, consultation must be extended to the companies. There must be an agreement between the two companies and Belton Park Trading 127 (Pty) Ltd on how activities will be harmonized.
- Furthermore, you are requested to consult with Maritime Transport to determine shipping lanes on the proposed mining location.

The EIAR must address the following issues:

- According to Figure 4 – 30, the proposed mining location is home to whales and breeding grounds to seal colony and other animals. The impact assessment must determine the breeding seasons and migration routes and describe how the prospecting activities will be managed to avoid and/or minimize the impacts.
- In the baseline section, you must submit a high resolution seabed sonar image and description of the environmental features.
- Distance of proposed mining location to the shore and EBSAs.
- How you intend to monitor the migration of the pollution plume particularly at bulk sampling phase.
- Given that not all material pumped to the surface will be used, clarify on how you intend to handle excess water and sediment fines.
- Under section 5.3, you indicated that there are development activities (petroleum and mining) in and around the proposed mining location, you are requested to ensure that the impact assessment describes cumulative impacts.

4. The following information are required to be included in the EIR & environmental management programme (EMPr):

a) The EMPr must include how the quantum for financial provision for remediation and rehabilitation was calculated and the method of financial provision;
b) The report must further include a phased mining and rehabilitation plan;
c) Closure plan in accordance to appendix 5 of the NEMA EIA Regulations, 2014 as amended;
d) The total footprint and depth of the proposed development should be indicated;
e) Possible impacts and effects of the development on the surrounding environment; and
f) A operational phase in the EMPr to include mitigation and monitoring measures;

5. Public participation must be conducted in accordance to Chapter 6 of the 2014 Environmental Impact Assessment Regulations as amended. In terms of Regulation 7(2) "the competent authority or EAP must consult with every organ of state that administers a law relating to a matter affecting the environment relevant to that application for an environmental authorisation when such competent authority considers the application and unless agreement to the contrary has been reached the EAP will be responsible for such consultation".

6. The EAP is therefore requested to consult environmental impact report inclusive of specialist reports, and an EMPr/closure Plan with every organ of state that administers a law relating to a matter affecting the environment as stipulated on regulation 7(2) of 2014 EIA Regulations as amended and to notify the Department of Mineral Resources of such consultation with the organ of state and include all the comments from all relevant stakeholders and must be presented in a tabular format that includes the EAP's response to all the issues raised. Should you be unable to obtain comments, proof of the attempts that were made to obtain comments must be enclosed in the EIR to be submitted to the department.

7. With regards to the submission of the EIR; in a case where there are significant changes in the information that was previously submitted; you will need to notify the Department in writing of such changes within the 106 days stated above and submit an environmental impact report within 156 days of acceptance of the scoping report by the Department.

8. Please ensure that the EIR includes the A3 size locality maps of the area and illustrates the exact location of the proposed development. The maps must be of acceptable quality and associated infrastructure and sensitive environmental features;

9. Should an application for Environmental Authorisation be subjected to any permits or authorisations in terms of the provisions of any Specific Environmental Management Acts (SEMAs) and other legislations, proof of such application will be required.

10. You are requested to upload the EIR and EMPr onto SAMRAD on line and submit two (2) hard copies of the EIR and EMPr including a CD to this Regional Office.

11. Your attention is brought to Section 24F of the NEMA which stipulates "that no activity may commence prior to an environmental authorisation being granted by the competent.

NB: Regulation 45 of 2014 EIA Regulations as amended stipulates that "an application in terms of these Regulations lapses and a competent authority will deem the application as having lapsed, if the applicant fails to meet any of the time-frames prescribed in terms of these Regulations, unless extension has been granted in terms of regulation 3(7)."

Hope you find the above in order, for any clarity please do not hesitate to contact me.

Kind Regards,

Regional Manager: Mineral Regulation
Western Cape Region
Date: 02/07/2020

APPENDIX 3: PUBLIC PARTICIPATION PROCESS

APPENDIX 3.1: I&AP DATABASE

APPENDIX 3.2: SCOPING COMMENTS AND RESPONSES REPORT

APPENDIX 3.3: I&AP NOTIFICATIONS

APPENDIX 3.4: EIA COMMENTS AND RESPONSES REPORT

APPENDIX 3.1: I&AP DATABASE

- - - - - - - - - -	Mr H Goliath
- - - - - - - - - -	Ms P Mostert
- - - - - - - - - -	Mr H Slabig
- - - - - - - - - -	Ms M Sowman
- - - - - - - - - -	Mr N Waldeck
.	Mr JA Yeld
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
BirdLife South Africa	Mr A McInnes
Cape West Coast Biosphere Reserve	Mr M Halvorsen
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
Coastal Links	Mr N Dowries
Coastal Links	Ms S Smith
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
Department of Transport	Mr T Mabuela
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
Live Fish Tanks (East Coast) (Pty) Ltd	Mr L De Freitas
Masifundise Development Trust	Ms M Nangle
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
Mayenzeke Development Initiative	Ms J Cole
National Nuclear Regulator	Mr U Coetzee
National Nuclear Regulator	Mr T Hill
National Nuclear Regulator	Mr P Mohajame
National Nuclear Regulator	Mr G Moonsamy
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
SANCCOB	K Ludynia
SANCCOB	Mr C Triay
SANCCOB	Ms L Waller
Sasol	Mr M Ginster
Sea Harvest Corporation Ltd	Mr R Hall
Sea Search Africa	Dr S Elwen
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 Collective South Africa	Ms H Adams
The Wildlife and Environ. Society of South Africa	Mr T Burger
Trans Hex / Ocean Diamond Mining 14C (Pty) Ltd	Mr V Madlela
University of Cape Town	Dr J Sunde
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 Association	Mr P Foley
West Coast Rock Lobster Industry Association	Mr D Grant

APPENDIX 3.2: SCOPING COMMENTS AND RESPONSES REPORT

ENVIRONMENTAL IMPACT ASSESSMENT FOR A PROSPECTING RIGHT APPLICATION FOR OFFSHORE SEA CONCESSIONS 13C, 15C, 16C, 17C & 18C: DRAFT ENVIRONMENTAL IMPACT REPORT

COMMENTS AND RESPONSES REPORT

The following Interested and Affected Parties (I&APs) submitted written comments for the proposed project during the Scoping Phase. The comments received are presented, and responded to, in Table 1 below. No importance should be given to the order in which the comments are presented. As far as possible, comments are presented verbatim from written submissions.

SUBMITTED BY		DATE	METHOD
COMMENTS RECEIVED DURING SCOPING PHASE			
1. Authorities			
1.1	South African Heritage Resources Agency (SAHRA) – Briege Williams	14 January 2020	Email
1.2	Department of Environmental Affairs and Development Planning: Development Facilitation - Gerhard Gerber	10 February 2020	Email
1.3	West Coast District Municipality - Doretha Kotze	17 February 2020	Email
1.4	Department of Mineral Resources and Energy -	2 July 2020	Letter
2. I&APs			
2.1	Birdlife South Africa – Alistair McInnes	9 January & 10 February 2020	Email
2.2	Sea Search – Simon Elwen	9 January 2020	Email
2.3	Southern African Foundation for the Conservation of Coastal Birds (SANCCOB) – Christian Triay	9 January 2020	Email
2.4	Cape West Coast Biosphere Reserve – Office Administrator	15 January 2020	Email
2.5	Ocean Group Ltd – Karen-Dawn Koen	10 February 2020	Email
2.6	Dr Jackie Sunde	3 and 20 July 2020	Email
2.7	Mayenzeke Development Initiative - Josette Cole	3 July 2020	Email
2.8	Masifundise Development Trust - Maia Nangle	3 July 2020	Email
2.9	Paulita Mostert	7 July 2020	Email
2.10	Hahn Goliath	8 July 2020	Email
2.11	John Yeld	22 July 2020	Email

Table 1: Summary table of comments received, with responses from SLR and the project technical team, as appropriate

Note: = Letter/Fax = Telephone = E-mail

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
1.	AUTHORITIES				
1.1	South African Heritage Resources (SAHRA) – Briege Williams				
1.1.1	Legislative Requirements	SAHRA – Briege Williams	14 January 2020	The South African heritage Resources Agency (SAHRA) would like to thank you for submitting the draft Scoping Report for EIA for a prospecting right application of offshore seas concessions 13C, 15C, 16C, 17C & 18C, West Coast, South Africa. In terms of the National Heritage Resources Act, No 25 of 1999 (NHRA), Sections 2 and 35 stipulates that any wreck, being any vessel or aircraft or any part thereof older than 60 years old lying in South Africa's territorial waters or maritime cultural zone is protected and falls under the jurisdiction of SAHRA's Maritime and Underwater Cultural Heritage Unit. These heritage sites or objects may not be disturbed without a permit from the relevant heritage resources authority.	This comment is noted. As noted in Section 4.1.4.6 of the Environment Impact Report (EIR), there are nine wrecks older than 60-years that are located in close proximity to concession areas 13C and 15C – 18C. Mitigation measures to avoid impacts on heritage resources is included in Section 4.3.6 of the Environmental Management Programme (EMPr).
1.1.2	Submission of the Maritime and Underwater Cultural Heritage Impact Assessment	SAHRA – Briege Williams	14 January 2020	The prospecting activities described in the report are geophysical survey, drill sampling and bulk (trench) sampling. The geophysical survey is non-invasive, and it is proposed that both a multibeam echosounder and sub-bottom profiler will be used. The drill sampling is invasive and has a footprint of 5 m^2, it is proposed that a total area of 2.4 hectares will be sampled using this method. The bulk sampling activity will cause the most disturbance to the seabed, it is proposed that 10 trenches each 180 m long and 20 m wide, totalling 3.6 ha would be dug in each concession area. This would result in a total area of approximately 18 hectares of the seabed being disturbed. The Draft Scoping Report has identified the need for a specialist study	This comment is noted. As requested, the EIR, including Maritime and Underwater Cultural Heritage Impact Assessment, has been uploaded onto the SAHRIS system.

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
				addressing the impact on underwater cultural heritage. The Underwater Heritage Impact Assessment will address the following issues: • Undertake a desktop study of all known and suspected wrecks in the area; and • Identify potential Maritime and Underwater Cultural Heritage sites in the area; • Recommend management measures for sites before and during development. SAHRA looks forward to receiving the Maritime and Underwater Cultural Heritage Impact Assessment once it has been uploaded onto SAHRIS as part of the Draft EIA.	
1.1.3	Process to be followed in the event of a discovery	SAHRA – Briege Williams	14 January 2020	While there are no known shipwreck sites within the proposed prospecting areas there is always the potential for unknown wrecks or shipwreck material to be uncovered during the works. Should anything of archaeological or paleontological significance be exposed during the proposed project, work must cease immediately and SAHRA must be informed of its discovery without delay. In this event, work may not commence until feedback has been received from SAHRA. Should you have any further queries, please contact the designated official using the case number quoted above in the case header.	This comment is noted. The required actions to be undertaken in the event that any unknown wrecks or shipwreck material are uncovered during the proposed prospecting operations has been included in the EMPr.
1.2	Department of Environmental Affairs and Development Planning (DEA&DP): Development Facilitation – Gerhard Gerber				
1.2.1	Provision of comment from other departments within DEA&DP	DEA&DP: Development Facilitation – Gerhard Gerber	10 February 2020	Various directorates within the Departmental will provide more detailed comment once the Draft EIA Report is released for comment. The Department reserves the right to revise or withdraw its comments and request further information based on new information received.	This comment is noted.

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
1.2.2	Assessment of cumulative impacts	DEA&DP: Development Management – Natasha Bieding	10 February 2020	It is indicated throughout the DSR that similar sea concession prospecting projects are underway or proposed in the greater West Coast region. The cumulative impacts of existing and proposed prospecting and mining operations on the marine ecosystems along the West Coast must be reported on in the Draft EIA Report.	The assessment of cumulative impacts is included in Section 5.6 of the EIR.
1.2.3	Map of proposed and existing offshore prospecting and mining activities			Where possible, a map of the proposed prospecting operations in Offshore Sea Concessions 13C, 15C, 16C, 17 C and 18C in relation to other proposed and existing offshore prospecting and mining activities must be provided in the Draft EIA Report. This includes existing and proposed marine mining (e.g. diamond) operations and proposed prospecting operations by the applicant (in Sea Concessions 14B, 15B and 17B) and other applicants in various sea concessions along the South African West Coast.	Refer to Figure 4-30 included in the EIR.
1.2.4	Environmental sensitivity map			An environmental sensitivity map indicating environmental sensitive areas and features that will be impacted upon, and a final layout map overlain on the environmental sensitivity map, indicating how the sensitive areas and features will be avoided, should be included in the Draft EIA Report.	Refer to Figure 4-34 included in the EIR.
1.2.5	Impact on non-fishing activities			The Draft EIA Report should further provide information whether prospecting activities (and possible future mining activities by the applicant) may impact on existing or approved non-fishing activities in the various sea concessions. This relates to potential impacts on submarine telecommunication infrastructure, 2D/3D seismic surveys, and oil – and gas exploration activities.	A description of other offshore activities undertaken in proximity to the Sea Concession areas is provided in Section 4.1.4 of the EIR. The possible impacts on these activities has been assessed in Section 5.3.

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
1.2.6	Interactive public participation process is recommended	DEA&DP: Development Management – Natasha Bieding	10 February 2020	Regulation 41(6) of the EIA Regulations, 2014 (as amended) requires that participation by potential or registered I&APs should be facilitated in such a manner that all potential or registered I&APs are provided with a reasonable opportunity to comment on the application. In view of the nature and potential impacts of the proposed prospecting operations on coastal communities, it is recommended that if so requested by local communities or organisations, interactive consultation sessions be held during the EIA phase, which could include meetings or open days to explain the development proposal and potential impacts and mitigation measures. Such consultation sessions must be mindful of the predominant language spoken in the affected area.	This comment is noted. Given the current rate of COVID-19 infections, hosting of physical public meetings is not considered to be practical or responsible at this time. If requested, focus-meetings via online platforms can be considered if requested.
1.2.7	Impact on Rocher Pan Nature Reserve			The DSR indicates that Sea Concession 18C is located 41 km to the west of Rocher Pan in St Helena Bay. Rocher Pan is a proclaimed Marine Protected Area (MPA). As such, prospecting activities must be cognisant of potential impacts to the MPA and the Draft EIA Report must indicate how proposed prospecting activities near the MPA will be avoided, or how restrictions of the MPA will be met.	The Rocher Pan MPA is located adjacent to the Rocher Pan Nature Reserve, stretching 3 km along the coast and 500 m offshore. Thus, at its closest point, the Sea Concession area is located more than 40 km away from the MPA. The proposed prospecting activities would most likely be located even further away. Due to this large distance and the short-duration of the proposed activities, no potential impacts on the Rocher Pan MPA are anticipated.
1.2.8	Need and desirability of the proposed project			The need and desirability of the proposed prospecting operations in the context of other prospecting and mining activities in the proposed sea concession areas must be elaborated on in the Draft EIA Report. The Draft EIA Report must further indicate whether the proposed prospecting operations are aligned to any of the six focus areas of Operation Phakisa.	This comment is noted. The need and desirability for the proposed project has been updated accordingly (see Section 3.2 of the EIR).

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
1.2.9	Contents of specialist reports	DEA&DP: Development Management – Natasha Bieding	10 February 2020	According to the information contained in the DSR, several specialist studies will be undertaken during the Environmental Impact Reporting phase, namely an Underwater Heritage Impact Assessment, Fisheries Impact Assessment and a Marine Fauna Impact Assessment. Please be reminded that all specialist reports must contain all information set out in Appendix 6 of the EIA Regulations, 2014 (as amended).	All specialist studies have been prepared in compliance with Appendix 6 of the EIA Regulations, 2014 (as amended).
1.2.10	Marine flora assessment			The Screening Tool Report for the proposed sea concession areas generated by the national web based environmental screening tool dated 9 December 2019, indicates that a Plant Species Assessment is required. Page 17 of the DSR indicates that no assessment in this regard will be undertaken as the project is located offshore. Please however be reminded that if the Marine Fauna Impact Assessment will only focus on the impacts to marine fauna, the impacts on the marine flora must be assessed as either a separate Marine Flora Impact Assessment, or the terms of reference for the Marine Fauna Impact Assessment must be expanded to include an assessment on marine flora.	Section 4.1.3.1.2 of the EIR provides a description of the rocky subtidal habitat and kelp beds. It is noted that kelp beds are located offshore up to about 30 m depth. The nature of the vessels to be used for the proposed prospecting operations are such that they would be unable to operate in the near-shore environments in which the kelp beds are located.
1.2.11	Anticipated months and seasons of the proposed geophysical surveys			Based on the findings of the various specialist studies, the Draft EIA Report must provide an indication of the anticipated months or season that geophysical surveys and drill sampling (four days per year per concession area over a four-year period) and bulk sampling (four days per year per concession area over a two-year period) will occur. Please further indicate whether different or the same zones in each concession area will be subjected to geophysical surveys, drill sampling and bulk sampling during the duration of the validity of the prospecting right.	The assessment of possible impacts on marine fauna is included in Section 5.2 of the EIR. The relevant recommendations for mitigation stipulated by the marine fauna specialist are included and have been incorporated into the EMPr. Based on the findings of the Marine Fauna impact assessment the following has been recommended: • Avoid planning geophysical surveys during the movement of migratory cetaceans (particularly baleen whales) from their southern feeding grounds into low latitude waters (beginning of June to end of November), and ensure that migration paths are not blocked by sonar operations.
1.2.12	Avoid undertaking activities during cetacean of breeding periods			Consideration should be given to restricting geophysical surveys, drill sampling and bulk sampling to outside the non-mating / breeding season of marine mammals, subject to consultation with the marine faunal specialist.	

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
					• For the months of June and November ensure that Passive Acoustic Monitoring (PAM) is incorporated into any survey programme.
1.2.13	Trench depth	DEA&DP: Development Management – Natasha Bieding	10 February 2020	The approximate depth of the trenches to be excavated during bulk sampling should be included in the Draft EIA Report and Environmental Management Programme (EMPr) (assuming to be at depths of up to 200m below sea level – please confirm).	Please note that the relevant concessions have a water depth between -50 and -200 meters. The proposed sub-soil depths for drill and bulk sampling would be up to 5 meters.
1.2.14	Waste disposal alternatives			Further alternatives related to waste disposal should be investigated as it is noted that some of the waste generated on the marine vessels will be disposed of overboard. Alternatives for waste disposal could include on-board recycling / re-use options (so that less waste is disposed of overboard), the use of non- or less toxic chemicals, biodegradable options, etc. This recommendation must be reported on in the EMPr.	Management measures for the handling and disposal of waste is included in Section 4.3.7 of the EMPr.
1.3	West Coast District Municipality (WCDM) – Doretha Kotze				
1.3.1	Legislative requirements	WCDM – Doretha Kotze	17 February 2020	The West Coast District Municipality has the same comments on both prospecting applications: *"Should any land-based activities in support of this proposal be required in the West Coast District Municipal Area, the necessary authorisations should be obtained from the relevant local municipalities before commencement of any activities associated with the proposed prospecting".*	The proposed project does not entail any land-based activities that would require authorisation.
1.4	Department of Mineral Resources and Energy – Peter Mohasoa				
1.4.1	Consultation with stakeholders	Department of Mineral Resources and Energy – Peter Mohasoa	6 July 2020	Since the activities involve heavy minerals, consultation must be extended to National Nuclear Regulation. You may contact Mr. Mohajane, e-mail address: pemohaiane@nnr.co.za or call 012 674 7130.	These stakeholders have been included on the project database and have been notified of the availability of the EIR for comment.
				Since the activities will impact on the marine living resources, consultation must also be extended to the Department of Environment, Forestry and Fisheries. You are requested to endeavour to locate the relevant divisions within this Department.	

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
				Since the proposed mining location (according to Figure 4-30) is situated adjacent to Ecologically or Biologically Significant Areas (EBSAs) (to the West, South and especially North), consultation must be extended to the South African National Biodiversity Institute (SANBI).	
1.4.2	Consultation with stakeholders	Department of Mineral Resources and Energy – Peter Mohasoa	6 July 2020	Since the Sea Concessions areas overlap with Block 3A/4A for which PetroSA and Sasol are the licence holders, consultation must be extended to the companies. There must be an agreement between the two companies and Belton Park Trading 127 (Pty) Ltd on how activities will be harmonized.	BPT127 has contact these stakeholders directly and notified them of the propose prospecting application. They have also been included on the project database and have been notified of the availability of the EIR for comment.
1.4.3	Shipping Lanes			Furthermore, you are requested to consult with Maritime Transport to determine shipping lanes on the proposed mining location.	Section 4.1.4.2 of the EIR provides a description of the shipping traffic off the West Coast. The safe shipping routes along the South African coast are shown in Figure 4 28.
1.4.4	Issues to be addressed in the EIR			The Environmental Impact Assessment Report must address the following issues: • According to Figure 4 - 30, the proposed mining location is home to whales and breeding grounds to seal colony and other animals. The impact assessment must determine the breeding seasons and migration routes and describe how the prospecting activities will be managed to avoid and/or minimize the impacts. • In the baseline section, you must submit a high resolution seabed sonar image and description of the environmental features. • Distance of proposed mining location to the shore and EBSAs.	The information requested has been included as follows: • The assessment of possible impacts on marine fauna (including cetaceans) is included in Section 5.2 of the EIR. • High resolution imagery of the seabed would only become available on completion of the proposed geophysical surveys. Section 4 of the EIR provides a baseline description of the sea concession areas. • The western boundaries of the sea concession areas are located between 4 km and 40 km of the shore. A description of their location in relation to Ecologically or Biologically Significant Areas (EBSAs) is provided in Section 4.2.2 of the EIR.

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
				• How you intend to monitor the migration of the pollution plume particularly at bulk sampling phase. • Given that not all material pumped to the surface will be used, clarify on how you intend to handle excess water and sediment fines. • Under section 5.3, you indicated that there are development activities (petroleum and mining) in and around the proposed mining location, you are requested to ensure that the impact assessment describes cumulative impacts.	• The potential impact associated with the generation of sediment plumes is assessed in Section 5.2.3 of the EIR. • The unwanted material is discarded overboard, with from where the heavy portion settling on the seafloor and the finer portion forming a suspended sediment plume in the water column which dissipates with time. • The assessment of cumulative impacts is included in Section 5.6 of the EIR.
1.4.5	Information to be included in the EMPR	Department of Mineral Resources and Energy – Peter Mohasoa	6 July 2020	The following information are required to be included in the EIR & environmental management programme (EMPr): • The EMPr must include how the quantum for financial provision for remediation and rehabilitation was calculated and the method of financial provision; • The report must further include a phased mining and rehabilitation plan; • Closure plan in accordance to Appendix 5 of the NEMA EIA Regulations, 2014 as amended;	Refer to Section 3.1.4 of the EIR. As this application only relates to prospecting, the provision of a phased mining and rehabilitation plan is not be possible as no mining activities are contemplated under a prospecting right. Any future mining activities within the Sea Concession areas (including financial provisions concerning monitoring of rehabilitations and closure plan) would be subject to a separate application for a mining right and associated Environmental Authorisation application upon conclusion of successful prospecting activities. On completion of the proposed prospecting operations, the survey and/or sampling vessels would sail off location to its next destination. As such, there would be no specific closure-related

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
					activities associated with the proposed prospecting operations (as opposed to land based operations). Accordingly, provision of a Closure Plan as per item 4(c) would not be applicable to the current application. Should any different outcome arise out of the proposed exploration activities, BPT127 will detail a closure of mine plan in terms of s. 43 MPRDA.
				• The total footprint and depth of the proposed development should be indicated;	As noted in Section 3.4.2 and 3.4.3, the total footprint for drill sampling would be 2.4 ha and 18 ha for bulk sampling, respectively. The proposed sub-soil depths for drill and bulk sampling would be up to 5 meters.
				• Possible impacts and effects of the development on the surrounding environment; and	Refer to Section 5 of the EIR.
				• An operational phase in the EMPr to include mitigation and monitoring measures;	Refer to the EMPr attached as Appendix 7.
1.4.6	Public participation requirements	Department of Mineral Resources and Energy – Peter Mohasoa	6 July 2020	Public participation must be conducted in accordance to Chapter 6 of the 2014 Environmental Impact Assessment Regulations as amended. In terms of Regulation 7(2) "the competent authority or EAP must consult with every organ of state that administers a law relating to a matter affecting the environment relevant to that application for an environmental authorisation when such competent authority considers the application and unless agreement to the contrary has been reached the EAP will be responsible for such consultation". The EAP is therefore requested to consult environmental impact report inclusive of specialist reports, and an EMPr/closure Plan with every organ of state that administers a law relating to a matter affecting the environment as stipulated on regulation 7(2) of 2014 EIA Regulations as amended and to notify the Department of Mineral Resources of such consultation with the organ of state and include all	The relevant information pertaining to the public participation process will be included in the Final EIR.

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
				the comments from all relevant stakeholders and must be presented in a tabular format that includes the EAP's response to all the issues raised. Should you be unable to obtain comments, proof of the attempts that were made to obtain comments must be enclosed in the EIR to be submitted to the department.	
1.4.7	Changes to the EIR	Department of Mineral Resources and Energy – Peter Mohasoa	6 July 2020	With regards to the submission of the EIR; in a case where there are significant changes in the information that was previously submitted; you will need to notify the Department in writing of such changes within the 106 days stated above and submit an environmental impact report within 156 days of acceptance of the scoping report by the Department.	If required, these requirements would be complied with.
				Please ensure that the EIR includes the A3 size locality maps of the area and illustrates the exact location of the proposed development. The maps must be of acceptable quality and associated infrastructure and sensitive environmental features;	Refer to Figure 1-1 of the EIR.
				Should an application for Environmental Authorisation be subjected to any permits or authorisations in terms of the provisions of any Specific Environmental Management Acts (SEMAs) and other legislations, proof of such application will be required.	The proposed prospecting operations would not require any other permits or authorisations in terms of other SEMAs.
2.	I&APS				
2.1	Birdlife South Africa – Alistair McInnes				
2.1.1	I&AP registration	Birdlife South Africa – Alistair McInes	9 January 2020	Please can you register us as an I&AP for the above-mentioned applications [WC30/5/1/1/2/10319PR, C30/5/1/1/2/10320PR, WC30/5/1/1/2/10321PR, WC30/5/1/1/2/10322PR & WC30/5/1/1/2/10323PR] for mineral prospecting in the Western Cape	The project database has been updated to include Birdlife South Africa.
2.1.2	Request for information	Birdlife South Africa – Alistair McInes	10 January 2020	Please can you provide the shapefile of the footprint of the development as shown on Belton Park Trading 127 (Pty) Ltd's application form (Figure 1) near Lambert's Bay. We would like to overlay some seabird data onto this to assess the relative impact.	The location of the Sea Concession areas was provided.

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
2.1.3	Impact on endangered Benguela endemic seabird species	Birdlife South Africa – Alistair McInes	10 February 2020	The activities associated with the proposed geophysical surveys in Lamberts Bay overlap important habitat for several endangered Benguela endemic seabird species. These species are recognised by BirdLife South Africa as priority species for conservation interventions especially within their vulnerable marine habitats where they forage. The following species will likely be significantly affected by the proposed prospecting activities: African Penguin; Cape Cormorant; Cape Gannet; and Bank Cormorant. [*Note: Figures provided in Birdlife's comment have been omitted here, but the full comment is attached in Annexure A of this Comments and Responses Report*].	The concerns raised regarding the proposed location of the proposed prospecting operations in relation to the listed seabird species are noted. It is pointed out that the planned operations would be highly localised (i.e. confined to the area of operations at any one point) and of very short duration (4-days per year) in each Sea Concession area. Thus no impacts at the population-level for these listed species are anticipated.
2.1.4	Potential impact on the African Penguin			African Penguin (Spheniscus demersus) – conservation status: globally Endangered (Crawford et al. 2011). This Benguela endemic and iconic African species is experiencing several at-sea threats with its population currently still decreasing. A significant proportion of this species' juvenile and immature birds utilise a significant proportion of the proposed prospecting areas during these life history stages (Sherley *et al.* 2017) (Figures 1 & 2). Adult African Penguins are also known to utilise this area in the crucial post-moult phase (Figure 3) – an import stage when they recover from 3 weeks of fasting to improve their condition in order to successfully breed the next year. The proposed activities are likely to displace productive habitat for the African Penguins principle prey in this region, anchovy and sardine, that frequently inhabit demersal areas during the day (van der Lingen, Hutchings, & Field 2006). African Penguins are also sensitive to acoustic energy and are known to respond to sounds ranging from 230 – 255 dB (Pichegru, Nyengera, Mcinnes, & Pistorius 2017), which is close to the range for the proposed acoustic surveys. African Penguins regularly dive to the seabed at depths ranging from 15 – 60 m where they use visual cues to drive benthic shoaling fish to the surface (Mcinnes & Pistorius 2019). Activities that lead to sedimentation will not only disturb foraging birds directly but will also displace their targeted prey.	The indirect impact on diving seabirds (including the African Penguin) due to effects on predators or prey is complex as a result of trophic pathways in the marine environment and depends on the diet make-up of the bird species concerned and the effect of the geophysical surveys on the diet species. With few exceptions, most plunge-diving birds forage on small shoaling fish prey species relatively close to the shore and are unlikely to feed extensively in offshore waters that would be targeted during the proposed geophysical surveys. Given the broad ranges of potential fish prey species, the low likelihood of encountering diving birds during the very short periods over which the proposed geophysical surveys activities would be undertaken (four days in a year) and the extensive ranges over which most seabirds feed suggest that indirect impacts on a species-level would be highly unlikely.

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
2.1.5	Potential impact on the Cape Cormorant	Birdlife South Africa – Alistair McInes	10 February 2020	Cape Cormorant (*Phalacrocorax capensis*) – conservation status: Globally Endangered (BirdLife International 2018). This Benguela endemic is under serious threat from reduced prey availability within its foraging range. There is a breeding colony of Cape Cormorants at Bird Island, Lamberts Bay – during this time they forage within 40 km of their colony. This area overlaps the proposed prospecting region and the activities associated with prospecting are likely to have a considerable disturbance impact on this species and its prey. Cape Cormorants have two modes of hunting: pelagic and demersal foraging (Cook et al. 2012). Demersal foraging relies on visually detecting prey species on the seabed which will be compromised under reduced visibility and displacement of prey.	As pointed out above, any impacts on seabirds as a result of the proposed prospecting operations is highly unlikely, as the proposed activities would be of very short duration and highly localised within the overall sea concession areas. For context the proposed footprints of the drill and bulk sampling would be 0.204 km^2 in extent and the total size of sea concession areas is over 6 000 km^2.
2.1.6	Potential impact on the Cape Cormorant			Cape Gannet (*Morus capensis*) – conservation status: Globally Endangered (BirdLife International 2018). Bird Island in Lambert's Bay hosts one of only six gannet breeding colonies in the world and has decreased by about ca 50% since the 1980s (Sherley et al. 2019). Gannets from Bird Island, use the area covered by the concession extensively, travelling a maximum of 67 km from the colony (Grémillet *et al*. 2004). Impacts from the proposed activities on Cape Gannets will likely be indirect. Noise from seismic activities may displace sardine and anchovy, gannets' preferred prey, forcing them to forage further from the colony. As Cape Gannets search for fish in flight, increased turbidity and suspended sediments from dredging and drilling activities will also likely affect their ability to find prey.	At its closest points, Bird Island Is located approximately 12 km from the western boundary of Sea Concessions 15C and 16C. It is noted that the proposed project does not entail any seismic surveys. Unlike the noise generated during seismic surveys, underwater noise emitted during the proposed geophysical surveys is not considered to be of sufficient amplitude to cause auditory or non-auditory trauma in marine fauna. Furthermore, as noted above, any impacts on seabirds as a result of the proposed prospecting operations is highly unlikely, as the proposed activities would be of very short duration and highly localised within the overall sea concession areas.
2.1.7	Potential impact on the Bank Cormorant	Birdlife South Africa – Alistair McInes	10 February 2020	Bank Cormorant (*Phalacrocorax neglectus*) - conservation status: Globally Endangered. The species is classified as Endangered owing to a recent large reduction in its number primarily driven by a decline in available food, particularly West Coast Rock Lobster *Jasus lalandii* (Dyer et al. 2019). The Bank Cormorant colonies on the west coast	As noted in Section 1.2.10 above, the nature of the vessels to be used for the proposed prospecting operations are such that they would be unable to operate in the near-shore

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
				(near Lambert's Bay, St Helena, Paternoster, Cape Columbine and Saldanha) have been particularly decimated in recent decades (DEA, unpubl. data). Bank Cormorants rely on intact kelp forests within 20 km of shore which harbour lobster populations and allow them to hunt efficiently (Ludynia et al. 2010). Bank Cormorants are benthic feeders, diving to considerable depths up to 40 m (Ludynia et al. 2010), but potentially deeper where bathymetry is not limiting. Breeding birds forage within a few kilometres of their colony (Ludynia *et al*. 2010), however during the non-breeding season the birds travel further (Sherley et al. 2017). Destruction of kelp forests and rocky substrate in the proposed area through the proposed prospecting activities is likely to preclude the recovery of this species in the area and will contribute significantly to potential local extinction. Additionally, silting and sedimentation are likely to negatively affect the foraging success of visual predators (Ehlman *et al.* 2020). Siltation is also known to have adverse effects on lobster recruitment (Herrnkind *et al.* 1988), which will likely reduce the availability of this prey to Bank Cormorants. The Benguela ecosystem is one of four eastern boundary upwelling systems globally. These ecosystems are typically highly productive systems that support large populations of small pelagic fish. These fish are the primary prey for many threatened predator species. Stocks of the two most commercially sought after small pelagic fish species, anchovy and sardine, are currently at exceptionally low levels (SPSWG, 2020). It is important that displacement or destruction of important habitat for these fish and their predators, especially during periods of low productivity, be limited for these populations to recover.	environments in which the kelp beds are located. In the high-energy environments located off the West Coast, sediment plumes from the drill and bulk sampling activities are expected to dissipate within the very short-term and would generally be limited in extent in proximity to the sampling vessel. Thus, any indirect impact on prey visibility for seabird predators would be highly localised within the overall sea concession areas.
2.1.8	Objection to proposed project			Considering the potential threat to globally significant populations of seabirds in this region, as highlighted above, we strongly advocate against the proposed activities.	This objection is noted and is recorded here for consideration by DMRE.

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
2.2	Sea Search – Simon Elwen				
2.2.1	I&AP registration	Sea Search – Simon Elwen	9 January 2020	We would like to register as I&APs for the project: info@seasearch.co.za.	The project database has been updated to include Simon Elwen and Sea Search.
2.2.2	Impact on whales and dolphins	Sea Search – Simon Elwen	9 January 2020	The Sea Search Group is one of the leading cetacean research groups in Southern Africa and we would like to express concerns with the potential impact of geophysical surveys on both whales and dolphins in that area. Combined with well-known avoidance responses shown by cetaceans to a range of geophysical survey techniques, there is a high potential for large population level impacts depending on the type of work to be undertaken.	The potential impact on cetaceans has been assessed as part of the marine faunal assessment (see Section 5.2 of the EIR).
2.2.3	Significance of Lambert's Bay and St Helena Bay for whales and dolphins			Lambert's Bay has one of the highest densities of Heaviside's dolphins in South Africa and the whole of St. Helena Bay is a globally unique and regionally incredibly important area for feeding for both humpback and southern right whales – two species which are both undergoing nutritional stress at the population level.	
2.2.4	Provision of cetacean migration information			We are in a position to help look into this further and help with migration. See www.seasearch.co.za/sevrices.	This comment is noted.
2.3	SANCCOB – Christian Triay				
2.3.1	I&AP registration	SANCCOB – Christian Triay	9 January 2020	Following the circulation regarding the Prospecting Right Application, I would like to register SANCCOB as an I&AP. Please also register my colleagues: 1. Christian Triay (Preparedness and Response Manager): christian@sanccob.co.za; 2. Katta Ludynia (Research manager): katta@sanccbob.co.za; and 3. Lauren Waller (Leiden Conservation Fellow): lauren@sanccob.co.za. Please confirm that we are now registered accordingly.	The project database has been updated to include Christian Triary, Katta Ludynia and Lauren Waller.
2.4.	Cape West Coast Biosphere Reserve (CWCBR) – Office Administrator				
2.4.1.	I&AP registration	Cape West Coast	15 January	The Cape West Coast Biosphere Reserve (CWCBR), of the UNESCO: Man and Biosphere Program, aims to implement sustainable	This comment is noted. It is pointed out that the southern boundary Sea Concession 18C is located

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
		Biosphere Reserve – Office Administrator	2020	development principles along the West Coast, in addition to integrating rapid growth with biodiversity and heritage conservation. The CWCBR extends from the Diep River in the south to the Berg River in the north and inland to Malmesbury and therefore the proposed development is located within the CWCBR. In this regard, the CWCBR would like to register as an I&AP and receive further correspondence and documentation regarding this development.	approximately 35 km north-west of the upper-most extent of the CWCBR (mouth of the Berg River). Thus, the application rights areas would be located well to the north of the CWCBR. Nevertheless, the project database has been updated to include the CWCBR.
2.5	Oceana Group Ltd – Karen-Dawn Koen				
2.5.1	Impact on living marine resources especially the West Coast pelagic fishing sector	Ocean Group Ltd – Karen-Dawn Koen	10 February 2020	There is a potential adverse environmental impact that the proposed scoping would have on all living resources in the prospecting area, particularly the red eye and anchovy pelagic fish species as the areas identified are productive fishing areas for both species. The biomass for both the anchovy and red eye pelagic species is already under severe pressure as evident by the reduced catch rates over the past two years. Further disruption on an already fragile pelagic sector may therefore have a devastating impact on the West Coast pelagic fishery.	The concerns raised regarding the potential impact of the proposed prospecting operations on red eye and anchovy pelagic fish species are noted. A fisheries impact assessment has been undertaken by an independent specialist (see Section 5.3). In summary, the potential impact of the proposed prospecting activities on the Small pelagic purse-seine fisheries and the traditional linefish (which might include elements of the Small Scale Fisheries) would be of local extent, short-term and of low to medium intensity. The significance of impact is thus considered to be VERY LOW with and without mitigation.
2.5.2	Objection to the proposed project	Ocean Group Ltd – Karen-Dawn Koen	10 February 2020	Until such time as a thorough impact assessment on the aforementioned species as well as the financial implications on the pelagic fishing industry has been determined and debated in an open public forum and suitable mitigating actions put in place, the Oceana Group Ltd cannot and will not support in prospecting exercises in the aforementioned areas. We trust that the above is in order and that our objection will be duly noted and recorded. We look forward to your timeous advises to any further developments regarding this application.	
2.6	Dr Jackie Sunde				
2.6.1	I&AP Registration	Jackie Sunde	3 July 2020	I found reference to this above-mentioned study on the internet by chance yesterday. I see that a Special Report on Fisheries will be commissioned. I work with the small-scale fisheries sector including fishing communities of Olifantsriver, Doringbaai and Lambertsbaai and	These stakeholders have been included on the project I&AP database.

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
				from what I can ascertain they are not aware of this scoping report. Please can you give me a sense of the time frames and suggest how they can be registered as I&APs?	
2.6.2				The following fishers have requested me to please ask you to add their names to the list - they are also copied into this email: • Ms Solene Smith - Chairperson Coastal Links (071 774 8838) • Mr Norton Dowries - Deputy Chair Coastal Links (060 341 1315)	
2.6.3				Please can you kindly include Mrs Hilda Adams, she is the organizer for The Collective South Africa, a national small-scale fisheries representative body registered in terms of the Marine Living Resources Act by DEFF. Please find her email attached. Her phone number is 063 691 9112.	
2.6.4	I&AP Registration	Jackie Sunde	20 July 2020	Please see email below from Mr Wally Croome. Please can you kindly register the SA Commercial Line Fishing Association for the "Offshore Sea Concessions 13C, 15C, 16C, 17C & 18C West Coast, prepared for Belton Park Trading 127 (Pty) Ltd" Mr Croome's details are below and attached.	This stakeholder has been included on the project I&AP database.
2.7	I&AP Registrations				
2.7.1	I&AP Registrations	Mayenzeke Development Initiative - Josette Cole	3 July 2020	I have been alerted to the EIA on Belton Park by Jackie Sunde and would like to receive a copy of the EIA once drafted. I am writing on behalf of my organisation Mayenzeke Development Initiative.	These stakeholders have been included on the project I&AP database.
2.7.2		Masifundise Development Trust - Maia Nangle	3 July 2020	I work for Masifundise Development Trust, an organisation that works with small-scale fishing communities. We would like to register our organisation as an I&AP. Please will you add my details to the project database?	
2.7.3		Paulita Mostert	7 July 2020	Good morning Candice register me on Belton Park Trading West Coast Mining Application off Doringbaai and the I&AP process please.	
2.7.4		Hahn Goliath	8 July 2020	My name is Han and my surname is Goliath. I am from Dooringbaai one the town's in the above mentioned subject. My request for	

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
				Candice is to please register me as an Interested and Affected Party and to be included in the public participation process. I thank you in advance.	
2.7.5		John Yeld	22 July 2020	Please register me as an I&AP for the West Coast prospecting application.	

APPENDIX 3.3: I&AP NOTIFICATIONS

27 August 2021

ATTENTION: INTERESTED AND AFFECTED PARTY

Dear Sir / Madam

BELTON PARK TRADING 127 (PTY) LTD – ENVIRONMENTAL IMPACT ASSESSMENT FOR A PROSPECTING RIGHT APPLICATION FOR OFFSHORE SEA CONCESSIONS 13C, 15C, 16C, 17C & 18C, WEST COAST (DMRE REFERENCE: 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): NOTIFICATION OF AVAILABILITY OF ENVIRONMENTAL IMPACT REPORT FOR REVIEW AND COMMENT

Our previous correspondence regarding above-mentioned project refers. This letter provides information regarding on the availability for comment of the Environmental Impact Report (EIR) prepared for the above mentioned project.

In accordance with the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended), you and / or your organisation are hereby invited to comment on the Draft EIR for the proposed project. The Draft EIR has been made available for a 30-day public and authority review and comment period from **27 August to 27 September 2021**. Copies of the full report have been made available on:

- the SLR website (at https://slrconsulting.com/public-documents/eia-belton-park-trading); and
- a zero-data rated website (https:// slrpublicdocs.datafree.co/public-documents/eia-belton-park-trading).

A copy of the Executive Summary is enclosed for ease of reference. Any comments should be forwarded to SLR at the address, telephone numbers or e-mail address shown below[1]. For comments to be included in the final EIR, comments should reach SLR by no later than **27 September 2021**.

Should you have any queries on the above, or require any further information, please do not hesitate to contact the undersigned (narnott@slrconsulting.com).

Yours sincerely

Nicholas Arnott Pr. Sci. Nat.
Associate Environmental Consultant
SLR Consulting (South Africa) (Pty) Ltd

[1] It is assumed that in providing your Personal Information to be registered as an Interested and Affected Party for this Project you authorise SLR to retain and use your Personal Information as part of a contact database for this and/or other Social and Environmental Impact Assessment Project(s) and that you confirm your acceptance for SLR to contact you regarding this and/or other Social and Environmental Impact Assessment processes. SLR warrants that we will not process your Personal Information, other than as permitted or required by Social and Environmental Impact Assessment processes or as required by Law or public policy. SLR will use reasonable, appropriate security safeguards in order to protect Personal Information, and to reasonably prevent any damage to, loss of, or unauthorised access or disclosure of Personal Information, other than as required for Social and Environmental Impact Assessment processes or as required by any Law or public policy. You may request for your Personal Information to be deleted from the I&AP database at any time by contacting SLR by e-mail or in writing at the address below.

EXECUTIVE SUMMARY

1. INTRODUCTION

Belton Park Trading 127 (Pty) Ltd (BPT127) lodged separate applications for Prospecting Rights 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 (See Figure 1). The applications were lodged in terms of Section 16 of the Mineral and Petroleum Resources Development Act, 2002 (No. 28 of 2002; MPRDA) (as amended by the Mineral and Petroleum Resources Development Amendment Act 49 of 2008).

In terms of the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended by GN40772 on 7 April 2017), promulgated in terms of the National Environmental Management Act (No. 107 of 1998; NEMA), an application for a prospecting right requires Environmental Authorisation (EA) from the competent authority, which in this case is the Minister of Mineral Resources and Energy, to carry out the proposed prospecting activities. The applications for EA, in terms of NEMA, was submitted to the DMRE at the same time as the prospecting right application. In terms of the EIA Regulations Listing Notices, a Scoping and Environmental Impact Assessment (EIA) process is required for the proposed prospecting activities.

SLR Consulting (South Africa) (Pty) Ltd (SLR) has been appointed by BPT127 as the independent Environmental Assessment Practitioner (EAP) to determine the biophysical, social and economic impacts, by means of the required EIA process, associated with undertaking the proposed prospecting activity. This report presents the process followed and the findings of the EIA.

2. OPPORTUNITY FOR COMMENT

This draft Environmental Impact Report (EIR) is available to Interested and Affected Parties (I&APs) for a 30-day review and comment period from **27 August to 27 September 2021**. Copies of the full report have been made available on: the SLR website (at https://slrconsulting.com/public-documents/eia-belton-park-trading) and zero-data rated website (https:// slrpublicdocs.datafree.co/public-documents/eia-belton-park-trading). Any comments should be forwarded to SLR at the address, telephone numbers or e-mail address shown below[1]. For comments to be included in the final EIR, comments should reach SLR by no later than **27 September 2021**.

SLR Consulting (South Africa) (Pty) Ltd

PO Box 798, Rondebosch, 7701

Tel: (021) 461 1118 / 9

E-mail: narnott@slrconsulting.com

[1] It is assumed that in providing your Personal Information to be registered as an Interested and Affected Party for this Project you authorise SLR to retain and use your Personal Information as part of a contact database for this and/or other Social and Environmental Impact Assessment Project(s) and that you confirm your acceptance for SLR to contact you regarding this and/or other Social and Environmental Impact Assessment processes. SLR warrants that we will not process your Personal Information, other than as permitted or required by Social and Environmental Impact Assessment processes or as required by Law or public policy. SLR will use reasonable, appropriate security safeguards in order to protect Personal Information, and to reasonably prevent any damage to, loss of, or unauthorised access or disclosure of Personal Information, other than as required for Social and Environmental Impact Assessment processes or as required by any Law or public policy. You may request for your Personal Information to be deleted from the I&AP database at any time by contacting SLR by e-mail or in writing at the address below.

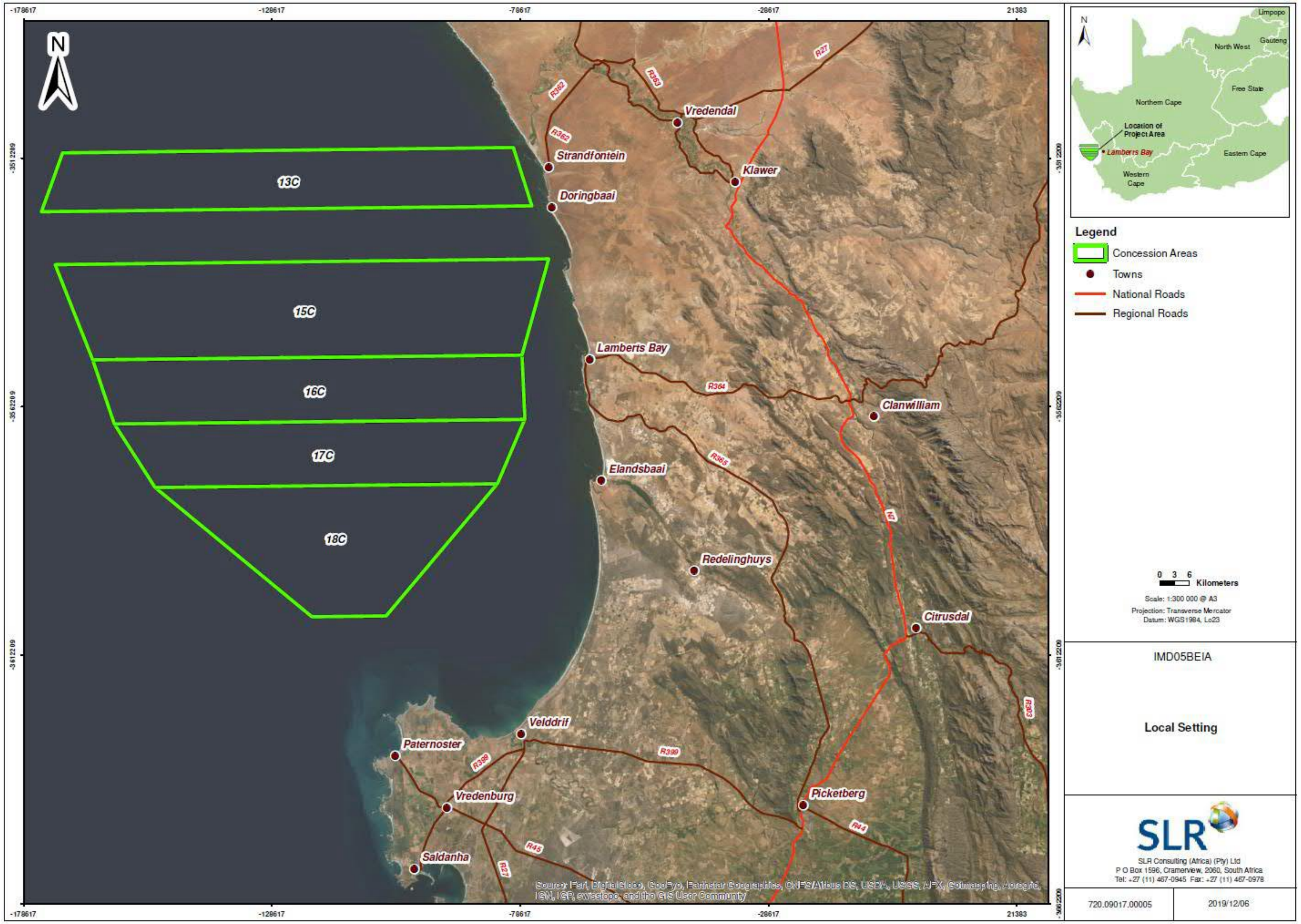

FIGURE 1: LOCATION OF THE 13C, 15C, 16C, 17C AND 18C SEA CONCESSION AREAS, OFF THE WEST COAST OF SOUTH AFRICA.

After the conclusion of the comment period, all comments received will be collated into a Comments and Responses Report. The comments will be duly taken into account in compiling the final EIR, which will be submitted to the DMRE for consideration and decision-making.

After DMRE has reached a decision, all registered I&APs 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, 2014 will follow the issuing of the decision.

3. SCOPING AND EIA PROCESS

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 applications were submitted. While five separate applications for EA have been submitted, DMRE has confirmed that one consolidated Scoping and EIA process could be undertaken for all five Sea Concession area applications. Accordingly, should DMRE decide to grant authorisation, a separate EA for each application would be issued (i.e., five EAs in total).

3.1.2. Compilation and review of the Scoping Report

The final Scoping Report was prepared in compliance with Appendix 2 of the EIA Regulations 2014 (as amended). Eight (8) submissions were received during the draft Scoping Report review and comment period. The submissions have been responded to in the Comments and Responses Report (see Appendix 3.2). The key issues raised relate to the potential impact of the proposed project on marine fauna (specifically seabirds and cetaceans), cultural heritage, and on the West Coast pelagic fishery. The Final Scoping Report was submitted and accepted by the DMRE.

3.2. EIA PHASE

3.2.1. Specialist Studies

The specialist studies commissioned to address the key issues and potential impacts were: (1) an Underwater Heritage Impact Assessment, (2) a Marine Faunal Assessment, and (3) a Fisheries Impact Assessment. The impacts in the studies were assessed according to a defined impact assessment methodology and the mitigation measures were defined to avoid or reduce negative impacts and enhance potential benefits.

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, have been integrated into this EIR and Environmental Management Programme (EMPr). After closure of the comment period, all comments received on the draft report will be incorporated and responded to in an updated Comments and Responses Report. The draft report will then be updated to a final report, to which the updated 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 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. The proposed prospecting activities are summarised in the table below:

Prospecting activity	Maximum anticipated area of disturbance	Duration
Geophysical Surveys	600 - 1 200 km per concession area.	**Four days per year** for each concession area (i.e. 20 days per year for **4 years**).
Drill Sampling	4 800 drill samples with a cumulative footprints of 2.4 ha per sea concession area.	**Four days per year** for each concession area (i.e. 20 days per year **for 4 years**).
Bulk Sampling	Ten trenches per concession area with a cumulative footprint of 3.6 ha per a concession area.	**Six to seven days per year** for each concession area (i.e. 35 days per year **for 2 years**).

4.2 NEED AND DESIRABILITY

The over-arching framework for considering the need and desirability of development in general is taken at the policy level and should be aligned with the content of regional and local plans, frameworks, and strategies. With respect to the national policy and planning framework, prospecting and mining is identified as a sector with substantial potential for growth stimulation and/or employment and is supported in numerous national planning instruments, such as the National Development Plan 2030 (2012), as well as Operation Phakisa (2014) and Mining Phakisa.

In the regional planning context, the West Coast District Municipality Spatial Development Framework (2020) notes that the District Municipality has a vast number of mineral resources, of which some are currently not being exploited. It is concluded that mining has the potential to make bigger contribution to the overall economy of the District Municipality, when unexploited resources are utilised in future. Thus, the proposed prospecting operations are considered to be aligned with the above-mentioned planning frameworks.

Marine mining at present contributes about 10% of South Africa's total diamond production. n 2019, about 7.2 million carats of diamonds were produced locally. Diamond revenues, levied through income tax on diamonds, mining leases, mining rights and diamond export duties, are put into the Central Revenue Fund from where they are allocated to various budgets by the South African Government.

Prospecting activities are needed to:

- Confirm and obtain additional information concerning potential targets through non-invasive activities (i.e. desk-top studies and geophysical surveys) and invasive activities (i.e. drilling).
- Assess if the resource can be extracted through future mining in an economically viable manner while being socially and environmentally responsible.

Should prospecting activities prove that there is a feasible mineral resource for mining, a new mining area could be developed, which would generate significant employment opportunities.

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 six to seven 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 Consideration of Alternatives

The project alternatives considered in this EIA are described below.

No.	Alternatives	Description
1. Site / location alternatives		
1.1	Exploration site	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.
1.2	Onshore logistics	The proposed prospecting operations are of such short duration (four days per concession per annum) that bunkering or provision of spares, consumables or crew changes would not be required. It is expected that once the required prospecting activity has been completed, the vessel would move off location and dock at the Port of Cape Town.

No.	Alternatives	Description
2. Activity alternatives		
2.1	Prospecting	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. Feasible and reasonable activity alternatives are limited by the proponent's motivation and intention to conduct prospecting to enhance the understanding of possible mineral resources occurring within the Sea Concession areas. Thus, no other activity alternatives for the proposed prospecting operations have been considered in this report.
3. Design alternatives		
3.1	Number of Sampling Cores, etc.	The dynamic nature of the proposed prospecting activities are such that the they may be divided into stages subject to outcomes of reviews of the results of the previous round of surveying/sampling. Consequently, the proposed works programme may be modified, extended or curtailed as data and results become available over the duration of the validity of the prospecting right period. Thus, the description of the proposed prospecting operations provided below is deemed to be the most realistic at this stage and is the anticipated maximum work scope that would be undertaken.
3.2	Scheduling	
4. Technology / process alternatives		
4.1	Vessel	Offshore mineral exploration is highly specialised with a limited number of possible vessels equipped to carry out this work. BPT127 intends to contract the vessels as indicated in the section below to undertake the work.
4.2	Bulk Sampling	Feasible and reasonable technology alternatives for the proposed activity are constrained by the best available proven technology for conducting the proposed bulk sampling operations. There are two possible basic configurations of vessel available for bulk sampling: (i) the vertical method, utilising a vertically mounted tool on a drill string; and (ii) the horizontal method, using a seabed crawler. As the vessel BPT127 intend on contracting to undertake the bulk sampling activities makes use of the horizontal method, only this approach has been considered in this report.
5. No-Go alternative		
5.1	No-go	The No-Go alternative represents the option not to proceed with exploration, which leaves the project areas of influence in their current state except for variation by natural causes and other human activities. It thus represents the current status quo and the baseline against which all potential project-related impacts are assessed. While prospecting does not automatically lead to mining, it is an essential stage in the process, which might lead to further exploration and, thereafter mining, which results in long-term economic opportunities in mining sector, if commercial reserves can be exploited. The 'do nothing' or 'no-go' option forgoes these possible advantages. In addition, the implications of not going ahead with the proposed exploration are as follows: • South Africa would lose the opportunity to further establish the extent of offshore diamond reserves; • Lost economic opportunities related to sunken costs (i.e., costs already incurred) of exploration in the sea concession areas; and • If economic diamond reserves do exist and are not developed, South Africa would lose the opportunity to maximise the use of its own indigenous diamond reserves.

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 economically significant pelagic fisheries.

5.2 BIOLOGICAL OCEANOGRAPHY

The sea concession areas fall is in the cold temperate Namaqua Bioregion. The Namaqua Coastal Area is characterized by high productivity and community biomass along its shores. A large proportion of the area is characterized by habitat that is in relatively good (natural/pristine) condition. The Namaqua Coastal consists of coastal, inner, mid and outer shelf ecosystem types (Sink et al., 2019). The associated pelagic environment is characterized by very high productivity, high chlorophyll and very cold water (mean SST = 15.2°C) caused by upwelling (Lagabrielle 2009, Roberson et al., 2017), also serving as an important area for coastal fish (Turpie et al., 2000).

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. Most 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 oil and gas production offshore of the South African West Coast. 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 few proposed prospecting areas for phosphate are located off the West Coast, these overlap with the western edge of the Sea Concession areas. A few marine diamond mining right and prospecting concession areas are also located in proximity to the Sea Concession areas under this application.

While the sea concessions areas do not overlap any Marine Protected Areas, there is overlap with proposed Cape Canyon and Associated Islands, Bays and Lagoon Ecologically or Biologically Significant Areas (EBSA). The principal objective of EBSAs is the identification of features of higher ecological value that may require enhanced conservation and management measures, however, they currently carry no legal status.

6. ENVIRONMENTAL IMPACT ASSESSMENT

Table 1 provides a summary of the significance ratings assigned to each potential impact of the proposed prospecting activities.

Table 1: Summary of the significance of the potential impacts associated with the proposed prospecting activities and No-Go Alternative.

Potential impact		Significance	
		Without mitigation	With mitigation
Impact of the Vessel Discharges / Disposal to Sea			
Deck Drainage		VL	**VL**
Machinery Space Drainage		VL	**VL**
Sewage		VL	**VL**
Galley Waste		VL	**VL**
Solid Waste		VL	**VL**
Impact on Marine Fauna:			
Acoustic Impacts:			
	Geophysical Surveys	VL	**VL**
	Sampling Operations	L	**N/A**
Disturbance and Loss of Benthic Fauna		VL	**VL**
Crushing of Benthic Fauna During Sampling Operations		VL	**VL**
Generation of Sediment Plumes		VL	**VL**
Smothering of Benthos in Redepositing Sediments:			
	Redeposition of discarded sediments on soft-sediment macrofauna	VL	**N/A**
	Redeposition of discarded sediments on rocky outcrop communities	L	**VL**
Impact on Other Users of the Sea:			
Fishing industry	Exclusion of the demersal long-line, traditional line-fish, pole-and-line, small-scale fishers and fisheries research	INSIG – L	**INSIG - L**
	Sediment plume impact on fish stock recruitment	INSIG	**INSIG**

Potential impact	Significance	
	Without mitigation	With mitigation
Marine mining and prospecting	INSIG	**INSIG**
Petroleum exploration	INSIG	INSIG
Marine transport routes	INSIG	**INSIG**
Socio-Economic Impact		
Impact on Cultural Heritage Material	M	**INSIG**
Impact related to Job creation and business opportunities	*VL+*	***VL+***
No-Go Alternative:		
Lost project and economic opportunity to establish whether or not a viable offshore diamond resources exists off the West Coast.	M	**N/A**
Cumulative Impact:		
Cumulative Impacts	L	**L**

VH=Very High H=High M=Medium L=Low VL=Very low INSIG = insignificant N/A= Not applicable

7. CONCLUSIONS

The impacts associated with the prospecting vessel operations would be of short-term duration and limited to the immediate areas where the prospecting activities are being undertaken. As a result, the impacts associated with the vessels are considered to be of **VERY LOW** significance after mitigation. Key mitigation includes ensuring that the vessels used comply with MARPOL 73/78 standards; prior notification is provided to key stakeholders (including fishing industry and adjacent rights holders); and Radio Navigation Warnings and Notices to Mariners are released prior to undertaking the prospecting activities.

Potential impacts on marine fauna as a result of the proposed prospecting activities would be of medium- to short-term duration and limited to the immediate area. As a result, the impacts on marine fauna associated with the sampling activities are considered to be of **VERY LOW** to **LOW** significance after mitigation. Key mitigation includes ensuring that a designated onboard Marine Mammal Observer (MMO) is aboard the survey vessel to ensure compliance with mitigation measures during geophysical surveying; terminating the survey if any marine mammals show affected behaviour within 500 m of the survey vessel or equipment; and avoiding undertaking sampling in rocky outcrop areas or other identified sensitive habitats in the concession areas.

Only two commercial fishing sectors could potentially be affected by the proposed prospecting activities, namely the small pelagic purse-seine and traditional linefish fisheries. It is recognised that elements of the Small Scale Fisheries may also be affected. Given the highly-localised nature of the prospecting operation over the short-term, the potential impact on these fisheries would be of **VERY LOW** significance with or without mitigation.

The likelihood of disturbing a shipwreck is expected to be very low considering the vast size of the South African offshore area. In the event that any cultural heritage material is disturbed during sampling operations, the impact would be at the national level, and of high intensity. Without mitigation this is of **Medium** significance. However, with the implementation of mitigation, cultural heritage sites can largely be avoided and if sampling is terminated in the unlikely event of encountering a shipwreck, the impact is regarded as **INSIGNIFICANT**.

The No-Go alternative represents the option not to proceed with exploration, which leaves the project areas of influence in their current state except for variation by natural causes and other human activities. While prospecting does not automatically lead to mining/production, it is an essential stage in the process, which might lead to further exploration and, thereafter mining, which results in significant employment opportunities in mining sector, if commercial reserves can be exploited. The ‘do nothing’ or ‘no-go’ option forgoes these possible advantages. In addition, the implications of not going ahead with the proposed exploration are that:

- South Africa would lose the opportunity to further establish the extent of offshore diamond reserves;
- Lost economic opportunities related to sunken costs (i.e. costs already incurred) of exploration in the licence area; and
- If economic diamond reserves do exist and are not developed, South Africa would lose the opportunity to maximise the use of its own indigenous diamond reserves.

This potential impact of the No-Go Alternative is considered to be of **LOW** significance.

8. KEY MITIGATION MEASURES

This section contains a summary of the key mitigation measures and contained in the EMPr which is attached as Appendix 7 to the main report.

8.1 COMPLIANCE WITH ENVIRONMENTAL MANAGEMENT PROGRAMME AND MARPOL 73/78 STANDARDS

- All phases of the proposed project must comply with the Environmental Management Programme presented in Chapter 7; and
- The vessels used during prospecting (including any required support vessels) must ensure compliance with MARPOL 73/78 standards.

8.2 NOTIFICATION AND COMMUNICATION WITH KEY STAKEHOLDERS

- As part of the stakeholder notification process, BPT127 should inform the Department of Forestry, Fisheries and the Environment (DFFE) fisheries research survey programme;
- Notify PetroSA and their contractors, as well as any other neighbouring petroleum exploration rights holders, as well as any companies undertaking marine prospecting or mining activities in the study area, prior to the commencement of activities.
- Liaise with PetroSA and any overlapping mineral prospecting rights holders to ensure that there is no overlapping of activities in the same area over the same time period.
- Prior to the commencement of the proposed survey and/or sampling activities the following key stakeholders should be notified and informed of the proposed activities (including navigational co-ordinates of the sampling areas, timing and duration of proposed activities) and the likely implications thereof:
  - Fishing industry / associations (these include South African Small Pelagic Fishing Industry Association, South African Tuna Association, South African Commercial Linefish Association, South African Hake Longline Association, South African Deepsea Trawling Industry Association, FishSA the West Coast Rock Lobster Association and the National SMME Fishing Forum);
  - Representatives of small-scale local fishing co-operatives; and

  > Other: DFFE, South African Maritime Safety Authority (SAMSA), South African Navy (SAN) Hydrographic office, overlapping and neighbouring exploration right holders and applicants, and Transnet National Ports Authority (ports of Cape Town and Saldanha Bay).

- The required safety zones around the prospecting vessels should be communicated via the issuing of Daily Navigational Warnings for the duration of the sampling operations through the South African Naval Hydrographic Office.
- The SAN Hydrographic office should be notified when prospecting activities are complete.

8.3 DISCHARGES

- Undertake training and awareness of crew in spill management to minimise contamination.
- Low-toxicity biodegradable detergents and reusable absorbent cloths should be used in cleaning of all deck spillage.
- All hydraulic systems should be adequately maintained.
- Minimise the discharge of galley waste material should obvious attraction of marine fauna be observed.

8.4 VESSEL SEAWORTHINESS AND SAFETY

- Vessels used during prospecting must be certified for seaworthiness through an appropriate internationally recognised marine certification programme (e.g. Lloyds Register, Det Norske Veritas).
- Collision prevention equipment should include radar, multi-frequency radio, foghorns, etc. Safety equipment and training of personnel to ensure the safety and survival of the crew in the event of an accident is a further legal requirement.
- A Notice to Mariners should provide the co-ordinates of the location of the planned areas in which prospecting is to take place.

8.5 GEOPHYSICAL ACTIVITIES

- A designated onboard Marine Mammal Observer (MMO) must ensure compliance with mitigation measures during geophysical surveying.
- The MMO should conduct visual scans for the presence of cetaceans around the survey vessel prior to the initiation of any acoustic impulses.
- Pre-survey scans should be of at least a 15-minute duration prior to the start of survey equipment.
- Where equipment permits, “soft starts” should be carried out for equipment with source levels greater than 210 dB re 1 µPa at 1 m over a period of 20 minutes to give adequate time for marine mammals to leave the vicinity. Where this is not possible, the equipment should be turned on and off over a 20 minute period to act as a warning signal and allow cetaceans to move away from the sound source.
- Pause the survey if any marine mammals show distressed behaviour within 500 m of the survey vessel or equipment until the mammal has vacated the area.
- Avoid planning geophysical surveys during the period for movement of migratory cetaceans (particularly baleen whales) from their southern feeding grounds into low latitude waters (beginning of June to end of November), and ensure that migration paths are not blocked by operations.
- Avoid undertaking prospecting activities during peak fishing periods of the small pelagic purse-seine sector. It is recommended that survey and sampling activities be carried out between mid-November and mid-January at a time when the small pelagic sector normally stops operations. This would also avoid possible impacts to the linefish fishery as linefish operations have a seasonal signal mostly driven by the availability of snoek in the winter period.
- For the months of June and November ensure that Passive Acoustic Monitoring (PAM) is incorporated into any survey programme.

8.6 SAMPLING ACTIVITIES

- Sampling activities of any kind should avoid rocky outcrop areas or other identified sensitive habitats in the concession area.
- Use should be made of geophysical data to conduct a pre-sampling geohazard analysis of the seabed, and near-surface substratum to map potentially vulnerable habitats and prevent potential conflict with the sampling targets.
- A buffer zone of 150 m will be established around any identified sensitive communities or rocky-outcrop areas.
- Avoid undertaking prospecting activities during peak fishing periods of the small pelagic purse-seine sector. It is recommended that survey and sampling activities be carried out between mid-November and mid-January at a time when the small pelagic sector normally stops operations. This would also avoid possible impacts to the linefish fishery as linefish operations have a seasonal signal mostly driven by the availability of snoek in the winter period.

8.7 CULTURAL HERITAGE MATERIAL

- Areas where shipwreck sites are identified during geophysical surveys must be excluded prior to undertaking sampling activities.
- It is recommended that the onboard BPT127 representative must consult the Maritime and Underwater Cultural Heritage (MUCH) Unit of the South African Heritage Resources Agency in developing a procedure for archaeological site and artefact recognition, as well as the procedure to follow should archaeological material be encountered during sampling.
- The contractor must be notified that archaeological sites could be exposed during drill and bulk sampling activities, as well as the procedure to follow should archaeological material be encountered.
- If shipwreck material is encountered during the course of bulk sampling in the concession area, the following mitigation measure should be applied:
    - Cease work in the directly affected area to avoid damage to the wreck until the South African Heritage Resources Agency (SAHRA) has been notified and the contractor/BPT127 has complied with any additional mitigation as specified by SAHRA; and
    - Where possible, take photographs of them, noting the date, time, location and types of artefacts found. Under no circumstances may any artefacts be removed, destroyed or interfered on the site, unless under permit from SAHRA.
- The possibility of realising core log information and samples of the coarser fraction (i.e. gravel and stone between 20 mm and 150 mm) of sorted seabed sediment for assessment by an archaeologist for the presence of prehistoric lithic material should be considered by BPT127.

Nicholas Arnott

From:	Nicholas Arnott
Sent:	Friday, 27 August 2021 21:02
To:	Nicholas Arnott
Subject:	Belton Park Trading 127 (Pty) Ltd – EIA for A Prospecting Right, Sea Concessions 13C, 15C, 16C, 17C & 18C, West Coast (DMRE REFERENCE: WC30/5/1/1/2/10319PR, WC30/5/1/1/2/10320PR, WC30/5/1/1/2/10321PR, WC30/5/1/1/2/10322P): Availability of DEIR for Comment
Attachments:	2021-08-27_IMD05C_DEIR.pdf; IMD05C_ExecSumm.pdf

Dear Interested and/or Affected Party,

The attached correspondence regarding the above-mentioned project refers. This email and attached notification letter provide information on the availability for comment of the draft Environmental Impact Report (EIR) prepared for the above-mentioned project. The draft EIR has been made available for a 30-day review and comment period from **27 August to 27 September 2021**.

A copy of the complete draft EIR can be downloaded at this link: https://slrconsulting.com/public-documents/eia-belton-park-trading. A copy of the Executive Summary is attached for ease of reference.

Should you have any queries in this regard or require additional information please do not hesitate to contact us.

Kind Regards,

SLR

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Project Reference: 720.09017.00005

File Ref. 2021-08-27_IMD05C_DEIR.docx

27 August 2021

DEPARTMENT OF MINERAL RESOURCES AND ENERGY
9th Floor Atterbury House
Corner Lower Burg & Riebeeck Streets
CAPE TOWN
8000

ATTENTION: MR MOHASOA

Dear Sir

BELTON PARK TRADING 127 (PTY) LTD – SCOPING REPORT FOR AN EIA FOR A PROSPECTING RIGHT APPLICATION FOR OFFSHORE SEA CONCESSIONS 13C, 15C, 16C, 17C & 18C, WEST COAST (DMRE REFERENCE: 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): NOTIFICATION OF RESUBMISSION OF APPLICATION FOR EA AND CONTINUATION OF EIA PROCESS

Your previous correspondence regarding above-mentioned project refers. This letter provides information regarding on the availability for comment of the Draft Environmental Impact Report (EIR) prepared for the above-mentioned project.

In accordance with the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended), you and / or your organisation are hereby invited to comment on the Draft EIR for the proposed project. The Draft EIR has been made available for a 30-day public and authority review and comment period from 27 August to 27 September 2021. A hard copy of the Draft EIR Report is enclosed.

Should you have any queries on the above, or require any further information, please do not hesitate to contact the undersigned (narnott@slrconsulting.com).

Yours sincerely

Nicholas Arnott Pr. Sci. Nat.
Associate Environmental Consultant
SLR Consulting (South Africa) (Pty) Ltd

APPENDIX 3.4: EIA COMMENTS AND RESPONSES REPORT

ENVIRONMENTAL IMPACT ASSESSMENT FOR A PROSPECTING RIGHT APPLICATION FOR OFFSHORE SEA CONCESSIONS 13C, 15C, 16C, 17C & 18C: ENVIRONMENTAL IMPACT REPORT

COMMENTS AND RESPONSES REPORT

1. INTRODUCTION

This Comments and Responses Report has been compiled as part of Environmental Impact Assessment (EIA) process that is being undertaken for the proposal by Belton Park Trading 127 (Pty) Ltd (BPT127) to undertake prospecting activities in South African Sea Concessions 13C, 15C, 16C, 17C and 18C.

The purpose of this report is to record all written comments received from Interested and Affected Parties (I&APs) during the EIA phase for the above-mentioned proposed prospecting activities. Where applicable, responses to comments and questions are given or cross-referenced to the relevant section of text in the Final Environmental Impact Report (EIR).

2. COMMENTS RECEIVED

A total of twelve submissions were received. Comments and issues are presented and responded to in Table 2-2 overleaf. A copy of all written submissions is provided in Attachment A. No importance should be given to the order in which the comments are presented. As far as possible, comments are presented verbatim from written submissions.

Submitted by		Date	Method
1.	SANNCCOB - Christian Triay	25 February 2020	Email
2.	South African Heritage Resources Agency - Briege Williams	14 September 2021	Email
3.	West Coast District Municipality - Doretha Kotze	22 September 2021	Email
4.	Department of Forestry, Fisheries and the Environment (DFFE) - Branch: Oceans and Coast	22 September 2021	Email
5.	Dehan Owies	27 September 2021	Email
6.	DFFE – Department of Biodiversity and Coastal Research – Gerhard Cilliers	27 September 2021	Email
7.	One Ocean Hub Research Team - Jackie Sunde	27 September 2021	Email
8.	Fannie Shabangu	27 September 2021	Email
9.	Masifundise Development Trust - Maia Nangle	27 September 2021	Email
10.	Small Pelagic Scientific Working Group - Dr Fannie Shabangu	27 September 2021	Email
11.	Hilda Adams	27 September 2021	Email
12.	Department of Forestry, Fisheries and the Environment (DFFE) - Branch: Oceans and Coast	28 September 2021	Email

Table 1: Summary table of comments received, with responses from SLR and the project technical team, as appropriate

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
1	SANCCOB - CHRISTIAN TRIAY				
1.1	Impacts on seabirds from bunkering at sea	SANCCOB - Christian Triay	Email 25 February 2020	The only comments I have from the preparedness and response perspective is that I notice under Section 6 [of the Scoping Report] (key project issues) under ‘potential impact on marine fauna’ that “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”. I think it is important to note that two oil spills have occurred in three years from ship-to-ship bunkering at sea affecting over 200 endangered seabirds. both oil spills involved a spillage of approximately 100 – 400 litres of heavy fuel oil. both spills resulted in an oiled wildlife response lasting a few months. This is important to note because an oil spill in the marine environment will not only affect water quality but also the marine wildlife in the area, especially seabirds. Seabirds are particularly vulnerable to oil spills at sea and it is highly likely that they will become oiled if there is an oil spill. Oiled wildlife will lose their insulation and become hypothermic and lose their buoyancy, which usually results in death at sea. Oiled wildlife will also ingest oil when preening, which damages their internal organs, blood etc. It would therefore be a concern that bunkering at sea would occur in the proposed area that has a high concentration of endangered seabirds (e.g. African penguins and cape gannets, amongst others). If bunkering at sea is going to occur then we highly recommend that an oiled wildlife contingency plan be developed in order to plan for a potential oiling event affecting seabirds and other marine wildlife. it is also important to invest in some oiled wildlife preparedness (e.g. equipment and basic wildlife response training). SANCCOB has worked closely with SAMSA and TNPA as well as the oil and gas and shipping industry with regard to mitigating the effects of oil spills on marine wildlife. We would be happy to provide some additional information in this regard. Ultimately, it would be preferable to avoid the risk altogether and recommend that the vessels in question receive bunkers within the safety of a port rather than at sea.	Given the very short-duration of the proposed prospecting operations over the duration of the proposed prospecting right application (see Section 3.4 of the final EIR), no bunkering at sea would be required.

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
2	SOUTH AFRICAN HERITAGE RESOURCES AGENCY (SAHRA) – MS. BRIEGE WILLIAMS				
2.1	Legislative requirements	South African Heritage Resources Agency – Briege Williams	Email - 14 September 2021	In terms of the National Heritage Resources Act, No 25 of 1999 (NHRA), Sections 2 and 35 stipulates that any wreck, being any vessel or aircraft or any part thereof older than 60 years old lying in South Africa's territorial waters or maritime cultural zone is protected and falls under the jurisdiction of SAHRA's Maritime and Underwater Cultural Heritage Unit. These heritage sites or objects may not be disturbed without a permit from the relevant heritage resources authority.	The legislative requirements are acknowledged.
2.2	Summary of previous comments			SAHRA previously issued a comment in January 2020 in response to the Draft Scoping Report (DSR). The DSR had identified the need for Maritime Heritage Impact Assessment (MHIA) and SAHRA supported this.	The Maritime Archaeological Impact Assessment undertaken for the proposed project is included in Appendix 4.4 of the final Environmental Impact Report (EIR).
2.3	Support of proposed mitigation measures			The MHIA discussed the potential for encountering and impacting underwater cultural heritage and highlighted the possible presence of four wrecks within the sea concession areas. The precise locations of these wrecks are not known, only that they are recorded as wrecking in the vicinity. Because of the possibility that there may be unrecorded wrecks within the sea concessions, the mitigation measures recommended in the MHIA, and listed below, must be strictly adhered to. SAHRA has reviewed the recommendations for mitigation set out in Section 6.2.7 of the EIR. These recommendations include the following: • *"Areas where shipwreck sites are identified during the geophysical surveys must be excluded prior to undertaking sampling activities.* • *It is recommended that the onboard BPT127 (Belton Park Trading 127 (Pty) Ltd: the applicants) representative must undergo a short induction on archaeological site and artefact recognition, as well as the procedure to follow should archaeological material be encountered during sampling.* • *The contractor must be notified that archaeological sites could be exposed during drill and bulk sampling activities, as well as the procedure to follow should archaeological material be encountered.* • *If shipwreck material is encountered during the course of bulk sampling in the concession area, the following mitigation measure should be applied:*	Support of the proposed mitigation measures included in the Environmental Management Programme (EMPr) is acknowledged.

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
				o *Cease work in the directly affected area to avoid damage to the wreck until SAHRA has been notified and the contractor/BPT127 has complied with any additional mitigation as specified by SAHRA; and* o *Where possible, take photographs of artefacts found, noting the date, time, location and types.* o *Under no circumstances may any artefacts be removed, destroyed or interfered on the site, unless under permit from SAHRA.* • *The possibility of realising core log information and samples of the coarser fraction (i.e. gravel and stone between 20 mm and 150 mm) of sorted seabed sediment for assessment by an archaeologist for the presence of prehistoric lithic material should be considered by BPT127."* SAHRA supports these mitigation measures and emphasises that they must be adhered to especially in the event that any cultural heritage should come to light.	
2.4	Notify SAHRA in the event that shipwrecks are identified	South African Heritage Resources Agency – Briege Williams	Email - 14 September 2021	We would like to reiterate that should any shipwrecks be identified as part of this project then SAHRA must be notified to enable us to add the information to our database. Any new discoveries or updated data is a valuable resource in adding to our knowledge of South Africa's maritime history.	SAHRA will be notified in the event that any shipwrecks are discovered whilst undertaking the proposed prospecting operations.
3	WEST COAST DISTRICT MUNICIPALITY – MS. DORETHA KOTZE				
3.1	No objection	West Coast District Municipality - Doretha Kotze	Email - 22 September 2021	The West Coast District Municipality takes note of the information contained in the Executive Summary of the DEIR and has no objection to the proposal, provided that all the mitigation measures stated in the DEIR are instituted.	This comment is noted and recorded here for consideration by the Competent Authority in decision-making.

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
4	DEPARTMENT OF FORESTRY, FISHERIES AND THE ENVIRONMENT (DFFE) - BRANCH: OCEANS AND COAST				
4.1	Mandate of Branch Oceans and Coasts	Department of Forestry, Fisheries and the Environment (DFFE) - Branch: Oceans and Coast	Email – 22 September 2021	The Branch O&C has the mandate to ensure the holistic management of the coast and estuarine areas as an integrated system and promote coordinated coastal management. It ensures that the ecological integrity, natural character, and the economic, social, and aesthetic value of the coastal zone are maintained and that people, properties, and economic activities are guarded against dynamic coastal processes. Guided by the principles of integrated coastal management, this Branch continues to strive for social equity and promote sustainable use of coastal resources. In line with the principles of international best practice, this Branch underscores the need for balancing sustainability and conservation concerns with the socioeconomic needs of fisheries and the environment to ensure that developments within coastal environments are socially responsible, economically justifiable, and ecologically sustainable.	The stated mandate of the Branch is acknowledged and recorded here for consideration by the Competent Authority in decision-making.
4.2	Branch Oceans and Coasts objection to the proposed prospection operations			Based on the information presented in this report, specialist knowledge on coastal and marine environments, this Branch does not endorse the implementation of the proposed prospecting right application for offshore sea concessions 13C, 15C, 16C, 17C & 18C. While this Branch recognizes the need for the assessment to identify and estimate the potential mineral resources within each Sea Concession area for possible future mining, this Branch objects to this application based on potential adverse ecological/environmental impacts and possible disruption to the West Coast pelagic fishery.	The objection of the Branch Oceans and Coasts to the proposed prospecting activities is acknowledged and recorded here for consideration by the Competent Authority in decision-making.

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
4.3	Potential impact of the proposed prospection operations	Department of Forestry, Fisheries and the Environment (DFFE) - Branch: Oceans and Coast	Email – 22 September 2021	This Branch strongly believed that the potential environmental impacts on marine fauna, impact on other users of the sea in terms of the exclusion of demersal long-line, traditional line-fish, pole-and-line, small-scale fishers, and fisheries research, sediment plume impact on fish stock recruitment and social and socio-economic impacts on cultural heritage material, impact related to job creation and business opportunities, visitors during construction on an environment that is already stressed and over-extracted have not been sufficiently justified.	This concern is acknowledged and recorded here for consideration by the Competent Authority in decision-making. It is pointed out that as the proposed prospecting operations would be of very short duration (several days over the course of the 5-year duration for the prospecting right) and highly localised within the concession areas, the majority of potential impacts were considered to be of LOW to VERY LOW significance with the application of the proposed mitigation measures.
4.4	Disturbance of benthic fauna			<u>Recommendations for Further Reflection and Review by the EAP and CA:</u> Page 107 of the report specifies that the proposed drill and bulk sampling operations are expected to result in the disturbance and loss of benthic fauna within the sampling footprint due to crushing (as a result of the drill frame structure or weight of the seabed crawler) and the removal of seafloor sediments (by the drill bit and crawler suction head). However, page 108 further identifies this impact to be of VERY LOW significance with and without mitigation. While this Branch notes that the proposed drill and bulk sampling operations would take place on a significantly smaller scale than historic mining operations, cumulative impacts of neighboring activities also need to be taken into account when determining the recovery rates of impacted communities. Recovery within the sampling footprints is expected to take place within the medium term, as the excavations would have slow infill rates and may persist for extended periods (years). Furthermore, biomass often remains reduced for several years as long-lived species like molluscs and echinoderms need longer to re-establish the natural age and size	As noted in Section 5.2.2 of the EIR, information from previous mining operations has demonstrated that on the southern African continental shelf, natural rehabilitation of the seabed takes place subsequent to disturbances through a process involving influx of sediments and recruitment of invertebrates into previously disturbed areas. Recovery rates of impacted communities were observed to be variable and dependent on the approach, sediment influx rates and the influence of natural disturbances on succession communities. Thus, while the impact may persist over the medium term (several years), the very localised extent and extremely small footprint (approximately 0.00001% of the overall area of the sea concession areas) has

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
				structure of the population. Taking this into account, it remains unclear of the methodology that was used to come to this conclusion.	resulted in the assessed significance of the impact to be LOW with and without mitigation.
4.5	Avoidance of Rocky Outcrop areas	Department of Forestry, Fisheries and the Environment (DFFE) - Branch: Oceans and Coast	Email – 22 September 2021	This Branch further reiterates that sampling activities of any kind should avoid rocky outcrop areas or other identified sensitive habitats in the concession areas.	This has been included as mitigation in the EMPr (see Appendix 1) for the proposed operations.
4.6	Assessment of impacts associated with sediment plumes			Page 109 of the report identifies that as part of the sampling operations, the seabed sediments will be pumped to the surface and discharged onto sorting screens on the sampling vessel for screening. The unwanted material will then be discarded overboard from where the heavy portion settles on the seafloor in the excavated areas and the finer portion forms a suspended sediment plume in the water column which dissipates with time. The main effect of sediment plumes is an increase in water column turbidity, leading to a reduction in light penetration with potentially adverse effects on the photosynthetic capability of phytoplankton. Other potential impacts include inhibiting pelagic visual predators due to poor visibility, egg and/or larval development impairment, and reduction of benthic bivalve filter-feeding efficiencies. Negative impacts may also occur when heavy metals or contaminants associated with fine sediments are remobilised. However, this impact has also been assessed to be of VERY LOW significance.	The impact associated with the generation of sediment plumes has been assessed in Section 5.2.3 of the EIR. It is noted that the West Coast offshore environment is naturally subjected to increased sediment loads under stronger wave conditions associated with high tides and storms, or under flood conditions. Thus, there is a natural variation in turbidity and sediment load within the waters off the West Coast. Furthermore, it has been observed from previous offshore sampling operations, that the suspended sediments in plumes settle rapidly (within hours) and results from water sampling confirmed that contaminant levels in the plumes are well below water quality guideline levels. Thus, the overall significance of this impact was assessed to be VERY LOW.
4.7	Presence of marine fauna within Sea Concessions areas			The report specifies that the proposed sea concession areas fall within the cold temperate Nammaqua Bioregion and overlap with proposed Cape Canyon and Associated Islands, Bays and Lagoon Ecologically or Biologically Significant Areas (EBSA). The Namaqua Coastal pelagic environment is characterized by very high productivity, high chlorophyll, and very cold water (mean SST = 15.2°C) caused by upwelling (Lagabrielle 2009, Roberson *et al.*,	Potential impacts on marine fauna have been assessed in Section 5.2 of the EIR.

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
				2017), also serving as an important area for coastal fish (Turpie *et al.*, 2000). The report further identifies that demersal fish species likely to be encountered in the general project area like St Joseph, Houndshark, Soupfin shark, Tigar catshark, and Bramble shark including, small pelagic species (sardine/pilchard, anchovy, chub mackerel, horse mackerel, and round herring) and occurring beyond the surf zone and generally within the 200 m contour. It has been widely established that most seabirds in the region reach the highest densities offshore of the shelf break (200 to 500 m depth) and are likely to be encountered within the proposed prospecting area. Marine mammals like sperm whales, migrating humpback and southern right whales, and various baleen and toothed whales are known to frequent offshore waters and are likely to be encountered.	
4.8	Disturbance of demersal fisheries research	Department of Forestry, Fisheries and the Environment (DFFE) - Branch: Oceans and Coast	Email – 22 September 2021	Section 5.3.1 of the report states that based on the assessment undertaken by the fisheries specialist, the proposed prospecting operations are expected to have NO IMPACT on the demersal trawl, large pelagic (tuna longline), abalone ranching, net fish and seaweed sectors, fisheries research, demersal longline, tuna pole, and the west coast rock lobster. However, Demersal research trawls and acoustic surveys could be affected by exclusion from Sea Concession 13C, 15C, 16C, 17C & 18C. Demersal fisheries research could be affected by exclusion from this area if it were to coincide with the designated survey timing. While the disturbance would be very localised in both time and space, the overall impact could be significant if they occur at times that the small pelagic fleet identifies target shoals in the Sea Concession areas.	The potential impact on demersal fisheries research has been assessed in Section 5.3.1 of the EIR. It is further pointed out that the nature of the proposed prospecting operations are such that fishing vessels would be able to continue to operate in the vast majority of the sea concession areas at the same time as the proposed prospecting operations take place. Fishing vessels would only be temporarily excluded in the immediate vicinity (up to 2 nm the bulk sampling vessel) of the prospecting operations due to required safety zone restrictions.

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
4.9	Impacts on small pelagic purse-seine and traditional line fish fisheries	Department of Forestry, Fisheries and the Environment (DFFE) - Branch: Oceans and Coast	Email – 22 September 2021	The concession areas are adjacent to the main landing points of the fishery from which a significant fleet of purse seine vessels operates. Further, the seasonal nature of the fishery means that fishing in the St Helena Bay area and northwards will occur and interaction/avoidance of the fishery with the prospecting operation will occur. Small pelagic shoals of sardine, anchovy, horse mackerel, and lantern and lightfish occur seasonally in the concession areas and these are targeted by the small pelagic fleets when they are identified. Small pelagic purse-seine and traditional line fish fisheries constitute a valuable food resource for human consumption and are also important components of marine food webs. Commercial fisheries play an important role in food security and income for coastal communities worldwide, particularly in developing countries (Berkes *et al.*, 2001, Béné *et al.*, 2010).	The potential impact on these fishing sectors has been assessed in Section 5.3.1 of the EIR.
4.10	Financial impact on commercial fisheries			The proposed BPT coincides with productive fishing grounds for anchovy and red-eye round herring and could potentially negatively impact the economic value and overall tonnage of landings are the demersal (bottom) trawl and longline fisheries targeting the Cape hakes (*Merluccius paradoxus* and *M. capensis*) and the pelagic-directed purse-seine fishery targeting pilchard (*Sardinops sagax*), anchovy (*Engraulis encrasicolus*) and red-eye round herring (*Etrumeus whitheadii*). However, the Fisheries Impact study has not adequately outlined the extent of the financial implications to commercial fisheries, including advice on the cumulative, unintended impacts of this proposal on fisheries.	Quantifying the financial implications for commercial fisheries is not considered possible as one cannot just consider a simple correlation between prospecting and reduced catches without also considering historical variations in the catch data and environmental variables. A previous review of historical variations found that annual catches of most species show considerable inter-annual variability (CapMarine, 2015). Variability in catches is driven largely by variability in abundance and distribution of each species, which in turn is driven by variability in the environment and other ecosystem components at a range of spatial and temporal scales.

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
4.11	Considerations for decision-making	Department of Forestry, Fisheries and the Environment (DFFE) - Branch: Oceans and Coast	Email – 22 September 2021	A combination of the ecological concerns necessitates that the merits of this proposal be carefully weighed against the externalities to inform whether this proposal is socially responsible, economically justifiable, and ecologically sustainable.	These concerns are recorded here for consideration by the Competent Authority in decision-making.
4.12	Avoidance of peak fishing periods for small pelagic purse-seine and linefish sectors			Fishing activity in this sector is reported by landing point. In the vicinity of Sea Concession 13C, 15C, 16C, 17C & 18C. The proposed activities should not coincide with peak fishing periods of the small pelagic purse-seine sector. Should this application be successful in the environmental authorization, it is recommended that the competent [authority] includes a condition that survey and sampling activities only be carried out between mid-November and mid-January at a time when the small pelagic sector normally stops operations. Linefish operations also have a seasonal signal mostly driven by the availability of snoek in the winter period. Therefore the mitigation of possible impacts to the linefish fishery by undertaking the surveys in the November to January periods coincides with the small pelagic mitigation option.	This recommendation is recorded here for consideration by the Competent Authority in decision-making.
4.14	Impact on commercial fisheries			The long-term impact of the 500 m exclusion zone which restricts vessels from entering the safety zone around a sampling vessel poses a direct impact to fishing operations in the form of loss of access to fishing grounds (abalone ranching, net fish, and seaweed, West Coast rock lobster, Tuna Pole and Demersal longline) and fishing research is largely irreversible. Demersal research trawls and acoustic surveys could be severely impacted by the 500 m exclusion from Sea Concession 13C, 15C, 16C, 17C & 18C. It is reiterated that the impact on fisheries because of the potential loss of fishing ground is regarded as a significant impact, as it potentially affects the livelihoods of communities and industries that are heavily reliant on fisheries as a source of income. A socio-economic assessment study is recommended to advise on the long-term unintended and cumulative impacts of this proposal on commercial fisheries as well as recommend mitigation measures to mitigate these impacts.	As noted in Section 4.8, the nature of the proposed prospecting operations are such that fishing vessels would be able to continue to operate in the vast majority of the sea concession areas at the same time as the proposed prospecting operations take place. Fishing vessels would only be temporarily excluded in the immediate vicinity (up to 2 nm of the bulk sampling vessel) of the prospecting operations due to required safety zone restrictions. Once the prospecting vessel has moved off location, the related safety exclusion zone would no longer apply.

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
4.15	Cumulative impacts	Department of Forestry, Fisheries and the Environment (DFFE) - Branch: Oceans and Coast	Email – 22 September 2021	Further to this, exploration for oil and gas is currently undertaken in several license blocks off the West Coast. The Sea Concession areas overlap with Block 3A/4A for which PetroSA and Sasol are the license holders and a few marine diamond mining right and prospecting concession areas are also located in proximity to the Sea Concession areas under this application. The potential negative impacts of the project on marine flora and fauna (small and large) onshore, nearshore, and offshore marine species to a large extent are irreversible even if feasible mitigation measures are applied. Ongoing exploration and prospecting activities are already causing irreversible impacts on the ecological integrity of these coastal areas. Further authorizing more prospecting activities in the same area where so much activity further promotes resource use conflicts which would not only negatively impact the ecological integrity of this environment and fisheries but also create conflict and competition between different license rights holders.	Cumulative impacts have been considered and assessed in Section 5.6 of the EIR.
4.16	Need and Desirability of proposed activities			The need and desirability of the proposed prospecting operations in the context of other prospecting and mining activities in the proposed sea concession areas must be further elaborated.	The need and desirability for the proposed prospecting operations is set out in Section 3.2 of the EIR.
4.17	Requirement for undertaking Strategic Environmental Assessment			This Branch further recommended for an assessment to be undertaken which provides a comprehensive outline of the advantages and disadvantages associated with prospecting in the offshore environment on the socio-economic, ecological, and economic environment of the West Coast.	This comment is noted. The recommendation for undertaking an assessment of all prospecting operations off the West Coast falls outside the scope of this EIA process. It is noted that the key purpose of Operation Phakisa (2014) is to unlock the economic potential of South Africa's oceans. Thus, the exploration offshore mineral resources is a key activity to understand the resource potential of the

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
					South African offshore environment.
4.18	Possible requirement for Coastal Water Discharge Permit	Department of Forestry, Fisheries and the Environment (DFFE) - Branch: Oceans and Coast	Email – 22 September 2021	The report specifies that discharges to the marine environment include deck drainage, machinery space drainage, sewage, galley wastes, and solid wastes from the geophysical survey and sediment sampling vessels. Please contact the Department of Forestry, Fisheries & Environment (DFFE) OC: Pollution Management to confirm the need for a Coastal Water Discharge Permit (Dr. Y Peterson Ypeterson@environment.gov.za / Mpho Ligudu Mligudu@environment.gov.za.	The typical discharges from the prospecting vessels would be no different to that of any other vessel operating within the South African EEZ. In this regard, these operational discharges are managed in accordance with the requirements of the MARPOL 73/78 standards which apply internationally.
4.19	Duty of Care			Caution needs to be undertaken when authorizing developments that may potentially compromise the ecological status of these ecosystems. You are kindly reminded of your duty of care towards the coastal environment per section 58 of the ICM Act read together with section 28 of NEMA which states that "*Every person who causes, has caused or may cause an adverse effect on the coastal environment must take reasonable measures to prevent such adverse effect from continuing, recurring or occurring or, in so far as such harm to the coastal environment is authorized by law or cannot reasonably be avoided or stopped, to minimize and rectify such adverse effect on the coastal environment*" by taking into consideration and implement recommendations provided in this comments document recommending measures to be undertaken to ensure the coastal zone is protected, preserved and managed.	The relevant requirements of the Duty of Care for the environment are acknowledged.
4.20	Undertaking listed activities before granting of an EA			Kindly note that the activity may not commence before the granting of environmental authorization by the CA. In terms of Section 49A of NEMA, the commencement of unauthorized activities, failure to comply with conditions in a license to operate, unlawful or intentional acts that lead to significant pollution, and failure to comply with compliance orders or directives may result in the imposition of a fine or jail sentence on conviction for an offense. Section 49B provides that any persons convicted of an offense in terms of Section 49A may be liable to a fine and/or imprisonment.	The proposed activities will not be undertaken until such time the required authorisations are in place.

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
4.21	Submission of information to Branch: Oceans and Coast	Department of Forestry, Fisheries and the Environment (DFFE) - Branch: Oceans and Coast	Email – 22 September 2021	Please be advised that the Sub Directorate: Coastal Development and Protection within the Branch: O&C is responsible for coordinating and facilitating EIA comments and advice for developments within the marine environment. Kindly forward any EIA-related information or request to Email: OCeia@environment.gov.za.	This address has been used for distribution of the Draft EIR.
4.22	Submission of comments to the Competent Authority			A copy of these comments should be forwarded to the CA for consideration and implementation. The EAP is kindly requested to submit proof of submission to OCeia@environment.gov.za. These comments must be sent to the CA for consideration and implementation, and the EAP is kindly requested to submit proof of such submission to us.	These comments together the responses included in this Comments and Responses Report have been submitted to the Competent Authority for consideration in decision-making.
5	DEHAN OWIES				
5.1	Online meetings	Dehan Owies	Email - 27 September 2021	This email refers to the planning mine activities (prospecting) in Doringbaai and northly areas to the Olifants River. As a concerned person in Doringbaai I wish to bring under your attention that zoom meetings is not an option to participate due to the fact that not everyone do have access to that infrastructure / facility. We request a community participation process whereby the locals can be better informed about these mining plans in our area.	Details of the public participation process undertaken are included in Sections 2.5.2 and 2.76 of the EIR. No online public meetings were arranged for the proposed project. During the Scoping Phase, telephonic discussions were held with Ward Councillors and Municipal Managers for the nearest Wards, District and Local Municipalities to inform them of the proposed project. Given the ongoing risk of COVID-19 infections, SLR is of the view that hosting of physical public meetings was not be practical or responsible during the EIA process and otherwise against restrictions on public gathering.

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
5.2	Impact on small-scale fishers			The Small Scale Fishers are worried about the possible impact on their livelihoods and the access to their fishing grounds. A lot of fishing activities is happening and in particular the white mussel harvesting in the identified mining area. I surely hope that this will be taken in consideration before any mining activities take place even the prospecting / drilling in the area.	Small-scale fishermen in the West Coast district would be included in the traditional line, west coast rock lobster, white mussel and abalone fisheries. Section 5.3.1.1 of the EIR includes an assessment of potential impact of the proposed prospecting activities on fishing activities. As the small-scale fishery rights cover the nearshore area, it is anticipated that the majority of the small-scale fishing activity would not be undertaken within the Sea Concession area. However, the possibility of small-scale fishing activities extending into the shallow water areas of the concession area was also not excluded. As the potential impact on the fisheries would be of local extent, short-term and of low intensity, the overall significance is considered to be VERY LOW (with and without mitigation). It is also pointed out that the nature of the proposed prospecting operations are such that fishing vessels would be able to continue to fish in the vast majority of the sea concession areas and they would only be temporarily excluded in the immediate vicinity (500 m of the prospecting vessel) of the prospecting operations due to required safety zone restrictions. It is pointed out that the nature of the proposed bulk sampling operations are such that fishing vessels would be able to

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
					fish in the vast majority of the sea concession area and they would only be temporarily excluded in the immediate vicinity (500 m of the bulk sampling vessel) of the prospecting operations due to required safety zone restrictions.
6	DFFE – DEPARTMENT OF BIODIVERSITY AND COASTAL RESEARCH – GERHARD CILLIERS				
6.1	Assessment of impacts on marine fauna/habitat	DFFE – Department of Biodiversity and Coastal Research – Gerhard Cilliers	Email – 27 September 2021	An impact such as 'disturbance and loss of benthic fauna' (by removal of sediments by drill bit or trawler suction head), during sampling, is scored as Medium in the report. Medium intensity/severity is defined in Appendix 4.1 as: 'Moderate change, disturbance or discomfort. Where the affected environment is altered, but natural functions and processes continue, albeit in a modified way.' However, the impact would result in 'elimination of the benthic infaunal and epifaunal biota in the sample footprints'. This is not consistent with Medium intensity, it is High intensity ('Prominent change, disturbance or degradation. Where natural functions or processes are altered to the extent that they will temporarily or permanently cease'). It may be that limited extent or duration of the impact were taken into account in scoring this impact as Medium intensity, but that would not be appropriate because these are all separate criteria that are supposed to be scored independently of each other. Therefore, the score should be adjusted from Medium to High. Similarly, it is very doubtful whether crushing of benthic fauna during sampling is Medium and not High. There are other examples where scores of impact seem too generous: For example, it is acknowledged in the Marine faunal assessment report that natural rehabilitation of the seabed and recovery of invertebrate communities is very dependent on a number of factors. It is also acknowledged that 'results of on-going research on the southern African West Coast suggest that differences in biomass, biodiversity or community composition following mining with drill ships or crawlers below the wave base may endure beyond the Medium term (6-15 years)', and that excavations at the proposed depths 'may have slow infill rates and persist for	This comment is noted. The impact assessment methodology considers the identified potential impacts and puts them into context with the entire extent of the Sea Concession areas. Thus, while there would be a "prominent change, disturbance or degradation" within the immediate footprint of the sampling footprints themselves, natural functions and processes would continue as normal over the vast majority of the entire Sea Concession areas. By contextualising the overall disturbance footprints of the proposed prospecting operations in relation to the overall extent of the Sea Concession areas, the identified impacts

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				several years'. How then, is the duration of impact scored Low-Medium. It should be Low-High, or rather Medium-High.	
6.2	Assessment on noise impacts			The impacts of underwater sampling noise on marine fauna are also unlikely to be Low, even if it may be of limited duration and (relatively) limited extent.	The comment provides no rationale for the assertion that the noise impacts would not be low. It is pointed out that many of the geophysical tools have similar noise profiles to equipment used by the commercial fishing industry and the acoustic footprint of the above-mentioned these tools is considered to be much lower than that of deeper penetration low frequency seismic surveys.
6.3	Impact of suspended sediment plumes	DFFE – Department of Biodiversity and Coastal Research – Gerhard Cilliers	Email – 27 September 2021	Furthermore, based on the assessment of the impact of suspended sediment plumes generated during sampling at the bottom of p72 of the Marine Faunal report, it is surprising that the intensity of the impact is disregarded as being of Low intensity in the following paragraph (p 73). In terms of how the impact is described on p72, the severity is certainly High. Once again it seems that allowance for (perceived) limited duration and extent of the impact has been made in the scoring of intensity, but once again, the score of intensity must be scored independently of these other criteria.	Refer to response included in Section 4.1 above.
6.4	Cumulative impacts assessment			The same does for smothering of benthic by redeposit tailings. This impact is most certainly High, not Low, even if it may be localised. It is also unclear why the duration of impact of smothering on rocky outcrop communities goes from Medium term without mitigation, to Short term with mitigation. The mitigation measure is to avoid rocky outcrop areas. If you try but fail to avoid them, the duration of impact should be no different to if you don't attempt to avoid them. The scoring of impacts therefore need to be reconsidered, with possible implications for the significance of impacts. Also, there seems to not be adequate consideration of cumulative impacts. Cumulative impacts are only considered in terms of the addition of other (outside) impacts (other seismic surveys, oil and gas activities). However, what is not acknowledged is that all the anticipated impacts of the sampling,	It is noted that the data derived from the proposed geophysical surveys would be used to delineate the location of rocky outcrop areas. In this way these areas can be avoided. Avoidance of these areas is important to the proposed operations as they are non-diamondiferous areas and care not penetrable by the seabed crawler. However, in the unlikely event that these areas are not avoided, the significance for unmitigated scenario would apply.

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				are taking place together at the same locations. If for example the intensity of sediment removal, crushing and smothering are all considered to be low or very low (although I argue above that they are much higher than this), individually, what then of their combined/cumulative impacts? And how will this affect duration, reversibility and overall significance of impacts?	The assessment of all sampling activities associated with the proposed application is provided in Section 5 of the EIA Report.
6.5	Impact Assessment	DFFE – Department of Biodiversity and Coastal Research – Gerhard Cilliers	Email – 27 September 2021	While it can be demonstrated that the activity will impact relatively small areas of each concession and overall of the entire bioregions (although even this is not quite clear, see below), the actual assessment of impacts on marine fauna is inaccurate and unrealistic, and cumulative impacts are not adequately addressed. See comments under 1 above. The impact assessment on marine fauna therefore needs to be reconsidered. Whether or not the proposed sampling should be considered in Threatened ecosystem types, EBSA habitat or Critical Biodiversity Area that overlap with the concession areas, should be dependent on the revised impact assessment.	See responses 4.1 to 4.4 above.
6.6	Total extent of disturbance footprint			P78 of the Marine Faunal Assessment incorrectly states that sampling would impact an area of <0.05 km^2. The impact would be larger than this, but probably the report was supposed to refer to % area (of the Namaqua Bioregion) here, not km^2. However, the following paragraph says 'The area of seabed disturbed .... can only be determined following analysis of drill samples and development of the inferred resource model.' This seems to suggest that it is unknown at this stage what the extent of the disturbance may be. Could it potentially amount to more than 0.05%, depending on the drill samples and modelling outcomes? Clarity is needed.	This comment is noted. The total footprint of the proposed drill sampling is a total area of 2.4 ha per concession area. The proposed disturbance footprint for the bulk sampling activities would be 18 ha for all five concessions. Thus, the overall disturbance footprint would be 30 ha or 0.3 km^2. This equates to 0.005% of the total extent of the sea concession areas (6086.47 km^2).
7	ONE OCEAN HUB RESEARCH TEAM - JACKIE SUNDE				
7.1	Public participation process	One Ocean Hub Research Team – Dr Jackie Sunde	Email - 27 September 2021	This EIA process has relied on an online process for the public participation process. This is not appropriate for an application that will have an impact ultimately on the food security and livelihoods of coastal fisher communities, the majority of whom are poor with no means of accessing online platforms or reports that are lengthy and are only made available locally in English and not in their own language. For this reason it is proposed that this deadline for the submission of comments should be extended and an additional face	The preliminary I&AP database for the proposed project was compiled at the start of the EIA process (see Section 2.5.2 of the EIR). In order to notify stakeholders who were not included on the preliminary I&AP database, a press advertisement providing notification of the proposed

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				to face public participation meeting specifically with small-scale and interim relief fishers of Elandsbaai and Lamberts Bay and Doring bay should be facilitated.	project, EIA process and availability of the Scoping Report for review and comment was placed in the "Die Burger" newspaper on 10 January 2020. Telephonic discussions were also held with Ward Councillors and Municipal Managers for the nearest Wards, District and Local Municipalities to inform them of the proposed project (see Box 2-1 of the EIR). In addition to uploading the draft EIR on the SLR website, it was also made available for review and comment on a data-free portal which is accessible to stakeholders using via a mobile device without the user incurring any data charges. Given the ongoing risk of COVID-19 infections, SLR is of the view that hosting of physical public meetings was not be practical or responsible during the EIA process and otherwise against restrictions on public gathering.
7.2	Cumulative impacts	One Ocean Hub Research Team – Dr Jackie Sunde	Email - 27 September 2021	Belton Park Trading 127 has contracted SLR Consulting to undertake an EIA for a prospecting right application off-shore of the West Coast. It is noted that within four months of submitting this application, the company also applied for prospecting rights offshore in the adjacent and nearby areas of 13C, 15C, 16C, 17C & 18C and SLR Consulting is also undertaking this EIA. Thus, Belton Park has two applications currently for adjacent areas for prospecting, Diamonds, Gemstones, Heavy Minerals, Industrial Minerals, Precious Metals, Ferrous and Base Metals, Offshore, West Coast. The proposed prospecting activities in both applications entail geophysical	Reference was made to the fact that BPT127 had also applied to undertake similar activities in Sea Concessions 14B, 15B and 17B in Section 5.6 of the EIR.

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				surveying, drill sampling and bulk (trench) sampling activities. Whilst each of these applications is submitted for a completely separate EIA process, the individual EIA reports do not reference the other application. Whilst this is in line with the protocol to assess an individual application it is of relevance to a general concern related to this application.	
	Requirement for undertaking Strategic Environmental Assessment	One Ocean Hub Research Team – Dr Jackie Sunde	Email - 27 September 2021	The sea concession areas for both applications fall within the cold temperate Namaqua Bioregion of the West Coast. Whilst this is a very productive fishing region, it has also been subjected to extensive coastal and sea-based mining. The EIA report itself notes that "*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)*". There has been a plethora of applications for coastal, surf, beach and sea-based prospecting and exploration, some of which has resulted in mining authorisations along this coastal region on the past 10 years. A very concerning problem is that each application for environmental authorisation is considered on its own and the actual cumulative impacts of all the projects authorised to date have not been assessed or considered in any substantive manner, despite there being extensive evidence, as submitted by Penney *et al.* and Lombard and Sink quoted above, over 10 years ago that these cumulative impacts had resulted in critically endangering the biodiversity of the area. It is therefore submitted that before this, or any other project can be considered, there should be a Strategic Environmental Assessment (SEA) conducted for the West Coast of South Africa. Given that SLR Consulting is involved in several of these current applications it is hoped that this reputable environmental consulting organisation would support such a call.	See response provided in Section 4.17 above.
7.3	Suspension of authorisations until completion of Marine Spatial Planning mapping	One Ocean Hub Research Team – Dr Jackie Sunde	Email - 27 September 2021	Need for alignment with the Marine Spatial Planning Act and planning process: This EIA Report fails to cite the Marine Spatial Planning Act of 2019, which commenced in April 2021, as a key legislative instrument in the process of	This comment is noted and recorded here for consideration by the Competent Authority in decision-making.

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				ensuring sustainable environmental planning. As this Act has now commenced, and planning is underway on the Marine Maps for the area under consideration, it is critical that no further authorizations for prospecting for mining be considered until these maps have been developed. It is not appropriate to consider prospecting for an activity that ultimately will not be permitted in the targeted area. There are already several competing, conflicting and overlapping activities scheduled for this region of the West Coast, including considerable gas pipeline activities. The report itself notes that the following: *"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. 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 few proposed prospecting areas for phosphate are located off the West Coast, these overlap with the western edge of the Sea Concession areas. A few marine diamond mining right and prospecting concession areas are also located in proximity to the Sea Concession areas under this application".* Given that the target area is an extremely important area at the heart of the fisheries industry in South Africa it is proposed that no further authorisations for prospecting or exploration be authorised until the MSP mapping process has been completed.	
7.4	Need and Desirability	One Ocean Hub Research Team – Dr Jackie Sunde	Email - 27 September 2021	Need and Desirability The EIA report fails to consider the full range of over-arching legislative and policy instruments of relevance to the issue of need and desirability. It states that: *"With respect to the national policy and planning framework, prospecting and mining is identified as a sector with substantial potential for growth stimulation and/or employment and is supported in numerous national planning instruments, such as the National Development Plan 2030 (2012), as well as Operation Phakisa (2014) and Mining Phakisa".*	The need and desirability for the proposed prospecting operations is set out in Section 3.2 of the EIR. It is pointed out that any future Mining Right application would be required to undertake a separate EIA process wherein the need and desirability of mining itself would need to be addressed.

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				However, this fails to take into consideration that food security and job creation also lie at the heart of the NDP and Operation Phakisa, as do consideration related to a just transition and the reduction in carbon emissions. Towards this end the report fails to give adequate attention to the fact that the area under consideration is a critical area for the small-scale fisheries sector and the report fails to outline the socio-economic contribution that the SSF fisheries make to local and regional food security, job creation and tourism. Instead it assumes that mining is preferable. It inappropriately states that: *"Should prospecting activities prove that there is a feasible mineral resource for mining, a new mining area could be developed, which would generate significant employment opportunities."* It is submitted that this must be removed from the report as no socio-economic impact assessment has been done and included in this report. Contrary to this, offshore mining does not generate considerable employment opportunities and the issue of whether or not a 'new' mining area should be developed needs to be decided as part of a Marine Spatial Planning process that has an SEA report upon which it can make such assessments. For the above-mentioned reasons it is requested that this authorisation be suspended until such time as the MSP process is underway and an SEA can be undertaken for this region so that the cumulative impacts of the various mining projects currently underway can be considered and the future spatial priorities for the region can be determined.	
7.5	Assessment of impacts on small-scale fishing activities and target species spawning and recruitment	One Ocean Hub Research Team – Dr Jackie Sunde	Email - 27 September 2021	The report acknowledges that the targeted area is an important area for fisheries and a specialist report was commissioned. The Specialist Reports for both applications are written by the same consultancy. The specialist report in this instance is biased towards the information required by the industrial (large scale commercial) fisheries sector and fails to provide similar depth of information for the current interim relief fishers/SSF sector, who are dependent on the nearshore, and whose social and economic rights and needs have been recognised by the Equality Court. Although the Specialist	Section 489 of the specialist Fisheries Impact Assessment report (see Appendix 4.2 of the EIR) discusses the Small-Scale Fisheries. It is noted that small-scale fishermen in the West Coast district would be included in the traditional line, west coast rock lobster, white mussel and abalone fisheries. The traditional linefish

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				Report does describe the Small-scale sector and does indicate where they catch traditional line fish and west coast rock lobster, it is surprising then that this specialist assessment did not go into detail about the impact of the proposed prospecting activities on the spawning and recruitment grounds of the specific species such as west coast rock lobster, Cape Bream, Harders, Snoek and other species that are important for the food security and livelihoods of the SSF sector.	and West Coast Rock lobster fisheries are also discussed in detail in Sections 4.5 and 4.6 of the specialist report. Section 5.3.2 of the specialist Fisheries Impact Assessment report considers the potential impact of sediment plumes on fish stock recruitment. The report states that typically fisheries stock recruitment is highly variable and shows a strong spatial and temporal signal and that spawning and recruitment of small pelagic species as well as of many demersal species occurs primarily well to the south of Sea Concessions 13C, 15C, 16C, 17C and 18C. The overall impact on fish stock recruitment was deemed to be of very low consequence and of overall very low significance due to the localised nature of the proposed sampling events in relation to the overall extent of fish nursery areas.
7.6	Assessment of impacts on key marine and coastal biodiversity areas and features	One Ocean Hub Research Team – Dr Jackie Sunde	Email - 27 September 2021	As noted in the EIA Report, the target area overlaps in part and is adjacent to the Conservation Zone of the Cape Canyon and Associated Islands, Bays and Lagoon Ecologically or Biologically Significant Areas (EBSA). The principal objective of EBSAs is the identification of features of higher ecological value that may require enhanced conservation and management measures, however, they currently carry no legal status. It is not clear why a precautionary approach has not been adopted in this instance, given that this information is already available and will inform the Marine Spatial planning process.	While the relevant EBSA and CBA areas have been identified, it is pointed out that "these are living documents and updates are ongoing as the MARISMA Project unfolds" (see: https://cmr.mandela.ac.za/Research-Projects/EBSA-Portal/South-Africa/SA-EBSA-Status-Assessment-Management) Thus, the mapped areas and associated zonings and proposed sea use guidelines could still be subject to change over time following the completion of the Marine

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					Sector Plans developed in terms of the Marine Spatial planning process.
8	FANNIE SHABANGU				
8.1	Updated marine fauna information	Fannie Shabangu	Email - 27 September 2021	I have commented directly on the document "ENVIRONMENTAL IMPACT REPORT FOR AN EIA FOR A PROSPECTING RIGHT APPLICATION FOR OFFSHORE SEA CONCESSIONS 13C, 15C, 16C, 17C & 18C, WEST COAST", please see the attached. *[These comments have been extracted and included below]:* • Section 4.1.3.2.6: This is not true, there have been recent studies that researched deeper waters (>200 m) post 1970. These are Shabangu et al. (2019,2020a,2021), Shabangu and Andrew (2020) and Purdon et al. (2020a,b,c). • Section 4.1.3.2.6: Purdon et al. (2020a,b,c) provide recent distribution of cetaceans in South African waters. Please revise to include those references here. • Section 4.1.3.2.6: Purdon et al. (2020a,b) provide the recent distribution of large whales withing the project area. Please indicate this here. • Section 4.1.3.2.6: And can be found there in summer as well according to Purdon et al. (2020b). Please rectify this. • Table 4-4: Calls of Antarctic minke whales were detected between September and February off the west coast of South Africa as detailed in Shabangu et al. (2020), whereas Shabangu et al. (2019) sighted some minke whales in July. Please be specific by including the above provided information. • Table 4-4: Shabangu et al. (2019) found fin whale calls from May through November, indicating that they are present in August as well. Please revise to indicate this. • Table 4-4: Yes, these can be found in the shelf. Barendse (2007) is the latest example of this. Please correct this • Table 4-4: Passive acoustic monitoring research show that blue whales are in South African waters from May through September with peak occurrence in June/July (Shabangu et al. 2019). Additionally, recent research show that these whales are sometimes in South African waters	It is noted that the specialist report was completed in January 2020 and many of the references included below were published later in the year or in 2021. Nevertheless, the information below is recorded here for consideration by the competent authority. The impact assessment undertaken and proposed mitigation measures are still deemed to be applicable for the proposed project.

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				year-round (Shabangu, Unpublished data). Please revise to reflect this provided information. • Table 4-4: Yes, these whales can be found offshore in water depths of 4500 m (Shabangu et al. 2021) or more (Purdon et al. 2020b). Please revise accordingly. • Table 4-5: This should be high as per Shabangu et al. (2019), as there is high detection of this species' calls at that time of the year. Please rectify • Table 4-5: This should be high or medium at least according to Shabangu et al. (2019), please revise accordingly. • Section 4.1.3.2.6: October is characterized by high numbers of southern right whales on the west coast (Shabangu et al. 2021). Thus, the University of Pretoria's aerial surveys are conducted by this month every year. Please change this to high. • Section 4.1.3.2.6: Purdon et al. (2020b) provides the recent distribution pattern of this species. Please rectify. • Section 4.1.3.2.6: Shabangu et al. (2019) provide the recent data on fin whale acoustic occurrence off the west coast of South Africa. So please refer to that study for fin whale occurrence in South African waters. • Section 4.1.3.2.6: This is incorrect, Thomisch et al. (2016) say in the abstract that "with most call detections between January and April". Similarly, Shabangu et al. (2020b) peak occurrence between those months. Please revise to indicate the above correction. • Section 4.1.3.2.6: Shabangu et al. (2019) observed peak in acoustic detections in June/July off the west coast of South Africa, and whale calls were detected from May through September. Please consider using this information and reference for the South African waters. • Section 4.1.3.2.6: Shabangu and Andrew (2020) and Purdon et al. (2020a,b) provide the up-to-date information on sperm whale occurrence off west coast of South Africa based on passive acoustic monitoring and sighting data respectively. Please indicate that all information about sperm whales were previously based on whaling data until these three recent studies were conducted. • Section 4.1.3.2.6: You can possibly cite Shabangu and Andrew (2020) as	

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				an example of studying sperm whales using PAM in South African waters. • Section 4.1.3.2.6: Purdon et al. (2020c) provides species distribution maps for 9 smaller odontocetes. • Section 4.1.3.2.6: Purdon et al. (2020a) supports this statement, maybe cite that study here. • Section 4.1.3.2.6: Purdon et al. (2020a) show that these dolphins can be found close to shore, and that area is one of their important habitats. Please revise this to indicate the above provided info. • Section 4.1.3.2.6: Purdon et al. (2020a) also support this. Please include this study too as a reference here.	
9	MASIFUNDISE DEVELOPMENT TRUST - MAIA NANGLE				
9.1	Public participation process	Masifundise Development Trust - Maia Nangle	Email - 27 September 2021	The EIA process has relied on online platforms for public participation processes. This is inadequate and inappropriate given the nature of the communities that will be affected by the prospecting activities in the application. Small-scale fishing communities who's lives and livelihoods will be negatively impacted by these developments cannot access lengthy meetings online, and cannot engage with the information that is not in their local language. The connectivity in these areas is often not satisfactory for engagement, poorer community members often don't have access to smart phones, and for those who do, the cost of the data required to access such lengthy meetings hinders their ability to participate.	See response provided in Section 7.1 above.
9.2	Social and economic impacts on small-scale fishing communities			The area in which the prospecting in these applications is planned is an important fish spawning and recruitment ground. It is recognised in the report, in the commissioning of a specialist report on fisheries, that the fisheries sector depends on this area. However, this specialist report is biased towards commercial fisheries and the industrial fisheries sector and provides insufficient evidence and information that is relevant to the small-scale fisheries sector. Although it acknowledges the small-scale sector, details are not provided on the impacts that the prospecting activities will have on the spawning and recruitment of the relevant species. It is essential for small-scale fishing communities to access these areas in order to secure their livelihoods and ensure local food and nutrition security. The inshore zones	See response provided in Section 7.6 above.

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				where small-scale fishers operate will experience the most damage and degradation by the proposed prospecting and mining activities. The report does also not detail the number of households that will be impacted by the nearshore mining, despite the fact that these activities will take place within 1m [*should read 1km*] of the shore, in areas such as Elandsbaai, in the middle of a near-shore lobster harvesting area. The small-scale fishers who operate in these areas are dependent on these resources and their social and economic rights have been recognised by the Equality Court.	
9.3	Cumulative Assessment	Masifundise Development Trust - Maia Nangle	Email - 27 September 2021	Belton Park Trading 127 currently has two prospecting right applications off-shore of the West Coast, through SLR Consulting. These individual reports do not reference each other. In addition to these applications, there are a number of other prospecting and mining applications that are in similar stages to these two by Belton Park, that also do not reference each other. Each of these applications considers the environmental and social impact of these projects on their own, without considering the cumulative impacts, which is extremely concerning, given that this could have a critical impact on the biodiversity of the region.	Reference was made to the fact that BPT127 had also applied to undertake similar activities in Sea Concessions 14B, 15B and 17B in Section 5.6 of the EIR. This section of the EIR considers the potential cumulative impacts associated with the proposed projects.
9.4	Marine Spatial Planning Act			Marine Spatial Planning Act of 2019 is not mentioned in the report, but is a key legislative instrument in sustainable environmental management. Planning is currently underway for the West Coast, as the Act was commenced this year. No authorisations for prospecting should be granted until these maps have been finalised as it is not appropriate for prospecting to occur in an area that will eventually not permit the activity. The West Coast is already a site of conflicting activities and users of the ocean space. This area is an extremely important one for the fisheries sector, and as this sector is important in the provision of food security and securing lives and livelihoods, this should be prioritised.	Refer to response provided in Section 7.7 above.
9.5	Requirement for undertaking Strategic Environmental			It is recommended that the deadline for comment should be postponed and that public consultations should take place in the communities of Ebenhaeser, Doringbaai, Papendorp, and Lamberts Bay prior to the continuation of the process. A Strategic Environmental Assessment of the West Coast of South Africa	See response provided in Section 4.17 above.

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	Assessment			must be conducted prior to this, or any other, application or project be considered. No further authorisations for prospecting or exploration should be authorised until the MSP mapping process has been completed.	
8	SMALL PELAGIC SCIENTIFIC WORKING GROUP - DR FANNIE SHABANGU				
8.1	Undertake proposed activities outside of the DFFE fisheries research survey programme	Small Pelagic Scientific Working Group - Dr Fannie Shabangu	Email - 27 September 2021	The SWG-PEL notes that the “Notification and Communication with Key Stakeholders” of the project’s Executive Summary states that: “As part of the stakeholder notification process, BPT127 should inform the Department of Forestry, Fisheries and the Environment (DFFE) fisheries research survey programme”. Whereas this is essential, it is important that not only is the Department’s survey programme notified of the planned dates of exploration activities, but that they are consulted well in advance, during the planning phases of the exploration work. This is critical because research surveys cannot be moved outside of the “temporal window” over which surveys have been conducted in the past. Small pelagic hydro-acoustic surveys are conducted bi-annually, with the recruit survey conducted in winter between mid-May and mid-July, and the spawner biomass survey conducted in summer between mid-October and mid-December. The survey area of the proposed geophysical surveys cover a significant amount of the research area to 200 m, and presents a potential area of conflict. Since the time for when the proposed geophysical surveys will be conducted is not stipulated, the SWG-PEL suggests that the proposed geophysical surveys be conducted outside the above stipulated times when important research surveys are conducted to prevent potential costly delays in progression of the surveys. Bulk and drill sampling will displace small pelagic fish by disturbing an important habitat on the west coast of South Africa, which will influence their distribution, behaviour and potentially also their abundance estimation. Any underestimation of the small pelagic fish biomass will have negative economic implications for the South African small pelagic fishing industry. It is for these reasons that we strongly recommend that geophysical surveys and sampling be conducted at times other than when the small pelagic fish abundance estimation research surveys take place.	This recommendation is recorded here for consideration by the Competent Authority in decision-making.

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9	HILDA ADAMS				
9.1	Public participation process	Hilda Adams	Email - 27 September 2021	It is with grave concern that I, on behalf of myself and other small scale fishers comment as follows: Online public participation process was not fair or adequate for SSF communities during COVID. They should extend the time and do more meetings in Elands, Lamberts and Doringbaai.	Refer to responded provided in Section 5.1 above.
9.2	Requirement for undertaking Strategic Environmental Assessment			There are so many applications going on that DFFE should do a Strategic Environmental Assessment SEA before authorising any further prospecting or mining.	See response provided in Section 4.17. above.
9.3	Marine Spatial Planning Act			The reports do not mention the Marine Spatial Planning Act and this Act is now in force. All prospecting and mining applications should be suspended until the MSP planning and maps are developed.	The Marine Spatial Planning Act applies to marine spatial planning on or in South African waters. The Act provides an organising framework that integrates decision-making across the different sectors operating in South African waters. The marine spatial planning process is a long-term project that is still in progress. Any applications currently underway need to be evaluated against legislation/plans/guidelines that are in effect at the time the application is made.
9.4	Impact on fish spawning and recruitment	Hilda Adams	Email - 27 September 2021	This area in which these applications are planned is a key fish spawning and recruitment ground. The fisheries sector depends on this area. No further mining or prospecting activities should be allowed in this area as this industry is critical for food security and livelihoods.	Refer to response provided in Section 5.6 above.
9.5	Impact on small-scale fishers			The SSF sector will be particularly impacted and the report fails to explore the social and economic impacts on livelihoods of thousands of fishers who are dependant on the oceans and species for our food security.	See responded provided in Section 3.2 above.

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9.6	Impacts on key marine and coastal biodiversity areas and features			The area is a critical biodiversity area and has been proposed as an ecologically sensitive area requiring further protection and management measures so no further prospecting or mining should be permitted and a precautionary approach taken.	See responded provided in Section 5.7 above.
10	Department of Forestry, Fisheries and the Environment (DFFE) - Branch: Oceans and Coast				
10.1	Branch Oceans and Coasts objection to the proposed prospection operations	Department of Forestry, Fisheries and the Environment (DFFE) - Branch: Oceans and Coast	Email -28 September 2021	This Branch reiterates that it does not endorse the implementation of the proposed prospecting right application for offshore sea concessions 13C, 15C, 16C, 17C & 18C. These comments should be read together with comments previously submitted as dated 21/09/2021. While this Branch recognizes the need for the assessment to identify and estimate the potential mineral resources within each Sea Concession area for possible future mining, this Branch objects to this application based on potential adverse ecological/environmental impacts and possible disruption to the West Coast pelagic fishery.	See response provided in Section 4.2.
10.2	Potential impact of the proposed prospection operations			This Branch strongly believed that the potential environmental impacts on marine fauna, impact on other users of the sea in terms of the exclusion of demersal long-line, traditional line-fish, pole-and-line, small-scale fishers, and fisheries research, sediment plume impact on fish stock recruitment and social and socio-economic impacts on cultural heritage material, impact related to job creation and business opportunities, visitors during construction on an environment that is already stressed and over-extracted have not been sufficiently justified.	See response provided in Section 4.3 above.
10.3	Basis for comments			The comments and recommendations are guided by the norms, standards, and policy objectives set out in the ICM Act, scientific research, and expert knowledge on the marine and coastal environment to motivate the above decision and outline areas of further reflection for the attention of the EAP and competent authority.	These comments are noted.

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
10.4	Repeat of submitted comments	Department of Forestry, Fisheries and the Environment (DFFE) - Branch: Oceans and Coast	Email -28 September 2021	The impact assessment rates the impact of 'disturbance and loss of benthic fauna' (by removal of sediments by drill bit or trawler suction head), during sampling, as of medium significance. Medium intensity/severity is defined in Appendix 4.1 as: 'Moderate change, disturbance or discomfort. Where the affected environment is altered, but natural functions and processes continue, albeit in a modified way.' However, this impact would result in "elimination of the benthic infaunal and epifaunal biota in the sample footprints". This is not consistent with Medium intensity, it is High intensity ('Prominent change, disturbance or degradation. Where natural functions or processes are altered to the extent that they will temporarily or permanently cease'). It may be that limited extent or duration of the impact were considered in scoring this impact as medium intensity, but that would not be appropriate because these are all separate criteria that are supposed to be scored independently of each other. Therefore, the score should be adjusted from Medium to High. Similarly, it is very doubtful whether crushing of benthic fauna during sampling is Medium and not High.	These comments have been addressed in Section 6 of this document.
				There are other examples where scoring of impacts seems too generous. For example, it is acknowledged in the Marine faunal assessment report that natural rehabilitation of the seabed and recovery of invertebrate communities is very dependent on several factors. It is also acknowledged that 'results of on-going research on the southern African West Coast suggest that differences in biomass, biodiversity or community composition following mining with drill ships or crawlers below the wave base may endure beyond the Medium term (6-15 years)', and that excavations at the proposed depths 'may have slow infill rates and persist for several years. How then, is the duration of impact scored Low-Medium? It should be Low-High, or rather Medium-High. Further clarity on this aspect is required.	
				The impacts of underwater sampling noise on marine fauna are also unlikely to be Low, even if it may be of limited duration and (relatively) limited extent.	

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
10.4	Repeat of submitted comments	Department of Forestry, Fisheries and the Environment (DFFE) - Branch: Oceans and Coast	Email -28 September 2021	Furthermore, based on the assessment of the impact of suspended sediment plumes generated during sampling at the bottom of p72 of the Marine Faunal report, it is surprising that the intensity of the impact is disregarded as being of Low intensity in the following paragraph (p 73). In terms of how the impact is described on p72, the severity is certainly High. Once again it seems that allowance for (perceived) limited duration and extent of the impact has been made in the scoring of intensity, but once again, the score of intensity must be scored independently of these other criteria.	These comments have been addressed in Section 6 of this document.
				The same does for smothering of benthic by redeposit tailings. This impact is most certainly High, not Low, even if it may be localised.	
				It is also unclear why the duration of impact of smothering on rocky outcrop communities goes from medium significance without mitigation, to short term with mitigation. The mitigation measure is to avoid rocky outcrop areas. If you try but fail to avoid them, the duration of impact should be no different to if you don't attempt to avoid them. The scoring of impacts therefore needs to be reconsidered, with possible implications for the significance of impacts.	
				Also, there seems to not be adequate consideration of cumulative impacts. Cumulative impacts are only considered in terms of the addition of other (outside) impacts (other seismic surveys, oil and gas activities). However, what is not acknowledged is that all the anticipated impacts of the sampling, are taking place together at the same locations. If for example the intensity of sediment removal, crushing and smothering are all considered to be low or very low (although I argue above that they are much higher than this), individually, what then of their combined/cumulative impacts? And how will this affect duration, reversibility, and overall significance of impacts?	

NO.	ISSUE	NAME	METHOD	COMMENT	RESPONSE
10.5	Duty of care	Department of Forestry, Fisheries and the Environment (DFFE) - Branch: Oceans and Coast	Email -28 September 2021	You are kindly reminded of your duty of care towards the coastal environment per section 58 of the ICM Act read together with section 28 of NEMA which states that "Every person who causes, has caused or may cause an adverse effect on the coastal environment must take reasonable measures to prevent such adverse effect from continuing, recurring or occurring or, in so far as such harm to the coastal environment is authorized by law or cannot reasonably be avoided or stopped, to minimize and rectify such adverse effect on the coastal environment" by taking into consideration and implement recommendations provided in this comments document recommending measures to be undertaken to ensure the coastal zone is protected, preserved and managed.	See response provided in Section 4.19 above.
10.6	Undertaking listed activities before granting of an EA			Kindly note that the activity may not commence before the granting of environmental authorization by the CA. In terms of Section 49A of NEMA, the commencement of unauthorized activities, failure to comply with conditions in a license to operate, unlawful or intentional acts that lead to significant pollution, and failure to comply with compliance orders or directives may result in the imposition of a fine or jail sentence on conviction for an offense. Section 49B provides that any persons convicted of an offense in terms of Section 49A may be liable to a fine and/or imprisonment.	See response provided in Section 4.20 above.
10.7	Submission of information to Branch: Oceans and Coast			Please be advised that the Sub Directorate: Coastal Development and Protection within the Branch: O&C is responsible for coordinating and facilitating EIA comments and advice for developments within the marine environment. Kindly forward any EIA-related information or request to Email: OCeia@environment.gov.za.	See response provided in Section 4.21 above.
10.8	Submission of comments to the Competent Authority			A copy of these comments should be forwarded to the CA for consideration and implementation. The EAP is kindly requested to submit proof of submission to OCeia@environment.gov.za. These comments must be sent to the CA for consideration and implementation, and the EAP is kindly requested to submit proof of such submission to us.	See response provided in Section 4.22 above.

ATTACHMENT A
WRITTEN COMMENTS

Candice Sadan

From: Christian Triay <christian@sanccob.co.za>
Sent: 25 February 2020 04:52 PM
To: Candice Sadan
Cc: Katta Ludynia; Lauren Waller; Nicholas Arnott; Rizqah Baker
Subject: RE: Belton Park Trading 127 (Pty) Ltd – Prospecting Right Application for Offshore Sea Concessions 13C, 15C, 16C, 17C & 18C, WEST COAST (DMRE Ref: WC30/5/1/1/2/10319PR, WC30/5/1/1/2/10320PR, WC30/5/1/1/2/10321PR, WC30/5/1/1/2/103: Notification

Follow Up Flag: Follow up
Flag Status: Completed

Good afternoon Candice,

Thank you very much for your e-mail. Please accept my sincere apologies for not having responded sooner. I do hope that it is not too late to submit some comments from my side on the project.

The only comments I have from the preparedness and response perspective is that I notice under Section 6 (Key Project Issues) under 'Potential impact on marine fauna' that "*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*".

I think it is important to note that two oil spills have occurred in three years from ship-to-ship bunkering at sea affecting over 200 endangered seabirds. Both oil spills involved a spillage of approximately 100 – 400 litres of heavy fuel oil. Both spills resulted in an oiled wildlife response lasting a few months.

This is important to note because an oil spill in the marine environment will not only affect water quality but also the marine wildlife in the area, especially seabirds. Seabirds are particularly vulnerable to oil spills at sea and it is highly likely that they will become oiled if there is an oil spill. Oiled wildlife will lose their insulation and become hypothermic and lose their buoyancy, which usually results in death at sea. Oiled wildlife will also ingest oil when preening, which damages their internal organs, blood etc. . It would therefore be a concern that bunkering at sea would occur in the proposed area that has a high concentration of endangered seabirds (e.g. African penguins and Cape gannets, amongst others).

If bunkering at sea is going to occur then we highly recommend that an oiled wildlife contingency plan be developed in order to plan for a potential oiling event affecting seabirds and other marine wildlife. It is also important to invest in some oiled wildlife preparedness (e.g. equipment and basic wildlife response training).

SANCCOB has worked closely with SAMSA and TNPA as well as the oil and gas and shipping industry with regard to mitigating the effects of oil spills on marine wildlife. We would be happy to provide some additional information in this regard.

Ultimately, it would be preferable to avoid the risk altogether and recommend that the vessels in question receive bunkers within the safety of a port rather than at sea.

Many thanks,

Warm regards

Christian

Christian Triay
Preparedness and Response Manager
Tel: +27 21 557 6155 Fax: +27 21 557 8804
PO Box 11116 Bloubergrandt 7443 South Africa

From: Candice Sadan [mailto:csadan@slrconsulting.com]
Sent: Monday, 17 February 2020 12:31
To: Christian Triay
Cc: Katta Ludynia; Lauren Waller; Nicholas Arnott; Rizqah Baker
Subject: RE: Belton Park Trading 127 (Pty) Ltd – Prospecting Right Application for Offshore Sea Concessions 13C, 15C, 16C, 17C & 18C, WEST COAST (DMRE Ref: WC30/5/1/1/2/10319PR, WC30/5/1/1/2/10320PR, WC30/5/1/1/2/10321PR, WC30/5/1/1/2/103: Notification

Good afternoon Mr Triay

I trust this email finds you well. Please could you kindly advise if there are any comments from SANCCOB for the abovementioned project.

We have not received any further communication from you since your email to register your colleagues, and we would like to confirm if you have any comments.

Many thanks.

Kind regards

Candice Sadan
Office Administrator
o +27 21 461 1118
e csadan@slrconsulting.com

SLR Consulting
SLR Consulting (Cape Town office) , Cape Town, 7700
5th Floor, Letterstedt House, Newlands on Main
Cnr Main and Campground Roads
Newlands

From: Christian Triay <christian@sanccob.co.za>
Sent: 09 January 2020 11:58 AM
To: Candice Sadan <csadan@slrconsulting.com>
Cc: Katta Ludynia <katta@sanccob.co.za>; Lauren Waller <lauren@sanccob.co.za>
Subject: FW: Belton Park Trading 127 (Pty) Ltd – Prospecting Right Application for Offshore Sea Concessions 13C, 15C, 16C, 17C & 18C, WEST COAST (DMRE Ref: WC30/5/1/1/2/10319PR, WC30/5/1/1/2/10320PR, WC30/5/1/1/2/10321PR, WC30/5/1/1/2/103: Notification

Dear Ms. Candice Sadan

Compliments of the season and all the best for 2020.

Following the circulation below regarding the Prospecting Right Application referenced above, I would like to register the Southern African Foundation for the Conservation of Coastal Birds (SANCCOB) as an interested and affected party.

Thank you very much for the opportunity to comment on the scoping document. We shall be providing comments to you before the deadline on the 10th February 2020.

Please confirm that we are now registered accordingly.

Many thanks,

Warm regards

Christian

SANCCOB™ saves seabirds
Christian Triay
Preparedness and Response Manager
Tel: +27 21 557 6155 Fax: +27 21 557 8804
PO Box 11116 Bloubergrandt 7443 South Africa

From: James Collocott [mailto:jcollocott@samsa.org.za]
Sent: Thursday, 09 January 2020 09:53
To: Falbertus@environment.gov.za; uvbloem@environment.gov.za; Christian Triay; 'mabuelat@dot.gov.za'; Vernon Keller; Ravi Naicker; Gustav Louw; Mike Viljoen; Justin Coraizin; Amina.Sulaiman@westerncape.gov.za; lavenia.nicholson@westerncape.gov.za; strydome@saps.gov.za
Subject: FW: Belton Park Trading 127 (Pty) Ltd – Prospecting Right Application for Offshore Sea Concessions 13C, 15C, 16C, 17C & 18C, WEST COAST (DMRE Ref: WC30/5/1/1/2/10319PR, WC30/5/1/1/2/10320PR, WC30/5/1/1/2/10321PR, WC30/5/1/1/2/103: Notification

Dear colleagues

For your information, action if applicable, or further distribution as may be necessary.

Regards

James.

From: Candice Sadan <csadan@slrconsulting.com>
Sent: 09 January 2020 08:46
To: Candice Sadan <csadan@slrconsulting.com>
Cc: Nicholas Arnott <narnott@slrconsulting.com>
Subject: Belton Park Trading 127 (Pty) Ltd – Prospecting Right Application for Offshore Sea Concessions 13C, 15C, 16C, 17C & 18C, WEST COAST (DMRE Ref: WC30/5/1/1/2/10319PR, WC30/5/1/1/2/10320PR, WC30/5/1/1/2/10321PR, WC30/5/1/1/2/103: Notification

Dear Interested and/or Affected Party,

The attached correspondence provides information regarding the availability of a draft Scoping Report for review and comment in accordance with the EIA Regulations, 2014 (as amended). Should you and / or your organisation wish to comment on the Scoping Report for the proposed project, such comments should be sent to our Ms Candice Sadan (at the details below) by no later than 10 February 2020. For more information, please refer to the attached letter and copy of the Executive Summary of the draft Scoping Report.

Should you have any queries on the above, or require any further information, please do not hesitate to contact the undersigned.

SLR Consulting (South Africa) (Pty) Ltd
Attention: Ms Candice Sadan
5th Floor, Letterstedt House, Newlands on Main, Corner of Main and Campground Roads, Newlands, Cape Town 7700
PO Box 10145, CALEDON SQUARE, 7905
Tel: (021) 461 1118/9

E mail: csadan@slrconsulting.com

Yours sincerely

Candice Sadan
Office Administrator

+27 21 461 1118
csadan@slrconsulting.com

SLR Consulting
SLR Consulting (Cape Town office)
5th Floor, Letterstedt House, Newlands on Main
Cnr Main and Campground Roads
Newlands, Cape Town, Western Cape, 7700

Prospecting Right Application for Offshore Sea Concessions 13C, 15C, 16C, 17C & 18C

Our Ref:

an agency of the
Department of Arts and Culture

T: +27 21 462 4502 | F: +27 21 462 4509 | E: info@sahra.org.za
South African Heritage Resources Agency | 111 Harrington Street | Cape Town
P.O. Box 4637 | Cape Town | 8001
www.sahra.org.za

Enquiries: Briege Williams
Tel: 021 462 4502
Email: bwilliams@sahra.org.za
CaseID: 14706

Date: Tuesday September 14, 2021
Page No: 1

Interim Comment

In terms of Section 38(8) of the National Heritage Resources Act (Act 25 of 1999)

Attention: SLR Consulting (South Africa) (Pty) Ltd

BPT127 proposes to undertake prospecting operations for various minerals (specifically diamond, gemstones, heavy minerals, industrial minerals, precious metals, ferrous and base metals) within Sea Concessions 13C, 15C, 16C, 17C and 18C. The proposed prospecting operations would entail geophysical surveys, drill sampling and bulk (trench) sampling. The Sea Concessions 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), Western Cape.

The South African Heritage Resources Agency (SAHRA) would like to thank you for submitting the Draft Environmental Impact Report (DEIR) for an Environmental Impact Assessment (EIA) for a prospecting right application of offshore sea concessions 13C, 15C, 16C, 17, & 18C, West Coast, South Africa.

In terms of the National Heritage Resources Act, No 25 of 1999 (NHRA), Sections 2 and 35 stipulates that any wreck, being any vessel or aircraft or any part thereof older than 60 years old lying in South Africa's territorial waters or maritime cultural zone is protected and falls under the jurisdiction of SAHRA's Maritime and Underwater Cultural Heritage Unit. These heritage sites or objects may not be disturbed without a permit from the relevant heritage resources authority.

SAHRA previously issued a comment in January 2020 in response to the Draft Scoping Report (DSR). The DSR had identified the need for Maritime Heritage Impact Assessment (MHIA) and SAHRA supported this.

The MHIA discussed the potential for encountering and impacting underwater cultural heritage and highlighted the possible presence of four wrecks within the sea concession areas. The precise locations of these wrecks are not known, only that they are recorded as wrecking in the vicinity. Because of the possibility that there may be unrecorded wrecks within the sea concessions, the mitigation measures recommended in the MHIA, and listed below, must be strictly adhered to.

an agency of the
Department of Arts and Culture

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South African Heritage Resources Agency | 111 Harrington Street | Cape Town
P.O. Box 4637 | Cape Town | 8001
www.sahra.org.za

Enquiries: Briege Williams
Tel: 021 462 4502
Email: bwilliams@sahra.org.za
CaseID: 14706

Date: Tuesday September 14, 2021

SAHRA has reviewed the recommendations for mitigation set out in Section 6.2.7 of the EIR. These recommendations include the following:

- · Areas where shipwreck sites are identified during the geophysical surveys must be excluded prior to undertaking sampling activities.
- · It is recommended that the onboard BPT127 (Belton Park Trading 127 (Pty) Ltd: the applicants) representative must undergo a short induction on archaeological site and artefact recognition, as well as the procedure to follow should archaeological material be encountered during sampling.
- · The contractor must be notified that archaeological sites could be exposed during drill and bulk sampling activities, as well as the procedure to follow should archaeological material be encountered.
- · If shipwreck material is encountered during the course of bulk sampling in the concession area, the following mitigation measure should be applied:
    - Cease work in the directly affected area to avoid damage to the wreck until SAHRA has been notified and the contractor/BPT127 has complied with any additional mitigation as specified by SAHRA; and
    - Where possible, take photographs of artefacts found, noting the date, time, location and types. Under no circumstances may any artefacts be removed, destroyed or interfered on the site, unless under permit from SAHRA.

• The possibility of realising core log information and samples of the coarser fraction (i.e. gravel and stone between 20 mm and 150 mm) of sorted seabed sediment for assessment by an archaeologist for the presence of prehistoric lithic material should be considered by BPT127.

SAHRA supports these mitigation measures and emphasises that they must be adhered to especially in the event that any cultural heritage should come to light.

We would like to reiterate that should any shipwrecks be identified as part of this project then SAHRA must be notified to enable us to add the information to our database. Any new discoveries or updated data is a valuable resource in adding to our knowledge of South Africa's maritime history.

Should you have any further queries, please contact the designated official using the case number quoted

an agency of the
Department of Arts and Culture

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Enquiries: Briege Williams
Tel: 021 462 4502
Email: bwilliams@sahra.org.za
CaseID: 14706

above in the case header.

Yours faithfully

Briege Williams
Heritage Officer
South African Heritage Resources Agency

Lesa la Grange
Manager: Maritime and Underwater Cultural Heritage
South African Heritage Resources Agency

ADMIN:
Direct URL to case: https://sahris.sahra.org.za/node/532762

Terms & Conditions:

1. This approval does not exonerate the applicant from obtaining local authority approval or any other necessary approval for proposed work.
2. If any heritage resources, including graves or human remains, are encountered they must be reported to SAHRA immediately.
3. SAHRA reserves the right to request additional information as required.

Nicholas Arnott

From: Doretha Kotze <dkotze@wcdm.co.za>
Sent: Wednesday, 22 September 2021 11:44
To: Nicholas Arnott
Cc: WCDM Correspondence
Subject: WCDM comment: Belton Park DEIR Prospecting Right, Sea Concessions 13C, 15C, 16C, 17C & 18C, West Coast

You don't often get email from dkotze@wcdm.co.za. Learn why this is important

Ref: 13/2/12/2/3
13/2/12/4/3
13/2/12/5/3

Sir

I refer to the DEIR for the proposed prospecting right in Sea Concessions 13C, 15C, 16C, 17C & 18C.

The West Coast District Municipality takes note of the information contained in the Executive Summary of the DEIR and has no objection to the proposal, provided that all the mitigation measures stated in the DEIR are instituted.

Regards

D o r e t h a K o t z e
Stads- en Streekbeplanner/Town and Regional Planner
Weskus Distriksmunisipaliteit
Langstraat 58 Long Street
Posbus 242 PO Box
MOORREESBURG 7310
Tel: 022 433 8523
West Coast District Municipality

From: Nicholas Arnott [mailto:narnott@slrconsulting.com]
Sent: 27 August 2021 09:02 PM
To: Nicholas Arnott
Subject: Belton Park Trading 127 (Pty) Ltd – EIA for A Prospecting Right, Sea Concessions 13C, 15C, 16C, 17C & 18C, West Coast (DMRE REFERENCE: WC30/5/1/1/2/10319PR, WC30/5/1/1/2/10320PR, WC30/5/1/1/2/10321PR, WC30/5/1/1/2/10322P): Availability of DEIR for Comment

Dear Interested and/or Affected Party,

The attached correspondence regarding the above-mentioned project refers. This email and attached notification letter provide information on the availability for comment of the draft Environmental Impact Report (EIR) prepared for the above-mentioned project. The draft EIR has been made available for a 30-day review and comment period from **27 August to 27 September 2021**.

A copy of the complete draft EIR can be downloaded at this link: https://slrconsulting.com/public-documents/eia-belton-park-trading. A copy of the Executive Summary is attached for ease of reference.

Should you have any queries in this regard or require additional information please do not hesitate to contact us.

Kind Regards,

SLR

Nicholas Arnott

Associate Environmental Consultant

+27 21 461 1118

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narnott@slrconsulting.com

SLR Consulting
SLR Consulting (Cape Town office)
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Cape Town, 7700

forestry, fisheries
& the environment

Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

E-mail: OCEIA@environment.gov.za **Tel**: 021 819 2499 **Ref:** EDMS- 209688

SLR Consulting (South Africa) (Pty) Ltd

Att: Mr. Nicholas Arnott

PO Box 798,

Rondebosch,

7701

Tel: (021) 461 1118 / 9

E-mail: narnott@slrconsulting.com

Dear Mr. Arnott

SUBJECT: COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE PROPOSED PROSPECTING RIGHT APPLICATION FOR OFFSHORE SEA CONCESSIONS 13C, 15C, 16C, 17C & 18C

The Oceans & Coasts (O&C) Branch of the Department of Forestry, Fisheries, and the Environment **(DFFE)** appreciates that opportunity granted to comment on the Draft Environmental Impact Report for the Proposed Prospecting Right Application for Offshore Sea Concessions 13C, 15C, 16C, 17C & 18C. This Branch has provided recommendations in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), **("NEMA")** and the National Environmental Management: Integrated Coastal Management Act, 2008 (Act No. 24 of 2008) **("ICM Act").**

1. The Branch O&C has the mandate to ensure the holistic management of the coast and estuarine areas as an integrated system and promote coordinated coastal management. It ensures that the ecological integrity, natural character, and the economic, social, and aesthetic value of the coastal zone are

maintained and that people, properties, and economic activities are guarded against dynamic coastal processes. Guided by the principles of integrated coastal management, this Branch continues to strive for social equity and promote sustainable use of coastal resources.

2. In line with the principles of international best practice, this Branch underscores the need for balancing sustainability and conservation concerns with the socioeconomic needs of fisheries and the environment to ensure that developments within coastal environments are socially responsible, economically justifiable, and ecologically sustainable.

3. Based on the information presented in this report, specialist knowledge on coastal and marine environments, this Branch does not endorse the implementation of the proposed prospecting right application for offshore sea concessions 13C, 15C, 16C, 17C & 18C.

4. While this Branch recognizes the need for the assessment to identify and estimate the potential mineral resources within each Sea Concession area for possible future mining, this Branch objects to this application based on potential adverse ecological/environmental impacts and possible disruption to the West Coast pelagic fishery.

5. This Branch strongly believed that the potential environmental impacts on marine fauna, impact on other users of the sea in terms of the exclusion of demersal long-line, traditional line-fish, pole-and-line, small-scale fishers, and fisheries research, sediment plume impact on fish stock recruitment and social and socio-economic impacts on cultural heritage material, impact related to job creation and business opportunities, visitors during construction on an environment that is already stressed and over-extracted have not been sufficiently justified.

6. The comments and recommendations are guided by the norms, standards, and policy objectives set out in the ICM Act, scientific research, and expert knowledge on the marine and coastal environment to motivate the above decision and outline areas of further reflection for the attention of the EAP and competent authority.

7. <u>Recommendations for Further Reflection and Review by the EAP and CA:</u>

7.1 Page 107 of the report specifies that the proposed drill and bulk sampling operations are expected to result in the disturbance and loss of benthic fauna within the sampling footprint due to crushing (as a result of the drill frame structure or weight of the seabed crawler) and the removal of seafloor sediments (by the drill bit and crawler suction head). However, page 108 further identifies this impact to be of VERY LOW significance with and without mitigation.

7.2 While this Branch notes that the proposed drill and bulk sampling operations would take place on a significantly smaller scale than historic mining operations, cumulative impacts of neighboring activities also need to be taken into account when determining the recovery rates of impacted communities. Recovery within the sampling footprints is expected to take place within the medium term, as the excavations would have slow infill rates and may persist for extended periods (years). Furthermore, biomass often remains reduced for several years as long-lived species like molluscs and echinoderms need longer to re-establish the natural age and size structure of the population. Taking this into account, it remains unclear of the methodology that was used to come to this conclusion.

7.3 This Branch further reiterates that sampling activities of any kind should avoid rocky outcrop areas or other identified sensitive habitats in the concession areas.

7.4 Page 109 of the report identifies that as part of the sampling operations, the seabed sediments will be pumped to the surface and discharged onto sorting screens on the sampling vessel for screening. The unwanted material will then be discarded overboard from where the heavy portion settles on the seafloor in the excavated areas and the finer portion forms a suspended sediment plume in the water column which dissipates with time. The main effect of sediment plumes is an increase in water column turbidity, leading to a reduction in light penetration with potentially adverse effects on the photosynthetic capability of phytoplankton. Other potential impacts include inhibiting pelagic visual predators due to poor visibility, egg and/or larval development impairment, and reduction of benthic bivalve filter-feeding efficiencies. Negative impacts may also occur when heavy metals or contaminants associated with fine sediments are remobilised. However, this impact has also been assessed to be of VERY LOW significance.

7.5 The report specifies that the proposed sea concession areas fall within the cold temperate Nammaqua Bioregion and overlap with proposed Cape Canyon and Associated Islands, Bays and Lagoon Ecologically or Biologically Significant Areas (EBSA). The Namaqua Coastal pelagic environment is characterized by very high productivity, high chlorophyll, and very cold water (mean SST = 15.2°C) caused by upwelling (Lagabrielle 2009, Roberson *et al.,* 2017), also serving as an important area for coastal fish (Turpie *et al*., 2000).

7.6 The report further identifies that demersal fish species likely to be encountered in the general project area like St Joseph, Houndshark, Soupfin shark, Tigar catshark, and Bramble shark including, small pelagic species (sardine/pilchard, anchovy, chub mackerel, horse mackerel, and round herring) and occurring beyond the surf zone and generally within the 200 m contour.

7.7 It has been widely established that most seabirds in the region reach the highest densities offshore of the shelf break (200 to 500 m depth) and are likely to be encountered within the proposed prospecting area. Marine mammals like sperm whales, migrating humpback and southern right whales, and various baleen and toothed whales are known to frequent offshore waters and are likely to be encountered.

7.8 Section 5.3.1 of the report states that '" *Based on the assessment undertaken by the fisheries specialist, the proposed prospecting operations are expected to have NO IMPACT* on the demersal trawl, large pelagic (tuna longline), abalone ranching, net fish and seaweed sectors, fisheries research, demersal longline, tuna pole, and the west coast rock lobster. However, Demersal research trawls and acoustic surveys could be affected by exclusion from Sea Concession 13C, 15C, 16C, 17C & 18C. Demersal fisheries research could be affected by exclusion from this area if it were to coincide with the designated survey timing. While the disturbance would be very localised in both time and space, the overall impact could be significant if they occur at times that the small pelagic fleet identifies target shoals in the Sea Concession areas.

7.9 The concession areas are adjacent to the main landing points of the fishery from which a significant fleet of purse seine vessels operates. Further, the seasonal nature of the fishery means that fishing in the St Helena Bay area and northwards will occur and interaction/avoidance of the fishery with the prospecting operation will occur. Small pelagic shoals of sardine, anchovy, horse mackerel, and lantern and lightfish occur seasonally in the concession areas and these are targeted by the small pelagic fleets when they are identified. Small pelagic purse-seine and traditional line fish fisheries constitute a valuable food resource for human consumption and are also important components of marine food webs. Commercial fisheries play an important role in food security and income for coastal communities worldwide, particularly in developing countries (Berkes *et al.*, 2001, Béné *et al*., 2010).

7.10 The proposed BPT coincides with productive fishing grounds for anchovy and red-eye round herring and could potentially negatively impact the economic value and overall tonnage of landings are the demersal (bottom) trawl and longline fisheries targeting the Cape hakes (Merluccius paradoxus and M. capensis) and the pelagic-directed purse-seine fishery targeting pilchard (Sardinops sagax), anchovy (Engraulis encrasicolus) and red-eye round herring (Etrumeus whiteadii). However, the Fisheries Impact study has not adequately outlined the extent of the financial implications to commercial fisheries, including advice on the cumulative, unintended impacts of this proposal on fisheries.

7.11 A combination of the ecological concerns necessitates that the merits of this proposal be carefully weighed against the externalities to inform whether this proposal is socially responsible, economically justifiable, and ecologically sustainable.

7.12 Fishing activity in this sector is reported by landing point. In the vicinity of Sea Concession 13C, 15C, 16C, 17C & 18C. The proposed activities should not coincide with peak fishing periods of the small pelagic purse-seine sector. Should this application be successful in the environmental authorization, it is recommended that the competent includes a condition that survey and sampling activities only be carried out between mid-November and mid-January at a time when the small pelagic sector normally stops operations.

7.13 Linefish operations also have a seasonal signal mostly driven by the availability of snoek in the winter period. Therefore the mitigation of possible impacts to the linefish fishery by undertaking the surveys in the November to January periods coincides with the small pelagic mitigation option.

7.14 The long-term impact of the 500m exclusion zone which restricts vessels from entering the safety zone around a sampling vessel poses a direct impact to fishing operations in the form of loss of access to fishing grounds (abalone ranching, net fish, and seaweed, West Coast rock lobster, Tuna Pole and Demersal longline) and fishing research is largely irreversible. Demersal research trawls and acoustic surveys could be severely impacted by the 500m exclusion from Sea Concession 13C, 15C, 16C, 17C & 18C. It is reiterated that the impact on fisheries because of the potential loss of fishing ground is regarded as a significant impact, as it potentially affects the livelihoods of communities and industries that are heavily reliant on fisheries as a source of income. A socio-economic assessment study is recommended to advise on the long-term unintended and cumulative impacts of this proposal on commercial fisheries as well as recommend mitigation measures to mitigate these impacts.

7.15 Further to this, exploration for oil and gas is currently undertaken in several license blocks off the West Coast. The Sea Concession areas overlap with Block 3A/4A for which PetroSA and Sasol are the license holders and a few marine diamond mining right and prospecting concession areas are also located in proximity to the Sea Concession areas under this application. The potential negative impacts of the project on marine flora and fauna (small and large) onshore, nearshore, and offshore marine species to a large extent are irreversible even if feasible mitigation measures are applied.

7.16 Ongoing exploration and prospecting activities are already causing irreversible impacts on the ecological integrity of these coastal areas. Further authorizing more prospecting activities in the same area where so much activity further promotes resource use conflicts which would not only negatively impact the ecological integrity of this environment and fisheries but also create conflict and competition between different license rights holders.

7.17 The need and desirability of the proposed prospecting operations in the context of other prospecting and mining activities in the proposed sea concession areas must be further elaborated.

7.18 Caution needs to be undertaken when authorizing developments that may potentially compromise the ecological status of these ecosystems.

7.19 This Branch further recommended for an assessment to be undertaken which provides a comprehensive outline of the advantages and disadvantages associated with prospecting in the offshore environment on the socio-economic, ecological, and economic environment of the West Coast.

7.20 The report specifies that discharges to the marine environment include deck drainage, machinery space drainage, sewage, galley wastes, and solid wastes from the geophysical survey and sediment sampling vessels. Please contact the Department of Forestry, Fisheries & Environment (DFFE) OC: Pollution Management to confirm the need for a Coastal Water Discharge Permit (Dr. Y Peterson Ypeterson@environment.gov.za/ Mpho Ligudu Mligudu@environment.gov.za.

7.21 You are kindly reminded of your duty of care towards the coastal environment per section 58 of the ICM Act read together with section 28 of NEMA which states that "Every person who causes, has caused or may cause an adverse effect on the coastal environment must take reasonable measures to prevent such adverse effect from continuing, recurring or occurring or, in so far as such harm to the coastal environment is authorized by law or cannot reasonably be avoided or stopped, to minimize and rectify such adverse effect on the coastal environment" by taking into consideration and implement recommendations provided in this comments document recommending measures to be undertaken to ensure the coastal zone is protected, preserved and managed.

7.22 Kindly note that the activity may not commence before the granting of environmental authorization by the CA. In terms of Section 49A of NEMA, the commencement of unauthorized activities, failure to comply with conditions in a license to operate, unlawful or intentional acts that lead to significant pollution, and failure to comply with compliance orders or directives may result in the imposition of a fine or jail sentence on conviction for an offense. Section 49B provides that any persons convicted of an offense in terms of Section 49A may be liable to a fine and/or imprisonment.

7.23 Please be advised that the Sub Directorate: Coastal Development and Protection within the Branch: O&C is responsible for coordinating and facilitating EIA comments and advice for developments within the marine environment. Kindly forward any EIA-related information or request to Email: OCeia@environment.gov.za.

7.24 A copy of these comments should be forwarded to the CA for consideration and implementation. The EAP is kindly requested to submit proof of submission to OCeia@environment.gov.za.

We will provide additional comments on the next PPP phase when more information is available.

These comments must be sent to the CA for consideration and implementation, and the EAP is kindly requested to submit proof of such submission to us.

Kindly note that the **Department reserves the right to revise its comments and request further information based on any additional information that might be received**. All future correspondence and documentation (hard copy and an electronic copy) must be submitted to our office via OCeia@environment.gov.za **/ or Physical Address:** Department of forestry and fisheries and the environment **(DFFE), Branch: Oceans and Coast, 2 East Pier Building, East Pier Road, Victoria and Alfred Waterfront, Cape Town, 8001.**

Yours Sincerely

ACTING DIRECTOR: COASTAL CONSERVATION STRATEGIES

DATE: 21/09/2021

Comments submitted on the Environmental Impact Report for an EIA for a Prospecting Right Application for Offshore Sea Concessions 13C, 15C, 16C, 17C and 18C West Coast

1. Introduction and general over-arching concerns about this EIA process and report

1.1 Inadequate and unfair public participation process during Covid Lockdown period

The EIA process underpinning this report has relied on an online process for the public participation process. This is not appropriate for an application that will have an impact ultimately on the food security and livelihoods of coastal fisher communities, the majority of whom are poor with no means of accessing online platforms or reports that are lengthy and are only made available locally in English and not in their own language. For this reason it is proposed that this deadline for the submission of comments should be extended and an additional face to face public participation meeting specifically with small-scale and interim relief fishers of Elandsbaai and Lamberts Bay and Doring bay should be facilitated.

1.2 Need for a Strategic Environmental Assessment of the West Coast prior to any further authorisations

Belton Park Trading 127 has contracted SRL Consulting to undertake an EIA for a prospecting right application off-shore of the West Coast. It is noted that the company also applied for prospecting rights offshore in the adjacent and nearby areas of 14B, 15, and 17B and SRL Consulting is also undertaking this EIA. Thus Belton Park has two applications currently for adjacent areas for prospecting, Diamonds, Gemstones, Heavy Minerals, Industrial Minerals, Precious Metals, Ferrous and Base Metals, Offshore, West Coast. The proposed prospecting activities in both applications entail geophysical surveying, drill sampling and bulk (trench) sampling activities. Whilst each of these applications is submitted for a completely separate EIA process, the individual EIA reports do not reference the other application. Whilst this is in line with the protocol to assess an individual application it is of relevance to a general concern related to this application.

The sea concession areas for both applications fall within the cold temperate Namaqua Bioregion of the West Coast. Whilst this is a very productive fishing region, it has also been subjected to extensive coastal and sea-based mining. The EIA report itself notes that

"*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)".*

There has been a plethora of applications for coastal, surf, beach and sea-based prospecting and exploration, some of which has resulted in mining authorisations along this coastal region on the past 10 years. A very concerning problem is that each application for environmental authorisation is considered on its own and the actual cumulative impacts of all the projects authorised to date have not been assessed or considered in any substantive manner, despite there being extensive evidence, as submitted by Penney et al and Lombard and Sink quoted above, over 10 years ago that these cumulative impacts had resulted in critically endangering the biodiversity of the area. It is therefore submitted that before this, or any other project can be considered, there should be a Strategic Environmental Assessment (SEA) conducted for the West Coast of South Africa.

Given that SRL Consulting is involved in several of these current applications it is hoped that this reputable environmental consulting organisation would support such a call.

1.3 Need for alignment with the Marine Spatial Planning Act and planning process

This EIA Report fails to cite the Marine Spatial Planning Act of 2019, which commenced in April 2021, as a key legislative instrument in the process of ensuring sustainable environmental planning.
As this Act has now commenced, and planning is underway on the Marine Maps for the area under consideration, it is critical that no further authorizations for prospecting for mining be considered until these maps have been developed. It is not appropriate to consider prospecting for an activity that ultimately will not be permitted in the targeted area. There are already several competing, conflicting and overlapping activities scheduled for this region of the West Coast, including considerable gas pipeline activities. The report itself notes that the following

> *"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. 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 few proposed prospecting areas for phosphate are located off the West Coast, these overlap with the western edge of the Sea Concession areas. A few marine diamond mining right and prospecting concession areas are also located in proximity to the Sea Concession areas under this application".*

Given that the target area is an extremely important area at the heart of the fisheries industry in South Africa it is proposed that no further authorisations for prospecting or exploration be authorised until the MSP mapping process has been completed.

2. Need and Desirability

The EIA report fails to consider the full range of over-arching legislative and policy instruments of relevance to the issue of need and desirability. It states that

"*With respect to the national policy and planning framework, prospecting and mining is identified as a sector with substantial potential for growth stimulation and/or employment and is supported in numerous national planning instruments, such as the National Development Plan 2030 (2012), as well as Operation Phakisa (2014) and Mining Phakisa*".

However this fails to take into consideration that food security and job creation also lie at the heart of the NDP and Operation Phakisa, as do consideration related to a just transition and the reduction in carbon emissions. Towards this end the report fails to give adequate attention to the fact that the area under consideration is a critical area for the small-scale fisheries sector and the report fails to outline the socio-economic contribution that the SSF fisheries make to local and regional food security, job creation and tourism. Instead it assumes that mining is preferable. It inappropriately states that

"Should prospecting activities prove that there is a feasible mineral resource for mining, a new mining area could be developed, which would generate significant employment opportunities."

It is submitted that this must be removed from the report as no socio-economic impact assessment has been done and included in this report. Contrary to this, offshore mining does not generate considerable employment opportunities and the issue of whether or not a 'new' mining area should be developed needs to be decided as part of a Marine Spatial Planning process that has an SEA report upon which it can make such assessments.

For the above-mentioned reasons it is requested that this authorisation be suspended until such time as the MSP process is underway and an SEA can be undertaken for this region so that the cumulative impacts of the various mining projects currently underway can be considered and the future spatial priorities for the region can be determined.

3. Assessment of impacts on key marine and coastal biodiversity areas and features

The report acknowledges that the targeted area is an important area for fisheries and a specialist report was commissioned. The Specialist Reports for both applications are written by the same consultancy. The specialist report in this instance is biased towards the information required by the industrial (large scale commercial) fisheries sector and fails to provide similar depth of information for the current interim relief fishers/SSF sector, who are dependent on the nearshore, and whose social and economic rights and needs have been recognised by the Equality Court. Although the Specialist Report does describe the Small-scale sector and does indicate where they catch traditional line fish and west coast rock lobster, it is surprising then that this specialist assessment did not go into detail about the impact of the proposed prospecting activities on the spawning and recruitment grounds of the specific species such as west coast rock lobster, Cape Bream, Harders, Snoek and other species that are important for the food security and livelihoods of the SSF sector.

As noted in the EIA Report, the target area overlaps in part and is adjacent to the Conservation Zone of the Cape Canyon and Associated Islands, Bays and Lagoon Ecologically or Biologically Significant Areas (EBSA). The principal objective of EBSAs is the identification of features of higher ecological value that may require enhanced conservation and management measures, however, they currently carry no legal status. It is not clear why a precautionary approach has not been adopted in this instance, given that this information is already available and will inform the Marine Spatial planning process.

Comments submitted by

Dr Jackie Sunde

One Ocean Hub Research Team,

Dept. of Environmental and Geographical Science,

University of Cape Town

MASIFUNDISE
DEVELOPMENT TRUST

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27 September 2021

To: SLR Consulting

Attention: Nicholas Arnott

Per email: narnott@slrconsulting.com

RE: Comments on the Belton Park Trading 127: Environmental Impact Assessment Process for Prospecting Activities, Sea Concession 13C, 15C, 16C, 17C & 18C, West Coast (DMRE reference 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)

Introduction:

Masifundise is an organisation that works towards the empowerment and capacity building of small-scale fishing communities across South Africa, with a vision of a just society based on the principles of food sovereignty with emphasis on social, economic, climate, and environmental justice for small-scale fishing communities. We believe that the voices of those who use and depend on ocean resources to support their livelihoods should be included and prioritised in decision-making processes that affect them.

Please find the comments on the EIA as well as the public participation process for this application below. These comments are informed by ongoing engagements and interactions with the communities of Ebenhaeser, Lamberts Bay and Doring Bay.

Regards,

Maia Nangle

Researcher and Project Officer

Masifundise Development Trust

Email: maia@masifundise.org.za

1. Concerns and Comments

1.1. Inadequate public participation

The EIA process has relied on online platforms for public participation processes. This is inadequate and inappropriate given the nature of the communities that will be affected by the prospecting activities in the application. Small-scale fishing communities who's lives and livelihoods will be negatively impacted by these developments cannot access lengthy meetings online, and cannot engage with the information that is not in their local language. The connectivity in these areas is often not satisfactory for engagement, poorer community members often don't have access to smart phones, and for those who do, the cost of the data required to access such lengthy meetings hinders their ability to participate.

1.2. Social and economic impacts on small-scale fishing communities

The area in which the prospecting in these applications is planned is an important fish spawning and recruitment ground. It is recognised in the report, in the commissioning of a specialist report on fisheries, that the fisheries sector depends on this area. However, this specialist report is biased towards commercial fisheries and the industrial fisheries sector and provides insufficient evidence and information that is relevant to the small-scale fisheries sector. Although it acknowledges the small-scale sector, details are not provided on the impacts that the prospecting activities will have on the spawning and recruitment of the relevant species. It is essential for small-scale fishing communities to access these areas in order to secure their livelihoods and ensure local food and nutrition security. The inshore zones where small-scale fishers operate will experience the most damage and degradation by the proposed prospecting and mining activities.

The report does also not detail the number of households that will be impacted by the nearshore mining, despite the fact that these activities will take place within 1m of the shore, in areas such as Elandsbaai, in the middle of a near-shore lobster harvesting area. The small-scale fishers who operate in these areas are dependent on these resources and their social and economic rights have been recognised by the Equality Court.

1.3. Need for a Strategic Environmental Assessment of the West Coast

Belton Park Trading 127 currently has two prospecting right applications off-shore of the West Coast, through SLR Consulting. These individual reports do not reference each other. In addition to these applications, there are a number of other prospecting and mining applications that are in similar stages to these two by Belton Park, that also do not reference each other. Each of these applications considers the environmental and social impact of these projects on their own, without considering the cumulative impacts, which is extremely concerning, given that this could have a critical impact on the biodiversity of the region.

1.4. Marine Spatial Planning Act

Marine Spatial Planning Act of 2019 is not mentioned in the report, but is a key legislative instrument in sustainable environmental management. Planning is currently underway for the West Coast, as the Act was commenced this year. No authorisations for prospecting should be granted until these maps have been finalised as it is not appropriate for prospecting to occur in an area that will eventually not permit the activity. The West Coast is already a site of conflicting activities and users of the ocean space. This area is an extremely important one for the fisheries sector, and as this sector is important in the provision of food security and securing lives and livelihoods, this should be prioritised.

2. Recommendations:
   - It is recommended that the deadline for comment should be postponed and that public consultations should take place in the communities of Ebenhaeser, Doringbaai, Papendorp, and Lamberts Bay prior to the continuation of the process.
   - A Strategic Environmental Assessment of the West Coast of South Africa must be conducted prior to this, or any other, application or project be considered.
   - No further authorisations for prospecting or exploration should be authorised until the MSP mapping process has been completed.

Regards,

Maia Nangle

Researcher and Project Officer

Masifundise Development Trust

Email: maia@masifundise.org.za

Nicholas Arnott

From: Dehan Owies <peterowies@gmail.com>
Sent: Monday, 27 September 2021 16:22
To: Nicholas Arnott
Subject: Comments

Good Day,

I trust this email finds you well.

This email refers to the planning mine activities (prospecting) in Doringbaai and northly areas to the Olifants River.

As a concerned person in Doringbaai I wish to bring under your attention that zoom meetings is not an option to participate due to the fact that not everyone do have access to that infrastructure / facility.

We request a community participation process whereby the locals can be better informed about these mining plans in our area.

The Small Scale Fishers are worried about the possible impact on their livelihoods and the access to their fishing grounds.

A lot of fishing activities is happening and in particular the white mussel harvesting in the identified mining area.

I surely hope that this will be taken in consideration before any mining activities take place even the prospecting / drilling in the area.

Kindly acknowledge receipt of this email.

Thanks in advance

Kindest Regards

Nicholas Arnott

From:	Gerhard Cilliers <GCilliers@environment.gov.za>
Sent:	Monday, 27 September 2021 15:45
To:	Nicholas Arnott
Subject:	Belton Park Trading 127 (Pty) Ltd – EIA for A Prospecting Right, Sea Concessions 13C, 15C, 16C, 17C & 18C, West Coast (DMRE REFERENCE: WC30/5/1/1/2/10319PR, WC30/5/1/1/2/10320PR, WC30/5/1/1/2/10321PR, WC30/5/1/1/2/10322P): Availability of DEIR for ...
Attachments:	Request for External Comments_ Draft Scoping Report for Amendment of EA_sk3.docx

You don't often get email from gcilliers@environment.gov.za. Learn why this is important

Good afternoon

Herewith comments from Directorate Biodiversity and Coastal Research on above matter. You may also have received additional comments from other directorates within DFFE.

Kind regards

Dr Gerhard Cilliers (Ph.D)
Pr.Nat.Sci. (400249/10)

Director: Biodiversity and Coastal Research
Department Forestry, Fisheries and the Environment: Oceans and Coast
Foretrust Building, Martin Hammerschlag Way, Foreshore, Cape Town
South Africa
Mobile: +27(0)64 908 6574

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

NO	ITEM	INPUTS & COMMENTS
1.	Findings of the review in terms of report structure, activities impacts, identified and assessed and suitability of proposed mitigation measures.	Regarding the assessment of impacts on marine fauna/habitat: An impact such as 'disturbance and loss of benthic fauna' (by removal of sediments by drill bit or trawler suction head), during sampling, is scored as Medium in the report. Medium intensity/severity is defined in Appendix 4.1 as: 'Moderate change, disturbance or discomfort. Where the affected environment is altered, but natural functions and processes continue, albeit in a modified way.' However, the impact would result in 'elimination of the benthic infaunal and epifaunal biota in the sample footprints'. This is not consistent with Medium intensity, it is High intensity ('Prominent change, disturbance or degradation. Where natural functions or processes are altered to the extent that they will temporarily or permanently cease'). It may be that limited extent or duration of the impact were taken into account in scoring this impact as Medium intensity, but that would not be appropriate because <u>these are all separate criteria that are supposed to be scored independently of each other</u>. Therefore, the score should be adjusted from Medium to High. Similarly, it is very doubtful whether crushing of benthic fauna during sampling is Medium and not High. There are other examples where scores of impact seem too generous:

		For example, it is acknowledged in the Marine faunal assessment report that natural rehabilitation of the seabed and recovery of invertebrate communities is very dependent on a number of factors. It is also acknowledged that 'results of on-going research on the southern African West Coast suggest that differences in biomass, biodiversity or community composition following mining with drill ships or crawlers below the wave base <u>may endure beyond the Medium term</u> (6-15 years)', and that excavations at the proposed depths 'may have slow infill rates and persist for several years'. How then, is the duration of impact scored Low-Medium. It should be Low-High, or rather Medium-High. The impacts of underwater sampling noise on marine fauna are also unlikely to be Low, even if it may be of limited duration and (relatively) limited extent. Furthermore, based on the assessment of the impact of suspended sediment plumes generated during sampling at the bottom of p72 of the Marine Faunal report, it is surprising that the intensity of the impact is disregarded as being of Low intensity in the following paragraph (p 73). In terms of how the impact is described on p72, the severity is certainly High. Once again it seems that allowance for (perceived) limited duration and extent of the impact has been made in the scoring of intensity, but once again, the score of intensity must be scored independently of these other criteria. The same does for smothering of benthic by redeposit tailings. This impact is most certainly High, not Low, even if it may be localised. It is also unclear why the duration of impact of smothering on rocky outcrop communities goes from Medium term without

		mitigation, to Short term with mitigation. The mitigation measure is to avoid rocky outcrop areas. If you try but fail to avoid them, the duration of impact should be no different to if you don't attempt to avoid them. The scoring of impacts therefore need to be reconsidered, with possible implications for the significance of impacts. Also, there seems to not be adequate consideration of cumulative impacts. Cumulative impacts are only considered in terms of the addition of other (outside) impacts (other seismic surveys, oil and gas activities). However, what is not acknowledged is that all the anticipated impacts of the sampling, are taking place together at the same locations. If for example the intensity of sediment removal, crushing and smothering are all considered to be low or very low (although I argue above that they are much higher than this), individually, what then of their combined/cumulative impacts? And how will this affect duration, reversibility and overall significance of impacts?
2.	Assessment of report findings in terms of; proposed site, proposed alternatives, technology applied and suitability of methodology to be applied.	
3.	Identify any outstanding information/ specialist study or other assessment that should have been conducted or informed report findings. Provide motivation for the need for inclusion.	
4.	Decision based on information provided (objection or support) with recommendations or motivation for this decision.	While it can be demonstrated that the activity will impact relatively small areas of each concession and overall of the entire bioregions (although even this is not quite clear, see below), the actual assessment of impacts on marine fauna is inaccurate and unrealistic, and cumulative impacts are not adequately addressed. See comments under 1 above. The

		impact assessment on marine fauna therefore needs to be reconsidered. Whether or not the proposed sampling should be considered in Threatened ecosystem types, EBSA habitat or Critical Biodiversity Area that overlap with the concession areas, should be dependent on the revised impact assessment.
5.	Questions or points of clarity to be directed the EAP, along with any other additional information required?	P78 of the Marine Faunal Assessment incorrectly states that sampling would impact an area of <0.05 km^2. The impact would be larger than this, but probably the report was supposed to refer to % area (of the Namaqua Bioregion) here, not km^2. However, the following paragraph says 'The area of seabed disturbed …. can only be determined following analysis of drill samples and development of the inferred resource model.' This seems to suggest that it is unknown at this stage what the extent of the disturbance may be. Could it potentially amount to more than 0.05%, depending on the drill samples and modelling outcomes? Clarity is needed.

Nicholas Arnott

From: Fannie Shabangu <fannie.shabangu@yahoo.com>
Sent: Monday, 27 September 2021 14:22
To: Nicholas Arnott
Subject: Comments on SLR Project No: 720.09017.00005
Attachments: IMD05C_DEIR_FS.pdf

You don't often get email from fannie.shabangu@yahoo.com. Learn why this is important

Dear Nicholas

I have commented directly on the document "ENVIRONMENTAL IMPACT REPORT FOR AN EIA FOR A PROSPECTING RIGHT APPLICATION FOR OFFSHORE SEA CONCESSIONS 13C, 15C, 16C, 17C & 18C, WEST COAST", please see the attached. Since you previously said that I can provide comments in any form, is it okay for me to provide comments this way?

Below are references I used to substantiate my comments:

1. Barendse J (2007) A head of steam. Africa Geographic: 42-47.
2. Purdon J, Shabangu FW, Pienaar M, Somers MJ, Findlay K (2020a) Cetacean species richness in relation to anthropogenic impacts and areas of protection in South Africa's mainland Exclusive Economic Zone. Ocean Coast Manage 197: 105292.
3. Purdon J, Shabangu FW, Yemane D, Pienaar M, Somers MJ, Findlay K (2020b) Species distribution modelling of Bryde's whales, humpback whales, southern right whales, and sperm whales in the southern African region to inform their conservation in expanding economies. PeerJ 8: e9997
4. Purdon J, Shabangu F, Pienaar M, Somers MJ, Findlay KP (2020c) South Africa's newly approved marine protected areas have increased the protected modelled habitat of nine odontocete species. Mar Ecol Prog Ser 633:1-21. https://doi.org/10.3354/meps13190
5. Shabangu FW, Findlay KP, Yemane D, Stafford KM, van den Berg M, Blows B, Andrew RK (2019) Seasonal occurrence and diel calling behaviour of Antarctic blue whales and fin whales in relation to environmental conditions off the west coast of South Africa. J Mar Syst 190: 25−39
6. Shabangu FW, Findlay K, Stafford KM (2020a) Seasonal acoustic occurrence, diel-vocalizing patterns and bioduck call-type composition of Antarctic minke whales off the west coast of South Africa and the Maud Rise, Antarctica. Mar Mamm Sci 36: 658−675.
7. Shabangu FW, Andrew RK, Yemane D, Findlay KP (2020b) Acoustic seasonality, behaviour and detection ranges of Antarctic blue and fin whales under different sea ice conditions off Antarctica. Endang Species Res 43: 21−37
8. Shabangu FW, Andrew RK, Findlay K (2021) Acoustic occurrence, diel-vocalizing pattern and detection ranges of southern right whale gunshot sounds off South Africa's west coast. Mar Mamm Sci 37:733–750. https:// doi.org/ 10.1111/ mms.12760
9. Shabangu, F. W., and Andrew, R. K. (2020). Clicking throughout the year: sperm whale clicks in relation to environmental conditions off the west coast of South Africa. Endanger. Species Res. 43, 475–494. https://doi.org/10.3354/esr01 089

For your easier referral, I have shared all these references on this Google Drive folder:
https://drive.google.com/drive/folders/1oqixmuXs0wqfY_JD7LQtv_8iS8y2VIPB?usp=sharing

I hope the above is in order, and please let me know if you require more information.

Regards,
Fannie

forestry, fisheries & the environment

Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

SMALL PELAGIC SCIENTIFIC WORKING GROUP COMMENTS ON THE ENVIRONMENTAL IMPACT REPORT OF PROJECT REFERENCE: 720.09017.00005

September 2021

TO WHOM IT MAY CONCERN

The Small Pelagic Scientific Working Group (SWG-PEL) of the Department of Forestry, Fisheries and the Environment comments as follows on the environmental impact reports for project reference no. 720.09017.00005:

1. Belton Park Trading 127 (PTY) LTD – Environmental Impact Assessment for a Prospecting Right Application for Offshore Sea Concessions 13C, 15C, 16C, 17C & 18C, West Coast (DMRE REFERENCE: 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): Notification of availability of environmental impact report for review and comment, and
2. Belton Park Trading 127 (PTY) LTD – Environmental Impact Assessment for a Prospecting Right Application for Offshore Sea Concessions 14B, 15B & 17B, West Coast (DMRE REFERENCE: WC30/5/1/1/2/10311PR, WC30/5/1/1/2/10312PR & WC30/5/1/1/2/10313PR): Notification of Availability of Environmental Impact Report for Review and Comment.

The SWG-PEL notes that the “Notification and Communication with Key Stakeholders” of the project’s Executive Summary states that: “As part of the stakeholder notification process, BPT127 should inform the Department of Forestry, Fisheries and the Environment (DFFE) fisheries research survey programme”. Whereas this is essential, it is important that not only is the Department’s survey programme notified of the planned dates of exploration activities, but that they are consulted well in advance, during the planning phases of the exploration work. This is critical because research surveys cannot be moved outside of the “temporal window” over which surveys have been conducted in the past. Small pelagic hydro-acoustic surveys are conducted bi-annually, with the recruit survey conducted in winter between mid-May and mid-July, and the spawner biomass survey conducted in summer between mid-October and mid-December. The survey area of the proposed geophysical surveys cover a significant amount of the research area to 200 m, and presents a potential area of conflict. Since the time for when the proposed geophysical surveys will be conducted is not stipulated, the SWG-PEL suggests that the proposed geophysical surveys be conducted outside the above stipulated times when important research surveys are conducted to prevent potential costly delays in progression of the surveys. Bulk and drill sampling will displace small pelagic fish by disturbing an important habitat on the west coast of South Africa, which will influence their distribution, behaviour and potentially also their abundance estimation. Any underestimation of the small pelagic fish biomass will have negative economic implications for the South African small pelagic fishing industry. It is for these reasons that we strongly recommend that geophysical surveys and sampling be conducted at times other than when the small pelagic fish abundance estimation research surveys take place.

We trust that our suggestion will be considered when planning the proposed geophysical surveys and sampling activities.

Sincerely,

Dr Fannie Shabangu
Chair of the Small Pelagic Scientific Working Group
Date: 27 September 2021

Nicholas Arnott

From:	hilda april adams <hildadms3@gmail.com>
Sent:	Tuesday, 28 September 2021 08:14
To:	Nicholas Arnott
Subject:	COMMENTS ON BELTON PARK TRADING PROSPECTING APPLICATIONS

Dear Nicholas

It is with grave concern that I, on behalf of myself and other small scale fishers comment as follows:

1. Online public participation process was not fair or adequate for SSF communities during COVID. They should extend the time and do more meetings in Elands, Lamberts and Doringbaai.

2. There are so many applications going on that DFFE should do a Strategic Environmental Assessment SEA before authorising any further prospecting or mining.

3. The reports do not mention the Marine Spatial Planning Act and this Act is now in force. All prospecting and mining applications should be suspended until the MSP planning and maps are developed.

4. This area in which these applications are planned is a key fish spawning and recruitment ground. The fisheries sector depends on this area. No further mining or prospecting activities should be allowed in this area as this industry is critical for food security and livelihoods.

5. The SSF sector will be particularly impacted and the report fails to explore the social and economic impacts on livelihoods of thousands of fishers who are dependant on the oceans and species for our food security.

6. The area is a critical biodiversity area and has been proposed as an ecologically sensitive area requiring further protection and management measures so no further prospecting or mining should be permitted and a precautionary approach taken.

Kindly revert back to me as soon as possible regarding action steps of our above comments. Thank you.

Kind regards
Hilda Adams
Small scale fisher woman, representative of small scale fishers along our coastline.

Sent from my Huawei tablet

forestry, fisheries & the environment

Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

Enquiries: **E-mail**: OCEIA@environment.gov.za **Tel**: 021 819 2499 Ref**: EDMS- 209688**

SLR Consulting (South Africa) (Pty) Ltd

Att: Mr. Nicholas Arnott

PO Box 798,

Rondebosch,

7701

Tel: (021) 461 1118 / 9

E-mail: narnott@slrconsulting.com

Dear Mr. Arnott

SUBJECT: COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE PROPOSED PROSPECTING RIGHT APPLICATION FOR OFFSHORE SEA CONCESSIONS 13C, 15C, 16C, 17C & 18C

The Oceans & Coasts (O&C) Branch of the Department of Forestry, Fisheries, and the Environment **(DFFE)** appreciates that opportunity granted to comment on the Draft Environmental Impact Report for the Proposed Prospecting Right Application for Offshore Sea Concessions 13C, 15C, 16C, 17C & 18C. This Branch has provided recommendations in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), **("NEMA")** and the National Environmental Management: Integrated Coastal Management Act, 2008 (Act No. 24 of 2008) **("ICM Act").**

1. This Branch reiterates that it does not endorse the implementation of the proposed prospecting right application for offshore sea concessions 13C, 15C, 16C, 17C & 18C. These comments should be read together with comments previously submitted as dated 21/09/2021.

2. While this Branch recognizes the need for the assessment to identify and estimate the potential mineral resources within each Sea Concession area for possible future mining, this Branch objects to this application based on potential adverse ecological/environmental impacts and possible disruption to the West Coast pelagic fishery.

3. This Branch strongly believed that the potential environmental impacts on marine fauna, impact on other users of the sea in terms of the exclusion of demersal long-line, traditional line-fish, pole-and-line, small-scale fishers, and fisheries research, sediment plume impact on fish stock recruitment and social and socio-economic impacts on cultural heritage material, impact related to job creation and business opportunities, visitors during construction on an environment that is already stressed and over-extracted have not been sufficiently justified.

4. The comments and recommendations are guided by the norms, standards, and policy objectives set out in the ICM Act, scientific research, and expert knowledge on the marine and coastal environment to motivate the above decision and outline areas of further reflection for the attention of the EAP and competent authority.

5. <u>Recommendations for the attention of the EAP and CA:</u>

5.1 The impact assessment rates the impact of 'disturbance and loss of benthic fauna' (by removal of sediments by drill bit or trawler suction head), during sampling, as of medium significance. Medium intensity/severity is defined in Appendix 4.1 as: 'Moderate change, disturbance or discomfort. Where the affected environment is altered, but natural functions and processes continue, albeit in a modified way.'

5.2 However, this impact would result in "elimination of the benthic infaunal and epifaunal biota in the sample footprints". This is not consistent with Medium intensity, it is High intensity ('Prominent change, disturbance or degradation. Where natural functions or processes are altered to the extent that they will temporarily or permanently cease'). It may be that limited extent or duration of the impact were considered in scoring this impact as medium intensity, but that would not be appropriate because these are all separate criteria that are supposed to be scored independently of each other. Therefore, the score should be adjusted from Medium to High.

5.3 Similarly, it is very doubtful whether crushing of benthic fauna during sampling is Medium and not High.

5.4 There are other examples where scoring of impacts seems too generous. For example, it is acknowledged in the Marine faunal assessment report that natural rehabilitation of the seabed and recovery of invertebrate communities is very dependent on several factors. It is also acknowledged that 'results of on-going research on the southern African West Coast suggest that differences in biomass, biodiversity or community composition following mining with drill ships or crawlers below the wave base may endure beyond the Medium term (6-15 years)', and that excavations at the proposed depths 'may have slow infill rates and persist for several years. How then, is the duration of impact scored Low-Medium? It should be Low-High, or rather Medium-High. Further clarity on this aspect is required.

5.5 The impacts of underwater sampling noise on marine fauna are also unlikely to be Low, even if it may be of limited duration and (relatively) limited extent.

5.6 Furthermore, based on the assessment of the impact of suspended sediment plumes generated during sampling at the bottom of p72 of the Marine Faunal report, it is surprising that the intensity of the impact is disregarded as being of Low intensity in the following paragraph (p 73). In terms of how the impact is described on p72, the severity is certainly High. Once again it seems that allowance for (perceived) limited duration and extent of the impact has been made in the scoring of intensity, but once again, the score of intensity must be scored independently of these other criteria.

5.7 The same does for smothering of benthic by redeposit tailings. This impact is most certainly High, not Low, even if it may be localised.

5.8 It is also unclear why the duration of impact of smothering on rocky outcrop communities goes from medium significance without mitigation, to short term with mitigation. The mitigation measure is to avoid rocky outcrop areas. If you try but fail to avoid them, the duration of impact should be no different to if you don't attempt to avoid them.

5.9 The scoring of impacts therefore needs to be reconsidered, with possible implications for the significance of impacts.

5.10 Also, there seems to not be adequate consideration of cumulative impacts. Cumulative impacts are only considered in terms of the addition of other (outside) impacts (other seismic surveys, oil and gas activities). However, what is not acknowledged is that all the anticipated impacts of the sampling, are taking place together at the same locations. If for example the intensity of sediment removal, crushing and smothering are all considered to be low or very low (although I argue above that they are much higher than this), individually, what then of their combined/cumulative impacts? And how will this affect duration, reversibility, and overall significance of impacts?

5.11 You are kindly reminded of your duty of care towards the coastal environment per section 58 of the ICM Act read together with section 28 of NEMA which states that "Every person who causes, has caused or may cause an adverse effect on the coastal environment must take reasonable measures to prevent such adverse effect from continuing, recurring or occurring or, in so far as such harm to the coastal environment is authorized by law or cannot reasonably be avoided or stopped, to minimize and rectify such adverse effect on the coastal environment" by taking into consideration and implement recommendations provided in this comments document recommending measures to be undertaken to ensure the coastal zone is protected, preserved and managed.

5.12 Kindly note that the activity may not commence before the granting of environmental authorization by the CA. In terms of Section 49A of NEMA, the commencement of unauthorized activities, failure to comply with conditions in a license to operate, unlawful or intentional acts that lead to significant pollution, and failure to comply with compliance orders or directives may result in the imposition of a fine or jail sentence on conviction for an offense. Section 49B provides that any persons convicted of an offense in terms of Section 49A may be liable to a fine and/or imprisonment.

5.13 Please be advised that the Sub Directorate: Coastal Development and Protection within the Branch: O&C is responsible for coordinating and facilitating EIA comments and advice for developments within the marine environment. Kindly forward any EIA-related information or request to Email: OCeia@environment.gov.za.

5.14 A copy of these comments should be forwarded to the CA for consideration and implementation. The EAP is kindly requested to submit proof of submission to OCeia@environment.gov.za.

We will provide additional comments on the next PPP phase when more information is available.

These comments must be sent to the CA for consideration and implementation, and the EAP is kindly requested to submit proof of such submission to us.

Kindly note that the **Department reserves the right to revise its comments and request further information based on any additional information that might be received**. All future correspondence and documentation (hard copy and an electronic copy) must be submitted to our office via **OCeia@environment.gov.za** **/ or Physical Address:** Department of forestry and fisheries and the environment **(DFFE), Branch: Oceans and Coast, 2 East Pier Building, East Pier Road, Victoria and Alfred Waterfront, Cape Town, 8001.**

Yours Sincerely

ACTING DIRECTOR: COASTAL CONSERVATION STRATEGIES

DATE: 28/09/2021

APPENDIX 4: SPECIALIST STUDIES

APPENDIX 4.1: CONVENTION FOR ASSIGNING SIGNIFICANCE RATINGS

APPENDIX 4.2: FISHERIES ASSESSMENT

APPENDIX 4.3: MARINE FAUNAL ASSESSMENT

APPENDIX 4.4: MARITIME ARCHAEOLOGICAL IMPACT ASSESSMENT

APPENDIX 4.1: CONVENTION FOR ASSIGNING SIGNIFICANCE RATINGS

1 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.

1.1 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.

1.2 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 1.4). 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 1.5). Significance is determined using the table in Section 1.5.
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 1.3). Confidence in the prediction is associated with any uncertainties, for example, where information is insufficient to assess the impact.

1.3 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.

1.4 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.***
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.***

Rating	Description	
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.

1.5 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**.

APPENDIX 4.2: FISHERIES ASSESSMENT

ENVIRONMENTAL IMPACT ASSESSMENT FOR MARINE PROSPECTING ACTIVITIES IN SOUTH AFRICAN SEA CONCESSION AREAS 13C, 15C, 16C, 17C AND 18C WEST COAST, SOUTH AFRICA

Fisheries Assessment

November 2020

PREPARED FOR:

SLR

ON BEHALF OF:

BELTON PARK TRADING 127 (PTY) LTD

CapMarine
Capricorn Marine Environmental

CAPRICORN MARINE ENVIRONMENTAL (PTY) LTD

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30 October 2020

This report was prepared by Sarah Wilkinson and David Japp of CapMarine (Pty) Ltd. David Japp has a BSC in Zoology, University of Cape Town (UCT) and an MSc degree in Fisheries Science from Rhodes University. Sarah Wilkinson has a BSc (Hons) degree in Botany from UCT. Both are professional natural scientists registered with the SA Council for Natural Scientific Professions (SACNASP).

Mr Japp has worked in the field of Fisheries Science and resource assessment since 1987 and has considerable experience in undertaking specialist environmental impact assessments relating to fishing and fish stocks. His work has included environmental economic assessments and the evaluation of the environmental impacts on fishing. Sarah Wilkinson has worked on marine resource assessments, specializing in spatial and temporal analysis (GIS) as well as the economic impacts of fisheries exploitation in the southern African region.

This specialist report was compiled for SLR Consulting (South Africa) (Pty) Ltd on behalf of Belton Park Trading 127 (Pty) Ltd for their use in preparing a Basic Impact Assessment for proposed offshore prospecting operations in Sea Concession 13C, 15C, 16C, 17C & 18C off the West Coast of South Africa.. We do hereby declare that we are financially and otherwise independent of the Applicant and of SLR.

Dave Japp

Sarah Wilkinson

Contact Details:

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Executive Summary

TBC

1. Introduction

Belton Park Trading 127 (Pty) Ltd (BPT127) has submitted an application for separate Prospecting Rights 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 applications were 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).

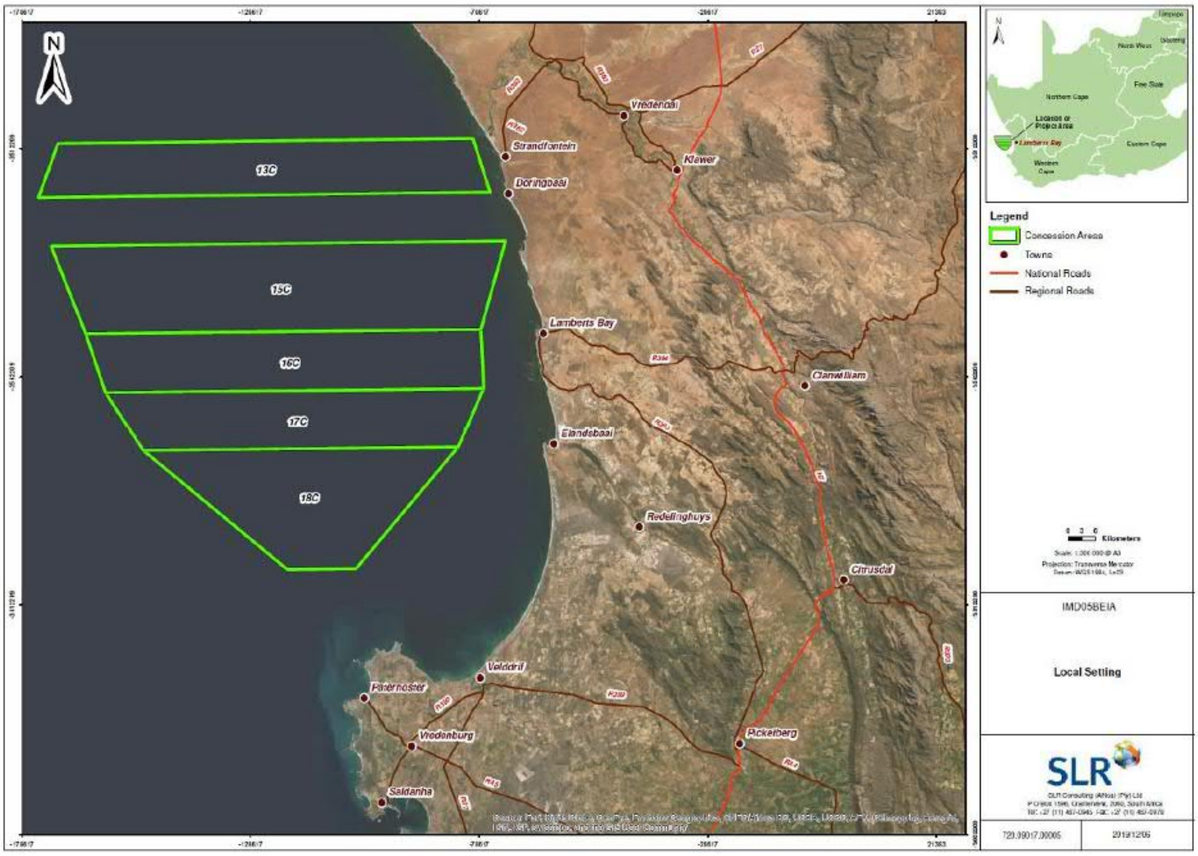

Figure 1-1: Location of Sea Concession 13C, 15C, 16C, 17C & 18C (SLR Consulting, 2020).

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 over a four year period (i.e. the duration of the validity of the prospecting right).

In terms of the Environmental Impact Assessment (EIA) Regulations 2014 (as amended), promulgated in terms of Chapter 5 of the National Environmental Management Act (NEMA), 1998 (No. 107 of 1998), an application for a Prospecting Right requires Environmental Authorisation (EA) to carry out the proposed prospecting operations.

SLR Consulting (South Africa) (Pty) Ltd (SLR) has been appointed to undertake the Scoping and EIA process in terms of the NEMA, and in turn have commissioned CapMarine (Pty) Ltd to provide a spatial assessment on the distribution of commercial fisheries off the West Coast in the vicinity of the sea concession areas.

2. Scope of Work

This specialist report was compiled as a desktop study on behalf of SLR, for their use in preparing a Scoping and Environmental Impact Assessment Report for the proposed prospecting activities off the South African West Coast.

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.

3. Description of the Proposed Project

BPT127 is proposing to explore for various minerals in concessions 13C, 15C, 16C, 17C and 18C off the West Coast of South Africa (Figure 1.1). Concessions 13C, 15C, 16C, 17C and 18C are 1 117.53 km^2, 1 791.40 km^2, 1 096.43 km^2, 976.69 km^2 and 1 104.42 km^2, respectively. They extend seawards from ~65 m to ~200 m depth. BPT127 has proposed an initial 4-year prospecting programme.

The proposed prospecting programme would involve:

- Geophysical surveys to collect high-resolution seismic and multibeam echosounder and Topas system shallow seismic data along lines 100 m to 1 000 m apart;
- Drill sampling to 12 m below the seafloor at intervals of 50 m to 500 m; and
- Bulk (trench) sampling in different geological domains, with each trench up to 180 m long and 20 m wide to a depth of between 1 m and 8 m.

3.1 Geophysical Surveys

The geophysical surveying will be undertaken using the group-owned dedicated survey vessel, the *DP Star*. The vessel is equipped with:

- a multibeam echosounder designed to produce high resolution digital terrain models of the seafloor (Figure 3.1, left) by transmitting a fan of acoustic beams below the vessel at frequencies ranging from 10 kHz to 200 kHz and typically produces sound levels in the order of 207 db re 1 µPa at 1 m; 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 3.1, right), thereby giving a cross section view of the sediment layers. Sound levels are typically in the order of 206 db re 1 µPa at 1 m

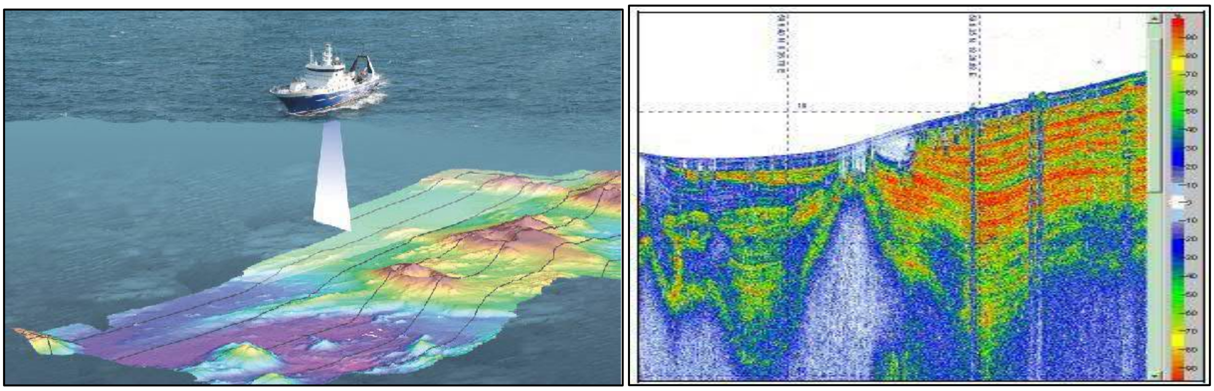

Figure 3-1: The geophysical survey techniques employed during Phase I of the proposed prospecting operations would include swath bathymetry (left) and sub-bottom profiling (right).

The proposed surveys would be undertaken in specific priority areas in each of the concessions, at water depths between approximately 45 - 200 m.

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.

3.2 Drill Sampling

Following interpretation of geophysical survey data obtained during Phase 1 of the project, drill sampling activities would be undertaken using the group-owned dedicated sampling vessel, the *MV Explorer* (Figure 3.2) 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 (Figure 3.3), which is launched through the moon pool of the support vessel and positioned on the seabed.

Figure 3-2: The proposed sampling vessel MV Explorer.

Figure 3-3: 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 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 subsea bed geotechnical conditions, up to 60 samples can be successfully taken per day. The samples would be undertaken at intervals of 50 to 500 m. 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. This amounts to ~0.0004% of the total combined seabed area of 6 086.5 km^2 for Concessions 13C, 15C, 16C and 18C.

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. 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. Fisheries Baseline Environment

South Africa has a coastline that spans two ecosystems over a distance of 3,623 km, extending from the Orange River in the west on the border with Namibia, to Ponta do Ouro in the east on the Mozambique border. The western coastal shelf has highly productive commercial fisheries similar to other upwelling ecosystems around the world, while the East Coast is considerably less productive but has high species diversity, including both endemic and Indo-Pacific species. South Africa’s fisheries are regulated and monitored by the Department of Environment, Forestry and Fisheries (DEFF). Broadly the fisheries sectors are managed either as commercial, small-scale or recreational groupings. All fisheries in South Africa, as well as the processing, sale in and trade of almost all marine resources, are governed under the Marine Living Resources Act, 1998 (No. 18 of 1998) (MLRA) and related regulations and fishery-specific permit conditions

The number of fishing rights holders remain reasonably stable and is subject to rights allocations that are issued for different periods up to 15 years at a time. Table 4.1 lists the commercial fisheries sectors, and the current number of rights holders and wholesale value of landed catch (2017)[1]. Regions of operation and ports of deployment are listed in Table 4.2 along with the main species targeted by each sector. Figure 4.1 also shows the proportional volume of catch and wholesale value of each of these sectors for 2017.

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-directed purse-seine fishery targeting pilchard (*Sardinops sagax)*, anchovy (*Engraulis encrasicolus*) and red-eye round herring (*Etrumeus whitheadii*).

Highly migratory tuna and tuna-like species are caught on the high seas and seasonally within the South African waters by the pelagic long-line and pole fisheries. Targeted species include albacore (*Thunnus alalunga*), bigeye tuna (*T. obesus*), yellowfin tuna (*T. albacares*) and swordfish (*Xiphias gladius*). The traditional line fishery targets a large assemblage of species close to shore including snoek (*Thyrsites atun*), Cape bream (*Pachymetopon blochii)*, geelbek (*Atractoscion aequidens)*, kob (*Argyrosomus japonicus)*, yellowtail (*Seriola lalandi)* and other reef fish. Crustacean fisheries comprise a trap and hoop net fishery targeting West Coast rock lobster (*Jasus lalandii*), a line trap fishery targeting the South Coast rock lobster (*Palinurus gilchristi*) and a trawl fishery based solely on the East Coast targeting

[1] Note : Economic data on these fisheries sectors is poor – the 2017 data is the most recent information provided by DEFF

penaeid prawns, langoustines (*Metanephrops andamanicus* and *Nephropsis stewarti*), deep-water rock lobster (*Palinurus delagoae*) and red crab (*Chaceon macphersoni*).

Other fisheries include a mid-water trawl fishery targeting horse mackerel (*Trachurus capensis*) predominantly on the south eastern part of the Agulhas Bank and a hand-jig fishery targeting chokka squid (*Loligo vulgaris reynaudii*) exclusively on the Southeast coastal area focused in the Port Elizabeth to Cape St Francis area In addition to commercial sectors, recreational fishing occurs along the entire coastline comprising shore angling and small, open boats generally less than 10 m in length. The commercial and recreational fisheries are reported to catch over 250 marine species, although fewer than 5% of these are actively targeted by commercial fisheries, which comprise 90% of landed catch.

Most commercial fish landings must take place at designated fishing harbours. For the larger industrial vessels targeting hake, only the major ports of Saldanha Bay, Cape Town, Mossel Bay and Port Elizabeth are used. On the West Coast, St. Helena Bay and Saldanha Bay are the main landing sites for the small pelagic fleets targeting anchovy and sardine. These ports have significant infrastructure for the processing of anchovy into fishmeal as well as canning of sardine. Smaller fishing harbours on the West Coast of South Africa towards the Namibian border include Port Nolloth, Hondeklip and Laaiplek. Further south and extending towards Cape Point and eastwards, Hout Bay and Gansbaai harbours are also smaller fishing ports with significant local fisheries. Further eastwards onto the East Coast and towards the Mozambique border, Durban and Richards Bay are ports utilised by the crustacean trawl and large pelagic longline sectors.

Although small-scale fisheries contribute less than 1% to South Africa's GDP, they play an important role in the provision of food and employment. There are more than 230 small-scale fishing communities on the South African coastline, ranging in size from small villages to towns (DEFF, 2016). Small-scale fisheries commonly use boats but occur mainly close to the shore. Recreational fisheries comprise shore-based, estuarine and boat-based line fisheries as well as spearfishing and net fisheries, including cast, drag and hoop-net techniques. There are approximately 10 000 fishers included in small-scale fishing co-operatives across all coastal provinces.

Those commercial sectors that operate on the West Coast will be further described later in this report.

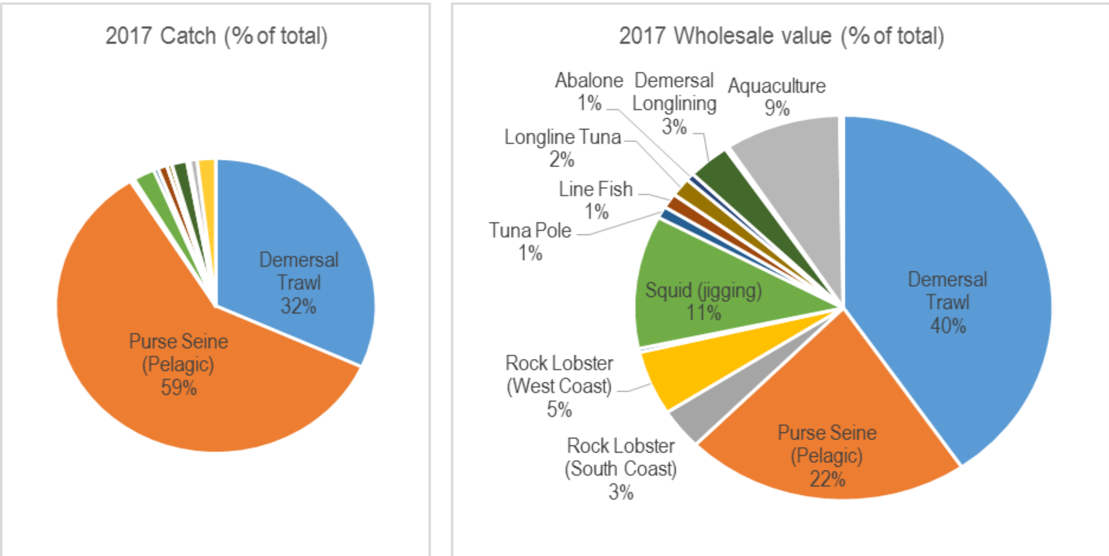

Figure 4-1: Pie chart showing percentage of landings by weight (left) and wholesale value (right) of each commercial fishery sector as a contribution to the total landings and value for all commercial fisheries sectors combined (2017). Source: DEFF, 2019.

Table 4-1: South African offshore commercial fishing sectors: wholesale value of production in 2017 (adapted from DEFF, 2019).

Sector	No. of Rights Holders (Vessels)	Catch (tons)	Wholesale Value of Production in 2017 (R'000)	% of Total Value
Small pelagic purse-seine	111 (101)	313 476	2 164 224	22.0
Demersal trawl (offshore)	50 (45)	163 743	3 891 978	39.5
Demersal trawl (inshore)	18 (31)	4 452	90 104	0.9
Mid-water trawl	34 (6)	30 000	No estimate	-
Demersal long-line	146 (64)	8 113	319 228	3.2
Large pelagic long-line	30 (31)	2 541	154 199	1.6
Tuna pole	170 (128)	2 399	97 583	1.0
Linefish	422 (450)	4 931	122 096	1.2
Longline shark demersal		72	1 566	0.0
South coast rock lobster	13 (12)	699	337 912	3.4
West coast rock lobster	240 (105)	1 238	531 659	5.4
Crustacean trawl	6 (5)	310	32 012	0.3
Squid jig	92 (138)	11 578	1 099 910	11.2
Miscellaneous nets	190 (N/a)	1 502	25 589	0.3
Oysters	146 pickers	42	3 300	0.0
Seaweeds	14 (N/a)	9 877	27 095	0.3
Abalone	N/a (N/a)	86	61 920	0.6
Aquaculture		3 907	881 042	9.0
Total		**528966 t**	**~R10 billion**	**100**

Table 4.2: South African offshore commercial fishing sectors, landings, number of rights holders, wholesale catch value and target species (DEFF, 2019).

Sector	Areas of Operation	Main Ports in Priority	Target Species
Small pelagic purse-seine	West, South Coast	St Helena Bay, Saldanha, Hout Bay, Gansbaai, Mossel Bay	Anchovy (*Engraulis encrasicolus*), sardine (*Sardinops sagax*), Redeye (*Etrumeus whiteheadi*)
Demersal trawl (offshore)	West, South Coast	Cape Town, Saldanha, Mossel Bay, Port Elizabeth	Deepwater hake (*Merluccius paradoxus*), shallow-water hake (*Merluccius capensis*)
Demersal trawl (inshore)	South Coast	Cape Town, Saldanha, Mossel Bay	East coast sole (*Austroglossus pectoralis*), shallow-water hake (*Merluccius capensis*), juvenile horse mackerel (mackerel (*Trachurus capensis*)
Mid-water trawl	West, South Coast	Cape Town, Port Elizabeth	Adult horse mackerel (*Trachurus capensis*)
Demersal long-line	West, South Coast	Cape Town, Saldanha, Mossel Bay, Port Elizabeth, Gansbaai	Shallow-water hake (*Merluccius capensis*)
Large pelagic long-line	West, South, East Coast	Cape Town, Durban, Richards Bay, Port Elizabeth	Yellowfin tuna (*T. albacares*), big eye tuna (*T. obesus*), Swordfish (*Xiphius gladius), s*outhern bluefin tuna (*T. maccoyii*)
Tuna pole	West, South Coast	Cape Town, Saldanha	Albacore tuna (*T. alalunga*)
Linefish	West, South, East Coast	All ports, harbours and beaches around the coast	Snoek (*Thyrsites atun*), Cape bream (*Pachymetopon blochii)*, geelbek (*Atractoscion aequidens)*, kob (*Argyrosomus japonicus)*, yellowtail (*Seriola lalandi),* Sparidae, Serranidae, Carangidae, Scombridae, Sciaenidae
South coast rock lobster	South Coast	Cape Town, Port Elizabeth	*Palinurus gilchristi*

Sector	Areas of Operation	Main Ports in Priority	Target Species
West coast rock lobster	West Coast	Hout Bay, Kalk Bay, St Helena	*Jasus lalandii*
Crustacean trawl	East Coast	Durban, Richards Bay	Tiger prawn (*Panaeus monodon*), white prawn (*Fenneropenaeus indicus*), brown prawn (*Metapenaeus monoceros*), pink prawn (*Haliporoides triarthrus*)
Squid jig	South Coast	Port Elizabeth, Port St Francis	Squid/chokka (*Loligo vulgaris reynaudii)*
Gillnet	West Coast	False Bay to Port Nolloth	Mullet / harders (*Liza richardsonii*)
Beach seine	West, South, East Coast	Coastal	Mullet / harders (*Liza richardsonii*)
Oysters	South, East Coast	Coastal	Cape rock oyster (*Striostrea margaritaceae*)
Seaweeds	West, South, East	Coastal	Beach-cast seaweeds (kelp, *Gelidium* spp and *Gracilaria* spp
Abalone	West Coast	Coastal	*Haliotis midae*

Spawning and Migration

The South African coastline is dominated by seasonally variable and sometimes strong currents and most species have evolved highly selective reproductive patterns to ensure that eggs and larvae can enter suitable nursery grounds situated along the coastline. The principle commercial fish species undergo a critical migration pattern in the Benguela and Agulhas ecosystems. This migration is demonstrated by the small pelagic species (anchovy and sardine) that is critical to the sustainability of the West Coast small pelagic but is also important for most demersal (bottom) species including hake.

The process is as follows (Refer to Figure 4.2):

- Adults spawn on the central Agulhas Bank in spring (September to November);
- Spawn drifts northwards in the Benguela current across the shelf;
- As eggs drift northwards, hatching takes place followed by larval development;
- Settlement of larvae occurs in the protected inshore areas, in particular the bays that are used as nurseries. This takes place from October through to March (see Figure 4.3); and
- Juveniles begin shoaling and systematically start a southward migration back towards the Agulhas Bank. This is the main period during which the anchovy and sardine are targeted by the small pelagic purse seine fishery. The demersal species such as hake migrate offshore into deeper water. Note also that this process is driven by environmental factors, in particular seasonal upwelling which provides the nutrients needed for growth and development of larvae and later juveniles and sub-adults.

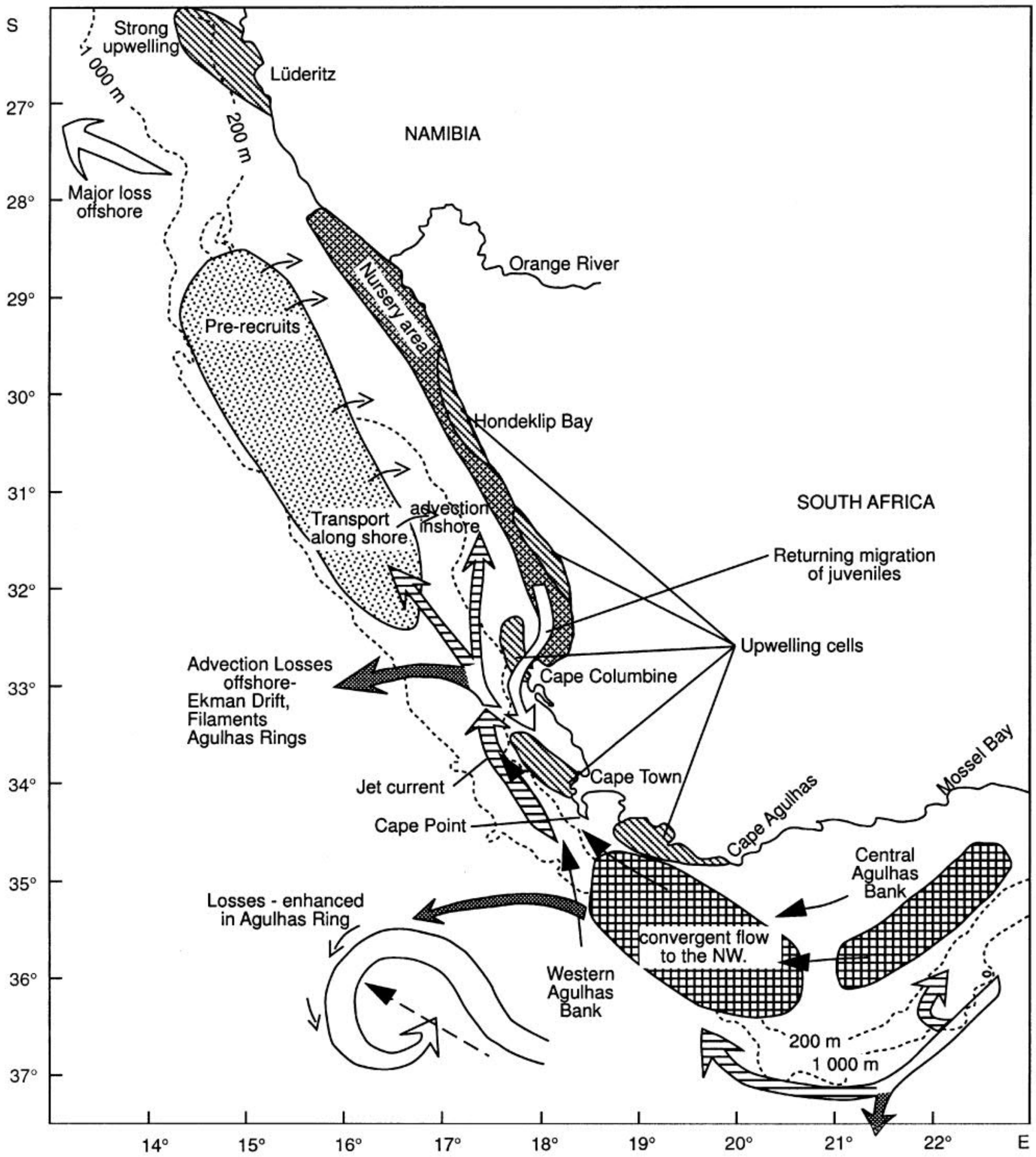

Figure 4-2: *Generalised figure of the main fish recruiting process for species caught on the West Coast of South Africa (after Hutchings et al., 2002). Figure shows the West Coast nursery area and the western/central Agulhas Bank spawning grounds. Light stippled area on the West Coast marks the main recruiting area for the small pelagic fishery and dark stippled area on the Agulhas Bank marks the main spawning grounds for small pelagic fish.*

Figures 4.3 and 4.4 show the distribution of hake eggs and larvae on the west and south-west coasts, with typically higher abundance evident in September and October (spring) compared with March and April (autumn).

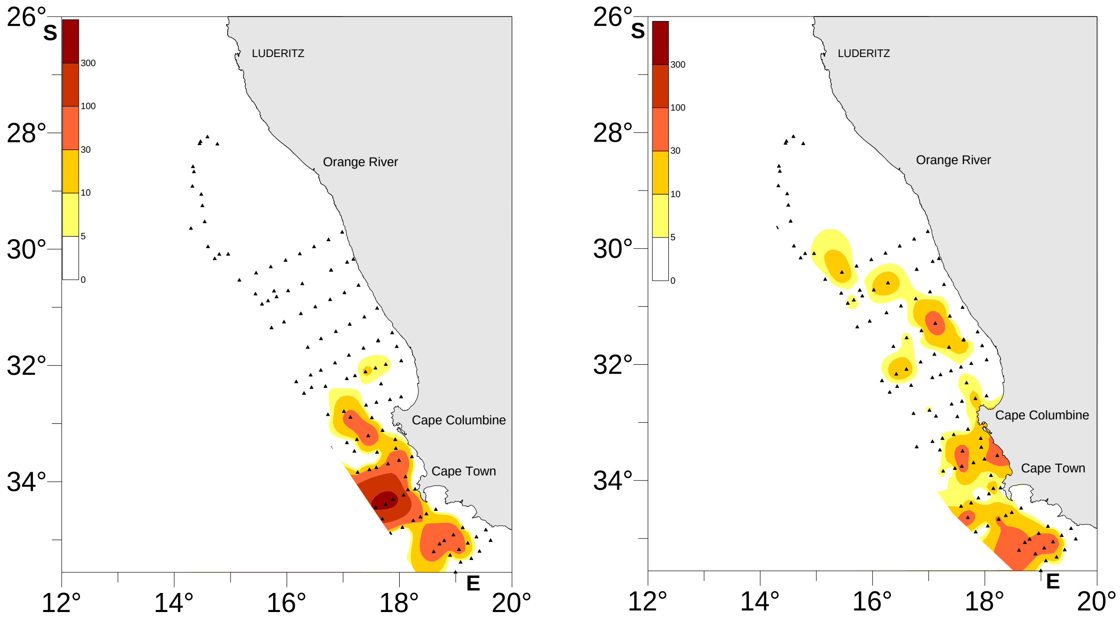

Figure 4-3: Typical distribution of hake eggs (left) and larvae (right) off the West Coast of South Africa between September and October 2005 (source: Institute of Marine Research Bergen, Norway).

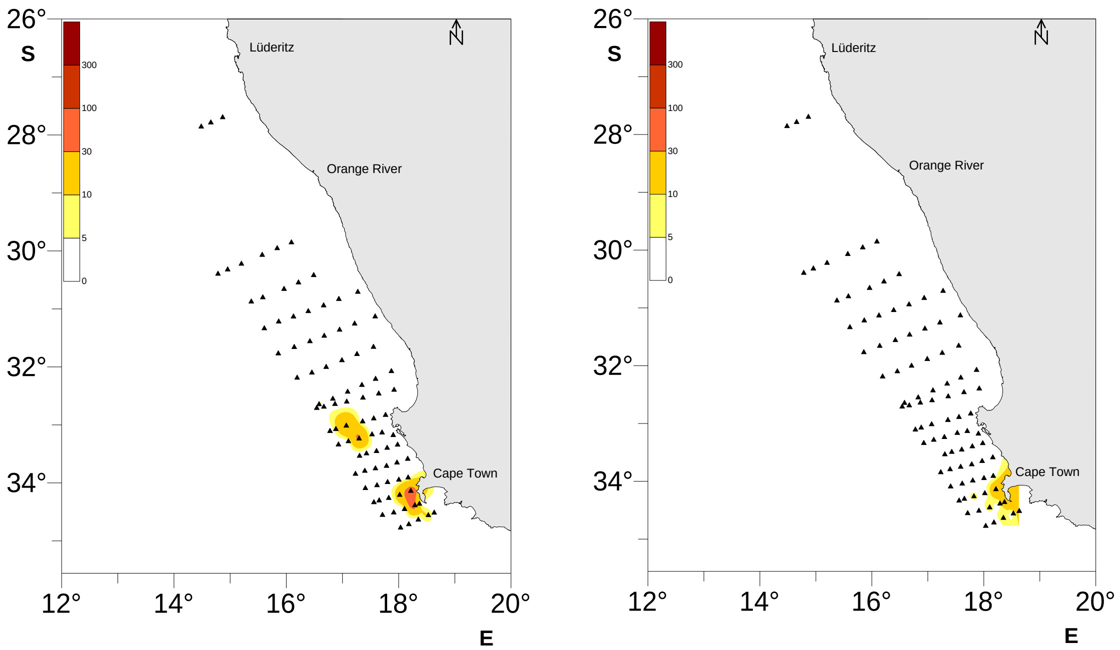

Figure 4-4: Typical distribution of hake eggs (left) and larvae (right) off the West Coast of South Africa between March and April 2007 (source: Institute of Marine Research Bergen, Norway).

4.1 Small pelagic purse-seine

The pelagic-directed purse-seine fishery targeting sardine, anchovy and to a lesser extent red-eye round herring is the largest South African fishery by volume (tons landed) and the second most important in terms of economic value. The wholesale value of catch landed by the sector during 2017 was R2.164 Billion, or 22% of the total value of all fisheries combined.

The abundance and distribution of small pelagic species fluctuates considerably in accordance with the upwelling ecosystem in which they exist (Figure 4-5). Fish are targeted in inshore waters, primarily along the West and South Coasts of the Western Cape and the Eastern Cape coast, up to a maximum offshore distance of about 100 km. In 2019 and 2020, both the sardine and anchovy management procedures required "exceptional circumstances" due the low abundance levels. This had a significant impact on the fishery operations.

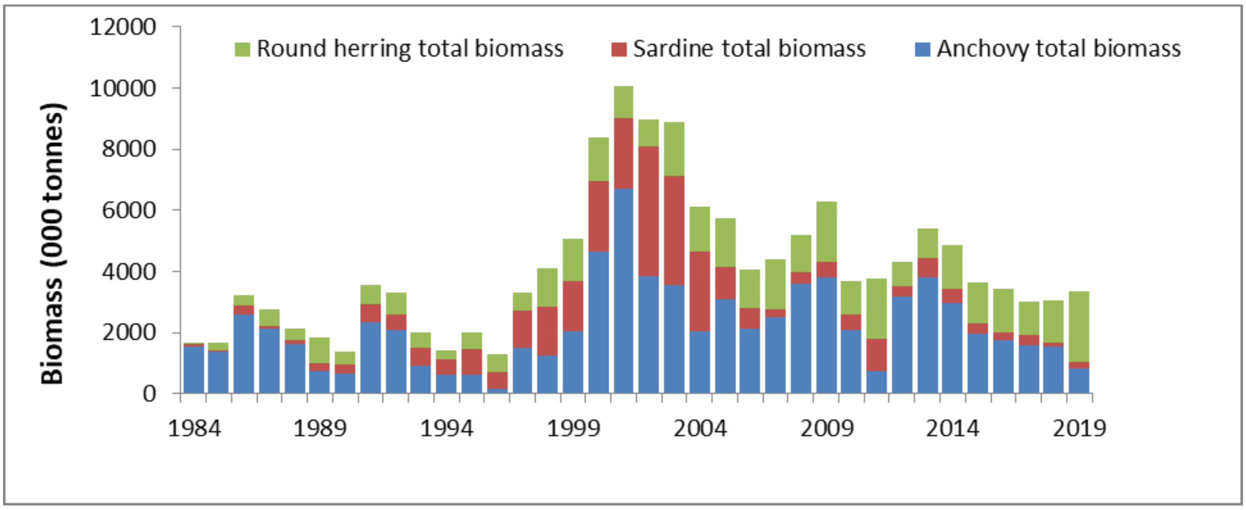

Figure 4-5: *Comparison of recruitment biomass estimated for anchovy and sardine from the DEFF July 2020 recruitment survey with the long-term average [2].*

Landings (catches) in 2019 reflected the critical state of the sardine stock (5 350 t) and anchovy 165 732 t. Total pelagic catches which includes the other bycatch species was only 226 872 t. Refer to Figure 4-6 below for the sector's annual landings of the two principle species from 1990 through to 2019. Current data (unpublished) for the fishery shows only a marginal improvement in sardine catches and an anchovy allowed catch of 350 000 t (improved on 2019).

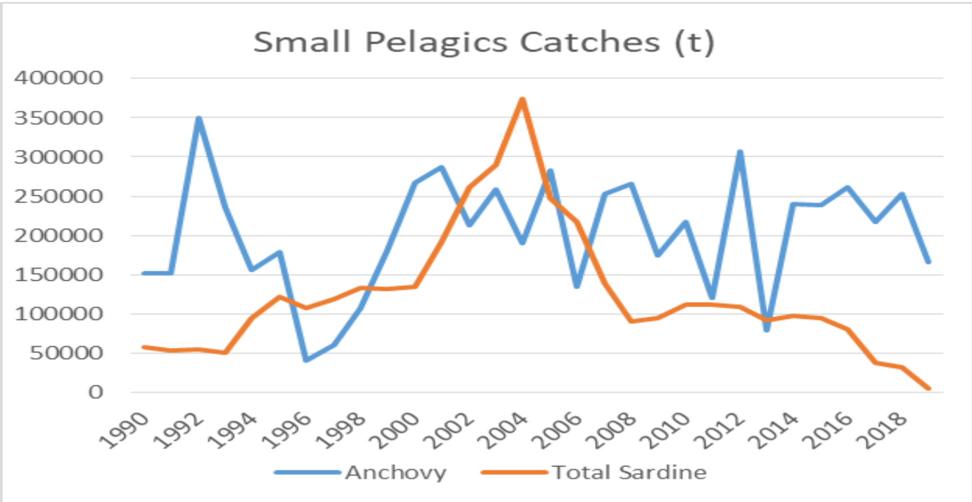

Figure 4-6: *Graph showing national catch of the main small pelagic species by the purse-seine fleet for the years 1990 to 2019.*

The majority of the small pelagic purse seine fleet operate from St Helena Bay, Laaiplek, Saldanha Bay and Hout Bay with fewer vessels operating on the South Coast from the harbours of Gansbaai, Mossel Bay and Port Elizabeth. Ports of deployment correspond to the location of canning factories and fish reduction plants along the coast. The geographical distribution and intensity of the fishery is largely

[2] Coetzee JC, Maliza L, Merkle D, Shabangu F, Peterson J, Jarvis G, Ntiyantiya D and Geja Y. 2020. Results of the 2020 pelagic recruitment survey. DFFE: Branch Fisheries Document FISHERIES/2020/JUL/SWG-PEL/56

dependent on the seasonal fluctuation and distribution of the targeted species. The sardine-directed fleet concentrates effort in a broad area extending from Lambert's Bay, southwards past Saldanha and 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 Lambert's Bay to Kleinbaai (19.5°E) and similarly the intensity of this fishery is dependent on fish availability and is most active in the period from March to September. Red-eye round herring (non-quota species) is targeted when available and specifically in the early part of the year (January to March) and is distributed from Lambert's Bay to south of Cape Point. This fishery may extend further offshore than the sardine and anchovy-directed fisheries. The fishery operates throughout the year with a short seasonal break from mid-December to mid-January. Figure 4-7 shows the species composition by month of landings over the period 2000 to 2019, as well as the average fishing effort by month.

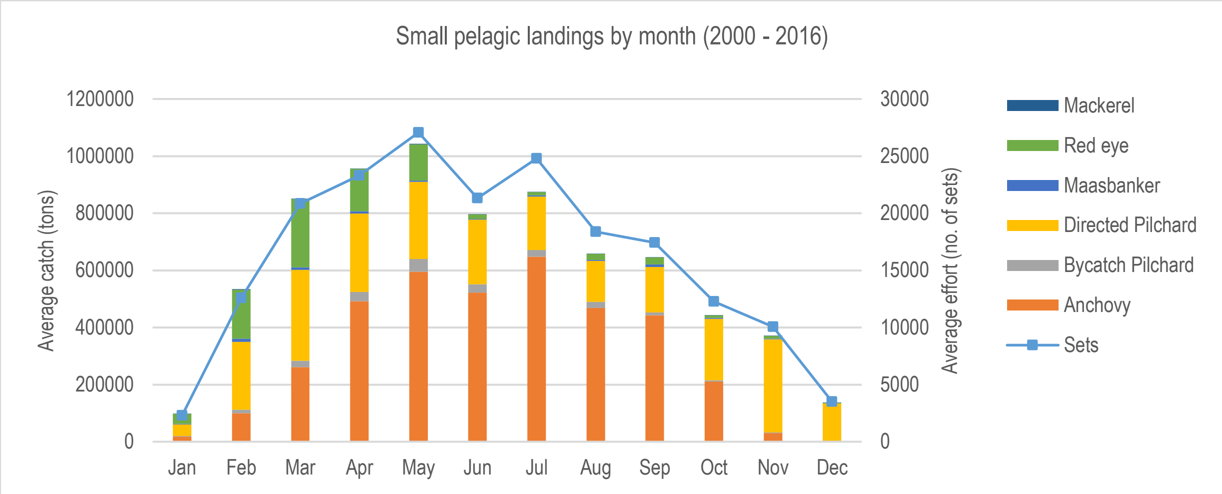

Figure 4-7: Graph showing average monthly catch (tons) and effort (number of sets) reported for the small purse-seine fleet over the period 2000 to 2016.

The fleet consists of approximately 100 wooden, glass-reinforced plastic and steel-hulled vessels ranging in length from 11 m to 48 m. The targeted species are surface-shoaling and once a shoal has been located the vessel will steam around it and encircle it with a large net, extending to a depth of 60 m to 90 m (Figure 4-8). Netting walls surround aggregated fish, preventing them from diving downwards. These are surface nets framed by lines: a float line on top and lead line at the bottom. Once the shoal has been encircled the net is pursed, hauled in and the fish pumped on board into the hold of the vessel. It is important to note that after the net is deployed the vessel has no ability to manoeuvre until the net has been fully recovered on board and this may take up to 1.5 hours. Vessels usually operate overnight and return to offload their catch the following day.

The catch and effort statistics for this sector are recorded by skippers on a grid block basis of 10 by 10 minutes. The spatial distribution of fishing effort expended by the purse-seine fleet along the west coast of South Africa and in the vicinity of the Sea Concessions is shown in Figure 4-9.

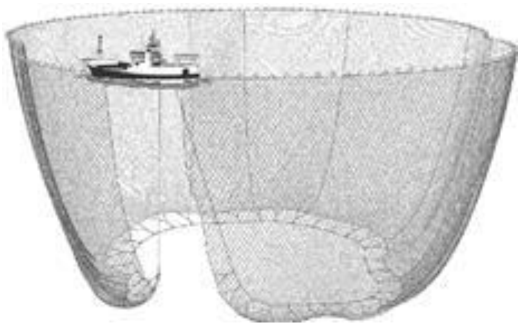

Figure 4-8: Schematic diagram showing typical configuration and deployment of a small pelagic purse-seine for targeting anchovy and sardine as used in South African waters.

Based on the best available spatial data provided by DEFF up to the 2016 year, an average of 952 hours of fishing activity (482 fishing events) per year were recorded within Sea Concessions 13C, 15C, 16C, 17C and 18C – this is equivalent to 4.6% of the overall annual effort expended by the sector[3]. Catch within the area amounted to 20 023 tons which is equivalent to 4.6% of the total average annual landings recorded by the sector. The species composition of catch within the area was recorded as predominantly anchovy (72%) and redeye round herring (18%). The remainder of the catch was comprised of sardine (9%) and juvenile horse mackerel (1%) (see Figure 4-10).

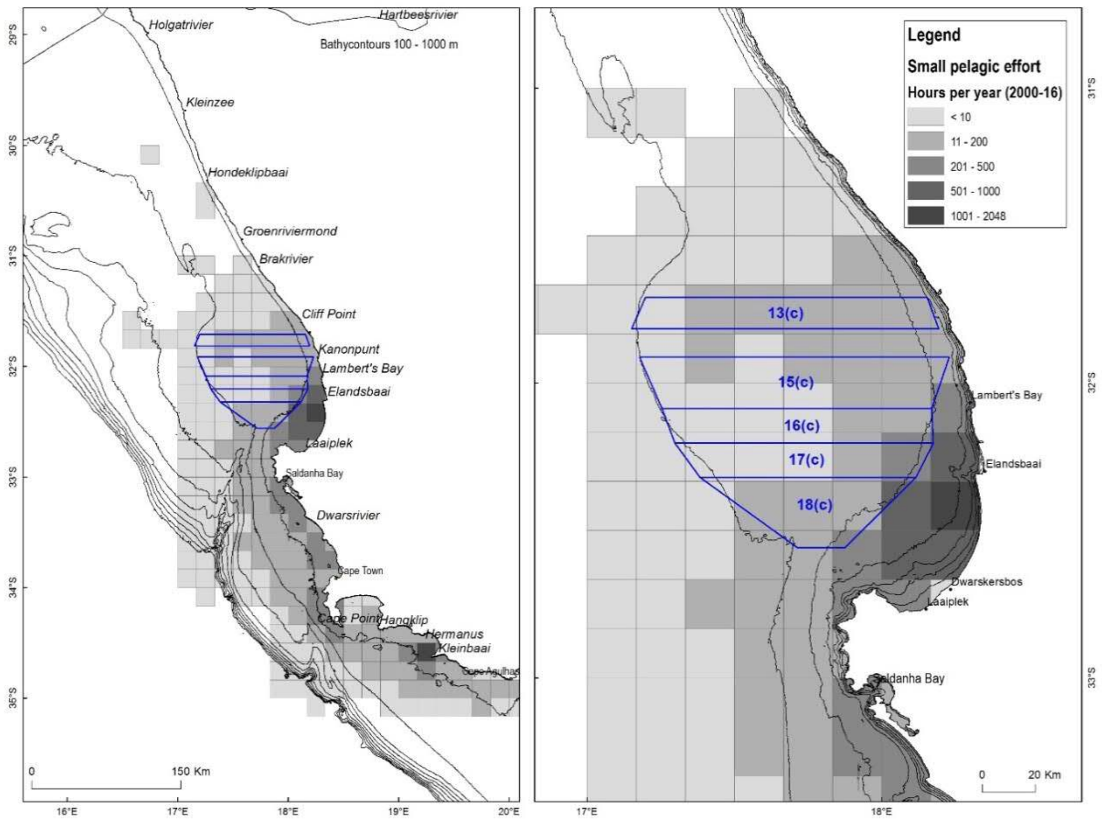

Figure 4-9: Spatial distribution of fishing grounds of the small pelagic purse-seine sector in relation to the location of Sea Concession 13C, 15C, 16C, 17C & 18C. Fishing activity is reported by 10 x 10 nautical minute grid block and average annual effort is shown for the period 2000 to 2016. Bathymetric contours are shown for 100m to 1000m (left) and 10m, 20m, 30m, 50m, 100m and 200m (right).

[3] Note: these data reflect an approximation of the pelagic fishery – more recent trends as indicated in the text reflect the expected variability of the fishery and the current status of the resources exploited.

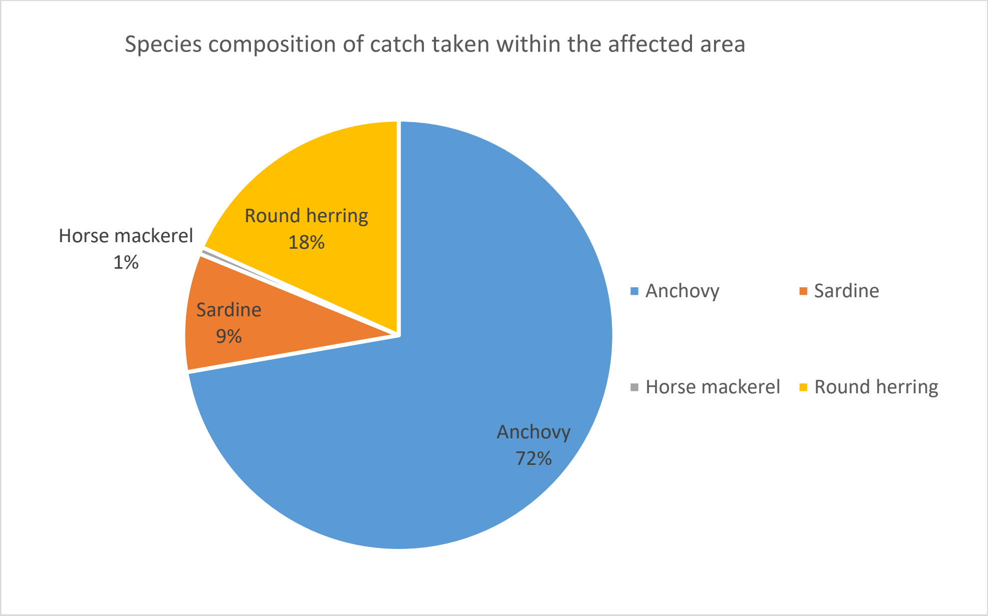

Figure 4-10: Pie chart showing the expected species composition of catch by landed weight within Sea Concession 13C, 15C, 16C, 17C & 18C over the period 2000 to 2016.

The concessions are located within what is referred to as the Cape Columbine upwelling cell, and waters are likely to be seasonally cold, nutrient rich and hosting high abundances of phytoplankton, zooplankton and ichthyoplankton (Pulfrich, 2020). The Sea Concessions overlap spawning and recruitment areas for small pelagic species as well as fishing grounds for anchovy and red-eye round herring. Figure 4-11 shows spawning areas of small pelagic species in relation to the Sea Concessions and Figure 4-12 displays the abundance of anchovy recruits as measured in the most recent 2020 pelagic recruitment survey undertaken by DEFF (refer to Section 4.12 for an overview of fisheries research survey activity).

Industry has noted with concern that the activities proposed by BPT127 coincide with productive fishing grounds for anchovy and red-eye round herring and have objected to the application based on potential adverse environmental impacts and possible disruption to the West Coast pelagic fishery (refer to Appendix A).

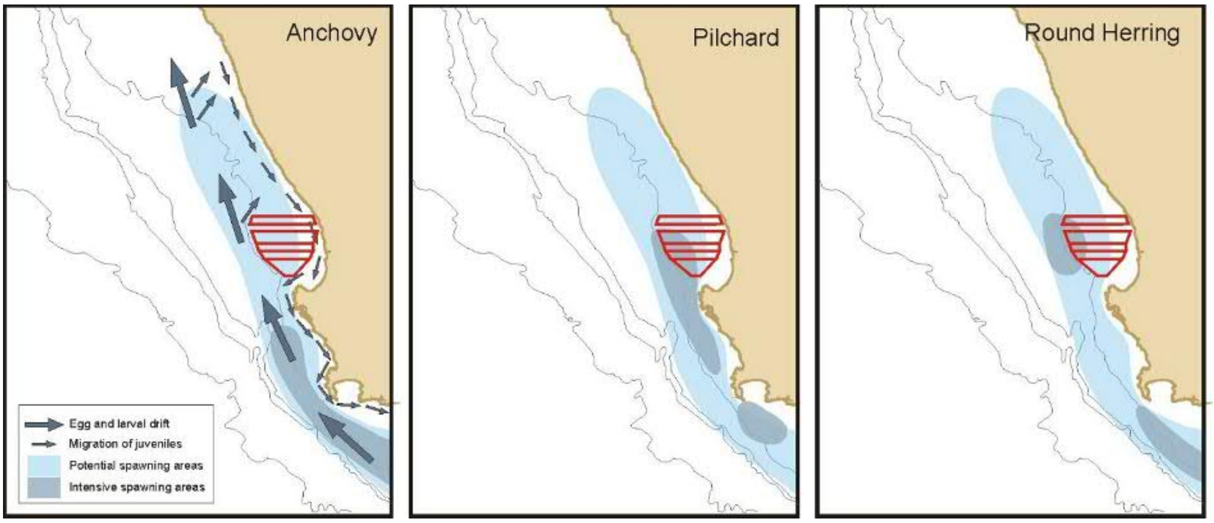

Figure 4-11: Sea Concession 13C, 15C, 16C, 17C & 18C (red polygon) in relation to major spawning areas of small pelagic species in the southern Benguela region (Source: Pisces 2020 adapted from Cruikshank 1990).

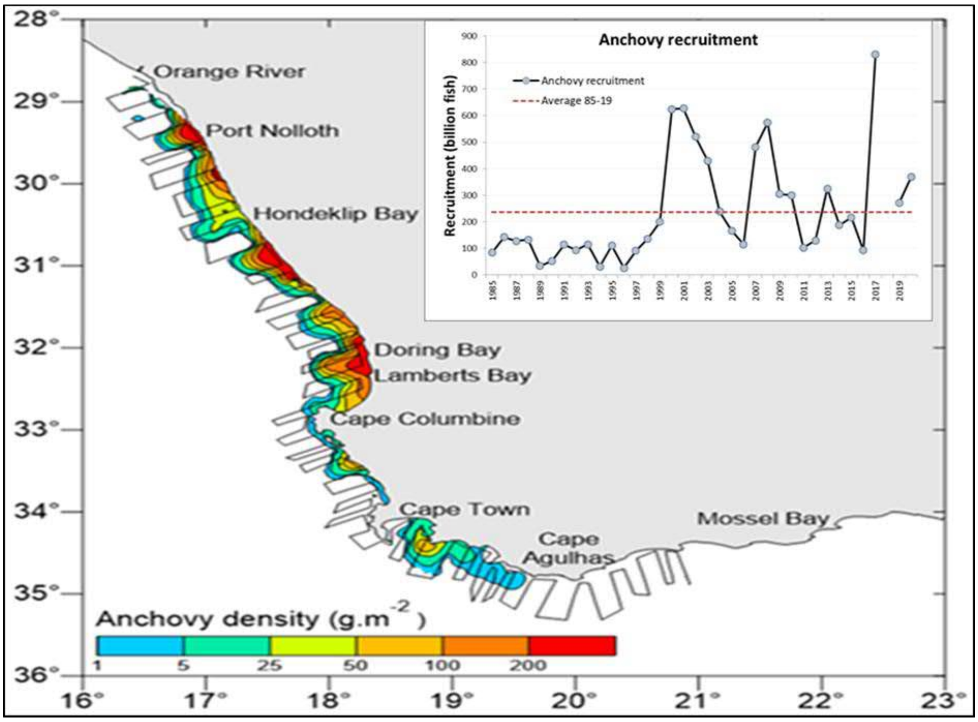

Figure 4-12: Recruitment survey results (May 2020) for anchovy and recruitment trend (inset). The red dotted line is the running average level of recruitment since 1985 and is used as one of the stock status indicators (information and figure provided by J. Coetzee and D. Merkel of DEFF)

4.2 Demersal trawl

South Africa's primary fisheries in terms of highest economic value are the trawl and long-line sectors targeting Cape hakes (*Merluccius paradoxus* and *M. capensis*). Secondary species include a large assemblage of demersal fish of which monkfish (*Lophius vomerinus*), kingklip (*Genypterus capensis*) and snoek (*Thyrsites atun*) are the most commercially important. The wholesale value of catch landed by the demersal trawl sector during 2017 was R3.982 Billion, or 40.5% of the total value of all South African fisheries combined. Nominal catch amounted to 145 088 tons during 2018 and currently (2020) approximates 140 000 t. The demersal trawl fishery comprises an offshore and inshore fleet, which differ primarily in terms of vessel capacity and the areas in which they operate.

Approximately 45 offshore vessels operate from most major harbours on both the West and South Coasts. Trawlers target fish at an approximate depth range of 300 m to 1 000 m with fishing grounds extending in an almost continuous band along the shelf edge from the Namibian maritime border in the north to Port Elizabeth in the East. The inshore fleet comprises approximately 30 vessels which operate off the South Coast from the harbours of Mossel Bay and Port Elizabeth. Sole and hake are targeted on the Agulhas Bank and eastward towards the Great Kei River at a depth range of 50 m to 80 m and 100 m to 160 m, respectively. Figure 4-13 shows the demersal trawling grounds in relation to Concession 13C, 15C, 16C, 17C & 18C. The 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. In the vicinity of the concession area, demersal trawling is centred along the 500 m bathymetric contour but ranges to 300 m and to 200 m in places. There is no direct overlap between trawling grounds and Concession 13C, 15C, 16C, 17C and 18C, which are situated at least 16 km from the designated footprint of trawling ground. The concession area does however, as with small pelagic stocks, coincide with spawning and recruitment areas for hake and other demersal species.

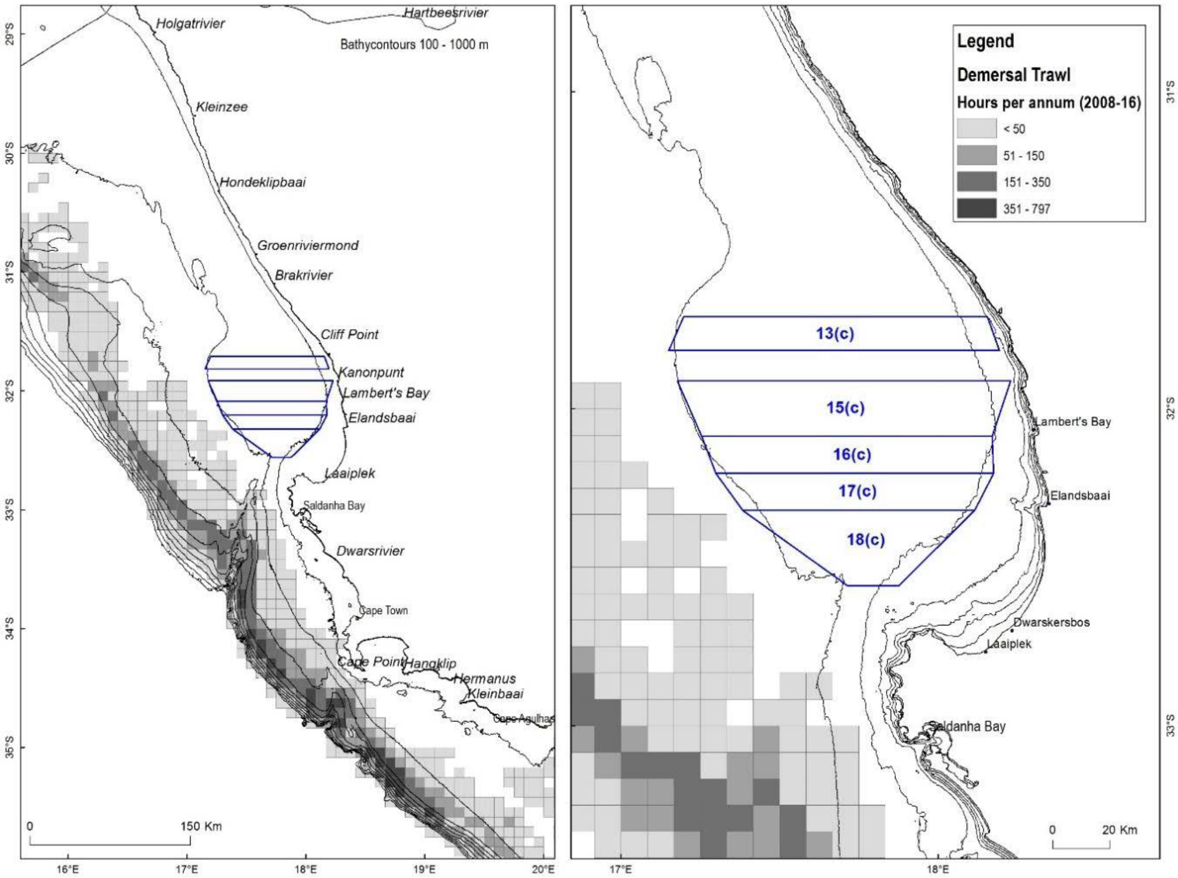

Figure 4-13: Spatial distribution of fishing grounds of the demersal trawl sector in relation to the location of Sea Concession 13C, 15C, 16C, 17C & 18C. Fishing activity is shown at a grid block resolution of 5 x 5 nautical minutes and average annual effort is shown for the period 2008 to 2016.

4.3 Demersal longline

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. In 2017, 8 113 tons of catch was landed with a wholesale value of R319.2 Million, or 3.2% of the total value of all fisheries combined. Landings of 8 230 tons were reported in 2018 and the proportion of the hake allowable catch remains fairly constant at this level. Currently 64 hake-directed longline vessels are active within the fishery, most of which operate from the harbours of Cape Town and Hout Bay. The targeting of demersal sharks (soupfin and smoothhound shark) by longline is managed as a separate sector.

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 4-14 for schematic of gear configuration). 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. Since the top-line (polyethylene, 10 – 16 mm diameter) is more buoyant than the bottom line, it is raised off the seafloor and minimizes the risk of snagging or fouling. The purpose of the top-line is to aid in gear retrieval if the bottom line breaks at any point along the length of the line. 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. Long-line vessels vary in length from 18 m to 50 m and remain at sea for four to seven days at a time.

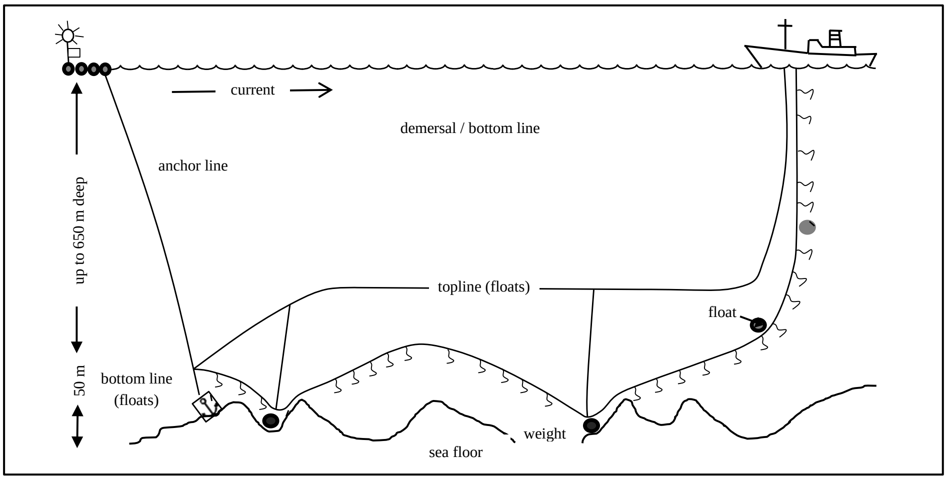

Figure 4-14: *Typical configuration of demersal long-line gear used in the South African hake-directed fishery (after Japp, 1989).*

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). Lines are set parallel to bathymetric contours and to a maximum depth of 1 000 m in places. Figure 4.14 shows demersal longline grounds in relation to Concession 13C, 15C, 16C, 17C & 18C. 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. Fishing activity reported between 2000 and 2017 shows minimal amounts of fishing activity within the Sea Concessions amounting to 23 000 hooks (or two set lines) per year resulting in 5.1 tons of hake catch. This is equivalent to 0.06% of the overall national catch landed by the sector. Although not situated in a priority fishing ground for hake, the concession area does overlap spawning and recruitment areas for hake and other demersal species.

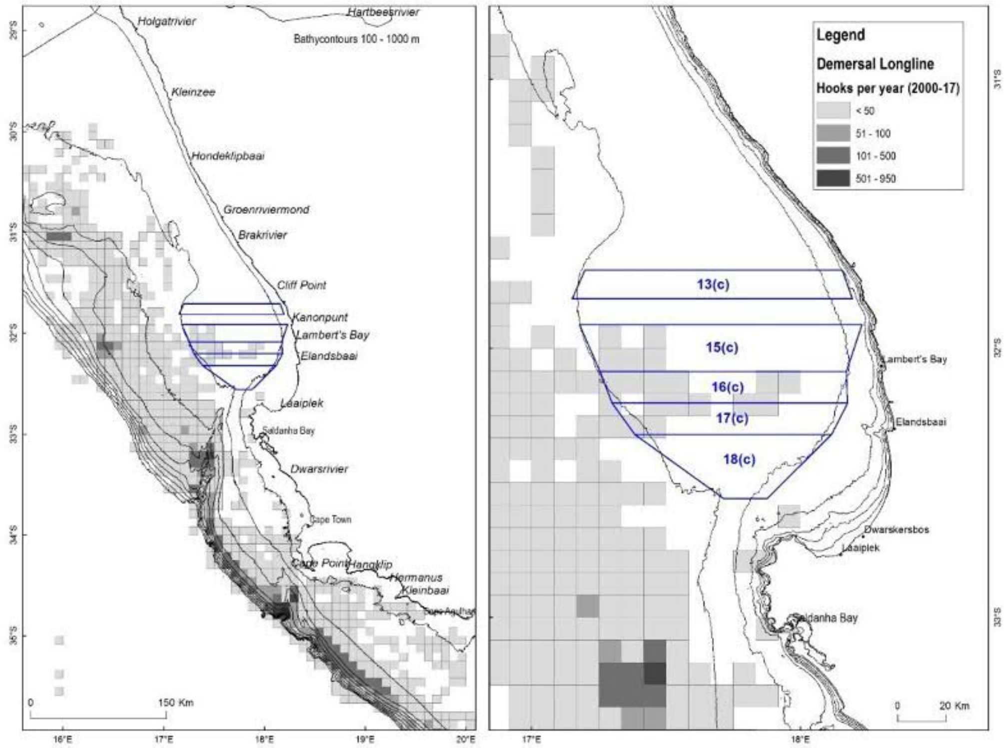

Figure 4-15: *Spatial distribution of fishing effort expended by the demersal longline sector (2000 – 2017) in relation to Sea Concession 13C, 15C, 16C, 17C & 18C. Bathymetric contours are shown for 100 m to 1000 m (left) and 10 m, 20 m, 30 m, 50 m, 100 m and 200 m (right).*

4.4 Large pelagic fisheries

Migratory tuna are caught on the high seas and seasonally within the South African Exclusive Economic Zone (EEZ) by longline and pole fisheries (note: we separate the Tuna fisheries in this assessment between longline and pole as they target different species). Targeted species include albacore (*Thunnus alalunga*), bigeye tuna (*T. obesus*), yellowfin tuna (*T. albacares*) and swordfish (*Xiphias gladius*). Since tuna, tuna-like species and billfishes are migratory stocks, they are managed as a shared resource amongst various countries under the jurisdiction of the International Commission for the Conservation of Atlantic Tunas (ICCAT) and the Indian Ocean Tuna Commission (IOTC). Note also that spatial data for these fisheries has relatively poor discrimination with catches mostly reported in 1^0 Grids i.e 60'x60'.

4.4.1 Longline

In the 1970s to mid-1990s the fishery was exclusively operated by Asian fleets (up to 130 vessels) under bilateral agreements with South Africa. From the early 1990s these vessels were banned from South African waters and South Africa went through a period of low fishing activity as fishing rights issues were resolved. Thereafter a domestic fishery developed and 50 fishing rights were allocated to South African companies only. Rights holders now include a small fleet of local longliners although the fishery is still undertaken primarily with Japanese vessels fishing in joint ventures with South African companies. There are currently 30 commercial large pelagic fishing rights issued and 21 active vessels. The fishery operates extensively within the South African EEZ, primarily along the continental shelf break and further offshore. Figure 4-16 shows the spatial distribution of fishing activity in the South African EEZ and in relation to Concession 13C, 15C, 16C, 17C & 18C.

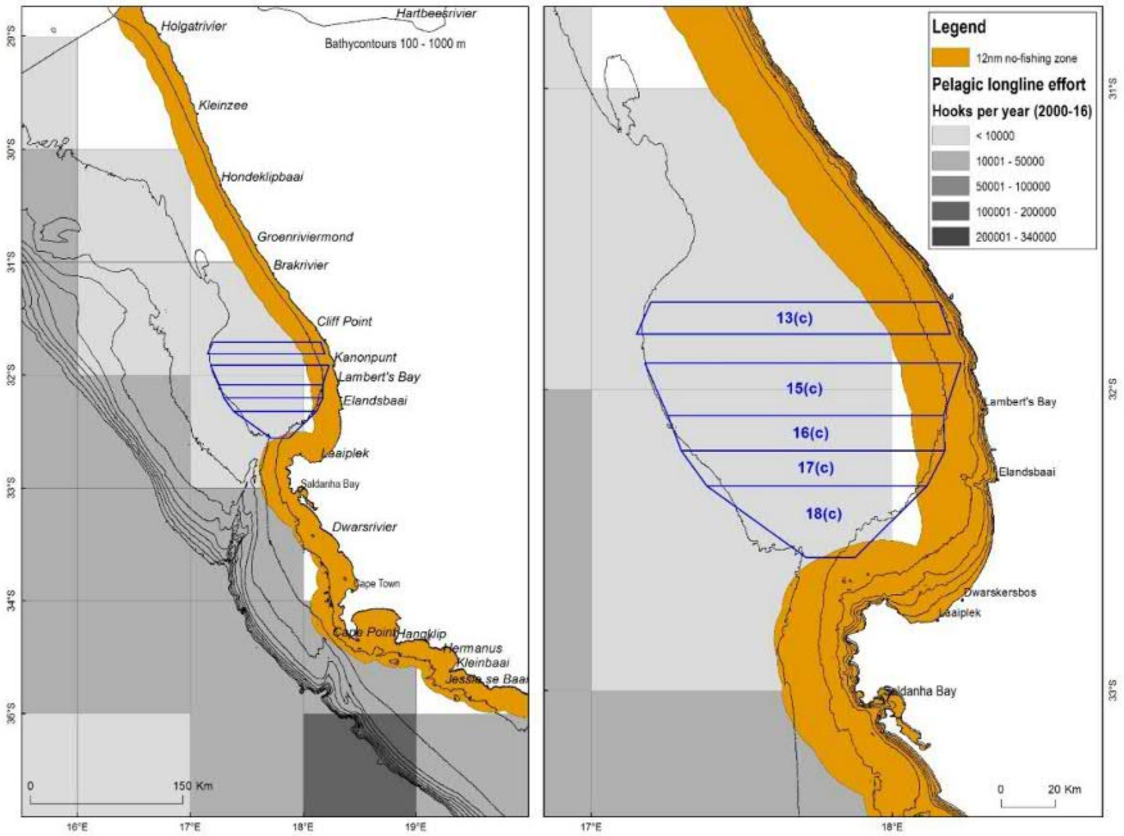

Figure 4-16: Spatial distribution of fishing grounds of the large pelagic longline sector in relation to the location of Sea Concession 13C, 15C, 16C, 17C & 18C. Fishing activity is shown at a grid block resolution of 60 x 60 nautical minutes (due to the spatial extent covered by drifting longline gear) and average annual effort is shown for the period 2000 to 2016. The bathymetric contours shown are 100 m to 1000 m (left) and 10 m, 20 m, 30 m, 50 m, 100 m and 200 m (right).

Vessels operate predominantly from the shelf break and into deeper waters and are prohibited from operating within 12 nm of the coastline (or within 20 nm of the coastline off KwaZulu-Natal). In the vicinity of Concession 13C, 15C, 16C, 17C & 18C, vessels operate along and offshore of the shelf break, which is situated about 80 km offshore of the concession area. Although there have been indications of minimal fishing activity within the Sea Concessions, it is highly unlikely that these reported positions are accurate.

4.4.2 Tuna pole

Poling for tuna is predominantly based on the southern Atlantic longfin tuna stock also referred to as albacore (*T. alalunga*). Other catch species include yellowfin tuna, bigeye tuna, skipjack tuna (*Katsuwonus pelamis*), snoek and yellowtail. The South African fleet is currently comprised of 128 vessels based at the ports of Cape Town, Hout Bay and Saldanha Bay. Fishing occurs along the entire West Coast, along the shelf break and beyond the 200 m isobath. Targeted fishing areas are situated north of Cape Columbine and between 60 km and 120 km offshore from Saldanha Bay and the Cape Canyon. Within southern Namibian waters albacore is targeted at Tripp Seamount, located south of Lüderitz. The fishery is seasonal with vessels active predominantly between November and May and peak catches recorded from November to January. Effort fluctuates according to the availability of fish in the area, but once a shoal of tuna is located a number of vessels will move into the area and target a single shoal which may remain in the area for days at a time.

Figure 4-17 shows the spatial distribution of fishing activity off the West Coast of South Africa and in relation to Concession 13C, 15C, 16C, 17C & 18C. Although the main targeted fishing grounds off the West Coast are situated to the west and south of the concession area, there are records of fishing activity which coincide with the concession area which is most likely due to vessels fishing en route to favoured grounds off Tripp Seamount on the Namibian side of the maritime border.

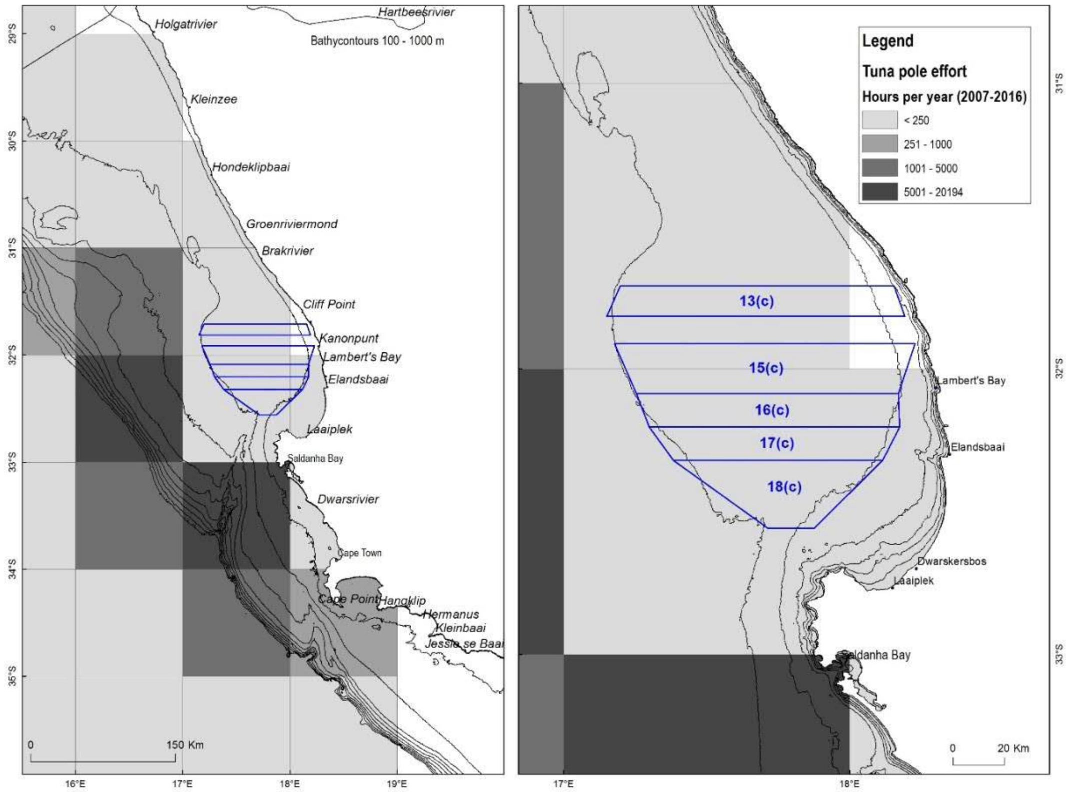

Figure 4-17: Spatial distribution of fishing grounds of the tuna pole sector in relation to the location of Sea Concession 13C, 15C, 16C, 17C & 18C. Fishing activity is shown at a grid block resolution of 60 x 60 nautical minutes and average annual effort is shown for the period 2007 to 2016. The bathymetric contours shown are 100 m to 1000 m (left) and 10 m, 20 m, 30 m, 50 m, 100 m and 200 m (right).

Over the period 2007 to 2016, an average of 238 fishing hours were reported within the concession area per year with a cumulative catch of 15.1 tons of albacore over this period. This is equivalent to 0.6% of the total albacore landed by the sector (nationally) over this period. Note that for Tuna pole specifically, the target species (longfin tuna) is reported to move systematically northwards from the southern Benguela into the northern Benguela into the waters of southern Namibia. This annual movement of albacore tuna is typical of this and other species of tuna. There is no evidence however to suggest that in the nearshore environment in the concession area that these tuna migrations occur or that if they do there will be a disruption of the tuna pole fishing operations. There is therefore no expected overlap of the concession area with spawning and recruitment areas of large pelagic species.

4.5 Traditional line fishery

The line fishery is divided into the commercial and recreational sectors, with the subsistence sector now falling under the classification of small-scale fishing (see Section 4.8). The commercial (or traditional) line fishery is the country's third most important fishery in terms of total tons landed and economic value. It is a long-standing, nearshore fishery based on a large assemblage of different species. Within the Western Cape the predominant catch species is snoek (*Thyrsites atun*) while other species such as Cape bream (hottentot) (*Pachymetopon blochii)*, geelbek (*Atractoscion aequidens)*, kob (*Argyrosomus japonicus)* and yellowtail (*Seriola lalandi)* are also important. Towards the East Coast the number of catch species increases and includes resident reef fish (Sparidae and Serranidae), pelagic migrants (Carangidae and Scombridae) and demersal migrants (Sciaenidae and Sparidae). The fishery operates along almost the entire coastline (excluding certain protected areas) from Port Nolloth on the West Coast to Cape Vidal on the East Coast (see Figure 4-18).

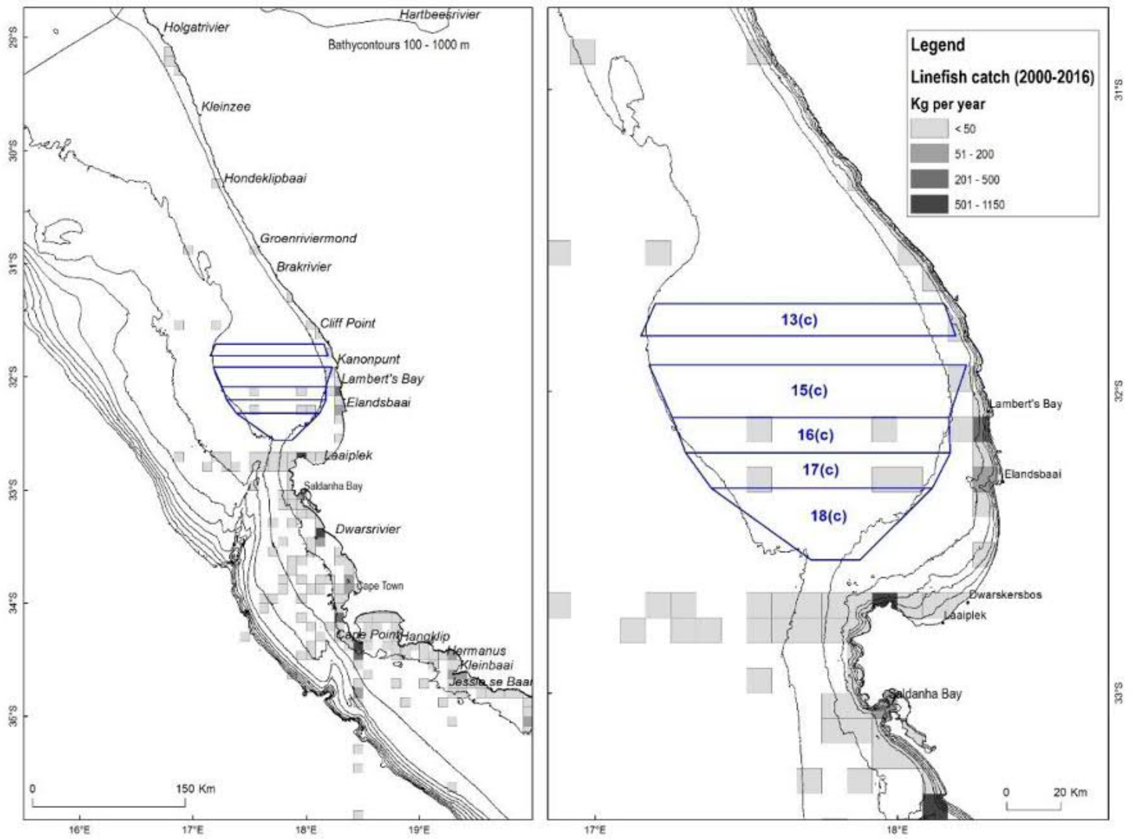

Figure 4-18: Spatial distribution of fishing effort expended by the South African traditional linefish sector (2000 – 2016) in relation to Sea Concession 13C, 15C, 16C, 17C & 18C. The bathymetric contours shown are 100 m to 1000 m (left) and 10 m, 20 m, 30 m, 50 m, 100 m and 200 m (right).

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 (DEFF 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).

Effort is managed geographically with the spatial effort of the fishery divided into three zones. Most of the catch (up to 95%) is landed by the Cape commercial fishery, which operates on the continental shelf from the Namibian border on the West Coast to the Kei River in the Eastern Cape. Sea Concession 13C, 15C, 16C, 17C & 18C coincides with linefish management Zone A which extends from the Namibian border to Cape Infanta. Fishing vessels generally range up to a maximum offshore distance of about 70 km, although fishing at this outer limit and beyond is sporadic (C. Wilke, pers. comm).

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 linefish species for subsistence purposes is now managed under South Africa's small-scale fishery policy which was implemented in 2016 (DEFF 2016). Fishing activity is reported by landing point. In the vicinity of Sea Concession 13C, 15C, 16C, 17C & 18C, Lambert's Bay is the closest landing point.

Over the period 2000 to 2016, an average of 392 tons per year were reported for the area which is equivalent to ~ 4.3% of the overall national landings of the sector. 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 across the extent of Sea Concession 13C, 15C, 16C, 17C & 18C.

4.6 West coast rock lobster

The West Coast rock lobster *Jasus lalandii* is a valuable resource of the South African West Coast and consequently an important income source for West Coast fishermen. Following the collapse of the rock-lobster resource in the early 1990s, fishing has been controlled by a Total Allowable Catch (TAC), a minimum size, restricted gear, a closed season and closed areas (Crawford *et al.* 1987, Melville-Smith *et al.* 1995). The fishery is divided into an offshore sector comprised of trap boats that operate at a depth range of approximately 30 m to 100 m and a near-shore sector which makes use of hoopnets to a maximum fishing depth of about 30 m. The resource is managed geographically, with TACs set annually for different management areas. The fishery operates seasonally, with closed seasons applicable to different management zones. Figure 4-19 and Figure 4-20 show a summary of the overall national catch and effort data by fishing season and month, respectively. Note that the most recent data up to 2019 has not been provided at this point in time – the catch trend post 2016 is however relatively unchanged as the number of rights holders (fishers) has not changed. What is more pertinent however is that the resource stock status has declined and the West Coast Rock Lobster Stock is deemed to be severely overexploited. The lobster stocks that are above the legal limit are now below 2% (down from 3.5% in 2012) of pristine levels (98% depleted)[4].

The areas fished by bakkies (using hoopnets) in the vicinity of Sea Concession 13C, 15C, 16C, 17C & 18C are shown in Figure 4-21 and the areas fished by trapboats are shown in Figure 4-22. The Sea Concession areas falls within Zone B, Management Area Lamberts Bay and Elands Bay where, over the period 2006 to 2017 the trap boat sector landed 95.4 tons (6.1% of their total catch). It is likely; however, that the majority of the catch was taken in shallower waters, inshore of the Concession Areas.

[4] Note: As reported by DEFF to the parliamentary portfolio committee in November 2020

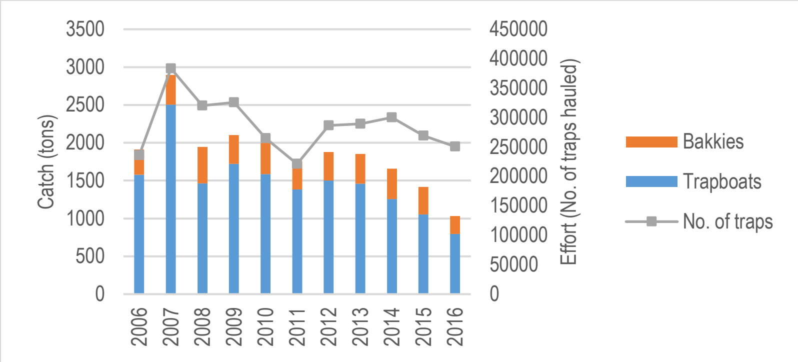

Figure 4-19: *Graph showing national catch recorded by the west coast rock lobster sectors for the period 2006 to 2016. Annual effort expenditure is indicated as the number of traps hauled.*

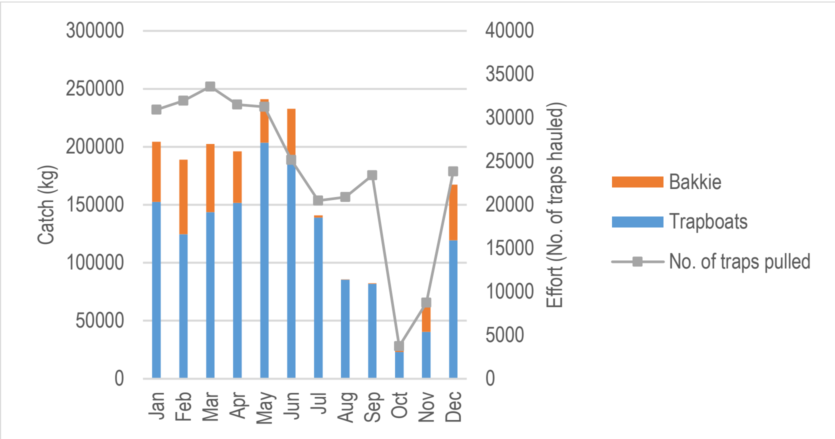

Figure 4-20: *Graph showing average monthly catch (kg) and effort (number of traps hauled) reported by the trapboat and bakkie sectors for west coast rock lobster over the period 2006 to 2016.*

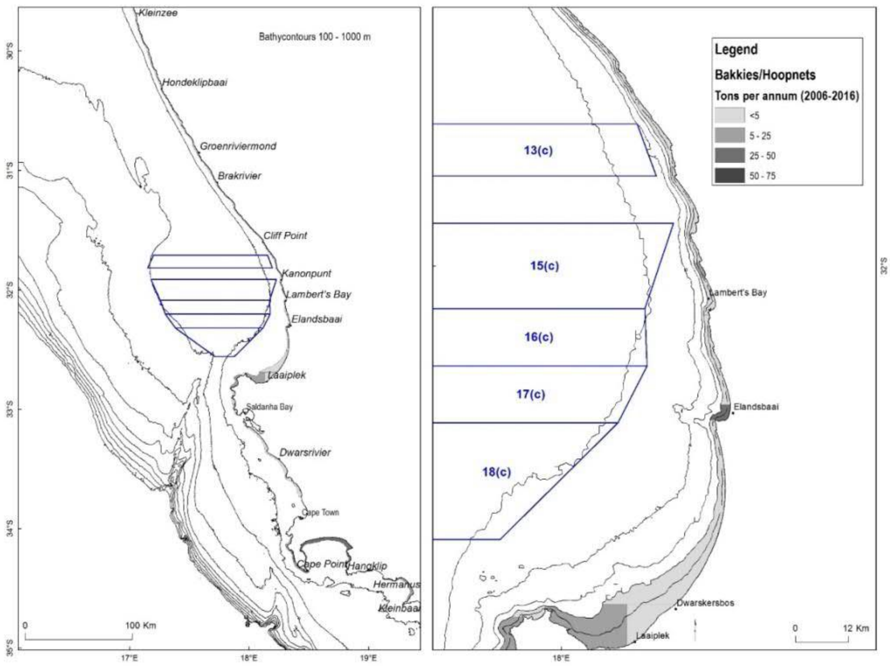

Figure 4-21: *Average catch per season (tons whole weight) of Jasus lalandii recorded by the nearshore (bakkie) sector for the years 2006 to 2016. Catch is shown by management subarea in relation to Sea Concession 13C, 15C, 16C, 17C & 18C. The bathymetric contours shown are 100m to 1000m (left) and 10m, 20m, 30m, 50m, 100m and 200m (right).*

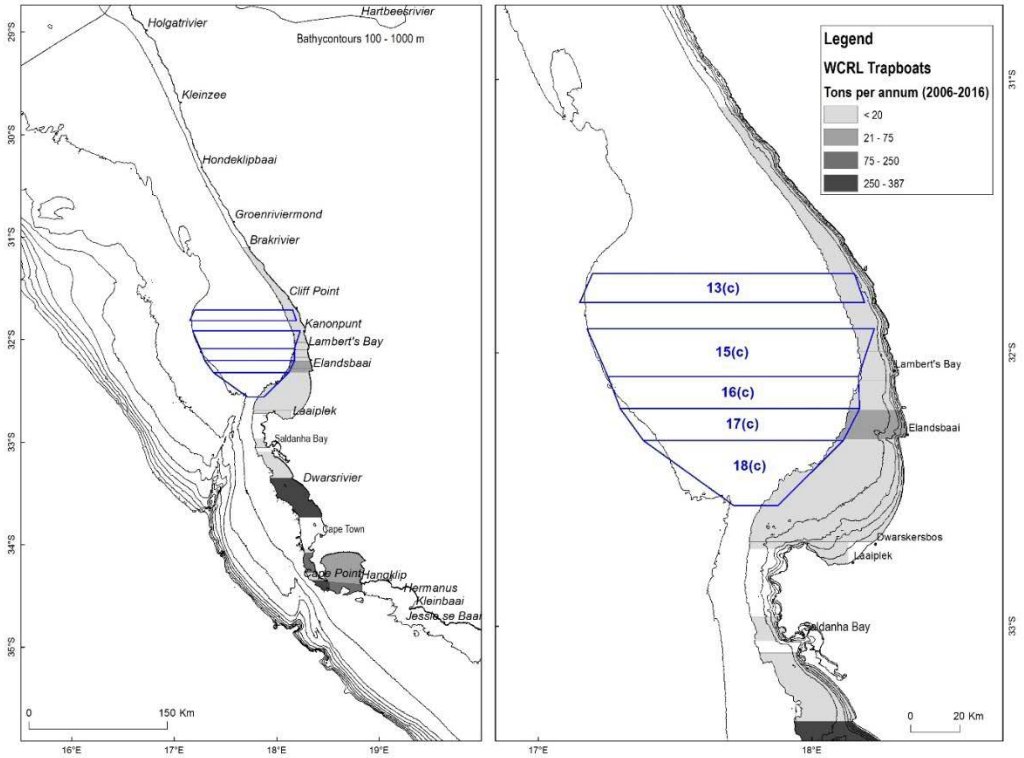

Figure 4-22: Average catch per season (tons whole weight) of Jasus lalandii recorded by the nearshore (Trapboats) sector for the years 2006 to 2016. Catch is shown by management subarea in relation to Sea Concession 13C, 15C, 16C, 17C & 18C. The bathymetric contours shown are 100 m to 1000 m (left) and 10 m, 20 m, 30 m, 50 m, 100 m and 200 m (right).

4.7 Abalone ranching

The Abalone *Haliotus midae*, is endemic to South Africa. The natural population extends along 1 500 km of coastline 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). Translocation of abalone occurs along roughly 50 km of the Namaqualand coast in the Northern Cape due to the seeding of areas using cultured spat specifically for seeding of abalone in designated areas (ranching) (Anchor Environmental, 2012). The potential to increase this to seeded area to 175 km has been made possible through the issuing of "Abalone Ranching Rights" (Government Gazette, 20 August 2010 No. 729) in four concession zones for abalone ranching between Alexander Bay and Hondeklipbaai (Diamond Coast Abalone 2016).

H. midae inhabits intertidal and subtidal rocky reefs, with the highest densities found in kelp forests (Branch et al., 2010). 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 10m on the Namaqualand coast (Anchor Environmental, 2012).

Habitat preferences change as abalone develop. Larvae settle on encrusted coralline substrate and feed on benthic diatoms and bacteria (Shepherd and Turner, 1985). Juveniles of 3-10 mm are almost entirely dependent on sea urchins for their survival, beneath which they conceal themselves from predators such as the West Coast rock lobster (Sweijd, 2008; Tarr et al., 1996). Juveniles may remain under sea urchins until they reach 21-35 mm in size, after which they move to rocky crevices in the reef. Adult abalone remain concealed in crevices, emerging nocturnally to feed on kelp fronds and red algae (Branch et al., 2010). 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).

South Africa is the largest producer of abalone outside of Asia (Troell et al., 2006). For example, in 2001, 12 abalone farms existed, generating US$12 million at volumes of 500-800 tons per annum

(Sales & Britz, 2001). By 2006, this number had almost doubled, with 22 permits granted and 5 more being scheduled for development (Troell et al., 2006). Until recently, abalone cultivation has been primarily onshore, but abalone ranching provides more cost effective opportunities for production (Anchor Environmental, 2012).

Abalone ranching is "where hatchery-produced seed are stocked into kelp beds outside the natural distribution" (Troell et al., 2006). 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 DAFF issued rights for each of four Concession Area Zones. The Ranching Zones as designated by DEFF are shown in Figure 4-23. Zone 4 is the closest to the concession areas but is nevertheless well to the north of Concession area 13c and no impact is expected (also current ranching activities are reported to be low or negligible).

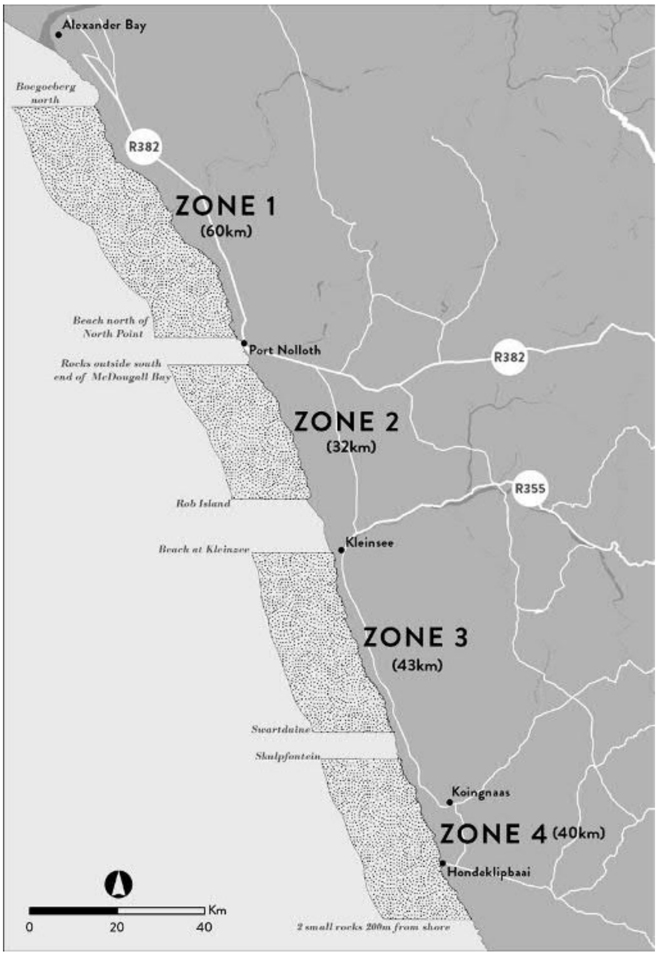

Figure 4-23. Abalone Ranching zones as designated by DEFF.

4.8 Small-scale fisheries

Small-scale fishers using traditional fishing gear have historically harvested marine resources along the coastline of South Africa for consumptive use, livelihoods, and medicinal purpose. However, this group of people was not recognised in terms of the Marine Living Resources Act and were further marginalised through commercial fishing rights allocation processes. In 2007 government was compelled to redress the inequality suffered by the small scale fishers by means of an order from the Equality Court. Through extensive consultative processes the small-scale fisheries policy was finalised in 2012 with the implementation plan approved in 2013. The small-scale fishery policy implementation plan was initiated in 2016 (DEFF 2016).

Small-scale fishers fish to meet food and basic livelihood needs, and may be directly involved in harvesting, processing and distribution of fish for commercial purposes. These fishers traditionally operate on nearshore fishing grounds, using traditional low technology or passive fishing gear to harvest marine living resources on a full-time, part-time or seasonal basis. Fishing trips are usually a single day in duration and fishing/harvesting techniques are labour intensive. The equipment used by small-scale fishers includes rowing boats in some areas, motorized boats on the south and west coast and simple fishing gear including hands, feet, screw drivers, hand lines, prawn pumps, rods with reels, gaffs, hoop nets, gill nets, seine/trek nets and semi-permanently fixed kraal traps. Distances fished from the shore are constrained by boat size and maritime safety requirements and as a general rule are not expected to be more than 3nm from the coastline.

Small-scale fishers are an integral part of the rural and coastal communities in which they reside and this is reflected in the socio-economic profile of such communities. In the Eastern Cape, KwaZulu-Natal and the Northern Cape, small-scale fishers live predominantly in rural areas while those in the Western Cape live mainly in urban and peri-urban areas. Resources are managed in terms of a community-based co-management approach that aims to ensure that harvesting and utilisation of the resource occurs in a sustainable manner in line with the ecosystems approach.

The small-scale fisheries policy proposes that certain areas on the coast be prioritized and demarcated as small-scale fishing areas. In some areas access rights could be reserved exclusively for use by small-scale fishers. The community, once they are registered as a community-based legal entity, could apply for the demarcation of these areas and should conflict arise, it should be referred to conflict resolution under the Policy. The policy also requires a multi-species approach to allocating rights, which will entail allocation of rights for a basket of species that may be harvested or caught within particular designated areas. DEFF recommends five basket areas: 1. Basket Area A – The Namibian border to Cape of Good Hope – 57 different resources 2. Basket Area B – Cape of Good Hope to Cape Infanta – 109 different resources 3. Basket Area C – Cape Infanta to Tsitsikamma – 107 different resources 4. Basket Area D – Tsitsikamma to the Pondoland MPA – 138 different resources 5. Basket Area E – Pondoland MPA to the Mozambican border – 127 different resources. The communities as designated into cooperatives are shown in Figure 4-24 and extracted from the DEFF lists for the Saldanha Bay to Port Nolloth area in Table 4-2.

Those SSF communities that are in process of, or have formed, cooperatives adjacent to the concession area are indicated in Table 4-2 below (source: DEFF). Note that the main SSF cooperatives that might be impacted are in the Lamberts Bay area as shown in Figure 4-24. Sea Concession 13C, 15C, 16C, 17C & 18C falls within the area demarcated as Basket Area A, with 623 fishers registered with the relevant local municipalities of Berg River, Saldanha Bay, Cederberg and Matzikama. These are the closest access points for participants in the small-scale fishing sector.

To the north of the concession areas there are 2 cooperatives in the Port Nolloth area and to the south there are also cooperatives in the Saldanha Bay area, but these are not considered relevant to this assessment as they are outside of the potential impacted area. Nevertheless, as the SSF implementation is currently in process, there is no certainty as to the extent and modus operandi of these cooperatives[5].

[5] Note this assessment has prepared Figure 4-25 to support this assessment – there is no as yet official designation by DFFE of active SSF cooperatives and it is premature to assume areas of overlap with the concession areas.

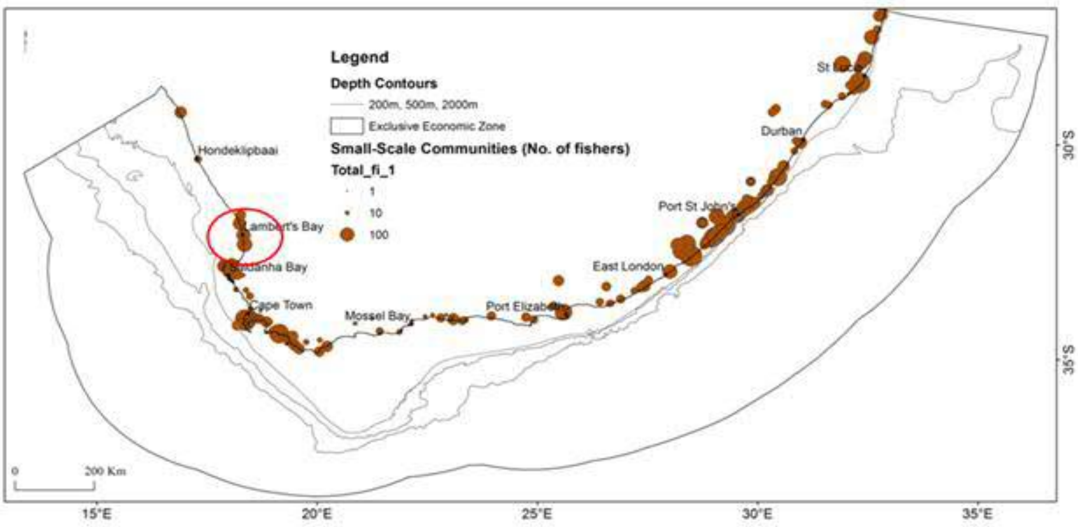

Figure 4-24. Designated Small Scale Fishery cooperatives around the South African coast. The specific area adjacent to the concession area is demarcated (red circle). Note the scale (Total) and the size of the bubbles refers to the relative numbers of SS fishers in each designated area

Table 4-2. Table of small scale fishery cooperatives adjacent to the concession area (extract from DEFF, 2020)

environment, forestry & fisheries

Department: Environment, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

local Municipality	Sub total	Community	Nearest Town	Total fishers
Berg rivier	30	Velddrif	Saldanha bay	30
Saldanha bay	384	Steenberg's Cove	Saldanha bay	21
		pneusbaai/Columbine/Duyker Isl	Saldanha bay	21
		Langebaan	Saldanha bay	38
		Vredenberg	Saldanha bay	43
		Paternoster	Saldanha bay	100
		Saldanha Bay	Saldanha bay	50
		Saldanha Bay, White City	Saldanha Bay	2
		Sandy Point	Saldanha Bay	1
		Yzerfontein	Saldanha Bay	16
		Laingville	Saldanha bay	92
Cederberg	221	Lamberts Bay	Lamberts Bay	103
		Elandsbaai	Lamberts Bay	118
Matzikama	158	Lutzville wes	Doringbaai	1
		Doringbaai	Lamberts Bay	88
		Ebenheaser	Lamberts Bay	58
		Papendorp	Doringbaai	11
Swartland	17	Darling	City of Cape Town	17
Saldanha bay	10	Hopefield	City of Cape Town	10
Richtersveld	75	Port Nolloth	Port Nolloth	75
Kamiesberg	28	Hondeklipbaai	Port Nolloth	28
	923			923

4.9 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 utilize 1 373 registered and 458 illegal 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*). Catch-per-unit-effort declines eastwards from 294 and 115 kg·net-day^{-1} for the beach-seine and gill-net fisheries respectively off the West Coast to 48 and 5 kg·net-day^{-1} off KwaZulu-Natal. Consequently, the fishery changes in nature from a largely commercial venture on the West Coast to an artisanal/subsistence fishery on the East Coast (Lamberth *et al*. 1997).

The fishery is managed on a Total Allowable Effort (TAE) basis with a fixed number of operators in each of 15 defined areas (see Table 4-3 for the number of rights issued and Figure 4-25 for the fishing areas). The number of Rights Holders for 2014 was listed as 28 for beach-seine and 162 for gill-net (DEFF, 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 linefish 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). There are currently no rights issued for Area B (Hondeklipbaai).

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).

Table 4-3: Recommended Total Allowable Effort (TAE, number of rights and exemption holders) and rights allocated in 2016-17 for each netfish area. Levels of effort are based on the number of fishers who could maintain a viable income in each area (DAFF 2017).

Area	Locality	Beach-seine	Gill/drift	Total	Rights allocated
A	Port Nolloth	3	4	7	4
B	**Hondeklipbaai** The area between Kleinsee and the security fence at Mitchell's Bay nearby the mouth of the Spoeg River.	**0**	**2**	**2**	**0**
C	Olifantsriviermond-Wadrifsoutpansmond	2	8	10	4
D	Wadrifsoutpansmond-Elandsbaai-Draaihoek	3	6	9	6
E	Draaihoek, (Rochepan)-Cape Columbine, including Paternoster	4	80	84	84
F	Saldhana Bay	1	5	6	5
G	Langebaan Lagoon	0	10	10	10
H	Yzerfontein	2	2	4	1
I	Bokpunt (Melkbos)-Milnerton	3	0	3	1
J	Houtbay beach	2	0	2	0
K	Longbeach-Scarborough	3	0	3	1
L	Smitswinkel Bay, Simonstown, Fishoek	2	0	2	2
M	Muizenberg-Strandfontein	2	0	2	2
N	Macassar*	0	0	0	(1)
OE	Olifants River Estuary	0	45	45	45

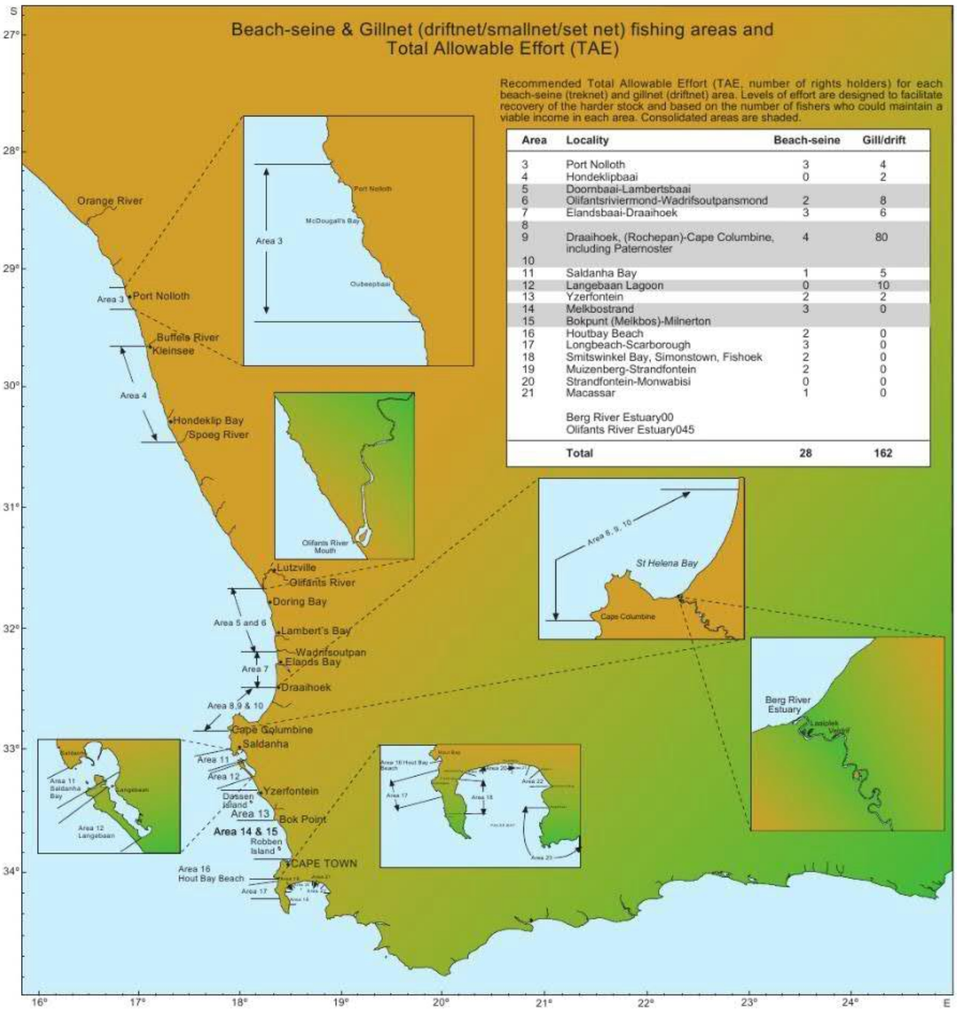

Figure 4-25: Beach-seine and gillnet fishing areas and TAE (DAFF, 2014).

Sea Concession 13C, 15C, 16C, 17C & 18C is situated offshore of management area B, however the range of gillnets (50 m) and that of beach-seine activity (20 m) does not overlap with the concession area which is situated in waters deeper than 65 m. Figure 4-26 and Figure 4-27 shows the expected range of gillnet and beach seine fishing activity in relation to the concession area, respectively. Figure 4-26 shows also that the closest proximity of the fishery is likely to only occur in Concession area 13C, but which nevertheless does not overlap and no impact is expected.

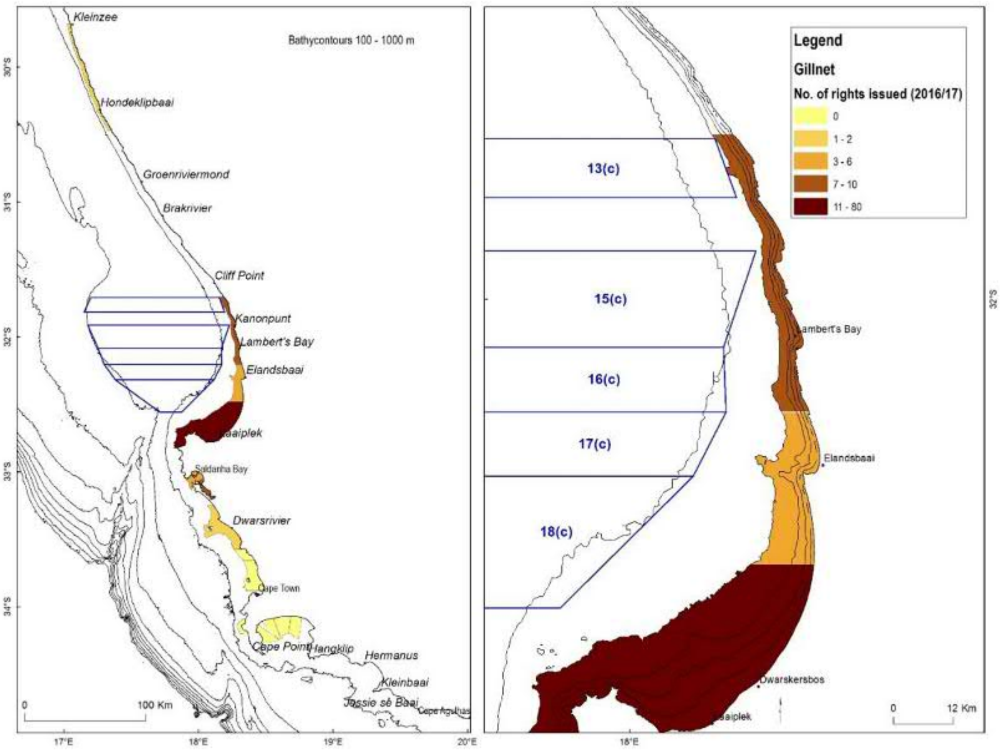

Figure 4-26: *Number of rights issued for gillnet fishing areas A and B to a maximum depth of 50 m (DAFF, 2016/17) in relation to Sea Concession 13C, 15C, 16C, 17C & 18C. The bathymetric contours shown are 100 m to 1000 m (left) and 10 m, 20 m, 30 m, 50 m, 100 m and 200 m (right).*

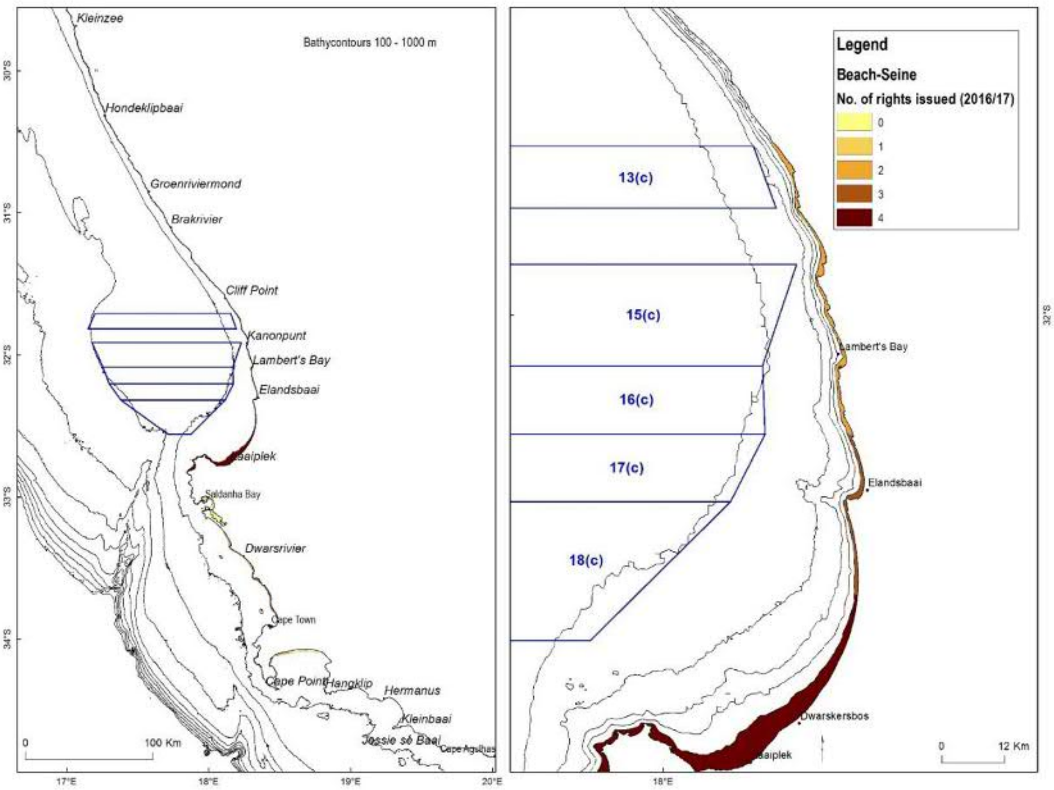

Figure 4-27: *Number of rights issued for beach seine fishing areas A and B to a maximum depth of 50 m (DAFF, 2016/17) in relation to Sea Concession 13C, 15C, 16C, 17C & 18C. The bathymetric contours shown are 100 m to 1000 m (left) and 10 m, 20 m, 30 m, 50 m, 100 m and 200 m (right).*

4.10 Seaweed

The South African seaweed industry is based on the commercial collection of kelps (*Ecklonia maxima* and *Laminaria pallida*) and red seaweed (*Gelidium* spp.) as well as small quantities of several other species. In the Northern and Western Cape, the industry is currently based on the collection of beach-cast kelps and harvesting of fresh kelps. Beach-cast red seaweeds were collected in Saldanha Bay and St Helena Bay, but there has been no commercial activity there since 2007. *Gelidium* species are harvested in the Eastern Cape (DEFF, 2014a).

The seaweed sector employs approximately 1 700 people, 92% of whom are historically disadvantaged persons. Much of the harvest is sun-dried, milled and exported for the extraction of alginate. Fresh kelp is also harvested in large quantities in the Western Cape as feed for farmed abalone. This resource, with a market value of about R6 million is critically important to local abalone farmers. Fresh kelp is also harvested for high-value plant-growth stimulants that are marketed locally and internationally.

Annual yields of commercial seaweeds over the period 2001 to 2015 are shown in Table 4-4. Harvesting rights are issued by management area. Whilst the Minister annually sets both a TAC and TAE for the sector, the principle management tool is effort control and the number of right holders in each seaweed harvesting area is restricted. Fourteen commercial seaweed harvesting rights are currently allocated and each concession area is limited to one right-holder for each functional group of seaweed (e.g. kelps, *Gelidium* spp. and Gracilarioids). In certain areas there are also limitations placed on the amounts that may be harvested. The South African coastline is divided between Port Nolloth and Port St Johns into 23 harvesting areas (see Table 4-5 for yield of kelp by area for the 2012/13 season).

Table 4-4: Annual yields of commercial seaweeds in South Africa (2001 – 2015). "Kelp beach cast' refers to material that is collected in a semi-dry state, whereas 'kelp fresh beach cast' refers to clean, wet kelp fronds that, together with 'kelp fronds harvest', are supplied as abalone feed (DAFF).

Year	*Gelidium* (kg dry weight)	Gracilarioids (kg dry weight)	Kelp beach cast (kg dry weight)	Kelp fronds harvest (kg fresh weight)	Kelp fresh beach cast (kg fresh weight)	Kelpak (kg fresh weight)
2001	144 997	247 900	845 233	5 924 489	0	641 375
2002	137 766	65 461	745 773	5 334 474	0	701 270
2003	113 869	92 215	1 102 384	4 050 654	1 866 344	957 063
2004	119 143	157 161	1 874 654	3 119 579	1 235 153	1 168 703
2005	84 885	19 382	590 691	3 508 269	126 894	1 089 565
2006	104 456	50 370	440 632	3 602 410	242 798	918 365
2007	95 606	600	580 806	4 795 381	510 326	1 224 310
2008	120 247	0	550 496	5 060 148	369 131	809 862
2009	115 502	0	606 709	4 762 626	346 685	1 232 760
2010	103 903	0	696 811	5 336 503	205 707	1 264 739
2011	102 240	0	435 768	6 023 935	249 651	1 617 915
2012	108 060	0	871 139	5 226 258	1 396 227	1 788 881
2013	106 182	0	590 741	4 881 136		2 127 659
2014	81 500	0	676 301	5 235 800		1 911 263
2015	94 700	0	265 895	3 080 049		1 162 594

Table 4-5: Maximum sustainable yield of harvested kelp for all areas for the 2012 season (1 April 2012 – 30 March 2013).

Area Number	Whole kelp (t fresh weight)	Kelp fronds (t fresh weight)
5	2 840	1 420
6	0	4 592
7	1 421	710
8	2 048	1 024
9	2 060	1 030
10	188	94
11	3 085	1 543
12	50	25
13	113	57
14	620	310
15	**2 200**	**1 100**
16	620	310
18	2 928	1 464
19	765	383
Total	18 938	14 062

Concession 13C, 15C, 16C, 17C & 18C lie offshore of Kelp collection areas 12 and 13 (Figure 4-28). Permit conditions stipulate that within this area kelp may be harvested using a diver deployed from a boat or the shore but is not expected to coincide with the depth range at which divers could harvest kelp. No kelp plants with a stipe less than 50 cm long may be cut or harmed. Beach cast plants may be collected by hand.

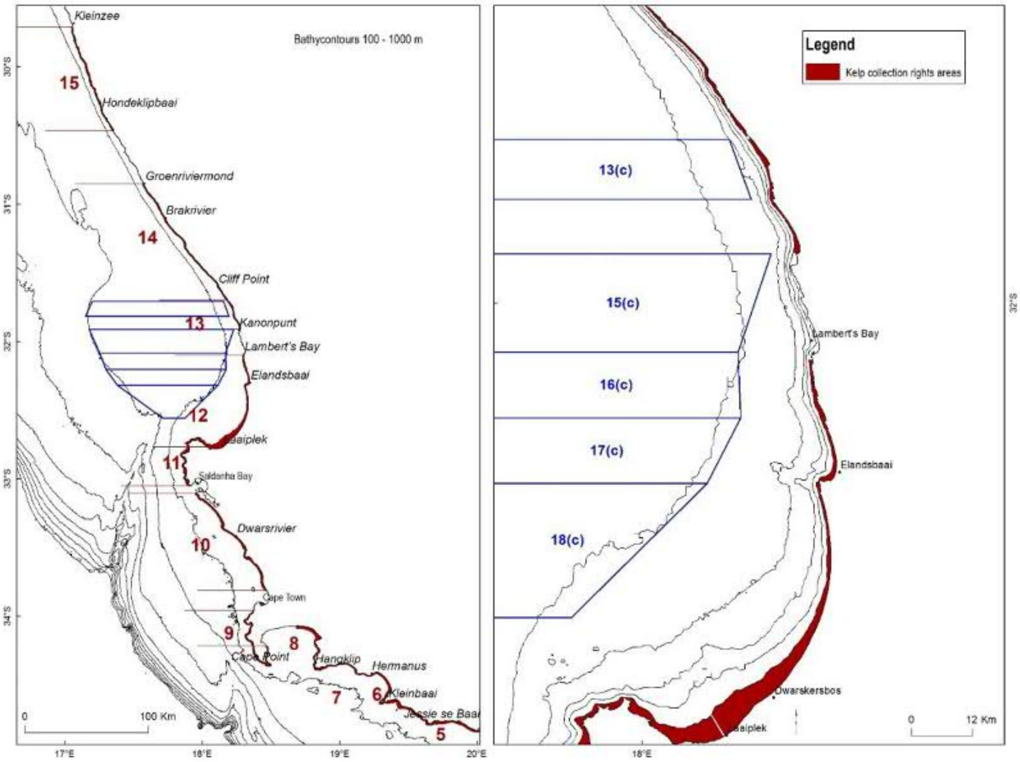

Figure 4-28: *Location of seaweed rights areas in relation to Sea Concession 13C, 15C, 16C, 17C & 18C. The bathymetric contours shown are 100m to 1000m (left) and 10m, 20m, 30m, 50m, 100m and 200m (right).*

4.11 Fisheries research surveys

Swept-area trawl surveys of demersal fish resources are carried out twice a year by DEFF in order to assess stock abundance. Results from these surveys are used to set the annual TACs for demersal fisheries. First started in 1985, the West Coast survey extends from Cape Agulhas (20°E) to the Namibian maritime boarder and takes place over the duration of approximately one month during January. The survey of the Southeast coast (20°E – 27°E longitude) takes place in April/May. Following a stratified, random design, 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. Trawl positions are randomly selected to cover specific depth strata that range from the coast to the 1 000 m isobath. Approximately 120 trawls are conducted during each survey and the location of these trawls is pre-determined usually a week before the cruise is scheduled to take place. Figure 4-29shows the distribution of research trawls undertaken in relation to the Sea Concession 13C, 15C, 16C, 17C & 18C.

The biomass of small pelagic species is assessed bi-annually by an acoustic survey. The first of these surveys is timed to commence in mid-May and runs until mid-June while the second starts in mid-October and runs until mid-December. The timing of the demersal and acoustic surveys is not flexible, due to restrictions with availability of the research vessel as well as scientific requirements. During these surveys the survey vessels travel pre-determined transects (perpendicular to bathymetric contours) running offshore from the coastline to approximately the 200 m isobath (see Figure 4-29**Error! Reference source not found.**). The surveys are designed to cover an extensive area from the Orange River on the West Coast to Port Alfred on the East Coast and the DEFF survey vessel progresses systematically from the Northern border Southwards, around Cape Agulhas and on towards the east. As acoustic biomass surveys take place inshore of the 200 m isobath.

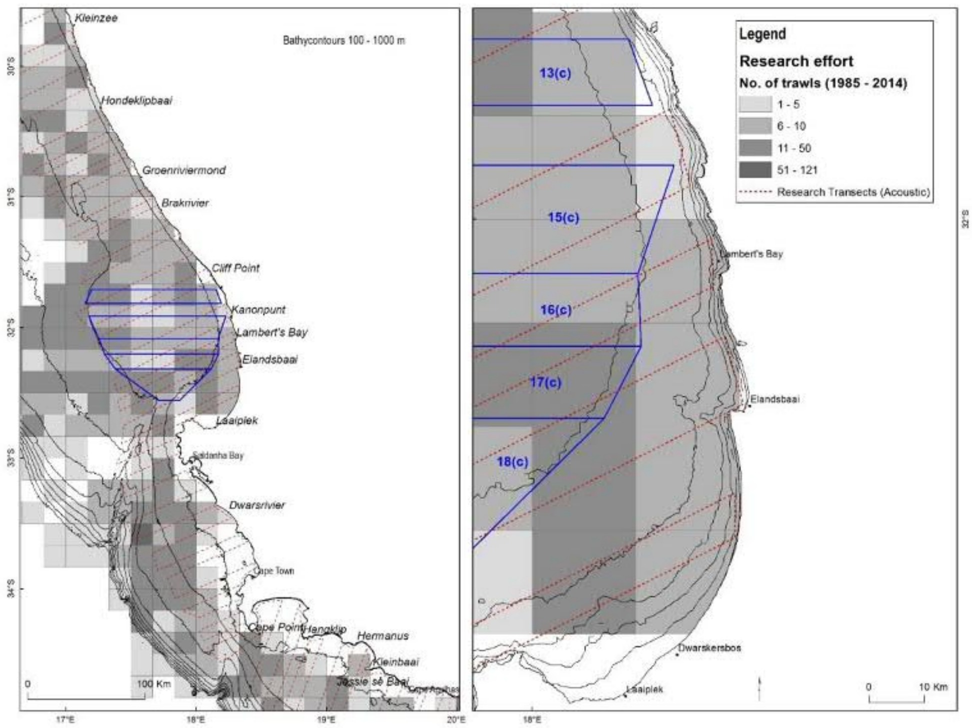

Figure 4-29: Spatial distribution of trawling effort and acoustic survey tracks undertaken by DEFF to ascertain biomass of demersal fish species and small pelagic species in relation to Sea Concession 13C, 15C, 16C, 17C & 18C.

5. Impact Assessment

This chapter describes and assesses the significance of potential impacts related to the proposed exploration activities in Sea Concession 13C, 15C, 16C, 17C & 18C. All impacts are assessed according to the rating scale defined in Section 5.1. Where appropriate, mitigation measures are proposed, which could ameliorate the negative impacts or enhance potential benefits, respectively. The status of all impacts should be considered negative unless otherwise stated. The significance of impacts with and without mitigation is assessed.

5.1 Assessment Procedure

The following convention was used to determine significance ratings in the assessment:

Rating	Definition of Rating
***Intensity** – establishes whether the magnitude of the impact is destructive or benign in relation to the sensitivity of the receiving environment*	
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.
Low	Minor (Slight) change, disturbance or nuisance. The impact on the environment is not detectable.
Medium	Moderate change, disturbance or discomfort. Where the affected environment is altered, but natural functions and processes continue, albeit in a modified way.
High	Prominent change, disturbance or degradation. Where natural functions or processes are altered to the extent that they will temporarily or permanently cease.
***Duration** – the time frame over which the impact will be experienced*	
Short-term	<5 years
Medium-term	5 – 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 would not occur in such a way or in such time span that the impact can be considered transient
***Extent** – defines the physical extent or spatial scale of the impact*	
Local	Extending only as far as the activity, limited to the site and its immediate surroundings
Regional	Impacts are confined to the region; e.g. coast, basin, etc.
National	Limited to the coastline of South Africa
International	Extending beyond the borders of South Africa
***Reversibility –** defines the potential for recovery to pre-impact conditions*	
Irreversible	Where the impact is permanent
Partially Reversible	Where the impact can be partially reversed
Fully Reversible	Where the impact can be completely reversed
***Probability** – the likelihood of the impact occurring*	
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.
***Degree of confidence in predictions** – in terms of basing the assessment on available information and specialist knowledge*	

Rating	Definition of Rating
Low	Less than 35 % sure of impact prediction.
Medium	Between 35 % and 70 % sure of impact prediction.
High	Greater than 70 % sure of impact prediction
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.
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.

Using the core criteria above (namely *extent, duration and intensity)*, the consequence of the impact is determined:

Consequence *– attempts to evaluate the importance of a particular impact, and in doing so incorporates extent, duration and intensity*	
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 enduring in the medium term; OR of high intensity at a national level in the short term; OR of medium intensity at a national level in the medium term; OR of low intensity at a national level in the long term; OR of high intensity at a local level in the long term; OR of medium intensity at a regional level in the long term.
MEDIUM	Impacts could be EITHER: of high intensity at a local level and endure in the medium term; OR of medium intensity at a regional level in the medium term; OR of high intensity at a regional level in the short term; OR of medium intensity at a national level in the short term; OR of medium intensity at a local level in the long term; OR of low intensity at a national level in the medium term; OR of low intensity at a regional level in the long term.
LOW	Impacts could be EITHER of low intensity at a regional level, enduring 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, enduring in the medium term.
VERY LOW	Impacts could be EITHER

Consequence – attempts to evaluate the importance of a particular impact, and in doing so incorporates extent, duration and intensity	
	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, enduring in the short term; OR Zero to very low intensity with any combination of extent and duration.
UNKNOWN	Where it is not possible to determine the significance of an impact.

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

Nature of the Impact – describes whether the impact would have a negative, positive or zero effect on the affected environment	
Positive	The impact benefits the environment
Negative	The impact results in a cost to the environment
Neutral	The impact has no effect

Type of impacts assessed:

Type of impacts assessed	
Direct (Primary)	Impacts that result from a direct interaction between a proposed project activity and the receiving environment.
Secondary	Impacts that follow on from the primary interactions between the project and its environment as a result of subsequent interactions within the environment (e.g. loss of part of a habitat affects the viability of a species population over a wider area).
Indirect	Impacts that are not a direct result of a proposed project, often produced away from or as a result of a complex impact pathway.
Cumulative	*Additive*: impacts that may result from the combined or incremental effects of future activities (i.e. those developments currently in planning and not included as part of the baseline).
	In-combination: impacts where individual project-related impacts are likely to affect the same environmental features. For example, a sensitive receptor being affected by both noise and drill cutting during drilling operations could potentially experience a combined effect greater than the individual impacts in isolation.

The relationship between the significance ratings after mitigation and decision-making can be broadly defined as follows:

Significance of residual impacts after Mitigation - considering changes in intensity, extent and duration after mitigation and assuming effective implementation of mitigation measures	
Very Low; Low	Activity could be authorised with little risk of environmental degradation.
Medium	Activity could be authorised with conditions and inspections.
High	Activity could be authorised but with strict conditions and high levels of compliance and enforcement.
Very High	Potential fatal flaw

5.2 Identification of Impacts

The potential impacts to the fishing industry of the proposed geophysical prospecting operations are changes to the catchability of fish related to the effects of noise generated during the survey.

The potential impacts to the fishing industry of the sampling operations relate to the temporary exclusion from fishing grounds due to a safety zone that would be affected around the mining vessel.

5.3 Assessment of Impacts

5.3.1 Impact of Exclusion of Fishing Operations

While the sampling and survey vessels are operational at a given location, a temporary 500 m operational safety zone around the unit would be in force, i.e. no other vessels (except the support vessels) may enter this area. A vessel conducting drill or bulk sampling operations would typically operate on a 3 or 4 anchor spread with unlit anchor mooring buoys. For the duration of sampling operations a coastal navigational warning would be issued by the South African Navy Hydrographic Office (SANHO) requesting a 2 nautical mile clearance from the sampling vessel. The safety zones aim to ensure the safety both of navigation and of the sampling vessel, avoiding or reducing the probability of accidents caused by the interaction of fishing boats and gears and the vessel. This safety zone could impact fisheries through the exclusion of fishing vessels from localised areas of Sea Concession 13C, 15C, 16C, 17C & 18C for the duration of the activities. The duration of which is expected to be 4 days per Concession area and 20 days in total over a 2-year period for bulk sampling activities and over a 4-year period for geophysical survey activities.

The exclusion of vessels from entering the safety zone around a sampling vessel therefore poses a direct impact to fishing operations in the form of loss of access to fishing grounds. The potential impacts to the fishing industry of the proposed geophysical prospecting operations are summarised as follows :

1) The main impact will be the temporary exclusion from the area where the sampling activity is being undertaken due to a safety zone that would be effected around the sampling vessel, and
2) Increased turbidity associated with the trenching in the immediate area that might result in avoidance of the area by pelagic species (in the water column) and recruitment effects; and
3) Possible changes to the catchability of fish related to the effects of noise generated during the geophysical surveys.

Assessment

Fisheries that are expected to have ZERO impact on them and which are not assessed are :

1. Demersal Trawl : There is no spatial overlap of the Concession Areas with fishing grounds of the demersal trawl sector

2. Large pelagic (Tuna longline): These vessels operate approximately 80 km offshore of the concession areas. Thus, there is no overlap with the proposed prospecting activities and no impacts expected;

3. Abalone ranching, netfish and seaweed : Although the concession areas are adjacent to each of these fishery areas the depths and range of these fisheries is highly unlikely to overlap with the concession areas and no disruption of these activities due to any of the potential impacts identified is likely.

4. Fisheries research : Demersal research trawls and acoustic surveys could be affected by exclusion from Sea Concession 13C, 15C, 16C, 17C & 18C. Demersal surveys are random depth-stratified and adaptable. Approximately five trawls per year are undertaken within this area between depths of 50 m and 200 m and it is possible that demersal fisheries research could be affected by exclusion from this area if it were to coincide with the designated survey timing. The nature of the random selection of survey trawl sites is such that if a selected sampling station coincided with an exclusion area, an alternative survey area could be randomly selected. Further, acoustic survey transects for small pelagic species are pre-determined and liaison between DEFF and the prospecting operation will only be required if there is a short term temporal overlap (which is unlikely) requiring a temporary cessation of prospecting activity in the sea concession areas.

5. Demersal longline : Fishing activity reported between 2000 and 2017 shows minimal amounts of fishing activity within the Sea Concessions amounting to 23 000 hooks (or two set lines) per year resulting in 5.1 tons of hake catch. This is equivalent to 0.06% of the overall national catch landed by the sector. Although not situated in a priority fishing ground for hake, the concession areas do overlap spawning and recruitment areas for hake and other demersal species.

6. Tuna Pole : Over the period 2007 to 2016, an average of 238 fishing hours were reported within the concession areas per year with a cumulative catch of 15.1 tons of albacore over this period. This is equivalent to 0.6% of the total albacore landed by the sector (nationally) over this period. There is no expected overlap of the concession area with spawning and recruitment areas of large pelagic species.

7. West Coast rock lobster : The Sea Concession areas fall within Zone B, Management Area Lamberts Bay and Elands Bay where, over the period 2006 to 2017 the trap boat sector landed 95.4 tons (6.1% of their total catch). The sea concessions do not coincide with areas fished by hoopnet and the minimum depth of the mining operation (65 m) precludes any interaction with these two sub-sectors of the west coast rock lobster fishery.

Two fishing sectors are assessed to be impacted by the mining operations in the designate concession areas :

1) small pelagic purse-seine, and 2) traditional linefish (which might include elements of the Small Scale Fisheries in the area.

Small pelagic purse-seine

The small pelagic fishery is a highly variable fishery centred in the Saldanha Bay, St Helena Bay and Lamberts Bay areas. The concession areas are adjacent to the main landing points of the fishery from which a significant fleet of purse seine vessels operate. Further, the seasonal nature of the fishery means that fishing in the St Helena Bay area and northwards will occur and interaction / avoidance of the fishery with the prospecting operation will occur. Small pelagic shoals of sardine, anchovy, horse mackerel and lantern and lightfish occurs seasonally in the concession areas and these are targeted by the small pelagic fleets when they are identified. Further, the St Helena Bay area comprises of mostly muddy habitat type and any disturbance of the sea floor through sampling operations is likely to create a sediment plume (see Section 5.3.2 below). While this plume may be localised and of short duration, and is unlikely to cause fish mortality, it is expected to result in displacement and disaggregation of small pelagic shoals targeted by the fleet for short periods when the mining occurs. This disturbance however will be very localised in both time and space, but the overall impact could be significant if at these times the small pelagic fleet identifies target shoals in the concession areas. A further negative impact is the broader ecosystem effect due to habitat disturbance although for small pelagic species the localised nature of the sampling (spatial and temporal) is highly unlikely to impact the species targeted.

It is further noted that the impacted fishing sector has noted with concern that the activities proposed by BPT coincide with productive fishing grounds for anchovy and red-eye round herring and have objected to the application based on potential adverse environmental impacts and possible disruption to the West Coast pelagic fishery (refer to Appendix A). Concessions 13C, 15C, 16C, 17C and 18C cover a combined area of ~6 086 km^2 at a depth range of 65 m to ~200 m. In this area, an average of 952 hours of fishing activity per year were recorded and catch taken within the area amounted to 20 023 tons (Note: small pelagic fisheries have high interannual variability therefore proportions of the catch relative to the Total Allowable Catch is not determined) . The species composition of catch within the area was recorded as predominantly anchovy (72%) and red-eye round herring (18%).

Impacts of Preclusion from Fishing Ground on the Small Pelagic Fishery		
	Without Mitigation	**Assuming Mitigation**
Intensity	Medium	Low to Medium
Duration	Short-term: for duration of survey	Short-term
Extent	Local: limited to sampling area	Local
Consequence	Very Low	Very Low
Significance	Very Low	Very Low
Status	Negative	Negative
Probability	Probable	Probable
Confidence	Medium	Medium
Nature of Cumulative impact	No cumulative impacts are anticipated during the **sampling phase**	
Reversibility	Fully reversible	
Loss of resources	Negligible	
Mitigation potential	Medium	

Traditional linefish

Fishing activity in this sector is reported by landing point. In the vicinity of Sea Concession 13C, 15C, 16C, 17C & 18C, Lambert's Bay is the closest landing point and in the most southerly area, at Sandy Point harbour. Over the period 2000 to 2016, an average of 392 tons per year were reported for the area which is equivalent to ~ 4.3% of the overall national landings of the sector. 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 across the extent of Sea Concession 13C, 15C, 16C, 17C & 18C, but as with the small pelagic sector, disturbance will be very low as it is likely to be both spatially and temporally unlikely to coincide with the proposed prospecting periods (four days per annum in each concession area over a four year period).

Impacts of Preclusion from Fishing Ground on the Traditional Linefish Fishery		
	Without Mitigation	**Assuming Mitigation**
Intensity	Low	Low
Duration	Short-term: for duration of survey	Short-term
Extent	Local: limited to sampling area	Local
Consequence	Very Low	Very Low
Significance	Very Low	Very Low
Status	Negative	Negative
Probability	Probable	Probable
Confidence	Medium	Medium
Nature of Cumulative impact	No cumulative impacts are anticipated during the **sampling phase**	
Reversibility	Fully reversible	
Loss of resources	Negligible	
Mitigation potential	Very Low	

Mitigation

The mitigation measures listed below are likely to reduce the intensity and significance of potential impacts to commercial fishing.

- The most effective means of mitigation would be to ensure that the proposed activities do not coincide with peak fishing periods of the small pelagic purse-seine sector. It is recommended that survey and sampling activities be carried out between mid-November and mid-January at a time when the small pelagic sector normally stops operations. Linefish operations also have a seasonal signal mostly driven by the availability of snoek in the winter period. Therefore the mitigation of possible impacts to the linefish fishery by undertaking the surveys in the November to January periods coincides with the small pelagic mitigation option.
- It is recommended that prior to the commencement of the proposed activities, BPT127 consult with the small pelagic fishing sector on fishery operational status to minimise potential operational impacts to the fishery;
- Prior to the commencement of the proposed sampling activities the following key stakeholders should be consulted and informed of the proposed activities (including navigational co-ordinates of the survey/sampling areas, timing and duration of proposed activities) and the likely implications thereof:

> Fishing industry associations (these include South African Small Pelagic Fishing Industry Association, South African Tuna Association, South African Commercial Linefish Association, South African Hake Longline Association, South African Deepsea Trawling Industry Association, FishSA the West Coast Rock Lobster Association and the National SMME Fishing Forum.

> Other: DEFF, Department of Environment, Forestry and Fisheries (DEFF), South African Maritime Safety Authority (SAMSA), South African Navy (SAN) Hydrographic office, overlapping and neighbouring exploration right holders and applicants, and Transnet National Ports Authority.

- The required safety zones around the sampling vessels should be communicated via the issuing of Daily Navigational Warnings for the duration of the sampling operations through the South African Naval Hydrographic Office;
- Any fishing vessel targets at a radar range of 12 nautical miles from the sampling vessel should be called via radio and informed of the navigational safety requirements; and
- Affected parties should be notified through fishing industry bodies when the programme is complete.

5.3.2 Impact of Sediment Plume on Fish Stock Recruitment

Description of Impact

The proposed bulk sampling operations would entail the excavation of ten trenches, each 180 m long and 20 m wide 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 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 sampled seabed sediments are pumped to the surface and discharged onto sorting screens on the sampling vessel. The screens separate the fine sandy silt and large gravel, cobbles and boulders from the size fraction of interest, the 'plantfeed' (usually 2 - 20 mm). The fine tailings are immediately discarded overboard where they form a suspended sediment plume in the water column which dissipates with time. The 'plantfeed' is mixed with high density ferrosilicon (FeSi) slurry and pumped under pressure into a Dense Medium Separation (DMS) plant resulting in a high density concentrate. The majority of the ferrosilicon is magnetically recovered for re-use in the DMS plant and the fine tailings (-2 mm) from the DMS process are similarly deposited over board. Furthermore, fine sediment re-suspension by the sampling tools will generate suspended sediment plumes near the seabed. The main effect of plumes is an increase in water column turbidity. The relevance of this in terms of effects on fisheries is the potential impairment of egg and/or larval development through high sediment loading in the water column.

Assessment

Typically fisheries stock recruitment is highly variable and shows a strong spatial and temporal signal. For example, this variability would apply to the small pelagic species that comprise the largest commercial fishery by volume on the West Coast of South Africa. Spawning and recruitment of these small pelagic species as well as of many demersal species occurs primarily to the south of Concession 13C, 15C, 16C, 17C & 18C.

The spawn products from these fisheries typically drift northwards with the prevailing Benguela Current and larval development mainly occurs nearshore and in bays along the West Coast of South Africa, referred to as nursery areas. These areas provide a suitable niche for development of juveniles of these species. Most of the species potentially impacted are broadcast spawners, with large volumes of spawn products being dispersed over large areas. This would apply equally, for example, to west coast rock lobster, hake, anchovy and sardine.

Sea Concession 13C, 15C, 16C, 17C & 18C is situated offshore of the 65 m depth contour. Relative to the location of the nursery areas, the sediment plumes generated during benthic sampling would be expected to predominantly disperse northwards and offshore of the nursery areas. Whereas sediment plumes could result in a localised negative environmental impact through increased turbidity, given the extent of the concession areas and limited sampling periods, the likely impact on fish recruitment is considered to be of low consequence and of overall insignificance due to the very short duration and highly localised nature of the proposed sampling events in relation to the fish nursery in the St Helena Bay area. Since the impact is unlikely to result in a significant impact on recruitment of the different species from the nursery areas, mitigation against this impact is not considered necessary.

Impacts of Sediment Plume on Fish Stock Recruitment		
	Without Mitigation	**Assuming Mitigation**
Intensity	Medium	Medium
Duration	Short-term: for duration of sampling	Short-term

Extent	Local: limited to sampling area	Local
Consequence	Low	Low
Significance	Insignificant	Insignificant
Status	Negative	Negative
Probability	Improbable	Improbable
Confidence	Medium	Medium
Nature of Cumulative impact	No cumulative impacts are anticipated during the sampling phase	
Reversibility	Fully reversible	
Loss of resources	Negligible	
Mitigation potential	None	

5.3.3 Acoustic Impacts of Geophysical Surveying

Description of Impact

The ocean is a naturally noisy place and marine animals are continually subjected to both physically produced sounds from sources such as wind, rainfall, breaking waves and natural seismic noise, or biologically produced sounds generated during reproductive displays, territorial defence, feeding, or in echolocation (see references in McCauley 1994). Such acoustic cues are thought to be important to many marine animals in the perception of their environment as well as for navigation purposes, predator avoidance, and in mediating social and reproductive behaviour. Anthropogenic sound sources in the ocean may thus interfere directly or indirectly with such activities. Of all human-generated sound sources, the most persistent in the ocean is the noise of shipping. Depending on size and speed, the sound levels radiating from vessels range from 160 to 220 dB re 1 µPa at 1 m (NRC 2003). Especially at low frequencies between 5 to 100 Hz, vessel traffic is a major contributor to noise in the world's oceans, and under the right conditions, these sounds can propagate 100s of kilometres thereby affecting very large geographic areas (Coley 1994, 1995; NRC 2003; Pidcock et al. 2003). Other forms of anthropogenic noise include 1) aircraft flyovers, 2) multi-beam sonar systems, 3) seismic acquisition, 4) hydrocarbon and mineral exploration/prospecting and recovery, and 5) noise associated with underwater blasting, pile driving, and construction.

The cumulative impact of increased background anthropogenic noise levels in the marine environment is an ongoing and widespread issue of concern (Koper & Plön 2012), as such sound sources interfere directly or indirectly with the animals' biological activities. Reactions of marine mammals to anthropogenic sounds have been reviewed by McCauley (1994), Richardson et al. (1995), Gordon & Moscrop (1996) and Perry (1998), who concluded that anthropogenic sounds could affect marine animals in the surrounding area in the following ways:

- Physiological injury and/or disorientation;
- Behavioural disturbance and subsequent displacement from key habitats;
- Masking of important environmental sounds and communication;
- Indirect effects due to effects on prey.

The acoustic impact of the proposed geophysical surveying on marine fauna has been assessed by Pisces (2019). The findings of the Marine Fauna Assessment report are that the noise generated by the acoustic equipment utilized during geophysical surveys would fall within the hearing range of most fish, and at sound levels of between 190 to 230 dB re 1 µPa at 1 m, would be audible for considerable distances (in the order of tens of km) before attenuating to below threshold levels (Findlay 2005). However, unlike the noise generated by airguns during seismic surveys, the emission of underwater noise from geophysical surveying and vessel activity would not be considered to be of sufficient amplitude to cause auditory or non-auditory trauma in marine fauna in the region. Only directly below the systems (within metres of the sources) would sound levels be in the 230 dB range where exposure could result in trauma. As most pelagic species likely to be encountered within the concessions are highly mobile, they would be expected to flee and move away from the sound source before trauma could occur.

Similarly, the sound level generated by seabed crawler operations would fall within the 120-190 dB re 1 µPa range at the sampling unit, with main frequencies between 3 – 10 Hz. The noise generated by sampling operations would therefore fall within the hearing range of most fish, and would be audible for up to 20 km around the vessel before attenuating to below threshold levels (Table 5.1). In a study evaluating the potential effects of vessel-based diamond mining on the marine mammals community off the southern African West Coast, Findlay (1996) concluded that the significance of the impact is likely to be minimal based on the assumption that the radius of elevated noise level would be restricted to ~20 km around the sampling vessel.

Table 5-1: Known hearing frequency and sound production ranges of various marine taxa (Pisces, 2018 adapted from Koper & Plön 2012).

Taxa	Order	Hearing frequency (kHz)	Sound production (kHz)
Shellfish	Crustaceans	0.1 – 3	-
Snapping shrimp	*Alpheus/ Synalpheus* spp.	-	0.1 - >200
Ghost crabs	*Ocypode* spp.	-	0.15 – 0.8
Fish	Teleosts	-	0.4 – 4
Hearing specialists	-	0.03 - >3	-
Hearing generalists	-	0.03 – 1	-
Sharks and skates	Elasmobranchs	0.1 – 1.5	Unknown

Assessment

The effects of high frequency sonars on catchability of fish is considered to be localised, short-term (for duration of survey i.e. weeks) and of medium intensity. The significance of the impact is considered to be very low both without and with mitigation.

The impact of underwater noise generated during sampling operations is considered to be of low intensity in the target area and for the duration of the sampling campaign. The impact of underwater noise is considered of very low significance without mitigation.

No mitigation measures are possible, or considered necessary for the generation of noise by the sampling tools and vessels.

Impacts of multi-beam and sub-bottom profiling sonar on catchability of fish		
	Without Mitigation	**Assuming Mitigation**
Intensity	Medium	Low
Duration	Short-term: for duration of survey	Short-term
Extent	Local: limited to survey area	Local

Consequence	Very Low	Very Low
Significance	Very Low	Very Low
Status	Negative	Negative
Probability	Probable	Probable
Confidence	Medium	Medium
Nature of Cumulative impact	Any direct impact is likely to be at individual rather than at species level.	
Reversibility	Fully reversible – any disturbance of behaviour, auditory “masking” or reductions in hearing sensitivity that may occur as a result of survey noise below 220 dB would be temporary.	
Loss of resources	Negligible	
Mitigation potential	Low	

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7. Appendix A

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10 February 2020
SLR consulting (South Africa) Pty Ltd
P O Box 10145
Caledon Square
7905

Attention: Ms Candice Sadan — Per email

Dear Sirs/ Madam,

RE: Belton Park Trading 127 (Pty) ltd – Prospecting Right Application for Offshore Sea concession 13C, 15C, 16C, 17C, West Coast (DMRE Ref: WC30/5/1/1/2/10319PR, WC30/5/1/1/2/10320PR, WC30/5/1/1/2/10321PR, WC30/5/1/1/2/103: Notification

We refer to the above matter and it is with concern that the Oceana Group hereby confirms its objection to the proposed prospecting application. The Oceana Group ("Oceana"), via its Lucky Star Operating division conducts its fishing operations in the area proposed for prospecting and accordingly objects to the application on the following grounds:

1. There is a potential adverse environmental impact that the proposed scoping would have on all living marine resources in the prospecting area, particularly the red eye and anchovy pelagic fish species as the areas identified are productive fishing areas for both species. The biomass for both the anchovy and red eye pelagic species is already under severe pressure as is evident by the reduced catch rates over the past two years. Further disruption on an already fragile pelagic sector may therefore have a devastating impact of the West Coast pelagic fishery;

2. Until such time as a thorough impact assessment on the afore-mentioned species as well as the financial implications on the pelagic fishing industry has been determined and debated in an open public forum and suitable mitigating actions put in place, the Oceana Group cannot and will not support any prospecting exercises in the aforementioned areas.

REGISTERED COMPANY NAME: Oceana Group Limited REGISTRATION NUMBER: 1939/001730/06
DIRECTORS: MA Brey (Chairman), I Soomra (CEO*), ZBM Bassa, PG de Beyer, A Jakoet, S Pather, NA Pangarker, L Sennelo, NV Simamane COMPANY SECRETARY: A Fortune
(Executive Director *)

We trust that the above is in order and that our objection will be duly noted and recorded. We look forward to your timeous advices as to any further developments regarding this application.

Yours faithfully

Koen

Mrs Karen- Dawn Koen
Executive: Sustainability & Compliance
Oceana Group Limited

LUCKY STAR DAYBROOK BLUE CONTINENT PRODUCTS CCS LOGISTICS OCEANA LOBSTER CALAMARI FISHING

EGISTERED COMPANY NAME: Oceana Group Limited REGISTRATION NUMBER: 1939/001730/06
IRECTORS: MA Brey (Chairman), I Soomra (CEO*), ZBM Bassa, PG de Beyer, A Jakoet, S Pather, NA Pangarker, L Sennelo,
V Simamane COMPANY SECRETARY: A Fortune
xecutive Director *)

APPENDIX 4.3: MARINE FAUNAL ASSESSMENT

ENVIRONMENTAL IMPACT ASSESSMENT FOR MARINE PROSPECTING ACTIVITIES IN SOUTH AFRICAN SEA AREAS 13C, 15C, 16C, 17C and 18C, WEST COAST, SOUTH AFRICA

Marine Faunal Assessment

Prepared for:

SLR

On behalf of:

BPT127

BELTON PARK TRADING 127 (Pty) Ltd

January 2020

PISCES Environmental Services (Pty) Ltd

ENVIRONMENTAL IMPACT ASSESSMENT FOR
MARINE PROSPECTING ACTIVITIES
IN SOUTH AFRICAN SEA AREAS 13C, 15C, 16C, 17C and 18C,
WEST COAST, SOUTH AFRICA

MARINE FAUNAL ASSESSMENT

Prepared for

SLR Consulting (Cape Town)

On behalf of

Belton Park Trading 127 (Pty) Ltd

Prepared by

Andrea Pulfrich
Pisces Environmental Services (Pty) Ltd

January 2020

Contact Details:

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TABLE OF CONTENTS

ABBREVIATIONS and UNITS

BCC	Benguela Current Commission
BCLME	Benguela Current Large Marine Ecosystem
CBA	Critical Biodiversity Area
cm	centimetres
cm/s	centimetres per second
CITES	Convention on International Trade in Endangered Species
CMS	Centre for Marine Studies
CMS	Convention on Migratory Species
CSIR	Council for Scientific and Industrial Research
dB	decibell
DAFF	Department of Agriculture, Forestry and Fisheries
DMS	Dense Medium Separation
E	East
EBSA	Ecologically and Biologically Significant Area
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ESA	Ecological Support Area
FAO	Food and Agricultural Organisation
FeSi	ferrosilicon
g/m^2	grams per square metre
$g\ C/m^2/day$	grams Carbon per square metre per day
ha	hectare
HABs	Harmful Algal Blooms
Hz	herz
IUCN	International Union for the Conservation of Nature
IWC	International Whaling Commission
JNCC	Joint Nature Conservation Committee
kHz	kiloHerz
km	kilometre
km^2	square kilometre
km/h	kilometres per hour
kts	knots
MMO	Marine Mammal Observer
MPA	Marine Protected Area
MPRDA	Mineral and Petroleum Resources Development Act
m	metres
m^2	square metres
m^3	cubic metre
mm	millimetres
m/s	metres per second
mg/ℓ	milligrams per litre
N	north
NDP	Namibian Dolphin Project

NE	north east
NEMA	National Environmental Management Act
NNW	north-northwest
NMMU	Nelson Mandela Metropolitain University
NW	north-west
PAM	Passive Acoustic Monitoring
PIM	Particulate Inorganic Matter
POM	Particulate Organic Matter
ppm	parts per million
S	south
SACW	South Atlantic Central Water
SANBI	South African National Biodiversity Institute
SASA	South African Sea Areas
SASTN	South Atlantic Sea Turtle Network
SE	South east
SFRI	Sea Fisheries Research Institute, Department of Environmental Affairs
SLR	SLR Consulting (South Africa) (Pty) Ltd
SPRFMA	South Pacific Regional Fisheries Management Authority
SSW	South-southwest
SW	south-west
TMNP	Table Mountain National Park
TSPM	Total Suspended Particlate Matter
UNEP	United Nations Environmental Programme
VMEs	Vulnerable Marine Ecosystems
VOS	Voluntary Observing Ships
µg	micrograms
µm	micrometre
µM	microMol
µg/l	micrograms per litre
µPa	micro Pascal
°C	degrees Centigrade
%	percent
‰	parts per thousand
~	approximately
<	less than
>	greater than

EXPERTISE AND DECLARATION OF INDEPENDENCE

This report was prepared by Dr Andrea Pulfrich of Pisces Environmental Services (Pty) Ltd. Andrea has a PhD in Fisheries Biology from the Institute for Marine Science at the Christian-Albrechts University, Kiel, Germany.

As Director of Pisces since 1998, Andrea has considerable experience in undertaking specialist environmental impact assessments, baseline and monitoring studies, and Environmental Management Programmes relating to marine diamond mining and dredging, hydrocarbon exploration and thermal/hypersaline effluents. She is a registered Environmental Assessment Practitioner and member of the South African Council for Natural Scientific Professions, South African Institute of Ecologists and Environmental Scientists, and International Association of Impact Assessment (South Africa).

This specialist report was compiled as a desktop study on behalf of SLR Consulting (South Africa) (Pty) Ltd (SLR), 5th floor Letterstedt House, Newlands on Main, Corner of Campground Road and Main Road, Claremont, 7700, South Africa. The compilation followed a review process of published (peer reviewed) and unpublished literature and the assessment of potential impacts based on proposed activities and identification of impacts (and their mitigation) within the available literature.

This specialist report was compiled on behalf of SLR for their use in preparing an Environmental Impact Assessment for marine prospecting activities by Belton Park Trading 127 (Pty) Ltd, off the West Coast of South Africa. I do hereby declare that Pisces Environmental Services (Pty) Ltd is financially and otherwise independent of the Applicant and SLR.

Andrea Pulfrich

Dr Andrea Pulfrich

1. GENERAL INTRODUCTION

Belton Park Trading 127 (Pty) Ltd has submitted applications to the Department of Mineral Resources for Prospecting Rights in the South African Sea Areas (SASA) concessions 13c, 15c, 16c, 17c and 18c. These concession areas are situated some 175 km north of Cape Town, with the inshore boundary ranging from ~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) (Figure 1). The minerals targeted by the proposed prospecting operations include:

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

The proposed prospecting operations would entail geophysical surveys, drill sampling and bulk (trench) sampling within each of the concession areas.

In terms of the Environmental Impact Assessment (EIA) Regulations 2014 (as amended), promulgated in terms of Chapter 5 of the National Environmental Management Act (NEMA), 1998 (No. 107 of 1998), an application for a Prospecting Right requires Environmental Authorisation (EA) to carry out the proposed prospecting operations.

SLR Consulting (Pty) Ltd (SLR) has been appointed to undertake the necessary application processes in terms of the NEMA, as amended, and in turn have asked Pisces Environmental Services (Pty) Ltd to provide a specialist report on potential impacts of the proposed prospecting activities on marine benthic fauna in the area.

1.1. Scope of Work

This specialist report was compiled as a desktop study on behalf of SLR Consulting, for their use in compiling an EIA for proposed prospecting activities in the SASA concessions 13c, 15c, 16c, 17c and 18c, off the South African West Coast.

The terms of reference for this study, as specified by SLR, are to:

- Provide a general description of the local marine fauna in and around the proposed concesssion areas;
- Identify, describe and assess the significance of potential impacts of the proposed prospecting activities on the local marine fauna;
- Identify practicable mitigation measures to reduce any negative impacts and indicate how these could be implemented as part of the proposed project; and
- Provide a report on the above information and assessments.

1.2. Approach to the Study

As determined by the terms of reference, this study has adopted a 'desktop' approach. Consequently, the description of the natural baseline environment in the study area is based on a review and collation of existing information and data from the scientific literature, internal reports and the Generic Environmetnal Management Programme (EMPr) compiled for diamond mining in South Africa (Lane & Carter 1999). The information for the identification of potential impacts was drawn from various scientific publications and the Generic EMPR as well as information sourced from the Internet. The sources consulted are listed in the Reference chapter.

All identified marine impacts are summarised, categorised and ranked in appropriate impact assessment tables, to be incorporated in the overall EIA for the proposed project.

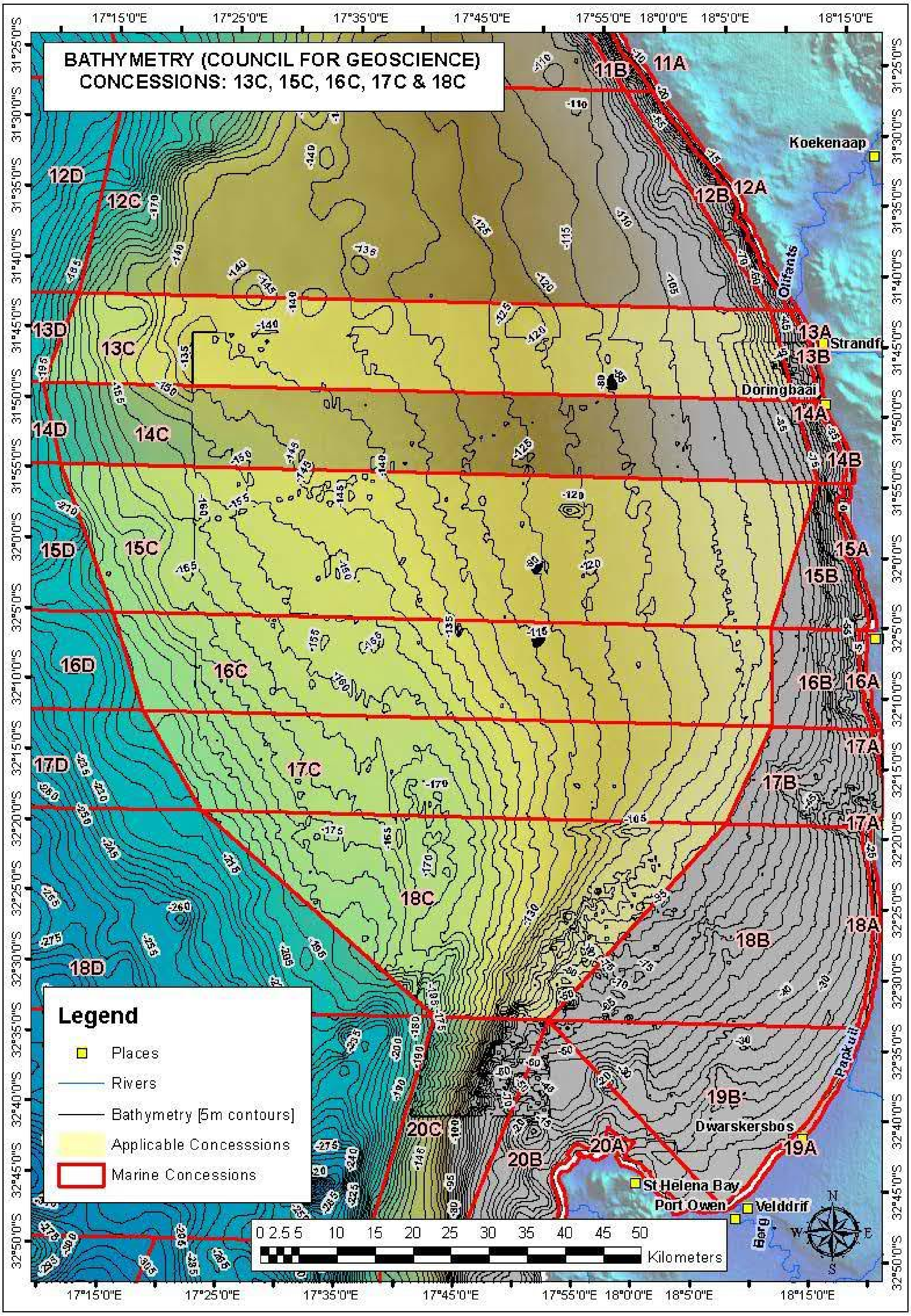

Figure 1: Regional bathymetry and seabed features of SASA Concessions 13c, 15c, 16c, 17c and 18c.

2. DESCRIPTION OF THE PROPOSED PROJECT

Belton Park Trading is proposing to explore for various minerals in concessions 13c, 15c, 16c, 17c and 18c off the West Coast of South Africa (Figure 1). Concessions 13c, 15c, 16c, 17c and 18c are 1 117.53 km^2, 1 791.40 km^2. 1 096.43 km^2, 976.69 km^2 and 1 104.42 km^2, respectively. They extend seawards from ~65 m to ~200 m depth (Figure 1). Belton Park Trading has proposed an initial 4-year prospecting programme.

The proposed prospecting programme would involve:

- Geophysical surveys to collect high-resolution seismic and multibeam echosounder and Topas system shallow seismic data along lines 100 m to 1 000 m apart;
- Drill sampling to 12 m below the seafloor at intervals of 50 m to 500 m; and
- Bulk (trench) sampling in different geological domains, with each trench up to 180 m long and 20 m wide to a depth of between 1 m and 8 m.

2.1. Geophysical Surveys

The geophysical surveying will be undertaken using the group-owned dedicated survey vessel, the *DP Star*. The vessel is equipped with:

- a multibeam echosounder designed to produce high resolution digital terrain models of the seafloor (Figure 2, left) by transmitting a fan of acoustic beams below the vessel at frequencies ranging from 10 kHz to 200 kHz and typically produces sound levels in the order of 207 db re 1 µPa at 1 m; 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 2, right), thereby giving a cross section view of the sediment layers. Sound levels are typically in the order of 206 db re 1 µPa at 1 m

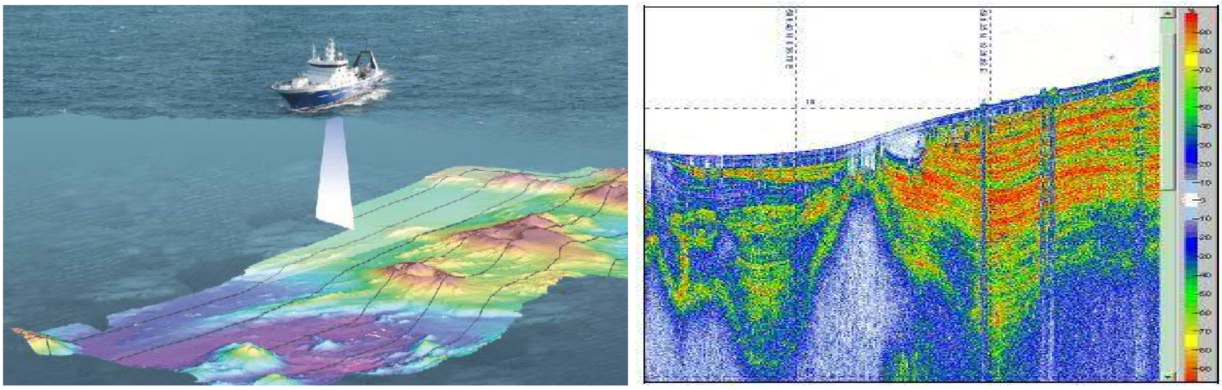

Figure 2: The geophysical survey techniques employed during Phase I of the proposed prospecting operations would include swath bathymetry (left) and sub-bottom profiling (right).

The proposed surveys would be undertaken in specific priority areas in each of the concessions, at water depths of between approximately 65 - 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.

2.2. Drill Sampling

Following interpretation of geophysical survey data obtained during Phase I of the project, drill sampling will be undertaken using the group-owned dedicated sampling vessel, the *MV Explorer* (Figure 3). With an overall length of 114.4 m and a gross tonnage of 4 677 tons, the vessel is equipped with a subsea sampling tool (Figure 4), which can be implemented in water depths up to 180 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: The proposed sampling vessel *MV Explorer*.

Figure 4: 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 unconsolidated sediments up to 12 m depth above the rock or clay footwall. 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 soil's 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. This amounts to ~0.0004 % of the total combined seabed area of 6 086.5 km^2 for Concessions 13c, 15c, 16c, 17c and 18c.

2.3. Bulk Sampling

Following analysis of the drill samples and establishment of a potential resource, further bulk (trench) sampling may be conducted to confirm the economic viability of the resource if mined. Trenching would be undertaken by the seabed crawler, deployed off the group-owned dedicated mining vessel, the *MV Ya Toivo*. With an overall length of 150 m and a gross tonnage of 9 111 tons, the vessel is equipped with a track-mounted subsea crawler (Figure 5) 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 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, to a depth of between 1 m and 8 m 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.

Figure 5: The *MV Ya Toivo* (left) and its *MK2* seabed crawler (right).

2.4. Land-based Support

The vessels will remain at sea for only a few weeks at a time, so there is no necessity to rotate and relieve the crew. Crew joining the vessels will be transported by road to Port Nolloth, from where they will board the vessels. The vessels will remain on site at all times without approaching the shore during the operations.

Normal industrial activities for maintaining the seaworthiness of the vessels will be undertaken in Cape Town harbour, where quay and dry dock space will be hired from the port authorities as required.

3. DESCRIPTION OF THE BASELINE MARINE ENVIRONMENT

The descriptions of the physical and biological environments along the South African West Coast focus primarily on the study area between Hondeklipbaai and Cape Town. The purpose of this environmental description is to provide the marine baseline environmental context within which the proposed prospecting activities will take place. The summaries presented below are based on information gleaned from Lane & Carter (1999), CCA & CMS (2001) and Penney *et al.* (2007) and more recent scientific studies undertaken in the general area. The description of benthic macrofaunal communities was provided by Natasha Karenyi of the South African National Biodiversity Institute, and the section on marine mammals was provided by Dr Simon Elwen of the Namibian Dolphin Project and Mammal Research Institute (University of Pretoria).

3.1. Geophysical Characteristics

3.1.1 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 NNW trend, widening north of Cape Columbine and reaching its widest (180 km) off the Orange River. The nature of the shelf break varies off the South African West Coast. Between Cape Columbine and the Orange River, there is usually a double shelf break, with the distinct inner and outer slopes, separated by a gently sloping ledge. The immediate nearshore area consists mainly of a narrow (about 8 km wide) rugged rocky zone and slopes steeply seawards to a depth of around 80 m. The middle and outer shelf normally lacks relief and slopes gently seawards reaching the shelf break at a depth of ~300 m.

Banks on the continental shelf include Child’s Bank, situated ~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).

3.1.2 Coastal and Inner-shelf Geology and Seabed Geomorphology

Figure 6 illustrates the distribution of seabed surface sediment types off the South African north-western coast. 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. An ~500-km long mud belt (up to 40 km wide, and of 15 m average thickness) is situated over the innershelf between the Orange River and St Helena Bay (Birch *et al.* 1976). Further offshore, sediment is dominated by muds and sandy muds. 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.

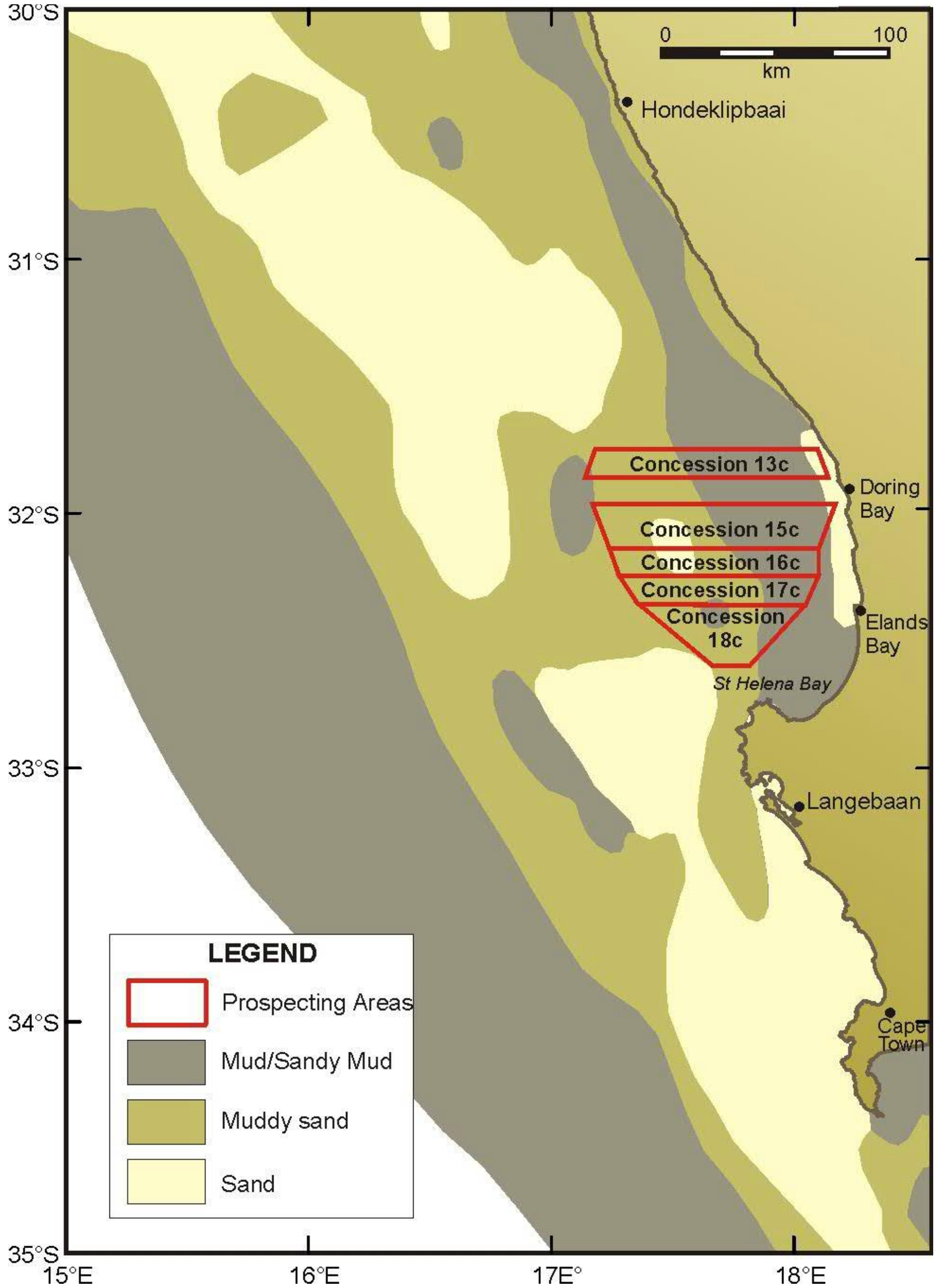

Figure 6: Concessions 13c, 15c, 16c, 17c and 18c in relation to the sediment distribution on the continental shelf off the South African West Coast (adapted from Rogers 1977).

Phosphorite, or phosphate-rich rock is defined as sedimentary rock typically containing between 5%-20% phosphate. In the marine environment, it occurs either as a nodular hard ground capping of a few metres thick or as series of unconsolidated sediments (Morant 2013). Several types of sedimentary phosphates occur offshore and onshore in South Africa, the largest of which is the diagenetic replacement resource on the Agulhas Bank. These replacement phosphate resources occur as near-continuous 'pavements' or cappings of limestones at depths between 200 m and 500 m on the continental shelf between Cape Agulhas and Cape Recife. Further sporadic phosphate mantles over the continental shelf are known to occur from Lamberts Bay, north to the mouth of the Orange River.

The "open shelf" phosphorite deposits, were formed during several episodes over the last 1.7 – 65 million years. They originated from the precipitation of phosphate in the form of calcium phosphate in an environment of intense upwelling and high biological activity along the continental margin of South Africa. The upwelling resulted in a change in temperature and pressure of the phosphate-laden oceanic waters, thus lowering the solubility of the phosphate salts they contained, and consequently precipitating the phosphates (in the form of apatite) over the continental shelf to form phosphatic packstones and colitic pellets at the sediment-water interface. The precipitation in facilitated by the decay of siliceous phytoplankton. The precipitated phosphates subsequently combined with calcium, derived from the disaggregation of calcareous foraminiferal and coccolithophorid debris on the outer continental shelf, to form phosphatised lime-rich muds. These muds subsequently lithified or consolidated through their replacement by secondary calcium phosphate (francolite), to form a near continuous hard capping of phosphate rock over the seafloor sediments (Birch 1990; Morant 2013).

During repeated sea level changes, the phosphate-rich rocks were extensively re-worked, eroding the hard capping pavements thereby liberating the heavy phosphate-bearing minerals (mainly glauconite and apatite) and concentrating them in the overlying unconsolidated sediments. Migrating zones of deposition and erosion occurred during repeated transgressive/regressive cycles. Renewed carbonate deposition and a further period of phosphatization occurred when the deposition zones migrated back across the shelf in response to a rising sea level, thereby incorporating boulders and cobbles of phosphatized limestone and glauconite left behind after the previous regressive cycle into the second-generation phosphatic deposits, forming conglomeratic rock types. Two main periods of phosphatization have been identified, namely the Middle Miocene (ca 15 Ma), and possibly the Upper Eocene (ca 37 Ma) (Birch 1990; Morant 2013).

The ore bearing lithologies comprise three non-conglomeratic and two conglomeratic rock types. The non-conglomeratic types are phosphatized foraminiferal lime packstones (a type of limestone), which are either poor in glauconite and quartz, rich in goethite, or highly glauconitic. The first conglomeratic type is also rich in glauconite, but contains pebble inclusions of phosphatized foraminiferal limestone. The second conglomeratic type is distinguished by its low glauconite content and high macrofossil and goethite abundance. The depth of mineralization within the conglomeratic ores is typically restricted to the upper few metres of sediment.

3.2. Biophysical Characteristics

3.2.1 Wind Patterns

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

The 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 7). 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 7). 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.

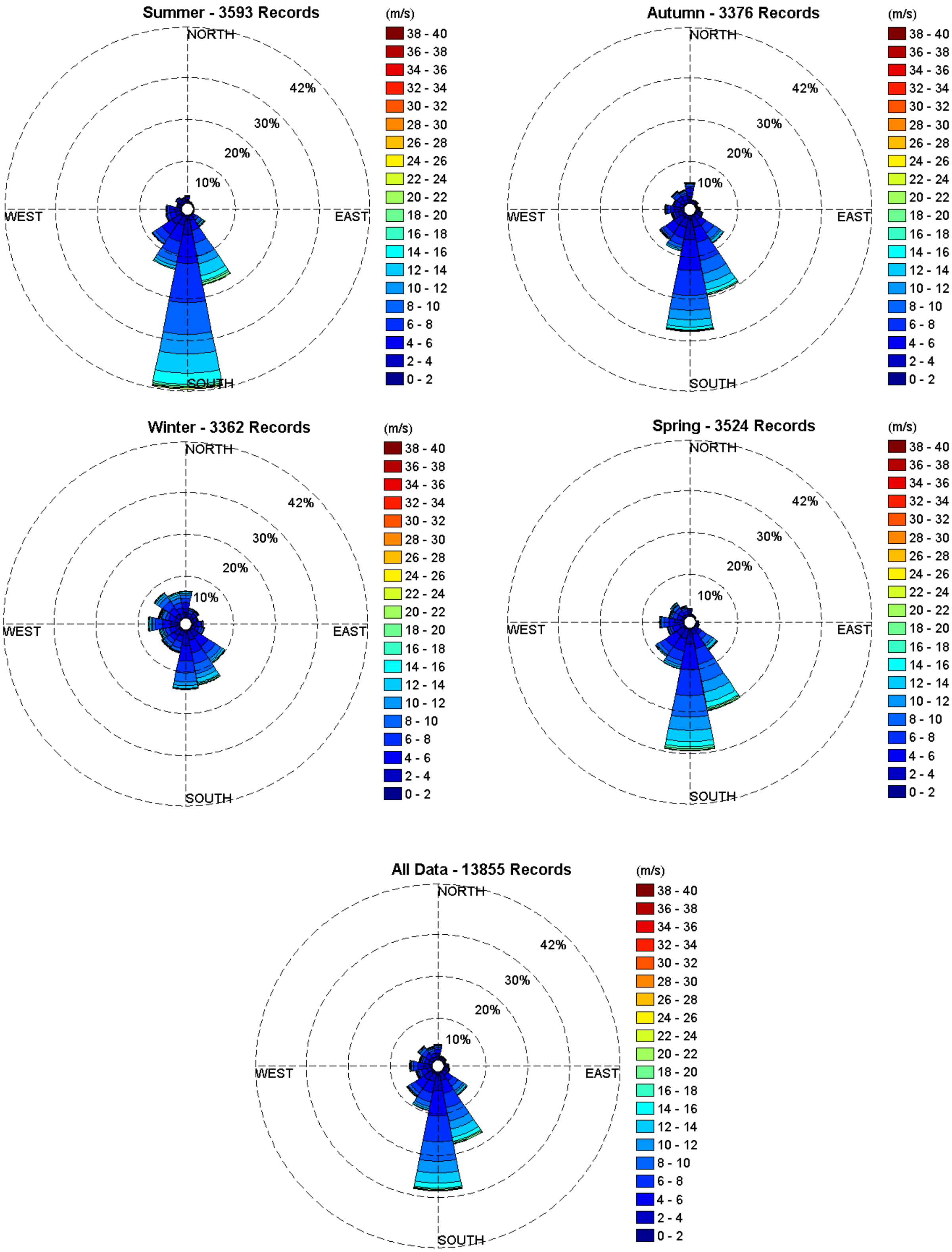

Figure 7: VOS Wind Speed vs. Wind Direction data for the Cape Columbine area 32.0 to 32.9 S and 17.0 to 17.9 E (1903-11-01 to 2011-05-24; 13,855 records) (from CSIR).

3.2.2 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). Fluctuation periods of these flows are 3 - 10 days, although the long-term mean current residual is in an approximate northwest (alongshore) direction. 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).

The major feature of the Benguela Current is coastal upwelling and the consequent high nutrient supply to surface waters leads to high biological production and large fish stocks. The prevailing longshore, equatorward winds move nearshore surface water northwards and offshore. To balance the displaced water, cold, deeper water wells up inshore (average sea surface temperature 10 - 14°C). 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 Cape Point (34°S), Cape Columbine (33°S) and Namaqua (30°S) upwelling cells (Taunton-Clark 1985) (Figure 8; left). The 13c, 15c, 16c, 17c and 18c concessions fall within the Cape Columbine upwelling cell. Upwelling in these cells is seasonal, with maximum upwelling occurring between September and March. An example of one such strong upwelling event in December 1996, followed by relaxation of upwelling and intrusion of warm Agulhas waters from the south, is shown in the satellite images in Figure 8.

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 (Figure 8, right). 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).

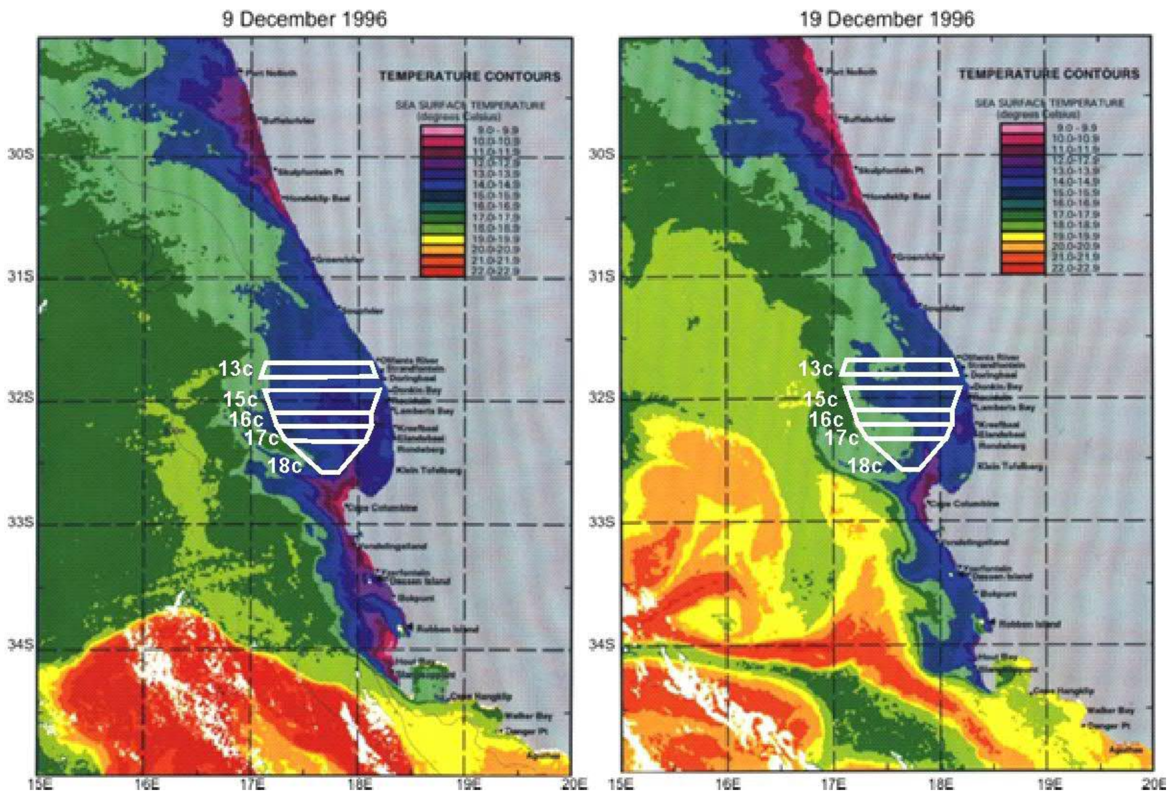

Figure 8: Satellite sea-surface temperature images showing the 13c, 15c, 16c, 17c and 18c concession areas (white polygons) in relation to upwelling intensity along the South African west coast on two days in December 1996 (from Lane & Carter 1999).

3.2.3 Waves and Tides

Most of the west coast of southern Africa is classified as exposed, experiencing strong wave action, rating 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 S and SSW direction (Figure 9). Winter swells are strongly dominated by those from the S and SSW, 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 (~8 seconds), and are generally steeper than swell waves (CSIR 1996).

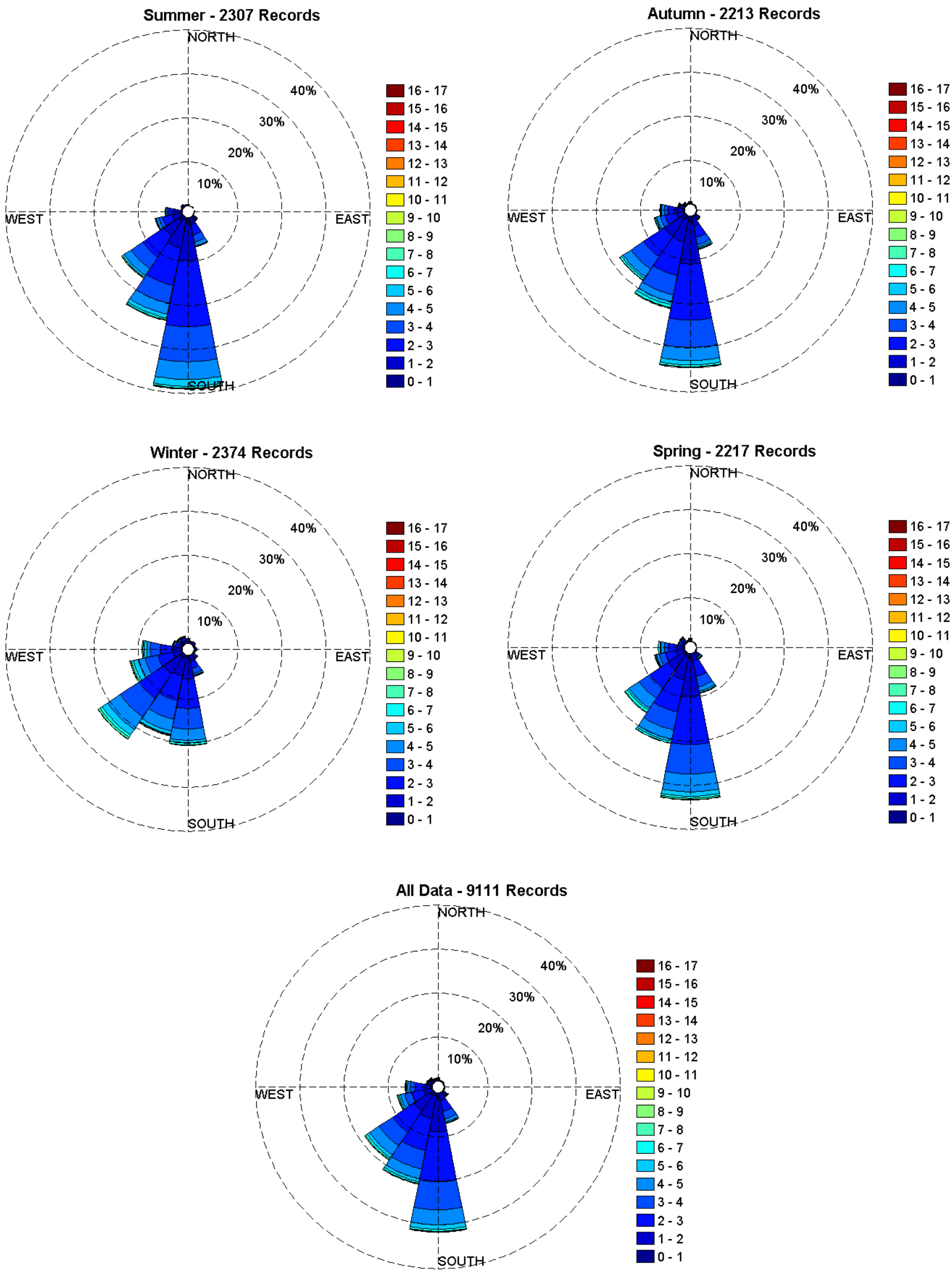

Figure 9: VOS Wave Height vs. Wave Direction data for the Cape Columbine area 32.0 to 32.9 S and 17.0 to 17.9 E (1903-11-01 to 2011-05-24; 9,111 records) (from CSIR).

These wind-induced southerly waves are relatively local and, although less powerful, tend to work together with the strong southerly winds of summer to cause the northward-flowing nearshore surface currents, and result in substantial nearshore sediment mobilisation, and northwards transport, by the combined action of currents, wind and waves.

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

3.2.4 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).

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. South and east of Cape Agulhas, the Agulhas retroflection area is a global "hot spot" in terms of temperature variability and water movements.

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).

3.2.5 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). Nutrient concentrations of upwelled water of the Benguela system attain 20 µM nitrate-nitrogen, 1.5 µM phosphate and 15-20 µM silicate, indicating nutrient enrichment (Chapman & Shannon 1985). This is mediated by nutrient regeneration from biogenic material in the sediments (Bailey *et al.* 1985). Modification of these peak concentrations depends upon phytoplankton uptake which varies according to phytoplankton biomass and production rate. The range of nutrient concentrations can thus be large but, in general, concentrations are high.

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 (see below). Subsequent anoxic decomposition by sulphur reducing bacteria can result in the formation and release of hydrogen sulphide (Pitcher & Calder 2000).

3.2.6 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 (jackass penguins, cormorants, pelicans, terns and others). All of these species are subject to natural mortality, and a proportion of the annual production of all these trophic levels, particularly the plankton communities, die naturally and sink to the seabed.

Balanced multispecies ecosystem models have estimated that during the 1990s the Benguela region supported biomasses of 76.9 tons/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 off the southern African West Coast has a substantial effect on the ecosystems of the Benguela region. It provides most of the food requirements of the particulate and filter-feeding benthic communities that inhabit the sandy-muds of this area, and results in the high organic content of the muds in the region. As most of the organic detritus is not directly consumed, it enters the seabed decomposition cycle, resulting in subsequent depletion of oxygen in deeper waters.

An associated phenomenon ubiquitous to the Benguela system are red tides (dinoflagellate and/or ciliate blooms) (see Shannon & 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 (Figure 10, left). 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 (Figure 10, right).


Figure 10: Red tides can reach very large proportions (left,Photo: www.e-education.psu.edu) and can lead to mass stranding, or ‘walk-out’ of rock lobsters, such as occurred at Elands Bay in February 2002 (Photo: www.waterencyclopedia.com)

3.2.7 Low Oxygen Events

The continental shelf waters of the Benguela system are characterised by low oxygen concentrations with <40% saturation occurring frequently (e.g. Visser 1969; Bailey *et al.* 1985). The low oxygen concentrations are attributed to nutrient remineralisation in the bottom waters of the system (Chapman & 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 (see Figure 6), 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) (see Figure 10, right). The development of anoxic conditions as a result of the decomposition of huge amounts of organic matter generated by phytoplankton 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 where 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.

3.2.8 Turbidity

Turbidity is a measure of the degree to which the water loses its transparency due to the presence of suspended particulate matter. Total Suspended Particulate Matter (TSPM) can be divided into Particulate Organic Matter (POM) and Particulate Inorganic Matter (PIM), the ratios between them varying considerably. The POM usually consists of detritus, bacteria, phytoplankton and zooplankton, and serves as a source of food for filter-feeders. Seasonal microphyte production associated with upwelling events will play an important role in determining the concentrations of POM in coastal waters. PIM, on the other hand, is primarily of geological origin consisting of fine sands, silts and clays. Off Namaqualand, the PIM loading in nearshore waters is strongly related to natural inputs from the Orange River or from 'berg' wind events. Although highly variable, annual discharge rates of sediments by the Orange River is estimated to vary from 8 - 26 million tons/yr (Rogers 1979). 'Berg' wind events can potentially contribute the same order of magnitude of sediment input as the annual estimated input of sediment by the Orange River (Shannon & Anderson 1982; Zoutendyk 1992, 1995; Shannon & O'Toole 1998; Lane & Carter 1999). For example, a 'berg' wind event in May 1979 described by Shannon and Anderson (1982) was estimated to have transported in the order of 50 million tons of sand out to sea, affecting an area of 20 000 km^2.

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 resuspending and transporting considerable quantities of sediment equatorwards. Under relatively calm wind conditions, however, much of the suspended fraction (silt and clay) that remains in suspension for longer periods becomes entrained in the slow poleward undercurrent (Shillington *et al.* 1990; Rogers & Bremner 1991).

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

On the inner and middle continental shelf, the ambient currents are insufficient to transport coarse sediments 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). 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 ~10 m depth, whilst 6-m waves achieve this at ~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, and discharges from terrestrial, coastal and marine mining operations (Airoldi 2003). Such increase of sediment loads has been recognised as a major threat to marine biodiversity at a global scale (UNEP 1995).

3.3. The Biological Environment

Biogeographically, the study area falls within the cold temperate Namaqua Bioregion (Emanuel *et al.* 1992; Lombard *et al.* 2004) (Figure 11), which in the 2018 National Biodiversity Assessment (Sink *et al.* 2019) is referred to as as a subregion of the Southern Benguela Shelf ecoregion. 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 concession areas are located beyond the 65 m depth contours. 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.

The biological communities consist of many hundreds of species, often displaying considerable temporal and spatial variability (even at small scales). No rare or endangered species have been recorded (Awad *et al.* 2002). 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 prospecting activities. The description of benthic macrofaunal communities was provided by Natasha Karenyi of the South African National Biodiversity Institute (SANBI), and the section on marine mammals was provided by Dr Simon Elwen of the Namibian Dolphin

Project and Mammal Research Institute (University of Pretoria) for a similar offshore project off the West Coast.

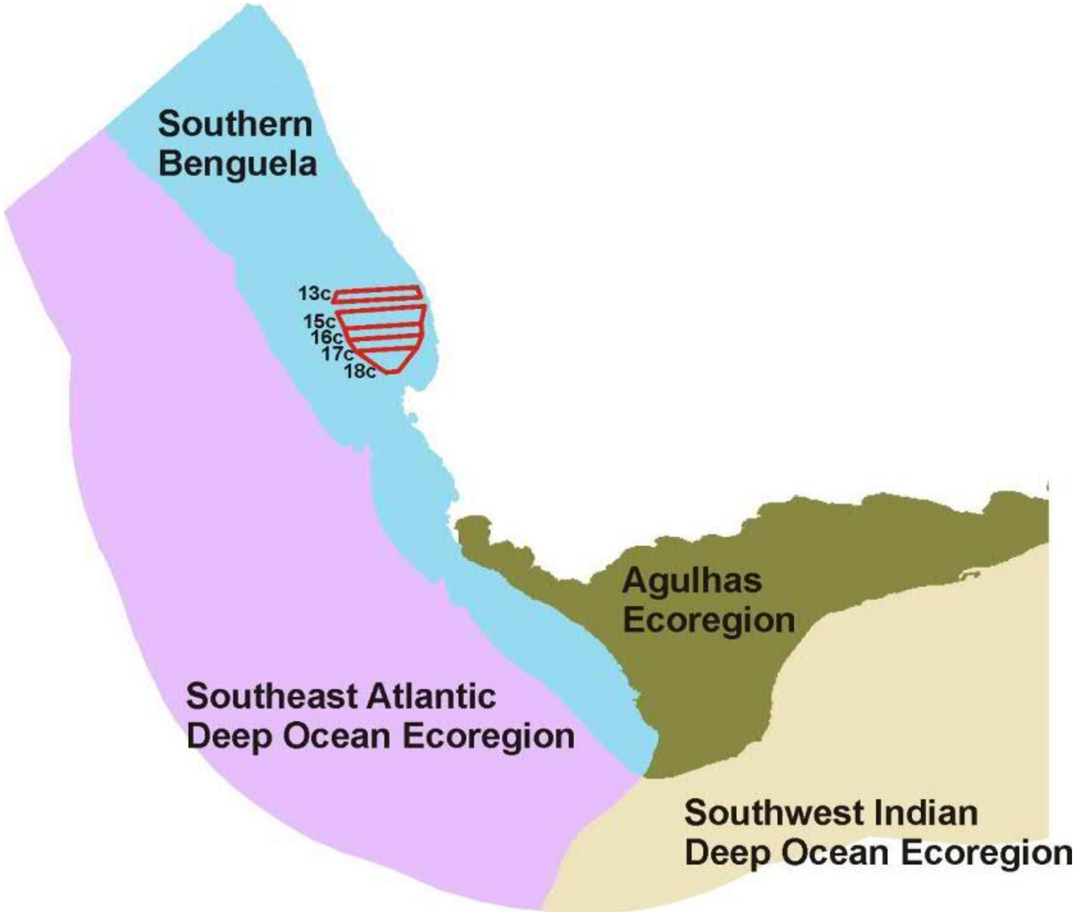

Figure 11: The South African ecoregions in relation to the 13c, 15c, 16c, 17c and 18c concessions (red polygons) (adapted from Sink *et al.* 2019).

3.3.1 Sandy Substrate Habitats and Biota

The benthic biota of soft bottom substrates constitutes invertebrates that live on, or burrow within, the sediments, and are generally divided into megafauna (>10 cm), macrofauna (animals >1 mm) and meiofauna (<1 mm).

Nearshore and Offshore unconsolidated habitats

Numerous studies have been conducted on southern African West Coast continental shelf benthos, mostly focused on mining, pollution or demersal trawling impacts (Christie & Moldan 1977; Moldan 1978; Jackson & McGibbon 1991; Environmental Evaluation Unit 1996; Field & Parkins 1997; Parkins & Field 1997; 1998; Pulfrich & Penney 1999; Goosen *et al.* 2000; Savage *et al.* 2001; Steffani & Pulfrich 2004a, 2004b; 2007; Steffani 2007a; 2007b; Steffani 2009a, 2009b, 2010a, 2010b, 2010c; Atkinson *et al.* 2011; Steffani 2012a, 2012b, 2014; Karenyi 2014; Steffani *et al.* 2015; Biccard & Clark 2016; Biccard *et al.* 2016; Duna *et al.* 2016; Karenyi *et al.* 2016; Biccard et al 2017, 2918, 2019). The description below is drawn from these.

Three macro-infauna communities have been identified on the inner- (0-30 m depth) and mid-shelf (30-150 m depth, Karenyi 2014; Karenyi *et al.* 2016) off the Namaqualand coast. 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 (Figure 12). 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, 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' (Figure 13) (see 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 31. 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 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.
Table 7). Those habitat types within the general project area and concessions 13c, 15c, 16c, 17c and 18c are illustrated in Figure 14.

Figure 12: Benthic macrofaunal genera commonly found in nearshore sediments include: (top: left to right) *Ampelisca*, *Prionospio*, *Nassarius*; (middle: left to right) *Callianassa*, *Orbinia*, *Tellina*; (bottom: left to right) *Nephtys*, hermit crab, *Bathyporeia*.

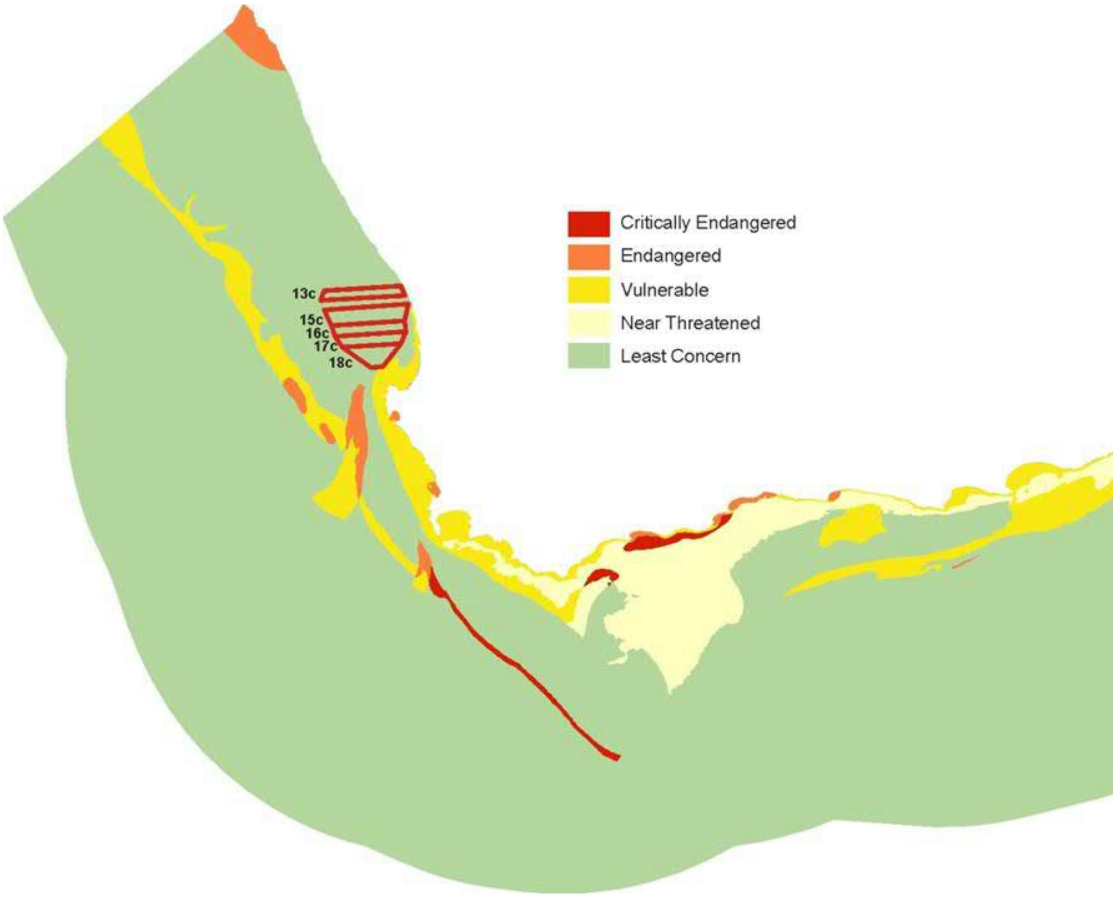

Figure 13: Concessions 13c, 15c, 16c, 17c and 18c (red polygons) in relation to the ecosystem threat status for coastal and offshore ecosystem types on the South African West Coast (adapted from Sink *et al.* 2019).

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) and elsewhere in the world (e.g. Gray 1981; Ellingsen 2002; Bergen *et al.* 2001; Post *et al.* 2006). 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. There are clearly other natural processes operating in the deepwater shelf areas of the West Coast that can over-ride the suitability of sediments in determining benthic community structure, and it is

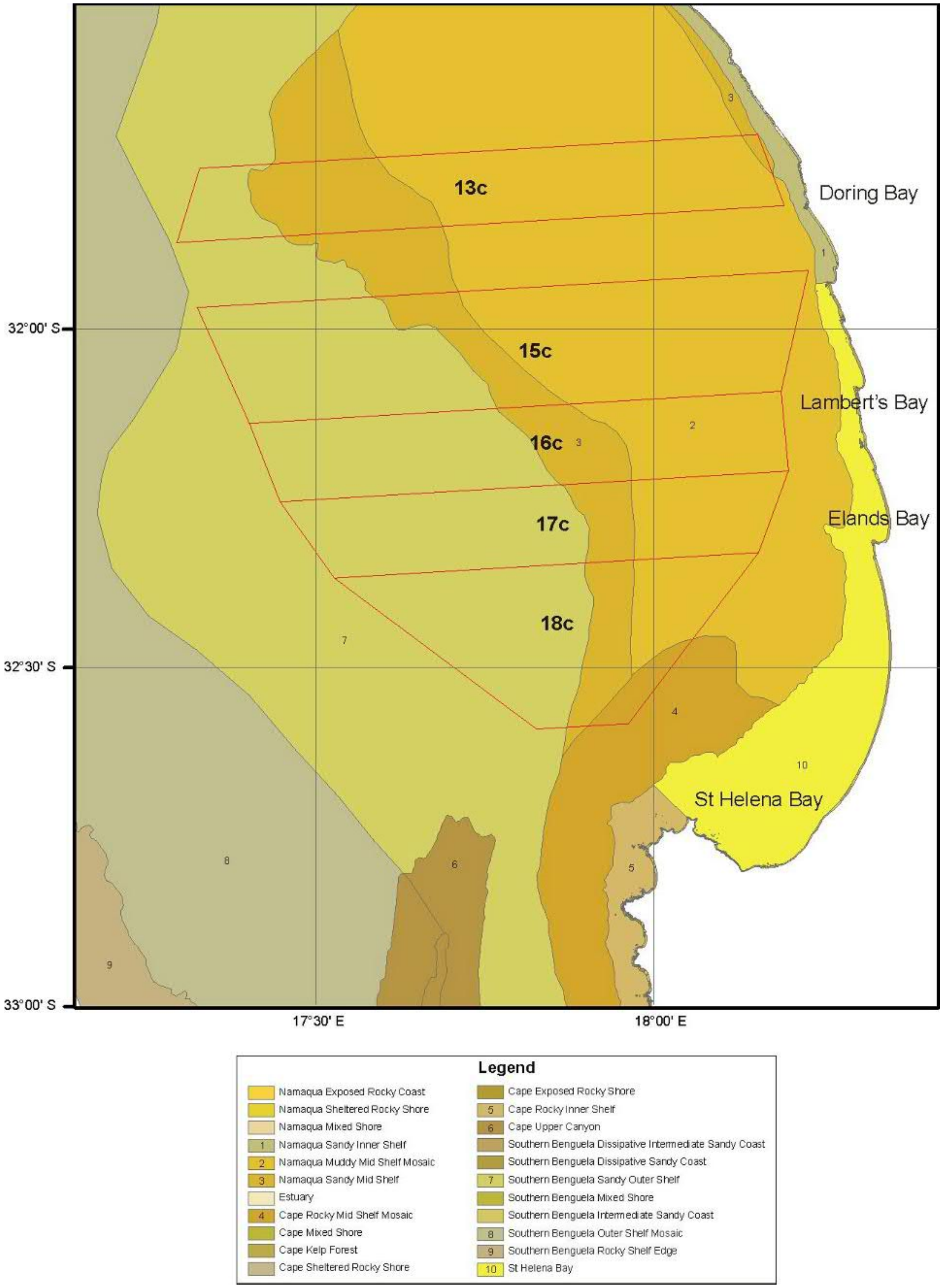

Figure 14: Marine Ecosystem types in Concessions 13c, 15c, 16c, 17c and 18c (red polygons). The ecosystem types affected by the proposed sediment sampling are identified in Table 6. Only nearshore and offshore habitat types are numbered according to the legend.

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).

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) the continental shelf on the West Coast between depths of 100 m and 250 m, contained a single epifaunal community 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.

3.3.2 Rocky Substrate Habitats and Biota

The biological communities of rocky subtidal reefs are generally ubiquitous throughout the southern African West Coast region, being particular only to wave exposure, turbulence and/or depth zone. Whereas the rocky subtidal communities in the wave base regime along the West Coast is relatively well known, information is largely lacking on deep-water reef communities due primarily to limited opportunities for sampling.

Deep-water coral communities

There has been increasing interest in deep-water corals in recent years because of their likely sensitivity to disturbance and their long generation times. These benthic filter-feeders generally occur at depths below 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. Nutrient seepage from the substratum might also promote a location for settlement (Hovland *et al.* 2002). In the productive Benguela region, substantial areas on and off the edge of 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) (Figure 15) suggest that vulnerable communities including gorgonians, octocorals and reef-building sponges do occur on the continental shelf.

Figure 15: Gorgonians and bryozoans communities recorded on deep-water reefs (100-120 m) off the southern African West Coast (Photos: De Beers Marine).

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). 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) (Figure 16, left) 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 (Figure 16, right) 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).

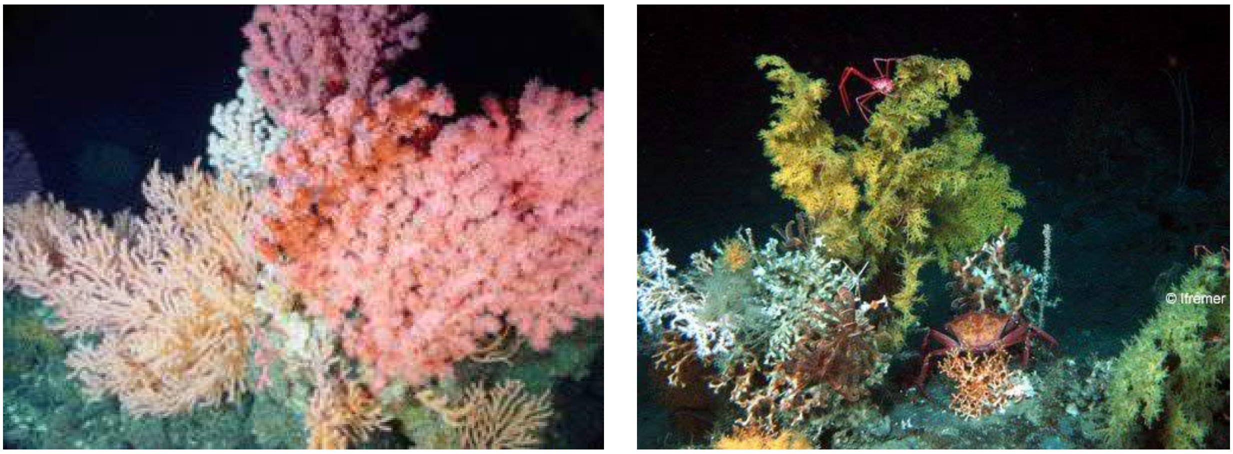

Figure 16: Seamounts are characterised by a diversity of deep-water corals that add structural complexity to seabed habitats and offer refugia for a variety of invertebrates and fish (Photos: www.dfo-mpo.gc.ca/science/Publications/article/2007/21-05-2007-eng.htm, Ifremer & AWI 2003).

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).

3.3.3 The Water Body

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 occurring 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 1.

Table 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
Yellowspot skate	*Raja wallacei*	70-500
Biscuit skate	*Raja clavata*	25-500
Spearnose skate	*Raja alba*	75-260
St Joseph	*Callorhinchus capensis*	30-380

Pelagic Communities

In contrast to demersal and benthic biota that are associated with the seabed, pelagic species live and feed in the 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. These are discussed separately below.

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 (Figure 17).

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.

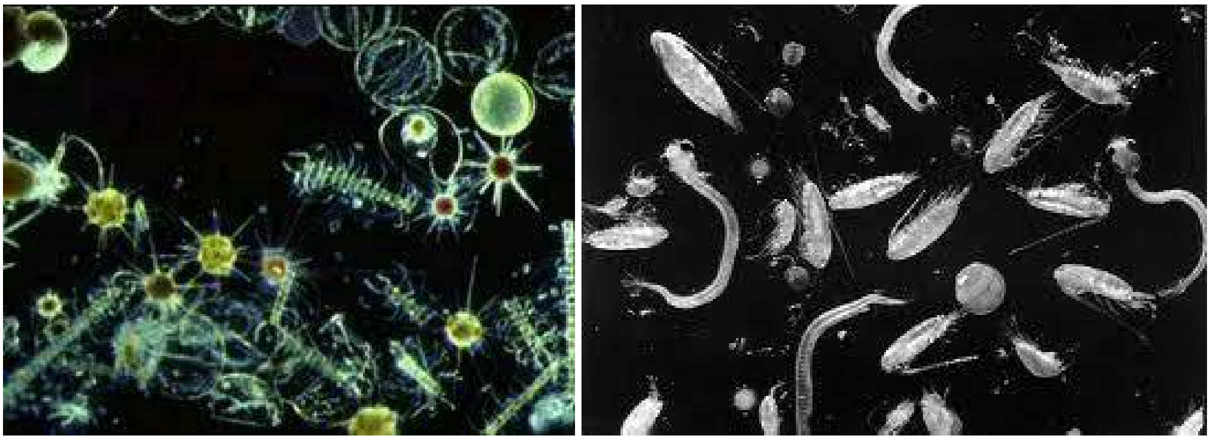

Figure 17: Phytoplankton (left, photo: hymagazine.com) and zooplankton (right, photo: mysciencebox.org) is associated with upwelling cells.

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 18), and their eggs and larvae form an important contribution to the ichthyoplankton in the region. Ichthyoplankton abundance within the Concession Areas is thus expected to be high.

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 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 (Figure 19, top) while the giant squid is usually found near continental and island slopes all around the world's oceans (Figure 19, bottom). Growing to in excess of 10 m in length, they are the principal prey of the sperm whale, and are also taken by beaked whaled, pilot whales, elephant seals and sleeper sharks. Nothing is known of their vertical distribution, but data from trawled specimens and sperm whale diving behaviour suggest they may span a depth range of 300 – 1 000 m. They lack gas-filled swim bladders and maintain neutral buoyancy through an ammonium chloride solution occurring throughout their bodies.

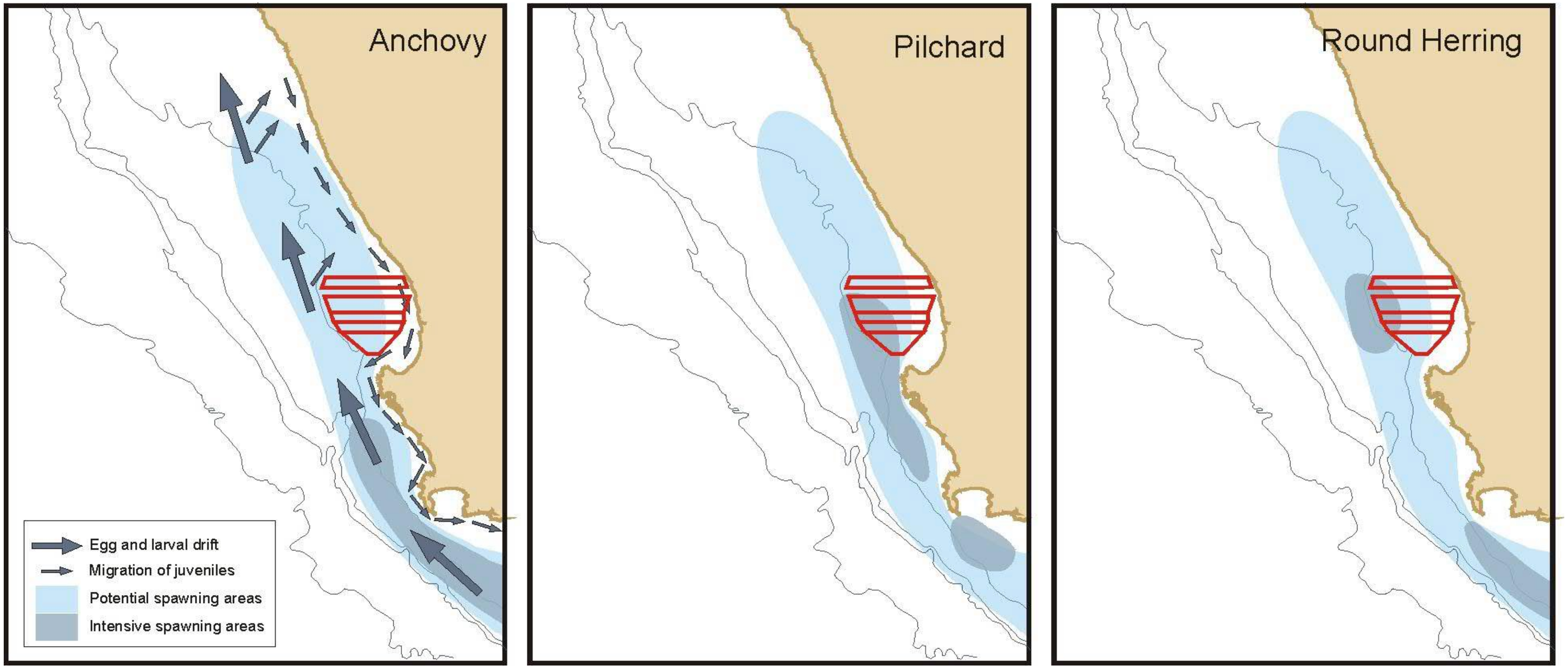

Figure 18: Concessions 13c, 15c, 16c, 17c and 18c (red polygons) in relation to the major spawning areas in the southern Benguela region (adapted from Cruikshank 1990).

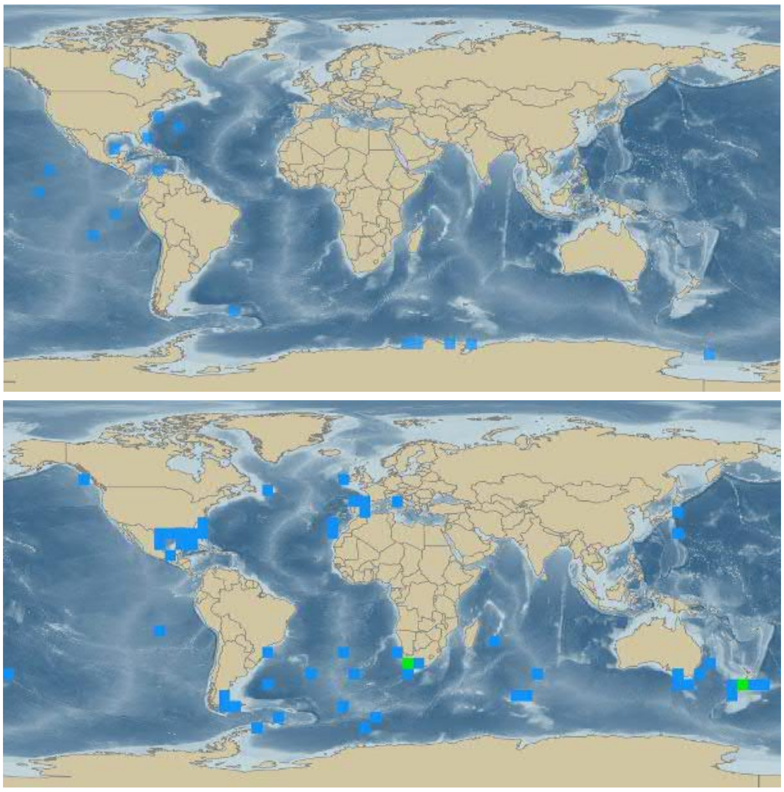

Figure 19: Distribution of the colossal squid (top; http://iobis.org) and the giant squid (bottom; http://iobis.org). Blue squares <5 records, green squares 5-10 records.

Pelagic Fish

Small pelagic species occurring beyond the surfzone and generally within the 200 m contour include the sardine/pilchard (*Sadinops ocellatus*) (Figure 20, left), anchovy (*Engraulis capensis*), chub mackerel (*Scomber japonicus*), horse mackerel (*Trachurus capensis*) (Figure 20, right) 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 extending 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.

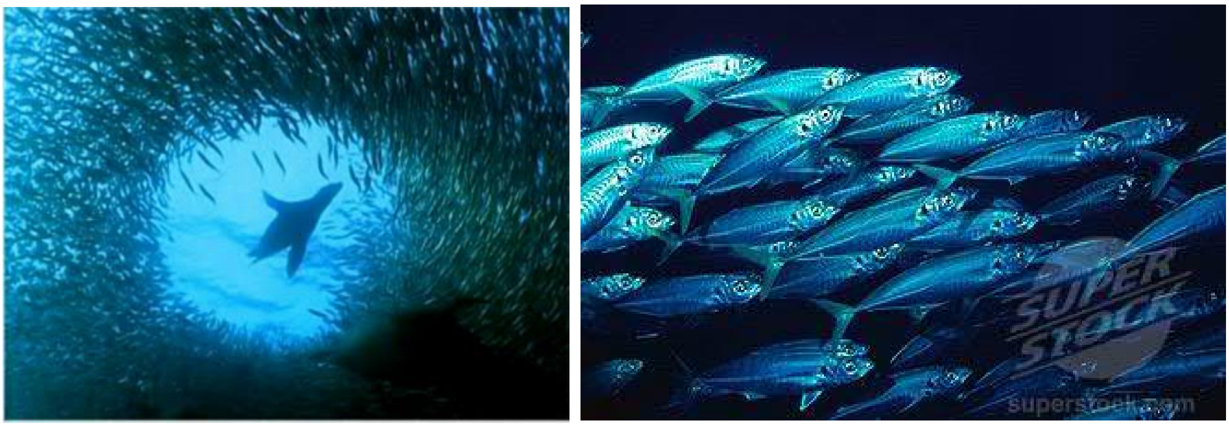

Figure 20: Cape fur seal preying on a shoal of pilchards (left). School of horse mackerel (right) (photos: www.underwatervideo.co.za; www.delivery.superstock.com).

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).

The fish most likely to be encountered in the Concession Areas are the large pelagic species such as tunas, billfish and pelagic sharks, which 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* (Figure 21, right), yellowfin *T. albacares*, bigeye *T. obesus*, and skipjack *Katsuwonus pelamis tunas*, as well as the Atlantic blue marlin *Makaira nigricans* (Figure 21, left), the white marlin *Tetrapturus albidus* and the broadbill swordfish *Xiphias gladius* (Payne & Crawford 1989). The distributions of these species is dependent on food availability in the mixed boundary layer between the Benguela and warm central Atlantic waters. These species have a highly seasonal abundance in the Benguela and show seasonal associations with underwater feature such as canyons and seamounts as well as meteorologically induced oceanic fronts (Penney *et al.* 1992). Underwater features in the vicinity of the Concession Areas include the Cape Canyon and Cape Valley, which lie some 30 km to the southwest of Concession 18c, and Child's Bank, which lies some 180 km to the northwest of 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).

Figure 21: Large migratory pelagic fish such as blue marlin (left) and longfin tuna (right) occur in offshore waters (photos: www.samathatours.com; www.osfimages.com).

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.

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.

Table 2: Some of the more important large migratory pelagic fish likely to occur in the offshore regions of the West Coast.

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

Common Name	Species	IUCN Conservation Status
Striped Marlin	*Kajikia audax*	Near Threatened
Sailfish	*Istiophorus platypterus*	Least concern
Swordfish	*Xiphias gladius*	Least concern
Pelagic Sharks		
Great Hammerhead Shark	*Sphyrna mokarran*	Endangered
Smooth Hammerhead shark	*Sphyrna zygaena*	Vulnerable
Pelagic Thresher Shark	*Alopias pelagicus*	Vulnerable
Bigeye Thresher Shark	*Alopias superciliosus*	Vulnerable
Common Thresher Shark	*Alopias vulpinus*	Vulnerable
Great White Shark	*Carcharodon carcharias*	Vulnerable
Shortfin Mako	*Isurus oxyrinchus*	Endangered
Longfin Mako	*Isurus paucus*	Vulnerable
Whale Shark	*Rhincodon typus*	Endangered
Blue Shark	*Prionace glauca*	Near Threatened

Turtles

Three species of turtle occur along the West Coast, namely the Leatherback (*Dermochelys coriacea*) (Figure 22, left), and occasionally the Loggerhead (*Caretta caretta*) (Figure 22, right) and the Green (*Chelonia mydas*) turtle. Loggerhead and Green turtles are expected to occur only as occasional visitors along the West Coast.

Figure 22: Leatherback (left) and loggerhead turtles (right) occur along the West Coast of Southern Africa (Photos: Ketos Ecology 2009; www.aquaworld-crete.com).

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[1]). 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) (Figure 23).

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 CMS (Convention on Migratory Species). Loggerhead and green turtles are listed as “Endangered”. As a signatory of CMS, South Africa has endorsed and signed a CMS International Memorandum of Understanding specific to the conservation of marine turtles. South Africa is thus committed to conserve these species at an international level.

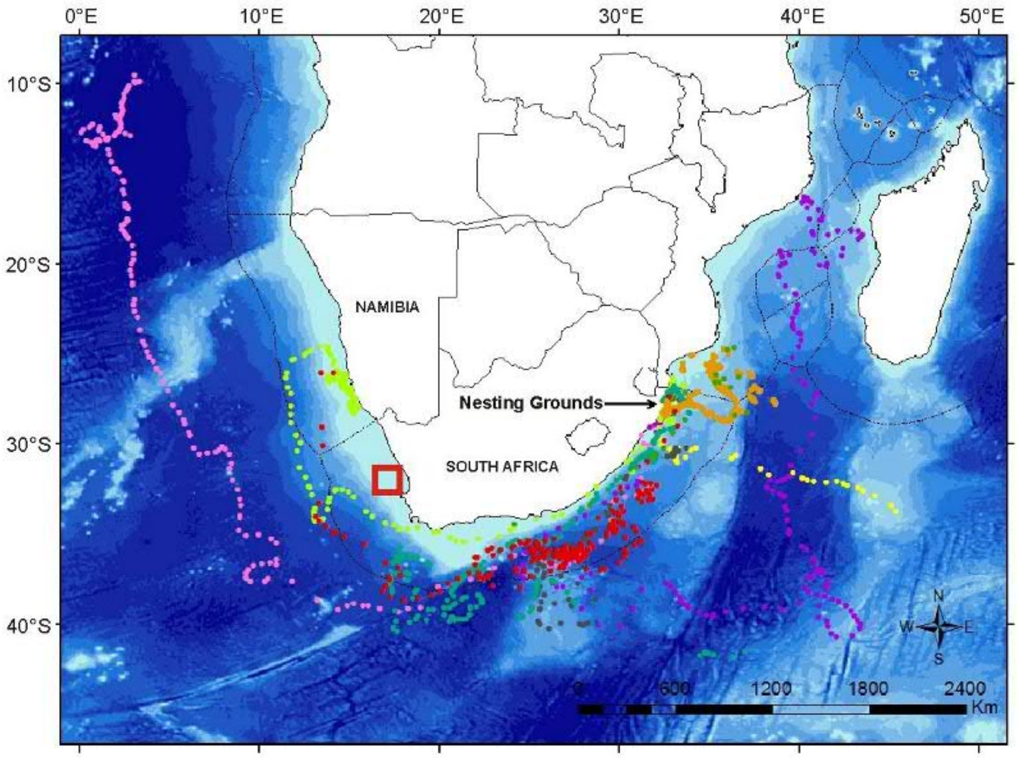

Figure 23: The post-nesting distribution of nine satellite tagged leatherback females (1996 – 2006; Oceans and Coast, unpublished data) in relation to the location of concessions 13c, 15c, 16c, 17c and 18c (red polygon).

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

Seabirds

Large numbers of coastal and 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 3. 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.

14 species of seabirds breed in southern Africa; Cape Gannet (Figure 24, left), African Penguin (Figure 24, right), four species of Cormorant, White Pelican, three Gull and four Tern species (Table 4). The breeding areas are distributed around the coast with islands being especially important. Breeding islands within 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.

Table 3: Pelagic seabirds common in the southern Benguela region (Crawford *et al.* 1991).

Common Name	Species name	RSA Regional Assessment
Shy albatross	*Thalassarche cauta*	Near Threatened
Black browed albatross	*Thalassarche melanophrys*	Endangered
Yellow nosed albatross	*Thalassarche chlororhynchos*	Endangered
Giant petrel sp.	*Macronectes halli/giganteus*	Near Threatened
Pintado petrel	*Daption capense*	Least concern
Greatwinged petrel	*Pterodroma macroptera*	Near Threatened
Soft plumaged petrel	*Pterodroma mollis*	Near Threatened
Prion spp	*Pachyptila* spp.	Near Threatened
White chinned petrel	*Procellaria aequinoctialis*	Vulnerable
Cory's shearwater	*Calonectris diomedea*	Least concern
Great shearwater	*Ardenna gravis*	Least concern
Sooty shearwater	*Ardenna griseus*	Near Threatened
Grey-backed storm petrel	*Oceanodroma leucorhoa*	Near Threatened
Wilson's storm petrel	*Oceanites oceanicus*	Least concern
Blackbellied storm petrel	*Fregetta tropica*	Near Threatened
Subantarctic Skua	*Catharacta antarctica*	Endangered
Sabine's gull	*Xema sabini*	Least concern

Figure 24: Cape Gannets *Morus capensis* (left) (Photo: NACOMA) and African Penguins *Spheniscus demersus* (right) (Photo: Klaus Jost) breed primarily on the offshore Islands.

Table 4: Breeding resident seabirds present along the West Coast (CCA & CMS 2001).

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

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 (Table 5). Apart from the resident species such as the endemic Heaviside's dolphin and dusky dolphin, the Benguela also hosts species that migrate between Antarctic feeding grounds and warmer breeding ground waters, as well as species with a global distribution. 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 and deep diving species (e.g. beaked whales) 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). Concession 13c, 15c, 16c, 17c and 18c lie 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 ~100 km offshore and on the western edge of the Concession Areas) 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. The continental slope (200-2 000m) tends to support the highest diversity of cetaceans, as species from both shelf and pelagic environments may be found. Cetacean density (i.e. number of animals encountered) on the continental shelf is usually higher than in pelagic waters as species associated with the pelagic environment tend to be wide ranging across 1 000s of km.

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.

Table 5 lists the cetaceans likely to be found within the Reconnaissance Permit Area, based on data sourced from: Findlay *et al.* (1992), Best (2007), Weir (2011), and unpublished records held by Sea Search / Namibian Dolphin Project. Of the 35 species listed, the blue whale is listed as “critically endangered”, the fin and sei whales are endangered and the sperm, Bryde’s (inshore) and humpback (B2 population) are considered vulnerable (South African Red Data list Categories). Altogether eight species are listed as “data deficient” underlining how little is known about cetaceans, their distributions and population trends. Even historical data from commercial whaling activities dating from the 1960s, or government run cruises between 1975 and 1986 (Findlay *et al.* 1992), mostly occurred inshore of the Reconnaissance Permit Area. 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). The large whale species for which there are current data available are the humpback and southern right whale, although almost all data is limited to that collected on the continental shelf close to shore.

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

Table 5: Cetaceans occurrence off the West Coast of South Africa, their seasonality, likely encounter frequency with proposed prospecting activities and South African Red List conservation status (Child *et al.* 2016).

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

Common Name	Species	Shelf	Offshore	Seasonality	Likely encounter frequency	IUCN Conservation Status
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
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 6: 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). 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 5.

	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

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.

BRYDE'S WHALE (*BALAENOPTER EDENI*) - Two genetically and morphologically distinct populations of Bryde's whales (Figure 25, left) 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 broaderProject 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). Only the offshore form may be encountered in the offshore portions of the Concession Areas.

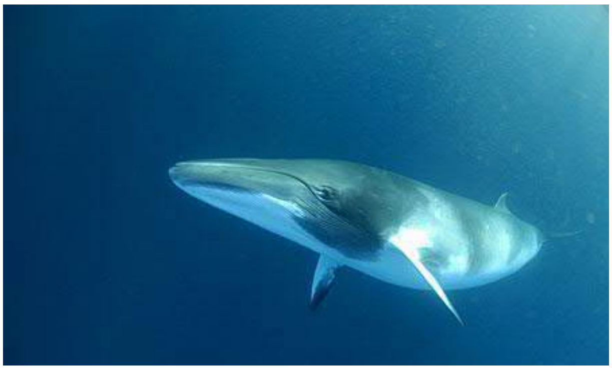

Figure 25: The Bryde's whale *Balaenoptera brydei* (left) and the Minke whale *Balaenoptera bonaerensis* (right) (Photos: www.dailymail.co.uk; www.marinebio.org).

SEI WHALE (*BALAENOPTERA BOREALIS*) - 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 concession areas due to their distribution further offshore.

FIN WHALE (*BALAENOPTERA PHYSALUS*) - 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.

BLUE WHALE (*BALAENOPTERA MUSCULUS*) - 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 SE 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 concession areas are unlikely.

MINKE WHALE (*BALAENOPTERA BONAERENSIS / ACUTOROSTRATA*) - Two forms of minke whale (Figure 25, right) 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 ~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.

PYGMY RIGHT WHALE (*CAPEREA MARGINATA*) - this 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 is may occur in the deeper portions of the concession areas.

The most abundant baleen whales in the Benguela are southern right whales and humpback whales (Figure 26). 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 SE 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 2000s (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 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.

SOUTHERN RIGHT WHALE (*EUBALAENA AUSTRALIS*) - 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). While in southern African waters, the vast majority of whales remain with a few kilometers of shore, predominantly in sheltered bays. The most recent abundance estimate for this population (2017), estimated the population at ~6,116 individuals including all age and sex classes, which is thought to be at least 30% of the original population size with the population growing at ~6.5% per year since monitoring began (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 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 concession areas between November and January.

Figure 26: The Humpback whale *Megaptera novaeangliae* (left) and the Southern Right whale *Eubalaena australis* (right) are the most abundant large cetaceans occurring along the southern African West Coast (Photos: www.divephotoguide.com; www.aad.gov.au).

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).

SPERM WHALE (*PHYSETER MACROCEPHALUS*) - 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 1 000 m depth, although they occasionally come onto the shelf in water 500 - 200 m deep (Best 2007) (Figure 27, left). 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 likely to be encountered in relatively high numbers in deeper waters (>500 m) beyond the 13c, 15c, 16c, 17c and 18c 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).

Figure 27: Sperm whales *Physeter macrocephalus* (left) and killer whales *Orcinus orca* (right) are toothed whales likely to be encountered in offshore waters (Photos: www.onpoint.wbur.org; www.wikipedia.org).

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 southern Africa. Beaked whales are all considered to be true deep water species usually being seen in waters in excess of 1 000 – 2 000 m deep (see various species accounts in Best 2007). Presence in the concession areas may fluctuate seasonally, but insufficient data exist to define this clearly.

PYGMY AND DWARF SPERM WHALES (KOGIA SPP) - 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 concession areas.

KILLER WHALE (*ORCINUS ORCA*) - Killer whales (Figure 27) 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 concession areas at low levels.

FALSE KILLER WHALE (*PSEUDORCA CRASSIDENS*) – 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 (*GLOBICEPHALA MELAS*) – 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 project area will be long-finned.

COMMON DOLPHIN (*DELPHINUS* SPP.) – 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 concession areas 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.

DUSKY DOLPHINS (*LAGENORHYNCHUS OBSCURUS*) - In water <500 m deep, dusky dolphins (Figure 28, right) are likely to be the most frequently encountered small cetacean as they are very “boat friendly” and often approach vessels to bowride. The species is resident year round throughout the Benguela ecosystem in waters from the coast to at least 2 000 m deep (Findlay *et al.* 1992; Sea Search data). Although no information is available on the size of the population, they are regularly encountered in near shore waters between Cape Town and Lambert’s Bay (Elwen *et al.* 2010; Sea Search 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 ~27°S and 30°S, associated with the Lüderitz upwelling cell (Findlay *et al.* 1992).

HEAVISIDE’S DOLPHINS (*CEPHALORHYNCHUS HEAVISIDII*) – This species (Figure 28, left) is 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 2008; Elwen *et al.* 2009a, 2009b). The Heaviside’s dolphin 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 concession areas.

Figure 28: The endemic Heaviside's Dolphin *Cephalorhynchus heavisidii* (left) (Photo: De Beers Marine Namibia), and Dusky dolphin *Lagenorhynchus obscurus* (right) (Photo: scottelowitzphotography.com).

OTHER DELPHINIDS – 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 (VARIOUS SPECIES) – 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 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).

All whales and dolphins are given protection under the South African Law.

Pinnepeds

The Cape fur seal (*Arctocephalus pusillus pusillus*) (Figure 29) 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 (see Figure 31). 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).

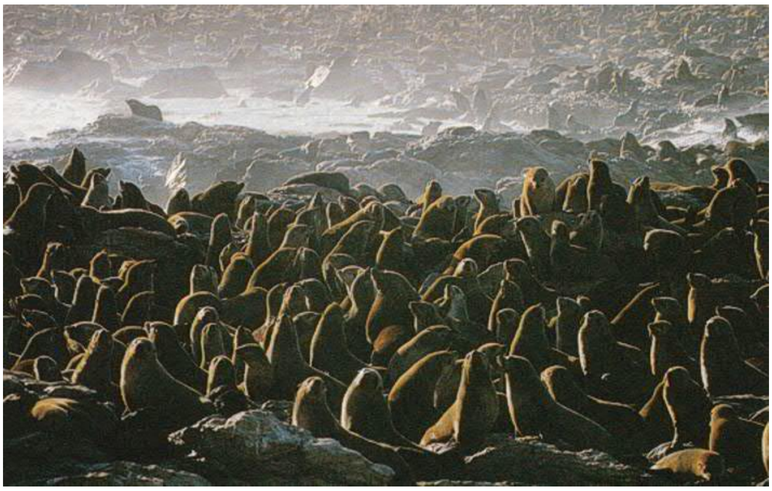

Figure 29: Colony of Cape fur seals *Arctocephalus pusillus pusillus* (Photo: Dirk Heinrich).

There are a number of Cape fur seal colonies within the broader study 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. These colonies all fall inshore and to the north or south of concessions 13c, 15c, 16c, 17c and 18c. 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 survey and sampling activities in the inshore portions of the Concession Areas.

3.4. Other Uses of the Area

3.4.1 Beneficial Uses

Other users within and surrounding concession areas 13c, 15c, 16c, 17c and 18c include the commercial fishing industry (see Specialist Report on Fisheries), neighbouring marine diamond mining concession holders (see Figure 32) and hydrocarbon exploration and production licences (see Figure 32). Recreational use of the offshore areas is negligible.

3.4.1.1 Diamond Mining and Minerals Prospecting

Concessions 13c, 15c, 16c, 17c and 18c lie adjacent to a number of other marine diamond mining concession areas (Figure 32). The marine diamond mining 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 (Figure 32). On the Namaqualand coast marine diamond mining activity is primarily restricted to the surf-zone and (a)-concessions, which extend to 1 000 m offshore of the high water mark. Nearshore shallow-water mining is typically conducted by divers using small-scale suction hoses operating either directly from the shore in small bays or from converted fishing vessels out to ~30 m depth. 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. Some vessels still operate out of Alexander Bay and Port Nolloth, but activity out of Hondeklip Bay has all but ceased.

Deep-water diamond mining and prospecting is currently limited to operations by Belton Park Trading 127 (Pty) Ltd in concessions 2C and 3C for mining and by De Beers Marine in concessions 4C -6C for prospecting.

There are also a number of proposed prospecting areas for glauconite and phosphorite / phosphate, although the Sea Concession areas are located to the east of these (Figure 30). Green Flash Trading received their prospecting rights for Areas 251 and 257 in 2012/2013.

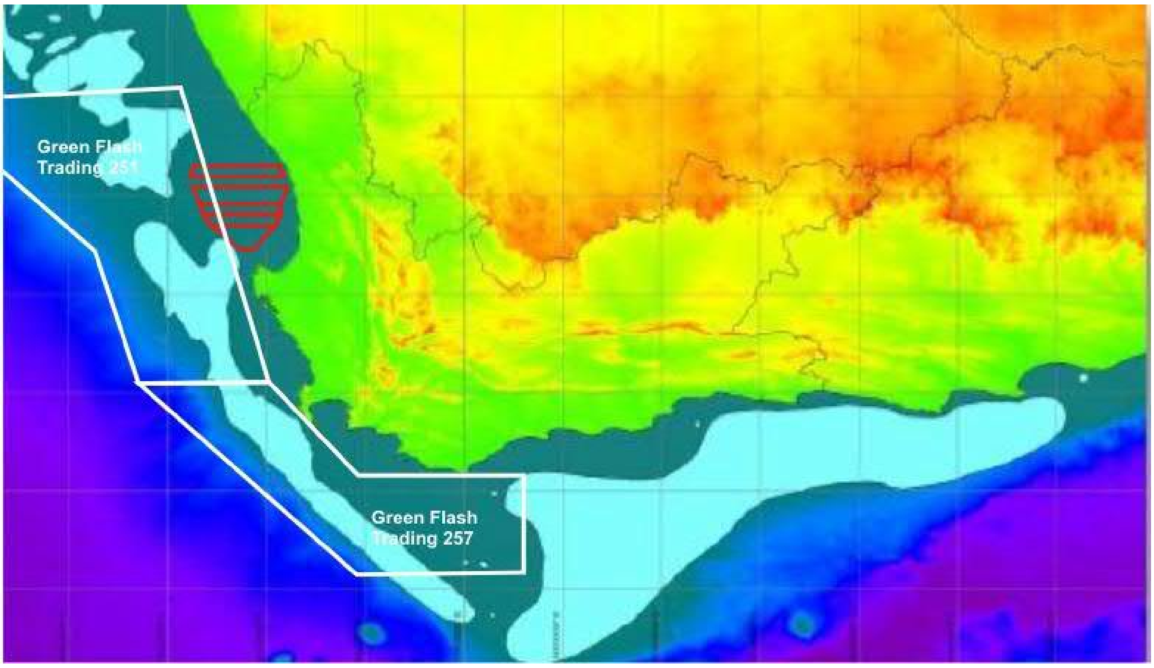

Figure 30: Approximate location of Sea Concessions 13c, 15c, 16c, 17c and 18c (red polygons) in relation to phosphate prospecting areas (white polygons). Light blue shaded areas indicate the distribution of phosphorite hard ground (adapted from Morant 2013).

3.4.1.2 Hydrocarbons

The South African continental shelf and economic exclusion zone (EEZ) have similarly been partitioned into Licence Blocks for petroleum exploration and production activities. Exploration has included extensive 2D and 3D seismic surveys and the drilling of numerous exploration wells, with ~40 wells having been drilled in the Namaqua Bioregion since 1976 (Figure 33). The majority of these occur in the iBhubesi gas field in Block 2A. Prior to 1983,

technology was not available to remove wellheads from the seafloor and currently 35 wellheads remain on the seabed.
Although no wells have recently been drilled in the area, further exploratory drilling is proposed for inshore and offshore portions of Block 1, Block 02B and the Orange Basin. A subsea pipeline to export gas from the iBhubesi field to a location either on the Cape Columbine peninsula or to Ankerlig ~25 km north of Cape Town is also proposed.

3.4.2 Conservation Areas and Marine Protected Areas

Numerous conservation areas and a marine protected area (MPA) exist along the coastline of the Western Cape, although these are all located to the south of concessions 13c, 15c, 16c, 17c and 18c (Figure 33). For the sake of completeness, they are briefly summarised below.

The Rocher Pan MPA, which stretches 500 m offshore of the high water mark of the adjacent Rocher Pan Nature Reserve, was declared in 1966. The MPA primarily protects a stretch of beach important as a breeding area to numerous waders.

The West Coast National Park, which was established in 1985 incorporates the Langebaan Lagoon and Sixteen Mile Beach MPAs, as well the islands Schaapen (29 ha), Marcus (17 ha), Malgas (18 ha) and Jutten (43 ha). Langebaan Lagoon was designated as a Ramsar site in April 1988 under the Convention on Wetlands of International Importance especially as Waterfowl Habitat. The lagoon is divided into three different utilization zones namely: wilderness, limited recreational and multi-purpose recreational areas. The wilderness zone has restricted access and includes the southern end of the lagoon and the inshore islands, which are the key refuge sites of the waders and breeding seabird populations respectively. The limited recreation zone includes the middle reaches of the lagoon, where activities such as sailing and canoeing are permitted. The mouth region is a multi-purpose recreation zone for power boats, yachts, water-skiers and fishermen. However, no collecting or removal of abalone and rock lobster is allowed. The length of the combined shorelines of Langebaan Lagoon MPA and Sixteen Mile Beach is 66 km. The uniqueness of Langebaan lies in its being a warm oligotrophic lagoon, along the cold, nutrient-rich and wave exposed West Coast.

No rock lobster may be caught in Saldanha Bay eastwards of a line between North Head and South Head. There is also a Rock Lobster Sanctuary in St Helena Bay. Further marine conservation areas in the Saldanha/Cape Columbine region include:

- Paternoster Rocks – Egg and Seal Island reserves for seabirds and seals
- Jacob's Reef - Island reserve for seabirds and seals
- An area within the military base, SAS Saldanha
- Vondeling Island

The Table Mountain National Park (TMNP) MPA was declared in 2004, and includes 996 km^2 of the sea area and 137 km of coastline around the Cape Peninsula from Moullie Point in the North to Muizenberg in the south. Although fishing is allowed in the majority of the MPA (subject to Department of Agriculture, Forestry and Fisheries (DAFF) permits, regulations and seasons), the MPA includes six 'no-take' zones where no fishing or extractive activities are allowed. These 'no-take' zones are important breeding and nursery areas for a wide variety of marine species thereby providing threatened species with a chance to recover form over-exploitation.

3.4.3 Threat Status and Vulnerable Marine Ecosystems

Until early 2019, 'no-take' MPAs offering protection of the Namaqua biozones (sub-photic, deep-photic, shallow-photic, intertidal and supratidal zones) were absent northwards of Cape Columbine (Emanuel *et al.* 1992, Lombard *et al.* 2004). 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 the coastal habitat types in Namaqualand being assigned a threat status of 'endangered', 'vulnerable' or of 'least concern' (Sink *et al.* 2019). 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 (Table 7; see also Figure 14). 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'.

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 within the broad project area are shown in Figure 31. There is no overlap of concession areas 13c, 15c, 16c, 17c and 18c with any of these MPAs, or with any other coastal MPAs, sanctuaries or conservation areas.

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 31. 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 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.

Table 7: Ecosystem threat status for marine and coastal habitat types in Concessions 13c, 15c, 16c, 17c and 18c (adapted from Sink *et al.* 2018). 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

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. 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.

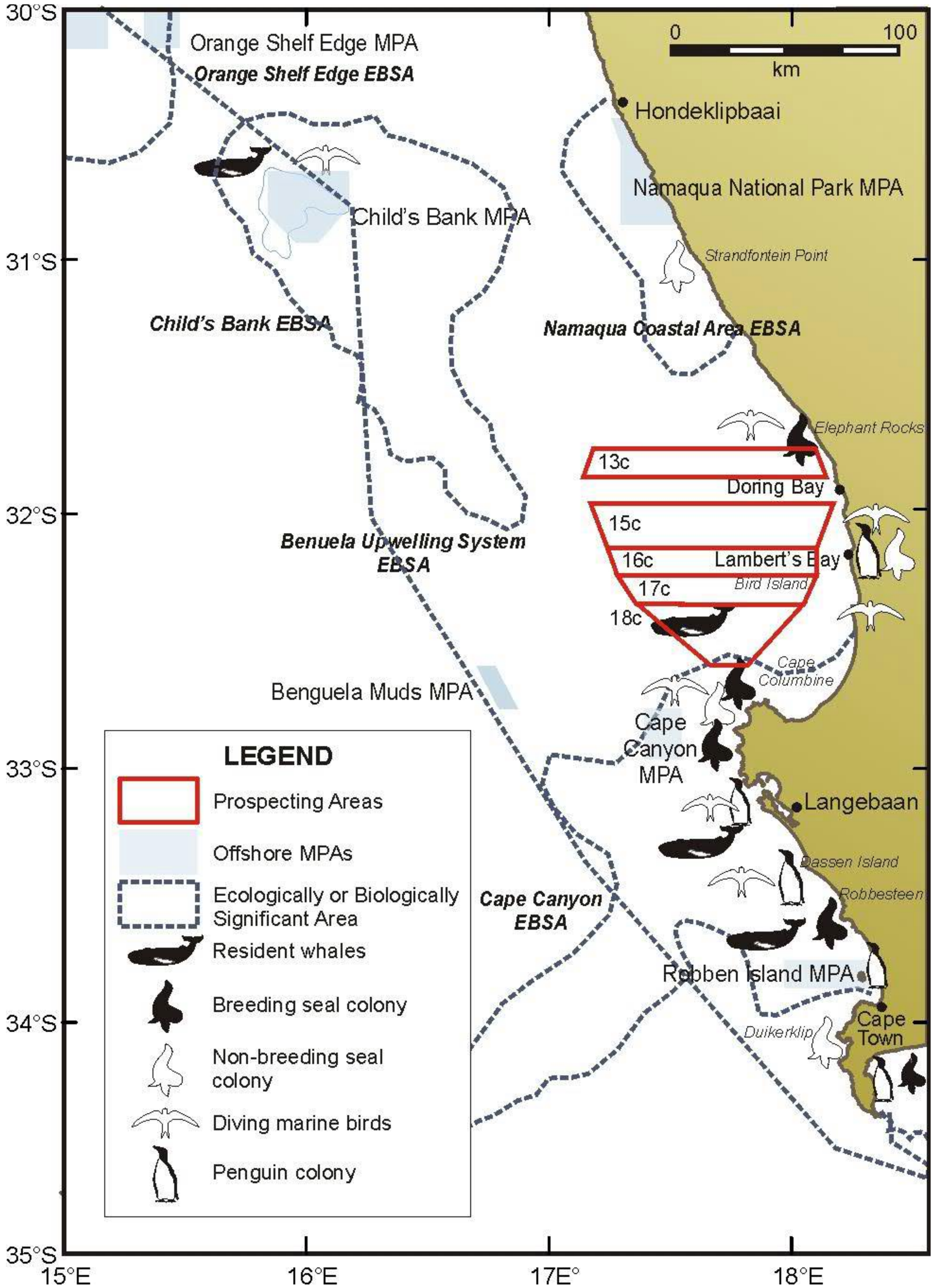

Figure 31: Project - environment interaction points on the West Coast, illustrating the location of seabird and seal colonies and resident whale populations in relation to the 13c, 15c, 16c, 17c and 18c Concession Areas. Offshore Marine Protected Areas and EBSAs (as of 30 Aug 2019) are also shown.

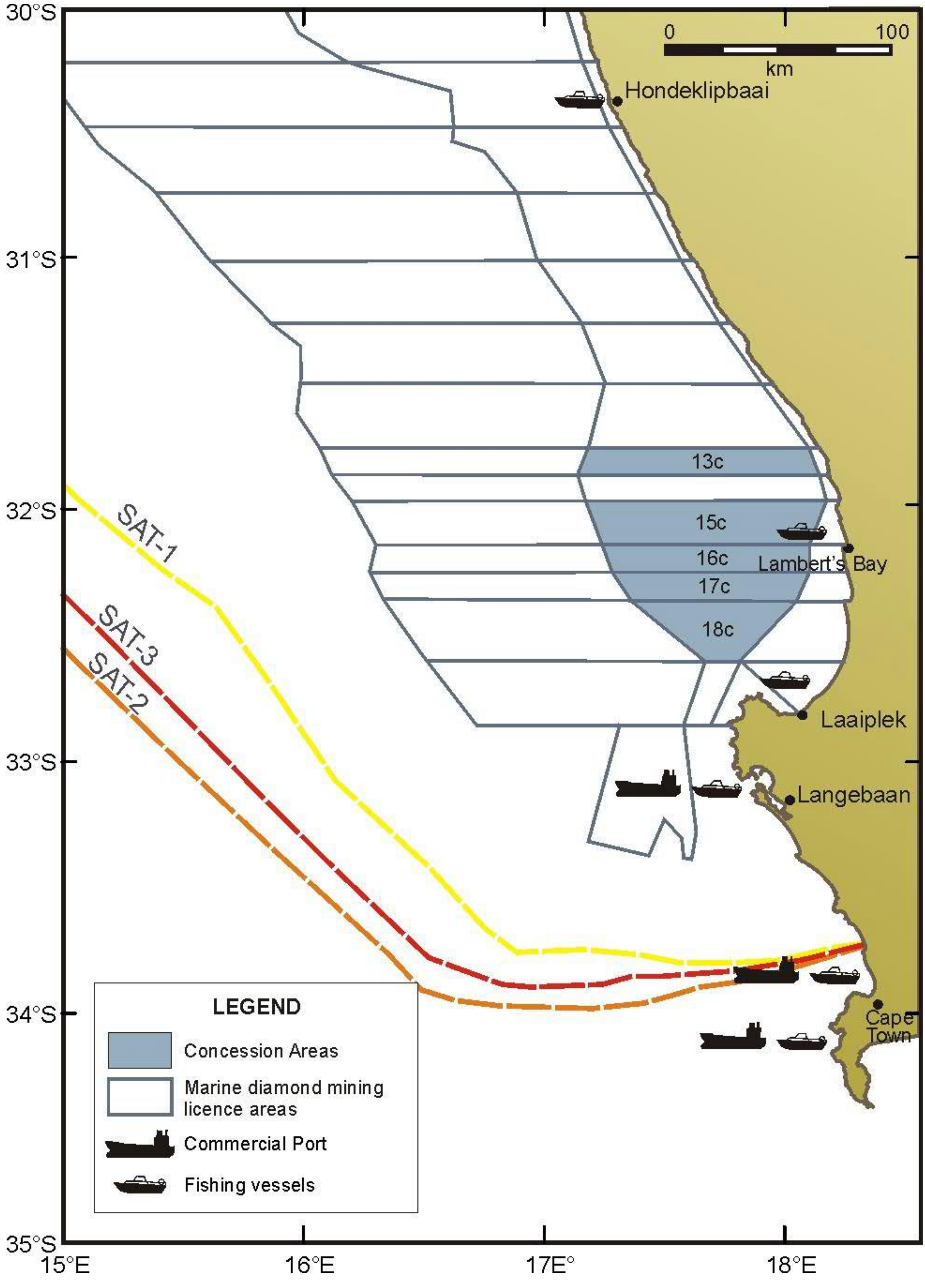

Figure 32: Project - environment interaction points on the West Coast, illustrating the marine diamond mining concessions and ports for commercial and fishing vessels in relation to the 13c, 15c, 16c, 17c and 18c Concesssion Areas. The routes of the subsea telecommunications cables (dashed lines) are also shown.

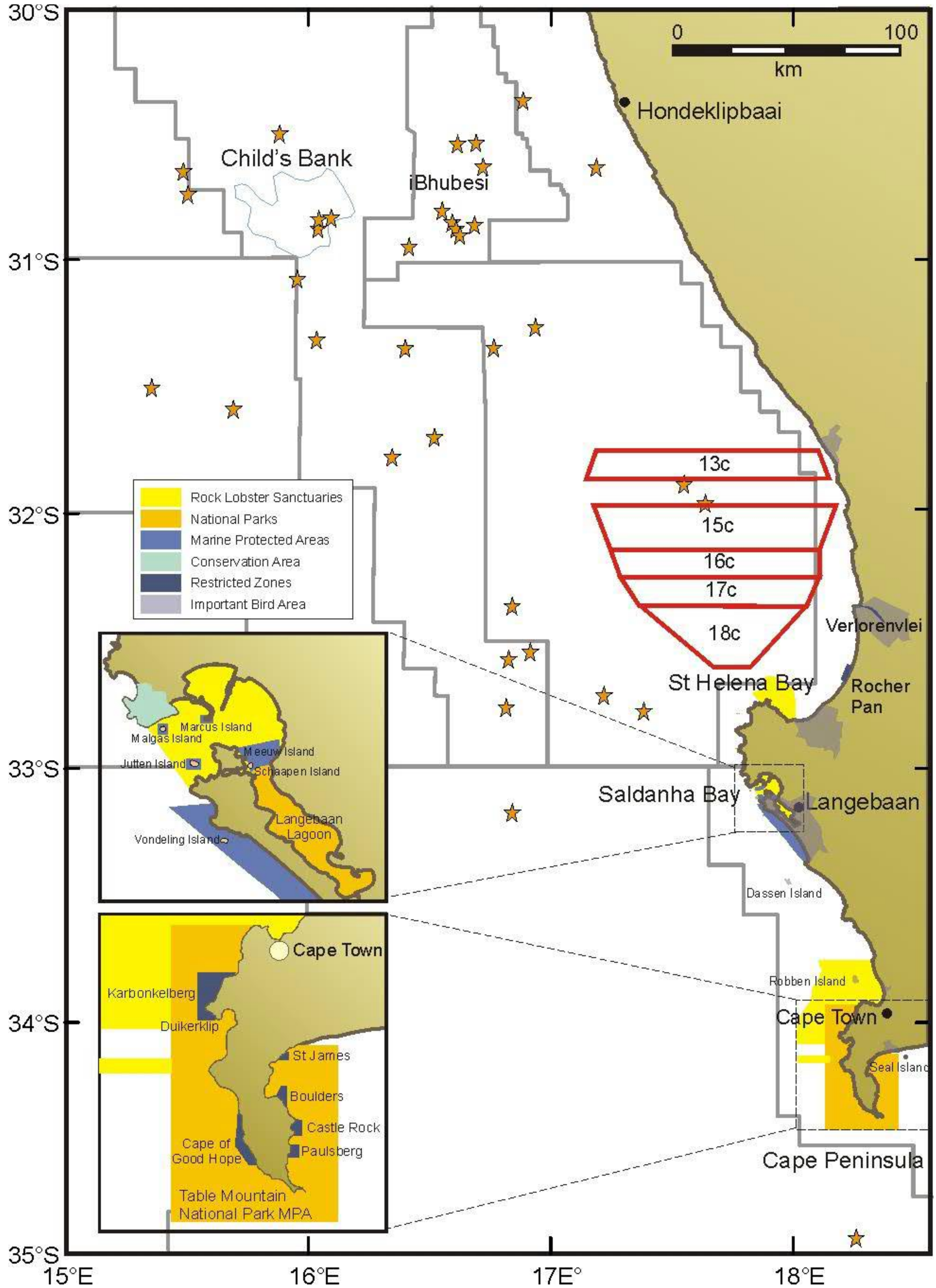

Figure 33: Conservation areas, Important Bird Areas and Marine Protected Areas on the West Coast, in relation to the 13c, 15c, 16c, 17c and 18c concessions (red polygons). The hydrocarbon licence areas (grey lines) and existing well-heads (stars) are also shown.

3.5. Summary of Features Specific to the Concesssion Areas

Features specific to concessions 13c, 15c, 16c, 17c and 18c are summarised below:

- Concessions 13c, 15c, 16c, 17c and 18c are 1 117.53 km^2, 1 791.40 km^2. 1 096.43 km^2, 976.69 km^2 and 1 104.42 km^2, respectively.
- Water depths range between 65 m and 200 m;
- The concession areas lie on the continental shelf with the nearest points located ~4 km offshore of the mean 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);
- Seabed sediments along the inshore portions of the concessions are dominated by the mudbelt with the offshore portions dominated by muddy sand;
- Of the benthic habitat types occurring in the concession areas, the Namaqua Muddy Mid Shelf Mosiac, Namaqua Sandy Mid Shelf and Southern Benguela Sandy Outer Shelf have been rated as 'least concern', whereas the Cape Rocky Mid Shelf Mosaic in the southern portion of concession 18c is considered 'vulnerable".
- The sediments are likely to host a range of benthic macrofaunal species including polychaete worms, crustaceans and echinoderms;
- The concessions are located within the Cape Columbine upwelling cell, and waters are likely to be seasonally cold, nutrient rich and hosting high abundances of phytoplankton, zooplankton and ichthyoplankton;
- A wide variety of, small pelagic, large migratory pelagic and demersal fish species are likely to be encountered in concessions 13c, 15c, 16c, 17c and 18c;
- Migrating leatherback turtles may also occur, as are a variety of pelagic seabirds;
- Marine mammals likely to be encountered include migrating and resident humpback and southern right whales and small odontocetes known to frequent continental shelf waters;
- There is no overlap of concessions 13c, 15c, 16c, 17c and 18c with offshore MPAs, but they overlap with the Benguela Upwelling System transboundary EBSA, and the southern portion of concession 18c overlaps with the Cape Canyon EBSA.

4. ASSESSMENT OF IMPACTS OF OFFSHORE MINING ON MARINE FAUNA

This chapter describes and assesses the significance of potential impacts related to the proposed prospecting activities in concessions 13c, 15c, 16c, 17c and 18c. All impacts are assessed according to the rating scale defined in Section 4.1. Where appropriate, mitigation measures are proposed, which could ameliorate the negative impacts or enhance potential benefits, respectively. The status of all impacts should be considered negative unless otherwise stated. The significance of impacts with and without mitigation is assessed.

4.1. Assessment Procedure

The following convention was used to determine significance ratings in the assessment:

Rating	Definition of Rating
Intensity – establishes whether the magnitude of the impact is destructive or benign in relation to the sensitivity of the receiving environment	
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.
Low	Minor (Slight) change, disturbance or nuisance. The impact on the environment is not detectable.
Medium	Moderate change, disturbance or discomfort. Where the affected environment is altered, but natural functions and processes continue, albeit in a modified way.
High	Prominent change, disturbance or degradation. Where natural functions or processes are altered to the extent that they will temporarily or permanently cease.
Duration – the time frame over which the impact will be experienced	
Short-term	<5 years
Medium-term	5 – 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 would not occur in such a way or in such time span that the impact can be considered transient
Extent – defines the physical extent or spatial scale of the impact	
Local	Extending only as far as the activity, limited to the site and its immediate surroundings
Regional	Impacts are confined to the region; e.g. coast, basin, etc.
National	Limited to the coastline of South Africa
International	Extending beyond the borders of South Africa
Reversibility – defines the potential for recovery to pre-impact conditions	
Irreversible	Where the impact is permanent
Partially Reversible	Where the impact can be partially reversed
Fully Reversible	Where the impact can be completely reversed

Probability – the likelihood of the impact occurring	
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.
Degree of confidence in predictions – in terms of basing the assessment on available information and specialist knowledge	
Low	Less than 35 % sure of impact prediction.
Medium	Between 35 % and 70 % sure of impact prediction.
High	Greater than 70 % sure of impact prediction
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.
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.

Using the core criteria above (namely *extent, duration and intensity)*, the consequence of the impact is determined:

Consequence – attempts to evaluate the importance of a particular impact, and in doing so incorporates extent, duration and intensity	
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.

Consequence – attempts to evaluate the importance of a particular impact, and in doing so incorporates extent, duration and intensity	
HIGH	Impacts could be EITHER: of high intensity at a regional level enduring in the medium term; OR of high intensity at a national level in the short term; OR of medium intensity at a national level in the medium term; OR of low intensity at a national level in the long term; OR of high intensity at a local level in the long term; OR of medium intensity at a regional level in the long term.
MEDIUM	Impacts could be EITHER: of high intensity at a local level and endure in the medium term; OR of medium intensity at a regional level in the medium term; OR of high intensity at a regional level in the short term; OR of medium intensity at a national level in the short term; OR of medium intensity at a local level in the long term; OR of low intensity at a national level in the medium term; OR of low intensity at a regional level in the long term.
LOW	Impacts could be EITHER of low intensity at a regional level, enduring 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, enduring 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, enduring in the short term; OR Zero to very low intensity with any combination of extent and duration.
UNKNOWN	Where it is not possible to determine the significance of an impact.

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

Nature of the Impact – describes whether the impact would have a negative, positive or zero effect on the affected environment	
Positive	The impact benefits the environment
Negative	The impact results in a cost to the environment
Neutral	The impact has no effect

Type of impacts assessed:

Type of impacts assessed	
Direct (Primary)	Impacts that result from a direct interaction between a proposed project activity and the receiving environment.
Secondary	Impacts that follow on from the primary interactions between the project and its environment as a result of subsequent interactions within the environment (e.g. loss of part of a habitat affects the viability of a species population over a wider area).
Indirect	Impacts that are not a direct result of a proposed project, often produced away from or as a result of a complex impact pathway.
Cumulative	*Additive*: impacts that may result from the combined or incremental effects of future activities (i.e. those developments currently in planning and not included as part of the baseline).
	In-combination: impacts where individual project-related impacts are likely to affect the same environmental features. For example, a sensitive receptor being affected by both noise and drill cutting during drilling operations could potentially experience a combined effect greater than the individual impacts in isolation.

The relationship between the significance ratings after mitigation and decision-making can be broadly defined as follows:

Significance of residual impacts after Mitigation - considering changes in intensity, extent and duration after mitigation and assuming effective implementation of mitigation measures	
Very Low; Low	Activity could be authorised with little risk of environmental degradation.
Medium	Activity could be authorised with conditions and inspections.
High	Activity could be authorised but with strict conditions and high levels of compliance and enforcement.
Very High	Potential fatal flaw

4.2. Identification of Impacts

The potential environmental impacts to the marine environment of the proposed geophysical prospecting operations are:

- Disturbance of marine mammals by the sounds emitted by the geophysical survey equipment;
- Potential injury to marine mammals and turtles through vessel strikes;
- Marine pollution due to discharges such as deck drainage, machinery space wastewater, sewage, etc. and disposal of solid wastes from the survey vessel; and
- Marine pollution due to fuel spills during refuelling, or resulting from collision or shipwreck.

The potential environmental impacts to the marine environment of the drill and bulk sampling operations are:

- Disturbance and loss of benthic fauna in the drill sample footprints and bulk sampling trenches;
- Crushing of epifauna and infauna by the crawler tracks;
- Generation of suspended sediment plumes through discard of fine tailings;
- Smothering of benthic communities through re-settlement of discarded tailings;
- Potential loss of equipment on the seabed;
- Disturbance of marine biota by noise from the sampling vessel and sampling tools; and
- Marine pollution due to discharges such as deck drainage, machinery space wastewater, sewage, etc. and disposal of solid wastes from the sampling vessel.

4.3. Assessment of Impacts

4.3.1 Acoustic Impacts of Geophysical Prospecting and Sampling

<u>Description of Impact</u>

The ocean is a naturally noisy place and marine animals are continually subjected to both physically produced sounds from sources such as wind, rainfall, breaking waves and natural seismic noise, or biologically produced sounds generated during reproductive displays, territorial defence, feeding, or in echolocation (see references in McCauley 1994). Such acoustic cues are thought to be important to many marine animals in the perception of their environment as well as for navigation purposes, predator avoidance, and in mediating social and reproductive behaviour. Anthropogenic sound sources in the ocean may thus interfere directly or indirectly with such activities. Of all human-generated sound sources, the most persistent in the ocean is the noise of shipping. Depending on size and speed, the sound levels radiating from vessels range from 160 to 220 dB re 1 µPa at 1 m (NRC 2003). Especially at low frequencies between 5 to 100 Hz, vessel traffic is a major contributor to noise in the world's oceans, and under the right conditions, these sounds can propagate 100s of kilometres thereby affecting very large geographic areas (Coley 1994, 1995; NRC 2003; Pidcock *et al.* 2003). Other forms of anthropogenic noise include 1) aircraft flyovers, 2) multi-beam sonar systems, 3) seismic acquisition, 4) hydrocarbon and mineral exploration/prospecting and recovery, and 5) noise associated with underwater blasting, pile driving, and construction (Figure 34).

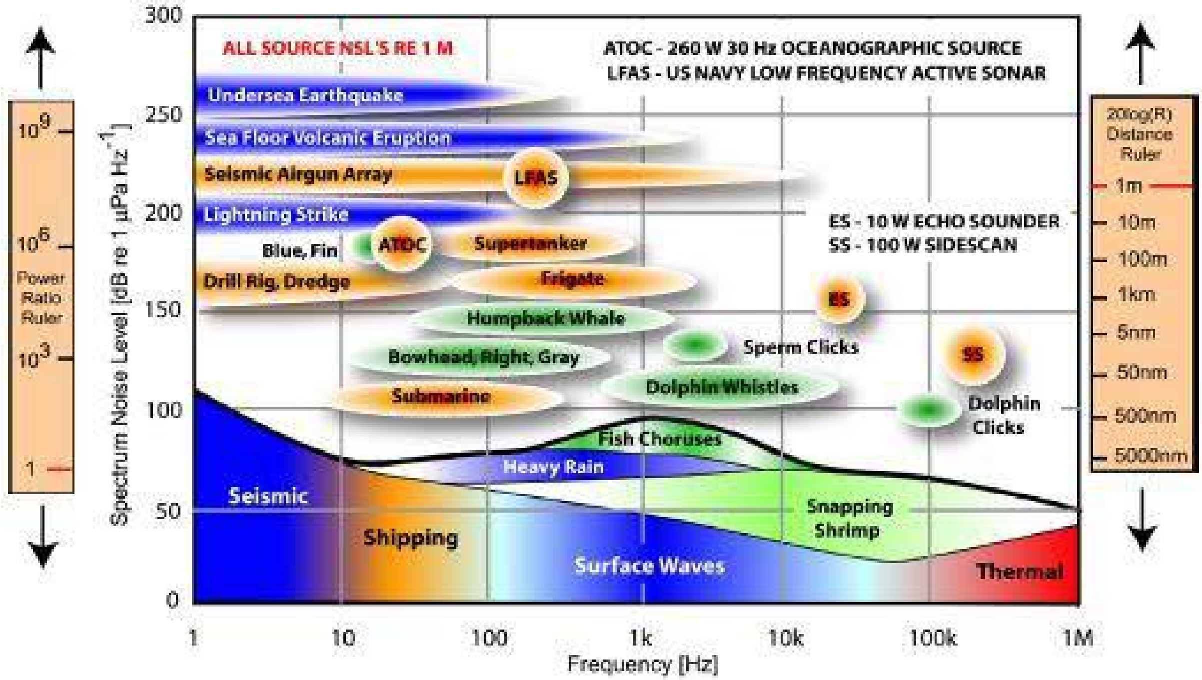

Figure 34: Comparison of noise sources in the ocean (Goold & Coates 2001).

The cumulative impact of increased background anthropogenic noise levels in the marine environment is an ongoing and widespread issue of concern (Koper & Plön 2012), as such sound sources interfere directly or indirectly with the animals' biological activities. Reactions of marine mammals to anthropogenic sounds have been reviewed by McCauley (1994), Richardson *et al.* (1995), Gordon & Moscrop (1996) and Perry (1998), who concluded that anthropogenic sounds could affect marine animals in the surrounding area in the following ways:

- Physiological injury and/or disorientation;
- Behavioural disturbance and subsequent displacement from key habitats;
- Masking of important environmental sounds and communication;
- Indirect effects due to effects on prey.

It is the received level of the sound, however, that has the potential to traumatise or cause physiological injury to marine animals. As sound attenuates with distance, the received level depends on the animal's proximity to the sound source and the attenuation characteristics of the sound. The noise generated by the acoustic equipment utilized during geophysical surveys falls within the hearing range of most fish and marine mammals (Table 8), and at sound levels of between 190 to 230 dB re 1 µPa at 1 m, will be audible for considerable distances (in the order of tens of km) before attenuating to below threshold levels (Findlay 2005). However, unlike the noise generated by airguns during seismic surveys, the emission of underwater noise from geophysical surveying and vessel activity is not considered to be of sufficient amplitude to cause auditory or non-auditory trauma in marine animals in the region. Only directly below the systems (within metres of the sources) would sound levels be in the 230 dB range where exposure result in trauma. As most pelagic species likely to be encountered within the concessions are highly mobile, they would be expected to flee and move away from the sound source before trauma could occur. Whereas the underwater noise from the survey systems may induce localised behavioural changes in some marine mammal, there is no evidence of significant behavioural changes that may impact on the wider ecosystem (Perry 2005).

Similarly, the sound level generated by drilling and seabed crawler operations fall within the 120-190 dB re 1 µPa range at the sampling unit, with main frequencies between 3 – 10 Hz. The noise generated by sampling operations thus falls within the hearing range of most fish and marine mammals, and depending on sea state would be audible for up to 20 km around the vessel before attenuating to below threshold levels (Table 8). In a study evaluating the potential effects of vessel-based diamond mining on the marine mammals community off the southern African West Coast, Findlay (1996) concluded that the significance of the impact is likely to be minimal based on the assumption that the radius of elevated noise level would be restricted to ~20 km around the mining vessel. Whereas the underwater noise from sampling operations may induce localised behavioural changes in some marine mammal, it is unlikely that such behavioural changes would impact on the wider ecosystem (see for example Perry 2005). The responses of cetaceans to noise sources are often also dependent on the perceived motion of the sound source as well as the nature of the sound itself. For example, many whales are more likely to tolerate a stationary source than one that is approaching them (Watkins 1986; Leung-Ng & Leung 2003), or are more likely to respond to a stimulus with a sudden onset than to one that is continuously present (Malme *et al.* 1985).

Table 8: Known hearing frequency and sound production ranges of various marine taxa (adapted from Koper & Plön 2012).

Taxa	Order	Hearing frequency (kHz)	Sound production (kHz)
Shellfish	Crustaceans	0.1 – 3	
Snapping shrimp	*Alpheus/ Synalpheus* spp.		0.1 - >200
Ghost crabs	*Ocypode* spp.		0.15 – 0.8
Fish	Teleosts		0.4 – 4
Hearing specialists		0.03 - >3	
Hearing generalists		0.03 – 1	
Sharks and skates	Elasmobranchs	0.1 – 1.5	Unknown
African penguins	Sphenisciformes	0.6 - 15	Unknown
Sea turtles	Chelonia	0.1 – 1	Unknown
Seals	Pinnipeds	0.25 – 10	1 – 4
Northern elephant seal	*Mirounga agurostris*	0.075 – 10	
Manatees and dugongs	Sirenians	0.4 – 46	4 – 25
Toothed whales	Odontocetes	0.1 – 180	0.05 – 200
Baleen whales	Mysticetes	0.005 – 30	0.01 – 28

<u>Assessment</u>

The effects of high frequency sonars on marine fauna is considered to be localised, short-term (for duration of survey i.e. weeks) and of medium intensity. The significant of the impact is considered of VERY LOW significance both without and with mitigation.

The impact of underwater noise generated during sampling operations is considered to be of low intensity in the target area and for the duration of the sampling campaign. The impact of underwater noise is considered of VERY LOW significance without mitigation.

Mitigation

No mitigation measures are possible, or considered necessary for the generation of noise by the sampling tools and vessels.

Despite the low significance of impacts for geophysical surveys, the Joint Nature Conservation Committee (JNCC) provides a list of guidelines to be followed by anyone planning marine sonar operations that could cause acoustic or physical disturbance to marine mammals (JNCC 2017). These have been revised to be more applicable to the southern African situation.

- Onboard Marine Mammal Observers (MMOs) should conduct visual scans for the presence of cetaceans around the survey vessel prior to the initiation of any acoustic impulses.
- Pre-survey scans should be limited to 15 minutes prior to the start of survey equipment.
- “Soft starts” should be carried out for any equipment of source levels greater than 210 dB re 1 μPa at 1 m over a period of 20 minutes to give adequate time for marine mammals to leave the vicinity.
- Terminate the survey if any marine mammals show affected behaviour within 500 m of the survey vessel or equipment until the mammal has vacated the area.
- Avoid planning geophysical surveys during the movement of migratory cetaceans (particularly baleen whales) from their southern feeding grounds into low latitude waters (beginning of June to end of November), and ensure that migration paths are not blocked by sonar operations. As no seasonal patterns of abundance are known for odontocetes occupying the proposed concession areas, a precautionary approach to avoiding impacts throughout the year is recommended.
- Ensure that PAM (passive acoustic monitoring) is incorporated into any surveying taking place between June and November.
- A MMO should be appointed to ensure compliance with mitigation measures during seismic geophysical surveying.

Impacts of multi-beam and sub-bottom profiling sonar on marine fauna		
	Without Mitigation	Assuming Mitigation
Intensity	Medium	Low
Duration	Short-term: for duration of survey	Short-term
Extent	Local: limited to survey area	Local
Consequence	Very Low	Very Low
Probability	Probable	Probable
Significance	Very Low	Very Low
Status	Negative	Negative
Confidence	Medium	Medium

Nature of Cumulative impact	Considering the number of seismic surveys recently conducted in the area, some cumulative impacts can be anticipated. However, any direct impact is likely to be at individual level rather than at species level.
Reversibility	Fully reversible – any disturbance of behaviour, auditory “masking” or reductions in hearing sensitivity that may occur as a result of survey noise below 220 dB would be temporary.
Loss of resources	Negligible
Mitigation potential	Low

<table>
<tr><td colspan="3">Impacts of noise from sampling operations on marine fauna</td></tr>
<tr><td></td><td>Without Mitigation</td><td>Assuming Mitigation</td></tr>
<tr><td>Intensity</td><td>Low</td><td rowspan="8">No mitigation is proposed</td></tr>
<tr><td>Duration</td><td>Short-term: for duration of sampling operations</td></tr>
<tr><td>Extent</td><td>Local: limited to target area</td></tr>
<tr><td>Consequence</td><td>Very Low</td></tr>
<tr><td>Probability</td><td>Definite</td></tr>
<tr><td>Significance</td><td>Very Low</td></tr>
<tr><td>Status</td><td>Negative</td></tr>
<tr><td>Confidence</td><td>High</td></tr>
</table>

Nature of Cumulative impact	None
Reversibility	Fully Reversible - any disturbance of behaviour, auditory “masking” or reductions in hearing sensitivity that may occur would be temporary.
Loss of resources	N/A
Mitigation potential	None

4.3.2 Disturbance and loss of benthic fauna during sampling

Description of Impact

The proposed sampling activities are expected to result in the disturbance and loss of benthic macrofauna through removal of sediments by the drill bit and crawler suction head. As the number of samples required can only be determined once the geophysical data have been analysed, and the sampling drill technology has not yet been finalised, the volume of sediment likely to be removed and disturbed, or the area of seabed impacted during the sampling campaign(s) cannot be provided at this stage. Similarly, the area of seabed disturbed during bulk sampling by crawler can only be determined following analysis of drill samples and development of the inferred resource model.

As benthic fauna typically inhabit the top 20 - 30 cm of sediment, the sample operations would result in the elimination of the benthic infaunal and epifaunal biota in the sample footprints. As many of the macrofaunal species serve as a food source for demersal and epibenthic fish, cascade effects on higher order consumers may result. However, considering the available area of similar habitat on the continental shelf of the West Coast, this reduction in benthic biodiversity can be considered negligible and impacts on higher order consumers are thus unlikely.

The ecological recovery of the disturbed seafloor is generally defined as the establishment of a successional community of species that achieves a community similar in species composition, population density and biomass to that previously present (Ellis 1996). The rate of recovery (recolonisation) depends largely on the magnitude of the disturbance, the type of community that inhabits the sediments in the sampling area, the extent to which the community is naturally adapted to high levels of sediment disturbances, the sediment character (grain size) that remains following the disturbance, and physical factors such as depth and exposure (waves, currents) (Newell *et al.* 1998). Generally, recolonisation starts rapidly after a sampling/mining disturbance, and the number of individuals (*i.e.* species density) may recover within short periods (weeks). Opportunistic species may recover their previous densities within months. Long-lived species like molluscs and echinoderms, however, need longer to re-establish the natural age and size structure of the population. Biomass therefore often remains reduced for several years (Kenny & Rees 1994, 1996; Kenny *et al.* 1998).

The structure of the recovering communities is typically also highly spatially and temporally variable reflecting the high natural variability in benthic communities at depth. The community developing after an impact depends on (1) the nature of the impacted substrate, (2) differential re-settlement of larvae in different areas, (3) the rate of sediment movement back into the disturbed areas and (4) environmental factors such as near-bottom dissolved oxygen concentrations etc. For the current project, much of the proposed sampling would be undertaken in depths beyond the wave base (>40 m) where near-bottom sediment transport is less than in shallower waters affected by swell. Excavations may therefore have slow infill rates and could persist for several years or even decades. Long-term or permanent changes in grain size characteristics of sediments may thus occur, potentially resulting in a shift in community structure if the original community is unable to adapt to the new conditions. Depending on the texture of the sediments at the sampling target sites, slumping of adjacent unconsolidated sediments into the excavations can, however, be expected over the very short-term. Although this may result in localised disturbance of macrofauna associated with these sediments and alteration of sediment structure, it also serves as a means of natural recovery of the excavations.

Natural rehabilitation of the seabed following sampling operations, through a process involving influx of sediments and recruitment of invertebrates, has been demonstrated on the southern African continental shelf (Penney & Pulfrich 2004; Steffani 2007a, 2007b, 2009a, 2010a, 2010b, 2012). Recovery rates of impacted communities were variable and dependent on the sampling /mining approach, sediment influx rates and the influence of natural disturbances on succession communities. Results of on-going research on the southern African West Coast suggest that differences in biomass, biodiversity or community composition following mining with drill ships or crawlers below the wave base may endure beyond the medium term (6-15 years) (Parkins & Field 1998; Pulfrich & Penney 1999; Steffani 2012). Savage *et al.* (2001), however, noted similarities in apparent levels of disturbance between mined and unmined areas off the southern African west coast, and areas of the Oslofjord in the NE Atlantic Ocean, which is known to be subject to periodic low oxygen events. Similarly, Pulfrich & Penney (1999) provided evidence of significant recruitments and natural disturbances in recovering succession communities off southern Namibia. These authors concluded that the lack of clear separation of impacted from reference samples suggests that physical disturbance resulting from sampling or mining may be no more stressful than the regular naturally occurring anoxic events typical of the West Coast continental shelf area.

Assessment

The medium-intensity negative impact of sediment removal during sampling operations and its effects on the associated communities is unavoidable, but as it will be extremely localised amounting to only 0.024 km^2 should all anticipated 4 800 samples be taken. The area disturbed constitutes ~ 0.0004% of the overall area of Concessions 13c, 15c, 16c, 17c and 18c, the impact can confidently be rated as being of LOW significance without mitigation.

Mitigation

No mitigation measures are possible, or considered necessary for the direct loss of macrobenthos due to drill and bulk sampling. However, sampling activities of any kind should avoid rocky outcrop areas or other identified sensitive habitats in the concession areas.

Disturbance and loss of benthic fauna during sampling		
	Without Mitigation	Assuming Mitigation
Intensity	Medium	Medium
Duration	Short- to Medium-term	Short- to Medium-term
Extent	Local: limited to target area	Local
Consequence	Low	Low
Probability	Definite	Definite
Significance	Low	Low
Status	Negative	Negative
Confidence	High	High

Nature of Cumulative impact	No cumulative impacts are anticipated during the sampling phase
Reversibility	Fully Reversible
Loss of resources	N/A
Mitigation potential	None

4.3.3 Crushing of benthic fauna during sampling

Description of Impact

Some disturbance or loss of benthic biota adjacent to the sample footprint can also be expected as a result of the placement on the seabed of the drill frame structure (during sampling) and the seabed crawler tracks (during bulk sampling). Epifauna and infauna beneath the footprint of the drill frame or crawler tracks would be crushed by the weight of the equipment resulting in a reduction in benthic biodiversity.

Assessment

Crushing is likely to primarily affect soft-bodied species as some molluscs and crustaceans may be robust enough to survive (see for example Savage *et al.* 2001). Considering the available area of similar habitat on the continental shelf of the West Coast, the reduction in benthic biodiversity through crushing can be considered negligible. The impacts would be of medium intensity but highly localised, and short-term as recolonization would occur rapidly from adjacent undisturbed sediments. The potential impact is consequently deemed to be of VERY LOW significance.

Mitigation

No direct mitigation measures are possible, or considered necessary for the indirect loss of benthic macrofauna due to crushing by the drill-frame structure and the seabed crawler tracks. However, it is recommended that:

- sampling activities of any kind avoid rocky outcrop areas or other identified sensitive habitats in the concession areas;
- dynamically positioned sampling vessels are implemented in preference to vessels requiring anchorage.

Crushing of benthic fauna during sampling		
	Without Mitigation	Assuming Mitigation
Intensity	Medium	Medium
Duration	Short-term	Short-term
Extent	Local: limited to target area	Local
Consequence	Very Low	Very Low
Probability	Definite	Definite
Significance	Very Low	Very Low
Status	Negative	Negative
Confidence	High	High
Nature of Cumulative impact	No cumulative impacts are anticipated during the sampling phase	
Reversibility	Fully Reversible	
Loss of resources	N/A	
Mitigation potential	None	

4.3.4 Generation of suspended sediment plumes during sampling

Description of Impact

The sampled seabed sediments are pumped to the surface and discharged onto sorting screens on the sampling vessel. The screens separate the fine sandy silt and large gravel, cobbles and boulders from the size fraction of interest, the ‘plantfeed’ (usually 2 - 20 mm). The fine tailings are immediately discarded overboard where they form a suspended sediment plume in the water column which dissipates with time. The ‘plantfeed’ is mixed with a high density ferrosilicon (FeSi) slurry and pumped under pressure into a Dense Medium Separation (DMS) plant resulting in a high density concentrate. The majority of the ferrosilicon is magnetically recovered for re-use in the DMS plant and the fine tailings (-2 mm) from the DMS process are similarly deposited over board. Furthermore, fine sediment re-suspension by the sampling tools will generate suspended sediment plumes near the seabed.

Assessment

Distribution and re-deposition of suspended sediments are the result of a complex interaction between oceanographic processes, sediment characteristics and engineering variables that ultimately dictate the distribution and dissipation of the plumes in the water column. Ocean currents, both as part of the meso-scale circulation and due to local wind forcing, are important in distribution of suspended sediments. Turbulence generated by surface waves can also increase plume dispersion by maintaining the suspended sediments in the upper water column. The main effect of plumes is an increase in water column turbidity, leading to a reduction in light penetration with potential adverse effects on the photosynthetic capability of phytoplankton. Poor visibility may also inhibit pelagic visual predators. Egg and/or larval development may be impaired through high sediment loading. Benthic species that may be impacted by near-bottom plumes include bivalves and crustaceans. Suspended sediment effects on juvenile and adult bivalves occur mainly at the sublethal level with the predominant response being reduced filter-feeding efficiencies at concentrations above about 100 mg/ℓ. Lethal effects are seen at much higher concentrations (>7 000 mg/ℓ) and at exposures of several weeks. Negative impacts may also occur when heavy metals or contaminants associated with fine sediments are remobilised.

In general though, the low-intensity negative impact of suspended sediments generated during sampling and onboard processing operations and its effects on the associated communities is extremely localised and short-term. The suspended sediments in plumes settle fairly rapidly and water sampling undertaken by De Beers Marine in the 2c-5c concessions has confirmed that contaminant levels in plumes are well below water quality guideline levels (Carter 2008). The impacts from suspended sediment plumes can confidently be rated as being VERY LOW.

Mitigation

No mitigation measures are possible, or considered necessary for the discharge of fine tailings from the sampling vessel.

Suspended sediment plumes		
	Without Mitigation	Assuming Mitigation
Intensity	Low	No mitigation is proposed
Duration	Short-term	
Extent	Local: limited to around the vessel	
Consequence	Very Low	
Probability	Definite	
Significance	Very Low	
Status	Negative	
Confidence	High	

Nature of Cumulative impact	None
Reversibility	Fully Reversible
Loss of resources	N/A
Mitigation potential	None

4.3.5 Smothering of benthos in redepositing tailings

Description of Impact

The sampled seabed sediments are pumped to the surface and discharged onto sorting screens, which separate the large gravel, cobbles and boulders and fine silts from the 'plantfeed'. The oversize tailings are discarded overboard and settle back onto the seabed beneath the vessel.

Assessment

Following discharge overboard of the fine and coarse tailings, these settle back onto the seabed where they can result in smothering of benthic communities adjacent to the sampled areas. Smothering involves physical crushing, a reduction in nutrients and oxygen, clogging of feeding apparatus, as well as affecting choice of settlement site, and post-settlement survival.

In general terms, the rapid deposition of the coarser fraction from the water column is likely to have more of an impact on the soft-bottom benthic community than gradual sedimentation of fine sediments to which benthic organisms are adapted and able to respond. However, this response depends to a large extent on the nature of the receiving community. Studies have shown that some mobile benthic animals are capable of actively migrating vertically through overlying sediment thereby significantly affecting the recolonization of impacted areas and the subsequent recovery of disturbed areas of seabed (Maurer *et al.* 1979, 1981a, 1981b, 1982, 1986; Ellis 2000; Schratzberger *et al.* 2000; but see Harvey *et al.* 1998; Blanchard & Feder 2003). In contrast, sedentary communities may be adversely affected by both rapid and gradual deposition of sediment. Filter-feeders are generally more sensitive to suspended solids than deposit-feeders, since heavy sedimentation may clog the gills. Impacts on highly mobile invertebrates and fish are likely to be negligible since they can move away from areas subject to redeposition.

Of greater concern is that sediments discarded during sampling operations may impact rocky outcrop communities adjacent to sampling target areas potentially hosting sensitive slow-growing benthic communities. Within the sampling target areas, such communities would be expected in the Namaqua Inshore Hard Ground habitat (see Figure 14). Rocky seabed outcrops are known to host fragile, habitat forming scleractinian corals. As deep-water corals tend to occur in areas with low sedimentation rates (Mortensen *et al.* 2001), these benthic suspension-feeders and their associated faunal communities are likely to show particular sensitivity to increased turbidity and sediment deposition associated with tailings discharges. Exposure of elevated suspended sediment concentrations can result in mortality of the colony due to smothering, alteration of feeding behaviour and consequently growth rate, disruption of polyp expansion and retraction, physiological and morphological changes, and disruption of calcification. While tolerances to increased suspended sediment concentrations will be species specific, concentrations as low as 100 mg/ℓ have been shown to have noticeable effects on coral function (Rogers 1999).

Considering the available area of unconsolidated seabed habitat on the continental shelf of the West Coast, the reduction in biodiversity of macrofauna associated with unconsolidated sediments through smothering can be considered negligible. The impacts would be of low intensity but highly localised, and short-term as recolonization would occur rapidly. The potential impact of smothering on communities in unconsolidated habitats is consequently deemed to be of VERY LOW significance. In the case of rocky outcrop communities, however, impacts would be of medium intensity and highly localised, but potentially enduring over the medium-term due to their slow recovery rates. The potential impact of smothering on rocky outcrop communities is consequently deemed to be of LOW significance.

Mitigation

No mitigation measures are possible, or considered necessary for the loss of macrobenthos due to smothering by redepositing sediments. However, sampling activities of any kind should avoid rocky outcrop areas or other identified sensitive habitats in the concession area. Use should be made of geophysical data to conduct a pre-sampling geohazard analysis of the seabed, and near-surface substratum to map potentially vulnerable habitats and prevent potential conflict with the sampling targets.

Redeposition of discarded sediments on soft-sediment macrofauna		
	Without Mitigation	Assuming Mitigation
Intensity	Low	No mitigation is proposed
Duration	Short-term	
Extent	Local	
Consequence	Very Low	
Probability	Probable	
Significance	Very Low	
Status	Negative	
Confidence	High	
Nature of Cumulative impact	None	
Reversibility	Fully Reversible	
Loss of resources	N/A	
Mitigation potential	Very Low	

Redeposition of discarded sediments: smothering effects on rocky outcrop communities		
	Without Mitigation	Assuming Mitigation
Intensity	Medium	Local
Duration	Medium-term	Short-term
Extent	Local	Low
Consequence	Low	Very Low
Probability	Probable	Improbable
Significance	Low	Very Low
Status	Negative	Negative
Confidence	High	High
Nature of Cumulative impact	None	
Reversibility	Fully Reversible	
Loss of resources	N/A	
Mitigation potential	Very Low	

4.3.6 Potential loss of Equipment

Description of Impact

Equipment such as anchors and sampling tools are occasionally lost on the seabed, although every effort is usually made to retrieve them.

Assessment

If left on the seabed, large items such as anchors and sampling tools would form a hazard to other users. Although they would eventually be colonised by benthic organisms typical of hard seabeds, every effort should be made to remove such foreign objects. The low-intensity negative impact of lost equipment would be extremely localised but if not retrieved would endure permanently and would thus be rated as being of VERY LOW significance.

Mitigation

The positions of all lost equipment must be accurately recorded in a hazards database, and reported to maritime authorities. Every effort should be made to remove lost equipment.

Equipment lost to the seabed		
	Without Mitigation	Assuming Mitigation
Intensity	Low	Low
Duration	Permanent	Short-term
Extent	Local	Local
Consequence	Very Low	Very Low
Probability	Improbable	Improbable
Significance	Very Low	Very Low
Status	Negative	Negative
Confidence	High	High
Nature of Cumulative impact	None	
Reversibility	Fully Reversible	
Loss of resources	N/A	
Mitigation potential	Very Low	

4.3.7 Pollution of the marine environment through Operational Discharges from the Sampling Vessel(s)

During the geophysical surveying and seabed sampling, normal discharges to the sea can come from a variety of sources (from sampling unit and sampling vessel) potentially leading to reduced water quality in the receiving environment. These discharges are regulated by onboard waste management plans and shall be MARPOL compliant. For the sake of completeness they are listed and briefly discussed below:

- Deck drainage: all deck drainage from work spaces is collected and piped into a sump tank on board the drilling unit to ensure MARPOL compliance (15 ppm oil in water). The fluid would be analysed and any hydrocarbons skimmed off the top prior to discharge. The oily substances would be added to the waste (oil) lubricants and disposed of on land.
- Sewage: sewage discharges would be comminuted and disinfected. In accordance with MARPOL Annex IV, the effluent must not produce visible floating solids in, nor causes discolouration of, the surrounding water. The treatment system must provide primary settling, chlorination and dechlorination before the treated effluent can be discharged into the sea. The discharge depth is variable, depending upon the draught of the drilling unit / support vessel at the time, but would not be less than 5 m below the surface.
- Vessel machinery spaces and ballast water: the concentration of oil in discharge water from vessel machinery space or ballast tanks may not exceed 15 ppm oil in water. If the vessel intends to discharge bilge or ballast water at sea, this is achieved through use of an oily-water separation system. Oily waste substances must be shipped to land for treatment and disposal.

- Food (galley) wastes: food wastes may be discharged after they have been passed through a comminuter or grinder, and when the vessel is located more than 12 nautical miles from land. For vessels outside of special areas, discharge of comminuted food wastes is permitted when >3 nautical miles from land and *en route*. Discharge of food wastes not comminuted may be discharged from vessels *en route* when >12 nautical miles from shore. The ground wastes must be capable of passing through a screen with openings <25 mm. The daily volume of discharge from a standard exploration vessel is expected to be <0.5 m^3.
- Detergents: detergents used for washing exposed marine deck spaces are discharged overboard. The toxicity of detergents varies greatly depending on their composition, but low-toxicity, biodegradable detergents are preferentially used. Those used on work deck spaces would be collected with the deck drainage and treated as described for deck drainage above.
- Cooling Water: electrical generation on sampling vessels is typically provided by large diesel-fired engines and generators, which are cooled by pumping water through a set of heat exchangers. The cooling water is then discharged overboard. Other equipment is cooled through a closed loop system, which may use chlorine as a disinfectant. Such water would be tested prior to discharge and would comply with relevant Water Quality Guidelines[2].

The potential impact on the marine environment of such operational discharges from the sampling vessel would be limited to the sampling target areas over the short-term. As volumes discharged would be low, they would be of low intensity, and are therefore considered to be of VERY LOW significance, both without or with mitigation.

Mitigation

The following mitigation measures are recommended:

- Ensure compliance with MARPOL 73/78 standards,
- Develop a waste management plan using waste hierarchy.

Impacts of operational discharges to the sea from the sampling vessel		
	Without Mitigation	Assuming Mitigation
Intensity	Low	Low
Duration	Short-term	Short-term
Extent	Local: limited to immediate area around vessel	Local
Consequence	Very Low	Very Low
Probability	Probable	Probable
Significance	Very Low	Very Low
Status	Negative	Negative
Confidence	High	High

[2] No South African guideline exists for residual chlorine in coastal waters. The Australian/New Zealand (ANZECC 2000) guidelines give a value of 3 µg Cl/ℓ, wheras the World Bank (1998) guidelines stipulate 0.2 mg/ℓ at the point of discharge prior to dilution

Nature of Cumulative impact	None
Reversibility	Fully Reversible
Loss of resources	N/A
Mitigation potential	High

4.3.8 Cumulative impacts

The primary impacts associated with the geophysical surveying and sediment sampling in the Namaqua Bioregion on the West Coast of South Africa, relate to cumulative anthropogenic noise, physical disturbance of the seabed, discharges of tailings to the benthic environment, and associated vessel presence. Considering the number of seismic surveys recently conducted in the general project area, some cumulative impacts can be anticipated. However, any direct noise impact is likely to be at individual level rather than at species level. The sampling operations likely to result as part of the proposed prospecting activities would impact an area of <0.05 km^2 in the Namaqua Bioregion, which can be considered an insignificant percentage of the Southern Benguela Shelf ecoregion as a whole.

The area of seabed disturbed during bulk sampling by crawler can only be determined following analysis of drill samples and development of the inferred resource model. Once bulk sampling and mining commence, it is recommended that detailed records of annual and cumulative areas sampled and mined be maintained, and that these be submitted to the authorities should future informed decisions need to be made regarding disturbance limits to benthic habitat types in the Namaqua Bioregion.

Cumulative impacts to the benthic environment also include the development of hydrocarbon wells. Since 1976 ~40 wells have been drilled in the Namaqua Bioregion. The majority of these occur in the iBhubesi Gas field in Block 2A well to the north and offshore of concession 13c, 15c, 16c, 17c and 18c. Prior to 1983, technology was not available to remove wellheads from the seafloor. Of the approximately 40 wells drilled on the West Coast, 35 wellheads remain on the seabed. The total area impacted by 40 petroleum exploration wells is estimated at around 10 km^2, or ~0.038% of the Namaqua bioregion. Cumulative impacts from other hydrocarbon ventures in the area are likely to increase in future, particularly with the planned development of the iBhubesi Gas Field. Further exploratory drilling has also being proposed in Block 2B.

5. RECOMMENDATIONS AND CONCLUSIONS

The impacts on marine habitats and communities associated with the proposed prospecting activities in concession 13c, 15c, 16c, 17c and 18c are summarised in the Table below (Note: * indicates that no mitigation is possible, thus significance rating remains). The total area to be impacted by the proposed sampling operations can be considered negligible with respect to the total area of the Namaqua Bioregion, although at full-scale mining cumulative impacts must be kept in mind.

Impact	Probability	Significance (before mitigation)	Significance (after mitigation)
Noise from geophysical surveying on marine fauna	Probable	Very Low	Very Low
Noise from sampling operations on marine fauna	Definite	Very Low	Very Low*
Disturbance and loss of benthic macrofauna	Definite	Low	Low*
Crushing of benthic macrofauna	Definite	Very Low	Very Low
Generation of suspended sediment plumes	Definite	Very Low	Very Low*
Smothering of benthos in unconsolidated sediments by redepositing tailings	Probable	Very Low	Very Low*
Smothering of vulnerable reef communities by redepositing tailings	Probable	Low	Very Low
Potential loss of equipment	Improbable	Very Low	Very Low
Pollution of the marine environment through operational discharges to the sea from mining vessel	Probable	Very Low	Very Low

5.1. Recommended Mitigation Measures

The following mitigation measures are proposed during geophysical surveying:

- Onboard Marine Mammal Observers (MMOs) should conduct visual scans for the presence of cetaceans around the survey vessel prior to the initiation of any acoustic impulses.
- Pre-survey scans should be limited to 15 minutes prior to the start of survey equipment.
- “Soft starts” should be carried out for any equipment of source levels greater than 210 dB re 1 μPa at 1 m over a period of 20 minutes to give adequate time for marine mammals to leave the vicinity.
- Terminate the survey if any marine mammals show affected behaviour within 500 m of the survey vessel or equipment until the mammal has vacated the area.
- Avoid planning geophysical surveys during the movement of migratory cetaceans (particularly baleen whales) from their southern feeding grounds into low latitude waters (beginning of June to end of November), and ensure that migration paths are not blocked by sonar operations. As no seasonal patterns of abundance are known for

odontocetes occupying the concesssion areas, a precautionary approach to avoiding impacts throughout the year is recommended.
- Ensure that PAM (passive acoustic monitoring) is incorporated into any surveying taking place between June and November.
- A MMO should be appointed to ensure compliance with mitigation measures during seismic geophysical surveying.

The following mitigation measures are proposed during sampling operations:

- Prospecting sampling targets gravel bodies and would thus avoid known sensitive habitats and high-profile, predominantly rocky-outcrop areas without a sediment veneer. Prior to bulk sampling, a visual sampling programme must be undertaken in rocky-outcrop areas to identify sensitive communities.
- Implement dynamically positioned sampling vessels in preference to vessels requiring anchorage.
- Use geophysical data to conduct a pre-sampling geohazard analysis of the seabed, and near-surface substratum to map potentially vulnerable habitats and prevent potential conflict with the sampling targets.
- The positions of all lost equipment must be accurately recorded in a hazards database, and reported to maritime authorities. Every effort should be made to remove lost equipment.
- Adhere strictly to best management practices recommended in the relevant Basic Assessment Report and EMPr and that of MARPOL 73/78 (International Convention for the Prevention of Pollution from Ships, 1973) for all necessary disposals at sea.
- Develop a waste management plan using waste hierarchy.

5.2. Recommended Environmental Management Actions

Most potential environmental impacts resulting from the proposed prospecting activities would be integrally managed in such a way as to prevent or minimise them. This is particularly the case for waste management, pollution control, equipment recovery and disaster prevention. Other potential but unlikely impacts (e.g. occurrence / behaviour of marine mammals around survey and mining vessels) should be closely monitored to ensure that adequate responses can be implemented, should a significant impact be detected.

The only impact which cannot be prevented or minimised through these integrated environmental management measures is the primary impact resulting from the removal of seabed sediments as part of the sampling itself. As there is no practical way of actively 'rehabilitating' these excavations other than discarding tailings back into the sampled area, recovery of the impacted habitats must rely on the gradual but continuous natural movement and deposition of fine sediments onto the seabed. Considering the comparatively small area of seabed impacted by sampling activities, the development of a monitoring plan to demonstrate natural recovery processes is not deemed necessary during the prospecting phase.

Should prospecting activities indicate economic viability of the resource, allowances for a well-designed benthic monitoring programme should be made during the feasibility phase of the project.

5.3. Conclusions

If all environmental guidelines, and appropriate mitigation measures and management actions advanced in this report, and the Basic Assessment and EMPr for the proposed prospecting operations as a whole, are implemented, there is no reason why the proposed prospecting activities should not proceed.

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Curriculum Vitae

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Dr Andrea Pulfrich is the founder, director, sole employee and share holder of Pisces Environmental Services (Pty) Ltd. The company was established in January 1998 to help fill the growing need for an expert interface between users of the coastal and marine environment and the various national and provincial management authorities. Since then, PISCES has been providing a wide range of information, analyses, environmental assessments, advice and management recommendations to these user groups, particularly the South African and Namibian marine diamond mining and hydrocarbon industries.

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- BSc (Zoology and Botany), University of Natal, Pietermaritzburg, 1982
- BSc (Hons) (Zoology), University of Cape Town, 1983
- MSc (Zoology), University of Cape Town, 1987
- PhD, Department of Fisheries Biology of the Institute for Marine Science at the Christian-Albrechts University, Kiel, Germany, 1995

Membership in Professional Societies

- South African Council for Natural Scientific Professions (Pr.Sci.Nat. No: 400327/06)
- South African Institute of Ecologists and Environmental Scientists
- International Association of Impact Assessment (South Africa)

Employment History and Professional Experience

1998-present: Director: Pisces Environmental Services (Pty) Ltd. Specifically responsible for environmental impact assessments, baseline and monitoring studies, marine specialist studies, and environmental management programme reports.

1999: Senior researcher at the University of Cape Town on contract to Namdeb Diamond Corporation and De Beers Marine South Africa; investigating and monitoring the impact of diamond mining on the marine environment and fisheries resources; experimental design and implementation of dive surveys; collaboration with fishermen and diamond divers; deep water benthic sampling, sample analysis and macrobenthos identification.

1996-1999: Senior researcher at the University of Cape Town, on contract to the Chief Director: Marine and Coastal Management (South African Department of Environment Affairs and Tourism); investigating and monitoring the experimental fishery for periwinkles on the Cape south coast; experimental design and implementation of dive surveys for stock assessments; collaboration with fishermen; supervision of Honours and Masters students.

1989-1994: Institute for Marine Science at the Christian-Albrechts University of Kiel, Germany; research assistant in a 5 year project to investigate the population dynamics of mussels and cockles in the Schleswig-Holstein Wadden Sea National Park (employment for Doctoral degree); extensive and intensive dredge sampling for stock assessments, collaboration with and mediation between, commercial fishermen and National Park authorities, co-operative interaction with colleagues working in the Dutch and Danish Wadden Sea, supervision of Honours and Masters projects and student assistants, diving and underwater scientific photography. Scope of doctoral study: experimental design and implementation of a regular sampling program including: (i) plankton sampling and identification of lamellibranch larvae, (ii) reproductive biology and condition indices of mussel populations, (iii) collection of mussel spat on artificial collectors and natural substrates, (iv) sampling of recruits to the established populations, (v) determination of small-scale recruitment patterns, and (vi) data analysis and modelling. Courses and practicals attended as partial fulfilment of the degree: Aquaculture, Stock Assessment and Fisheries Biology, Marine Chemistry, and Physical and Regional Oceanography.

1988-1989: Australian Institute of Marine Science; volunteer research assistant and diver; implementation and maintenance of field experiments, underwater scientific photography, digitizing and analysis of stereo-photoquadrats, larval culture, analysis of gut contents of fishes and invertebrates, carbon analysis.

1985-1987: Sea Fisheries Research Institute of the South African Department of Environment Affairs and Tourism: scientific diver on deep diving surveys off Cape Agulhas; censusing fish populations, collection of benthic species for reef characterization.

South African National Research Institute of Oceanography and Port Elizabeth Museum: technical assistant and research diver; quantitative sampling of benthos in Mossel Bay, and census of fish populations in the Tsitsikamma National Park.

University of Cape Town, Department of Zoology and Percy Fitzpatrick Institute of African Ornithology; research assistant; supervisor of diving survey and collection of marine invertebrates, Prince Edward Islands.

1984-1986: University of Cape Town, Department of Zoology; research assistant (employment for MSc Degree) and demonstrator of first year Biological Science courses. Scope of MSc study: the biology, ecology and fishery of the western Cape linefish species *Pachymetopon blochii*, including (i) socio-economic survey of the fishery and relevant fishing communities, (ii) collection and analysis of data on stomach contents, reproductive biology, age and growth, (iii) analysis of size-frequency and catch statistics, (iv) underwater census, (v) determination of hook size selectivity, (vi) review of historical literature and (vii) recommendations to the Sea Fisheries Research Institute of the South African Department of Environment Affairs and Tourism for the modification of existing management policies for the hottentot fishery.

APPENDIX 4.4: MARITIME ARCHAEOLOGICAL IMPACT ASSESSMENT

MARITIME ARCHAEOLOGICAL IMPACT ASSESSMENT FOR PROSPECTING RIGHTS APPLICATIONS: SEA CONCESSION AREAS 13C AND 15C - 18C, WEST COAST, WESTERN CAPE PROVINCE

Assessment conducted under Section 38 (8) of the
National Heritage Resources Act (No. 25 of 1999) as part of a Environmental Impact Assessment

Prepared for

SLR Consulting (South Africa) (Pty) Ltd

On behalf of

Belton Park Trading 127 (Pty) Ltd

Draft

August 2020

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EXECUTIVE SUMMARY

ACO Associates cc has been commissioned by SLR Consulting (South Africa) (Pty) Ltd, on behalf of Belton Park Trading 127 (Pty) Ltd to undertake a desktop maritime archaeological impact assessment to support prospecting right applications for sea concession areas 13C and 15C – 18C, located between the Oliphants River Mouth and St Helena Bay on the west coast of the Western Cape Province.

Prospecting operations will be for various minerals within each of the sea concession areas and the target sediments are storm lag beach deposits, at various sea levels below current sea level, which are known to contain mineralised Quaternary gravels and other sediments overlying Pre-Cambrian and Cretaceous bedrock.

The proposed prospecting operations will entail geophysical surveys, drill sampling and bulk sampling. Of these activities the drill sampling and bulk sampling have the potential to affect submerged heritage resources. Drill sampling to 8 m below seafloor will take place at intervals of 500 m to 50 m across the concession areas. The bulk sampling will comprise of excavation of ten sampling trenches per concession area at different geological domains, with each trench up to 180 m long and 20 m wide.

This desktop maritime heritage impact assessment provides an assessment of the maritime and underwater cultural heritage potential of the five concession areas, within a study area defined as the area within a 2 km buffer around the maximum extents of the concession area.

Findings:
Although there have been no specific studies of the submerged prehistory of the West Coast, the archaeological evidence for a hominin presence in the vicinity of the study area in the Earlier, Middle and Later Stone Age is plentiful. The past occupation and exploitation of the continental shelf by hominins during periods of lower sea level suggests that archaeological sites and materials can be expected on and within the current seabed that comprises the three concession areas, where the water depth is less than -120 m.

The maritime history of the West Coast dates back to almost the first days of the Dutch settlement in Table Bay but there are relatively few recorded wrecks in the vicinity of the concession areas. Of the twelve recorded maritime casualties, only four - *Eros*, *Antoinette*, *Blue Bird* and *Jenny-Lee* - could be present on the seabed in the concession areas. While *Blue Bird* and *Jenny-Lee* are of limited, current historical interest, *Eros* and *Antoinette* are older wrecks and hold greater potential archaeological interest.

Conclusions:
This assessment of the maritime heritage resources of concession areas 13C and 15C – 18C indicates that there is the potential for the presence of submerged prehistoric archaeological material in sediments to be affected by prospecting in areas of the seabed less than about -120 m in depth. There is also the potential for the presence of historical shipwrecks in one or more of the areas, although this potential appears to be low.

The significance of impacts from drill and bulk sampling on submerged prehistoric resources, where they occur, has been assessed to be very low. The application of measures to mitigate impacts is not practical given the uncertainty over the presence and distribution of these resources and the nature of prospecting activities being undertaken. However, this assessment has suggested for both the drill and bulk sampling, consideration be given by BPT127 to the retention of samples of the tailings and coarser fraction of sorted seabed material (particularly gravel and stone between c. 20 mm and 150 mm) for assessment by an archaeologist for the presence of prehistoric lithic material.

The implementation of these measures would result in a potential benefit to archaeological research and knowledge from the prospecting programme and it is suggested that the feasibility and mechanics of these suggestions are explored by BPT127 and the project archaeologist prior to the commencement of the prospecting programme.

In respect of historical shipwrecks and maritime heritage resources, this assessment found that the significance of likely impacts will be very low and that impacts can be mitigated through the avoidance of identifiable sites. Should a previously unknown or unrecorded shipwreck material be encountered during prospecting, work at that location must cease until the project archaeologist and SAHRA have been notified, the significance of the material has been assessed and a decision has been taken as to how to deal with it.

Lastly, it is recommended that the processing of multibeam and sub-bottom profiler data collected to inform prospecting activities includes the noting of and reporting to the project archaeologist of any seabed anomalies that could represent shipwrecks or maritime heritage resources, and the presence in the seismic data of any sediment horizons with pre-colonial archaeological potential.

It is our reasoned opinion that the proposed prospecting activities in concession areas 13C and 15C – 18C are likely to have a very low impact on submerged prehistoric and maritime and underwater cultural heritage resources and provided the recommendations and suggestions to mitigate and offset potential impacts are implemented, can be considered to be archaeologically acceptable.

GLOSSARY

Aeolianite: Any rock formed by the lithification of sediment deposited by aeolian processes, that is, by the wind.

Archaeology: Remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures.

Early Stone Age: The archaeology of the Stone Age between 700 000 and 2 500 000 years ago**.**

Heritage: That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999.

Holocene: The most recent geological time period which commenced 10 000 years ago.

Hominin: A member of the tribe Hominini which comprises those species regarded as human, directly ancestral to humans, or very closely related to humans.

Late Stone Age: The archaeology of the last 20 000 years associated with fully modern people.

Marine Isotope Stages: Alternating warm and cool periods in the Earth's paleoclimate, deduced from oxygen isotope data reflecting changes in temperature derived from data from deep sea core samples.

Midden: A pile of debris, normally shellfish and bone that have accumulated as a result of human activity.

Middle Stone Age: The archaeology of the Stone Age between 20 000-300 000 years ago associated with early modern humans.

Pleistocene: A geological time period (of 3 million – 10 000 years ago).

SAHRA: South African Heritage Resources Agency – the compliance authority which protects national heritage.

ABBREVIATIONS

DMRE	Department of Mineral Resources and Energy
EA	Environmental Authorisation
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
HIA	Heritage Impact Assessment
LSA	Late Stone Age
MSA	Middle Stone Age
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
SAHRA	South African Heritage Resources Agency
UNCLOS	United Nations Convention on the Law of the Sea

1. INTRODUCTION

ACO Associates cc has been commissioned by SLR Consulting (South Africa) (Pty) Ltd, on behalf of Belton Park Trading 127 (Pty) Ltd (BPT127), to undertake a desktop maritime archaeological impact assessment to support prospecting right applications for sea concession areas 13C and 15C – 18C, located between the Oliphants River Mouth and St Helena Bay on the west coast of the Western Cape Province (Figure 1).

BPT127 has lodged applications for Prospecting Rights with the Department of Mineral Resources and Energy (DMRE) to undertake offshore prospecting activities, in terms of Section 16 of the Mineral and Petroleum Resources Development Act, 2002 (No. 28 of 2002) (MPRDA), as amended.

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.

2. PROJECT DESCRIPTION

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. According to the Prospecting Rights Applications for the three concession areas, the sediments that are the target of the prospecting are storm lag beach deposits, at various sea levels below current sea level, which are known to contain mineralised Quaternary gravels and other sediments overlying Pre-Cambrian and Cretaceous bedrock.

The proposed prospecting operations will entail geophysical surveys (multibeam bathymetry and sub-bottom profiler), drill sampling and bulk sampling. Of these activities the drill sampling and bulk sampling have the potential to affect submerged heritage resources.

Drill sampling to 8 m below seafloor will take place at intervals of 500 m to 50 m across the concession areas. The bulk sampling will comprise of excavation of ten sampling trenches per concession area at different geological domains, with each trench up to 180 m long and 20 m wide. The total footprint of disturbance associated with the drill sampling and bulk (trench) sampling would be approximately 20.4 ha in total.

3. RELEVANT LEGISLATION

3.1. **National Heritage Resources Act (No 29 of 1999)**

The National Heritage Resources Act (NHRA) came into force in 2000 with the establishment of the South African Heritage Resources Agency (SAHRA), replacing the National Monuments Act (No. 28 of 1969 as amended) and the National Monuments Council as the national agency responsible for the management of South Africa's cultural heritage resources.

The NHRA reflects the tripartite (national/provincial/local) nature of public administration under the South African Constitution and makes provision for the devolution of cultural heritage management to the appropriate, competent level of government. Because national government is responsible for the management of the seabed below the high-water mark, however, the management of maritime and underwater cultural heritage resources under the NHRA does not devolve to provincial or local heritage resources authorities but remains the responsibility of the national agency, SAHRA.

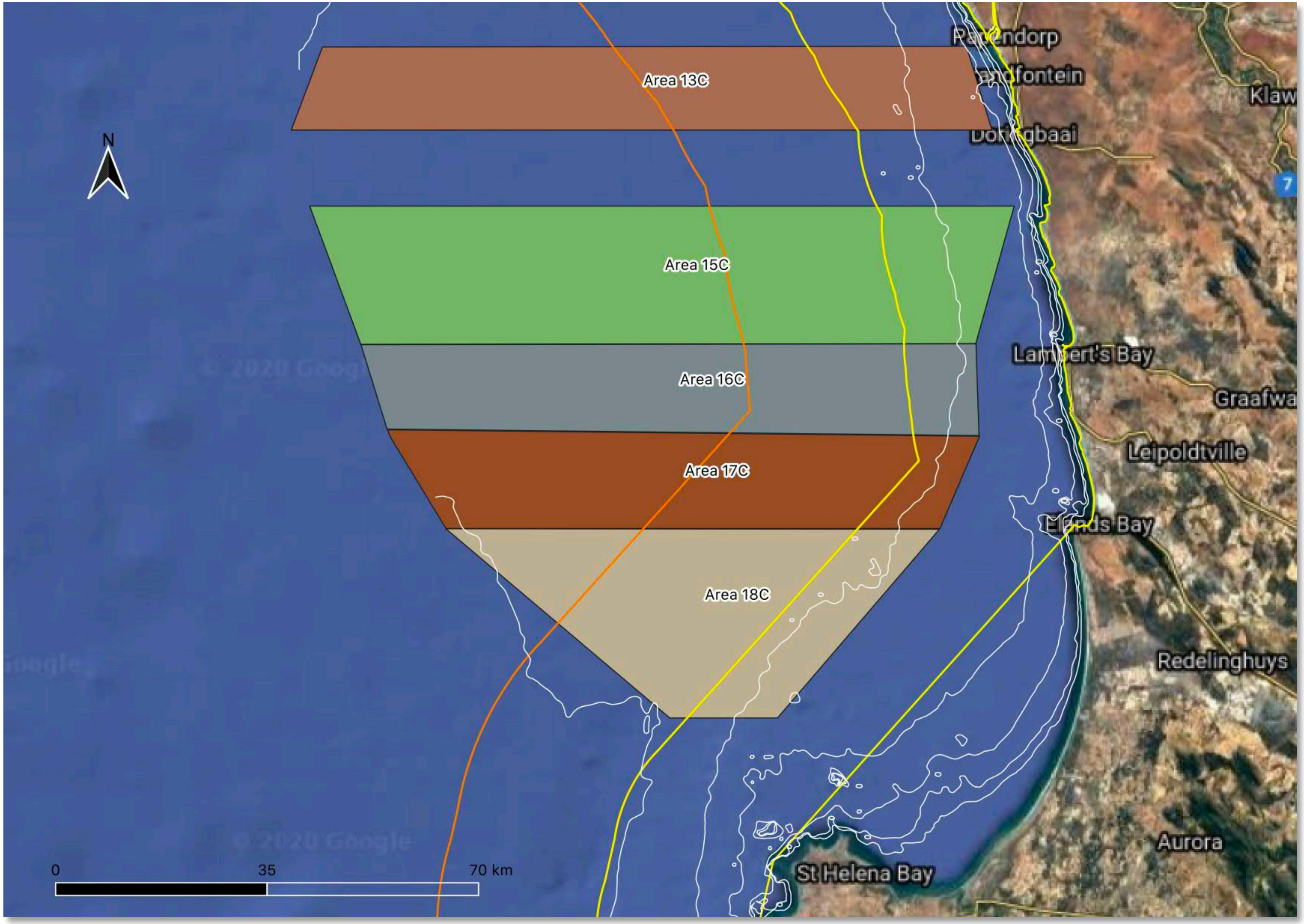

Figure 1: Location of concession areas 13C and 15C – 18C between St Helena Bay in the south and Papendorp at the mouth of the Oliphants River in the north on the Cape west coast. The yellow and orange lines which cross the concessions areas are the limits of South Africa's territorial waters and contiguous zone, respectively (Source: Google Earth).

The NHRA gives legal definition to the range and extent of what are considered to be South Africa's heritage resources. According to Section 2(xvi) of the Act, a heritage resource is "any place or object of cultural significance". This means that the object or place has aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.

In terms of the definitions provided in Section 2 of the NHRA, maritime and underwater cultural heritage can include the following sites and/or material relevant to this assessment:

- material remains of human activity which are in a state of disuse and are in or on land [which includes land under water] and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures (Section 2(ii));
- wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the Republic, a defined respectively in sections 3, 4 and 6 of the Maritime Zones Act, 1994 (Act No. 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation (Section 2(ii)); and
- any movable property of cultural significance which may be protected in terms of any provisions of the NHRA, including any archaeological artefact or palaeontological specimen (Section 2(xxix)).

Of the heritage resource types protected by the NHRA, seabed mineral prospecting has the potential to impact the following:

- submerged pre-colonial archaeological sites and materials; and
- maritime and underwater cultural heritage sites and material, which are principally historical shipwrecks.

As per the definitions provided above, these cultural heritage resources are protected by the NHRA and a permit from SAHRA is required to destroy, damage, excavate, alter, deface or otherwise disturb any such site or material.

It is also important to be aware that in terms of Section 35(2) of the NHRA, all archaeological objects and palaeontological material is the property of the State and must, where recovered from a site, be lodged with an appropriate museum or other public institution.

3.2. **Maritime Zones Act (No 15 of 1994)**

South Africa's Maritime Zones Act of 1994 is the national legislative embodiment of the international maritime zones set out in the United Nations Convention on the Law of the Sea (UNCLOS). The Act defines the extent of the territorial waters, contiguous zone, exclusive economic zone (EEZ) and continental shelf (which together comprises of some 4.34 million square kilometres of seabed) and sets out South Africa's rights and responsibilities in respect of these various maritime zones.

Under the terms of Sections 4(2) and 6(2) of the Maritime Zones Act respectively, "any law in force in the Republic, including the common law, shall also apply in its territorial waters" and "subject to any other law the Republic shall have, in respect of objects of an archaeological or historical nature found in the maritime cultural zone, the same rights and powers as it has in respect of its territorial waters".

The NHRA applies, therefore, within South Africa's territorial waters (12 nautical miles seaward of the baseline) and to the outer limit of the maritime cultural zone (24 nautical miles seaward of the baseline) (see Figure 1above).

Approximately half of concession areas 13C and 15C – 18C lie within South Africa's territorial waters and contiguous zone and are thus subject to the NHRA (see Figure 1 above). Any offshore activities that have the potential to disturb or damage cultural heritage resources located in or on the seabed within the territorial waters and maritime cultural zone require the involvement of SAHRA, as a commenting body in respect of the National Environmental Management Act environmental assessment process (see below) and as permitting authority where impacts to sites or material cannot be avoided and damage or destruction will occur.

In the seaward portions of the concession areas which lies beyond the outer limit of the contiguous zone, within South Africa's Exclusive Economic Zone (EEZ) (see Figure 1 above), the NHRA technically does not apply.

However, in terms of Section 9 of the Maritime Zones Act, any law in force in the Republic, including the common law, shall also apply on and in respect of an installation. The definition of an installation includes:

- any exploration or production platform used in prospecting for or the mining of any substance;
- any exploration or production vessel; and/or
- any vessel or appliance used for the exploration or exploitation of the seabed.

The activities on or related to the platform to be used in the proposed prospecting may thus be subject to the requirements of the NHRA.

3.3. **National Environmental Management Act (Act No 107 of 1998)**

The National Environmental Management Act (No 107 of 1998) (NEMA) provides a framework for the integration of environmental issues into the planning, design, decision-making and implementation of plans and development proposals that are likely to have a negative effect on the environment.

Regulations governing the environmental authorisation (EA) process have been promulgated in terms of NEMA and include the EIA Regulations (GNR 982/2014, as amended) and Listing Notices (LN) 1-3 (R983, R984 and R985, as amended) that list activities requiring an EA.

The proposed prospecting in concession areas 13C and 15C – 18C, triggers activities listed in LN2 and requires an application for EA that follows the Scoping and Environmental Impact Assessment (EIA) process.

The EIA process aims to identify and assess all potential environmental impacts (negative and positive) and the Environmental Impact Report (including Environmental Management Programme) should recommend how potential negative impacts can be effectively mitigated and how benefits can be enhanced.

4. METHODOLOGY

This desktop maritime heritage impact assessment (HIA) provides an assessment of the maritime and underwater cultural heritage potential of the three concession areas described above and within the study area defined in Section 4.1 below.

The report includes a short description of what comprises South Africa's maritime and underwater cultural heritage and the maritime history of West Coast, followed by a discussion of potential maritime heritage resources of the three concession areas within that wider context.

The report draws information from readily available documentary sources and databases, including SAHRA's Maritime and Underwater Cultural Heritage database, a database of underwater heritage resources maintained by ACO Associates, and from relevant primary and secondary sources and aims to identify as accurately as possible the maritime heritage resources within the concession areas.

An assessment of the potential impacts of the proposed prospecting on maritime and underwater cultural heritage resources is provided and this is supported by recommendations for measures to mitigate possible impacts arising from prospecting operations in the concession areas.

4.1. **Maritime Study Area**

The study area for this HIA is defined as the area within a 2 km buffer around the maximum extents of the concession areas (Figure 2).

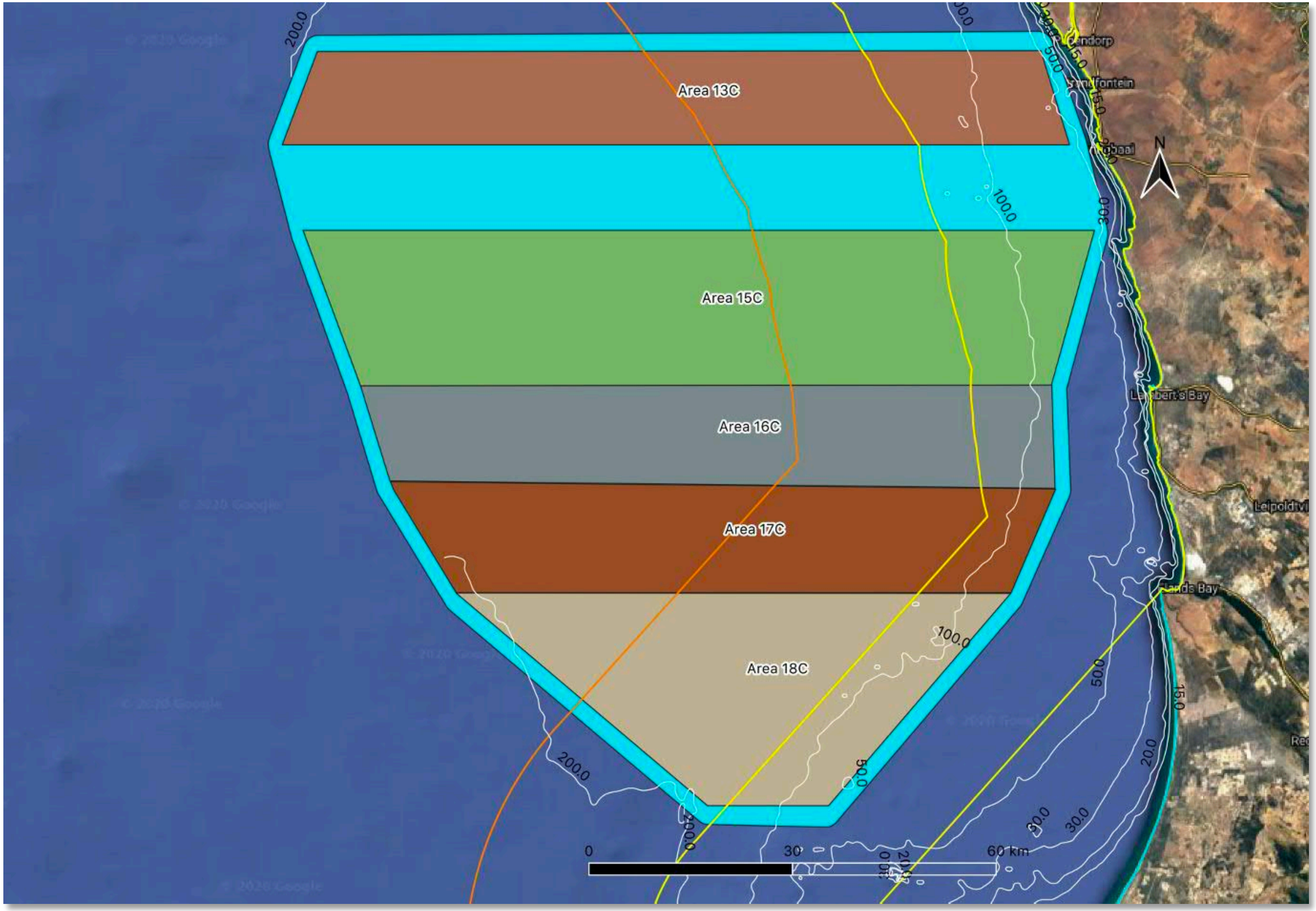

Figure 2: Study area used for this HIA report (Source: Google Earth).

4.2. **Limitations**

South Africa's record of maritime and underwater cultural heritage resources is based on a mix of information derived in the main from historical documents and other secondary sources and from very limited primary sources such as geophysical data and other field-based observations and site recordings.

While every effort has been made to ensure the accuracy of the information presented below, the reliance on secondary data sources means that there are considerable gaps and inaccuracies in this record and the locations of most of the wrecks referred to in the following sections are approximate. The potential also exists for currently unknown and/or unrecorded maritime heritage sites to be encountered within the concession areas in the course of prospecting activities.

5. UNDERWATER CULTURAL HERITAGE

South Africa has a rich and diverse underwater cultural heritage. Strategically located on the historical trade route between Europe and the East, South Africa's rugged and dangerous coastline has witnessed more than its fair share of shipwrecks and maritime dramas in the last 500 years.

At least 2400 vessels are known to have sunk, grounded, or been wrecked, abandoned or scuttled in South African waters since the early 1500s. This doesn't include the as yet unproven potential for shipwrecks and other sites that relate to pre-European, Indian Ocean maritime exploration, trade and interactions along the South African east coast, or the potential for wrecks of vessels which disappeared between Europe and the East to be present in our waters.

In addition to historical shipwrecks, the record of South Africa's long association with the sea is much broader and extends far back into prehistory. This element of our maritime and underwater cultural heritage is represented around the South African coast by thousands of pre-colonial shell middens and large numbers of tidal fish traps, which reflect prehistoric human exploitation of marine resources since the Middle Stone Age, more than 150,000 years ago.

Another, until recently, largely unacknowledged and unexplored aspect of our maritime and underwater cultural heritage are pre-colonial terrestrial archaeological sites and palaeolandscapes which are now inundated by the sea.

This assessment considers the potential for both historical shipwrecks and submerged prehistoric archaeological resources to be present in concession areas 13C and 15C – 18C.

5.1. **Submerged Prehistory**

Since the start of the Quaternary, approximately 2.6 million years ago, the world has been subject to a series of cooling and warming climatic cycles in which sea level was mainly lower than it is today. During the last 900,000 years, global sea levels have fluctuated substantially on at least three occasions, the result of increased and decreased polar glaciation. The dropping of sea levels was caused by the locking up in the polar ice caps of huge quantities of seawater as global temperatures cooled. The most extreme recent sea level drop occurred between circa 20,000 and 17,000 years ago when at the height of the last glaciation (Marine Isotope Stage (MIS) 2) the sea was more than 120 m lower than it is today (Waelbroeck *et al*, 2002; Rohling *et al*, 2009).

As with the MIS 2 low sea level stand, those which corresponded with MIS 4 (~70,000 years ago), MIS 6 (~190,000 years ago), MIS 8 (~301,000 years ago) and MIS 12 (~478,000 years ago) would have "added a large coastal plain to the South African land mass" (Van Andel, 1989:133) where parts of the continental shelf were exposed as dry land (see Cawthra *et al*, 2016) (Figure 3).

The exposure of the continental shelf would have been most pronounced on the wide Agulhas Bank off the southern Cape coast, and it is estimated that a new area of land, as much as 80,000 km^2 in extent, was exposed during the successive glacial maxima (Fisher *et al*, 2010). Figure 4 below gives an indication of the extent of the continental shelf exposure on the south and west coasts during the second to last glaciation (MIS 6).

The exposed continental shelf was quickly populated by terrestrial flora and fauna, and also by our human ancestors who were dependant on these resources (Compton, 2011). As a result, for periods numbering in the tens of thousands of years on at least three occasions during the last 500,000 years our ancestors inhabited areas of what is now seabed around the South African coast. This means that a large part of the archaeological record of the later Earlier, Middle and early Late Stone Age is located on the continental shelf and is now “inundated and for all practical purposes absent from [that] record” (Van Andel, 1989:133-134).

Until relatively recently there was little or no access to the submerged prehistoric landscapes and sites on the continental shelf, although evidence from various parts of the world of drowned, formerly terrestrial landscapes hinted at the tantalising prospect of prehistoric archaeological sites on and within the current seabed.

Perhaps the best-known example of such evidence is archaeological material and late Pleistocene faunal remains recovered in the nets of fishing trawlers in the North Sea between the United Kingdom and the Netherlands throughout the 20th century (Peeters *et al*, 2009; Peeters, 2011) and the University of Birmingham’s recent archaeological interpretation of 3D seismic data, collected in the same area by the oil and gas industry, which has revealed well-preserved prehistoric landscape features across the southern North Sea (Fitch *et al*, 2005, Gaffney *et al*, 2010).

Closer to home, there is archaeological evidence for a prehistoric human presence in what is now Table Bay. In 1995 and 1996 during the excavation of two Dutch East India Company shipwrecks, the *Oosterland* and *Waddinxveen*, divers recovered three Early Stone Age handaxes from the seabed under the wrecks. The stone tools, which are between 300,000 and 1.4 million years old, were found at a depth of 7-8 m below mean sea level and were associated with Pleistocene sediments from an ancient submerged and infilled river channel. Their unrolled and unworn condition indicate that they had not been carried to their current position by the ancient river and suggests that they were found more or less where they were dropped by Early Stone Age hominins more than 300,000 years ago, when the sea level was at least 10 m lower than it is today (Werz and Flemming, 2001; Werz *et al*, 2014).

5.1.1. **Submerged Prehistory of the Concession Areas**

There have, to date, been no specific studies of the submerged prehistory of the west coast. However, the archaeological evidence for a hominin presence along the West Coast in the Earlier, Middle and Later Stone Ages is plentiful.

Diepkloof Rock Shelter, inland of Elands Bay for example, contains evidence of a nearly continuous human occupation for nearly 85 000 years (see for example, Parkington and Poggenpoel 1987; Texier et al 2010), while Elands Bay Cave, on the coast at the mouth of the Verloren Vlei, preserves archaeological evidence of the Pleistocene / Holocene transition during the Later Stone Age (Parkington 1988).

At Hoedjiespunt in Saldanha Bay, south of the study area, four hominid teeth, four or five small fragments of cranium, and two postcranial bones from one or two individuals have been found in an ancient hyena lair and are associated with uranium series dates on ostrich eggshell fragments which imply an age of 130,000 to 180,000 years for the hominids (Berger and Parkington 1996). Nearby, at Churchaven on the Langbaan Lagoon a set of fossilized human footprints were discovered in an aeolianite slab in 1995. They are thought to be those of a female human (hence their nickname “Eve’s footprints”) and have been dated to approximately 117,000 years ago, very close to the start of the last glaciation when sea levels would have been starting to drop (see http://www.sawestcoast.com/fossileve.html).

Later Stone Age coastal shell middens are ubiquitous along the West Coast, as are numerous Middle Stone Age shell middens; the latter being some of the earliest evidence in the world for the exploitation by our ancestors of marine resources. Older, Earlier Stone Age lithics are also commonly found along on the West Coast (David Halkett pers. comm.).

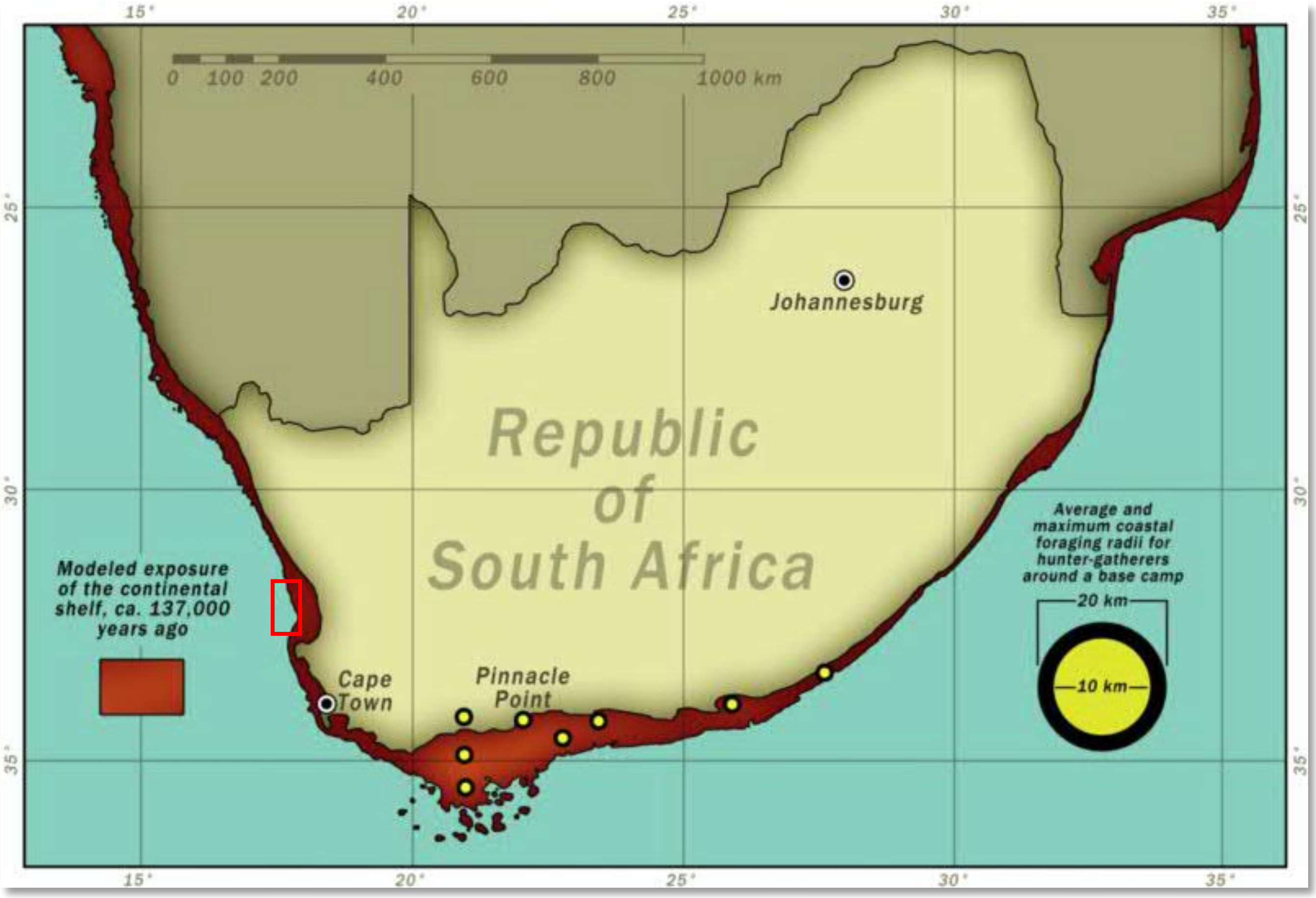

Figure 3: Possible extent of the South African continental shelf c.137,000 years ago. The location of concession areas 14B, 15B and 17B is marked by the red box (Source: Franklin et al, 2015)

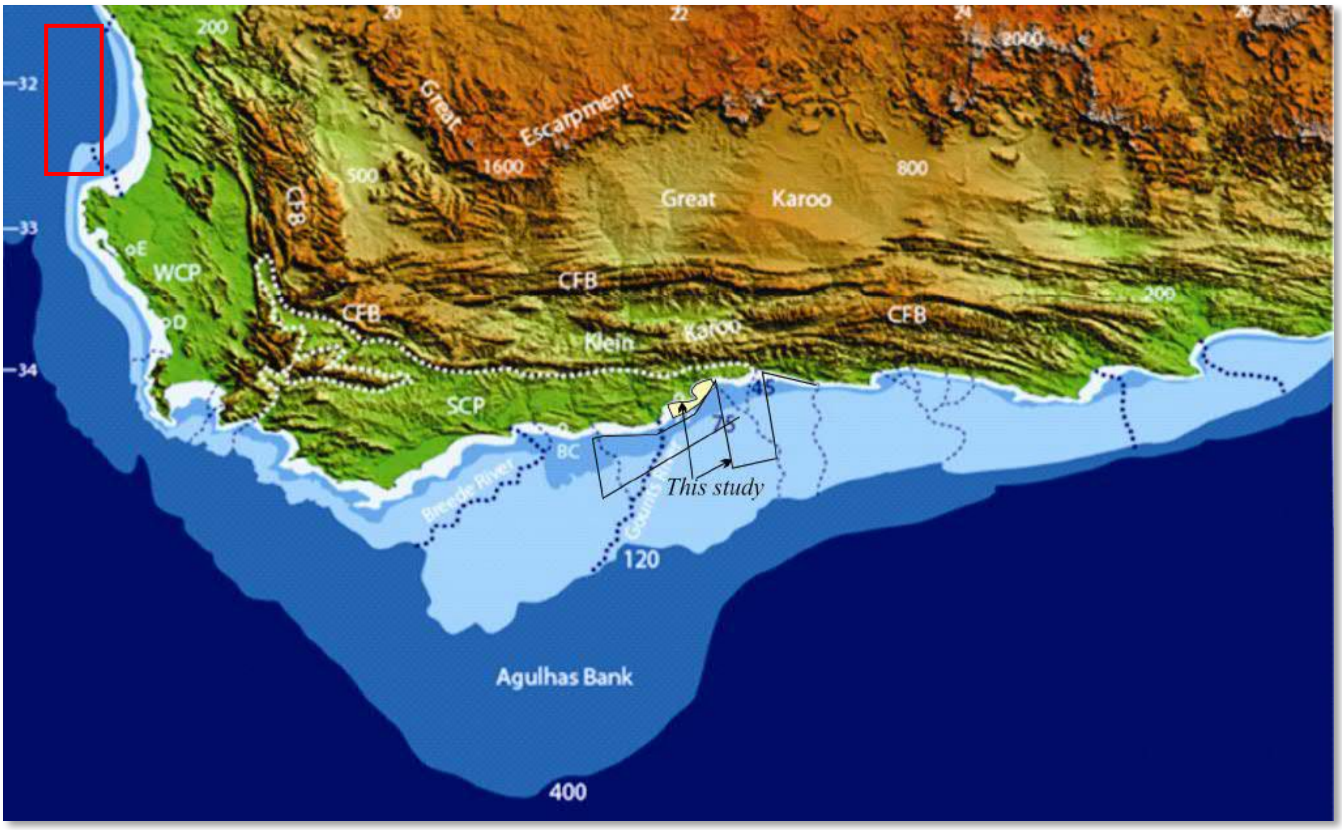

Figure 4: The south and west coast continental shelf showing the water depths of 45, 75, 120 and 400 m. The location of the concession areas is marked by the red box on the left of the image (Source: Compton, 2011 from Cawthra, 2014).

As discussed in the previous section, the maximum sea level lowstand during the Quaternary, when hominins would have been present in and on the South African landscape, was -120 m. Any areas of South Africa's current seabed shallower than -120 m thus have the potential to have been used by our ancestors and to preserve the archaeological evidence of that use.

Although no recent geophysical data are available for the B concession areas being assessed here, seabed sediment mapping by O'Shea (1971) further up the coast at Kleinzee indicates that a channel cut by the palaeo-Buffels River extends offshore to the west of Kleinzee. This channel has the potential for associated, now submerged, archaeological material and palaeoenvironmental evidence, and is illustrative of the likely situation with many of the other major rivers that feed into the Atlantic along the West Coast have submerged palaeo-channels extending offshore. These channels are an important mining target, particularly for diamond mining as they are the source of and contain diamondiferous gravel.

During times of lower sea level in the past, these rivers would have flowed across the exposed continental shelf and these ancient river courses, whose channels are today buried under modern seabed sediment, would have been an important focus for hominin activity on the exposed continental shelf in the past. As demonstrated in Table Bay, there is the potential for the occurrence of ancient, submerged archaeological material in association with palaeo-river channels. Where alluvial sediment within these channels has survived post-glacial marine transgressions there is also the potential to recover palaeoenvironmental data (pollens, foraminifera and diatoms, for example) which can contribute contextual information to our understanding of the ancient human occupation of South Africa.

It is important to note here that most of concessions areas 13C and 15C – 18C are deeper than -120 m and will thus not contain prehistoric archaeological evidence. Seabed contour information from the South African Naval Hydrographers Office on Figure 2 shows the -100 m and -200 m contour lines, and suggests that the -120 m line corresponds roughly with the outer edge of the territorial waters.

This rough correlation has been assumed for this report and the assessment of impacts on submerged prehistoric archaeological resources below applies only within those portions of the concession areas within the territorial waters.

5.2. **Maritime History of the South African coast**

In 1498 the Portuguese explorer Vasco da Gama finally pioneered the long-sought sea route around Africa from Europe to the East. Since then, the southern tip of the African continent has played a vital role in global economic and maritime affairs, and until the opening of the Suez Canal in 1869, represented the most viable route between Europe and the markets of the East (Axelson, 1973; Turner, 1988; Gribble, 2002; Gribble and Sharfman, 2013).

The South African coast is rugged, and the long fetch and deep offshore waters mean that the force and size of seas around the South African coast are considerable, a situation exacerbated by prevailing seasonal winds.

The geographical position of the South African coast on the historical route to the East and the physical conditions mariners could expect to encounter in these waters have, in the last five centuries, been responsible for the large number of maritime casualties which today form the bulk of South Africa's maritime and underwater cultural heritage (Gribble, 2002).

At least 2500 vessels are known to have sunk, grounded, or been wrecked, abandoned or scuttled in South African waters since the early 1500s. More than 1900 of these wrecks are more than 60 years old and are thus protected by the NHRA as archaeological resources. This list is by no means complete and does not include the as yet unproven potential for shipwrecks and other sites that relate to pre-European, Indian Ocean maritime exploration, trade and interactions along the South African east coast. It is, thus anticipated that further research in local and foreign archives, together with physical surveys to locate the remains of historical shipwrecks will produce a final tally of more than 3000.

For obvious historical reasons, the earliest known South African wrecks are Portuguese, dating to the sixteenth century when that country held sway over the route to the East. Due to the later, more prolonged ascendancy of first the Dutch and then the British in European trade with the East and control at the Cape, the majority of wrecks along the South African coast are Dutch and British. However, at least 36 other nationalities are represented amongst the other wrecks that litter the South African coast.

Da Gama's maritime incursion into the Indian Ocean laid the foundation for more than 500 years of subsequent European maritime activity in the waters off the South African coast. The Portuguese and other European nations who followed their lead around the Cape and into the Indian Ocean, however, joined a maritime trade network that was thousands of years old and in which east and south east Africa was an important partner.

This trade spanned the Indian Ocean and linked the Far East, South East Asia, India, the Indian Ocean islands and Africa. Archaeological evidence from Africa points to an ancient trade in African products – gold, skins, ivory and slaves – in exchange for beads, cloth, porcelain, iron and copper. The physical evidence for this trade includes Persian and Chinese ceramics excavated sites on African Iron Age like Khami, Mapungubwe and Great Zimbabwe (see Garlake, 1968, Huffman, 1972, Chirikure, 2014), glass trade beads found in huge numbers on archaeological sites across eastern and southern Africa (Wood, 2012).

There is shipwreck evidence on the East African coast for this pre-European Indian Ocean trade (see for example Pollard et al 2016) and clear archaeological and documentary evidence that this trade network extended at least as far south as Maputo in Mozambique. This suggests that there is the potential for shipwrecks and other sites that relate to pre-European, Indian Ocean maritime exploration, trade and interactions to exist along the South African east coast and offshore waters.

The more than 2500 historical shipwrecks that make up the bulk of South Africa's underwater cultural heritage are a thus huge, cosmopolitan, repository of information about mainly global maritime trade during the last five centuries and potentially much further back into the past. These sites contain a wealth of cultural material associated with that trade and clues to the political, economic, social and cultural changes that accompanied this trade, and which contributed to the creation of the modern world.

5.2.1. **Maritime History of the B Concession Areas**

The maritime history of the West Coast dates back to almost the first days of the Dutch settlement in Table Bay. The Dutch settlers were quick to recognise and exploit the rich marine resources of the West Coast and fishing and sealing flourished, with the catches transported down the coast to supply Cape Town.

This industry led to the development of fishing villages at Saldanha Bay, Lamberts Bay, and at Laaiplek on the Berg River in St Helena Bay. Saldanha, together with places like Elands Bay, also later becoming ports for the export of grain and other produce from the Swartland and Cederberg (Ingpen 1979).

During the early nineteenth century the West Coast islands became the focus of an international 'white gold' rush to exploit their rich guano resources. The guano was soon depleted but the discovery of rich copper deposits in Namaqualand and the Richtersveld led to the use of Alexander Bay, Robbe Bay (now Port Nolloth) and Hondeklip Bay by the early 1850s and the development of local, coasting shipping services to support this new industry (The Nautical Magazine and Naval Chronicle 1855: 297-303; Ingpen 1979).

With the exception of Saldanha Bay, the West Coast historically lacked good harbours. Combined with the regular coastal fogs, a largely rocky shoreline and dangerous currents this took its toll on shipping over the years.

According to SAHRA's Maritime and Underwater Cultural Heritage database, the national record of underwater cultural heritage curated on the South African Heritage Resources Information System (SAHRIS) (http://www.sahra.org.za/sahris), there are at least 89 shipping casualties recorded between the Berg and Orange Rivers, many of which were vessels involved in coastal trade and fishing.

South of the study area there is a concentration of wrecks around the northern end of the Vredenburg Peninsula, but these sites are all more than 17 km south of the southern boundary of concession area 18C and are well outside the scope of this assessment. Similarly, within St Helena Bay, south-east of concession area 18C two wrecks are recorded: the Dutch East Indiaman *Gouden Buys* (1693) and the modern fishing vessel *Bella Theresa* (1977). Neither will be impacted by activities in the concession area.

There remain twelve maritime casualties located within or close to concession areas 13C and 15C – 18C (see Figure 5 and Figure 6). A gazetteer of these wrecks is provided in Appendix 1.

Three of these wrecks, the *Girl Devon* (1971), *Boy Donald* (1983) and *Jenny-Lee* (1992) are currently less than 60 years of age and are thus not protected by the NHRA as heritage resources. Of the three, only the *Jenny-Lee*, which is recorded as having foundered 52 nautical miles west of Lamberts Bay, is likely to be within the concession areas (potentially Area 15C or 16C). Although these wrecks are not heritage resources, they can pose a risk to prospecting machinery and for that reason have been retained in the overall count of sites that may lie within the concession areas.

Of the remaining wrecks the following can be stated:

- The story of the wreck of HMS *Sybille* (1901) at Steenboksfontein south of Lamberts Bay is well known (see Gribble & Athiros 2008) and its position on the seabed accurately recorded. This site can be excluded from this assessment because it is well outside any of the concession areas;
- *Rosebud* (1859) was wrecked at Lamberts Bay. This implies that the vessel came ashore on the coast and the wreck is thus also well outside any of the concession areas;
- *Lamberts Bay Packet* (1859) and *Shamrock* (1959) are both recorded as having grounded in Lamberts Bay, which usually implies that they were subsequently refloated and didn't become wrecks. It is thus unlikely that the remains of either vessel will be located in the concession areas;
- *Eros* (1918) foundered at sea near Lamberts Bay while *en route* from Cape Town to Port Nolloth, which implies that the wreck could be present in any of the five concession areas being considered here; and
- Because there is no indication in the available records of how or where *Antoinette* (1854) and *Blue Bird* (1960) were lost, it must be assumed that either or both could potentially lie within concession areas 13C and 15C – 18C.

For the purposes of this impact assessment, therefore, it must be assumed that the remains of *Eros*, *Antoinette*, *Blue Bird* and *Jenny-Lee* could be present on the seabed in the concession areas. While *Blue Bird* and *Jenny-Lee* are of limited, current historical interest, *Eros* and *Antoinette* are older wrecks and hold greater potential archaeological interest.

Lastly, it must be stated that the possibility exists for the remains of currently unknown and unrecorded wrecks to be present in the concession areas. The historical records contain many references to vessels that were lost without trace between their points of departure and arrival. Where survivors of such events were subsequently rescued, the loss was recorded, but in many cases, vessels simply never arrived at their destination and could thus lie anywhere along their intended route. The potential for the occurrence of such unrecorded wrecks was illustrated in 2008 when a 16th century Portuguese wreck, since identified as the *Bom Jesus*, was unexpectedly found during the diamond mining south of Oranjemund in Namibia (see Alves 2011).

6. IMPACT ASSESSMENT

As stated in the Section 2 above, potential impacts on submerged prehistory and maritime and underwater cultural heritage resources from the prospecting activities in concession areas 13C and 15C – 18C will arise out of the drill and bulk sampling in the area landward of the limit of the territorial waters.

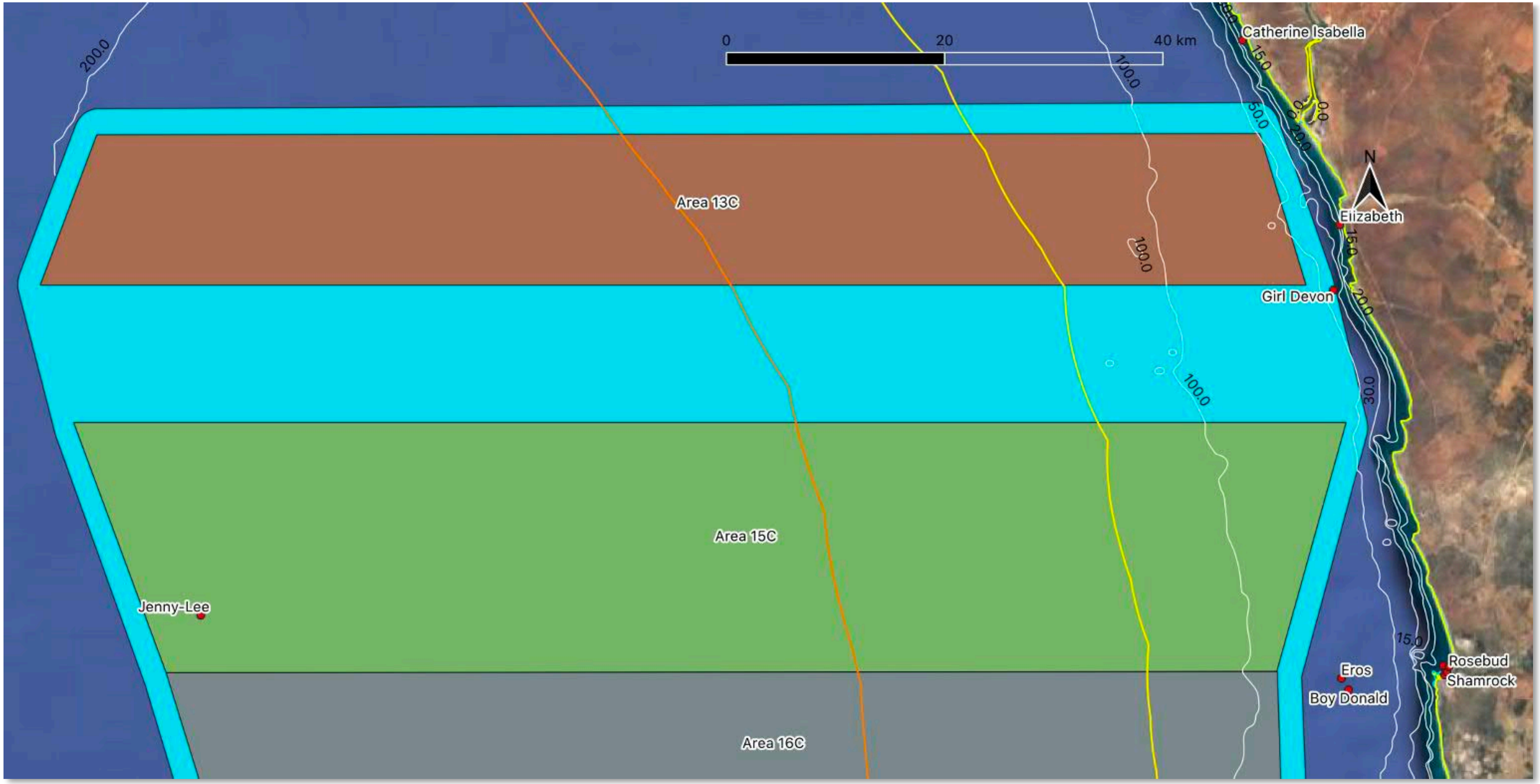

Figure 5: Wrecks recorded in and near concession area 13C, 15C and 16C (Source: Google Earth).

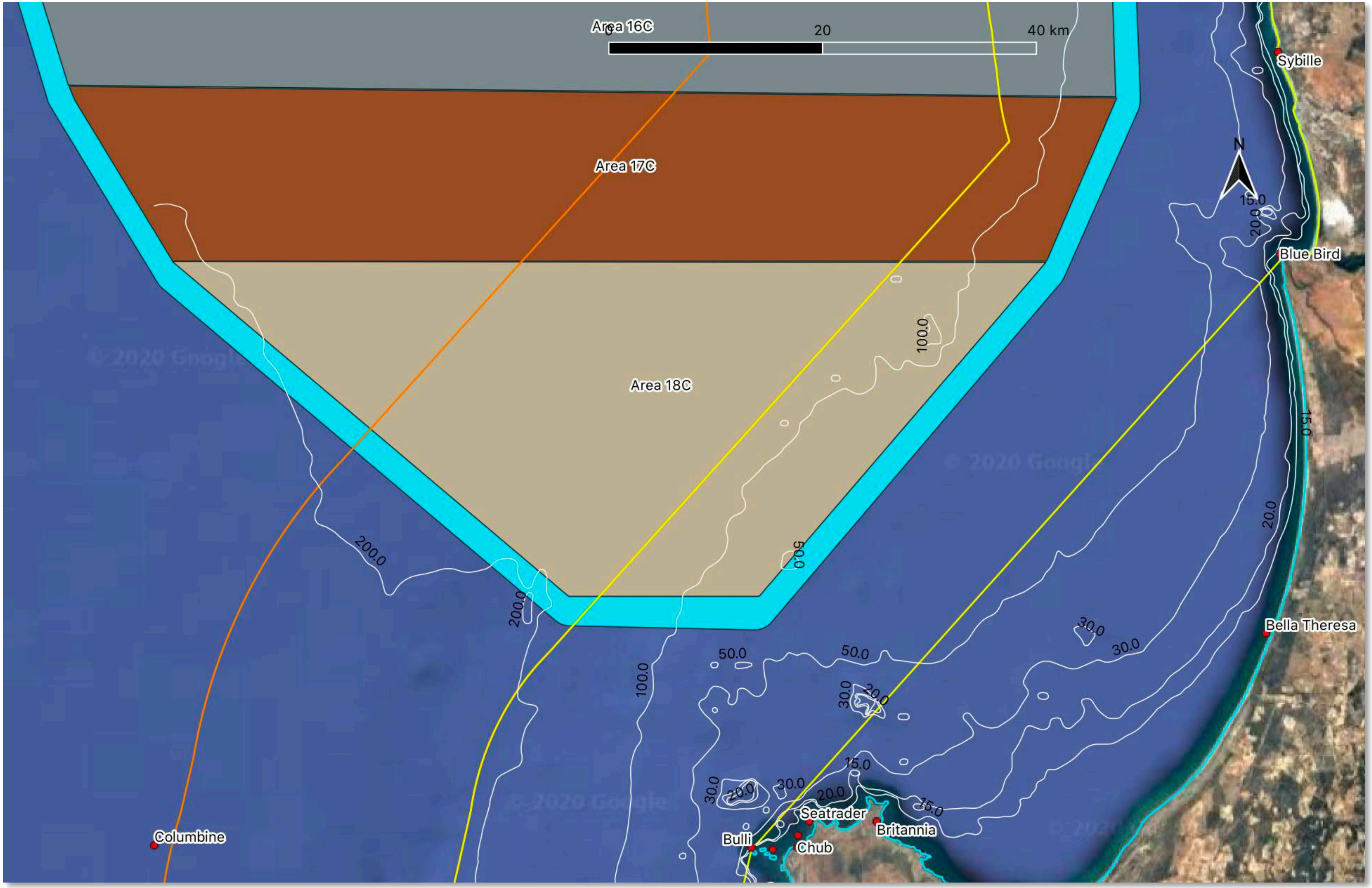

Figure 6: Wrecks recorded in and near to concession areas 16C-18C (Source: Google Earth).

It is difficult to quantify the impacts on cultural heritage resources of seabed activities such as prospecting because the locations and extent of these resources are generally poorly understood and the nature of the environment limits the potential for finding sites and monitoring the intrusive activities.

Recent studies, particularly work done in the UK between 2002 and 2011 under the aegis of the Marine Aggregate Levy Sustainability Fund, have demonstrated that the use of geophysical and geotechnical data generated for seabed development can create a better understanding of the marine historic environment, allowing far more informed predictions about where submerged prehistoric archaeological and shipwreck sites and material can be expected in and on the seabed (Firth 2013; see also Fitch et al 2005, Gaffney et al 2007, 2010 and the *Wrecks on the Seabed* and *Submerged Prehistory* projects conducted by Wessex Archaeology and archived at the Archaeological Data Service (http://archaeologydataservice.ac.uk/archive/).

The potential impacts associated with seabed prospecting are assessed for the two heritage resources - submerged prehistory and shipwrecks/ maritime heritage - in the following sections. The assessment is based on the methodology set out in Appendix 4 below.

6.1. **Submerged Prehistory – All Concession Areas**

The past use by our hominin ancestors of the exposed continental shelf is beyond doubt and the evidence of this presence can be expected wherever archaeological material and palaeoenvironmental evidence, in water shallower than approximately -120 m, has survived post-glacial marine transgressions. There is the potential for this material to be found on palaeo-landsurfaces within seabed sediments and in association with now submerged palaeo-channels.

Although no geophysical data for the concession areas are available it is also likely that the rivers that presently debouch into the sea along the stretch of coastline adjacent to the concession areas will have palaeo-channels which extend offshore across the present seabed of the concession areas.

The relatively small footprint of the seabed interventions associated with prospecting means that the potential for interaction with or impact on submerged prehistoric archaeological material in the concession areas will be small, although the likelihood that prospecting will target seabed palaeo-channels, as a source particularly of diamondiferous gravels, raises the potential for impacts.

Were impacts on submerged prehistoric archaeological resources to occur, they will be negative because the finite and non-renewable nature of these resources means that they cannot recover if disturbed, damaged or destroyed.

6.1.1. **Impacts of Drill Sampling**

According to the Scoping Report (Arnott 2020) for concession areas 13C and 15C – 18C seabed drill sampling will be undertaken using a subsea sampling tool deployed from the dedicated sampling vessel, the MV *The Explorer*. The sampling tool comprises a 2.5 m diameter drill bit operated from a drill frame structure that is deployed on the seabed. The drill uses water jetting to fluidise sediments and can penetrate to a depth of 12 m above the bedrock. The fluidised sediments are 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.

The physical intrusion of this seabed drill into the seabed is relatively small and the potential impacts of seabed drilling in the five concession areas on prehistoric heritage resources on, or in, the seabed will be localised. Where they occur, however, the impacts will be irreversible/permanent because the finite and non-renewable nature of heritage resources means that they cannot recover if disturbed, damaged or destroyed.

The intensity of impact will be low, given the very limited physical intrusion into or disturbance of the seabed of the drilling and the probability of occurrence is very low.

The significance of the impact is thus assessed to be very low and the effect of the impact be negative.

The lack of information about the submerged prehistory of the concession areas means that the level of confidence in this assessment of impacts is low.

No mitigation is suggested for the seabed drilling. However, it is suggested that the possibility of the retention of samples of the tailings (particularly gravel and stone between c. 20 mm and 150 mm) for assessment by an archaeologist for the presence of prehistoric lithic material is explored with BPT127.

Access to such material for archaeological assessment may offset the potential impacts of seabed drilling and would result in the changing of the impact status from negative to positive because of a potential benefit to archaeological research and knowledge that could accrue from access to such seabed material.

The assessment of impact in respect of seabed drilling can be summarised as follows:

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	**Local 1**	**Low 1**	**Long-term (Irreversible) 3**	**Low 5**	**Very low**	**VERY LOW**	**-ve**	**Low**
Essential mitigation measures: **No mitigation proposed but the release of core log information for inclusion in the archaeological research record could offset any potential impacts**								
With mitigation	**1**	**1**	**3**	**5**	**Very low**	**VERY LOW**	**+ve**	**Low**

6.1.2. **Impacts of Bulk Sampling**

According to the Scoping Report (Arnott 2020) and the Prospecting Rights Applications, the bulk sampling will comprise of excavation of ten sampling trenches, per concession area, at different geological domains. Each will be trench will be up to 180 m long and 20 m wide with a maximum depth of 8 m.

Trenching would be undertaken by a seabed crawler, deployed off the dedicated mining vessel, the MV *Ya Toivo*. The crawler, which is 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 remining sampled sediments are pumped to the surface for shipboard processing.

The bulk sampling represents a substantial physical intrusion into the seabed which, depending on the nature of the seabed at sampling locations, can impact submerged prehistoric heritage resources. Where impacts do occur they will be localised but irreversible/permanent because the finite and non-renewable nature of heritage resources means that they cannot recover if disturbed, damaged or destroyed.

The intensity of impact has been assessed to be low and the probability of occurrence is very low.

The significance of the impact is thus assessed to be very low and the effect of the impact be negative.

As for the drill sampling, the lack of information about the submerged prehistory of the concession areas means that the level of confidence in this assessment of impacts is low.

No mitigation is suggested for the bulk sampling although it is suggested that the retention of samples of the coarser fraction (i.e. gravel and stone between c. 20 mm and 150 mm) of sorted seabed sediment for assessment by an archaeologist for the presence of prehistoric lithic material be explored with BPT127. As in the case of the drill sampling this would result in the changing of the impact status from negative to positive because of a potential benefit to archaeological research and knowledge that could accrue from access to such seabed material.

The assessment of impact in respect of bulk sampling can be summarised as follows:

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	**Local** **1**	**Low** **1**	**Long-term (Irreversible)** **3**	**Low** **5**	**Very low**	**VERY LOW**	**-ve**	**Low**
Essential mitigation measures: **No mitigation proposed but the retention of samples of the coarser fraction of sorted seabed sediment for assessment by an archaeologist for the presence of prehistoric lithic material is suggested**								
With mitigation	**1**	**1**	**3**	**5**	**Very low**	**VERY LOW**	**+ve**	**Low**

6.2. **Maritime Archaeology**

For the purposes of this impact assessment and based on the discussion of maritime heritage resources in Section 5.2.1 above, it is assumed that the remains of *Eros*, *Antoinette*, *Blue Bird* and *Jenny-Lee* could be in the concession areas and also that currently unknown historical wrecks or maritime debris could present on the seabed in the concession areas.

These wrecks may be subject to impacts from prospecting activities which will occur where drilling or dredging plant interacts with the physical remains of the wrecks. These impacts represent a risk to both the wrecks themselves and the seabed machinery being used.

In planning and conducting the drilling and bulk sampling operations it is assumed that the multibeam data to be collected as part of the prospecting programme will be used to identify seabed anomalies which will then be avoided during drilling and bulk sampling.

Where impacts to maritime heritage resources do occur during either drill sampling or bulk sampling they will be localised but irreversible/permanent because the finite and non-renewable nature of heritage resources means that they cannot recover if disturbed, damaged or destroyed.

The intensity of impact is likely to be low and the probability of occurrence is improbable.

The significance of the impact is thus assessed to be very low and the effect of the impact be negative.

The lack of clear information about the presence or not of wrecks in the concession areas means that the level of confidence in this assessment of impacts is low.

Mitigation of impacts on maritime heritage resources is likely to be effected through avoidance of identifiable sites. A permit from SAHRA is required to disturb or damage and wreck older than 60 years.

Should a previously unknown or unrecorded shipwreck material be encountered during prospecting, work at that location must cease until the project archaeologist and SAHRA have been notified, the significance of the material has been assessed and a decision has been taken as to how to deal with it.

The potential impacts of prospecting in the three concession areas on maritime heritage resources can be summarised as follows:

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	**Local** **1**	**Low** **1**	**Long-term (Irreversible)** **3**	**Low** **5**	**Improbable**	**VERY LOW**	**-ve**	**Low**
Essential mitigation measures: **Avoidance and exclusion from prospecting activities of identifiable wrecks or maritime debris** **Should a previously unknown or unrecorded shipwreck material be encountered during prospecting, work at that location must cease until the project archaeologist and SAHRA have been notified, the significance of the material has been assessed and a decision has been taken as to how to deal with it**								
With mitigation	**1**	**1**	**3**	**5**	**Improbable**	**VERY LOW**	**-ve**	**Low**

6.3. **Summary of Impact Significance Ratings for Heritage Receptors**

The results of the impact assessment for the heritage receptors in the concession areas can be summarised as follows:

Impact	***Consequence***	***Probability***	**Significance**	***Status***	***Confidence***
Impacts on Submerged Prehistoric Heritage Resources – Drill Sampling	Low 5	Improbable	VERY LOW	-ve	Low
With Mitigation	5	Very low	VERY LOW	+ve	Low
Impacts on Submerged Prehistoric Heritage Resources – Bulk Sampling	Low 5	Very low	VERY LOW	-ve	Low
With Mitigation	5	Very low	VERY LOW	+ve	Low
Impacts on Maritime Archaeological Resources: Drill & Bulk Sampling	Low 5	Improbable	VERY LOW	-ve	Low
With Mitigation	5	Improbable	VERY LOW	-ve	Low

7. CONCLUSIONS

This assessment of the maritime heritage resources of concession areas 13C and 15C – 18C indicates that there is the potential for the presence of submerged prehistoric archaeological material in sediments to be affected by prospecting in areas of the seabed less than about -120 m in depth. There is also the potential for the presence of historical shipwrecks in one or more of the areas, although this potential appears to be low.

The significance of impacts from drill and bulk sampling on submerged prehistoric resources, where they occur, has been assessed to be very low. The application of measures to mitigate impacts is not practical given the uncertainty over the presence and distribution of these resources and the nature of prospecting activities being undertaken. However, this assessment has suggested for both the drill and bulk sampling, consideration be given by BPT127 to the retention of samples of the tailings and coarser fraction of sorted seabed material (particularly gravel and stone between c. 20 mm and 150 mm) for assessment by an archaeologist for the presence of prehistoric lithic material.

The implementation of these measures would result in a potential benefit to archaeological research and knowledge from the prospecting programme and it is suggested that the feasibility and mechanics of these suggestions are explored by BPT127 and the project archaeologist prior to the commencement of the prospecting programme.

In respect of historical shipwrecks and maritime heritage resources, this assessment found that the significance of likely impacts will be very low and that impacts can be mitigated through the avoidance of identifiable sites. Should a previously unknown or unrecorded shipwreck material be encountered during prospecting, work at that location must cease until the project archaeologist and SAHRA have been notified, the significance of the material has been assessed and a decision has been taken as to how to deal with it.

Lastly, it is recommended that the processing of multibeam and sub-bottom profiler data collected to inform prospecting activities includes the noting of and reporting to the project archaeologist of any seabed anomalies that could represent shipwrecks or maritime heritage resources, and the presence in the seismic data of any sediment horizons with pre-colonial archaeological potential.

7.1. **Acceptability of the Proposed Activity with Respect to Heritage Resources**

It is our reasoned opinion that the proposed prospecting activities in concession areas 13C and 15C – 18C are likely to have a very low impact on submerged prehistoric and maritime and underwater cultural heritage resources and provided the recommendations and suggestions to mitigate and offset potential impacts are implemented, can be considered to be archaeologically acceptable.

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APPENDIX 1: RECORDED WRECKS AND SHIPPING CASUALTIES WITHIN AND IN THE VICINITY OF THE MARITIME ARCHAEOLOGICAL STUDY AREA

Ship Name	Area	Place	Event Type	Vessel Category	Type	Nationality	Year	Notes
Antoinette	Lamberts Bay	-	Unknown				1854	
Lamberts Bay Packet	Lamberts Bay	Lamberts Bay	Grounded	Sailing Vessel	Schooner		1859	Grounded. No lives lost.
Rosebud	Lamberts Bay	Lamberts Bay	Wrecked	Wooden Sailing Vessel	Schooner		1859	Marsh lists a vessel of this name lost in the same year, but between East London and Table Bay.
Sybille	Lamberts Bay	Grootrif near Steenboksfontein	Wrecked	Twin Screw Steel Motor Vessel	Light Cruiser (2nd Class)	British	1901	Vessel wrecked near the farm of Steenboksfontein, 6 miles south of Lamberts Bay. She was the only vessel to fire a shot in anger during the South African War. Members of General Hertzog's Commando rode down to the coast to make contact with a ship carrying supplies for the Boer forces, but found the light cruiser, HMS Sybille there instead. She promptly opened fire on them, although they all got away. Shortly thereafter she ran aground in a heavy sea and became a total wreck. One crewman was lost. 2nd class cruiser built 1890 by R. Stephenson & Co. 3400 tons, 300x42x16.5 ft, 9496 Hp, 20 knots, triple expansion engines
Eros	Lamberts Bay	Near	Foundered	Steamship	Two masted coaster	British	1918	Vessel foundered somewhere near Lamberts Bay between 26 - 28 May, while en route from Cape Town to Port Nolloth. All 14 hands lost. A Court of Inquiry was held by the magistrate in Clanwilliam on 7 June 1918. Tonnage may be 74 tons net - Marsh.
Shamrock	Lamberts Bay	Lamberts Bay	Grounded	Motor Vessel	Fishing	South African	1958	
Blue Bird	Elands Bay	Elands Bay		Motor Vessel			1960	Date may be 1960/01/11.
Girl Devon	Doring Bay	Doring Bay	Foundered	Sailing Vessel	Cutter	South African	1971	Sank 19 lives lost.
Boy Donald	Lamberts Bay	Lamberts Bay (off)	Foundered	Motor Vessel	Fishing Vessel	South African	1983	Foundered. 4 lives lost.
Jenny-Lee	Lamberts Bay	52 nautical miles west of	Foundered	Motor Vessel	Fishing Vessel (Tuna boat)	South African	1992	Sunk after being struck by a giant wave. No lives lost.
Catherine Isabella	Oliphants River	Elephants Rock (north of river)	Wrecked	Wooden Sailing Vessel	Schooner		1845	Wrecked when cables parted in a heavy north-westerly gale
Elizabeth	Oliphants River	Mietjie Frans se Baai		Wooden Sailing Vessel		British	1817/8	Presumed wrecked

APPENDIX 2: SPECIALIST CV

Name:	John Gribble
Profession:	Archaeologist
Date of Birth:	15 November 1965
Parent Firm:	ACO Associates cc
Position in Firm:	Senior Archaeologist
Years with Firm:	>2
Years of experience:	>30
Nationality:	South African
HDI Status:	n/a

Education:

1979-1983	Wynberg Boys' High School (1979-1983)
1986	BA (Archaeology), University of Cape Town
1987	BA (Hons) (Archaeology), University of Cape Town
1990	Master of Arts, (Archaeology) University of Cape Town

Employment:

- ACO Associates, Senior Archaeologist and Consultant, September 2017 – present
- South African Heritage Resources Agency, Manager: Maritime and Underwater Cultural Heritage Unit, 2014 – 2017 / Acting Manager: Archaeology, Palaeontology and Meteorites Unit, 2016-2017
- Sea Change Heritage Consultants Limited, Director, 2012 – present
- TUV SUD PMSS (Romsey, United Kingdom), Principal Consultant: Maritime Archaeology, 2011-2012
- EMU Limited (Southampton, United Kingdom), Principal Consultant: Maritime Archaeology, 2009-2011
- Wessex Archaeology (Salisbury, United Kingdom), Project Manager: Coastal and Marine, 2005-2009
- National Monuments Council / South African Heritage Resources Agency, Maritime Archaeologist, 1996-2005
- National Monuments Council, Professional Officer: Boland and West Coast, Western Cape Office, 1994-1996

Professional Qualifications and Accreditation:

- Member: Association of Southern African Professional Archaeologists (No. 043)
- Principal Investigator: Maritime and Colonial Archaeology, ASAPA CRM Section
- Field Director: Stone Age Archaeology, ASAPA CRM Section
- Class III Diver (Surface Supply), Department of Labour (South Africa) / UK (HSE III)

Experience:

I have more than 30 years of combined archaeological and heritage management experience. After completing my postgraduate studies, which were focussed on the vernacular architecture of the West Coast, and a period of freelance archaeological work in South Africa and aboard, I joined the National Monuments Council (NMC) (now the South African Heritage Resources Agency (SAHRA)) in 1994. As the Heritage Officer: the Boland I was involved in day to day historical building control and heritage resources management across the region. In 1996 I become the NMC's first full-time maritime archaeologist in which role was responsible for the management and protection of underwater cultural heritage in South Africa under the National Monuments Act, and subsequently under the National Heritage Resources Act.

In 2005 I moved to the UK to join Wessex Archaeology, one of the UK's biggest archaeological consultancies, as a project manager in its Coastal and Marine Section. In 2009 I joined Fugro EMU

Limited, a marine geosurvey company based in Southampton to set up their maritime archaeological section. I then spent a year at TUV SUD PMSS, an international renewable energy consultancy based in Romsey, where I again provided maritime archaeological consultancy services to principally the offshore renewable and marine aggregate industries.

In August 2012 I set up Sea Change Heritage Consultants Limited, a maritime archaeological consultancy. Sea Change provides archaeological services to a range of UK maritime sectors, including marine aggregates and offshore renewable energy. It also actively pursues opportunities to raise public awareness and understanding of underwater cultural heritage through educational and research projects and programmes, including some projects being developed in South Africa.

Projects include specialist archaeological consultancy for more than 15 offshore renewable energy projects and more than a dozen offshore aggregate extraction licence areas.

In addition to managing numerous UK development-driven archaeological projects, I have also been involved in important strategic work which developed guidance and best practice for the offshore industry with respect to the marine historic environment. This has included the principal authorship of two historic environment guidance documents for COWRIE and the UK renewable energy sector, and the development of the archaeological elements of the first Regional Environmental Assessments for the UK marine aggregates industry. In 2013-14 I was lead author and project co-ordinator on the Impact Review for the United Kingdom of the 2001 UNESCO Convention on the Protection of the Underwater Cultural Heritage. In 2016 I was co-author of a Historic England / Crown Estate / British Marine Aggregate Producers Association funded review of marine historic environment best practice guidance for the UK offshore aggregate industry.

I returned to South African in mid-2014 where I was re-appointed to my earlier post at SAHRA: Manager of the Maritime and Underwater Cultural Heritage Unit. In July 2016 I was also appointed Acting Manager of SAHRA's Archaeology, Palaeontology and Meteorites Unit.

I left SAHRA in September 2017 to join ACO Associates as Senior Archaeologist and Consultant.
I have been a member of the ICOMOS International Committee for Underwater Cultural Heritage since 2000 and have served as a member of its Bureau since 2009. I am currently the secretary of the Committee.

I have been a member of the Association of Southern African Professional Archaeologists for more than twenty years and am accredited by ASAPA's CRM section. I have been a member of the UK's Chartered Institute for Archaeologist's (CIfA) since 2005, and served on the committee of its Maritime Affairs Group between 2008 and 2010. Since 2010 I have been a member of the UK's Joint Nautical Archaeology Policy Committee.

I am currently a member of the Advisory Board of the George Washington University / Iziko Museums of South Africa / South African Heritage Resources Agency / Smithsonian Institution 'Southern African Slave Wrecks Project' and serve on the Heritage Western Cape Archaeology, Palaeontology and Meteorites Committee.

Books and Publications:

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APPENDIX 3: SPECIALIST DECLARATION

I, John Gribble, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- There are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24(F) of the Act.

Signature of the specialist

ACO Associates cc

Name of company (if applicable):

13 August 2020

Date

APPENDIX 4: IMPACT ASSESSMENT METHODOLOGY

The significance of all potential impacts that would result from the proposed project is determined in order to assist decision-makers. The **significance** of an impact is defined as a combination of the **consequence** of the impact occurring and the **probability** that the impact will occur. The significance of each identified impact was thus rated according to the methodology set out below:

Step 1 – Determine the **consequence** rating for the impact by determining the score for each of the three criteria (A-C) listed below and then **adding** them. The rationale for assigning a specific rating, and comments on the degree to which the impact may cause irreplaceable loss of resources and be irreversible, must be included in the narrative accompanying the impact rating:

Rating	Definition of Rating	Score
A. *Extent – the area over which the impact will be experienced*		
Local	Confined to project or study area or part thereof (e.g. limits of the concession area)	1
Regional	The region (e.g. the whole of Namaqualand coast)	2
(Inter) national	Significantly beyond Saldanha Bay and adjacent land areas	3
B. *Intensity – the magnitude of the impact in relation to the sensitivity of the receiving environment, taking into account the degree to which the impact may cause irreplaceable loss of resources*		
Low	Site-specific and wider natural and/or social functions and processes are negligibly altered	1
Medium	Site-specific and wider natural and/or social functions and processes continue albeit in a modified way	2
High	Site-specific and wider natural and/or social functions or processes are severely altered	3
C. *Duration – the time frame for which the impact will be experienced and its reversibility*		
Short-term	Up to 2 years	1
Medium-term	2 to 15 years	2
Long-term	More than 15 years (state whether impact is irreversible)	3

The combined score of these three criteria corresponds to a **Consequence Rating**, as follows:

Combined Score (A+B+C)	**3 – 4**	**5**	**6**	**7**	**8 – 9**
Consequence Rating	Very low	Low	Medium	High	Very high

Step 2 – Assess the **probability** of the impact occurring according to the following definitions:

Probability– the likelihood of the impact occurring	
Improbable	< 40% chance of occurring
Possible	40% - 70% chance of occurring
Probable	> 70% - 90% chance of occurring
Definite	> 90% chance of occurring

Step 3 – Determine the overall **significance** of the impact as a combination of the **consequence** and **probability** ratings, as set out 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**

Step 4 – Note the **status** of the impact (i.e. will the effect of the impact be negative or positive?)

Step 5 – State the level of **confidence** in the assessment of the impact (high, medium or low).

Impacts are also considered in terms of their status (positive or negative impact) and the confidence in the ascribed impact significance rating. The prescribed system for considering impacts status and confidence (in assessment) is laid out in the table below. Depending on the data available, a higher level of confidence may be attached to the assessment of some impacts than others. For example, if the assessment is based on extrapolated data, this may reduce the confidence level to low, noting that further ground-truthing is required to improve this.

Confidence rating	
Status of impact	+ ve (beneficial) or – ve (cost)
Confidence of assessment	Low, Medium or High

The significance rating of impacts is considered by decision-makers, as shown below. Note, this method does not apply to minor impacts which can be logically grouped into a single assessment.

- **INSIGNIFICANT**: the potential impact is negligible and **will not** have an influence on the decision regarding the proposed activity.
- **VERY LOW**: the potential impact is very small and **should not** have any meaningful influence on the decision regarding the proposed activity.
- **LOW**: the potential impact **may not** have any meaningful influence on the decision regarding the proposed activity.
- **MEDIUM**: the potential impact **should** influence the decision regarding the proposed activity.
- **HIGH**: the potential impact **will** affect a decision regarding the proposed activity.
- **VERY HIGH**: The proposed activity should only be approved under special circumstances.

Step 6 – Identify and describe practical **mitigation** and **optimisation** measures that can be implemented effectively to reduce or enhance the significance of the impact. Mitigation and optimisation measures must be described as either:

- **Essential**: must be implemented and are non-negotiable; and
- **Best Practice**: must be shown to have been considered and sound reasons provided by the proponent if not implemented.

Essential mitigation and optimisation measures must be inserted into the completed impact assessment table. The impact should be re-assessed with mitigation, by following Steps 1-5 again to demonstrate how the extent, intensity, duration and/or probability change after implementation of the proposed mitigation measures.

Step 7 – Prepare a summary table of all impact significance ratings.

Finally, indicate whether the proposed development alternatives are environmentally suitable or unsuitable in terms of the respective impacts assessed by the relevant specialist and the environmentally preferred alternative.

APPENDIX 5: EAP DECLERATION

UNDERTAKING BY THE EAP

I, the undersigned, responsible for compiling this Environmental Impact Report, undertake that:

- The information provided herein is correct;
- The comments and inputs from stakeholders and I&APs have been recorded and included in the final Environmental Impact Report; and
- Any information and responses provided to stakeholders and I&APs by the consultant is correct.

Signed on the 26th day of September 2021.

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

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Nicholas Arnott

Associate Environmental Consultant

APPENDIX 6: FINANCIAL PROVISION

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1. BACKGROUND

In terms of Section 24P of NEMA and associated regulations pertaining to Financial Provision (GN No. R1147), an applicant for a Prospecting Right must determine and make Financial Provision for rehabilitation, management and closure of environmental impacts.

Regulation 9(1) of the regulations pertaining to Financial Provision (GN No. R1147) requires that the quantum for Financial Provision be independently determined by a specialist or specialists.

2. PROPOSED ACTIVITIES

BPT127 proposes to undertake exploration operations in various target areas within the Sea Concessions 13C, 15C, 16C, 17C and 18C. The concession areas are offshore areas situated approximately 3 km (13C) to 18.5 km (18C) seaward off the West Coast of South Africa with distance from nearest town as follows:

- Sea Concessions 13C is located approximately 5 km west of Strandfontein;
- Sea Concessions 15C is located approximately 13 km west-north-west of Lamberts Bay;
- Sea Concessions 16C is located approximately 12.5 km west of Lamberts Bay;
- Sea Concessions 17C is located approximately 20 km west of Elands Bay;
- Sea Concessions 18C is located approximately 22 km west-south-west of Elands Bay.

The survey operations will have no impact on the seabed and marine environment.

The sampling operations, in view of the prospecting phase, are estimated to have a very limited impact, with a total footprint of approximately 0.24 ha within each of the Sea Concessions. Bulk sampling will only be undertaken where point sampling has delineated possible economically viable mineral resources (which is by no means a given factor) and will have a footprint of less than 2 ha. In addition, other potential resource areas may be identified based on the results of the survey operations. At present, the estimate duration of the prospecting operations will span between 3 and 5 years.

3. CLOSURE DESIGN PRINCIPLES

The Financial Provisioning Regulations, 2015 (GNR 1147 of 20 November 2015) require the compilation of a mine closure plan. Such a plan should include (amongst others):

- Closure objectives;
- Proposed mechanisms for monitoring compliance with and performance assessment against the closure plan and reporting thereon;
- Proposed measures to rehabilitate the environment affected by the activity and associated closure to its natural or predetermined state; and
- information on any proposed avoidance, management and mitigation measures that will be taken to address the environmental impacts resulting from the undertaking of the closure activity.

3.1 Closure Objectives

The closure objective for prospecting in Sea Concessions 13C, 15C, 16C, 17C and 18C is to allow disturbed areas to return naturally to its original pre-prospecting state. However, in view of the kind of application (i.e. Prospecting Rights) and limited scope of invasive activities impacting on the environment (i.e. selected drill samples and limited bulk trenching described above), the impact and monitoring activities will consequently have a reduced extent.

3.2 Closure Monitoring Compliance

While survey operations are carried out and topographical data gathered and elaborated, a monitoring plan will be developed to determine the efficacy of natural rehabilitation in relation to the in situ conditions. The principal objective of the monitoring would be to demonstrate the natural recovery process by means of pre- and post-sampled/trenched seabed (Multibeam Echo Sounder) and benthic faunal community surveys.

3.3 Closure Rehabilitation Measures

Formal backfilling of the removed seabed sediments is not practical, possible or considered necessary for the following reasons:

- The majority of the sampled material that is pumped to the vessel would be returned directly to the sea after the primary screening process. Typically, the coarser material sinks directly to the sea floor in and around previously sampled areas and the fine discarded material forms turbid plumes that are carried away from the mining vessel by ambient currents. It is noted that the deposition of the tailings partially infills the sampled areas leaving localized depressions where sediment is deposited unevenly.
- From previous mining activities in the northern C-concession areas, it has been recorded that the depressions from mined areas have become filled with natural sediment over time. Natural deposition and currents, together with the transportation of sediment which is discharged by the rivers, result in the observed infill. Thus, the excavated sample footprints would be naturally infilled by seabed sediments which are remobilised and redistributed by wave base actions and ocean currents

4. POTENTIAL RISKS / RESIDUAL IMPACTS

The key risks and possible residual impacts associated with the proposed prospecting activities that may require rehabilitation and remediation include the following:

- Accidental fuel spills (diesel or heavy fuel oil) into the sea during offshore bunkering;
- Accidental spillage of fuel on-board the survey or support vessel;
- Loss of equipment overboard;
- Impact on fishing gear (e.g. long-line, trawl gear or trap) due to damage or loss as a result of entanglement with the seabed crawler; and
- Loss of benthic biodiversity due to the removal of sediments from the seafloor.

5. REVIEW OF QUANTUM FOR FINANCIAL PROVISION

In view of the “pointer” characteristic of the drill sampling and limited footprint, no financial provision is made for rehabilitation and/or monitoring.
Should bulk sampling be deemed necessary, the applicant has proposed a quantum of approx. USD [---] (ZAR [---] converted at an exchange rate of USD/ZAR [---]) for the Financial Provision associated with the proposed sampling activities. An additional amount of approx. USD [---] (ZAR [---] converted at an exchange rate of USD/ZAR [---]) per year will also be apportioned to contingencies.

Based on the proposed activities and the anticipated environmental risks / residual impacts, it is estimated that an amount of USD [---] for the monitoring of the rehabilitation (i.e. deployment of a survey vessel to undertake benthic operations for a maximum period of 1 day, exclusive of mob/demob) per year would be sufficient for the Financial Provision.

Over and above the Financial Provision, the contracted survey and sampling vessels would have their own professional and indemnity insurance in place. This insurance would cover costs relating to, *inter alia*, personnel injury, loss of vessel and equipment, collisions and pollution. Specifically (with reference to the indicative costs provided for the items listed in Table 1 below) all costs related to the removal of wreckages, equipment etc. and spillages are covered by the vessels' dedicated insurance.

6. CONCLUSION

Based on the potential risks / residual impacts and our assumptions, we are of the opinion that the Financial Provision as indicated in the Section 5 would be sufficient for the undertaking the required rehabilitation monitoring, if bulk sampling (i.e. trenching) will be required. Any other costs associated with the anticipated environmental risks / residual impacts as a result of the proposed exploration operations would be included in the charter rate (e.g. waste management) or covered by the vessels existing insurance cover (e.g. spillages, wreck removal etc.).

Bill Ludick
20 August 2020

Table 1: Review of quantum for Financial Provision.

Activity	Review assumptions / comments	Estimate
Mobilisation		
Mobilisation of personnel, vessel and equipment	• It is assumed that only one vessel (sampling/ supply vessel) would be required to deal with any one of the scenarios listed in Section 3 above. • The cost for mobilisation is estimated as a minimum to be equal to the daily rate for vessel hire, which may be up to [---] per day depending on the vessel.	
Removal of miscellaneous objects from the sea		
Retrieving of lost equipment / items through the use of divers/appointment of specialised contractor, etc.	• Only objects that pose a risk to other users of the sea and where the location of the object is known may be retrieved. • Objects that pose no risk would not be retrieved. • It is estimated that the retrieval process would take up to 3 days to complete at a daily rate of USD [---] for vessel hire (subject to availability and type of lost equipment to be recovered. In some instances, the same survey vessel *DP Star* can be deployed to recover lost items at no additional hire) Please note that the wreck removal insurance cover of the vessels *DP Star, The Explorer and Ya Toivo* will cover several cases of lost equipment which implies that there would be no cost incurred (or to recover its related expenditures) to remove equipment etc.	
	• Salvage could include the hiring of divers (shallow water) or salvage equipment (deep water). This is estimated to range from USD 5 000 per day for decompressions divers to USD 10 000 per day for specialist salvage personnel and equipment (e.g. ROV). • It is assumed that the retrieval process could take up to 3 days to complete.	
Clean-up of oil spillages		
Oil recovery equipment and absorbent material hire / purchase.	• A diesel spill, which evaporates relatively quickly, would be agitated or mixed using a vessel's propeller to aid dispersal and evaporation. • It is estimated that a small spill could take in the order of 5 days to remediate.	
Waste Management		
Handling, storage and final disposal at licensed landfill site onshore.	• Waste disposal and handling is included in the cost of chartering the mining vessel. Should the vessel be required to retrieve waste from the survey or support vessel at a daily rate of USD [---] per day. Two days (maximum) has been included to retrieve waste.	
Liabilities to other users		
Compensation, damage claims etc. to marine, mining, fishing industry, marine transport route.	• Fishing gear that could be affected could include long-lines, trawl gear or traps.	

Activity	Review assumptions / comments	Estimate
Monitoring and Maintenance		
Project Management	• This is assumed to be related to onshore support and reporting which is undertaken by the company's in-house personnel at no additional cost. A contingency for external consultant to audit the project management for a period of up to 15 days at USD 1 000 per day may be included.	
Travel, sundries, appointment of contractors, monitoring, etc.	• It is assumed that monitoring of benthic can be done simultaneously with benthic survey and then evaluated remotely at no additional cost.	
Sub-total	**Sub-total**	
Contingencies (10% of the total cost)	• Contingencies (10% of the total cost)	
Sub-total	**Sub-total**	
VAT @ 15%	• VAT @ 15%	
GRAND TOTAL	**GRAND TOTAL**	

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