EXPLORATION IN BLOCK 2B OFF THE WEST COAST OF SOUTH AFRICA

ENVIRONMENTAL AUDIT REPORT

Block 2B, West Coast

Prepared for: Thombo Petroleum Ltd

SLR Project No.: 720.01133.00001
Report No.: 1
Revision No.: 0
March 2020

DOCUMENT INFORMATION

Title	Exploration in Block 2B off the West Coast of South Africa
Sub-title	Environmental Audit Report
Project Manager	Jonathan Crowther
Project Manager Email	jcrowther@slrconsulting.com
Author	Jonathan Crowther and Rizqah Baker
Reviewers	Jonathan Crowther and Jeremy Blood
Keywords	Block 2B; Seismic survey; Environmental Audit
Status	Draft
PASA Reference	14/12/16/3/3/2/7/734
Report No.	1
Revision	0
SLR Company	SLR Consulting (South Africa) (Pty) Ltd

DOCUMENT REVISION RECORD

Rev No.	Issue Date	Description	Issued By
0	March 2020	First draft issued for client comment	Jonathan Crowther

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ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Definition
Africa Energy	Africa Energy (SA) Corporation
CapMarine	Capricorn Marine Environmental (Pty) Ltd
DEFF	Department of Environment, Forestry and Fisheries
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
EMP	Environmental Management Plan
EMPr	Environmental Management Programme
FLO	Fisheries Liaison Officer
Gardline	Gardline Environmental Ltd
I&AP	Interested and Affected Party
IAIAsa	International Association for Impact Assessment South Africa
MARPOL	International Convention for the Prevention of Pollution from Ships, 1978
MMO	Marine Mammal Observer
MPRDA	Mineral and Petroleum Resources and Development Act, 2002 (No. 28 of 2002)
NEMA	National Environmental Management Act, 1998 (No. 107 of 1998)
PAM	Passive Acoustic Monitoring
PASA	Petroleum Agency of South Africa
SLR	SLR Consulting (South Africa) (Pty) Ltd

1. INTRODUCTION

1.1 SCOPE AND PURPOSE OF THE REPORT

This Environmental Audit Report has been compiled in compliance of Section 54(A)(2) of the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended), promulgated under the National Environmental Management Act, 1998 (Act No. 107 of 1998; NEMA) on behalf of Thombo Petroleum Ltd (herein referred to as "Thombo") for exploration activities conducted in Block 2B (see Figure 1), off the West Coast of South Africa (herein referred to as the "Project").

According to Section 54(A)(2), where a right or permit has been issued in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002; MPRDA), as amended, for: a) a prospecting or exploration of a mineral or petroleum resources; or b) the extraction and primary processing of a mineral or petroleum resource; and the associated Environmental Management Programme (EMPr) is still in effect after 8 December 2014, the requirements contained in part 3 of Chapter of these Regulations apply to such EMPr. This entails the submission of an Environmental Audit Report to the competent authority. This Environmental Audit Report is submitted to the Petroleum Agency of South Africa (PASA), as the competent authority.

In compliance with Section 34(2)(a) of the EIA Regulations, 2014 (as amended), SLR Consulting (South Africa) (Pty) Ltd (herein referred to as "SLR") has been appointed by Thombo as the independent Environmental Assessment Practitioner (EAP) to undertake the environmental audit.

1.2 PROJECT BACKGROUND

On 9 February 2010, Thombo (then Q Venture Development (South Africa) Limited which later became Thombo Petroleum Ltd) obtained a Record of Decision which approved the Environmental Management Programme (EMPR) for undertaking a 3D seismic survey in support of an exploration right application for Block 2B. The EMPR was approved by the Petroleum Agency SA (PASA) in terms of the Mineral and Petroleum Resources Development Act, 2002 (No. 28 of 2002) (MPRDA), as amended. The decision limited the survey to a 1 700 km^2 operational sail area and a fold cover area of 523 km^2. Thombo obtained an exploration right (ER 12/3/105) for Block 2B offshore South Africa on 13 April 2011. Subsequently, various transfers of Participating Interests have taken place resulting in the following parties holding Participating Interests in Block 2B:

- Thombo Petroleum Limited – 34.50375%;
- Main Street 840 Proprietary Limited – 55.49625%; and
- Simbo Petroleum No. 2 Limited – 10%.

Thombo remains the operator of the block.

Under the Exploration Right and the approved EMPR, Thombo undertook a 3D seismic survey (20 January 2013 to 17 February 2013) during the initial three-year Exploration Right period. No other physical offshore exploration activities have been conducted over the block under the Exploration Right by the holders.

The subsequent work performed has comprised of desktop analyses of the seismic data and further desktop studies.

In October 2014, a Closure Plan was submitted to PASA for the relinquishment of a portion of Block 2B. A south-eastern portion with an approximate extent of 1 089.7 km was relinquished (relinquished on submission of 1st renewal period in March 2015). A further 15% was relinquished on submission of the 2nd renewal period in January 2017 and a further 15% relinquished on submission of the 3rd renewal period in February 2020 resulting in a remaining 3 063 km² for the 3rd period.]

In 2014, Thombo commenced with an application process to undertake exploration well drilling in the target area identified following the analysis of the 3D seismic acquisition. In terms of the MPRDA and NEMA at the time, an EIA and EMPR process were undertaken. The EIA and EMPR were submitted to the authorities in April 2016. The EIA was approved by the then Department of Environmental Affairs on 24 August 2016.

The First Renewal period (mentioned above) expired on 13 March 2017. On 26 January 2017 Thombo filed a joint application for the Second Renewal of the licence which commenced on 19 February 2018 and expired on 19 February 2020. Thombo submitted a joint application for the Third Renewal of the ER on 14 February 2020.

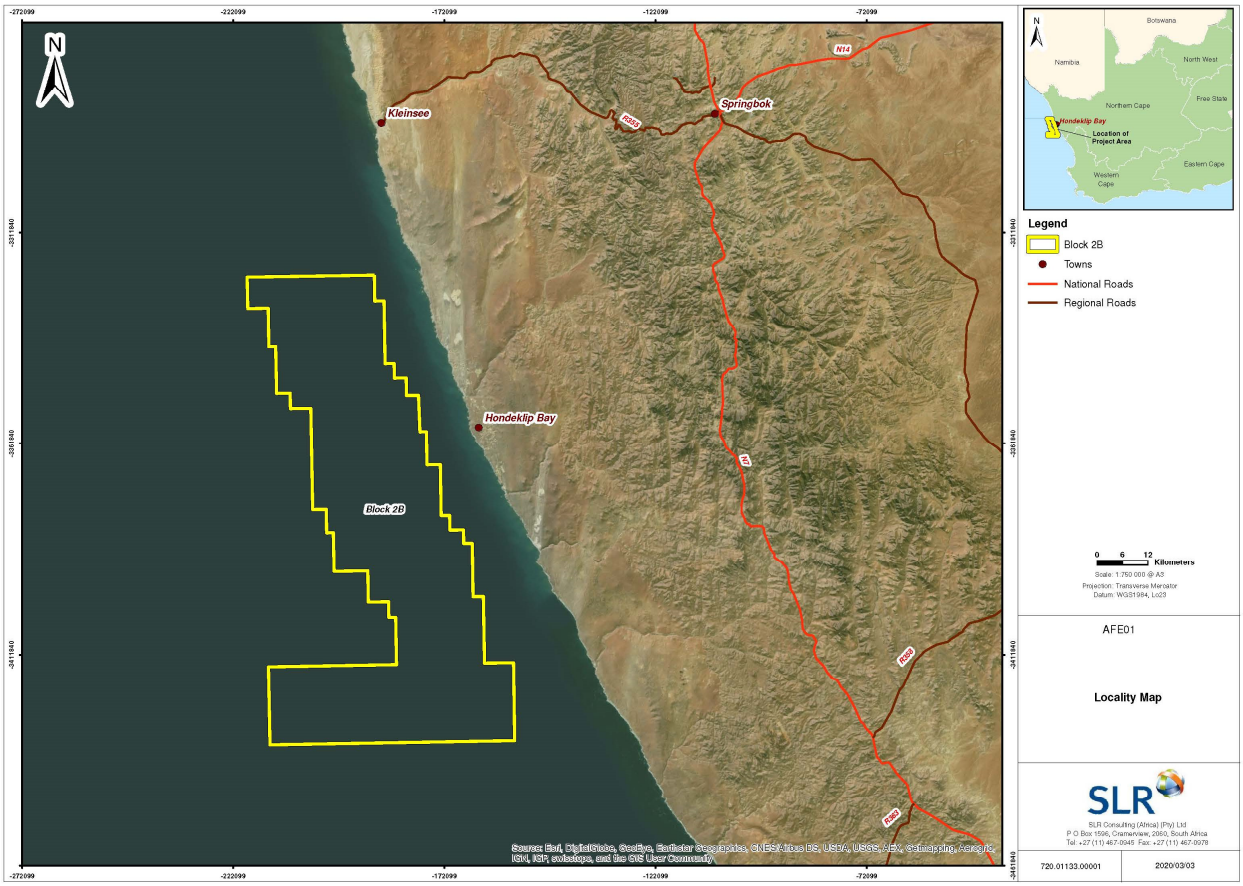

FIGURE 1-1: LOCALITY OF BLOCK 2B OFF THE WEST COAST OF SOUTH AFRICA

1.3 TERMS OF REFERENCE

The terms of reference for the Environmental Audit Report are provided in Appendix 7 of the EIA Regulations, 2014 (as amended). Accordingly, the terms of reference are to consider the following aspects:

- 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.

1.4 STRUCTURE OF THE REPORT

This report has been prepared in compliance with Appendix 7 of the EIA Regulations 2014, as amended. An overview of the structure and content of this report is given in Table 1-1 below.

TABLE 1-1: OVERVIEW OF THE STRUCTURE AND CONTENT OF THE Environmental Audit Report

SECTION	CONTENTS
Chapter 1	**Introduction** Describes the report purpose, briefly describes the project background, provides the terms of reference and describes the structure of the report.
Chapter 2	**Methodology** Presents the Environmental Audit Report team and the assumptions and limitations associated with the report and outlines the audit methodology.
Chapter 3	**Exploration Activities Undertaken Within the Licence Area** Describes the exploration activities undertaken within the licence area to date.
Chapter 4	**Environmental Audit Findings** Assesses the level of compliance with the provisions of the EMPr and Closure Plan, indicates the ability of the EMPr to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the Project and the closure / conclusion of the activity and describes changes to the mitigation measures presented in the EMPr.
Chapter 5	**Conclusion** Provides a conclusion of the Environmental Audit Report and summaries the key findings of the Environmental Audit Report.

2. METHODOLOGY

2.1 DETAILS OF THE ENVIRONMENTAL AUDIT TEAM AND DECLARATION OF INDEPENDENCE

SLR has been appointed as the independent EAP to undertake the Environmental Audit for the exploration activities undertaken by Thombo. The details of the project team that were involved in the preparation of the Environmental Audit Report are provided in Table 2-1.

SLR has no vested interest in the Project other than fair payment for consulting services rendered.

TABLE 2-1: DETAILS OF THE PROJECT TEAM

GENERAL				
Organisation	SLR Consulting (South Africa) (Pty) Ltd			
Physical Address	5th Floor, Letterstedt House, Newlands on Main Cnr Main and Campground Roads, Newlands, 7700			
Tel No.	+27 21 461 1118			
Fax No.	+27 21 461 1120			
FULL NAME	QUALIFICATIONS	PROFESSIONAL REGISTRATIONS	EXPERIENCES (YEARS)	TASKS AND ROLES
Jonathan Crowther	M.Sc. (Env. Sci.), University of Cape Town	Pr. Sci. Nat, IAIAsa Member	32	Project Management, Report compilation and report and process review
Jeremy Blood	M.Sc (Cons. Ecol.), University of Cape Town	Pr.Sci.Nat, Certified EAP, IAIAsa Member	19	Report and process review
Rizqah Baker	BA. Hons. (Env. & Geog. Sci.), University of Cape Town	IAIAsa Member	3	Report compilation

2.1.1 Expertise of the Project Team

Jonathan is a Lead Environmental Consultant at SLR and has over 31 years of experience with expertise in a wide range of environmental disciplines, including Environmental and Social Impact Assessments (ESIA), Environmental Management Plans (EMPs) / EMPrs, Environmental Planning, Environmental Compliance & Monitoring, and Public Participation & Facilitation. He has project managed many offshore oil and gas EIAs for various exploration and production activities in Southern Africa.

Jeremy Blood is an Associate at SLR and has over 19 years of experience in a range of environmental disciplines, including EIAs, EMPrs, Environmental Auditing and Monitoring in South Africa, Namibia, Mozambique and Kenya. He has expertise in a wide range of projects, including oil / gas, mining and infrastructure.

Rizqah Baker is an Environmental Consultant at SLR and has three years of experience working in the environmental field and has worked both in the public and private sectors. At SLR she has worked on a range of EIAs and Basic Assessments, providing project support and assisting with the public participation process.

2.2 ENVIRONMENTAL AUDIT METHODOLOGY

The Environmental Audit Report has been informed by a desktop review of the following documentation:

- CCA Environmental (Pty) Ltd, February 2009. Environmental Management Programme, Proposed 3D Seismic Survey in Block 2B, West Coast, South Africa;
- CCA Environmental (Pty) Ltd, December 2012. Survey Notification, Block 2B, Seismic Survey Programme Summer 2012, West Coast, South Africa;
- CCA Environmental (Pty) Ltd, May 2013. Survey Close-Out Report, 3D Seismic Survey in Licence Block 2B off the West Coast of South Africa;
- CCA Environmental (Pty) Ltd (an SLR Group Company), April 2016. Final Environmental Impact Report, Proposed Exploration Well Drilling in Block 2B off the West Coast of South Africa; and
- CCA Environmental (Pty) Ltd (an SLR Group Company), April 2016. Environmental Management Programme Addendum, Proposed Exploration Well Drilling in Block 2B off the West Coast of South Africa.

The latest 2016 Project Interested and Affected Parties (I&AP) database has been updated where necessary. All I&APs registered on the Project database will be notified, within seven days of the audit submission of the availability of the report upon request.

2.3 ASSUMPTIONS AND LIMITATIONS

The following assumption and limitation applies:

- It is assumed that SLR has been provided with all relevant project information and that it was correct and valid at the time it was provided.

3. EXPLORATION ACTIVITIES UNDERTAKEN WITHIN THE LICENCE AREA

During the initial three-year Exploration Right period, Thombo undertook a 3D seismic survey under its Exploration Right and the approved EMPr. This survey is summarised below.

As indicated in the introduction Thombo also applied and obtained approval in terms of the relevant legislative process at the time to undertake exploration well drilling in Block 2B. To date no exploration well drilling has been undertaken.

3.1 3D SEISMIC SURVEY (2013)

Thombo contracted Western Geco to undertake a 3D seismic survey within Block 2B using the vessel, *MV WG Vespucci.* The survey consisted of 43 survey transects covering a total area and distance of 689.14 km^2 and 1 541.71 km, respectively (see Figure 3-1). The survey was mobilised from the Port of Durban on 10 January 2013 with the deployment of seismic gear commencing on 13 January 2013. Actual surveying was undertaken from 20 January 2013 to 17 February 2013, after which the vessel headed to Walvis Bay, Namibia, docking on 21 February 2013. The survey vessel was accompanied by *MV Mariska G* and *MV Storm* West as the guard and support vessels during the survey.

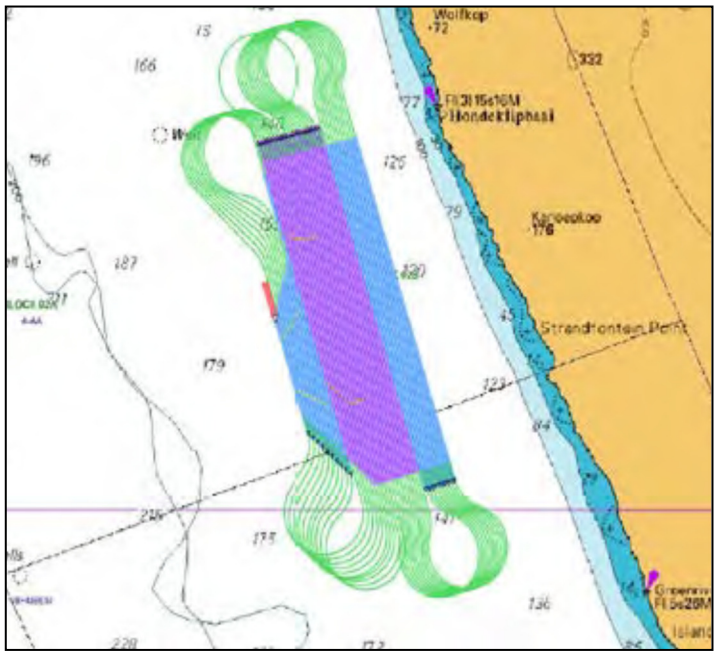

FIGURE 3-1: ORIENTATION OF PRIME SURVEY LINES ACQUIRED WITHIN LICENCE BLOCK 2B. VESSEL TURNING POINTS ARE DEPICTED IN GREEN.

Capricorn Marine Environmental (CapMarine, then CapFish) was appointed as the on-board Marine Mammal Observer (MMO) and Fisheries Liaison Officer (FLO) for the duration of the survey. Gardline Environmental Ltd (Gardline) was appointed as the Passive Acoustic Monitoring (PAM) operator. SLR Consulting (then CCA Environmental) was appointed in a project management and quality control role for the duration of the survey.

A summary of key survey details is provided in Table 3-1.

TABLE 3-1: SUMMARY OF 3D SEISMIC SURVEY UNDERTAKEN IN LICENCE BLOCK 2B BETWEEN 17 JANUARY 2013 AND 20 FEBRUARY 2013

No.	Survey aspect / component	Survey stats
1.	Total survey area	689.14 km^2
2.	Total survey length	1 541.71 km
3.	Number of survey transects	43
4.	Survey timing	20 January – 17 February 2013
5.	Total survey duration	43 days
6.	Number of operational days	31 days
7.	Total time airguns in operation	18.8 days (451.25 hours)
8.	Airgun soft-starts: Ave / Min / Max (minutes)	24.6 / 21 / 35 minutes
9.	Faunal sightings	
	Mysticete	2
	Odontocete	25
	Seal	33
	Turtle	0
	Closest cetacean approach to active airguns	600 m
10.	Downtime	
	Weather / sea (swell and current)	79.8 hrs
	Technical (source, streamer and navigation)	99.0 hrs
	Crew change	0 hrs
	Cetacean	0 hrs
	Fishing and maritime vessels	0 hrs
11.	Percentage of survey completed	100 %

4. ENVIRONMENTAL AUDIT FINDINGS

This chapter describes and assesses the level of compliance with the conditions of the EMPr; indicates the extent of the ability of the EMPr to sufficiently provide for the avoidance, management and mitigation measures provided for in the EMPr; and reports on any changes to the mitigation measures / actions contained in the EMPr.

4.1 LEVEL OF COMPLIANCE – 3D SEISMIC SURVEY

4.1.1 Level of Compliance with the Environmental Management Programme (EMPr)

This section outlines the implementation and level of compliance with the EMPr during the exploration activities, i.e. 3D seismic survey in Block 2B undertaken by Thombo.

A narrative summary of the key mitigation measures implemented per phase is presented below.

Pre-establishment Phase

Pre-establishment phase activities related primarily to communicating with stakeholders and the provision of notification of the survey activities; making provision for placing appropriate staff (MMO, PAM operator and FLO) on board the seismic vessel; developing monitoring measures and detailed management plans and ensuring compliance with relevant legislative requirements. Overall for the pre-establishment phases, Thombo and its contractors complied with the necessary requirements.

Establishment Phase

The establishment phase comprised preparations for the exploration activities; engaging and notifying stakeholder groups; ensuring the contractor had received a copy of the EMPr and ensuring that the vessel's personnel were aware of the requirements contained therein.

There was no evidence of non-compliance during the establishment phase.

Operation Phase

The EMPr requirements were implemented during the operational phase of the survey. The broad measures included:

- Applying internationally acceptable environmental management system principles on-board the vessels, including training and compliance with internationally recognised guidelines (e.g. "Environmental Guidelines for Worldwide Geophysical Operations" issued by the International Association for Geophysical Contractors and MARPOL);
- Ensuring continuous pro-active communication with various stakeholders, including fishery operators, fishing vessels, government departments and other maritime users;
- Minimising the chance of emergencies and subsequent damage to the environment, including preventing of collisions by ensuring that the correct signals are displayed by night; by ensuring the

correct equipment and training is kept and undertaken on board; by servicing equipment regularly; and by practicing weekly emergency response plans.

- Protecting marine fauna by:
  - > Minimizing equipment loss to sea;
  - > Implementing protocols for marine mammal observations (survey pre-watch) and use of PAM and specific soft-start procedures to reduce the disturbance of marine biota;
  - > Starting seismic shooting only once the 500 m radius of the seismic vessel is clear of all marine mammal species for a period of 30 minutes prior to firing;
  - > Implementing soft-start procedures of 20 minutes prior to the commencement of the firing of airguns and if breaks in airguns are longer than 20 minutes;
  - > Terminating seismic shooting (1) if cetacean activity is sighted within 500 m of the vessel; and (2) if any obvious abnormal behaviour of seabirds, seals and cetaceans is observed; and
  - > Adjust seismic shooting if fish or cephalopod mortality is observed.
- Emergency response planning and incident reporting protocols;
- Implementing waste management practices in line with MARPOL, separation and recycling where possible, correct storage of hazardous goods and onshore disposal of hazardous and medical wastes and sewage and effluent treatment; and
- Formal reporting of marine observations, fisheries interactions and seismic firing activities.

There was no evidence of non-compliance during the operation phase. It is concluded that the survey operations followed the specification of the EMPr closely with no deviations from the agreed protocol.

Decommissioning and Closure Phase

The requirements of the decommissioning and closure phase of the Project entailed the restoration of the Block to pre-survey conditions. The requirements required the operator to:

- Retrieve all deployed equipment and any dropped objects from the marine environment prior to cessation of survey activities;
- Inform all key stakeholders that the vessels are off location within two weeks of survey completion; and
- Dispose of all waste retained on board at a licenced waste site using a licenced waste disposal contractor and obtain a final waste disposal certificate.

The operators were found to be fully compliant with these commitments.

Monitoring, Compliance Auditing and the Submission of Information Phase

The requirements of the monitoring, compliance auditing and submission of information phase entailed the following:

- Compile a seismic survey Close-Out Report at the end of the survey that is based on the requirements of the monitoring and EMPr Performance Assessment;
- Provide information and / or records within 90 days of the seismic survey; and
- Provide a copy of the Close-Out Report to PASA.

There was no evidence of non-compliance during the monitoring, compliance auditing and submission of information phase.

4.1.2 Overall Compliance

Based on the findings as indicated in Section 4.1.1 above, it is concluded that the 3D seismic survey complied with the requirements of the EMPr.

4.2 THE ABILITY OF THE 3D EMPR TO PROVIDE FOR THE AVOIDANCE, MANAGEMENT AND MITIGATION OF ENVIRONMENTAL IMPACTS ASSOCIATED WITH THE EXPLORATION ACTIVITY

4.2.1 Key Environmental Impacts / Risks associated with Exploration Activities

Key environmental impacts / risks associated with the 3D seismic survey included the following:

- Pollution from emissions to the air;
- Pollution from the discharges of waste to sea;
- Airgun noise effects on marine fauna;
- Helicopter noise effects on marine fauna;
- Interaction with the fishing and maritime vessels; and
- Loss of equipment.

These impacts and risks are described in Table 4-1.

4.2.2 Overall ability of the EMPr to provide for the Avoidance, Management and Mitigation of Environmental Impacts

Due to the transitory nature of the exploration activity and the fact that no environmental issues or significant incidents were reported during the seismic survey, no long-term environmental impacts and / or significant risks are expected in future.

The ability of the EMPr to provide for the avoidance, management and mitigation of environmental impacts associated with future seismic survey exploration activity is therefore considered to be largely sufficient. No additional impacts have resulted from the exploration activities and no residual impacts have been identified that cannot be adequately mitigated and managed. The assessment of impacts associated with the exploration activities remains as previously assessed, i.e. there is considered to be no change to the significance of the impacts associated with the 3D exploration activities in the block and the mitigation achieves the impact management outcomes.

Thus, with the exception of changes to the mitigation management actions (see Section 4.3 below) no other recommendations to amend the EMPr are deemed necessary as part of the Environmental Audit Report.

TABLE 4-1: ENVIRONMENTAL ASPECTS, IMPACTS AND RISKS

Environmental aspects	Impacts	Mitigation	Risk level	Survey observations	Residual risk level
Emissions to air and sea (local air and water quality)	Emissions generated during the surveys included exhaust gases from the use of diesel as fuel for survey / support vessels and the incineration of wastes. Due to the transient nature of the survey, emissions had the potential to cause short-term, localised changes to the air quality. It is not expected that such emissions would have a direct effect on any other activity. Discharges to the marine environment from the seismic / support vessels included deck drainage, machinery space drainage and sewage. Based on the small volumes, high-energy sea conditions and non-continuous nature of the discharges, the discharge of wastes only had the potential of causing short-term, localised changes to the water quality.	No mitigation measures were deemed necessary for emissions to air, but it was recommended that all diesel motors and generators received adequate maintenance to minimise the soot and un-burnt diesel released to the atmosphere. Vessels were required to comply with MARPOL 73/78 standards. Additional mitigations measures were provided for discharges to sea: • Deck drainage should be collected in oil water catchment systems; • Low-toxicity biodegradable detergents should be used in the cleaning of all deck spillages; and • All hydraulic systems should be adequately maintained and hydraulic hoses should be frequently inspected.	Very low	The seismic contractor followed high standards for the handling, storage and method of disposal of all waste generated at sea and complied with MARPOL requirements for waste disposal. There was a “zero-waste overboard policy”. Waste was separated into burnable (galley waste) and non-burnable waste (including engine sludge), with all ash and non-burnable waste being retained in storage bins for later onshore disposal. The vessel was equipped with a sewage treatment plant, which recycled raw sewage and released treated water overboard. The vessel was also equipped with an oil separator and no oil slicks were seen behind the vessel at any time during the survey operation. No spill incidents were noted during the survey.	Zero

Environmental aspects	Impacts	Mitigation	Risk level	Survey observations	Residual risk level
Underwater noise in the marine environment (injury and disturbance to/ displacement of animals)	Acoustic sources have the potential to cause physiological injury and disturbance to marine fauna. Given the high mobility of most large fauna species (e.g. large pelagic fish species, seals and cetaceans), it is assumed that the majority of animals would avoid seismic noise at levels below those where physiological injury would result. The greatest risk of pathological injury from seismic sound sources is for species that establish home ranges near the survey area. Seismic noise may also result in behavioural avoidance of the area (e.g. critical feeding or breeding habitats or areas). Behavioural effects are generally short-term with duration of the effect being less than or equal to the duration of exposure.	Airgun firing may only commence after observations have deemed that the area around the vessel (to a distance of 500 m) has been clear of all marine mammal species for a period of 30 minutes prior to firing. A "soft-start" shall be implemented at the commencement of the firing of airguns. The duration of "soft-starts" shall be 20 minutes. All breaks in airgun firing longer than 20 minutes must be followed by a "soft-start" of at least 20 minutes prior to the survey operation continuing. During start-up, airgun firing shall be stopped or postponed if cetacean activity is sighted within 500 m of the vessel. During seismic surveying, airgun firing shall be temporarily terminated, if possible, if any obvious abnormal behaviour of seabirds, seals and cetaceans is observed or if cetaceans are spotted within 500 m of the vessel. During seismic surveying, if fish or cephalopod mortality is observed, adjust seismic shooting, if possible. Seismic surveys should as far as possible be planned to coincide with the movement of migratory cetaceans out of low latitude waters (i.e. between December to May).	Very Low to Medium	The MMO carried out observations of marine fauna prior to the commencement of "soft-starts" during the daytime, whilst the PAM operator monitored for mammal vocalisations during the night and during periods of poor visibility. On no occasion was a "soft-start" delayed due to the presence of cetaceans within the mitigation zone during pre-shooting watches. All initiations were carried out as "soft-starts". All "soft-starts" met the minimum period of 20 minutes (the average time for soft-starts was 24.6 minutes) and there was no incidence of non-compliance in this regard. Twenty-seven separate cetacean sightings were recorded during the survey. On no occasion were cetaceans observed to enter the mitigation zone while the air guns were operational. The closest a cetacean approached the active airguns was 600 m. Thus, no soft-starts or production lines were terminated due to the presence of cetaceans. The survey took place from 20 January 2013 to 17 February 2013.	Zero
Noise from helicopter (injury and disturbance to / displacement of animals)	Low altitude flight paths over bird breeding colonies could result in temporary abandonment of nests and exposure of eggs and chicks leading to increased predation risk. Low altitude flight paths over seal colonies can cause stampedes of animals to sea resulting in trampling of pups and nesting seabirds within seal colonies. Low altitude flights (especially near the coast) can also have a significant disturbance impact on cetaceans during their	Establish, with pilots, flight paths that do not over-pass Ramsar sites, islands, coastal reserves, bird and seal breeding colonies (including seal colonies at Kleinsee) or bird breeding colonies / sanctuaries on the coast (minimum altitudes of 2000 feet above ground level over nature conservation areas). Extensive coastal flights (parallel to the coast within 1 nautical mile of the shore) should also be avoided.	Very Low	The survey did not utilise helicopters for crew transport or supply purposes.	Zero

Environmental aspects	Impacts	Mitigation	Risk level	Survey observations	Residual risk level
	breeding and mating season.	Aircraft may not approach to within 300 m of whales. Deviations from set flight plans must be reported. Brief all pilots on the ecological risks associated with over flights of seabird and seal colonies.			
Impact on other users of the sea	The proposed seismic surveys could result in impacts on fishing as a result of the 500 m safety zone around the vessel. Impacts could include the loss-of-access to fishing grounds during the survey period, disruption to fishing activities and subsequent loss of catch (i.e. economic loss) in the proposed survey area. Diamond mining and associated activities would be required to avoid the 500 m safety zone and proposed safe operational limits around the seismic vessel, which could cause disruption to diamond mining and associated activities. The presence of the seismic vessel with the associated 500 m safety zone and proposed safe operational limits could interfere with shipping in the area.	The operator and its contractors must notify key stakeholders of the navigational co-ordinates of the seismic survey and to keep them updated on the seismic survey programme. The operator must request, in writing, the SAN Hydrographic Office (Silvermine) to release Radio Navigation Warnings and Notices to Mariners throughout the seismic survey period. The Notice to Mariners should give notice of (1) seismic survey co-ordinates, (2) safety zone around seismic vessel, (3) the timing of the seismic survey, and (4) a special note of the hazard posed by the anchor chains and anchors. Co-operate with other legitimate users of the sea to minimise disruption to other marine activities and marine fauna.	Low	SLR held discussions with De Beers and AuruMar (telephonically and email). It was confirmed that that they had no physical activities planned over the same areas during February and March 2013. A focus group meeting was held with the Department of Agriculture, Forestry and Fisheries (DAFF) on 7 December 2012 to discuss Thombo's seismic and DAFF's research surveys in order to minimise or avoid disruptions to all parties. SLR on behalf of Thombo distributed a notice to all relevant parties via email and letter on 10 January 2013. CapMarine distributed a "Notice to Mariners" to fishing companies, their operations personnel and skippers via email on 11 January 2013. They distributed a further notice via email on 16 January 2013. SLR on behalf of Thombo submitted an Environmental Notification to PASA on 12 December 2012.	Zero
Loss of equipment (hazard to other vessels)	The loss of seismic equipment could result in damage to fishing and maritime vessels, as well as the lost or entanglement of fishing gear.	Keep a record of lost equipment and all items lost overboard and not recovered. 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 date and cause of loss, details of equipment type, etc. Pass information to PASA and SAMSA. Notify SAN Hydrographer, relevant fishing associations. SAN Hydrographer will send out Notice to Mariners with this information.	Low	No equipment was lost during the survey.	Zero

4.3 CHANGES TO IMPACT MANAGEMENT ACTIONS 3D SEISMIC SURVEY

A review undertaken of the EMPr proposes a number of changes to the impact management actions of the EMPr in order to more closely align them with current good industry practise.

According to Section 36(1) of the EIA Regulations, 2014 (as amended), where a change is required to the impact management actions of an EMPr, such changes may immediately be effected by the holder and reflected in the next Environmental Audit Report submitted to the competent authority. In accordance with Section 36(1) of the EIA Regulations, 2014 (as amended), the suggested changes to the impact management actions are presented in Table 4-2 below.

TABLE 4-2: CHANGES TO THE IMPACT MANAGEMENT ACTIONS PRESENTED IN THE 3D EMPR (2009)

Section in EMPr	Proposed amendment
1. SEISMIC SURVEY TIMING AND SCHEDULING	Seismic surveys should take place outside the main cetacean migration periods or winter breeding concentrations (beginning June to end November), and ensure that migration paths are not blocked.
2. LEGISLATED MPA RESTRICTED AREAS	Although a seismic vessel and its gear may pass through a declared Marine Protected Area, acoustic sources (airguns) must not be operational during this transit.
3. SURVEY EQUIPMENT	Use 'turtle-friendly' tail buoys. Alternatively, the existing tail buoys should be fitted with either exclusion or deflector 'turtle guards' to prevent turtle entrapment. The Marine Mammal Observer (MMO) shall inspect tail buoys prior to the survey to ensure guards are in place. The seismic survey vessel must be fitted with Passive Acoustic Monitoring (PAM) technology. The use of PAM 24-hr per day must be implemented. The hydrophone streamer should ideally be towed behind the airgun array to minimise the interference of vessel noise and be fitted with two hydrophones to allow directional detection of cetaceans.
3.9 ACOUSTIC EMISSIONS FROM AIRGUNS	The MMOs and PAM operators must have experience in seabird, turtle and marine mammal identification and observation techniques. Undertake a continuous look-out for marine life (including cetaceans, seals, diving seabirds and in particular feeding aggregations of diving seabirds, turtles and cephalopods) prior to the start of airgun firing and follow IAGC procedures. Airgun firing may only commence after observations have deemed that the area around the airgun source ~~vessel~~ (to a distance of 500 m) has been clear of all marine mammal species for a period of 30 minutes prior to firing. In the case of fur seals and small odontocetes, which may occur commonly around the vessel, the presence of seals and small odontocetes (<3 m) (including number and position / distance from the vessel) and their behaviour should be recorded prior to "soft-start" procedures. If possible, "soft-starts" should only commence once it has been confirmed that there is no seal and small odontocetes activity within 500 m of the airguns. However, if after a period of 30 minutes they are still within 500 m of the airguns, the normal "soft-start" procedure should be allowed to commence[1]. Their activity should be carefully monitored during "soft-starts" to determine if they display any obvious negative responses to the airguns and gear or if there are any signs of injury or mortality as a direct result of the seismic activities.

[1] Seals may linger behind the vessel for extended periods in anticipation of food, mistaking the seismic vessel for a fishing vessel.

Section in EMPr	Proposed amendment
	A "soft-start" shall be implemented at the commencement of the firing of airguns. The duration of such "soft-starts" shall be 20 minutes. All breaks in air-gun firing longer than 20 minutes must be followed by a "soft-start of at least 20 minutes prior to the survey operation continuing. Breaks of shorter than 20 minutes should be followed by a "soft-start" of similar duration. During start-up, air-gun firing shall be stopped or postponed if cetacean and turtle activity is sighted within 500 m of the airgun source ~~vessel~~. During seismic surveying, air-gun firing shall be ~~temporarily~~ terminated~~, if possible,~~ if any obvious abnormal behaviour of turtles, seabirds, seals and cetaceans is observed or if cetaceans and turtles are spotted within 500 m of the airgun source ~~vessel~~. Seismic shooting should be terminated on observation of any obvious mortality or injuries to cetaceans, turtles, seals or large mortalities of invertebrate and fish species as a direct result of the survey. Such mortalities would be of particular concern where a) commercially important species are involved, or b) mortality events attract higher order predator and scavenger species into the seismic area during the survey, thus subjecting them to acoustic impulses ~~During seismic surveying, if fish or cephalopod mortality is observed, adjust seismic shooting, if possible.~~ Note: MMOs and PAM operators must have a full understanding of the financial implications of terminating firing and that such decisions are made confidently and expediently. MMOs and PAM operators should keep a log of all termination decisions.
5.2 COMPILE SEISMIC SURVEY CLOSE-OUT REPORT	Compile a seismic survey "Close-out" report at the end of the seismic survey. "Close–out" Report must be based on requirements of the monitoring and EMP Performance Assessment. Provide information / records as indicated in the "Close-out" Report column of the EMP within 90 days of the seismic survey. In addition, information relating to percentage of daylight airgun firing time and frequency of airgun shutdowns must be included in the "Close out" Report. Provide copy of report to PASA. Seabird, turtle and marine mammal incidence data and seismic source output data arising from surveys should be made available on request to the Marine Mammal Institute, DEFF and the Petroleum Agency of South Africa for analyses of survey impacts in local waters.

Note: Amendments are presented as follows:

- Red-coloured, strikethrough font indicates a deletion; and
- Purple-coloured, font indicates an insertion.

4.4 CHANGES TO IMPACT MANAGEMENT ACTIONS – EXPLORATION WELL DRILLING

The audit has also reviewed the impact management actions included in the EIA and EMPR compiled for exploration well drilling. The finding of this review is that these management actions sufficiently address all necessary requirements as per current industry practise.

5. CONCLUSION

During the 3D survey undertaken in 2013 by Thombo in Block 2 off the West Coast of South Africa, Thombo and its contractor(s) displayed a commitment to ensure that the survey operations were carried out in a manner that complied with the relevant legal and environmental requirements of the approved EMPr. There was no evidence of non-compliance during the 3D seismic survey.

Due to the transitory nature of the 3D seismic survey exploration activity and the fact that no environmental issues or significant incidents were reported during the survey, no long-term environmental impacts and / or significant risks are expected in future. This is supported by the fact that in the period post these surveys (seven years since the last survey), the operator has not been made aware of any identified record of any residual environmental impacts.

The ability of the EMPr to provide for the avoidance, management and mitigation of environmental impacts associated with any future seismic exploration activity is therefore considered to be largely sufficient. No additional impacts have resulted from the seismic exploration activities and no residual impacts have been identified. The assessment of impacts associated with the exploration activities remains as previously assessed, i.e. there is considered to be no change to the significance of the impacts associated with 3D seismic surveys and the mitigation achieves the impact management outcomes.

A review undertaken of the 3D seismic survey EMPr proposes a number of changes to the impact management actions in order to more closely align them with current good industry practise. Such changes do not, however, affect the impact management outcomes provided in the EMPr and provide further clarity on existing impact management actions.

No further physical fieldwork has been undertaken by Thombo since the abovementioned 2013 3D seismic survey.

The audit of the exploration well drilling EMPr found that the impact management actions sufficiently address all necessary requirements as per current industry practise.

Rizqah Baker	Jeremy Blood	Jonathan Crowther
(Environmental Consultant)	(Associate)	(Lead Environmental Consultant)

AFRICAN OFFICES

South Africa

CAPE TOWN
T: +27 21 461 1118

FOURWAYS
T: +27 11 467 0945

Namibia

WINDHOEK
T: + 264 61 231 287