

Environmental Audit Report of the Environmental Management Programme for Exploration in the Northern Cape Ultra Deep Licence Area





The Orange Basin, West Coast of South Africa

Shell Offshore Upstream South Africa B.V.

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List of Acroymns

Acronym	Description
2D	Two Dimensional
3D	Three Dimensional
AECOM	AECOM Limited
CA	Competent Authority
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
EA	Environmental Authorisation
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMPr	Environmental Management Programme
FLO	Fisheries Liaison Officer
GIIP	Good International Industry Practice
IAGC	International Association for Geophysical Contractors
IFC	International Finance Corporation
I&AP	Interested and Affected Parties
JNCC	Joint Nature Conservation Committee
MBES	Multi-Beam Echo Sounder
MMO	Marine Mammal Observer
MPRDA	Mineral and Petroleum Resources Development Act (Act No. 28 of 2002)
NCUD	Northern Cape Ultra Deep
NEMA	National Environmental Management Act (Act No. 107 of 1998) as amended
PAM	Passive Acoustic Monitoring
PASA	Petroleum Agency South Africa
SAMSA	South African Maritime Safety Authority
SANCCOB	Southern African Foundation for the Conservation of Coastal Birds
SAN	South African Navy
SBP	Sub Bottom Profiler

Acronym	Description
SEP	Stakeholder Engagement Plan
Shell	Shell Offshore Upstream South Africa B.V.
SOLAS	Safety of Lives at Sea
SOPEP	Shipboard Oil Pollution Emergency Plan
SPI	Shot Point Interval
PS	Performance Standards

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Executive Summary

An Environmental Management Programme (EMPr) was prepared in 2014 by CCA Environmental (Pty) Limited (now SLR Consulting South Africa) on behalf of OK Energy Limited as part of their application for an Exploration Right for the Northern Cape Ultra Deep (NCUD) Licence Area (comprising Licence Blocks 3013 and 3113). OK Energy Limited obtained an Exploration Right and environmental approval for the following exploration activities:

- Two dimensional (2D) seismic;
- Three dimensional (3D) seismic;
- Boat acquired full tensor gravity and magnetics;
- Multi-beam bathymetry; and
- Seafloor sampling for geochemical analysis.

OK Energy Limited did not proceed with any exploration activities and in Q3 2019 Shell Offshore Upstream South Africa B.V took over as the Operator from OK Energy Limited.

Following changes to the regulatory regime in 2014, specifically Section 54 of the EIA Regulations 2014 (as amended in 2017), an audit of the EMPr is required prior to undertaking exploration activities. This environmental audit report has been prepared to evaluate “*the ability of the measures contained in the EMPr, ... to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity*” (Section 34(2)(b)(ii)) of the EIA Regulations 2014 (as amended in 2017).

The audit has been conducted in line with the requirements of Section 34 and the objectives of Appendix 7 of the EIA Regulations 2014 (as amended in 2017) and has evaluated the following:

1. Extent to which the avoidance, management and mitigation measures provided for in the EMPr achieve the objectives and outcomes of the EMPr;
2. Assessment of any new impacts and risks as a result of undertaking the activities presented in the EMPr;
3. Effectiveness of the EMPr;
4. Shortcomings in the EMPr; and
5. Need for changes to the avoidance, management and mitigation measures provided for in the EMPr.

A checklist and adequacy rating criteria was developed based on Good International Industry Practice (GIIP) as a benchmark to audit the adequacy of the EMPr measures to provide for the avoidance, management and mitigation of environmental impacts. The identification of new impacts and risks, evaluation of shortcomings, effectiveness and changes required to the EMPr was undertaken by analysing the audit findings and applying professional judgement.

Table E-1 presents a summary of the environmental audit findings with reference to the relevant objectives of Section 34 and Appendix 7 of the EIA Regulations 2014 (as amended in 2017). Overall, the audit concluded that the EMPr is largely aligned with GIIP; however, some updates are required to ensure full alignment.

Table E.1: Summary of the Environmental Audit Findings

Objective of Environmental Audit Report in accordance with Appendix 7(2) of the EIA Regulations 2014 (as amended 2017)		Summary of Findings of the Environmental Audit
Appendix 7(2a)	Report on extent to which the avoidance, management and mitigation measures provided for in the EMPr achieve the objectives and outcomes of the EMPr.	The results of the audit are: 89% of the measures are “adequate”; 8% of the measures are “adequate with recommendations” (slight modifications required to align it to GIIP); 3% of the measures are “inadequate”.
Appendix 7(2b)	Identify and assess any new impacts and risks as a result of undertaking the activities.	No new impacts or risks were identified by the audit.
Appendix 7(2c)	Evaluate the effectiveness of the EMPr.	The audit found that the EMPr presented a comprehensive assessment of the potential impacts from the proposed exploration activities. The audit proposed some amendments to the EMPr measures to fully align them with GIIP.
Appendix 7(2d)	Identify shortcomings in the EMPr.	No shortcomings were identified by the audit.
Appendix 7(2e)	Identify the need for changes to the avoidance, management and mitigation measures provided for in the EMPr.	The audit recommends amendments to the EMPr measures so as to align them with GIIP. These changes are focused on limiting the impacts to marine fauna from the planned seismic and multi-beam bathymetry surveys.

The overall conclusion of this audit is that the EMPr should be updated.

Declaration

I, Alison Williams, as independent consultant hereby declare/affirm the correctness of the information provided or to be provided as part of the audit report, and that I:

- in terms of the general requirement to be independent, other than fair remuneration for work performed/to be performed in terms of this audit report, have no business, financial, personal or other interest in the activity or application and that there are no circumstances that may compromise my objectivity.
- in terms of the remainder of the general requirements for an environmental auditor, am fully aware of and meet all the requirements and that failure to comply with any the requirements may result in disqualification.
- undertake the environmental audit based on information provided to me by the licence holder/proponent, and additional information obtained during the audit period.
- am aware that a false declaration is an offence in terms of Regulation 48 of the EIA Regulations (2014) of South Africa, as amended.



Alison Williams
Associate Director, AECOM

I, Henry Camp, as independent consultant hereby declare/affirm the correctness of the information provided or to be provided as part of the audit report, and that I:

- in terms of the general requirement to be independent, other than fair remuneration for work performed/to be performed in terms of this audit report, have no business, financial, personal or other interest in the activity or application and that there are no circumstances that may compromise my objectivity.
- in terms of the remainder of the general requirements for an environmental auditor, am fully aware of and meet all the requirements and that failure to comply with any the requirements may result in disqualification.
- undertake the environmental audit based on information provided to me by the licence holder/proponent, and additional information obtained during the audit period.
- am aware that a false declaration is an offence in terms of Regulation 48 of the EIA Regulations (2014) of South Africa, as amended.



Henry Camp
Director, Camp Consult LLC (appointed as a Subcontractor to AECOM)

1. Introduction

1.1 Overview

This environmental audit report presents the findings of the audit of the Environmental Management Programme (EMPr) for Exploration in the Northern Cape Ultra Deep Licence Area (comprising Licence Blocks 3013 and 3113). The EMPr was prepared in 2014 by CCA Environmental (Pty) Limited (now SLR Consulting South Africa) on behalf of OK Energy Limited. It was submitted for approval in accordance with Section 79 of the Mineral and Petroleum Resources Development Act (MPRDA). The EMPr was authorised and approved in 2014 in accordance with Section 39 and 52 of the MPRDA and the Environmental Authorisation (EA) was issued by the Petroleum Agency South Africa (PASA) as the competent authority (CA) under reference number 12/3/274.

The exploration activities were never undertaken and in Q3 2019 Shell Offshore Upstream South Africa B.V (hereinafter referred to as 'Shell') took over as the Operator from OK Energy Limited with the intention to proceed with exploration activities.

The Environmental Impact Assessment (EIA) Regulations 2014 (as amended in 2017) (hereinafter referred to as "EIA Regulations") require that an environmental audit be conducted in accordance with Section 54. Shell appointed AECOM Ltd (hereinafter referred to as "AECOM") as the "independent person" with relevant environmental auditing expertise to undertake the environmental audit of the EMPr in accordance with Section 34(2)(a) of the EIA Regulations.

1.2 Regulatory Requirements

The regulatory regime for permitting of oil and gas activities changed in 2014 and in accordance with Section 54(A)(2) of the "transitional arrangements" of the EIA Regulations all Rights issued in accordance with the MPRDA and the associated EMPrs are required to be subjected to auditing requirements as stipulated in Chapter 5, Part 3, Section 34 of the EIA Regulations. The objective of the audit is to evaluate *"the ability of the measures contained in the EMPr, ... to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity"*.

The EIA Regulations as promulgated in terms of the National Environmental Management Act (NEMA) defines an environmental audit report as: *"a report contemplated in regulation 34"*. Section 34 of the EIA Regulations in turn requires an environmental audit report to be completed by an "independent person" with the relevant environmental auditing expertise to provide verifiable findings in a structured and systematic manner. The specific regulatory requirements relevant to environmental audit scope are outlined in **Table 1-1** below.

Table 1-1: Regulatory Requirements for Auditing of Environmental Management Programmes as Required by the EIA Regulations

Topic	Title in EIA Regulations	Relevant Sections
Auditing of Environmental Management Programme	Chapter 5, Part 3, Section 34: Auditing and amendment of environmental authorisation, environmental management programme and closure plan	34: (1) (b) (2) (a) (b) (c) (d) (3) (a) (b) (4) (a) (5) (6) (7)
Transitional Arrangements	Chapter 8, Section 54A: Transitional provisions	54: (2)
Audit Report	Appendix 7: Environmental audit report	Appendix 7

The Holder of an EA must, for the period during which the authorisation and EMPr remain valid, submit an environmental audit report to the relevant competent authority. The EIA Regulations sets out the requirements for auditing an EMPr in Appendix 7.

Table 1-2 summarises the contents of the environmental audit report as required by Appendix 7(3) of the EIA Regulations and identifies how the requirements are addressed in this report.

Table 1-2: Environmental Audit Report Structure Based on the Requirements of the EIA Regulations

Environmental Audit Report Section	Appendix 7(3) Section Number	Content
n/a	3 (1)	An environmental audit report prepared in terms of these Regulations must contain—
	3(1)(a)	details of the—
Section 3.4	3(1)(a)(ii)	independent person who prepared the environmental audit report; and
	3(1)(a)(ii)	expertise of the independent person that compiled the environmental audit report;
Page 9 of this environmental audit report	3(1)(b)	a declaration that the independent auditor is independent in a form as may be specified by the competent authority;
Section 1.4	3(1)(c)	an indication of the scope of, and the purpose for which, the environmental audit report was prepared;
Section 3	3(1)(d)	a description of the methodology adopted in preparing the environmental audit report;
Section 4	3(1)(e)	an indication of the ability of the EMPr, and where applicable, the closure plan to—
	3(1)(e)(i)	sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity on an on-going basis
	3(1)(e)(ii)	sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the closure of the facility; and
	3(1)(e)(iii)	ensure compliance with the provisions of environmental authorisation, EMPr, and where applicable, the closure plan.

Environmental Audit Report Section	Appendix 7(3) Section Number	Content
Section 3.5	3(1)(f)	a description of any assumptions made, and any uncertainties or gaps in knowledge
Section 1.3.2	3(1)(g)	a description of any consultation process that was undertaken during the course of carrying out the environmental audit report
n/a	3(1)(h)	a summary and copies of any comments that were received during any consultation process; and
n/a	3(1)(i)	any other information requested by the competent authority.

1.3 Audit Scope and Regulatory Process

1.3.1 Audit Scope

The scope of this environmental audit focuses on evaluating the adequacy of the mitigation measures contained in the EMPr to effectively avoid, manage and reduce the potential impacts from exploration activities.

According to Appendix 7(2) in the EIA Regulations, the objectives of the environmental audit are to:

- Evaluate the effectiveness of the EMP;
- Identify and assess new impacts and risks;
- Identify shortcomings in the EMP;
- Identify the need for any changes to the mitigation measures; and
- Provide findings on the ability of the mitigation measures to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity.

1.3.2 Audit Regulatory Process

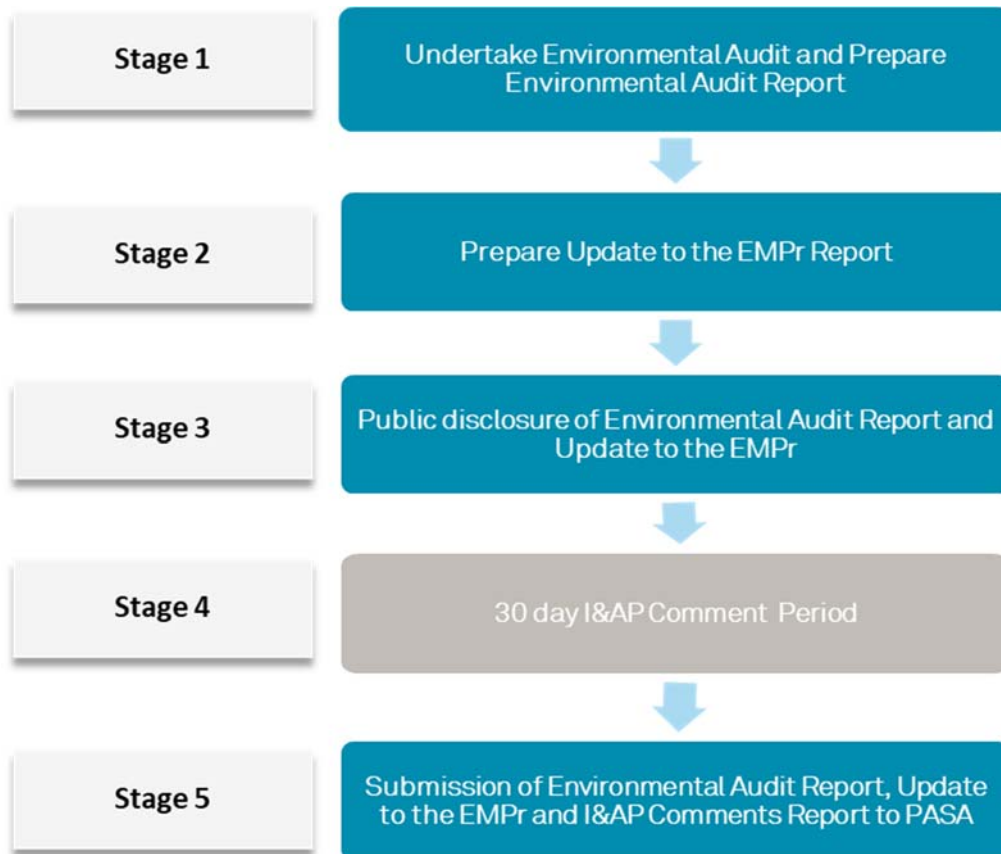
The key steps of the audit process are illustrated in **Figure 1-1**. It should be noted that the purpose of the audit was to review the EMPr measures with respect to their adequacy to effectively avoid, manage and reduce the potential impacts. The environmental audit report will be publicly disclosed for review and comment.

The overall finding of this environmental audit report is that it is necessary to prepare an updated EMPr. Both this environmental audit report and updated EMPr will be issued to PASA as the competent authority after a public review and comment period. In line with EIA Regulation Section 34(6)(b), the documents will be made available to potential Interested and Affected Parties (I&AP) via a publicly available AECOM project website¹ and the I&APs will be notified by email. There will be a 30-day comment period for I&APs to provide comments on this environmental audit report and/or the updated EMPr.

At the end of the 30-day comment period an I&AP Comment Report will be prepared and issued to PASA and will be made available on the AECOM project website.

¹ Accessed via <https://aecom.com/environmental-audit-report-and-updated-environmental-management-programme/>

Figure 1-1: Process for the Environmental Audit



2. Location of Exploration Activities

The planned exploration activities will be undertaken in the NCUD Licence Area as shown in **Figure 2-1**². In the figure, the solid blue line shows the original Licence Area in 2014 and the yellow line indicates the current configuration of the Licence Block. The Licence Area is located more than 300 km from the west coast of South Africa in water depths ranging from approximately 2,300m to 3,000m. South Africa's Exclusive Economic Zone (EEZ) defines the northern and part of the western maritime boundary of the NCUD Licence Area.

Figure 2-1: Location of the NCUD Licence Area



Exploration activities for which approval has been obtained comprises:

- Two-dimensional (2D) seismic survey;
- Three dimensional (3D) seismic survey;
- Boat acquiring full tensor gravity and magnetic measurements;
- Multi-beam bathymetry survey; and
- Seabed sampling programme.

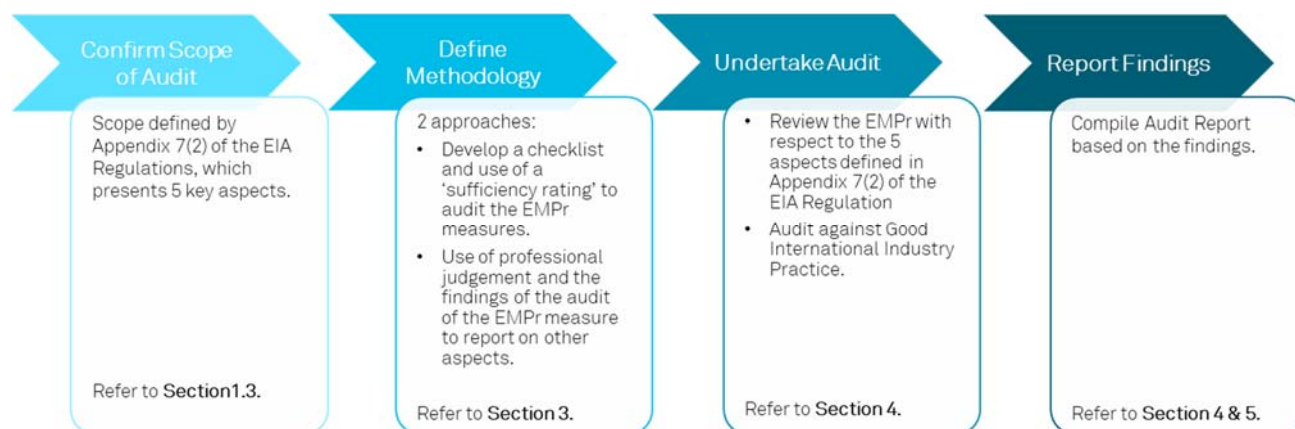
² 25% of the licence block was relinquished by Shell in 2019.

3. Methodology

3.1 Audit Approach

In line with the ISO 19011:2018 Guidelines for Auditing Management Systems, the audit was undertaken in a structured and systematic manner. **Figure 3-1** presents an overview of the audit approach and illustrates the key stages.

Figure 3-1: Overview of Audit Approach



The audit scope was based on Section 34 and Appendix 7(2) of the EIA Regulations which defines five key objectives as summarised in **Section 1.3.1** of this report.

A checklist was developed to audit the EMPr measures; this enabled a methodical approach to be applied to the process as described in **Section 3.1.1**. The audit of the remaining aspects (namely identifying and assessing any new impacts and risks; evaluation of the effectiveness of the EMPr; identifying shortcomings in the EMPr; and identifying the need for any changes to the avoidance, management and mitigation measures) was undertaken by analysing the audit findings of the EMPr measures and applying professional judgement.

3.1.1 Audit Checklist

An audit checklist was developed to review each of the measures as summarised in Chapter 7 of the EMPr (CCA, 2014). An adequacy rating, as defined in **Section 3.1.2**, was developed based on the requirements of the EIA Regulations for the EMPr to provide avoidance, management and mitigation of potential impacts. Good International Industry Practice (GIIP) was used as a defining benchmark of adequacy. GIIP was defined using a number of references including national regulations, international conventions and recognised codes of practice, which included:

- Shell global environmental performance standards;
- Recognised industry codes of practice (e.g. International Association for Geophysical Contractors (IAGC) and Joint Nature Conservation Committee (JNCC)); and
- International Conventions (e.g. MARPOL).

In addition, a review of the measures was considered against the statutory requirements of applicable South African legislation.

In South Africa, the practice for offshore seismic operations has been to adopt the “*JNCC Guidelines for minimising the risk of injury to marine mammals*”. JNCC provides internationally recognised guidelines to protect marine mammals during geophysical surveys. The guidelines are periodically updated. At the time the EMPr was prepared JNCC Guidelines, 2010 was the current version and provided guidance on seismic surveys only. In 2017 JNCC published further guidance covering geophysical surveys, which includes multibeam echo sounder (MBES) and sub-bottom profiler (SBP). The audit reviewed the EMPr measures and assessed its adequacy against the 2017 Guidelines from JNCC, where applicable. It should be noted that the 2017 Guidelines did not supersede the 2010 Guidelines, but instead provided additional recommendations. Both the JNCC 2010 and 2017 Guidelines are relevant sources.

3.1.2 Audit Assessment

The adequacy rating was developed to evaluate each EMPr measures and assess if it provides adequate avoidance, management and mitigation of potential impacts with reference to GIIP. EMPr measures have been rated according to the criteria presented in **Table 3-1**.

Table 3-1: Adequacy Rating

Adequacy Rating	Definition
Adequate (A)	Measure is considered adequate to provide avoidance, management and mitigation of potential impacts and is aligned with GIIP.
Adequate with Recommendations (AR)	Measure is considered adequate to provide avoidance, management and mitigation with recommendations for modifications to meet GIIP.
Inadequate (I)	Measure is not considered adequate to provide avoidance, management and mitigation of potential impacts. Additional measures are required to meet GIIP.

3.1.3 Documents Reviewed

Documents reviewed as part of the audit comprise:

- EMPr for an Exploration Right in the NCUD Licence Area in the Orange Basin, West Coast of South Africa; and
- Environmental Authorisation (12/3/274).

In addition, international conventions and practice guidance documents were referenced (as described in **Section 3.1.1**) as part of the audit process to define GIIP.

3.2 Environmental Audit Team

The audit team comprised the following members:

- **Alison Williams**, Lead Auditor

Alison Williams is a chartered environmental professional with over 15 years’ experience working on ESIA’s primarily in the oil and gas sector. She is a highly experienced project manager with a detailed understanding of the potential environmental and social impacts associated with offshore seismic surveys in a variety of environments and a long track record working with the large O&G majors including BP, TOTAL and Tullow. Her experience includes preparing ESIA’s for seismic surveys in the vicinity of internationally and nationally protected area.

- **Henry Camp, Technical Reviewer**

Henry Camp is an environmental and social specialist with over 30 years' experience. He has worked extensively across Africa, advising financial institutions and developers to effectively manage environmental and social impacts and risks associated with new capital projects. Key experience includes the preparation of numerous EMPs for oil and gas exploration offshore South Africa including exploration areas off the West Coast of South Africa (including the Orange Basin). He has a thorough understanding of South African laws and regulations pertaining to oil and gas exploration and regulator expectations.

3.3 Assumptions and Limitations

The following assumptions and limitations are applicable to the audit process and ensuing findings:

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

4. Audit Findings

4.1 Adequacy of Measures of the EMPr to Provide for Avoidance, Management and Mitigation of Environmental Impacts

The findings of the audit indicate the extent of the ability of the EMPr measures to adequately provide for the avoidance, management and mitigation of potential impacts; and report on any changes to the measures contained in the EMPr. The measures considered either ‘Adequate with Recommendations’ or ‘Inadequate’, based on the adequacy rating shown in **Table 3-1**, are presented in **Table 4-1**.

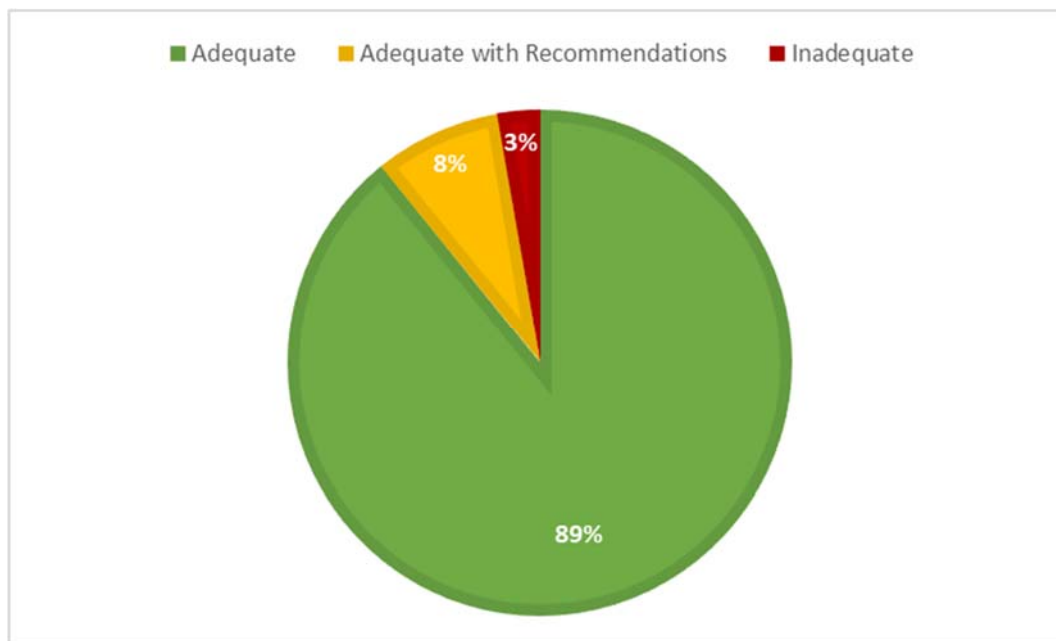
Where a measure is deemed ‘Adequate’ the audit findings are presented in **Appendix A**, which also includes any minor changes to provide additional clarity; these minor changes do not affect the adequacy rating.

The results of the audit presented in **Table 4-1** and **Appendix A** are that:

- 89% of the measures are “adequate”;
- 8% of the measures are “adequate with recommendations” (i.e. slight modifications required to align it to GIIP); and
- 3% of the measures are “inadequate”.

Figure 4-1 illustrates the findings of the audit.

Figure 4-1: Summary of Audit Findings



In the “Audit Finding” column in **Table 4-1** below, where there are text or number strike throughs, these indicate changes from the original 2014 EMPr³.

³ Red coloured, strikethrough font indicates a recommended deletion to the EMPr.

Green coloured, underlined font indicates a recommended insertion to the EMPr.

Table 4-1: Summary of Audit with Findings for the Mitigation Measures rated to be “Adequate with Recommendations” and “Inadequate”.

EMPr Section Reference	Project Activity *	Mitigation Objective*	EMPr Mitigation Measure*	Adequacy Rating	Evaluation	Audit Finding
Operational Phase						
7.3.8	Vessel Lighting	Minimise stranding of pelagic seabirds	Lighting on-board the survey vessel(s) should be reduced to the minimum safety levels to reduce the incidence of stranded pelagic seabirds on the vessel(s) at night. All stranded seabirds shall be retrieved and released during daylight hours.	AR	Limiting lighting to reduce potential impacts to pelagic seabird is considered GIIP, however the guidance provided for stranded birds is not accurate and does not reflect relevant protocol. The procedure for dealing with injured birds will vary depending on the species; an expert should be consulted before acting.	Measure to be updated to state: Lighting on-board the survey vessel(s) should be reduced to the minimum safety levels to reduce the incidence of stranded pelagic seabirds on the vessel(s) at night. All stranded seabirds shall be retrieved and released during daylight hours. <u>A vet at the Southern African Foundation for the Conservation of Coastal Birds (SANCCOB) should be contacted for advice before handling and retrieving stranded or injured seabirds.</u>
7.3.9	Seismic Survey Procedure and Monitoring	Reduce disturbance of marine life, particularly cetaceans (whales and dolphins), seals, turtles and seabirds	Pre-survey watch: <ul style="list-style-type: none"> Undertake pre-survey watch (prior to soft-starts) in order to confirm there is no seal, turtle or cetacean activity within 500 m or no diving seabirds (specifically large flocks consisting of several hundred birds) within 500 m of the seismic source array. This is to be undertaken both visually and with PAM technology during the day and using only PAM technology at night and during periods of poor visibility. Should a technical problem be encountered with PAM during surveying, visual watches shall be maintained during the day and night-vision/infra-red binoculars used at night until such time as PAM is repaired. For cetaceans, the period of confirmation should be for at least 30 minutes⁴ prior to the commencement of the “soft-start” procedures, so that deep or long diving species can be detected. However, in the case of seals, which are often attracted to survey vessels, the normal “soft-start” procedures should be allowed to commence, if after a period of at least 30 minutes seals are still within 500 m of the seismic source array. 	AR	The pre-survey watch is aligned with the recommendations of the following published guidance: <ul style="list-style-type: none"> JNCC Guidelines, 2010. JNCC Guidelines, 2017. <p>However, the time periods proposed are not aligned to the above-mentioned published guidance, which states that pre-watch period should be 60 minutes in water greater than 200m. While it is acknowledge that the reduction in pre-watch time (30 minutes rather than 60 minutes) takes into account the use of PAM, given that deep diving species (e.g. sperm whale) have the potential to be present in the area all year round a 60 minute duration is strongly recommended. This allows for detection of deep diving species which are known to dive for longer than 30 minutes.</p>	Measure to be updated to state: Pre-survey watch: <ul style="list-style-type: none"> Undertake pre-survey watch (prior to soft-starts) in order to confirm there is no seal, turtle or cetacean <u>marine mammal or sea turtle</u> activity within 500 m or no diving seabirds (specifically large flocks consisting of several hundred birds) within 500 m of the seismic source array. This is to be undertaken both visually and with PAM technology during the day and using only PAM technology at night and during periods of poor visibility. Should a technical problem be encountered with PAM during surveying, visual watches shall be maintained during the day and night-vision/infra-red binoculars used at night until such time as PAM is repaired. For cetaceans <u>marine mammals and sea turtles</u>, the period of confirmation <u>pre-survey watch</u> should be for at least <u>60</u> 30 minutes prior to the commencement of the “soft-start” procedures, so that deep or long diving species can be detected. However, in the case of seals, which are often attracted to survey vessels, the normal “soft-start” procedures should be allowed to commence, if after a period of at least 30 minutes seals are still within 500 m of the seismic source array. However, in the case of <u>If marine mammals or sea turtles are detected within the 500 m mitigation zone during the pre-survey watch, the soft-start must be delayed until their passage, or the transit of the vessel, results in them being outside of the mitigation zone. There must be a minimum of a 20-minute delay from the time of the last detection within the mitigation zone and the commencement of the soft-start.</u>

⁴ The JNCC Guidelines state that this should be extended to 60 minutes for deep-diving species when surveying in deeper water (>200 m). However, as PAM would be operational during the pre-watch period deep diving species would already be identified within the 30-minute period proposed.

EMPr Section Reference	Project Activity *	Mitigation Objective*	EMPr Mitigation Measure*	Adequacy Rating	Evaluation	Audit Finding
			<p>Break in seismic acquisition:</p> <ul style="list-style-type: none"> All breaks in seismic acquisition of longer than 20 minutes must be followed by the 30-minute pre-shoot watch and a “soft-start” procedure of at least 20 minutes prior to the survey operation continuing. Breaks shorter than 20 minutes should be followed by a visual scan for marine mammals within the 500 m mitigation zone (not a 30 minute pre-shoot watch) and a “soft-start”, of similar duration. 	I	<p>Guidance to planned and unplanned breaks in seismic acquisition is provided in Section 2.1.7 of JNCC Guidelines, 2017. The measure is not fully aligned with these Guidelines.</p> <p>Seismic survey line changes may also result in a break in seismic acquisition and there is specific JNCC guidelines for this event. A section entitled ‘Line Change’ is included in the Table of Contents under Section 6.2.3.3; however, this section is not included in Chapter 6. The measure should be updated to include line change procedures.</p>	<p>Measure to be updated as follows:</p> <p><u>Unplanned</u> break in seismic acquisition:</p> <ul style="list-style-type: none"> All <u>unplanned</u> breaks in seismic acquisition of longer than <u>10 20</u> minutes must be followed by the <u>60 30</u>-minute pre-shoot watch and a <u>full 20-minute</u> “soft-start” procedure of at least 20 minutes prior to the survey operation continuing. Breaks shorter than 20 minutes should be followed by a visual scan for marine mammals within the 500 m mitigation zone (not a 30 minute pre-shoot watch) and a “soft-start”, of similar duration. <u>Unplanned breaks less than 10 minutes do not require a soft-start provided that no marine mammals or sea turtles have been detected within the 500 m mitigation zone.</u> <p><u>Planned breaks in seismic acquisition:</u></p> <ul style="list-style-type: none"> <u>The same procedures for unplanned breaks can be applied. However, if the planned break will be for less than 10 minutes, the MMO/PAM operatives must begin monitoring 20 minutes prior to the planned break and continue for the duration of the break.</u> <p><u>Line Changes:</u></p> <ul style="list-style-type: none"> <u>If a line change is expected to take less than 40 minutes:</u> <ul style="list-style-type: none"> <u>Airgun firing can continue provided the power is reduced to 180 cubic inches;</u> <u>The Shot Point Interval (SPI) is increased to provide a longer duration between shots;</u> <u>The power is increased, and SPI decreased in uniform stages during the last 10 minutes of the line change.</u> <u>If a line change is expected to take more than 40 minutes the airguns should be shut down. A reshoot survey and soft start procedure should be implemented.</u>

EMPr Section Reference	Project Activity *	Mitigation Objective*	EMPr Mitigation Measure*	Adequacy Rating	Evaluation	Audit Finding
7.3.10	Multi-Beam Bathymetry Survey Procedure and Monitoring	Reduce disturbance of marine life, particularly cetaceans (whales and dolphins), seals, turtles and seabirds	<ul style="list-style-type: none"> An onboard Independent Observer(s) must be appointed for the duration of the multi-beam survey to act as the FLO and MMO (see Section 7.3.9 for duties). Surveying must only commence once it has been confirmed by the MMO (visually during the day) that there is no large cetacean activity within 500 m of the vessel for a 15-minute period. If the source level is greater than 210 dB re 1 μPa at 1 m the following is recommended: <ul style="list-style-type: none"> Where equipment allows, a “soft-start” procedure shall be implemented for a period of 20 minutes. 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; “Soft-starts” should, as far as possible, be planned to commence within daylight hours; “Soft-start” procedures must only commence once it has been confirmed by the MMO (visually during the day) that there is no large cetacean activity within 500 m of the vessel for a 15-minute period. “Soft-start” procedures must also be implemented after breaks in surveying (for whatever reason) of longer than 20 minutes. Breaks of shorter than 20 minutes should be followed by a “soft-start” of similar duration; and Should surveying in the sensitive cetacean period be unavoidable, PAM technology must be implemented 24 hours a day from beginning of June to end of November. If there is a technical problem with PAM during surveying, visual watches must be maintained by the MMO during the day and night-vision/infra-red binoculars must be used at night while PAM is being repaired. A PAM operator must be appointed during this period (see Section 7.3.9 for duties). Surveying should be terminated temporarily if cetaceans show obvious negative behavioural changes within 500 m of the survey vessel or equipment; and The survey should be terminated until such time the MMO confirms that cetaceans have moved to a point that is more than 500 m from the source or despite continuous observation, 15 minutes has elapsed since the last sighting of the cetaceans within 500 m of the source. 	AR	<p>Measures to reduce disturbance to marine life from the MBES are not aligned with published guidance, namely JNCC Guidelines 2017. The JNCC Guidelines 2017 has expanded to provide guidelines on high resolution surveys, which includes MBES and SBP which are planned to be used as part of the multi-beam bathymetry survey. The proposed change in the JNCC guidance reflects on the increased scientific understanding of the impact of underwater sound on marine mammals, specifically a recent study linking a mass stranding of melon-headed whales to the operation of an MBES survey (Southall et al, 2013). Whilst the melon-headed whales are not deep diving species (diving to a maximum of around 400 m) the lengthy post-incident investigation did indicate a potentially increased risk to cetaceans from high frequency MBES.</p> <p>The measure should be updated to align with JNCC Guidelines, 2017.</p>	<p><i>Measure to be updated as follows:</i></p> <ul style="list-style-type: none"> An onboard Independent Observers must be appointed for the duration of the multi-beam survey to act as the FLO and MMO (see Section 7.3.9 for duties). <u>The multi-beam survey should be conducted in accordance with the same measures applied for the seismic survey as set out in Section 7.3.9.</u> Surveying must only commence once it has been confirmed by the MMO (visually during the day) that there is no large cetacean activity within 500 m of the vessel for a 15-minute period. If the source level is greater than 210 dB re 1 μPa at 1 m the following is recommended: <ul style="list-style-type: none"> Where equipment allows, a “soft-start” procedure shall be implemented for a period of 20 minutes. 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; “Soft-starts” should, as far as possible, be planned to commence within daylight hours; “Soft-start” procedures must only commence once it has been confirmed by the MMO (visually during the day) that there is no large cetacean activity within 500 m of the vessel for a 15-minute period. “Soft-start” procedures must also be implemented after breaks in surveying (for whatever reason) of longer than 20 minutes. Breaks of shorter than 20 minutes should be followed by a “soft-start” of similar duration; and Should surveying in the sensitive cetacean period be unavoidable, PAM technology must be implemented 24 hours a day from beginning of June to end of November. If there is a technical problem with PAM during surveying, visual watches must be maintained by the MMO during the day and night-vision/infra-red binoculars must be used at night while PAM is being repaired. A PAM operator must be appointed during this period (see Section 7.3.9 for duties). Surveying should be terminated temporarily if cetaceans show obvious negative behavioural changes within 500 m of the survey vessel or equipment; and The survey should be terminated until such time the MMO confirms that cetaceans have moved to a point that is more than 500 m from the source or despite continuous observation, 15 minutes has elapsed since the last sighting of the cetaceans within 500 m of the source.

4.2 Identification and Assessment of Any New Impacts and Risks

The audit has not identified any new impacts or risks. All impacts identified in the EMPr are considered appropriate, considering the description of the proposed activities and the baseline conditions presented in Chapters 3 and 4 (including associated appendices), respectively.

4.3 Evaluation of the Effectiveness of the EMPr

The EMPr presents a comprehensive assessment of the potential impacts from the proposed exploration activities. Overall the EMPr is considered effective in identifying and assessing the impacts. While the audit has identified some measures which are not considered to fully align with GIIP, the overall conclusions of the EMPr are not affected.

It should be acknowledged that the EMPr was prepared in 2014 and additional industry recognised guidance is now available. It is this guidance that defines current GIIP and should form the basis of mitigation, management or avoidance measures.

4.4 Identification of Shortcomings of the EMPr

The audit has not identified any shortcoming in the EMPr. All potential impacts have been identified and applicable mitigation proposed.

4.5 Identification of the Need for Changes to the EMPr

This environmental audit report does not consider that changes are required to the description of the project; the description of the affected environment or the methodology of the impacts, which are considered robust. The overall impact significant rating for each of the receptors is considered appropriate.

The audit has determined that while the EMPr measures are largely considered to align with GIIP, there are instances where some EMPr measures do not meet the latest guidelines or GIIP. **Table 4-1** presents the recommended changes to the EMPr measures to fully align the EMPr with GIIP. Changes to the EMPr needs only to be restricted to the Chapter 7: Action Plan and Procedures.

4.6 Additional Operational Actions

In addition to the changes identified in **Table 4-1**, it is advised that the following action be implemented by Shell:

- Establish an Issues and Response procedure, which should be defined in the Stakeholder Engagement Plan (SEP). The process should align with the guidance presented in the International Finance Corporation (IFC) Performance Standard (PS) 1 and the IPIECA Manual on “community grievance mechanisms in the oil and gas industry” (IPIECA, 2015).

5. Conclusion and Recommendations

The audit found that the EMPr is broadly aligned with GIIP and with the exception of four measures provides adequate avoidance, management and mitigation of potential impacts. The audit has not identified any new impacts or risks. The EMPr presents a comprehensive assessment of the potential impacts from the proposed exploration activities. Overall the EMPr is considered effective in identifying and assessing the impacts. The audit has not identified any shortcoming in the EMPr.

It is recommended that an updated EMPr be prepared. There is no need for changes to any of the Chapters in the EMPr, except for the Chapter 7: Action Plan and Procedures.

6. References

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Appendix A : Audit of Mitigation Measures rated as “Adequate”

EMPr Section Reference	Project Activity *	Mitigation Objective*	EMPr Mitigation Measure*	Adequacy Rating	Evaluation	Audit Finding
Planning Phase						
7.11	Survey Timing and Schedule	Minimise impact on cetaceans and fishing industry	The seismic and multi-beam bathymetry surveys should be undertaken outside of the key winter cetacean migration and breeding period, which occurs between June and November (inclusive).	A	Avoiding key periods of cetacean migration is a measure aligned to the recommendations of the following published guidance: <ul style="list-style-type: none"> OSPAR, 2009 and 2014. JNCC Guidelines, 2017 (Section 1.2). This measure is considered GIIP.	No change is required to align with GIIP.
7.1.2	Survey Equipment	Minimise impact on cetaceans and turtles	Use ‘turtle-friendly’ tail buoys during seismic surveys. Alternatively, the existing tail buoys should be fitted with either exclusion or deflector ‘turtle guards’ to prevent turtle entrapment. The MMO shall inspect tail buoys prior to the survey to ensure guards are in place. If turtles are observed to be trapped, survey operations will be ceased until the animal can be freed from the towed equipment.	A	Measure to limited impact to turtles is aligned with research published in 2009, which recommends where feasible that the turtle guard design should include both a deflector and an exclusion element (Keto Ecology, 2009). This measure is considered GIIP.	No change is required to align with GIIP.
			If necessary, apply to DEA for an exemption to approach to or remain within 300 m of whales (see note below). The request for an exemption must be submitted to DEA (Xola Mfeke; email: xmfeke@environment.gov.za).	A	The requirement for applying exemption is aligned with the requirements the following national regulation: <ul style="list-style-type: none"> Section 81 of the requirements of South Africa Marine Living Resources Act, 1998. This measure is considered GIIP.	No change is required to align with GIIP. However, it is recommended the measure is updated to remove reference to a specific named person given that personnel in organisations may change.
			The survey vessel(s) must be fitted with Passive Acoustic Monitoring (PAM) technology, which detects animals through their vocalisations. The PAM 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. It is recommended that a spare PAM cable and sensor are kept on-board should there be any technical problems with the system.	A	The use of PAM during seismic surveys is aligned with the recommendations of the following published guidance: <ul style="list-style-type: none"> Section 1 of JNCC Guidelines, 2010. Section 1.2 of JNCC Guidelines, 2017. The measure takes into account the potential presence of sperm whales (<i>Physeter macrocephalus</i>); a deep diving mammal that has the potentially to be present throughout the year in the blocks. Both the towing recommendation and the recommendation to carry spare equipment and parts are considered good practice. This measure is considered GIIP.	No change is required to align with GIIP.
7.1.3	Survey Personnel	Minimise impact on cetaceans	Appoint an independent on-board Marine Mammal Observer (MMO) and PAM operator for the duration of the seismic surveys. The MMO and PAM operator must have experience in seabird, turtle and marine mammal identification and observation techniques. Only an MMO is required for the multi-beam bathymetry survey.	A	Measure to appoint independent and certified MMO and PAM operator for the seismic survey is aligned with the recommendations of the following published guidance: <ul style="list-style-type: none"> Section 1.4 of JNCC Guidelines, 2017 (Section 1.4). As the multi-beam survey will not be using airguns, the use of a PAM is not stipulated in JNCC Guidelines, 2017. This measure is considered GIIP.	No change is required to align with GIIP.

EMPr Section Reference	Project Activity *	Mitigation Objective*	EMPr Mitigation Measure*	Adequacy Rating	Evaluation	Audit Finding
		Minimise impact on other users of the sea	Appoint an independent on-board Fisheries Liaison Officer (FLO) for the duration of the seismic surveys. The FLO must be familiar with fisheries operational in the area.	A	The measure takes into account that the seismic survey area is used by a commercial fishery using longline fishing technique for large pelagic fish. This measure is considered GIIP.	No change is required to align with GIIP.
7.1.4	Preparation of Subsidiary Plans	Preparation for any emergency that could result in an environmental impact	<p>Ensure the following plans are prepared and in place:</p> <ul style="list-style-type: none"> • Emergency Response Plan (including MEDIVAC plan); • Support vessel and helicopter Emergency Response Plans; • Shipboard Oil Pollution Emergency Plan (SOPEP) as required by MARPOL; and • Waste Management Plan (see contents in 7.3.5). <p>In addition to the above, ensure that:</p> <ul style="list-style-type: none"> • There is adequate protection and indemnity insurance cover for oil pollution incidents; and • There is a record of the vessel's seaworthiness certificate and/or classification stamp. 	A	The development and implementation of the suite of management plans is considered GIIP to respond to an emergency.	No change is required to align with GIIP.
7.1.5	Stakeholder Consultation and Notification	PASA Notification	<p>Compile the specific details of the exploration activities into a Survey Notification and submit to the Petroleum Agency SA (PASA). The notification should provide details on the following:</p> <ul style="list-style-type: none"> • Survey lines / sampling target areas; • Number of samples; • Survey timing and duration; • Contractor details; • Vessel specifications (including relevant certification and insurance); • Emergency Response Plan; • Shipboard Oil Pollution Emergency Plan (SOPEP); and • Details of MMO, PAM operator and FLO. 	A	Measure to provide PASA with details of the planned surveys once surveys plans were completed is considered GIIP.	No change is required to align with GIIP.
		Stakeholder Notification	<ul style="list-style-type: none"> • Notify relevant government departments and other key stakeholders of the proposed exploration activities (including navigational co-ordinates of the survey area, and timing and duration of proposed activities) and the likely implications thereof (500 m safety zone and proposed safe operational limits). • The notification must also invite stakeholders to be included on the daily report distribution list (only those included on the daily notification database will receive further notification during the survey). • Stakeholders include: <ul style="list-style-type: none"> – Fishing industry and associations (South African Tuna Association, South African Tuna Long-Line Association, Fresh Tuna Exporters Association, South African Deep-Sea Trawling Industry Association, South African Hake Long-Line Association and South African Pelagic Fishing Industry Association; Namibian Large Pelagic Long-Line Association); – Overlapping and neighbouring users with delineated boundaries in the oil / gas and mining industries; – SAN Hydrographic Office (Silvermine); 	A	<p>The need to liaise and notify relevant stakeholders is aligned with the requirements and recommendations of the following:</p> <p>National Regulation</p> <ul style="list-style-type: none"> • Maritime Safety Authority, 1998. <p>Published Guidance</p> <ul style="list-style-type: none"> • ISO 14001. <p>The list of organisations corresponds with the fisheries stakeholders identified in in the Fisheries Industries Assessment (Appendix 3 of the EMPr), with the exception of several additional organisations. This measure is considered GIIP.</p>	No change is required to align with GIIP.

EMPr Section Reference	Project Activity *	Mitigation Objective*	EMPr Mitigation Measure*	Adequacy Rating	Evaluation	Audit Finding
			<ul style="list-style-type: none"> Government departments with jurisdiction over marine activities, particularly DAFF, DEA:BOC and PASA; and SAMSA and local Port Captains. 			
		Compliance with legislative requirements	<ul style="list-style-type: none"> Ensure that the EMP has been approved by the Minister or delegated authority. 	A	Measure is aligned with regulatory requirements for approval of the EMPr by PASA (the delegated authority) in order for exploration rights to be granted to the Operator. This measure is considered GIIP.	No change is required to align with GIIP.
Establishment Phase						
7.2.1	Compliance with EMP	Operator and contractor to commit to adherence to environmental protection activities and procedures	<ul style="list-style-type: none"> Verify that a copy of the approved EMP is supplied to all Contractors and is on-board the survey and support vessels during the operation. Operator to commit organisation and Contractors to meet the requirements of the EMP. Verify procedures and systems for compliance are in place. Verify correct equipment and personnel are available to meet the requirements of the EMP. 	A	Measure is considered a necessary mechanism to ensure that the Contractor is bound by the requirements set out in the EMPr and is aligned with the requirements of the following national regulation: <ul style="list-style-type: none"> MPRDA Regulations, 2004. This measure is considered GIIP.	No change is required to align with GIIP.
7.2.2	Environmental Awareness Training	Ensure personnel are appropriately trained	<ul style="list-style-type: none"> Undertake Environmental Awareness Training to ensure the vessel's personnel are appropriately informed of the purpose and requirements of the EMP. Verify responsibilities are allocated to personnel. 	A	Implementing Environmental Awareness Training is a good mechanism to educate personnel involved in the planned activities. This measure is considered GIIP.	No change is required to align with GIIP.
7.2.3	Notifying Other Users of the Sea	Ensure that other users are aware of the seismic survey	<ul style="list-style-type: none"> OK Energy must request, in writing, the SAN Hydrographic Office (Silvermine) to release Radio Navigation Warning and Notices to Mariners throughout the seismic survey period. The Notice to Mariners should give notice of (1) the co-ordinates of the proposed survey area, (2) an indication of the proposed survey timeframes and day-to-day location of the survey vessel(s), and (3) an indication of the 500 m safety zone and the proposed safe operational limits of the survey vessel(s). These notices should also be distributed directly to: <ul style="list-style-type: none"> Fishing operators through recognised fishing associations and directly to fishing vessels; and Overlapping and neighbouring users with delineated boundaries in the offshore petroleum and offshore mineral prospecting/mining industries. 	A	Notification of the survey location, timeframe and safety exclusion zone is aligned with the requirements of the following: <p>National Regulation</p> <ul style="list-style-type: none"> MPRDA Act, 2002. Maritime Safety Authority Act, 1998. <p>International Convention</p> <ul style="list-style-type: none"> Convention on the Safety of Lives at Sea (SOLAS). This measure is considered GIIP.	No change is required to align with GIIP.
Operational Phase						
7.3.1	Adherence to the EMP	Operate in an environmentally responsible manner	<ul style="list-style-type: none"> Comply fully with the EMP (compliance would mean that all activities were undertaken successfully, and details recorded); Subscribe to the principles of an internationally acceptable Environmental Management System on-board the vessels. This includes environmental awareness training, waste management and environmental monitoring, record keeping and continuous improvement; and Comply with the "Environmental Guidelines for Worldwide Geophysical Operations" issued by the International Association of Geophysical Contractors (IAGC). 	A	The measure to ensure adherence with the EMPr, including training, monitoring and compliance with IAGC Guidance is aligned with the requirements of the following national regulation: <ul style="list-style-type: none"> MPRDA Act, 2002. This measure is considered GIIP.	No change is required to align with GIIP.

EMPr Section Reference	Project Activity *	Mitigation Objective*	EMPr Mitigation Measure*	Adequacy Rating	Evaluation	Audit Finding
7.3.2	Communication with other Users of the Sea and Resource Managers	Promote cooperation and successful multiple use of the sea, including promotion of safe navigation	<p>Daily reports shall be submitted, via email, to key stakeholders and those stakeholders that request to be notified during the survey (see 7.1.5). Daily reports should include, but not limited to, the following:</p> <ul style="list-style-type: none"> • Survey details (incl. percentage completion & start-up procedure); • Vessel interaction; • Meteorological Conditions; • Observation times and sightings; • Waste management; and • Survey strategy (incl. survey progress and next line / sample to be acquired). 	A	Regular and informative communication with stakeholders is a principle of South African guidance on public participation and is considered GIIP.	No change is required to align with GIIP.
			<p>Keep constant watch for approaching vessels during operations. Warn by radio and chase boat if required. The duties of the FLO include:</p> <ul style="list-style-type: none"> • Identifying fishing vessels active in the area and associated fishing gear; • Advising on actions to be taken in the event of encountering fishing gear; • Providing back-up on-board facilitation with the fishing industry and other users of the sea; and • Daily electronic reporting on vessel activity and recording of any communication and/or interaction. <p>In addition, the following sector-specific procedures shall be followed:</p> <ul style="list-style-type: none"> • Large pelagic long-line: Establish communications with the known operators if drifting buoys (with radar responders) are sighted. 	A	The measure provides a clear description of the role of a FLO to limit and/or manage disturbances from the survey on fishing vessels. This measure is considered GIIP.	No change is required to align with GIIP.
			<p>Support vessel to patrol the 500 m safety zone in order to minimise the risk of fishing vessels or gear from being entangled with or damaged by the streamers or survey vessels (seismic surveys only).</p>	A	<p>A 500m safety zone established around the seismic vessel and streamers is aligned with the requirements of the following national regulation:</p> <ul style="list-style-type: none"> • Marine Traffic Act, 1981. <p>This measure is considered GIIP.</p>	No change is required to align with GIIP.
7.3.3	Prevention of Emergencies	Minimise disruption to other legitimate users of the sea by respecting their rights and the chance of emergency occurring and subsequent damage to the environment	<ul style="list-style-type: none"> • Co-operate with other legitimate users of the sea to minimise disruption to other marine activities. • Vessels are required to fly standard flags, lights (three all-round lights in a vertical line, with the highest and lowest lights being red and the middle light being white) or shapes (three shapes in a vertical line, with the highest and lowest lights being balls and the middle light being a diamond) to indicate that the seismic vessel is engaged in towing surveys and is restricted in manoeuvrability. • Use warning lights during twilight and at night and in periods of low visibility. • Maintain standard visual watch procedures (also see 7.3.2). 	A	<p>Specific points presented in the measure are aligned with the requirements of the following international convention:</p> <ul style="list-style-type: none"> • Convention on the SOLAS. <p>This measure is considered GIIP.</p>	No change is required to align with GIIP.

EMPr Section Reference	Project Activity *	Mitigation Objective*	EMPr Mitigation Measure*	Adequacy Rating	Evaluation	Audit Finding
			<ul style="list-style-type: none"> • Maintain 500 m safety zone around survey vessel through Notices to Mariners and Navigation Warnings. • 24 hr chase boat on patrol during seismic surveying. • Radio communication to alert approaching vessels. • Use of radar equipment. • Use flares or fog horn where necessary. • Practice weekly emergency response drills. • Ensure access to current weather information. • Establish lines of communication with the following emergency response agencies/facilities: National Sea Rescue Institute and Port Captain(s). 			
7.3.4	Dealing with Emergencies including Major Oil Spills (owing to collision, vessel break-up, refuelling etc.)	Minimise damage to the environment by implementing response procedures efficiently	<ul style="list-style-type: none"> • Adhere to obligations regarding other vessels in distress. • Notify SAMSA about wrecked vessels (safety and pollution) and the Department of Finance (salvage, customs, royalties). Provide location details to SAN Hydrographer. • In the event of an oil spill immediately implement emergency plans (see 7.1.4). 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 DEA's Chief Directorate of Marine & Coastal Pollution Management in Cape Town and (c) Smit Amandla Marine. Information that should be supplied when reporting a spill includes: <ul style="list-style-type: none"> – 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; and – Support 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. • Dispersants should not be used without authorisation of DEA. Dispersants should not be used: <ul style="list-style-type: none"> – On diesel or light fuel oil. – On heavy fuel oil. – On slicks > 0.5 cm thick. – On any oil spills within 5 nautical miles off-shore or in depths less than 30 metres. – In areas far offshore where there is little likelihood of oil reaching the shore. • Dispersants are most effective: 	A	<p>Measure to limit damage to the environment from an unplanned event are aligned with the requirements of the following national regulations:</p> <ul style="list-style-type: none"> • Marine Pollution (Control and Civil Liability) Act, 1981 • DEA Coastal Oil Spill Contingency Plan(s). <p>This measure is considered GIIP.</p>	No change is required to align with GIIP.

EMPr Section Reference	Project Activity *	Mitigation Objective*	EMPr Mitigation Measure*	Adequacy Rating	Evaluation	Audit Finding
			<ul style="list-style-type: none"> – On fresh crude oils; under turbulent sea conditions (as effective use of dispersants requires mixing). – When applied within 12 hours or at a maximum of 24 hours. • The volume of dispersant application should not exceed 20-30% of the oil volume. 			
7.3.5	Pollution Control and Waste Management (of products disposed of: into the air (exhausts, cfc's and incinerators), to sea (sewage, food, oils), to land (used oils etc, metals, plastics, glass, etc.))	Minimise pollution and maximise recycling by implementing and maintaining pollution control and waste management procedures at all times.	<p>Implement Waste Management Plan (see 7.1.4). The plan must comply with legal requirements for waste management and pollution control (for air and water quality levels at sea) and ensure "good housekeeping" and monitoring practices:</p> <ul style="list-style-type: none"> • General waste: <ul style="list-style-type: none"> – Initiate a waste minimisation system. – No disposal overboard. – Ensure on-board solid waste storage is secure. – Incinerate (non-hazardous) or transport ashore for disposal. Retain waste receipts. • Galley (food) waste: <ul style="list-style-type: none"> – Ensure compliance with MARPOL standards. – No disposal within 3 nm of the coast. – Disposal between 3 nm and 12 nm needs to be comminuted to particle sizes smaller than 25 mm. – Disposal beyond 12 nm requires no treatment. • Deck drainage: <ul style="list-style-type: none"> – Deck drainage should be collected in oily water separator systems. – Ensure that weather decks are kept free of spillage. – Mop up any spills immediately with biodegradable low toxicity detergents. – Low-toxicity biodegradable detergents should be used in cleaning of all deck spillage. – Maintain hydraulic systems and ensure that hydraulic hoses are frequently inspected. – Ensure compliance with MARPOL standards. • Machinery space drainage: <ul style="list-style-type: none"> – 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. – Any spills should be cleaned up immediately with low-toxicity biodegradable detergents. – All hydraulic systems should be adequately maintained and hydraulic hoses regularly inspected. • Sewage: <ul style="list-style-type: none"> – Use approved treatment plants to the MARPOL standards. – No disposal within 4 nm of the coast. 	A	<p>The implantation of a Waste Management Plan is aligned with the requirements of the following international convention:</p> <ul style="list-style-type: none"> • International Convention for the Protection of Pollution from Ships MARPOL 73/78. <p>This measure is considered GIIP.</p>	No change is required to align with GIIP.

EMPr Section Reference	Project Activity *	Mitigation Objective*	EMPr Mitigation Measure*	Adequacy Rating	Evaluation	Audit Finding
			<ul style="list-style-type: none"> – Disposal between 4 nm and 12 nm needs to be comminuted and disinfected prior to disposal into the sea. – Disposal beyond 12 nm requires no treatment. • Medical waste: Seal in aseptic containers for appropriate disposal onshore. • Metal: Send to shore for recycling or disposal. • Other waste: Incinerate (only non-hazardous waste) or send remaining waste to a licensed waste site. 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. • Wastewater: Comply with MARPOL. • Minor oil spill: Use oil absorbent. • Emissions to the atmosphere: Properly tune and maintain all engines, motors, generators and all auxiliary power to contain the minimum of soot and unburned diesel. • Other hazardous waste: Send to designated onshore hazardous disposal site. <p>Ensure all crew is trained in spill management.</p>			
7.3.6	Equipment Loss	Minimise hazards left on the sea bed or floating in the water column, and inform relevant parties	<ul style="list-style-type: none"> • Keep a record of lost equipment and all items lost overboard and not recovered. • When any item that constitute a seafloor or navigation hazard is lost on the sea bed, or in the sea, a standard form must be completed which records the date and cause of loss, details of equipment type, vessel Sea Control location, sea state and weather, and the nature of the sea bed. • Submit form to SAMSA, South African Navy Hydrographic Office, relevant mining companies and fishing associations. • Request that the SAN Hydrographic office send out a Notice to Mariners with this information. 	A	Procedures for recording and reporting equipment loses are considered GIIP.	No change is required to align with GIIP.
7.3.7	Use of Helicopters for Crew Changes, Servicing, Etc.	Minimise disturbance / damage to marine and coastal fauna	<ul style="list-style-type: none"> • Establish, with pilots, flight paths that do not over-pass Ramsar sites, islands, coastal reserves, bird and seal breeding or bird breeding colonies / sanctuaries on the coast (minimum altitudes of 600 m 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. • Report any deviations from set flight plans. • Brief all pilots on the ecological risks associated with flying over seabird and seal colonies and at a low level parallel to the coast. • Comply with aviation and authority guidelines and rules. 	A	<p>Flight restrictions in the vicinity of nationally and internationally protected areas is aligned with the requirements of the requirements of the following national regulations:</p> <ul style="list-style-type: none"> • Maritime Living Resources Act, 1998. • Sea Birds and Seal Protection Act, 1963. <p>This measure is considered GIIP.</p>	No change is required to align with GIIP.
7.3.9	Seismic Survey Procedure	Reduce disturbance of marine life, particularly cetaceans (whales and	Joint Nature Conservation Commission (JNCC) Guidelines (2010) relative to precautions to be taken to minimise potential impacts to marine mammals and marine turtles during seismic surveys shall be followed, as appropriate. An on-board MMO and PAM	A	The measure makes reference to JNCC Guidelines, 2010; which is specific to seismic surveys. This measure is considered GIIP.	No change is required to align with GIIP.

EMPr Section Reference	Project Activity *	Mitigation Objective*	EMPr Mitigation Measure*	Adequacy Rating	Evaluation	Audit Finding
	and Monitoring	dolphins), seals, turtles and seabirds	operator shall be assigned to perform marine mammal observations and notifications (see 7.1.3)			
			Ensure the lowest practicable seismic source array volume to achieve the geophysical objective is defined and used throughout the survey period.	A	Using the lowest practicable power level is aligned with the recommendations of the following published guidance: <ul style="list-style-type: none"> Section 1.2 of JNCC Guidelines, 2010. Section 1.2 of JNCC Guidelines, 2017. This measure is considered GIIP.	No change is required to align with GIIP.
			Airgun use should be prohibited outside the survey area.	A	Limiting the use of airguns to within the survey area is both in line with the recommendations of the following published guidance: <ul style="list-style-type: none"> Section 1.2 of JNCC Guidelines, 2010. Section 1.2 of JNCC Guidelines, 2017. It should be acknowledged that the turning circle may extend beyond the defined survey area and this measure may restricts the Contractor’s ability to maintain operation of the airguns during line changes, which is permitted under JNCC Guidelines 2010 as long as the duration is less than 20 minutes. This measure is considered to go beyond the requirements of GIIP.	No change is required to align with GIIP.
			“Soft-start” procedure: <ul style="list-style-type: none"> All initiations of seismic surveys must be carried out as “soft-starts” for a minimum of 20 minutes. This requires that the sound source be ramped from low to full power rather than initiated at full power, thus allowing a flight response by marine fauna to outside the zone of injury or avoidance. Where possible, “soft-starts” should be planned so that they commence within daylight hours. 	A	The soft-start procedure is aligned with the recommendations of the following published guidance: <ul style="list-style-type: none"> Section 3.3 of JNCC Guidelines, 2010. Section 2.1.3 of JNCC Guidelines, 2017. This measure is considered GIIP.	No change is required to align with GIIP.
			Monitoring: <ul style="list-style-type: none"> MMO is to monitor survey operations visually during the day. Duties include: <ul style="list-style-type: none"> Monitoring marine faunal activity during daytime surveying; Confirm that there is no marine mammal activity within 500 m of the seismic source array prior to commencing with the “soft-start” procedures; Observing and recording responses of marine fauna to the seismic surveys, including incidence and behaviour, and any mortality as a result of the surveys. Data captured should include species identification, position (latitude/longitude), distance from the vessel, swimming speed and direction (if applicable), any obvious changes in behaviour (e.g. startle responses or changes in surfacing/diving frequencies, breathing patterns) and incidence of feeding behaviour of predators within the hydrophone streamers as a result of the survey activities; Recording survey activities, including sound levels, “soft-start” procedures and survey periods (duration); 	A	Monitoring measures takes into account the guidelines in Section 1.4 of JNCC Guidelines, 2017 and are considered GIIP.	No change is required to align with GIIP.

EMPr Section Reference	Project Activity *	Mitigation Objective*	EMPr Mitigation Measure*	Adequacy Rating	Evaluation	Audit Finding
			<ul style="list-style-type: none"> – Requesting the temporary termination of seismic acquisition, as appropriate; – Recording meteorological conditions; – Monitoring compliance with international marine pollution regulations (MARPOL 73/78 standards); and – Preparing daily reports of all observations. • PAM operator is to monitor at night and during periods of poor visibility. Duties include: <ul style="list-style-type: none"> – Ensuring that hydrophone streamers are optimally placed within the towed array; – Monitoring marine cetacean activity during night time surveying or during period of poor visibility; – Confirming that there is no marine mammal activity within 500 m of the seismic source array prior to commencing with the “soft-start” procedures; – Recording species identification, position (latitude/longitude) and distance from the vessel, where possible; – Recording survey activities, including sound levels, “soft-start” procedures and survey periods (duration); and – Requesting the temporary termination of seismic acquisition, as appropriate. 			
			<p>Temporary termination of seismic acquisition:</p> <ul style="list-style-type: none"> • During seismic acquisition the sound source should be terminated when: <ul style="list-style-type: none"> – obvious negative changes to turtle, seal and cetacean behaviour is observed; – turtles or cetaceans are observed within 500 m of the active sound source and appear to be approaching the sound source; or – there is visual evidence of mass mortality of fish or mortality / injuries to seabirds, seals, turtles or cetaceans as a direct result of the seismic survey. • The survey should be terminated until such time as the MMO / PAM operator confirms that: <ul style="list-style-type: none"> – Turtles or cetaceans have moved to a point that is more than 500 m from the sound source; – Despite continuous observation, 30 minutes has elapsed since the last sighting of the turtles or cetaceans within 500 m of the sound source; and – Risks to seabirds, turtles, seals or cetaceans have been significantly reduced. • A log of all termination decisions must be kept. 	A	JNCC Guideline state that once the survey has started there is no requirement to terminate the sound source even if a marine mammal is observed in the mitigation zone. This measure is considered to go beyond the requirements of GIIP but is align with Shell global environmental performance standards.	No change is required to align with GIIP.
Decommissioning Phase						
7.4.1	Survey Vessels to Leave Area	Leave survey area as it was prior to survey	Ensure that all deployed equipment is retrieved.	A	Retrieving all deployed equipment and ensure no equipment is left in the sea, where feasible is considered aligned with the requirements of the requirements of the following national regulations:	No change is required to align with GIIP.

EMPr Section Reference	Project Activity *	Mitigation Objective*	EMPr Mitigation Measure*	Adequacy Rating	Evaluation	Audit Finding
					<ul style="list-style-type: none"> Dumping at Sea Control Act, 1980. MPRDA Act, 2002. <p>This measure is considered GIIP.</p>	
7.4.2	Inform Key Stakeholders of Survey Completion	Ensure that relevant parties are aware that the seismic campaign is complete	Inform all key stakeholders (see 7.1.5) that the survey has been completed and the vessels are off location.	A	Engagement with relevant stakeholders, including to inform of the end of the survey is considered GIIP.	No change is required to align with GIIP.
7.4.3	Final Waste Disposal	Minimise pollution and ensure correct disposal of waste	Dispose all waste retained on-board at a licensed waste site using a licensed waste disposal contractor.	A	<p>Disposal of all waste at a licenced facility is aligned with the requirements of the following:</p> <p>National Regulations</p> <ul style="list-style-type: none"> National Environmental Management Waste Act, 2008. <p>International Convention</p> <ul style="list-style-type: none"> International Convention for the Protection of Pollution from Ships MARPOL 73/78. <p>This measure is considered GIIP.</p>	No change is required to align with GIIP.
7.4.4	Information Sharing	Information sharing	<p>Take steps to share data collected during the survey (e.g. marine mammal incidence and behaviour), if requested, to resource managers (the Marine Mammal Institute, DEA: BOC, DAFF and PASA).</p> <p>Provide a log of hourly seismic survey vessel positioning data to the Namibian government task force for use in research into the potential impact of seismic survey activities on migration routes of albacore tuna along the southwest coast of Africa.</p>	A	The dissemination of information to government departments and agencies is considered GIIP as a mechanism to enhance the understanding on the processes and potential impacts.	No change is required to align with GIIP.
7.4.5	Compile Seismic Survey /Exploration Activity "Close-Out" Reports	Ensure corrective action and compliance and contribute towards improvement of EMP implementation	<ul style="list-style-type: none"> Compile "close-out" reports at the end of the exploration activities. The "close-out" reports must be based on requirements of the monitoring and EMP. Provide information / records as indicated in the "close-out" report column of the EMP within 90 days of the end of the survey. Provide a copy of the report to PASA. 	A	<p>The measure is aligned to aligned with the requirements of the following national regulations:</p> <ul style="list-style-type: none"> MPRDA Act, 2002. MPRDA Regulations, 2004. <p>This measure is considered GIIP.</p>	No change is required to align with GIIP.

Notes:

*As presented in the EMPr, 2014

Red coloured, strikethrough font indicates a recommended deletion to the EMPr.

Green coloured, underlined font indicates a recommended insertion to the EMPr.

