



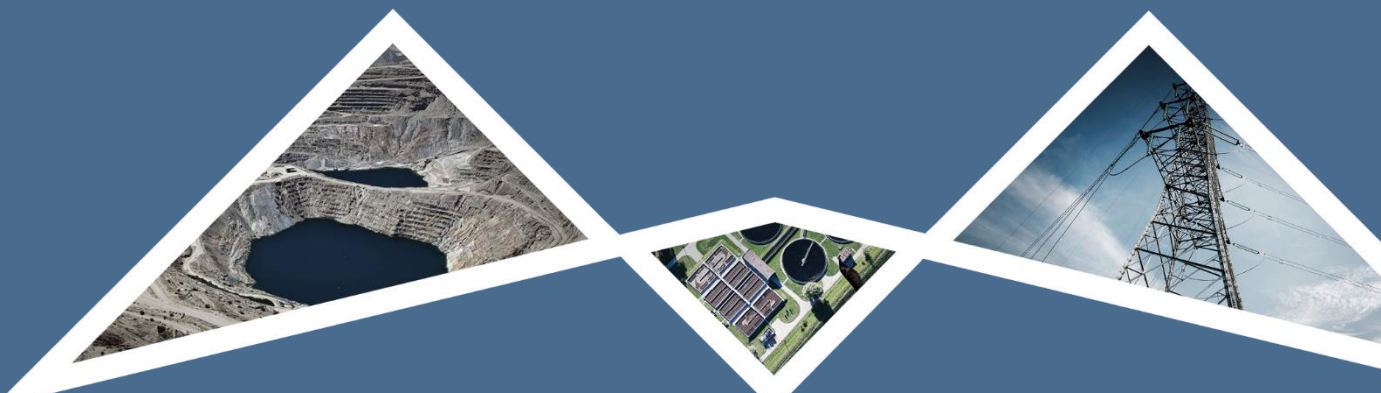
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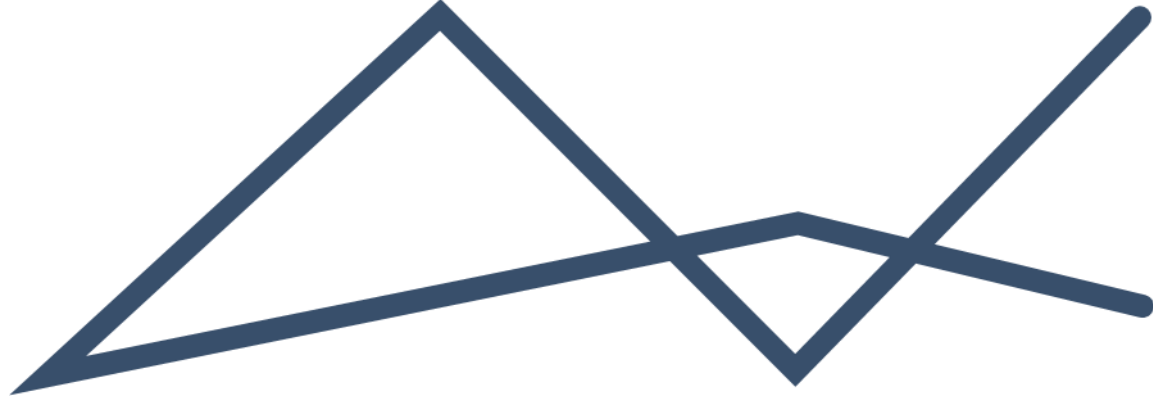
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ENVIRONMENTAL MANAGEMENT PROGRAMME:

PROPOSED TOSACO ENERGY BLOCK 1 EXPLORATION RIGHT
TOSACO ENERGY (PTY) LTD

PASA REFERENCE: 12/3/362





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Abbreviations

BPEO	:	Best Practicable Environmental Option
DFFE	:	Department of Forestry, Fisheries and Environment
DWAF	:	Department of Water Affairs and Forestry (now DHSWS)
DHSWS	:	Department of Human Settlements, Water and Sanitation
EA	:	Environmental Authorisation
CBA	:	Critical Biodiversity Area
EAP	:	Environmental Assessment Practitioner
ECO	:	Environmental Control Officer
EO	:	Environmental Officer
EIA	:	Environmental Impact Assessment
EIMS	:	Environmental Impact Management Services (Pty) Ltd
EMF	:	Environmental Management Framework
EMPr	:	Environmental Management Programme Report
EPRP	:	Emergency Preparedness and Response Plan
ESA	:	Ecological Support Area
HSE	:	Health, Safety and Environment
I&AP	:	Interested and Affected Party
ISO	:	International Standards Organisation
MPRDA	:	Minerals and Petroleum Resources Development Act (Act No. 28 of 2002)
NFA	:	National Forests Act (Act 84 of 1998)
NEMA	:	National Environmental Management Act (Act No. 107 of 1998)
NEMAQA	:	National Environmental Management: Air Quality Act (Act No. 39 of 2004)
NEMBA	:	National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
NEMWA	:	National Environmental Management: Waste Act (Act No. 59 of 2008)
NWA	:	National Water Act (Act No. 36 of 1998)
OHSA	:	Occupational Health and Safety Act (Act No. 85 of 1993)
SABS	:	South African Bureau of Standards
SANAS	:	South African National Accreditation System
SWMP	:	Storm Water Management Plan



1 INTRODUCTION

Tosaco Energy (Pty) Ltd (hereafter Tosaco) has applied for an Exploration Right (ER) for offshore oil and gas in Block 1, located off the West Coast of South Africa. Environmental Impact Management Services (Pty) Ltd (EIMS) has been appointed by Tosaco to prepare and submit an application for Environmental Authorisation (EA) as per the requirements of the Environmental Impact Assessment (EIA) Regulations, 2014, as amended, promulgated under the National Environmental Management Act (Act No. 107 of 1998- NEMA) and the requirements of the Minerals and Petroleum Resources Development Act (Act No. 28 of 2002 – MPRDA).

The Environmental Management Programme (EMPr) has been compiled to meet the requirements for an EIA and as stipulated in the EIA Regulations, 2014. The competent authority for this application will be the Department of Mineral Resources and Energy (DMRE).

An EMPr is an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts during the applicable phases of a development or activity are prevented, and that the positive benefits of the projects are enhanced. This EMPr has been compiled as a guideline for the mitigation and management measures to be implemented to avoid, reduce and minimise potential environmental impacts arising out of the project.

2 SCOPE OF THIS DOCUMENT

The purpose of the EMPr is to give effect to precautionary measures, which are to be put in place for controlling the activities that take place during the project. The EMPr also provides guidance to assist in ensuring compliance with relevant national legislative and regulatory requirements.

It should be borne in mind, however, that the EMPr is a working document that should be updated on a regular basis, as and when necessary. Formal risk identification forms an integral part of EMPr management and assists with prioritizing and focusing the control of risks. The EMPr thus supports this on-going proactive mitigation and the duty of care to the environment. The EMPr shall therefore allow for risk minimization, rather than just ensuring legal compliance. The purpose of this EMPr is thus also to allow the user to make minor amendments to ensure continual revision and improvement of risk mitigation through the continual re-assessment of risks associated with the activity.



3 DOCUMENT STRUCTURE

Table 1: EMPr Structure

Appendix 4 Reference	Description	Section in EMPr
Appendix 4(1)(1)(a)	<p>Details of –</p> <ul style="list-style-type: none"> (i) The EAP who prepared the EMPR; and (ii) The expertise of that EAP to prepare an EMPR, including a curriculum vitae; 	<p>Section 4</p> <p>Appendix 1 – EAP Curriculum Vitae</p>
Appendix 4(1)(1)(b)	A detailed description of the aspects of the activity that are covered by the EMPR as identified by the project description.	Section 5
Appendix 4(1)(1)(c)	A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	Section 6
Appendix 4(1)(1)(d)	<p>A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including –</p> <ul style="list-style-type: none"> (i) Planning and design; (ii) Pre-construction activities; (iii) Construction activities; (iv) rehabilitation of the environment after construction and in the case of a closure activity, closure; and (v) Where relevant, operation activities; 	Section 13
Appendix 4(1)(1)(f)	<p>A description of proposed impact management actions, identifying the manner in which the impact management contemplated in paragraphs (d) will be achieved, and must, where applicable, include actions to –</p> <ul style="list-style-type: none"> (i) Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) Comply with any prescribed environmental management standards or practices; and (iii) Comply with any applicable provisions of the act regarding closure, where applicable. 	Section 13



Appendix 4 Reference	Description	Section in EMPr
Appendix 4(1)(1)(g)	The method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 13
Appendix 4(1)(1)(h)	The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 13
Appendix 4(1)(1)(i)	An indication of the persons who will be responsible for the implementation of the impact management actions;	Section 13
Appendix 4(1)(1)(j)	The time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Section 13
Appendix 4(1)(1)(k)	The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 13
Appendix 4(1)(1)(l)	A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 13
Appendix 4(1)(1)(m)	An environmental awareness plan describing the manner in which – <ul style="list-style-type: none">(i) The applicant intends to inform his or her employees of any environmental risk which may result from their work; and(ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment; and	Section 11
Appendix 4(1)(1)(n)	Any specific information that may be required by the competent authority.	N/A



4 REQUIREMENTS OF AN EAP

In terms of Regulation 13 of the EIA Regulations, 2014, an independent EAP, must be appointed by the applicant to manage the application. EIMS has been appointed by the Applicant as the EAP and is compliant with the definition of an EAP as defined in Regulations 1 and 13 of the EIA Regulations and Section 1 of the NEMA. This includes, inter alia, the requirement that EIMS is:

- 1) Objective and independent;
- 2) Has expertise in conducting EIA's;
- 3) Comply with the NEMA, the Regulations and all other applicable legislation;
- 4) Takes into account all relevant factors relating to the application; and
- 5) Provides full disclosure to the applicant and the relevant environmental authority.

The declaration of independence of the EAPs involved and the Curriculum Vitae (indicating the experience with environmental impact assessment and relevant application processes) of the consultants that were involved in the EMP process and the compilation of this report are attached as Appendix 1 – EAP Curriculum Vitae.

4.1 Details of the EAP

EIMS was appointed by the Applicant as the EAP to compile this report. The contact details of the EIMS consultants who compiled the report are as follows:

Table 2: EAP Details

Name of Practitioner	Mr GP Kriel (Project Manager)
Tel No.:	043 783 9826
E-mail:	tosacoer@eims.co.za

4.2 Expertise of the EAP

EIMS is a private and independent environmental management-consulting firm that was founded in 1993. EIMS has in excess of 27 years' experience in conducting EIA's. Please refer to the EIMS website (www.eims.co.za) for further details of expertise and experience.

GP holds an M.Env.Sci (Water Sciences) Cum Laude from the North-West University (Potchefstroom Campus). He has been employed as an Environmental Consultant since 2007 and is the manager of the EIMS East London office. He has delivered presentations locally and internationally concerning the use of bio-indicators for the determination of water quality, and has experience in a wide variety of environmental management projects including: Environmental Impact Assessments, Basic Assessments, Geographic Information Systems (GIS), Environmental Compliance Monitoring, Environmental Awareness Training, Aquatic Ecological Assessments, Drinking and Waste Water Treatment Process Audits, Wetland Delineation and Assessments, ISO 14001 Aspect Registers, Water Use Licence Applications, Waste Management Licence Applications and Integrated Waste and Water Management Plans.

5 PROJECT DESCRIPTION

Hydrocarbon deposits occur in reservoirs in sedimentary rock layers. Being lighter than water they accumulate in traps where the sedimentary layers are arched or tilted by folding or faulting of the geological layers. Marine seismic surveys are one of the primary geophysical methods for locating such deposits.

Seismic survey programmes comprise of data acquisition in either two-dimensional (2D) and/or three-dimensional (3D) scales, depending on information requirements. 2D surveys are typically applied to obtain regional data from widely spaced survey grids and provide a vertical profile through the subsurface, highlighting geophysical, geological information and features along the seismic-line. Infill surveys on closer grids subsequently provide more detail over specific areas of interest. In contrast, 3D seismic surveys are conducted on a very tight survey grid spacing in specific



target areas identified during 2D applications and provide a cube image of the subsurface geology within the survey volume. 3D seismic acquisition is applied to prospective petroleum areas of interest to assist in fault interpretation, distribution of potential reservoirs, estimates of oil and gas in place and the location of potential exploration wells. **The current exploration programme does not include any provision for exploration drilling.**

During seismic surveys high-level, low frequency sound pulses are generated by an acoustic instrument towed behind a survey vessel, just below the sea surface. The sounds are directed towards the seabed and the seismic signal is reflected by the geological interfaces below the seafloor. The reflected signals are received by an array of receivers or sets of hydrophones towed behind the vessel in a single streamer (2D) or in multiple streamers (3D) and are fed back to the recording instruments on board. The spacing between the hydrophone groups is commonly 25 m or shorter, depending on the purpose of the seismic survey. Each group contains many hydrophones, spaced less than 1 m apart. The hydrophone streamers must be towed at constant depth (6 – 10 m), with flotation usually achieved by filling the cables with kerosene, gel or flexible polymer foam, so that they are neutrally buoyant. To compensate for minor adjustments, Automatic Cable Levellers, or “birds” are used. The ends of the hydrophone streamers are marked with tail buoys, to warn shipping about the presence of the cable in the water. The tail buoys also act as a platform for surface positioning systems so that the cable locations can be accurately monitored.

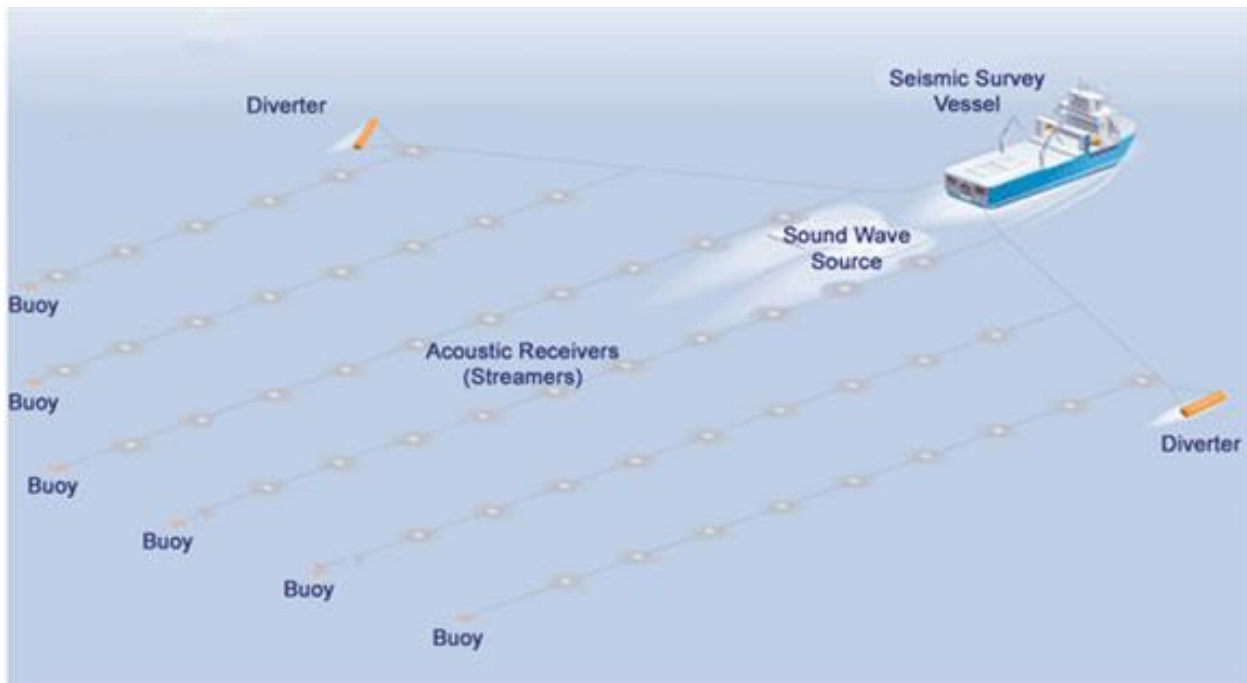


Figure 1: Example of seismic survey vessel and associated equipment (Fish Safe, 2021)

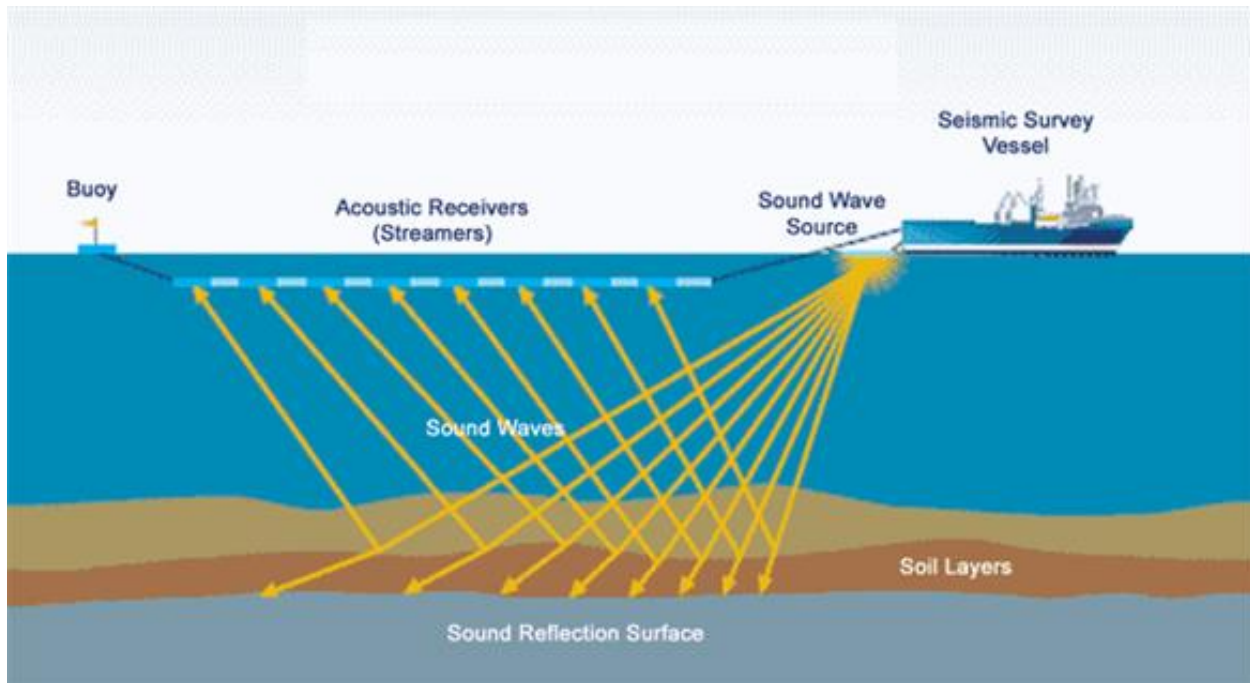


Figure 2: Example demonstration of seismic survey activities (Fish Safe, 2021)

While acquiring the seismic data, the survey vessel would travel along transects of a prescribed grid within the survey area that have been chosen to cross any known or suspected geological structure in the area. The vessel typically travels at a speed of between four and six knots (i.e. 2 to 3 metres per second / 7.2 to 10.8 kilometres per hour) while surveying.

The proposed survey would involve a seismic sound source (airgun array) and multiple hydrophone streamers, which would be up to 10,000 m long. The streamers would be towed at a depth of 9 m to 10 m below the surface and would not be visible, except for the tail-buoy at the terminal end of the cable. The sound source or airgun array would be towed 80 – 150 m behind the vessel at a depth of between 5 – 25 m below the surface. As the survey vessel would be restricted in manoeuvrability (a turn radius of 4.5 km is expected), other vessels should remain clear of it and therefore a supply/chase vessel usually assists in the operation of keeping other vessels at a safe distance.

Each triggering of a sound pulse is termed a seismic shot, and these are fired at intervals of 10 – 20 seconds and at an operating pressure of between 2 000 to 2 500 psi and a volume of 3 000 to 5 000 cubic inches. Each seismic shot is usually only between 5 and 30 milliseconds in duration, and despite peak levels within each shot being high, the total energy delivered into the water is low.

Airguns have most of their energy in the 5-300 Hz frequency range, with the optimal frequency required for deep penetration seismic work being 50-80 Hz. The maximum sound pressure levels at the source of airgun arrays in use today in the seismic industry are typically around 220 dB re 1 μ Pa at 1 m, with the majority of their produced energy being low frequency of 10-100 Hz. The location where this level of sound is attained is directly beneath the airgun array, generally near its centre, but the exact location and depth beneath the array are dependent on the detailed makeup of the array, the water depth, and the physical properties of the seafloor. However, based on analogue sound sources, sound levels for the seismic survey can notionally be expected to attenuate below 160 dB less than 1 325 m from the source array.

For this investigation Tosaco is proposing to undertake the reprocessing of approximately 5 000 km of existing 2D seismic lines taken previously in the block, as well as approximately 750 km² of 3D seismic data previously undertaken in the block. However, if it is determined by subsequent analysis of existing data, that acquisition of a



seismic dataset utilising 3D seismic techniques might be beneficial, then an additional 3D seismic surveys might be conducted over an area approximately 1 340 km² as shown in Figure 3 below.

The commencement of the 3D surveys will depend on an Exploration Right award date (if awarded) and availability of seismic contractors. It is anticipated that the 3D survey would take approximately 4 months to complete. In the event that the survey cannot be completed during the months when offshore seismic surveys are allowed, the survey will be completed in the following year. The exploration will be undertaken in accordance with the Exploration Works Programme (EWP) submitted with the application for exploration right as shown in Table 3 below.

Table 3: Exploration Works Programme

Year	Activity
1	<ul style="list-style-type: none"> • Review of all available technical data: <ul style="list-style-type: none"> ○ Geographical Information System (GIS) data; ○ Geophysical data, geological data, borehole data and log data; and ○ Third party technical reports. • Reprocessing of existing geological/geophysical data. • Preliminary estimation of contingent resources. • Prepare conceptual design and programme of future geophysical and geological exploration and appraisal.
2	<ul style="list-style-type: none"> • Planning and preparation of possible seismic survey.
3	<ul style="list-style-type: none"> • Possible 2D and/ or 3D seismic survey. • Processing and interpretation of seismic data. • Evaluation and estimation of contingent resources based on new data.

6 SITE DESCRIPTION AND SENSITIVE AREAS

A number of MPAs are located within the Block 1 offshore area. For oil and gas exploration activities, although vessels are permitted to sail through these areas, no invasive exploration activities are permitted in any proclaimed MPA. Should an exploration right be issued, no invasive exploration activities (3D surveys) may be undertaken in any proclaimed MPAs. It should be noted that the proposed 3D Seismic Survey area is intersected by the Namaqua Fossil Forest MPA (Figure 3below). As such, it has been recommended that the area falling within the MPA, as well as the recommended 5 km buffer required by the NEMPAA, be excluded from the 3D Seismic area. Apart from the exclusion of the NEMPAA, no other layout alternative is considered feasible to be considered further.

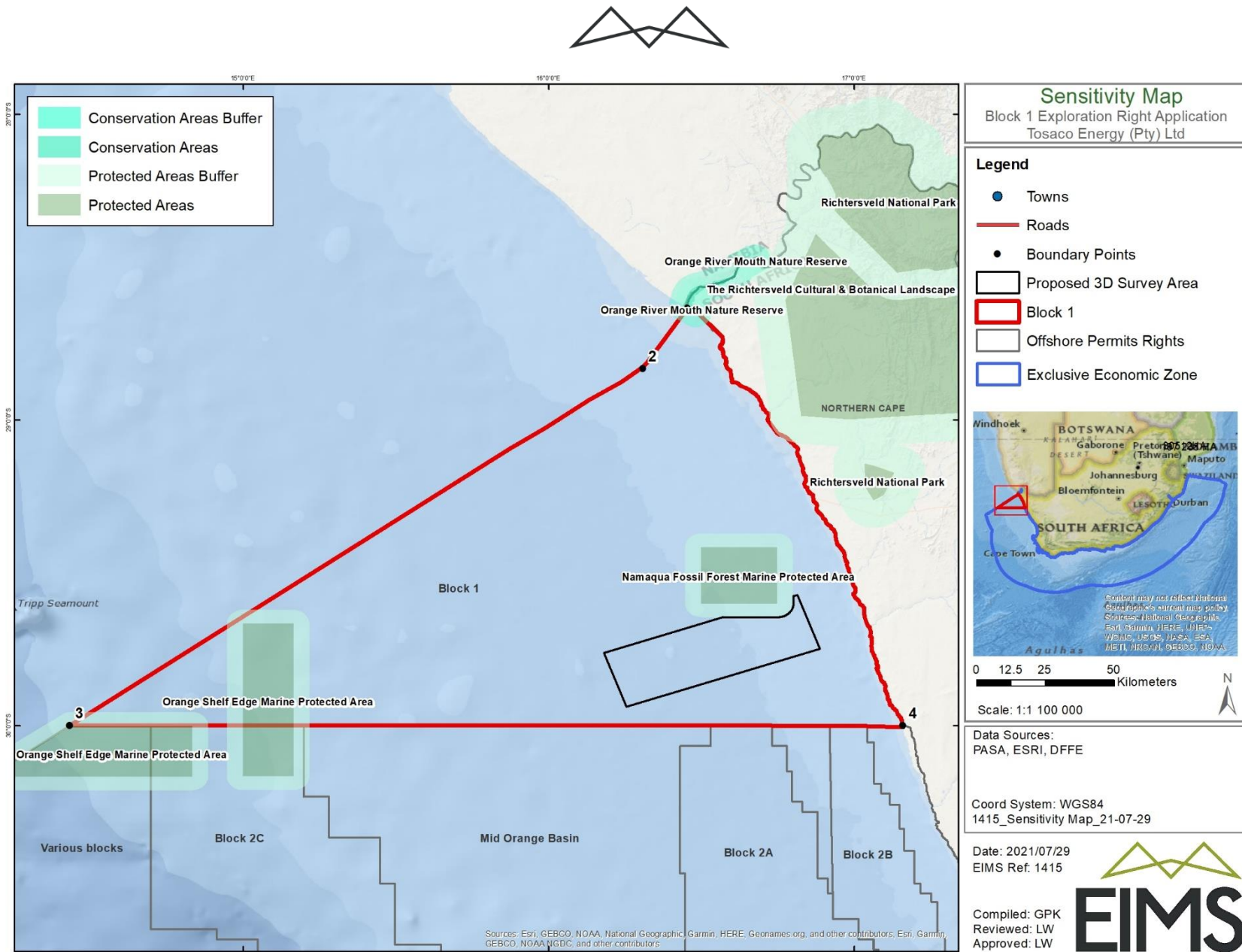


Figure 3: Locality Map showing the preferred alternative sites for 3D Survey



6.1 Potential Impacts Identified

Potential impacts associated with the proposed activity at the selected site have been identified and addressed in the EMPr and are summarised in the table below:

Table 4:

Aspect	Impact
Marine Ecology	Noise impact on Plankton
Marine Ecology	Noise Impacts on Marine Invertebrates - physiological Injury
Marine Ecology	Noise Impacts on Marine Invertebrates - behavioural avoidance
Marine Ecology	Noise impacts on fish - physiological injury
Marine Ecology	Noise impacts on fish - behavioural avoidance
Marine Ecology	Noise impacts on fish - reproductive success
Marine Ecology	Noise impacts on fish - masking of sounds
Marine Ecology	Noise impacts on fish - food sources
Marine Ecology	Noise impacts on Birds - physiological injury
Marine Ecology	Noise impacts on Birds - behavioural avoidance
Marine Ecology	Noise impacts on Birds - food sources
Marine Ecology	Noise impact on turtles - physiological injury
Marine Ecology	Noise impact on turtles - behavioural disturbance
Marine Ecology	Noise impact on turtles - masking of sounds
Marine Ecology	Noise impact on turtles - food sources
Marine Ecology	Noise impact on seals - physiological injury
Marine Ecology	Noise impact on seals - behavioural disturbance
Marine Ecology	Noise impact on seals - masking of sounds
Marine Ecology	Noise impact on seals - food sources
Marine Ecology	Noise impact on mysticetes - physiological injury
Marine Ecology	Noise impact on mysticetes - behavioural disturbance
Marine Ecology	Noise impact on mysticetes - masking of sounds
Marine Ecology	Noise impact on mysticetes - food sources
Marine Ecology	Noise impact on odontocetes - physiological injury



Aspect	Impact
Marine Ecology	Noise impact on odontocetes - behavioural disturbance
Marine Ecology	Noise impact on odontocetes - masking of sounds
Marine Ecology	Noise impact on odontocetes - food sources
Marine Ecology	Impacts of non-seismic noise
Marine Ecology	Impact of vessel lighting
Marine Ecology	Ballast water discharges
Marine Ecology	Routine vessel discharges
Marine Ecology	Vessel strikes and entanglement
Marine Ecology	Loss of Equipment
Marine Ecology	Release of diesel
Socio-Economic	Job Creation
Socio-Economic	Job Creation
Marine Ecology	Noise Nuisance from Vessel and Helicopter Operations
Marine Ecology	Noise Nuisance from Vessel and Helicopter Operations
Heritage	Disturbance of Potential Heritage Features
Socio-Economic	Interference with Existing Uses
Socio-Economic	Interference with Existing Uses
Fisheries	Fisheries Exclusion: Tuna pole-line sector
Fisheries	Fisheries Exclusion: Traditional linefish sector
Fisheries	Fisheries Exclusion: Small-scale sector
Fisheries	Fisheries Exclusion: Demersal longline sector
Fisheries	Fisheries Exclusion Research: DFFE
Fisheries	Fisheries Noise: Tuna pole-line sector
Fisheries	Fisheries Noise: Traditional linefish sector
Fisheries	Fisheries Noise: Small-scale sector
Fisheries	Fisheries Noise: Demersal longline sector
Fisheries	Fisheries Noise Research: DFFE



Aspect	Impact
Atmospheric Pollution	Atmospheric Emissions

7 ENVIRONMENTAL MANAGEMENT APPROACH

The compilation of an EMPr for an activity which is likely to result in significant environmental impacts is typically compiled at the culmination of a thorough investigation into the receiving environment and the identification and assessment of likely environmental impacts (i.e. EIA). This EMPr forms part of an EIA process. This EMPr aims to comply with the requirement of Appendix 4 of the EIA Regulations, 2014. These requirements are systematically addressed in the subsequent sections of this report. The primary objectives of the EMPr are as follows:

- To promote sustainability and describe an action programme to mitigate negative impacts as far as possible;
- To be a practical document that sets out both the goals and actions required in mitigation. Though the term “mitigation” can be broad in definition, it means in this context to “allay, moderate, palliate, temper or intensify.” Mitigation of a negative impact means that its effect is reduced. Mitigation of a positive impact means that its effect is increased or optimised; and
- To indicate responsibilities for the implementation of these action items within the EMPr.

This EMPr shall be deemed to have contractual standing on the basis that its contents and specifically objectives are a detailed expansion of the environmental risks and consequent requirements of the EA (if, and when issued). Where relevant the Applicant is responsible for delegating responsibility for compliance to designated parties (internal or external). Such delegation must be legally binding to the extent relevant.

The objectives and targets in this EMPr are further guided by the NEMA, and specifically by the EIA Regulations, 2014. Thus, the underlying principles of sustainable development are the ultimate objectives and target of this report. The EMPr has included measures to ensure the development activity complies with the following principles, as instilled in the NEMA, amongst others:

- i. That the disturbance of ecosystems and loss of biological diversity are minimised and remedied;
- ii. That pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- iii. That waste is avoided, minimised and reused or recycled where possible and otherwise disposed of in a responsible manner;
- iv. That a risk-averse and cautious approach is applied, which considers the limits of current knowledge about the consequences of decisions and actions; and
- v. That negative impacts on the environment and on people’s environmental rights be anticipated, prevented and remedied.

7.1 Environmental Management Principles

NEMA establishes a general framework for environmental law, in part by prescribing national environmental management principles that must be applied when making decisions that may have a significant impact on the environment. These principles are briefly summarised below:

7.1.1 Holistic Principle

The Holistic principle, as defined by NEMA (Section 2(4) (b)) requires that environmental management must be integrated, acknowledging that all elements of the environment are linked and inter-related and it must take into account the effect of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option (defined below in Section 7.1.2). Holistic



evaluation does not mean that a project must be looked at as a whole. It rather means that it must be accepted that there is a whole into which a project introduced. If the indications are that the project could have major adverse effects, the project must be reconsidered and where appropriate re-planned or relocated to avoid an adverse impact or to ensure a beneficial impact.

7.1.2 Best Practicable Environmental Option

When it is necessary to undertake any action with environmental impacts, the different options that could be considered for the purpose must be identified and defined. The Best Practicable Environmental Option (BPEO) is defined in NEMA as “the option that provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term.” Other guidelines typically used for environmental management in terms of other legislation include: BPM which is the Best Practicable Means and BAT which is the Best Available Technology.

7.1.3 Sustainable Development

The concept of sustainable development was introduced in the 1980’s with the aim to ensure that the use of natural resources is such that our present needs are provided without compromising the ability of future generations to meet their own needs. The constitution of South Africa is built around the fact that everyone has the right to have the environment protected through reasonable legislative and other measures that secure ecologically sustainable development. The National Environmental Principles included in the NEMA require development to be socially, environmentally and economically sustainable.

7.1.4 Preventative Principles

The preventative principle is fundamental to sustainable development and requires that the disturbance to ecosystems and the pollution, degradation of the environment and negative impacts on the environment be avoided, or, where they cannot be altogether avoided, are minimised and remedied.

7.1.5 The Precautionary Principle

The precautionary principle requires that where there is uncertainty, based on available information, that an impact will be harmful to the environment, it is assumed, as a matter of precaution, that the said impact will be harmful to the environment until such time that it can be proven otherwise. The precautionary principle requires that decisions by the private sector, governments, institutions and individuals need to allow for and recognise conditions of uncertainty, particularly with respect to the possible environmental consequences of those decisions. In South Africa, the DHSWS (then DWAF) adopted a BPEO guideline in 1991 for water quality management and in 1994 in the Minimum Requirements document for waste management.

In terms of DWAF Minimum Requirements for the Handling and Disposal of Hazardous Waste, 1994, the precautionary principle is defined as, “Where a risk is unknown; the assumption of the worst-case situation and the making of provision for such a situation.” Here the precautionary principle assumes that a waste or an identified contaminant of a waste is “both highly hazardous and toxic until proven otherwise.”

In the context of the EIA process in South Africa, the precautionary principle also translates to a requirement to provide sound, scientifically based, information that is sufficient to provide the decision-making authority with reasonable grounds to understand the potential impacts on the environment, the extent thereof and how impacts could be mitigated. If such information is not adequate for this purpose, the relevant authority cannot be satisfied as is required and then the authority should require that further information be collected and provided.

7.1.6 Duty of Care and Cradle to Grave Principle

In terms of the NEMA Section 28, “Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.”



By way of example, the principle of “duty of care” in terms of waste management emphasises the responsibility to make sure that waste is correctly stored and correctly transported, as it passes through the chain of custody to final point of disposal. This means that waste must always be stored safely and securely. The company removing and disposing of waste also holds the responsibility to hold the relevant licenses, and that waste is transported alongside the necessary paperwork.

“Cradle to Grave” refers to the responsibility a company takes for the entire life cycle of a product, service or program, from design to disposal or termination. In terms of the DWAF Minimum Requirements for the Handling and Disposal of Hazardous Waste, 1994, “any person who generates, transports, treats or disposes of waste must ensure that there is no unauthorised transfer or escape of waste from his control. Such a person must retain documentation describing both the waste and any related transactions. In this way, he retains responsibility for the waste generated or handled.” This places responsibility for a waste on the Generator and is supported by the “Cradle to Grave” principle, according to which a “manifest” accompanies each load of Hazardous Waste until it is responsibly and legally disposed. This manifest is transferred from one transporter to the next along with the load, should more than one transporter be involved. Once the waste is properly disposed of at a suitable, permitted facility, a copy of the manifest must be returned to the point of origin.” Duty of Care offers one strategy to implement sustainable development.

7.1.7 Polluter Pays Principle

The “polluter pays principle” holds that the person or organisation causing pollution is liable for any costs involved in cleaning it up or rehabilitating its effects. It is noted that the polluter will not always necessarily be the generator, as it is possible for responsibility for the safe handling, treatment or disposal of waste to pass from one competent contracting party to another. The polluter may therefore not be the generator but could be a disposal site operator or a transporter. Through the ‘duty of care’ principle, however, the generator will always be one of the parties held accountable for the pollution caused by the waste. Accordingly, the generator must be able to prove that the transferral of management of the waste was a responsible action. The polluter pays principle acceding to NEMA dictates that “the cost of remedying pollution, environmental degradation and consequent adverse effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.”

7.2 Duty of Care Responsibilities

Section 28 of the NEMA makes provision for duty of care, and remediation of environmental damage. The binding principles are described below:

1. Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.
 - (1A) Subsection (1) also applies to a significant pollution or degradation that-
 - a) occurred before the commencement of this Act;
 - b) arises or is likely to arise at a different time from the actual activity that caused the contamination; or
 - c) arises through an act or activity of a person that results in a change to pre-existing contamination.
2. Without limiting the generality of the duty in subsection (1), the persons on whom subsection (1) imposes an obligation to take reasonable measures, include an owner of land or premises, a person in control of land or premises or a person who has a right to use the land or premises on which or in which-
 - a) any activity or process is or was performed or undertaken; or



- b) any other situation exists, which causes, has caused or is likely to cause significant pollution or degradation of the environment.
3. The measures required in terms of subsection (1) may include measures to-
- a) investigate, assess and evaluate the impact on the environment;
 - b) inform and educate employees about the environmental risks of their work and the manner in which their tasks must be performed in order to avoid causing significant pollution or degradation of the environment;
 - c) cease, modify or control any act, activity or process causing the pollution or degradation;
 - d) contain or prevent the movement of pollutants or the cause of degradation;
 - e) eliminate any source of the pollution or degradation; or
 - f) remedy the effects of the pollution or degradation.

7.3 Failure to Comply with Environmental Considerations

Within the provisions of the relevant environmental legislation, there are a number of penalties for non-compliance or offences. Below a few extracts are presented for information purposes, however these must not be read in isolation and the reader is reminded that there are other Acts, or sections of Acts, that may be applicable to the relevant project:

- NEMA Section 49B(1): A person convicted of an offence in terms of section 49A(1)(a), (b), (c), (d), (e), (f) or (g) is liable to a fine not exceeding R10 million or to imprisonment for a period not exceeding 10 years, or to both such fine or such imprisonment- this includes commencing with a listed activity without an EA or the non-compliance with conditions of any EA and associated EMPr;
- NEMA Section 49B(2): A person convicted of an offence in terms of section 49A(1)(i), (j) or (k) is liable to a fine not exceeding R5 million or to imprisonment for a period not exceeding 5 years, and in the case of a second or subsequent conviction to a fine not exceeding R10 million or to imprisonment for a period not exceeding 10 years, and in both instances to both such fine and such imprisonment;
- NEMA Section 49B(3): A person convicted of an offence in terms of section 49A(1)(h), (l), (m), (n), (o) or (p) is liable to a fine or to imprisonment for a period not exceeding one year, or to both a fine and such imprisonment;
- NWA Section 151 (1c): No person may fail to comply with any condition attached to a permitted water use under this Act;
- NWA Section 151 (2): Any person who contravenes any provision of subsection (1) is guilty of an offence and liable, on the first conviction, to a fine or imprisonment for a period not exceeding five years, or to both a fine and such imprisonment and, in the case of a second or subsequent conviction, to a fine or imprisonment for a period not exceeding ten years or to both a fine and such imprisonment;
- NEM:BA Section 102 (1): A person convicted of an offence in terms of section 101 is liable to a fine not exceeding R10 million, or an imprisonment for a period not exceeding ten years, or to both such a fine and such imprisonment;
- NEM:WA Section 68 (1): A person convicted of an offence referred to in section 67(1)(b), (c), (d), (e), (f), (i), (j), (k) or (l) or section 67(2)(a), (b), (c), (d) or (e) is liable to a fine not exceeding R5 000 000 or to imprisonment for a period not exceeding five years, or to both a fine and such imprisonment, in addition to any other penalty or award that may be imposed or made in terms of the National Environmental Management Act;
- NEM:WA Section 68 (2): A person convicted of an offence referred to in section 67(1)(b), (c), (d), (e), (f), (i), (j), (k) or (l) or section 67(2)(a), (b), (c), (d) or (e) is liable to a fine not exceeding R5 000 000 or to imprisonment for a period not exceeding five years, or to both a fine and such imprisonment, in addition to any other penalty or award that may be imposed or made in terms of the National Environmental Management Act;



- NEM:WA Section 68 (3): Any person convicted of an offence referred to in section 67(1)(m) is liable to a fine or to imprisonment for a period not exceeding six months or to both a fine and such imprisonment;
- NEM:WA Section 68 (4): A person who is convicted of an offence in terms of this Act and who persists after conviction in the act or omission that constituted the offence commits a continuing offence and is liable on conviction to a fine not exceeding R1 000 or to imprisonment for a period not exceeding 20 days, or to both such fine and such imprisonment, in respect of each day that person persists with that act or omission;

It is recommended that a procedure for non-compliances (i.e. incentives or disincentives for conformance and non-conformance with the EMPr requirements) must be employed to ensure that the EMPr is adequately implemented. The system to be used must be determined before the project commences, included in the tender documents and contracts, and made clear to all project workers. The system may include that the independent Environmental Control Officer (ECO) can be authorized to impose spot fines on the Contractor and/or his subcontractors for any of the defined transgressions. Such fines should be issued in addition to any remedial costs incurred as a result of non-compliance with the environmental specifications and or legal obligations.

8 ROLES AND RESPONSIBILITIES

The applicant will be responsible for ensuring overall compliance with the provisions of the EMPr. Implementation is the key to the success of the EMPr. In order to ensure that the EMPr and its mitigation measures are implemented, roles and responsibilities need to be clearly defined and documented prior to commencement. This section serves as a guide on which party is normally responsible for certain tasks. Specific roles are designated in the specific environmental management and mitigation requirements in this EMPr.

8.1 The Project Applicant/Proponent

The applicant is the principal party (Proponent) of the project. For the purposes of this project it is understood that the Applicant role is fulfilled by the Tosaco. The legal accountability for correct implementation of the relevant requirements of the EA and EMPr falls primarily upon the applicant and must therefore be built into all contractor's contractual agreements. The applicant's role typically includes:

- Provide for all necessary supervision during the execution of the project including appointment of key personnel to act on his/her behalf during the project (e.g.: Project Manager). The key personnel will be tasked with ensuring that the various contractors/developers comply with the necessary provisions of the EA and EMPr;
- Ensure that the various contractors and applicable sub-contractors appoint a suitably qualified, competent Environmental Officer (EO) that will be responsible for among others, ensuring daily compliance with the EMPr and EA throughout the execution of the relevant project components;
- Appoint a suitably qualified, competent independent Environmental Control Officer (ECO) who will undertake periodic audits on the various contractors works and/or land parcels under development;
- Appoint an independent and suitably qualified MMO to monitor marine fauna for the duration of the survey;
- Appoint an independent and suitably qualified PAM operator to monitor marine fauna for the duration of the survey;
- Notify the relevant competent authority of changes in the development resulting in significant environmental impacts;
- Assess the various contractor's environmental performance during exploration, in consultation with the ECO;
- Ensure compliance with regulations;
- To implement the projects as per the approved project plan;
- To ensure that implementation is conducted in an environmentally acceptable manner;



- To comply with special conditions as stipulated by surrounding landowners during the negotiation process (if any); and
- To inform and educate all employees about the environmental risks associated with the different activities that should be avoided during the exploration process and lessen significant impacts to the environment.

Therefore, ultimately, the Applicant is responsible for the development and implementation of the EMPr and, where relevant, ensuring that the conditions in the EA are satisfied. Where exploration activities are contracted out (e.g. to Contractors and Subcontractors), the liability associated with non-compliance still rests with the Applicant (unless otherwise agreed upon between the authorities, the Applicant and the contracting parties). The Applicant (and not the Contractor) is therefore responsible for liaising directly with the relevant authorities with respect to the preparation and implementation of the EMPr and meeting authorisation conditions.

8.2 The Project Manager

During the development, it is envisaged that there may be a number of contractors and sub-contractors undertaking various activities on the project. The Project Manager would oversee all contractors and sub-contractors from a project management point of view. The roles of the Project Manager typically include the following:

- The Project Manager acts on behalf of the Applicant regarding the administration of contracts to sub-contractors, etc.;
- Provides and/or approves scheduling, aspects of co-ordination and estimating;
- Ensures implementation of the project plan within cost, time and quality constraints;
- Ensures that implementation of EMPr is executed as planned; and
- Keeps the asset owner informed of progress made during the life cycle of the project.

8.3 The Environmental Control Officer

The ECO is appointed by the Applicant and should be independent from the Applicant and the Contractors. The ECO should have appropriate training and/or experience in the implementation of environmental management specifications. The ECO must preferably have a tertiary qualification in an Environmental Management or appropriate field. The ECO provides feedback to the Project Manager regarding all environmental matters. The ECO's key role is auditing the implementation of the EMPr. For the purposes of implementing the conditions contained herein, the Applicant should appoint the ECO well before the start of exploration. The ECO is responsible for the auditing function as well as the clarification of environmental conditions contained in this EMPr to anyone working on the site. **For the purposes of this project, the role of ECO and MMO can be fulfilled by the same person.**

The ECO roles include:

- Recommendations for review and update of the EMPr;
- Liaison between the Applicant, Contractors, authorities and other lead stakeholders on high importance environmental concerns;
- Review the site induction training to ensure environmental issues receive adequate attention and important site-specific issues are included;
- Conduct environmental audits of the site/contractors including relevant documentation on a monthly basis;
- Validating the regular site inspection reports, which are to be prepared by the relevant contractor EO's;
- Maintain a record of all non-conformances and incidents to ensure that measures are put in place to remedy such;



- Maintain a public consultation register in which all complaints are recorded, as well as action taken; and
- Verification that all environmental monitoring programmes (sampling, measuring, recording etc. when specified) are carried out according to protocols and schedules.

It is important to note that where opportunity for interpretation occurs within the conditions of this EMP, the interpretation of the ECO will take preference.

8.4 Marine Mammal Observer

Two qualified, independent Marine Mammal Observer (MMOs) are required on board at all times; as a minimum at least one must be on watch during all daylight hours while the acoustic source is in the water in the operational area. The duties of the MMO would be to:

- Give effective briefings to crew members, and establish clear lines of communication and procedures for onboard operations;
- Record airgun activities, including sound levels, “soft-start” procedures and pre-firing regimes;
- Observe and record responses of marine fauna to seismic shooting from optimum vantage points, including seabird, turtle, seal and cetacean incidence and behaviour and any mortality or injuries of marine fauna as a result of the seismic survey. Data captured should include species identification, position (latitude/longitude), distance/bearing from the vessel, swimming speed and direction (if applicable) and any obvious changes in behaviour (e.g. startle responses or changes in surfacing/diving frequencies, breathing patterns) as a result of the seismic activities. Both the identification and the behaviour of the animals must be recorded accurately along with current seismic sound levels. Any attraction of predatory seabirds, large pelagic fish or cetaceans (by mass disorientation or stunning of fish as a result of seismic survey activities) and incidents of feeding behaviour among the hydrophone streamers should also be recorded;
- Sightings of any injured or dead protected species (marine mammals, seabirds and sea turtles) should be recorded, regardless of whether the injury or death was caused by the seismic vessel itself. If the injury or death was caused by a collision with the seismic vessel, the date and location (latitude/longitude) of the strike, and the species identification or a description of the animal should be recorded;
- Record meteorological conditions at the beginning and end of the observation period, and whenever the weather conditions change significantly;
- Request the delay of start-up or temporary termination of the seismic survey or adjusting of seismic shooting, as appropriate. It is important that MMO decisions on the termination of firing are made confidently and expediently, and following dialogue between the observers on duty at the time. A log of all termination decisions must be kept (for inclusion in both daily and “close-out” reports);
- Use the JNCC (2017) recording spreadsheet in order to record all the above observations and decisions; and
- Prepare daily reports of all observations, to be forwarded to the necessary authorities on a daily or weekly basis to ensure compliance with the mitigation measures.

8.5 Passive Acoustic Monitoring Operator

At least two qualified, independent Passive Acoustic Monitoring (PAM) Operators are required on board at all times, as a minimum at least one must be on watch at all times while the acoustic source is in the water in the operational area. If PAM is to be operational 24/7 then 3 PAM operators are required. The duties of the PAM operator would be to:

- Give effective briefings to crew members, and establish clear lines of communication and procedures for onboard operations;
- Ensure that the hydrophone cable is optimally placed, deployed and tested for acoustic detections of marine mammals;



- Confirm that there is no marine mammal activity within 1 000 m (very high frequency cetaceans) or 500 m (low and high frequency cetaceans) of the airgun array prior to commencing with the “soft-start” procedures;
- Record species identification, position (latitude/longitude), distance and bearing from the vessel and acoustic source, where possible;
- Record general environmental conditions;
- Record airgun activities, including sound levels, “soft-start” procedures and pre-firing regimes;
- Request the delay of start-up and temporary termination of the seismic survey, as appropriate;
- Ensure MMOs and PAM operators are briefed on the area-specific sensitivities and on the seismic survey planning (including roles and responsibilities, and lines of communication); and
- 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, DFFE, and the Petroleum Agency South Africa for analyses of survey impacts in local waters.

8.6 Fisheries Liaison Officer

An Independent Fisheries Liaison Officer (FLO) must be appointed to undertake the following:

- Facilitate communication with maritime vessels;
- Report daily on vessel activity;
- Respond and advise on action to be taken in the event of encountering fishing gear; and
- Report daily on the survey vessel’s potential impacts on marine fauna.

8.7 The Contractor/ Operator

The contractor is usually a third party appointed by the applicant/project manager to undertake the actual exploration. For the purposes of this section, any contractor (regardless of who appointed them) is referred to as the “contractor”.

The relevant contractors are answerable to the Project Manager and ECO for all environmental issues associated with the project. Contractor performance will, amongst others, be assessed on health, safety and environmental management criteria. The principal contractor/s, any other contractors and sub-contractors will be required to comply with the provisions contained herein, and accordingly, the EMPr and its provisions must form part of any contractual arrangements between the applicant and contractors, and contractors and their sub-contractors, etc. The contractor must comply with EMPr and ensure that all his employees and sub-contractors appointed by him/her are familiar with the EMPr. The legal accountability for correct implementation of the relevant requirements of the EA and EMPr must be contractually bound to the appointed contractor.

The Contractors roles include (but not limited to):

- Provide all necessary supervision during the execution of the project;
- Appoint a suitably qualified, competent EO that will be responsible for amongst others, ensuring daily compliance with the EMPr, EA during the exploration phase;
- Adhere to the instructions of the MMO and PAM operators with regards to air gun soft start procedures and possible temporary termination of activities if indicated by marine fauna observations;
- To implement the project as per the approved project plan;
- To ensure that implementation is conducted in an environmentally acceptable manner;
- To fulfil all obligations as per the agreed contract; and
- Ensure that the Contractors staff and employees have received the appropriate environmental awareness training prior to commencing exploration.



8.8 The Contractor/ Operator Environmental Officer

The principle contractor shall appoint an Environmental Officer (EO), who is responsible for implementation of the EMPr. The Contractor must ensure that the Contractor's EO is suitably qualified and competent to perform the necessary tasks and is appointed at a level such that she/he can interact effectively with other Contractors, labourers, the ECO and the public (if necessary). The Contractor's EO ensures that all sub-contractors working under the Contractor and sub-contractors abide by the requirements of the EMPr. The appointment of additional EO's and/or sub-contractors EO's is at the ECO's discretion. The costs related to the implementation of the EMPr will be the responsibility of the relevant Contractor/ sub-contractor.

The Contractor's EO roles will include:

- Preparing activity based Environmental Method Statements where applicable and where required by the ECO;
- Review the contractors safe work procedures/risk assessments/induction training/DSTI's (daily safe task instruction) during the exploration and include information relating to the relevant environmental risks and appropriate mitigation measures;
- Support the ECO in monitoring by maintaining a permanent presence on board the exploration vessel;
- Establishing and maintaining an environmental incident register;
- Taking required corrective action within specified time frame in respect of non-conformances and environmental incidents;
- Assist in finding environmentally acceptable solutions to problems;
- Attendance at HSE meetings, toolbox talks and induction programmes (where relevant);
- Complete a daily diary with the purpose of recording environmental issues and corrective measures on a daily basis;
- Report any complaints to the ECO to be captured in the Consultation register;
- Liaise with the exploration team on issues related to implementation of, and compliance with the EMPr; and
- Ensure adequate and compliant waste management.

8.9 The Authorities

The authorities that should be involved include the Competent Authorities, i.e. PASA and the DMRE. The authorities may be required to perform the following roles:

- Review Monitoring and Audit reports, if required;
- Review whether there is compliance by the Applicant and Contractor with the terms of the EMPr and permit/license conditions. Whenever necessary, the authorities should assist the Applicant in understanding and meeting the specified requirements; and
- The authorities may perform random controls to check compliance. In case of persistent non-compliance, the Applicant will be required to provide an action plan with corrective measures, and have it approved by the authorities.

9 ENVIRONMENTAL MANAGEMENT SYSTEM

The purpose of this EMPr is to ensure that the environment is properly considered during the design, mobilisation, operations, and completion of exploration activities, and that negative impacts are minimised or prevented, and positive impacts enhanced. At the same time the EMPr should provide a logical extension of the EIA, specialist studies, or any other technical planning and assessment documentation, to ensure that recommendations are implemented, and that the project does not deviate from the environmental profile that formed the basis of the assessment.



9.1 Document Control

A formal document control system should be established. The document control system must provide for the following requirements;

- Documents are approved for adequacy prior to use;
- Review and update documents as necessary and re-approve documents;
- Ensure that changes and the current version status of documents are identified;
- Ensure that relevant versions of applicable documents are available at points of use;
- Ensure that documents remain legible and readily identifiable;
- Ensure that documents of external origin necessary for the EMPr are identified and their distribution controlled; and
- Prevent unintended use of obsolete documents and apply suitable identification to them if they are retained for any purpose.

The responsibility for establishing a suitable document control system rests with the Project Manager.

9.2 Record Keeping

It is essential that an official procedure for control of records be developed to ensure records required to demonstrate conformity to environmental standards are maintained. The Applicant, or the Project Manager (if assigned) is therefore required to develop and maintain a procedure for the identification, storage, protection, retrieval, retention and disposal of records as part of the EMPr. Records must be legible, identifiable and traceable.

9.3 Auditing and Reporting Procedures

Reporting procedures must be developed at the start of the project, for conveying information from the compliance monitoring activities and to ensure that management is able to take rapid corrective action should certain thresholds be exceeded. Different reporting procedures may include:

- Inspections;
- Accidents and emergencies;
- Measuring performance indicators and interpreting and acting on the indicators;
- Records of monitoring activities to test the effectiveness of mitigation measures and impact controls, as well as for compliance auditing purposes; and
- Training programmes and evidence of appropriate levels/amount of skills/capacities created.

All monitoring and auditing must be accompanied by applicable records and evidence (e.g. delivery slips, photographic records, etc.). All reports must be retained and made available for inspection by the ECO, the Applicant and /or the Relevant Competent Authorities. All reports shall be signed by the relevant parties to ensure accountability. The Applicant must use the audit report findings to continually ensure that environmental protection measures are working effectively through a system of self-checking. The EMPr should be viewed as a dynamic document aimed at continual environmental performance improvement.

The following auditing and reporting shall be required throughout the exploration:

- Daily Environmental Diary: These reports must be prepared by the contractors' EO and must aim to monitor and report on day-to-day activities so as to ensure compliance with the relevant authorisations, licences and permits, the approved EMPr, and environmental method statements;
- Monthly Compliance Reports (EO): These reports must be prepared by the contractors' EO and must aim to provide a concise monthly performance report, including copies of relevant documents (e.g. waste manifests, incident registers, consultation registers, etc);



- Monthly Audit Reports: The ECO must compile monthly compliance reports (audits) which are to be submitted to the Applicant for review and correction of non-compliance issues. It is the responsibility of the ECO to report any non-compliance, which is not correctly rectified. Depending on the outcome of the authorisation processes it may be a requirement to submit these to the relevant authorities.

9.4 Responding to Non-Compliances

Non-compliance will be identified and managed through the following four key activities including:

- Inspections of the exploration vessel and activities related to exploration;
- Monitoring of selected environmental quality variables (where relevant);
- Audits of the exploration activities and relevant documentation; and
- Reporting on a monthly basis.

An environmental non-conformance and incident register must be prepared and maintained by the ECO throughout the 3D seismic exploration phase in order to track and monitor environmental concerns, incidents, and non-conformances. The register must include details of date, location (coordinates), description of the NC or Incident, applicable environmental commitment/standard, corrective action taken, adequacy of corrective action, date rectified, etc.

Non-compliance with the EMPr or any other environmental legislation, specifications or standards shall be recorded by the ECO in the non-conformance register. This register shall be maintained by the ECO and will be sent to the Applicant and Contractor on a regular basis (monthly), and the Applicant shall ensure that the responsible party takes the necessary corrective actions. Non-conformances may only be closed out in the register by the ECO upon confirmation that adequate corrective action has been taken and/or documented proof provided. The register should be utilised to measure overall environmental performance.

9.5 Environmental Incidences

For the purposes of this project, an environmental incident can be divided into three levels, i.e. major, medium and minor. All Major and Medium environmental incidents shall be recorded in the ECO's non-conformance and incident register. Minor incidents shall be recorded by the contractor, and by the Applicant in their own incident register. Definitions of environmental incidents are provided in Table 5.

Table 5: Description of incidents and non-conformances for the purpose of the project

Non-Conformance	Any deviation from work standards, practices, procedures, regulations, management system performance etc. that could either directly or indirectly lead to injury or illness, damage to the workplace or oceanic environment, legal transgression or a combination of these.
Major Environmental Incident	<p>An incident or sequel of incidents, whether immediate or delayed, that results or has the potential to result in widespread, long-term, irreversible significant negative impact on the oceanic environment and/or has a high risk of legal liability.</p> <p>A major environmental incident usually results in a significant pollution and may entail risk of public danger. Major environmental incidents usually remain an irreversible impact even with the involvement of long-term external intervention i.e. expertise, best available technology, remedial actions, excessive financial cost etc. Major environmental incidents must be reported to the authorities. The ECO shall make the final decision as to whether a particular incident should be classified as a Major incident.</p>
Medium Environmental Incident	An incident or sequel of incidents, whether immediate or delayed, that results or has the potential to result in widespread or localised, short term, reversible



	<p>significant negative impact on the oceanic environment and/or has a risk of legal liability.</p> <p>A medium environmental incident may be reported to the authorities, can result in significant pollution or may entail risk of public danger. The impact of medium environmental incidents should be reversible within a short to medium term with or without intervention. The ECO shall make the final decision as to whether a particular incident should be classified as a Medium incident.</p>
Minor Environmental Incident	<p>An incident or sequel of incidents, whether immediate or delayed, where the oceanic environmental impact is negligible immediately after occurrence and/or once-off intervention on the day of occurrence.</p>

The following incident reporting procedures shall apply to this project:

- All environmental incidents shall be reported to Contractor’s EO, and the ECO, and shall be recorded in the contractors’ respective incident registers;
- The ECO shall record the incident in the non-conformance and incident register and advise on the appropriate measures and timeframes for corrective action;
- An incident report shall be completed by the relevant party responsible for the incident for all medium and major incidents and the report shall be submitted to the Project Manager and ECO within 5 calendar days of the incident;
- The EO shall investigate all incidents and identify any required actions to prevent a recurrence of such incidents; and
- In the event of an emergency incident (unexpected sudden occurrence), including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed, the Applicant shall notify the relevant authorities in accordance with Section 30(3) of the NEMA. The Applicant shall engage the ECO who shall assess all major incidents and shall advise the Applicant when any such incident must be reported to the authorities as per the above requirement.

9.6 Application of the Mitigation Hierarchy

A key component of the EIA process is to explore practical ways of avoiding and where not possible to reducing potentially significant impacts of the proposed seismic acquisition activities. The mitigation measures put forward are aimed at preventing, minimising or managing significant negative impacts to as low as reasonably practicable (ALARP). The mitigation measures are established through the consideration of legal requirements, project standards, best practice industry standards and specialist inputs.

The mitigation hierarchy, as specified in International Finance Corporation (IFC) Performance Standard 1, is based on a hierarchy of decisions and measures aimed at ensuring that wherever possible potential impacts are mitigated at source rather than mitigated through restoration after the impact has occurred. Any remaining significant residual impacts are then highlighted and additional actions are proposed. With few exceptions, however, identified impacts were of low significance with very low or zero potential for further mitigation. In such cases the appropriate project Standards will be used and additional best management practices are proposed.

The operator will ensure that the proposed seismic survey is undertaken in a manner consistent with good international industry practice and Best Available Techniques (BAT), and in compliance with the applicable requirements in the MPRDA regulations.

The operator will ensure that the proposed seismic survey is undertaken in a manner consistent with good international industry practice and in compliance with the applicable requirements in MARPOL 73/78, as summarised below.



- The discharge of biodegradable wastes from vessels is regulated by MARPOL 73/78 Annex V, which stipulates that:
 - No disposal to occur within 3 nautical miles (\pm 5.5 km) of the coast.
 - Disposal between 3 nautical miles (\pm 5.5 km) and 12 nautical miles (\pm 22 km) needs to be comminuted to particle sizes smaller than 25 mm.
 - Disposal overboard without macerating can occur greater than 12 nautical miles from the coast when the vessel is sailing.
- Discharges of oily water (deck drainage, bilge and mud pit wash residue) to the marine environment are regulated by MARPOL 73/78 Annex I, which stipulates that vessels must have:
 - A Shipboard Oil Pollution Emergency Plan (SOPEP).
 - A valid International Oil Pollution Prevention Certificate, as required by vessel class.
 - Equipment for the control of oil discharge from machinery space bilges and oil fuel tanks, e.g. oil separating/filtering equipment and oil content meter. Oil in water concentration must be less than 15 ppm prior to discharge overboard.
 - Oil residue holding tanks.
 - Oil discharge monitoring and control system.
- Sewage and grey water discharges from vessels are regulated by MARPOL 73/78 Annex IV, which specifies the following:
 - Vessels must have a valid International Sewage Pollution Prevention Certificate.
 - Vessels must have an onboard sewage treatment plant providing primary settling, chlorination and dechlorination before discharge of treated effluent.
 - The discharge depth is variable, depending upon the draught of the seismic vessel / support vessel at the time, but will be in accordance with MARPOL 73/78 Annex IV.
 - Discharge of sewage beyond 12 nm requires no treatment. However, sewage effluent must not produce visible floating solids in, nor cause the discolouration of, the surrounding water.
 - Sewage must be comminuted and disinfected for discharges between 3 nautical miles (\pm 6 km) and 12 nautical miles (\pm 22 km) from the coast. This will require an onboard sewage treatment plant or a sewage comminuting and disinfecting system.
 - Disposal of sewage originating from holding tanks must be discharged at a moderate rate while the ship is proceeding on route at a speed not less than 4 knots.
- Sewage will be treated using a marine sanitation device to produce an effluent with:
 - A biological oxygen demand (BOD) of <25 mg/l (if the treatment plant was installed after 1/1/2010) or <50 mg/l (if installed before this date).
 - Minimal residual chlorine concentration of 1.0 mg/l.
 - No visible floating solids or oil and grease.

The project will also comply with industry best practices with regard to waste management, including:

- Waste management will follow key principles: Avoidance of Waste Generation, adopting the Waste Management Hierarchy (reduce, reuse, recycle, recover, residue disposal), and use of Best Available Technology (BAT).
- An inventory will be established of all the potential waste generated, clarifying its classification (hazardous, non-hazardous or inert) and quantity, as well as identifying the adequate treatment and disposal methods.
- Waste collection and temporary storage shall be designed to minimise the risk of escape to the environment (for example by particulates, infiltration, runoff or odours).



- On-site waste storage should be limited in time and volume.
- Dedicated, clearly labelled, containers (bins, skips, etc.) will be provided in quantities adapted to anticipated waste streams and removal frequency.

Detailed mitigation measures for seismic surveys in other parts of the world are provided by Weir et al. (2006), Compton et al. (2007) and US Department of Interior (2007). Many of the international guidelines presented in these documents are extremely conservative as they are designed for areas experiencing repeated, high intensity surveys and harbouring particularly sensitive species, or species with high conservation status. A number of countries have more recently updated their guidelines, most of which are based on the JNCC (2010, 2017) recommendations but adapted for specific areas of operation. A review and comparison of these is provided in MaMa CoCo SEA (2015). The guidelines currently applied to seismic surveying in South African waters are those proposed in the Generic EMPr (CCA & CMS 2001). These have been updated as necessary to include salient points from recognised international guidelines, particularly the JNCC (2010, 2017) Guidelines and the 2013 New Zealand Code of Conduct for seismic operations.

10 REVIEW AND REVISION OF THE EMPr

It is important to note that this EMPr is made legally binding on the Applicant through the EA and the approval of the EMPr by the decision-making authority. It is important to consider that the EMPr is a dynamic document which may require such alteration and /or amendment as the project evolves. Conditions under which the EMPr would require revision include:

- Changes in legislation;
- Occurrence of unanticipated impacts or impacts of greater intensity, extent and significance than predicted;
- Inadequate mitigation measures (i.e. where environmental performance does not meet the required level despite the implementation of the mitigation measure);
- Secondary impacts occur as a result of the mitigation measures; and
- Instances where the implementation of the specified management, as a result of changes in circumstances, may become impractical or unreasonable to implement.

The Applicant in consultation with the ECO should be responsible for ensuring that the registration and updating of all relevant EMPr documentation is carried out. It shall be the responsibility of the Applicant, in consultation with the ECO, to ensure that all personnel are performing according to the requirements of the document control procedure, and to initiate the revision of controlled documents, when required by changes in process or operations.

The ECO must undertake a risk assessment of any proposed changes to the EMPr. This risk assessment must be included in the applicable monthly audit report, and where applicable supported by the necessary proof of public consultation. It is important to note that if alterations and/or amendments are required; these may only be affected with written approval from the competent authority and in accordance with the relevant legal processes.

11 ENVIRONMENTAL AWARENESS PLAN AND TRAINING

Training and environmental awareness is an integral part of a complete EMPr. The overall aim of the training will be to ensure that all site staff are informed of their relevant requirements and obligations pertaining to the relevant authorisations, licences, permits and the approved EMPr and protection of the environment.

The applicant and contractor must ensure that all relevant employees are trained and capable of carrying out their duties in an environmentally responsible and compliant manner and are capable of complying with the relevant environmental requirements. To obtain buy-in from staff, individual employees need to be involved in:

- Identifying the relevant risk;
- Understanding the nature of risks;



- Devising risk controls; and
- Given incentive to implement the controls in terms of legal obligations.

The Applicant shall ensure that adequate environmental training takes place. All employees shall have been given an induction presentation on environmental awareness. Where possible, the presentation needs to be conducted in the language of the employees. All training must be formally recorded, and attendance registers retained. The environmental training should, as a minimum, include the following:

- General background and definition of the oceanic environment;
- The importance of compliance with all environmental policies;
- The environmental impacts, actual or potential, of their work activities;
- Compliance with mitigation measures proposed for sensitive marine fauna;
- Their roles and responsibilities in achieving compliance with the environmental policy and procedures and with the requirement of the applicant's environmental management systems, including emergency preparedness and response requirements;
- The potential consequences (legal and/or other) of departure from specified operating procedures including fines (where applicable);
- The mitigation measures required to be implemented when carrying out their work activities; and
- All operational risks must be identified, and processes established to mitigate such risk, proactively. Thus, the applicant needs to inform the employees of any environmental risks that may result from their work, and how these risks must be dealt with in order to avoid pollution and/or degradation of the oceanic environment.

The specific requirements for environmental training during the exploration survey phase include:

- Environmental Induction Training: All workers must receive induction training which shall be presented by the Contractors HSE Manager Representatives. The induction training must include an environmental management component which will be prepared by the Contractor's EO and presented where possible by the Contractor's EO. The training material must include general environmental awareness and an overview of the approved EMPr and applicable authorisations, licences and permits. The Induction Training Material must be reviewed and approved by the ECO;
- Weekly Environmental Toolbox Talks will be prepared by the Contractor's EO to cover a range of environmental topics and must be presented to relevant staff during applicable times during the exploration process (e.g. at the start of a day or activity). The aim of these toolbox talks will be to inform employees of general environmental requirements pertaining to specific activities, as well as specific EMPr and EA requirements and obligations. The ECO shall review environmental toolbox talks on a periodic basis to ensure the material is relevant and appropriate;
- Informal training of all exploration survey staff is also required on an on-going basis through informal discussions, on-site supervision and through facilitation of day to day activities. Such training must be given or otherwise facilitated by the Contractor's EO; and
- The Contractor's EO must review all safe work procedures/risk assessments/DSTI's (daily safe task instruction) from the safety department and include the relevant environmental risks and appropriate mitigation measures where necessary. Since the above procedures are specific to the applicable activity being undertaken, the inclusion of environmental measures aims to ensure each activity is undertaken in an environmentally responsible manner.

12 EMERGENCY RESPONSE PLAN

The Applicant must identify potential emergencies and develop procedures for preventing and responding to them. There are several options for dealing with high priority impacts and risks, as the paradigm has two components, probability and consequence. The design of control measures rests on understanding the cause and effect. Best practise is to intervene with the ultimate factors where feasible, rather than treat the outcomes.



Emergency response therefore has the option of reducing probability or reducing the consequence while reducing the probability is the preferred option. Below are some common emergency preparedness approaches:

- Threat consequence if a risk eventuates, when the risk becomes an issue;
- Combine reducing the probability and treating the consequence;
- Offset environmental losses by investing in other assets;
- Not manage some of the risks because there are too many; and
- Make provision to manage residual impacts or issues that arise because of shortcomings in risk identification and rating, avoidance and mitigation or because a rare event has occurred.

Residual impacts are those impacts that despite reducing the probability and consequence might still occur. In these cases, parties will have to be compensated, pollution cleaned up and damage to the environment remediated.

The Applicant shall be required to develop and implement an Emergency Preparedness and Response Plan prior to commencing work. The Applicant must ensure that the Emergency Preparedness and Response Plan makes provision for environmental emergencies, including, but not limited to:

- Fire Prevention;
- Fire Emergency Response;
- Spill prevention;
- Spill Response;
- Accidents to employees; and
- Use of hazardous substances and materials, etc.

The Applicant and Contractor must ensure that lists of all emergency telephone numbers/contact persons (including fire control) are kept up to date and that all numbers and names are posted at relevant locations throughout the exploration survey phase.

12.1 Spill Response Procedure

The Contractor must ensure that all employees, staff and labourers are informed and instructed regarding implementation of spill prevention measures and spill response procedures. In the event of a spill, the following general requirements shall apply, and the detailed spill procedure must cater for these requirements:

- Immediately reporting of spills by all employees and/or visitors to the relevant supervisor and EO (this requirement must be including in induction training);
- Take immediate action to contain or stop the spill where it is safe to do so;
- Contain the spill and prevent its further spread;
- Dispose of any contaminated materials according to appropriate waste disposal procedure. Note: Waste from spills of hazardous materials shall be disposed of as hazardous waste at a suitably licensed onshore waste disposal facility;
- The Contractor's EO shall record details of the spill in their respective incident registers;
- Photographic evidence shall be obtained of the spill clean-up.

In the case of large spills, the services of a specialist spill response agency shall be required, who shall advise on appropriate clean-up procedures and follow-up monitoring (if required). The incident procedures as defined in Section 9.5 shall also apply.

The Applicant must also, (as per Section 30 of the NEMA) notify the Director-General (DHSWS, Competent Authority, DEFF), South African Police Services, Provincial Environmental Authority, the Local Municipality, and any persons whose health may be affected of the nature of an incident including:



- Any risks posed to public health, safety and property;
- Toxicity of the substance or by products released by the incident; and
- Any step taken to avoid or minimise the effects of the incident on public health and the environment.

12.2 Measures to Control or Remedy any Causes of Pollution or Degradation

The broad measures to control or remedy any causes of pollution or environmental degradation as a result of the proposed activities taking place on the project are provided below:

- Ensure that the environmentally sensitive areas are adequately understood by the ship's Captain throughout exploration;
- Contain potential pollutants and contaminants (where possible) at source;
- Handling of potential pollutants and contaminants (where possible) must be conducted in controlled areas;
- Ensure the timeous clean-up of any spills;
- Implement a waste management system for all waste streams present; and
- Investigate any third party claims of pollution or contamination as a result of the project activities.



13 MANAGEMENT AND MITIGATION

Table 6: Technical or Management Options

Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
13.1 Legal Compliance							
A	<ul style="list-style-type: none"> The Applicant shall identify and comply with all relevant national, provincial and local legislation, including associated regulations and bylaws and shall establish and maintain procedures to keep track of, document and ensure compliance with environmental legislative changes. 	Planning Operation	Prior to operation and ongoing	Applicant	ECO (Monthly)	Ensure compliance with relevant legislation.	Up to date legal register. (Legal register) (ECO Monthly Audit)
B	<ul style="list-style-type: none"> Should there be changes in legislation and/or regulations the Applicant shall take the necessary actions to incorporate such changes and to pass these requirements on to the Contractors. 	Planning Operation	Prior to operation and ongoing	Applicant ECO	ECO (Monthly)	Ensure compliance with relevant legislation / Confirmation that requirements in terms of updated legislation are passed onto the contractors.	(Contractors contractual agreements) (ECO Monthly Audit)
13.2 Appointment of ECO/MMO/PAM/FLO							
A	<ul style="list-style-type: none"> The Applicant shall appoint a suitably qualified ECO who shall be independent from the Applicant and the Contractor. The ECO must preferably have a tertiary qualification in Environmental Management or appropriate environmental science field. The ECO should have appropriate qualification and experience in the implementation of environmental management specifications. For the purposes of implementing the conditions contained in this EMPr. The Applicant shall provide the ECO with the necessary support to ensure that the environmental aspects relating to the development is adhered to. The appointment of the ECO shall remain in force until all obligations of this EMPr have been met (e.g. including rehabilitation phase). 	Planning Operation	Prior to operation	Applicant	Applicant (once off prior to operations)	Appoint ECO to ensure monitoring of successful implementation of the EMPr.	Confirmation that ECO has been appointed and is suitably qualified to perform the duties contained in this EMPr. (ECO appointment and CV)
B	<ul style="list-style-type: none"> Two qualified, independent MMOs are required on board at all times; as a minimum one must be on watch during daylight hours while the acoustic source is in the water in the operational area. 	Planning Operation	Prior to operation	Applicant	Applicant (once off prior to operations)	Appoint MMO to ensure monitoring of successful implementation of the EMPr.	Confirmation that MMO has been appointed and is suitably qualified to perform the duties contained in this EMPr. (MMO appointment and CV)



Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
C	<ul style="list-style-type: none"> At least two qualified, independent PAM Operators are required on board at all times, as a minimum one must be on watch while the acoustic source is in the water in the operational area. If PAM is to be operational 24/7 then 3 PAM operators are required. 	Planning Operation	Prior to operation	Applicant	Applicant (once off prior to operations)	Appoint PAM to ensure monitoring of successful implementation of the EMPr.	Confirmation that PAM has been appointed and is suitably qualified to perform the duties contained in this EMPr. (PAM appointment and CV)
D	<ul style="list-style-type: none"> The Applicant shall appoint an independent FLO who must have experience in the liaising with the fishing operations and communities. 	Planning Operation	Prior to operation	Applicant	Applicant (once off prior to operations)	Appoint FLO to ensure monitoring of successful implementation of the EMPr.	Confirmation that FLO has been appointed and is suitably qualified to perform the duties contained in this EMPr. (FLO appointment and CV)
E	<ul style="list-style-type: none"> The Applicant is responsible for the maintenance, update and review of the EMPr. The ECO shall include any recommendations for proposed amendments/alterations of the EMPr to the Applicant who shall engage the competent authority, to the extent required, with regards to such changes. 	Planning Operation	As required	Applicant ECO	ECO (Monthly) Applicant (as and when necessary)	Ensure EMPr is reviewed and updated where necessary to ensure adequate mitigation for all impacts associated with the project.	Audit results and recommendations (ECO Monthly Audit)
13.3 Appointment of Contractors							
A	<ul style="list-style-type: none"> The EMPr must be made binding on the contractor/s and should be included in tender documentation and contracts. The costs related to the implementation of the EMPr during exploration must be provided for in the contract. 	Planning Operation	Prior to operation	Applicant Contractors	ECO (Once-off at the start of individual contractor's work)	Ensure that the contractor is in possession of the EMPr and that they understand their obligations thereto.	Confirmation that contractor has received EMPr, and that EMPr has been made contractually binding. (Contractual agreements) (ECO Monthly Audit)
B	<ul style="list-style-type: none"> All contractors and sub-contractors must have a copy of this EMPr on site and should be briefed by the EO with regards to the use and implementation of the EMPr. 	Planning Operation	Prior to Operation and Ongoing	Contractor	ECO (Monthly) Applicant (once off per contractor)	Ensure all contractors are aware of EMPr requirements.	Confirmation that contractors have received training relating to EMPr implementation. (Training records) (ECO Monthly Audit)
C	<ul style="list-style-type: none"> The Contractor shall appoint a dedicated Contractor's EO who is suitably qualified to perform the necessary tasks and is appointed at a level such that she/he can interact effectively with other site Contractors, labourers, the ECO and the public. The Contractor's EO shall be appointed prior to the onset of exploration. 	Planning	Prior to Operation and Ongoing	Contractor	ECO (Once-off)	Ensure a suitably qualified EO is present on site to oversee day to day activities and ensure successful implementation of EMPr during exploration.	Confirmation that EO has been appointed and is suitably qualified to perform the necessary duties contained in this EMPr. (ECO Monthly Audit)
D	<ul style="list-style-type: none"> The Contractor shall ensure that all sub-contractors working under them abide by the requirements of the 	Operation	Ongoing	Contractor	EO (Weekly)	Ensure that the contractor implements	Signed declaration of understanding by contractors



Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	EMPr through the inclusion of the EMPr and applicable environmental requirements in contractual agreements for all sub-contractors.				ECO (Monthly)	all the mitigation measures as described in the EMPr.	(EO weekly checklist) (ECO Monthly Audit Report)
13.4 Health and Safety							
A	The Applicant through the Project Manager shall ensure: <ul style="list-style-type: none"> • That reasonable measures are taken to ensure the safety of all site staff; • Provide appropriate Personal Protective Equipment (PPE) where required; • Compliance with the Occupational Health and Safety Act (Act No. 85 of 1993) and associated regulations; • That all accidents and incidents are recorded and reported to the Project Manager and EO/ECO; and • The Applicant and Contractor must ensure that he/she has the contact details of the nearest emergency rooms (hospitals), of both private and public hospitals. 	Operation	Ongoing	Project Manager Contractor	Safety Department	Ensure compliance with legal provisions of OHSA.	(safety reports) (safety audits)
13.5 Emergency Response / Disaster Management Planning							
A	<ul style="list-style-type: none"> • Develop and implement an Emergency Preparedness and Response Plan (EPRP) for implementation during the exploration phase. This should be revised periodically as the various phases of the exploration work takes place. 	Planning Operation	Prior to Operation and Ongoing	Contractor	ECO (Once-off)	Ensure emergency preparedness and response systems in place.	Verification that EPRP is in place. (ECO Audit) (EPRP) (Incident Reports)
13.6 Socio-Economic Considerations							
A	<ul style="list-style-type: none"> • The Project manager must ensure that a system is established and maintained for the recording of public and community comments and concerns. The comments and concerns must be addressed as far as reasonable possible. 	Planning Operation	Prior to Operation and Ongoing	Applicant/ Project manager	ECO (Monthly)	Ensure that socio-economic considerations are considered and implemented where necessary	Preparation and maintenance of a consultation register. (ECO Monthly Audit) (Consultation register)
B	<ul style="list-style-type: none"> • Without compromising operations and schedules, it is recommended that local labour is employed as far as possible. • Those employed should be provided with the appropriate skills development and training, as required. 	Planning Operation	Prior to Operation and Ongoing	Applicant/ Project manager	ECO (Monthly)	Ensure that socio-economic considerations are considered and implemented where necessary	List of names of personnel appointed with residential details. Training Records



Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
13.7 Heritage/ Palaeontological Features							
A	<ul style="list-style-type: none"> According to section 35(3) of the NHRA, if any heritage resource is discovered these must be reported to SAHRA immediately. Therefore, survey data, and/or resulting information, that could aid in the discovery of offshore heritage resources, such as shipwrecks, must be shared with SAHRA. 	Operation	During Operation	Applicant/ Project manager in consultation with specialist	Specialist monitoring during operations (if required).	No impact on or destruction of significant heritage resources	Reporting of heritage / palaeontological finds to the SAHRA.
13.8 Air Quality							
A	<ul style="list-style-type: none"> Maintain all diesel motors and generators in good working order. Properly tune and maintain all engines, motors, generators and all auxiliary power to contain the minimum of soot and unburned diesel. 	Operation	Ongoing	Applicant & Contractor	ECO (Weekly)	Ensure that no excessive air quality impacts are perceived	Visual confirmation of compliance with EMPr conditions. (EO weekly checklist) (ECO Monthly Audit)
13.9 Noise Nuisance							
A	<ul style="list-style-type: none"> Plan flight path to avoid sensitive and protected areas. 	Planning Operation	Prior to Operation and Ongoing	Applicant Contractor	EO (Weekly) ECO (Monthly)	Ensure that noise levels are controlled within acceptable limits. No complaints relating to noise.	Confirmation that noise levels are within acceptable limits and relevant notifications undertaken. (EO weekly checklist) (ECO Monthly Audit) (Consultation register)
13.10 Acoustic Impacts of Seismic Surveys on Marine Fauna							
A	<ul style="list-style-type: none"> All initiation of airgun firing be carried out as "soft-starts" of at least 20 minutes duration, allowing neritic and pelagic cephalopods to move out of the survey area. 	Operation	During Operation	Contractor	EO (Weekly) ECO (Monthly)	Utilisation of soft starts at initiation.	Confirmation soft starts at initiation. (EO weekly checklist) (ECO Monthly Audit)
B	<ul style="list-style-type: none"> All initiation of airgun firing be carried out as "soft-starts" of at least 20 minutes duration, allowing fish to move out of the survey area and thus avoid potential physiological injury or behavioural avoidance as a result of seismic noise. 	Operation	During Operation	Contractor	EO (Weekly) ECO (Monthly)	Utilisation of soft starts at initiation.	Confirmation soft starts at initiation. (EO weekly checklist) (ECO Monthly Audit)
C	<ul style="list-style-type: none"> All initiation of airgun firing be carried out as "soft-starts" of at least 20 minutes duration, allowing pelagic seabirds to move out of the survey area and thus avoid potential physiological injury or behavioural avoidance as a result of seismic noise. 	Operation	During Operation	Contractor	EO (Weekly) ECO (Monthly)	Utilisation of soft starts at initiation.	Confirmation soft starts at initiation. (EO weekly checklist) (ECO Monthly Audit)



Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
D	<ul style="list-style-type: none"> Soft starts should be scheduled so as to minimise, as far as possible, the interval between reaching full power operation and commencing a survey line. 	Operation	During Operation	Contractor	EO (Weekly) ECO (Monthly)	Utilisation of soft starts at initiation.	Confirmation soft starts at initiation. (EO weekly checklist) (ECO Monthly Audit)
E	<p>The “soft-start” cannot commence during daylight hours unless:</p> <ul style="list-style-type: none"> An area of 500 m radius from the centre of the airgun array (exclusion zone) has been scanned for the presence of diving seabirds (including penguins) and in particular feeding aggregations of diving seabirds, turtles, seals and cetaceans. As the survey will primarily be conducted in water depths of more than 200 m, there should be a dedicated pre-shoot watch of at least 60 minutes for deep-diving species. “Soft-starts” should be delayed until such time as this area is clear of individuals or aggregations of diving seabirds, turtles and cetaceans. A “soft-start” should not begin until 60 minutes after the animals depart the exclusion zone or 60 minutes after they are last seen or acoustically detected by PAM in the exclusion zone. In the case of fur seals, which may occur commonly around the vessel, the presence of seals (including number and position / distance from the vessel) and their behaviour should be recorded prior to “soft-start” procedures. “Soft-starts” should only commence once it has been confirmed that no seal activity has been observed within 500 m of the airguns for at least 10 minutes. However, if after a period of 10 minutes they are still within 500 m of the airguns, the normal “soft-start” procedure should be allowed to commence for at least a 20-minute duration. 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. PAM for the presence of marine mammals has been carried out for at least 60 minutes before activation of “soft-starts” and no vocalising cetaceans have been detected in the mitigation zone. If PAM has malfunctioned then revert to requirements under “PAM Malfunctions”. 	Operation	During Operation	Contractor MMO	MMO (ongoing) ECO (Monthly)	Visual scanning of seabirds.	Confirmation recording of diving seabirds, turtles, seals and cetaceans visual scanning. (MMO Reports) (ECO Monthly Audit)
F	<ul style="list-style-type: none"> “Soft-start” procedures cannot commence during times of poor visibility or darkness unless PAM for the presence of marine mammals has been carried out by a PAM operator 	Operation	During Operation	Contractor	EO (Weekly) ECO (Monthly)	Utilisation of soft starts at initiation.	Confirmation soft starts at initiation. (EO weekly checklist)



Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	for at least 60 minutes before activation and no vocalising cetaceans have been detected in the mitigation zone.						(ECO Monthly Audit)
G	<ul style="list-style-type: none"> All breaks in airgun firing of longer than 5 minutes but less than 20 minutes should be followed by a “soft-start” of similar duration. All breaks in firing of 20 minutes or longer must be followed by a “soft-start” procedure of at least 20 minutes prior to the survey operation continuing. 	Operation	During Operation	Contractor	EO (Weekly) ECO (Monthly)	Utilisation of soft starts after breaks.	Confirmation soft starts after breaks. (EO weekly checklist) (ECO Monthly Audit)
H	<ul style="list-style-type: none"> Any attraction of predatory fish (by mass disorientation or stunning of fish as a result of seismic survey activities) and incidents of feeding behaviour among the hydrophone streamers should be recorded by an onboard Independent MMO. 	Operation	During Operation	Contractor MMO	MMO (ongoing) ECO (Monthly)	Recording of predatory fish activity as a result of survey activities.	Confirmation recording of predatory fish activity. (MMO Reports) (ECO Monthly Audit)
I	<ul style="list-style-type: none"> An area of radius of 500 m from the centre of the airgun array be scanned (visually during the day) by an independent observer for the presence of diving seabirds (and in particular feeding aggregations of diving seabirds) prior to the commencement of “soft starts” and that these be delayed until such time as this area is clear of seabirds. 	Operation	During Operation	Contractor MMO	MMO (ongoing) ECO (Monthly)	Visual scanning of seabirds.	Confirmation recording of seabird visual scanning. (MMO Reports) (ECO Monthly Audit)
J	<ul style="list-style-type: none"> Seabird incidence and behaviour should be recorded by an onboard Independent Observer. <ul style="list-style-type: none"> Any obvious mortality or injuries to seabirds as a direct result of the survey should result in temporary termination of operations. Any attraction of predatory seabirds (by mass disorientation or stunning of fish as a result of seismic survey activities) and incidents of feeding behaviour among the hydrophone streamers should be recorded by an onboard Independent Observer. 	Operation	During Operation	Contractor MMO	MMO (ongoing) ECO (Monthly)	Visual scanning of seabirds. Ceasing of survey activities.	Confirmation recording of seabird visual scanning and attraction of predatory seabirds. (MMO Reports) (ECO Monthly Audit)
K	<ul style="list-style-type: none"> An area of radius of 500 m from the centre of the airgun array be scanned (visually during the day) by an independent observer for the presence of seals prior to the commencement of “soft starts” and that these be delayed until such time as this area is clear of seals for a period of 10 minutes. If after a period of 10 minutes seals are still within 500 m of the airguns, the normal “soft start” procedure should be allowed to commence for at least a 20-minutes duration. 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. 	Operation	During Operation	Contractor MMO	MMO (ongoing) ECO (Monthly)	Visual scanning of seabirds.	Confirmation recording of seabird visual scanning. (MMO Reports) (ECO Monthly Audit)



Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
L	<ul style="list-style-type: none"> Seal incidence and behaviour should be recorded by an onboard Independent Observer. <ul style="list-style-type: none"> Seismic shooting should be terminated when obvious negative changes to seal behaviour is observed from the survey vessel. Any obvious mortality or injuries to seals as a direct result of the survey should result in temporary termination of operations. 	Operation	During Operation	Contractor MMO	MMO (ongoing) ECO (Monthly)	Visual scanning of seabirds. Ceasing of survey activities.	Confirmation recording of seabird visual scanning and attraction of predatory seabirds. (MMO Reports) (ECO Monthly Audit)
M	<ul style="list-style-type: none"> Airgun firing should be terminated if, in the unlikely event, mass mortality of fish, seabirds, seals, whales or dolphins are observed as a direct result of shooting. 	Operation	During Operation	Contractor MMO	MMO (ongoing) ECO (Monthly)	Recording of mass mortality as a result of survey activities. Ceasing of survey activities.	Confirmation recording of mortality as a result of survey activities. (MMO Reports) (ECO Monthly Audit)
N	<ul style="list-style-type: none"> Plan seismic surveys to avoid the periods of movement of migratory cetaceans (particularly baleen whales) from their southern feeding grounds into low latitude waters (June to November inclusive), and ensure that migration paths are not blocked by seismic operations. In addition, avoid surveying during December when humpback whales may still be moving through the area on their return migrations. 	Planning Mobilisation	Pre-Survey Planning	Contractor	MMO (ongoing) ECO (Monthly)	Surveys planned according to the movement of mammals.	Confirmation recording of surveys in line with the movement of mammals. (MMO Reports) (ECO Monthly Audit)
O	<ul style="list-style-type: none"> Plan survey, as far as possible, so that the first commencement of airgun firing in a new area (including gun tests) are undertaken during daylight hours. 	Planning Mobilisation	Pre-Survey Planning	Contractor	MMO (ongoing) ECO (Monthly)	Surveys commence during daylight hours.	Confirmation recording of surveys commencement during daylight hours. (MMO Reports) (ECO Monthly Audit)
P	<ul style="list-style-type: none"> 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. 	Planning Mobilisation	Pre-Survey Planning	Contractor	MMO (ongoing) ECO (Monthly)	No surveys guns operational during transit	Confirmation no survey equipment in use during transit. Survey logs. (MMO Reports) (ECO Monthly Audit)
Q	<ul style="list-style-type: none"> A buffer of at least 5 km is recommended around MPAs. 	Planning Mobilisation	Pre-Survey Planning	Contractor	MMO (ongoing) ECO (Monthly)	No surveys undertaken in MPAs or within 5 km from MPAs.	Confirmation no survey equipment in use within MPAs. Survey logs. (MMO Reports) (ECO Monthly Audit)
R	<p>When arriving at a new location in the survey programme for the first time, the initial acoustic source activation must not be undertaken at night or during poor sighting conditions unless either:</p> <ul style="list-style-type: none"> MMOs have undertaken observations within 20 nautical miles of the planned start up position for at least the 	Operation: Pre-Start Observations	During Operation	Contractor MMO PAM Operator	MMO (ongoing) PAM Operator (ongoing)	New location arrival procedure followed.	Confirmation of following of new location arrival procedure. Survey logs. (MMO Reports) (PAM Reports) (ECO Monthly Audit)



Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	<p>previous two hours of good sighting conditions preceding proposed operations, and no marine mammals have been detected; or</p> <ul style="list-style-type: none"> Where there have been less than two hours of good sighting conditions preceding proposed operations (within 20 nautical miles of the planned start up position), the source may be activated if: <ul style="list-style-type: none"> PAM monitoring has been conducted for 2 hours immediately preceding proposed operations and no marine mammals have been acoustically detected; MMOs have conducted visual monitoring for 2 hours immediately preceding proposed operations and no marine mammals have been visually detected; and No fur seals have been sighted in the mitigation zone during visual monitoring in the 10 minutes immediately preceding proposed operations. 				ECO (Monthly)		
13.11 Line Turns and Breaks in Firing							
A	<ul style="list-style-type: none"> When surveying in deeper waters (>200 m) and for surveys which have relatively fast line turn times, the searches for marine mammals can commence before the end of the survey line if line changes take less time than a pre-shoot search and soft-start combined (i.e. 80 minutes). If marine mammals are detected when the airguns have ceased firing, the commencement of the “soft-start” for any subsequent survey lines should be preceded by the usual 60 minute pre-watch period. 	Operation	During Operation	Contractor	EO (Weekly) ECO (Monthly)	Utilisation of soft starts.	Confirmation soft starts (EO weekly checklist) (ECO Monthly Audit)
B	<ul style="list-style-type: none"> If line changes are expected to take longer than 40 minutes, firing must be terminated at the end of the survey line and the usual pre-shoot search undertaken during the line change, followed by a “soft-start”; 	Operation	During Operation	Contractor	EO (Weekly) ECO (Monthly)	Utilisation of soft starts.	Confirmation soft starts (EO weekly checklist) (ECO Monthly Audit)
C	<ul style="list-style-type: none"> If during unplanned breaks airguns can be restarted within 5 minutes, no soft-start is required and firing can recommence at the same power level provided no marine mammals have been detected in the mitigation zone during the break-down period. 	Operation	During Operation	Contractor	EO (Weekly) ECO (Monthly)	Utilisation of soft starts.	Confirmation soft starts (EO weekly checklist) (ECO Monthly Audit)
D	<ul style="list-style-type: none"> All breaks in airgun firing of longer than 5 minutes but less than 20 minutes should be followed by a “soft-start” of similar duration. All breaks in firing of 20 minutes or longer 	Operation	During Operation	Contractor	EO (Weekly) ECO (Monthly)	Utilisation of soft starts.	Confirmation soft starts (EO weekly checklist) (ECO Monthly Audit)



Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	must be followed by a “soft-start” procedure of at least 20 minutes prior to the survey operation continuing.						
E	<ul style="list-style-type: none"> For planned breaks longer than 40 minutes normal start-up procedures apply. For planned breaks less than 10 minutes, monitoring must commence 20 minutes prior to the break and continue for the duration of the break. In this regard, good communication between the seismic contractor and MMOs and PAM operators is key in order to ensure that all parties are aware of planned breaks and early commencement of pre-watch periods. 	Operation	During Operation	Contractor	EO (Weekly) ECO (Monthly)	Utilisation of soft starts.	Confirmation soft starts (EO weekly checklist) (ECO Monthly Audit)
13.12 Shut-downs							
A	<ul style="list-style-type: none"> Seismic shooting should be terminated on observation of diving seabirds (including penguins) and in particular feeding aggregations of diving seabirds, turtles, seals and cetaceans within the 500 m mitigation zone. If PAM detects the presence of very high frequency cetaceans (Heaviside’s dolphins, pygmy sperm whale and dwarf sperm whale) within 1 000 m of the sound source, seismic shooting should be terminated. 	Operation	During Operation	Contractor MMO PAM Operator	MMO (ongoing) ECO (Monthly)	Visual scanning and termination of activities.	Confirmation recording of visual scanning. Termination of activities. (MMO Reports) (ECO Monthly Audit)
B	<ul style="list-style-type: none"> 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. 	Operation	During Operation	Contractor MMO PAM Operator	MMO (ongoing) ECO (Monthly)	Visual scanning and termination of activities.	Confirmation recording of visual scanning. Termination of activities. (MMO Reports) (ECO Monthly Audit)
C	<ul style="list-style-type: none"> Seismic shooting should also be terminated when obvious changes to turtle, seal or cetacean behaviours are observed from the survey vessel, or turtles and cetaceans (not seals) are observed within 500 m of operating airguns or appear to be approaching firing airguns (particularly if the MMO has lost sight of the approaching animal prior to it entering the mitigation zone). The rationale for this is that animals at close distances (i.e. where physiological injury may occur) may be suffering from reduced hearing as a result of seismic sounds, that frequencies of seismic sound energy lies below best hearing frequencies (certain toothed cetaceans and seals), or that animals have become 	Operation	During Operation	Contractor MMO PAM Operator	MMO (ongoing) ECO (Monthly)	Visual scanning and termination of activities.	Confirmation recording of visual scanning. Termination of activities. (MMO Reports) (ECO Monthly Audit)



Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	trapped within the area filled with sound through diving behaviour.						
D	<ul style="list-style-type: none"> 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. 	Planning Mobilisation	Pre-Survey Planning	Contractor	MMO (ongoing) ECO (Monthly)	No surveys guns operational during transit	Confirmation no survey equipment in use during transit. Survey logs. (MMO Reports) (ECO Monthly Audit)
13.13 Key Equipment							
A	<p>Key Equipment to be used:</p> <ul style="list-style-type: none"> All seismic vessels must be fitted with Passive Acoustic Monitoring (PAM) technology, which detects animals through their vocalisations. The use of PAM 24-h a day must be implemented to detect deep diving species. Ensure the PAM streamer is fitted with at least four hydrophones, of which two are HF and two LF, to allow directional detection of cetaceans. Ensure the PAM hydrophone streamer is towed in such a way that the interference of vessel noise is minimised. Ensure spare PAM hydrophone streamers (e.g. 4 heavy tow cables and 6 hydrophone cables) are readily available in the event that PAM breaks down, in order to ensure timeous redeployment Define and enforce the use of the lowest practicable airgun volume for production. Ensure the ramp-up noise volumes do not exceed the production volume. Prohibit airgun use (including airgun tests) outside of the area of operation (which includes line turns undertaken outside the licence area). The operator must provide a display screen for the acoustic source operations. All information relating to the activation of the acoustic source and the power output levels must be readily available to support the observers in real time via the display screen and to ensure that operational capacity is not exceeded. Ensure that 'turtle-friendly' tail buoys are used by the survey contractor or that existing tail buoys are fitted with either exclusion or deflector 'turtle guards'! 	Planning Mobilisation Operation	Mobilisation and Operation	Contractor PAM Operator	PAM Operator (ongoing) ECO (Monthly)	Adequate equipment is in place and used as per the requirements and specifications.	Confirmation Of PAM Operations (PAM Operator Reports, ECO Reports). Use of lowest volume airguns, turtle friendly bouys, operation within approved area, use of solid streamers.



Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	<ul style="list-style-type: none"> Ensure that solid streamers rather than fluid-filled streamers are used to avoid leaks. 						
13.14 PAM Malfunctions							
A	<ul style="list-style-type: none"> If the PAM system malfunctions or becomes damaged during night-time operations or periods of low visibility, surveying must be discontinued until such time as the functional PAM system can be redeployed. If the PAM system breaks down during daylight hours operations may continue for 20 minutes without PAM while the PAM operator diagnoses the issue. If the diagnosis indicates that the PAM gear must be repaired to solve the problem, operations may continue for an additional 2 hours without PAM monitoring as long as: <ul style="list-style-type: none"> No marine mammals were detected solely by PAM in the mitigation zones in the previous 2 hours; Two MMOs maintain watch at all times during operations when PAM is not operational; The time and location in which operations began without an active PAM system is recorded. Sufficient time should be provided to the PAM operator to redeploy fixed or replacement PAM equipment prior to survey activities (with appropriate pre-watch and “soft-start” operations) recommencing. 	Operation	Operation	Contractor PAM Operator MMO	PAM Operator (ongoing) ECO (Monthly)	Ceasing activities during PAM Malfunctions. PAM equipment investigation and repair.	Ceasing activities during PAM Malfunctions. PAM equipment investigation and repair. (PAM Operator Reports, ECO Reports).
13.15 Airgun Testing							
A	<p>For airgun testing the following should apply:</p> <ul style="list-style-type: none"> If testing a single lowest power airgun a “soft-start” is not required; If testing multiple higher powered airguns a “soft-start” is required. The “soft-start” should be carried out over a time period proportional to the number of guns being tested and not exceed 20 minutes; airguns should be tested in order of increasing volume; If testing all airguns at the same time a 20 minute “soft-start” is required; A pre-shoot watch must be maintained before any instances of airgun testing; 	Operation	Operation	Contractor	PAM Operator (ongoing) ECO (Monthly)	Adequate testing is in place and conducted as per the requirements and specifications.	Testing in line with the requirements (PAM Operator Reports, ECO Reports).



Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	<ul style="list-style-type: none"> No airgun testing may be undertaken outside of the approved 3D survey area. 						
13.16 Waste Management							
A	<ul style="list-style-type: none"> The discharge of biodegradable wastes from vessels is regulated by MARPOL 73/78 Annex V, which stipulates that: <ul style="list-style-type: none"> No disposal to occur within 3 nautical miles (\pm 5.5 km) of the coast. Disposal between 3 nautical miles (\pm 5.5 km) and 12 nautical miles (\pm 22 km) needs to be comminuted to particle sizes smaller than 25 mm. Disposal overboard without macerating can occur greater than 12 nautical miles from the coast when the vessel is sailing. 	Operation	During Operation	Contractor ECO	ECO (ongoing)	Proper waste management in line with the required EMPr and regulations.	Recording of waste types and quantities (waste register and records)
B	<ul style="list-style-type: none"> Discharges of oily water (deck drainage, bilge and mud pit wash residue) to the marine environment are regulated by MARPOL 73/78 Annex I, which stipulates that vessels must have: <ul style="list-style-type: none"> A Shipboard Oil Pollution Emergency Plan (SOPEP). A valid International Oil Pollution Prevention Certificate, as required by vessel class. Equipment for the control of oil discharge from machinery space bilges and oil fuel tanks, e.g. oil separating/filtering equipment and oil content meter. Oil in water concentration must be less than 15 ppm prior to discharge overboard. Oil residue holding tanks. Oil discharge monitoring and control system. 	Operation	During Operation	Contractor ECO	ECO (ongoing)	Proper waste management in line with the required EMPr and regulations.	Recording of waste types and quantities (waste register and records)
C	<ul style="list-style-type: none"> Sewage and grey water discharges from vessels are regulated by MARPOL 73/78 Annex IV, which specifies the following: <ul style="list-style-type: none"> Vessels must have a valid International Sewage Pollution Prevention Certificate. Vessels must have an onboard sewage treatment plant providing primary settling, chlorination and dechlorination before discharge of treated effluent. The discharge depth is variable, depending upon the draught of the seismic vessel / support vessel at the time, but will be in accordance with MARPOL 73/78 Annex IV. 	Operation	During Operation	Contractor ECO	ECO (ongoing)	Proper waste management in line with the required EMPr and regulations.	Recording of waste types and quantities (waste register and records)



Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	<ul style="list-style-type: none"> ○ Discharge of sewage beyond 12 nm requires no treatment. However, sewage effluent must not produce visible floating solids in, nor cause the discolouration of, the surrounding water. ○ Sewage must be comminuted and disinfected for discharges between 3 nautical miles (± 6 km) and 12 nautical miles (± 22 km) from the coast. This will require an onboard sewage treatment plant or a sewage comminuting and disinfecting system. ○ Disposal of sewage originating from holding tanks must be discharged at a moderate rate while the ship is proceeding on route at a speed not less than 4 knots. 						
D	<ul style="list-style-type: none"> • Sewage will be treated using a marine sanitation device to produce an effluent with: <ul style="list-style-type: none"> ○ A biological oxygen demand (BOD) of <25 mg/l (if the treatment plant was installed after 1/1/2010) or <50 mg/l (if installed before this date). ○ Minimal residual chlorine concentration of 1.0 mg/l. ○ No visible floating solids or oil and grease. 	Operation	During Operation	Contractor ECO	ECO (ongoing)	Proper waste management in line with the required EMPr and regulations.	Recording of waste types and quantities (waste register and records)
E	<ul style="list-style-type: none"> • The project will also comply with industry best practices with regard to waste management, including: <ul style="list-style-type: none"> ○ Waste management will follow key principles: Avoidance of Waste Generation, adopting the Waste Management Hierarchy (reduce, reuse, recycle, recover, residue disposal), and use of Best Available Technology (BAT). ○ An inventory will be established of all the potential waste generated, clarifying its classification (hazardous, non-hazardous or inert) and quantity, as well as identifying the adequate treatment and disposal methods. ○ Waste collection and temporary storage shall be designed to minimise the risk of escape to the environment (for example by particulates, infiltration, runoff or odours). ○ On-site waste storage should be limited in time and volume. ○ Dedicated, clearly labelled, containers (bins, skips, etc.) will be provided in quantities adapted to anticipated waste streams and removal frequency. 	Operation	During Operation	Contractor ECO	ECO (ongoing)	Proper waste management in line with the required EMPr and regulations.	Recording of waste types and quantities (waste register and records)



Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
F	<ul style="list-style-type: none"> Avoid the unnecessary discharge of ballast water. Use filtration procedures during loading in order to avoid the uptake of potentially harmful aquatic organisms, pathogens and sediment that may contain such organisms. Ensure that routine cleaning of ballast tanks to remove sediments is carried out, where practicable, in mid-ocean or under controlled arrangements in port or dry dock, in accordance with the provisions of the ship's Ballast Water Management Plan. Ensure all infrastructure (e.g. arrays, streamers, tail buoys etc) that has been used in other regions is thoroughly cleaned prior to deployment. 	Operation	During Operation	Contractor ECO	ECO (ongoing)	Proper waste management in line with the required EMPr and regulations.	Recording of waste types and quantities (waste register and records)
13.17 Vessel and Aircraft Operations							
A	<ul style="list-style-type: none"> Pre-plan flight paths to ensure that no flying occurs over the seal colonies; Avoid extensive low-altitude coastal flights (<2,500 ft and within 1 nautical mile of the shore); The flight path between the onshore logistics base and seismic vessel should be perpendicular to the coast; A flight altitude >1 000 ft be maintained at all times, except for when the aircraft lands on or takes off from the seismic vessel and logistics base; Maintain an altitude of at least 2 500 ft over of a Special Nature Reserve, National Park or World Heritage Site; Contractors should comply fully with aviation and authority guidelines and rules; Brief all pilots on the ecological risks associated with flying at a low level along the coast or above marine mammals. 	Operation	During Operation	Contractor ECO	ECO (ongoing)	Adequate flight planning in line with the requirements of the EMPr and legislation.	Confirmation of flights undertaken in accordance with the requirements (ECO Reports, Flight plans).
B	<ul style="list-style-type: none"> The lighting on the seismic vessel and support vessels should be reduced to a minimum compatible with safe operations whenever and wherever possible. Light sources should, if possible and consistent with safe working practices, be positioned in places where emissions to the surrounding environment can be minimised. Keep disorientated, but otherwise unharmed, seabirds in dark containers for subsequent release during daylight hours. Ringed/banded birds should be reported to the appropriate ringing/banding scheme (details are provided on the ring). 	Operation	During Operation	Contractor ECO	ECO (ongoing)	Adequate lighting and vessel planning, operation and maintenance in line with the requirements of the EMPr and legislation.	Confirmation of lighting and vessel planning, operation and maintenance undertaken in accordance with the requirements (ECO Reports, maintenance plans, OM Manuals).



Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	<ul style="list-style-type: none"> • Develop a ballast water management plan that considers all IMO requirements. • Ensure all infrastructure (e.g. arrays, streamers, tail buoys etc.) that has been used in other regions is thoroughly cleaned prior to deployment. • Implement a waste management system that addresses all wastes generated at the various sites, shore-based and marine. This should include: <ul style="list-style-type: none"> ○ Separation of wastes at source; ○ Recycling and re-use of wastes where possible; • Treatment of wastes at source (maceration of food wastes, compaction, incineration, treatment of sewage and oily water separation). • Implement leak detection and repair programmes for valves, flanges, fittings, seals, etc. • Use a low-toxicity biodegradable detergent for the cleaning of all deck spillages. • In the event that equipment is lost during the operational stage, assess safety and metocean conditions before performing any retrieval operations. • Establishing a hazards database listing the type of gear left on the seabed and/or in the licence area with the dates of abandonment/loss and locations, and where applicable, the dates of retrieval. • Prepare and implement a Shipboard Oil Pollution Emergency Plan and an Oil Spill Contingency Plan. In doing so take cognisance of the South African Marine Pollution Contingency Plan, which sets out national policies, principles and arrangements for the management of emergencies including oil pollution in the marine environment. • As far as possible, and whenever the sea state permits, attempt to control and contain the spill at sea with suitable recovery techniques to reduce the spatial and temporal impact of the spill. • Ensure offshore bunkering is not undertake in the following circumstances: <ul style="list-style-type: none"> ○ Wind force and sea state conditions of ≥ 6 on the Beaufort Wind Scale; ○ During any workboat or mobilisation boat operations; ○ During helicopter operations; 						



Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
	<ul style="list-style-type: none"> ○ During the transfer of in-sea equipment; and ○ At night or times of low visibility. 						
13.18 Fisheries							
A	<ul style="list-style-type: none"> • At least three weeks prior to the commencement of survey activities the following key stakeholders should be consulted and informed of the proposed survey programme (including navigational co-ordinates of location, timing and duration of proposed activities) and the likely implications thereof (specifically the exclusion and safety zone around the survey vessels): <ul style="list-style-type: none"> ○ Fishing industry associations: SA Tuna Association; SA Tuna Longline Association, Fresh Tuna Exporters Association, South African Deepsea Trawling Industry Association (SADSTIA), South African Hake Longline Association (SAHLLA), SA Commercial Linefish Association and West Coast Rock Lobster Association. ○ Other key stakeholders: SANHO, South African Maritime Safety Association, Ports Authority and the Department of Agriculture, Forestry and Fisheries Vessel Monitoring, Control and Surveillance Unit in Cape Town. • These stakeholders should again be notified at the completion of the project when the survey and support vessels are off location. 	Planning Operation	Three weeks prior to operation	Contractor FLO	FLO (pre- and post operations) ECO	Notification of stakeholders.	Confirmation of notification of stakeholders.
B	<ul style="list-style-type: none"> • Request, in writing, the SANHO to broadcast a navigational warning via Navigational Telex (Navtext) and Cape Town radio for the duration of the activity. 	Operation	During Operation	Contractor FLO	FLO (pre- and post operations) ECO	Navigational Telex (Navtext) and Cape Town radio broadcast.	Navigational Telex (Navtext) and Cape Town radio broadcast.
C	<ul style="list-style-type: none"> • Timing: The tuna pole-and-line sector targets snoek seasonally in the vicinity of the proposed seismic survey acquisition area. If possible, time the survey to avoid peak fishing activity during March to July. 	Operation	March-July	Contractor	ECO (monthly)	Where possible, time the survey to avoid peak fishing activity during March to July.	Confirmation that survey timed to avoid peak fishing activity during March to July.
D	<ul style="list-style-type: none"> • Demersal research surveys are undertaken within the licence area and proposed seismic survey area over the period January/February. An acoustic survey for small pelagic species is carried out in the area during November and again during May/June by DFFE. 	Operation	January/February May/June	Contractor	ECO (monthly)	Liaison with the DFFE research team and vessels.	Confirmation of Liaison with the DFFE research team and vessels.
E	<ul style="list-style-type: none"> • As far as possible, avoid vessel turns in shallow waters east of the proposed seismic acquisition area. 	Operation	During operation	Contractor	ECO (monthly)	Where possible, avoid vessel turns in shallow	Confirmation that vessel turns in shallow waters east of the



Item No.	Technical or Management Option	Phase	Timeframes	Responsible Party	Monitoring Party (Frequency)	Target	Performance Indicators (Monitoring Tool)
						waters east of the proposed seismic acquisition area.	proposed seismic acquisition area were avoided.
F	<ul style="list-style-type: none"> The lighting on the survey and support vessels should be managed to ensure that they are sufficiently illuminated to be visible to fishing vessels, as well as ensure that it is reduced to a minimum compatible with safe operations. 	Operation	During Operation	Contractor FLO	FLO (pre- and post operations) ECO	Adequate lighting in place	Adequate lighting in place
G	<ul style="list-style-type: none"> Notify any fishing vessels at a radar range of 12 nm from the vessel via radio regarding the safety requirements around the survey vessel. 	Operation	During Operation	Contractor FLO	FLO (pre- and post operations) ECO	Notification of fishing vessels.	Notification of fishing vessels.
Ha	<ul style="list-style-type: none"> Implement a grievance mechanism in case of disruption to fishing or navigation. 	Operation	During Operation	Contractor FLO	FLO (pre- and post operations) ECO	Grievance mechanism	Grievance mechanism. (Complaints register)



14 APPENDICES

14.1 Appendix 1 – EAP Curriculum Vitae

CURRICULUM VITAE

Name:	Gideon Petrus Kriel
Nationality:	South African
Date of Birth:	1 September 1983
Profession:	Environmental Scientist
Professional Qualification/ Training:	<p>M.Env.Sci Water Sciences; North West University (Potchefstroom Campus), 2008</p> <p>Implementation of Environmental Management Systems (ISO 14001); Centre for Environmental Management, North-West University (Potchefstroom Campus), 2007.</p> <p>Bringing Data Into GIS (ArcGIS); GIMS (now ESRI SA), 2008.</p> <p>Tools for Wetland Assessment; Rhodes University, 2013</p>
Professional Membership/ Registrations:	<p>Registered Professional Natural Scientist (SACNSP- #400202/09) – Environmental Sciences</p> <p>Water Institute of Southern Africa (WISA) Member (21161)</p>
Current Employer:	Environmental Impact Management Services (Pty) Ltd.

KEY EXPERIENCE

GP holds an M.Env.Sci (Water Sciences) Cum Laude from the North-West University (Potchefstroom Campus). He has been employed as an Environmental Consultant since 2007 and is the East London office manager. He has delivered presentations locally and internationally concerning the use of bio-indicators for the determination of water quality, and has experience in a wide variety of environmental management projects including: Environmental Impact Assessments, Basic Assessments, Geographic Information Systems (GIS), Environmental Compliance Monitoring, Environmental Awareness Training, Aquatic Ecological Assessments, Drinking and Waste Water Treatment Process Audits, Wetland Delineation and Assessments, ISO 14001 Aspect Registers, Water Use Licence Applications, Waste Management Licence Applications and Integrated Waste and Water Management Plans (IWWMP).

CAREER SUMMARY

Period: July 2007- Current	Organisation: EIMS	Position: Senior Environmental Assessment Practitioner
Key Projects/Assignments	<p><u>Office Manager:</u> Responsible for the technical management of the East London Office including the following aspects:</p> <ul style="list-style-type: none"> • Technical review and direction; • Quality control and assurance; • Client management; and 	



- Marketing and business development.

Project Experience:

- Environmental Impact Assessment for the proposed Zonk'izizwe Mixed Use Development in Midrand, Gauteng.
- Basic Assessments for the road upgrades for the Johannesburg Roads Agency (JRA).
- Environmental Impact Assessment for the proposed Thabeng Eco Reserve and Golf Estate, near Ohrigstad, Limpopo.
- Basic Assessment for the proposed TATA Steel KZN Clean Energy Project, Richards Bay, KwaZulu-Natal.
- Basic Assessment for the proposed IFM Clean Energy Project, Mooi Nooi, North-West Province.
- Compilation of ISO 14001 Aspect/Impact registers for Clover (Pty) Ltd.
- Basic Assessment for the proposed N17 Phase 2 project: Addition of Auxiliary Lanes Between the Rondebult Road Interchange and the Proposed Trichardts Road Interchange.
- Basic Assessment for the Proposed Early Warning System for the South African Nuclear Energy Corporation of South Africa (NECSA).
- Environmental Impact Assessment for the Proposed Water and Effluent Collection and Treatment Infrastructure Upgrade for the Nuclear Energy Corporation of South Africa (NECSA).
- Basic Assessment for the proposed Residential Development on Portions 16 & 17 of the Farm Wilgespruit 190 IQ, Wilgeheuwel, Roodepoort.
- Independent Environmental Control Officer for the Eye of Africa Golf Estate, Gauteng.
- Independent Environmental Control Officer for the Department of International Relations Head Office Construction, Pretoria.
- Water Use License Application for the Upgrade of the Low Level Bridge on Hyperion Drive, North Riding, Johannesburg.
- Diatom Water Quality Assessments for the Upgrade of the Low Level Bridge on Hyperion Drive, North Riding, Johannesburg.
- Basic Assessment for the Proposed Rand Water 1400mm diameter L17 Bulk Water Pipeline, Brakpan, Gauteng.
- Wetland Delineation for Anglo Platinum Potgietersrus Platinum Limited near Mokopane, Limpopo.
- Independent Environmental Control Officer for the Knock-down and Rebuild of the Shell Range River Service Station, Gillview, Johannesburg.
- Independent Designated Environmental Officer for the Refurbishment of the South African National Roads Agency Limited (SANRAL) Dalpark Operations Centre, Brakpan.
- Waste Licence Application for the Proposed Water and Effluent Collection and Treatment Infrastructure Upgrade for the Nuclear Energy Corporation of South Africa (NECSA).



- Prospecting Rights Applications on behalf of the African Exploration Mining and Finance Corporation (Pty) Ltd for a variety of projects in Limpopo, Free State and North-West Provinces.
- Environmental Impact Assessment and Waste Management Licence Application for the Lusikisiki Sewer and Sewer Treatment Plant, Lusikisiki, Eastern Cape.
- Diatom Monitoring for the Lusikisiki Sewer and Sewer Treatment Plant, Lusikisiki, Eastern Cape.
- Appointed as a Blue Water Services Inspector for the 2012 Blue Water Services Audits by the Department of Water Affairs.
- Basic Assessment for the formalisation of Masibambane, Masibulele, Ilinge, Dacawa Gwentshe, Velwano, Mathemba Vuso in Mdantsane for the Buffalo City Metropolitan Municipality.
- Environmental Impact Assessment for the Proposed Sunny South Housing Development for the Buffalo City Metropolitan Municipality.
- Basic Assessment and Water Use Licence for the Mqonjwana Access Road for the Mbizana Local Municipality.
- Independent Environmental Control Officer for the East London Industrial Development Zone (ELIDZ): Infrastructure Services for the Zone 1B West Residential Development.
- Heritage Impact Assessment and Public Participation for the Proposed Reconstruction of Fleet Street, East London for the Buffalo City Metropolitan Municipality.
- Environmental Monitoring (Water Quality) for Phase 2 CD of the Olifants River Water Resources Development Project for Basil Read.
- Basic Assessment and Water Use Licence Application for the Proposed Sidwadeni River Access Road near Mthatha, Eastern Cape on behalf of the South African National Roads Agency (SOC) Limited.
- Basic Assessment and Water Use Licence Application for the Proposed Mngazi River Access Road near Port St Johns, Eastern Cape on behalf of the South African National Roads Agency (SOC) Limited.
- Independent Environmental Control Officer for the East London Industrial Development Zone (ELIDZ): Proposed MMOEM Facilities.
- Amalinda Fairlands Feasibility Study for the Buffalo City Metropolitan Municipality (CS Consulting).
- Independent Environmental Control Officer for the Lusikisiki Sewer and Sewer Treatment Plant, Lusikisiki, Eastern Cape.
- Independent Environmental Control Officer for the Noblesfontein Wind Energy Facility near Victoria West, Northern Cape Province.
- Independent Environmental Control Officer for the Reconstruction of Fleet Street, East London, Buffalo City Metropolitan Municipality, Eastern Cape Province.
- Transnet Freight Rail NEMA Section 24G Rectification Application – Coega Station to Tankatara Level Crossing, Coega, Eastern Cape.



- Independent Environmental Control Officer for the Sunny South Housing Development for the Buffalo City Metropolitan Municipality.
- Vincent-Berea Local Spatial Development Framework, CS Consulting (Buffalo City Metropolitan Municipality), East London, Eastern Cape.
- Participatory Based Planning Support to Informal Settlements Upgrading Projects In Buffalo City Metropolitan Municipality, CS Consulting, Eastern Cape.
- Molopo Free State Wetland Delineations, Virginia, Free State.
- Puma Energy Fuel Depot Wetland Delineation, Nelspuit, Mpumalanga.
- Mdantsane Roads Cluster 2 Environmental Control Officer, Buffalo City Metropolitan Municipality.
- Giuricich Chemical Removal at Vodacom Site, East London.
- Internal Environmental Management System Audits (ISO 14001) for the East London Distribution Centre and Ladismith Plant for Parmalat South Africa.
- Environmental Control Officer for the Eskom Albany-Mimososa 66KV Distribution Line near Alicedale, Eastern Cape.
- Environmental Impact Assessment for the Proposed Algoa Basin Oil & Gas Production Project for Aberdeen Offshore Engineering.
- Basic Assessment for the Proposed Ablution Facilities Along the Coast for Nyandeni Local Municipality.
- Environmental Control Officer for the Eskom Wittekleibosch-Dieprivier 132kV Power Line and Switching Station, Tsitsikamma, Eastern Cape.
- Specialist Walkdown and Site Specific EMPR for the Eskom Ankerlig-Omega Power line, Western Cape.
- Wetland Assessment for the Lichtenburg Hospital Basic Assessment Process for PH Bagale (on behalf of the Department of Health).
- Update of the Integrated Waste and Water Management Plan Eskom Lethabo Power Station, Free State.
- Basic Assessment for the Upgrade of the Loop 16 (Gariep) Road for ACWA Power, Groblershoop, Northern Cape.
- Prospecting Rights Application and Basic Assessment for Black Mountain Mining, Aggeneys, Northern Cape.
- Basic Assessment for the Eskom Riverbank IPP Projects, Eastern Cape.
- Environmental Control Officer for the SANRAL N2 Section 15 from Buffalo River (km 2,94) to Breidbach Intersection (km 9,8) and the R63 from Alexandra Road (km 0) to Bhisho, Eastern Cape.
- Environmental Control Officer for the Greenfields section of the SANRAL N2 Wild Coast Toll Highway (Southern Section), Eastern Cape.
- Basic Assessment for the Upgrading to a Surface Standard Portion of Road DR08606 +1-12KM, Eastern Cape Department of Roads and Public Works, Eastern Cape.
- Transnet TM2 Aquatic Monitoring Programme.



- Prospecting Right Applications and Basic Assessment Processes for Black Mountain Mining near Aggeneys, Northern Cape.
- Eskom Amathole Stormwater Environmental Control Officer, Eastern Cape.
- Update of the ACWA Bokpoort Concentrated Solar Plant Integrated Waste and Water Management Plan, Northern Cape.
- Update of the Rirhanzdu Rehabilitation Strategy and Implementation Plan, Mpumalanga.
- Basic Assessment and Water Use Licence Application for the Proposed Megamor Park Extension, Meisieshalt, East London for Umbra Trading 11.
- Creation of the Ekurhuleni Metropolitan Municipality Parks GIS Layer.
- Enviro-legal review for Bax Kaplan Russel for a Waste Processing Facility in Wilsonia, East London.
- Enviro-Legal Review: Demonstration of On-Site Faecal Sludge Treatment In East London, Impilo Yabantu Services (Pty) Ltd.
- Umgeni Raw Water Management Audit for SizweNtsalubaGobodo, Pietermaritzburg.
- Umgeni Waste Water Management Audit for SizweNtsalubaGobodo, Pietermaritzburg.
- Competent Persons Report (Environmental) for the Ntshovelo Mining Resources (Pty) Ltd Welgemeend Colliery.
- Umgeni Potable Water Management Audit for SizweNtsalubaGobodo, Pietermaritzburg.
- Cambridge Pedestrian Bridge Enviro-legal Interpretation for CBM Consulting Engineers.
- Komati Power Station Legal Audit for Eskom.
- Beaconhurst Drive Enviro-legal Interpretation for CBM Consulting Engineers.
- Port of Ngqura Tank Farm Infrastructure Specialists Services for Transnet Group Capital.
- Prospecting Rights Application and Basic Assessment for Black Mountain Mining, Northern Cape.
- Independent Environmental Control Officer for the East London Industrial Development Zone (ELIDZ): GW1 Facilities in Zone 1A.
- Basic Assessment and Water Use Licence Application for the Proposed Summerpride Erf 107 Residential Development, East London.
- Harmony Target 1 & 2 Performance Assessment Audits 2019, Welkom
- Harmony President Steyn North (Steyn 3_ 7 & 9) Performance Assessment Audits, Welkom.
- City of Ekurhuleni Tsakane Sewer Pump Station Basic Assessment, Ekurhuleni.
- Eskom Duvha Power Station Legal Compliance Audit.



	<ul style="list-style-type: none">• Buffalo City Metropolitan Municipality Eastern Beach Sewer Upgrade Environmental Officer, East London.• Transnet Group Capital Coega Kop Quarry Water Use Licence Application.• SCAW Dimbaza Foundry Groundwater Monitoring, Dimbaza.• Independent Environmental Control Officer for the East London Industrial Development Zone (ELIDZ): Sundale Dairy Expansion Zone 1A.• GSW Vlakvarkfontein Integrated Waste and Water Management Plan Update.• East London Industrial Development Zone (ELIDZ) Zone 1B Solar Facility Basic Assessment.• Harmony Target 1 & 2 Performance Assessment Audits 2020, Welkom.• UMK Green House Gas Report 2019, Northern Cape.• Tosaco Energy Block 1 Offshore Exploration Right Environmental Impact Assessment.• GIS work for a large amount of projects from 2007 - Present including the following: the identification and mapping of sensitivities and interested and affected parties, the delineation of site boundaries, the identification of alternative development sites, geo-referencing of old maps and technical drawings, production of informative maps for Basic Assessments, Environmental Impact Assessments and Environmental Compliance Monitoring.
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LANGUAGE CAPABILITY

Language	Speak	Read	Write
English	Excellent	Excellent	Excellent
Afrikaans	Excellent	Excellent	Excellent

DECLARATION

I confirm that the above information contained in the CV is an accurate description of my experience and qualifications at the time of signature.

Signature of Staff Member

7 March 2021

Date