



FORMS

Form 1

REPUBLIC OF NAMIBIA

ENVIRONMENTAL MANAGEMENT ACT, 2007

(Section 32)

APPLICATION FOR ENVIRONMENTAL CLEARANCE CERTIFICATE

MINISTRY OF ENVIRONMENT,
FORESTRY AND TOURISM
DIRECTORATE OF ENVIRONMENTAL AFFAIRS

14 DEC 2022

**ECC Application Reference No:
APP-00685**



PART A: DETAILS OF APPLICANT

1. Name (person or business) – PGS Exploration (UK) Limited

Application for Environmental Clearance Certificate (ECC) for the Proposed 3D Seismic Survey covering Blocks 2713, 2712A, 2712B, 2812B, and 2812A and Portions of Blocks 2813B, 2813A, 2814B, 2714B, 2714A, 2614 2613, 2612A and 2612B, Orange and Lüderitz Basins, Offshore Southern Namibia

2. Business Registration/Identity No. 02904391 (UK Registered)
(if applicable)

3. Correspondence address: PGS Exploration (UK) Limited
The Heights, Brooklands, Weybridge,
Surrey, KT13 0NY,
UNITED KINGDOM

4. Name of Contact Person: Dr. Sindila Mwiya

5. Position of Contact Person: Environmental Assessment Practitioner (EAP)

6. Telephone No.: (061) 306058 / 0811413229

7. Fax No.: (061) 306059

8. E-mail Address: (if any): smwiya@rbs.com.na or frondesk@rbs.com.na

Tick () the appropriate box

PART B: SCOPE OF THE ENVIRONMENTAL CLEARANCE CERTIFICATE

The environmental clearance certificate is for:

- Environmental Clearance Certificate (ECC) is required for the Proposed 3D Seismic Survey covering Blocks 2713, 2712A, 2712B, 2812B, and 2812A and Portions of Blocks 2813B, 2813A, 2814B, 2714B, 2714A, 2614 2613, 2612A and 2612B, Orange and Lüderitz Basins, Offshore Southern Namibia.

Details of the activity(s) covered by the environmental clearance certificate.

The Environmental Clearance Certificate is required Application for Environmental Clearance Certificate (ECC) for the Proposed 3D Seismic Survey covering Blocks 2713, 2712A, 2712B, 2812B, and 2812A and Portions of Blocks 2813B, 2813A, 2814B, 2714B, 2714A, 2614 2613, 2612A and 2612B, Orange and Lüderitz Basins, Offshore Southern Namibia. The following is the general summary specifications of the proposed 3D seismic survey activities by PGS:

- ❖ **Proposed activities** – Multiclient or Proprietary (Exclusive) 3D seismic survey.
- ❖ **Summary Example of the of the Seismic Specification:**
 - Source array details including:
 - Array pressure time history signature (preferably in electronic format – e.g. .sig file).
 - Power spectral density (amplitude spectrum) plots (preferably in electronic format – e.g. .sig file).
 - airgun volume.
 - peak and rms sound pressure level.
 - shot rate.
 - total number of shots per 24 h period.
 - Total number of shots per 24 h period = Approx. 5,206
 - Total number of shots for the full survey = Approx. 458,180
 - copy of Gundalf or Nucleus report.
 - Vessel sail speed and line change times: Expected vessel speed = 4.2 knots. Line change duration expected to be 3.4 hours (nominal).
 - Shot spacing: 16.667m flip-flop-flap (50m per same source).
 - Source activation time (hours per day):
 - Source to be activated once every Approx. 7.7 seconds.
- ❖ **3D seismic survey Water Depth of the main key target area** – Ranges from ca-500m to -4000m from east to west respectively.
- ❖ **Nearest Namibian Port** –Port of Lüderitz or Walvis Bay.
- ❖ **Nearest fishing ground** –Tripp Sea Mount tuna fishing grounds (October – April fishing season).
- ❖ **Survey vessel(s)** – To be confirmed and multiple vessels (2) may be used.
- ❖ **Type of Survey** – 3D Streamers.
- ❖ **Desired acquisition time** – From January / February if the ECC is granted by the Environmental Commissioner, and.
- ❖ **Estimated survey duration**–Seventy (70) days per survey event and multiple survey events will be undertaken over the next three (3) years.

[Note: Please attach plans to show the location and scope of the designated activity(s), and use

additional sheets if necessary: EIA and EMP Reports Attached.

Title of Activity:

Proposed 3D Seismic Survey covering Blocks 2713, 2712A, 2712B, 2812B, and 2812A and Portions of Blocks 2813B, 2813A, 2814B, 2714B, 2714A, 2614 2613, 2612A and 2612B, Orange and Lüderitz Basins, Offshore Southern Namibia (Fig. 1).

Nature of Activity:

The proposed 3D seismic survey operations involve sending energy into the earth using an energy wave-generating device, towed by ship for offshore operations (Fig. 1). Specifications of a typical Ramform class seismic survey vessel likely to be used for the proposed survey is shown in Figs. 2 and 3 and all the detailed specific survey parameters and specifications of the proposed 3D seismic survey are available on request from the proponent. Seismic surveys allow geophysicists to get a picture of the terrestrial or marine underground rock formations (Fig. 2). Airguns are the most common sound source used in modern offshore seismic surveys (2 and 3).

An airgun is an underwater pneumatic device from which high-pressure air is released suddenly into the surrounding water. On release of pressure the resulting bubble pulsates rapidly producing an acoustic signal that is proportional to the rate of change of the volume of the bubble. The frequency of the signal depends on the energy of the compressed air prior to discharge. Arrays of airguns are made up of towed parallel strings (Figs. 2 and 3) usually comprised of a total of 12 - 70 airguns. A single airgun could typically produce sound levels of the order of 220 - 230 dB re 1 mPa @ 1 m, while arrays produce sounds typically in the region of the following:

- Maximum Sound Pressure Level (SPL) of around 232 dB re 1uPa at 1m below the source, and.
- Maximum Sound Exposure Levels (SEL) of around 210.2 dB re ((1uPa) 2 s) at 1m below the source.

The majority of the energy produced is in the range of between 0 - 120 Hz bandwidth, although energy at much higher frequencies is also produced and recorded. High-resolution surveys and shallow penetration surveys require relatively high frequencies of between 100 – 1, 000 Hz, while the optimum wavelength for deep seismic work is in the 10 - 80 Hz range. During the survey operation, the seismic vessel records the data from all the hydrophones, including accurate coordinates of the vessel and its hydrophones. The proposed 3D seismic survey will employ numerous streamers and many hydrophones, providing enough data to give a detailed 3-Dimensional profile of the rock layers as illustrated in Figs. 2 and 3.

The depths of the reflecting layers are calculated from the time taken for the sound to reach the hydrophones via the reflector. this is known as the two-way travel time. The pulse of sound from the guns radiates out as a hemispherical wave front, a portion is reflected back towards the hydrophones from rock interfaces. The path of the minute portion of the reflected wave-front intercepted by a hydrophone group is called a ray path.

Hydrophone groups spaced along the streamer pick out ray paths that can be related to specific points on the reflector surface. Graphs of the intensity of the recorded sound plotted against the two-way time are displayed as wiggle traces (Figs. 2 and 3).

Seismic recording at sea always uses the Common Depth Point (CDP) method. A sequence of regularly spaced seismic shots is made as the survey vessel accurately navigates its course. Shots are usually timed to occur at distances equal to the separation of the hydrophone groups. In this way up to 120 recordings of the echoes from any one of 240 reflecting points can be collected. Each represents sound, which has followed a slightly different ray path, but has all been reflected from the same common depth point.

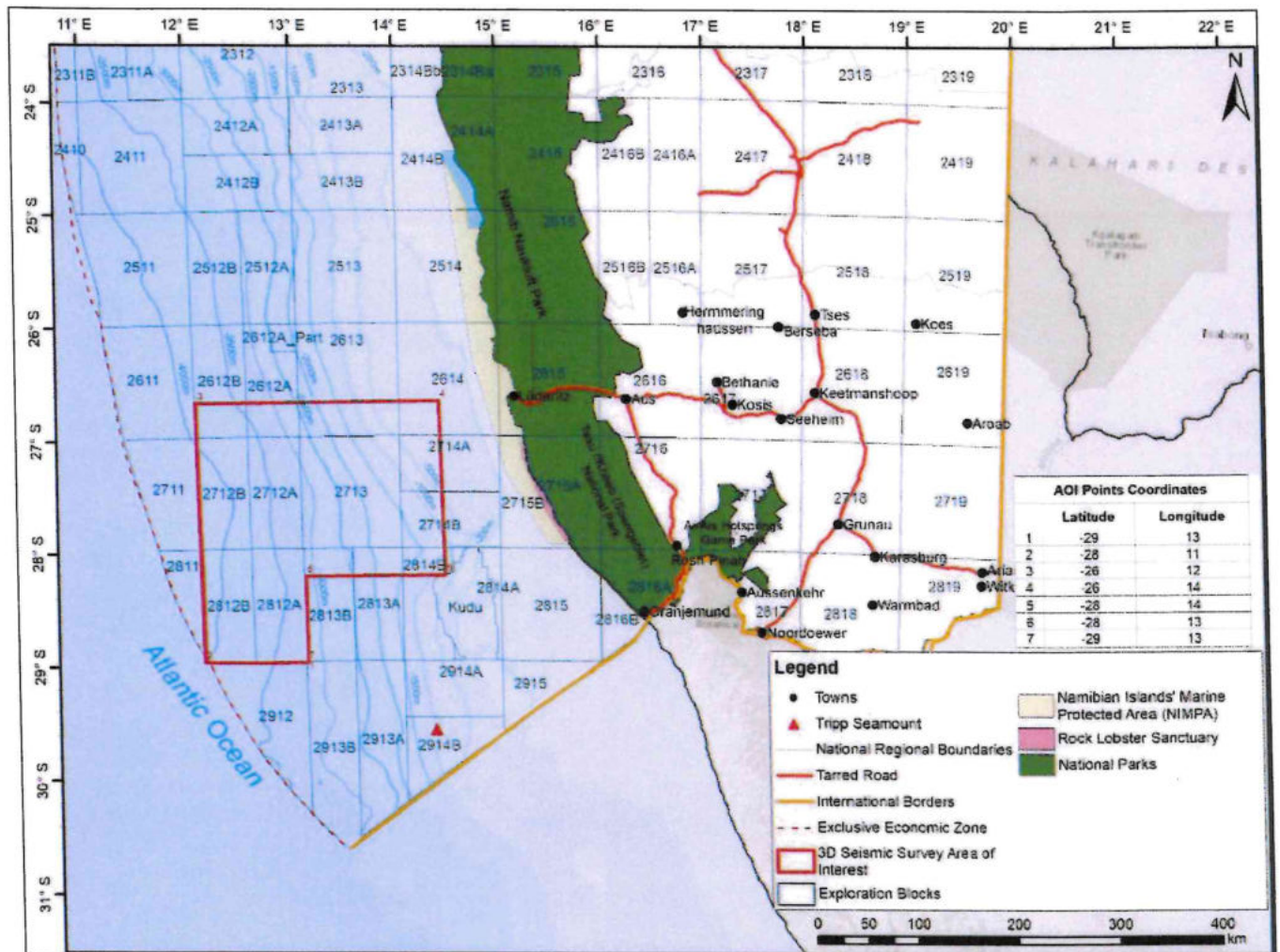


Figure 1: Proposed 3D seismic survey location map.

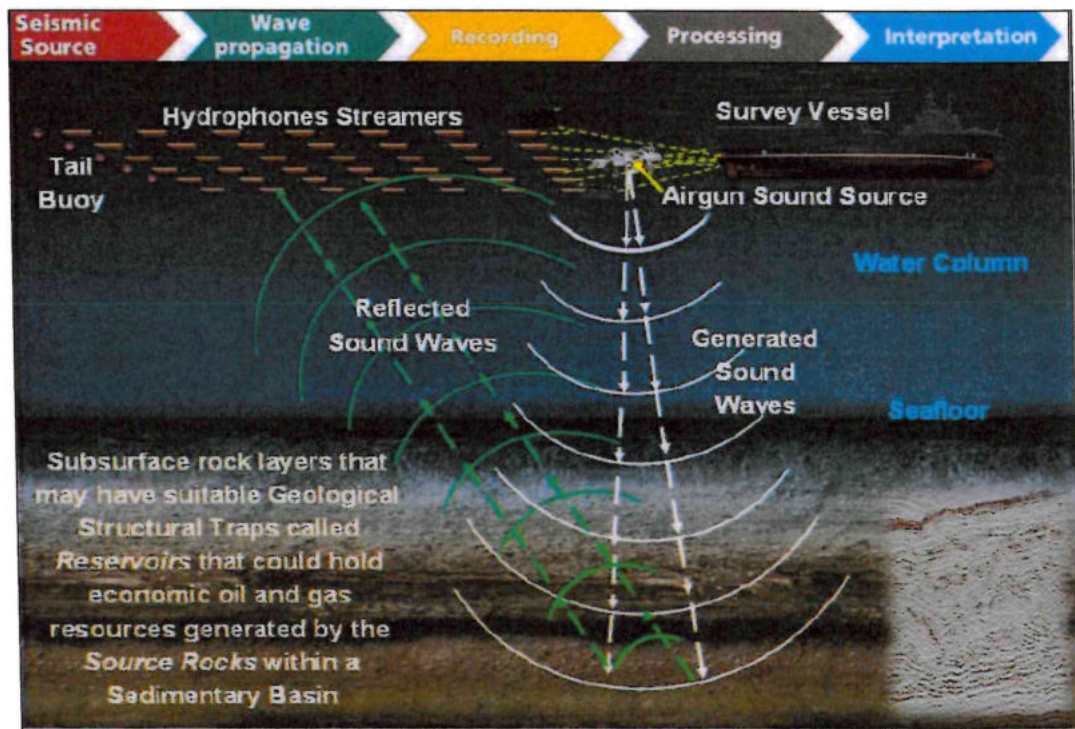


Figure 2: Illustration of the application of marine seismic survey method involving data collection and analyses of the times for seismic waves to travel between the various subsurface rock formations. Geophysicists, geologists, and petroleum engineers use sophisticated software to create subsurface images /maps showing potential drill-ready subsurface geological structures called reservoirs that may contain commercial hydrocarbons as shown in Fig. 3 (Image Source: www.youtube.com/watch?v=FN8IAb0rG9A).

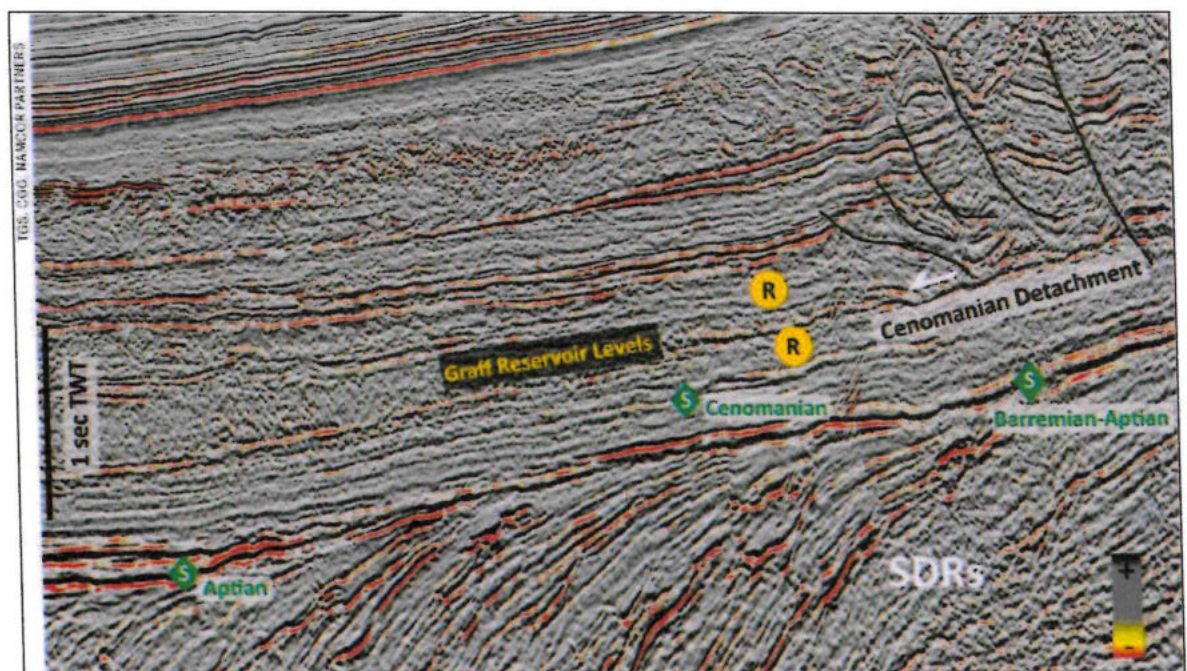


Figure 3: An example of the results of seismic survey data interpretation from the Orange Basin, offshore Namibia showing the SW-NE dip line through the Graff light oil discovery trend at the western end of the toe-thrust system and the base of the collapse structures. The Santonian-Campanian turbidites have been trapped above the outer high, which likely acts as a backstop for the reservoir influx from the east. Light oil in two different reservoir levels has been discovered by Shell in 2022 (Source: Winter F., Intawong A. and Robinson J., 2022).

Location of Activity:

Blocks 2713, 2712A, 2712B, 2812B, and 2812A and Portions of Blocks 2813B, 2813A, 2814B, 2714B, 2714A, 2614 2613, 2612A and 2612B, Orange and Lüderitz Basins, Offshore Southern Namibia (Fig. 1).

Scale and Scope of Activity:

The scale and scope of activity of the proposed 3D seismic survey operations will cover Blocks 2713, 2712A, 2712B, 2812B, and 2812A and Portions of Blocks 2813B, 2813A, 2814B, 2714B, 2714A, 2614 2613, 2612A and 2612B, Orange and Lüderitz Basins, Offshore Southern Namibia. The activities associated with proposed project have been grouped as follows:

- (i) Routine and physical presence of the survey and support vessels in the area including the Port of Walvis Bay, physical presence of survey and support vessels, Physical disturbance of the survey operations., sound generation from proposed 3D seismic survey airguns including sound of the survey and support vessels engines, increased light levels from routine vessels operations, atmospheric emissions from routine operations of the survey and support vessels, and planned marine discharges, and.
- (ii) Accidental events covering: Unplanned marine discharges (e.g., minor spillages of fuel, lubricants / maintenance oils, loss of vessel, equipment or material, collision with marine wildlife during vessel operations, and, loss of Marine Gasoline Oil (MGO) containment on the survey or support vessels due to ship collision or another major event.

The following is the summary of the proposed project implementation stages as assessed in this Environmental Impact Assessment (EIA) Report with mitigation measures provided in the Environmental Management Plan (EMP) Report:

- (i) Mobilisation and pre-survey preparations.
- (ii) Actual survey operations.
- (iii) Post survey operations, and.
- (iv) Non-routine or accidental events.

Both the survey and support vessels will use existing facilities in the Port of Walvis Bay for supplies, fueling and crew changeover as may be required and if required. No helicopter crew transfer support is anticipated except in event of an emergency.

PART C: DECLARATION BY APPLICANT

I hereby certify that the particulars given above are correct and true to the best of my knowledge and belief. I understand the environmental clearance certificate may be suspended, amended or cancelled if any information given above is false, misleading, wrong or incomplete.

A circular blue stamp from Risk-Based Solutions cc. The text inside the stamp includes the company name, a date stamp '14 DEC 2022', and a handwritten signature in black ink.

DR. SINDILA MWIYA

ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

Signature of Applicant

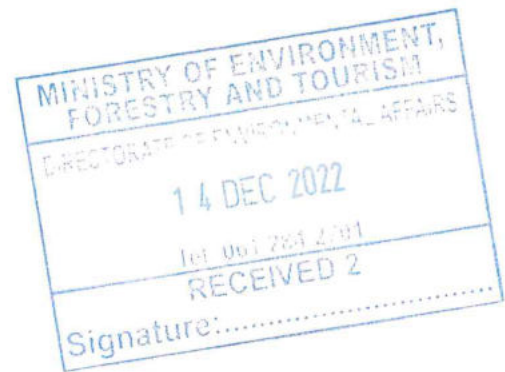
Full Name in Block Letters

Position

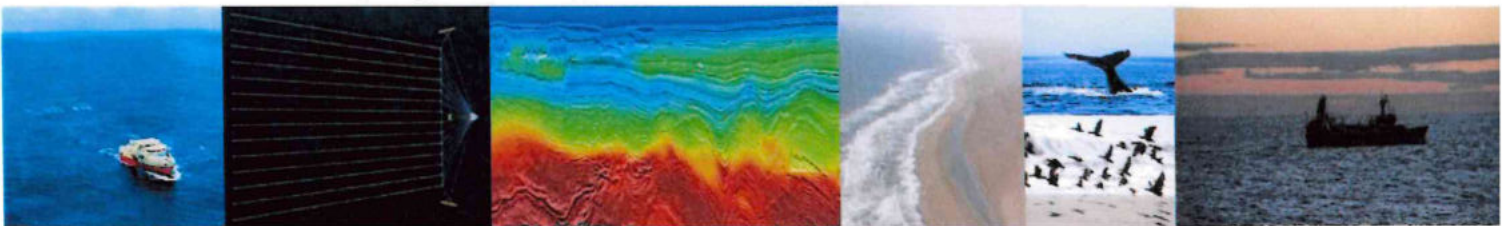
on behalf of PGS Exploration (UK) Limited

Date: 14th December 2022

PGS Exploration (UK) Limited



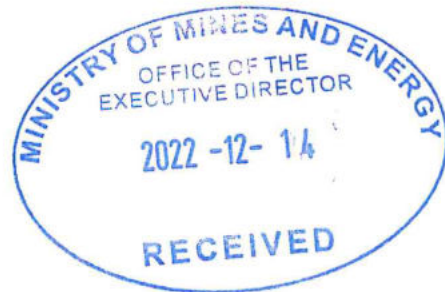
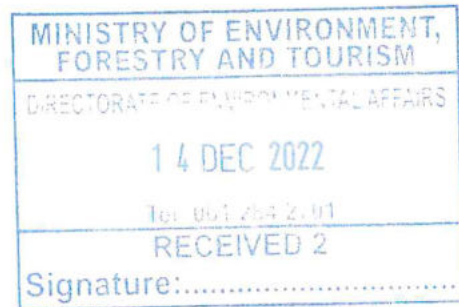
Final Environmental Impact Assessment (EIA) Report to Support the Application for Environmental Clearance Certificate (ECC) for the Proposed 3D Seismic Survey covering Blocks 2713, 2712A, 2712B, 2812B, and 2812A and Portions of Blocks 2813B, 2813A, 2814B, 2714B, 2714A, 2614 2613, 2612A and 2612B, Orange and Lüderitz Basins, Offshore Southern Namibia



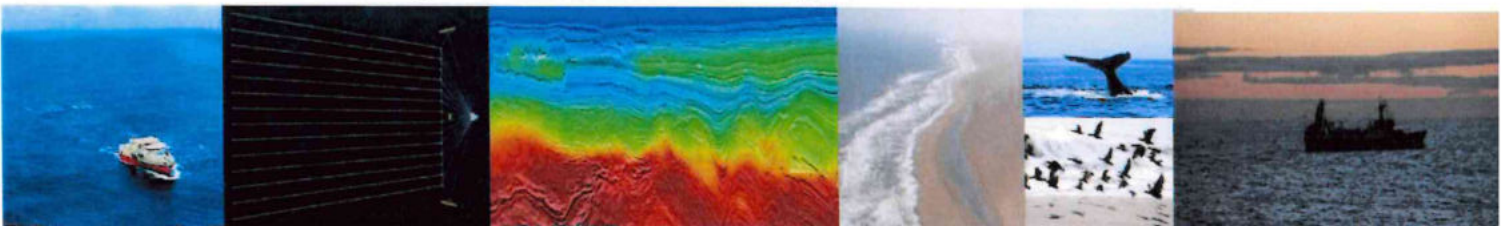
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**Final Environmental Management Plan (EMP) Report to Support the
Application for Environmental Clearance Certificate (ECC) for the
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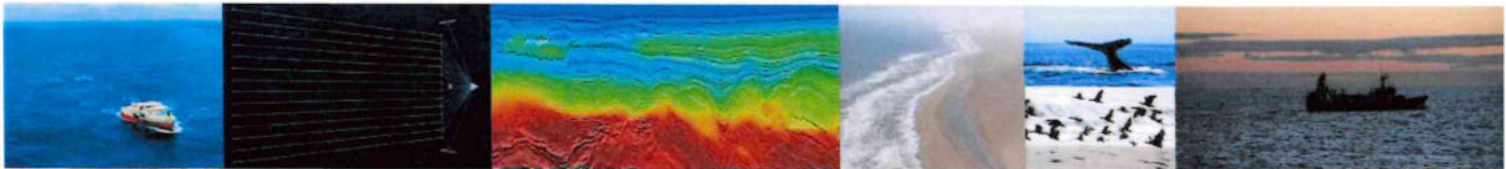
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DIRECTORATE OF ENVIRONMENTAL AFFAIRS
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Tel: 061 264 2701
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Background Information Document (BID) for Public and Stakeholder Consultation Process for Environmental Assessment to Support the Application for Environmental Clearance Certificate (ECC) for the Proposed 3D Seismic Survey covering Blocks 2713, 2712A, 2712B, 2812B, and 2812A and Portions of Blocks 2813B, 2813A, 2814B, 2714B, 2714A, 2614 2613, 2612A and 2612B, Orange and Lüderitz Basins, Offshore Southern Namibia

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November 2022





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Proposed Seismic Survey – Orange Luderitz Basin

Underwater Acoustic Modelling



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