

FORMS

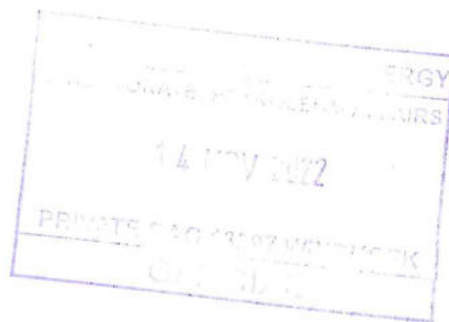
Form 1

REPUBLIC OF NAMIBIA

ENVIRONMENTAL MANAGEMENT ACT, 2007

(Section 32)

APPLICATION FOR ENVIRONMENTAL CLEARANCE CERTIFICATE



**MEFT ECC APPLICATION No.
APP-00321**



PART A: DETAILS OF APPLICANT

1. Name (person or business) – TGS Geophysical Company (UK) Limited

Application for Environmental Clearance Certificate (ECC) for the Proposed Multiclient or Proprietary 2D / 3D Seismic Survey covering Blocks 2010A, 2011A, 2010B, 2011B, 2111A, 2110A, 2111Bb, 2111Ba, 2210A, 2211Ab, 2211Aa, 2211Bb, 2211Ba, 2212B, 2311B, 2311A, 2312, 2411, 2412A, 2412B, 2512B, 2512A, 2612B, 2612A_Part, 2612A, 2612B, and 2612A, Walvis and Lüderitz Basins, Offshore South-Central Namibia

2. Business Registration/Identity No. 5731700 (UK Registered)
(if applicable)

3. Correspondence address: TGS Geophysical Company (UK) Limited
Dukes Court, Duke Street, Woking, GU21 5BH,
UNITED KINGDOM

4. Name of Contact Person: Dr. Sindila Mwiya

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

6. Telephone No.: +264-61-306058 / 224780 / 236398

7. Fax No.: +264-61-245001

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:

- Proposed Multiclient or Proprietary 2D / 3D Seismic Survey covering Blocks 2010A, 2011A, 2010B, 2011B, 2111A, 2110A, 2111Bb, 2111Ba, 2210A, 2211Ab, 2211Aa, 2211Bb, 2211Ba, 2212B, 2311B, 2311A, 2312, 2411, 2412A, 2412B, 2512B, 2512A, 2612B, 2612A_Part, 2612A, 2612B, and 2612A, Walvis and Lüderitz Basins, Offshore South-Central Namibia.

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

The Environmental Clearance Certificate is required to undertake 2D/3D seismic surveys activities starting from January / February 2023 for period of up to 70 days per survey event subject to favourable weather and receiving marine environmental sensitivity. The vessel to be used for the proposed 2D/3D survey will be fully compliant to all the national maritime legislation and regulations and MARPOL (marine pollution) regulations and waste disposal procedure and all legal frameworks and all other requirements.

[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 with Living Marine Resources and Underwater Acoustic Modeling Specialist Reports Attached.

Title of Activity:

Proposed Multiclient or Proprietary 2D / 3D Seismic Survey covering Blocks 2010A, 2011A, 2010B, 2011B, 2111A, 2110A, 2111Bb, 2111Ba, 2210A, 2211Ab, 2211Aa, 2211Bb, 2211Ba, 2212B, 2311B, 2311A, 2312, 2411, 2412A, 2412B, 2512B, 2512A, 2612B, 2612A_Part, 2612A, 2612B, and 2612A, Walvis and Lüderitz Basins, Offshore South-Central Namibia.

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 (Figs. 2.1). Specifications of a typical Ramform class seismic survey vessel likely to be used for the proposed survey is shown in Figs. 2.4 and 2.5 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 (Figs. 1-3). Airguns are the most common sound source used in modern offshore seismic surveys (Fig. 1). 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. 1-3) 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 1µPa at 1m below the source, and.
- Maximum Sound Exposure Levels (SEL) of around 210.2 dB re ((1µPa) 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. 1 and 2.

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. 1-.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.

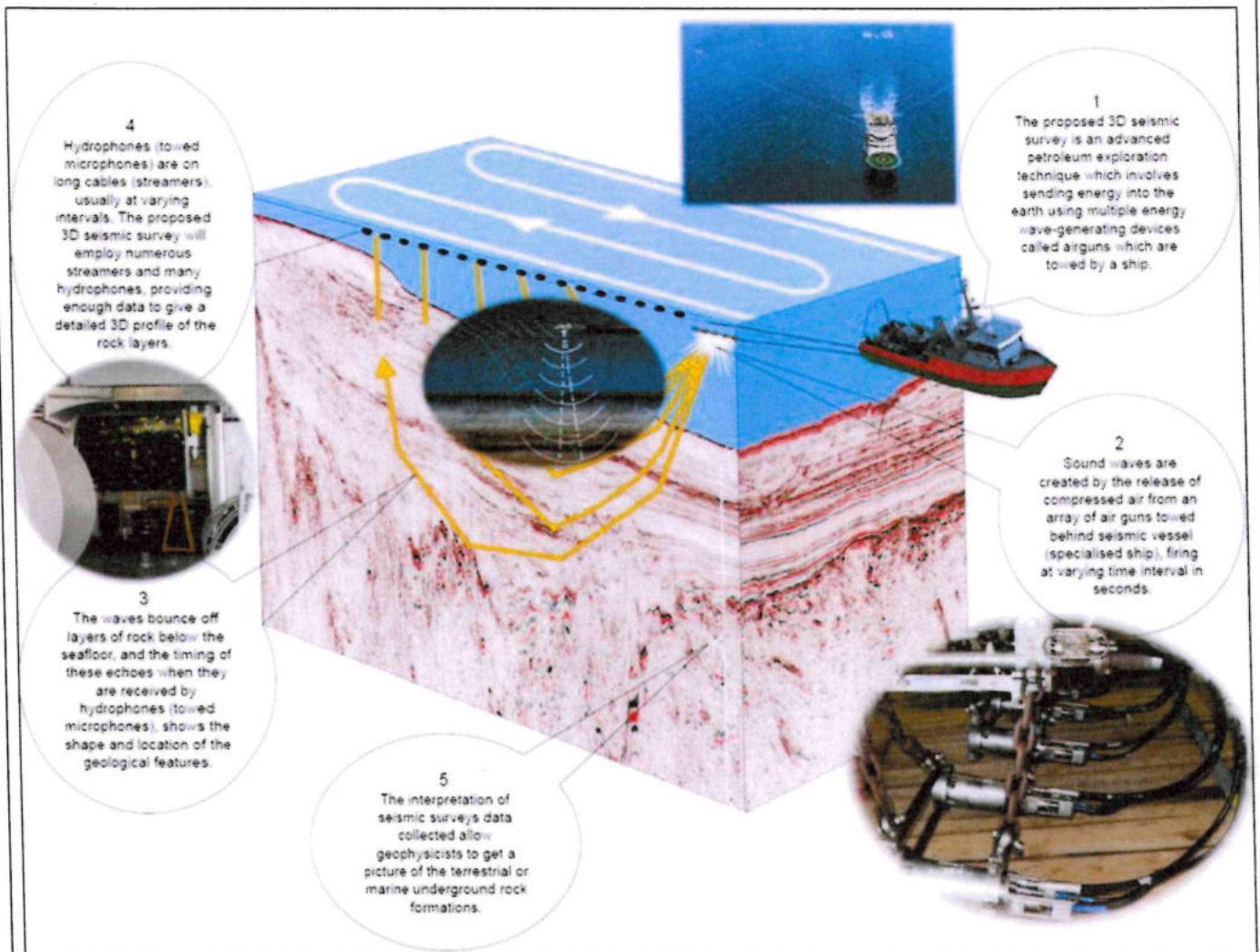


Figure 1: Generalised illustration of offshore seismic survey operations.

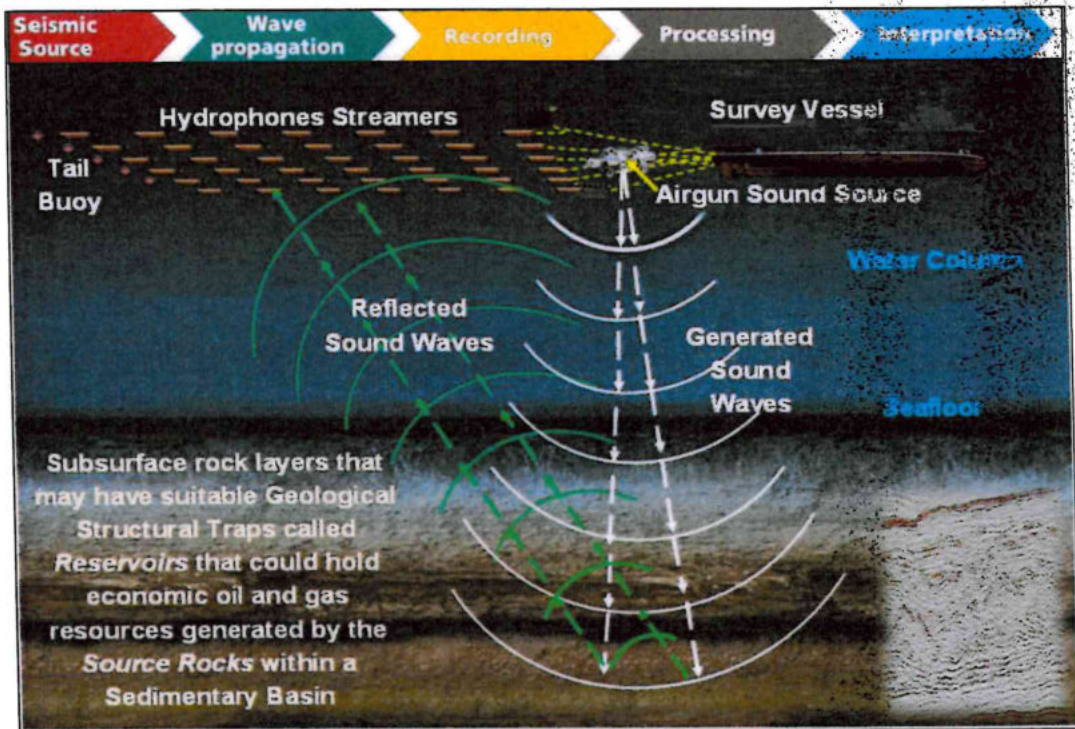


Figure 2: Illustration of the application of marine seismic survey method involving data collection and analyses of the times for seismic waves to travel between the various subsurface rock formations. Geophysicists, geologists, and petroleum engineers use sophisticated software to create subsurface 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).

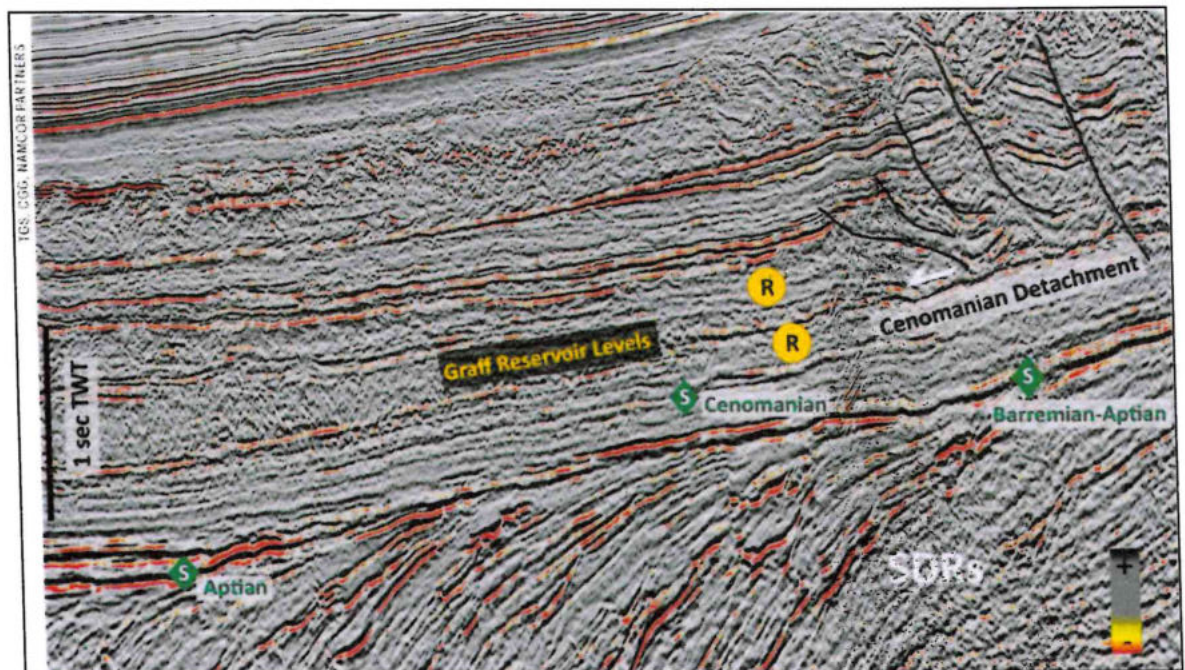


Figure 3: An example of the results of seismic survey data interpretation from the Orange Basin, offshore Namibia showing the SW-NE dip line through the Graff light oil discovery trend at the western end of the toe-thrust system and the base of the collapse structures. The Santonian-Campanian turbidites 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:

Proposed Multiclient or Proprietary 2D / 3D Seismic Survey covers Blocks 2010A, 2011A, 2010B, 2011B, 2111A, 2110A, 2111Bb, 2111Ba, 2210A, 2211Ab, 2211Aa, 2211Bb, 2211Ba, 2212B, 2311B, 2311A, 2312, 2411, 2412A, 2412B, 2512B, 2512A, 2612B, 2612A_Part, 2612A, 2612B, and 2612A, Walvis and Lüderitz Basins, Offshore South-Central Namibia.


Scale and Scope of Activity:

The spatial coverage of the proposed 2D / 3D seismic survey and impact assessment and management thereof covers the current outlined initial survey area as shown in Figs. 1.1-1.3 and covering the current and future seismic survey extension falling within the Lüderitz and Walvis Basins, offshore southcentral Namibia. The outlined area shown in Figs. 1.1-1.3 is defined as the immediate impact zone. The receiving environment in this area likely to be directly influenced by the survey activities will include a radius of 500 m safety exclusion zone around the survey vessel and surrounding areas where discharges to sea and sound may propagate and affect marine wildlife and immediate environment.

Survey area broader impact zone include all the surrounding socioeconomic zones likely to be affected around the 199,000 km² Area of Interest (AOI) situated in the Lüderitz and Walvis Basins Namibia. The proposed survey area covers Blocks 2010A, 2011A, 2010B, 2011B, 2111A, 2110A, 2111Bb, 2111Ba, 2210A, 2211Ab, 2211Aa, 2211Bb, 2211Ba, 2212B, 2311B, 2311A, 2312, 2411, 2412A, 2412B, 2512B, 2512A, 2612B, 2612A_Part, 2612A, 2612B, and 2612A, Walvis and Lüderitz Basins Offshore Namibia. The water depths of the survey area range from ca-1000m to ca-4000m from east to west, respectively.

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.



DR. SINDILA MWIYA

ENVIRONMENTAL
ASSESSMENT
PRACTITIONER (EAP)

Signature of Applicant

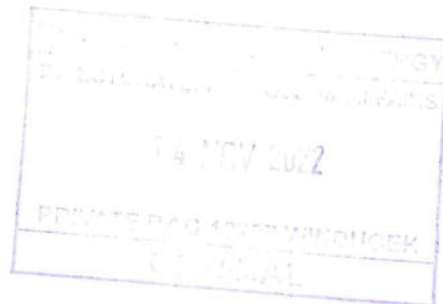
Full Name in Block Letters

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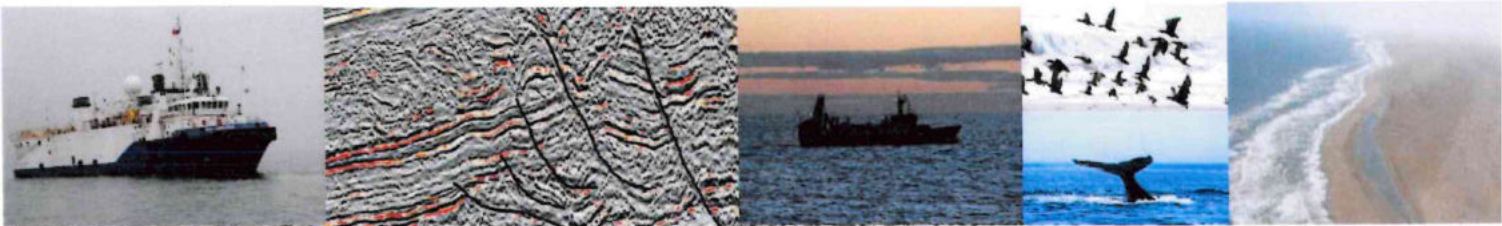
on behalf of TGS Geophysical Company (UK) Limited

Date: 14th November 2022

TGS Geophysical Company (UK) Limited



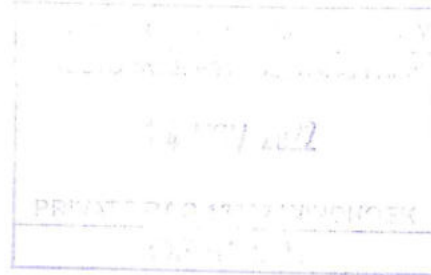
Final Environmental Management Plan (EMP) Report to Support the Application for Environmental Clearance Certificate (ECC) for Proposed Multiclient or Proprietary 2D / 3D Seismic Survey covering Blocks 2010A, 2011A, 2010B, 2011B, 2111A, 2110A, 2111Bb, 2111Ba, 2210A, 2211Ab, 2211Aa, 2211Bb, 2211Ba, 2212B, 2311B, 2311A, 2312, 2411, 2412A, 2412B, 2512B, 2512A, 2612B, 2612A_Part, 2612A, 2612B, and 2612A, **Walvis and Lüderitz Basins, Offshore South-Central Namibia**



November 2022

Dukes Court, Duke Street,
Woking, GU21 5BH,
UNITED KINGDOM

TGS Geophysical Company (UK) Limited



Final Environmental Impact Assessment (EIA) Report to Support the Application for Environmental Clearance Certificate (ECC) for Proposed Multiclient or Proprietary 2D / 3D Seismic Survey covering Blocks 2010A, 2011A, 2010B, 2011B, 2111A, 2110A, 2111Bb, 2111Ba, 2210A, 2211Ab, 2211Aa, 2211Bb, 2211Ba, 2212B, 2311B, 2311A, 2312, 2411, 2412A, 2412B, 2512B, 2512A, 2612B, 2612A_Part, 2612A, 2612B, and 2612A, Walvis and Lüderitz Basins, Offshore South-Central Namibia



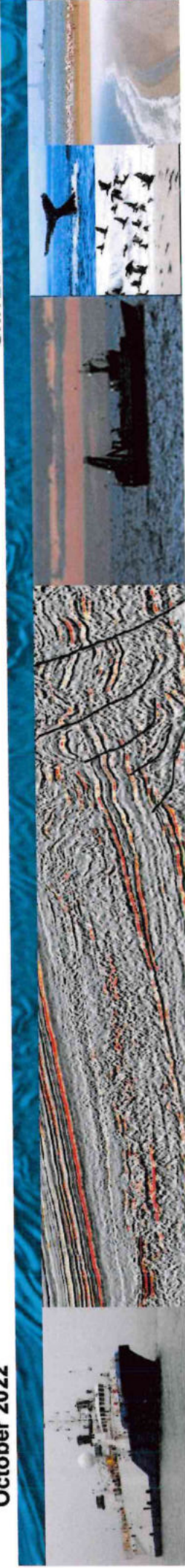
TGS Geophysical Company (UK) Limited



Background Information Document (BID) for Public and Stakeholder Consultation Process on the Environmental Assessment to Support the Application for Environmental Clearance Certificate (ECC) for Proposed Multiclient or Proprietary 2D / 3D Seismic Survey covering Blocks 2010A, 2011A, 2010B, 2011B, 2111A, 2110A, 2111Bb, 2111Ba, 2210A, 2211Ab, 2211Aa, 2211Bb, 2211Ba, 2212B, 2311B, 2311A, 2312, 2411, 2412A, 2412B, 2512B, 2512A, 2612B, 2612A_Part, 2612A, 2612B, and 2612A, **Walvis and Lüderitz Basins, Offshore South-Central Namibia**

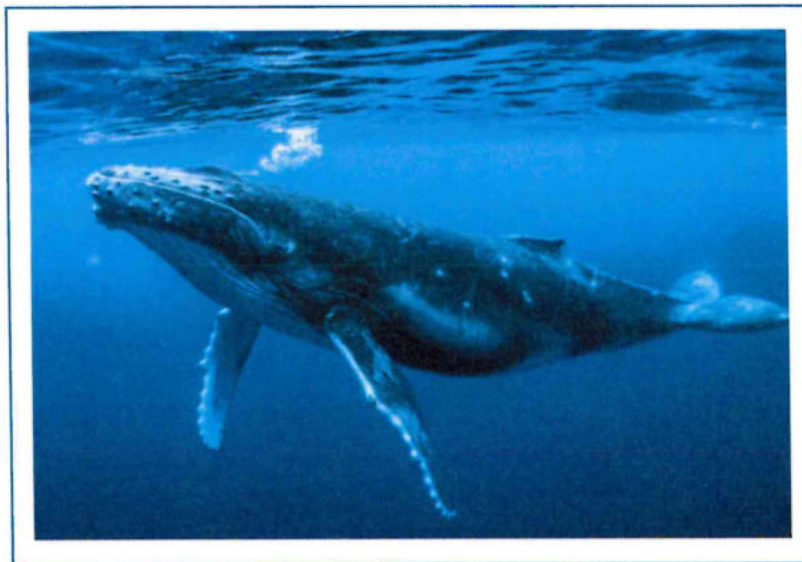
TGS Geophysical Company (UK) Limited
Dukes Court, Duke Street,
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UNITED KINGDOM

October 2022



Proposed 2D/3D Seismic Survey Offshore Namibia

Underwater Acoustic Modelling



OVERVIEW OF POTENTIAL IMPACT OF THE PROPOSED TGS 2-D/3-D SURVEY ON MARINE MAMMALS, BIRDS, FISH AND FISHERIES: LÜDERITZ AND WALVIS BASINS OFFSHORE NAMIBIA

Dr A.J. Rau PhD (UCT)

October 2022

