Aim of this Document

The aim of this Background Information Document (BID) is to provide stakeholders with information about proposed oil and gas exploration activities in the Deepwater Durban Exploration Area, offshore of the East Coast of South Africa.

You are invited to raise issues and concerns that you may have about the project. Potential positive and negative environmental and social impacts will be investigated during the compilation of the Environmental Management Programme (EMPr). The final EMPr, which will include your comments, will then be submitted to the Petroleum Agency of South Africa (PASA), and the Minister of Mineral Resources will then decide whether or not to grant an Exploration Right.

Background Information

ExxonMobil Exploration and Production South Africa Limited (EMEPSAL) has lodged an application with the Petroleum Agency of South Africa (PASA) for an Exploration Right in terms of Section 79 of the Mineral and Petroleum Resources Development Act (MPRDA) in order to explore for oil and gas in the Deep Water Durban

Exploration Area (refer to Figure 1 below). PASA accepted EMEPSAL’s application on 22 November 2013. In terms of the MPRDA, a requirement for obtaining an Exploration Right is that an Environmental Management Programme (EMPr) must be compiled and submitted to PASA for consideration and for approval by the Minister of Mineral Resources. Environmental Resources Management Southern Africa (Pty) Ltd (ERM) has been appointed to conduct the process to prepare the EMPr in accordance with the requirements of the MPRDA and the Regulations thereto.

The proposed Deepwater Durban Exploration Area is located far from the coast and in deep water. It is approximately 50 km offshore of the East Coast of South Africa (60 km south east of Port Edward) at its nearest point. The easternmost extent of the Exploration Area is approximately 380 km from the coast. The total area of the Exploration Area is approximately 50,000 km² with water depths that range from 2,200 to 3,600 metres (Figure 1).

EMEPSAL have proposed an initial three-year exploration programme. The purpose of the exploration programme is to investigate the subsea geological structures to determine the presence of hydrocarbons (oil and gas) within the proposed Exploration Area.

The proposed minimum exploration work programme would comprise of the acquisition of airborne geophysics data (7,000 km²) and the licensing (and possibly acquisition by EMEPSAL) of 2D seismic survey data (2,600 line km). Licensing of 2D seismic survey data is not covered by the EMPr that EMEPSAL will compile; the 2D seismic survey data acquisition was undertaken pursuant to a reconnaissance permit, which included filing of an environmental management plan.
EMEPSAL may however acquire additional airborne geophysics data (up to a total of 40,000 km²) and license and/or acquire up to a total of 4,300 line km 2D seismic survey data. Depending on the results from these surveys, the following activities may then be undertaken as described in further detail below (e.g. 2D and 3D seismic acquisition, sediment coring, etc.).

**Project Description**

The minimum proposed programme is expected to commence with the acquisition of Airborne geophysics data in 2015. The airborne geophysics and licensed seismic survey data obtained would be analysed to determine the geological structures and potential for presence of oil and gas. Depending on the results of the analysis, the following activities may then be undertaken:

- Additional 2D seismic survey
- 3D seismic survey;
- Seabed surface heat flow measurements;
- Seabed and water column sampling including piston coring;
- Multibeam echo sounder and sub-bottom profile survey; and
- Autonomous Underwater Vehicle (AUV) survey

These activities would be carried out in sequence or parallel and the schedule for these activities has not yet been determined and would be dependent on the result of the initial surveys.

A summary description of each of the proposed activities is provided below.

**Airborne Geophysics Programme**

EMEPSAL proposes to acquire airborne gravity and magnetic data covering parts of the proposed Exploration Area with a minimum of 7,000 km² and a maximum of 40,000 km², which would take in the order of 60 to 160 days respectively.

Acquisition of this data and integration of the airborne geophysical data with other geologic and geophysical data sets, would provide support for future seismic acquisition planning programmes, as well as support integrated seismic interpretation efforts, exploration concepts and exploration strategies.
Seismic Survey Programme

Seismic surveys are carried out during oil and gas exploration activities in order to investigate subsea geological formations. During seismic surveys, high-level, low frequency sounds are directed towards the seabed from near-surface sound sources towed by a seismic vessel. Signals reflected from geological interfaces below the seafloor are recorded by multiple receivers (or hydrophones) towed in a single or multiple streamer (see Figure 2) configuration. Analyses of the returned signals allow for interpretation of subsea geological formations.

Seismic surveys are undertaken to collect either two dimensional (2D) data with a single streamer or three dimensional (3D) data with multiple streamers. 2D surveys are typically applied to obtain regional data from widely spaced survey grids (tens of kilometres) and infill surveys on closer grids (down to 1 km spacing) that provide more detail over specific areas of interest. 3D surveys are typically applied to promising petroleum prospects to assist in fault interpretation, distribution of sand bodies, estimates of oil and gas in place and the location of exploration wells.

For this investigation EMEPSAL is proposing to undertake acquisition of a 2D seismic survey (or surveys). However, if it is determined by subsequent analysis of existing data, that acquisition of a seismic dataset utilising 3D seismic techniques might be a more advantageous approach for interpretation, then a 3D seismic survey might be substituted for or done in addition to the 2D survey.

Up to 4,300 line km 2D seismic survey data would be licensed from a third party and acquired directly by EMEPSAL. Most lines will be widely spaced over the proposed Exploration Area with some areas where the lines will be closer together. Specific details of the 2D and 3D seismic surveys would be developed based on the results of other studies and following selection of a seismic survey contractor and survey vessel. The specific details of the surveys will be submitted to PASA through an Environmental Notification.

Survey Vessel and Equipment

The seismic survey vessel will travel along transects of a prescribed course or grid that is carefully chosen to cross known or suspected geological structures. The vessel travels at a speed of four to six knots (i.e. 2 to 3 metres per second).

The seismic survey will involve a towed airgun array, which provides the seismic source energy for the profiling process, and a seismic wave detector system, usually known as a hydrophone streamer (see Figure 2). The sound source or airgun array (one array for 2D and two for 3D) will be located some 80 m to 150 m behind the vessel at a depth of 5 m to 10 m below the surface. A 2D survey typically uses a single streamer, whereas 3D surveys use multiple streamers (up to 12 streamers spaced 100 m apart) (see Figure 3). The streamers can be up to 12,000 m long. The streamer(s) will be towed at a depth of between 6 m and 30 m and will not be visible at the surface, except for the tail-buoy(s) with radar reflector at the far end of the cable(s). A typical 3D seismic survey configuration and safe operational limits are illustrated in Figure 4.

The airgun will be fired at approximately 10 to 20 second intervals at an operating pressure of between 2,000 to 2,500 psi and a volume of 3,000 to 5,000 cubic inches. Similar airgun source arrays are around 220 dB re 1 µPa-at 1 meter. 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.

The sound waves are reflected by boundaries between sediments of different densities. The returned signals are recorded by hydrophones inside
the streamers and the data is transmitted electronically to the vessel for recording and processing.

**Seismic Survey Exclusion Zone**

Under the International Maritime Organization (IMO) Convention on the International Regulations for Preventing Collisions at Sea (COLREGS, 1972, Part A, Rule 10), a seismic survey vessel that is engaged in surveying is defined as a ‘vessel restricted in its ability to manoeuvre’ which requires that power-driven and sailing vessels give way to a vessel restricted in her ability to manoeuvre. Vessels engaged in fishing shall, so far as possible, keep out of the way of the seismic survey operation.

Figure 4: Configuration of a typical 3D survey with safe operational limits (apply to both 2D and 3D). The exclusion zone to the rear of the vessel would increase in accordance with the length of the streamers (i.e. 6 km. aft of tailbuoys).

Under the South Africa Marine Traffic Act, 1981 (No. 2 of 1981), a seismic survey vessel and its array of airguns and hydrophones fall under the definition of an "offshore installation" and as such it is protected by a 500 m safety buffer zone. It is an offence for an unauthorised vessel to enter the safety zone. In addition to the statutory limit, the seismic vessel will also request an additional safety buffer zone during operations of typically 8 km fore of the vessel and 6 kms aft of the streamer tailbuoy and 6 km abeam during daylight; and 12 km fore and aft and 9 km abeam during the night.

**Seabed Heat Flow Measurements, Seabed and Water Column Sampling Programme**

The seabed heat flow measurements will be conducted using heat flow probes, which will measure the temperature and thermal conductivity of in situ sediments to 12 m below the seabed. The measurement device will be lowered from a vessel into the seabed, allowed to equilibrate and then recovered to the surface.

No samples or other materials will be recovered with the heat flow probe. Acquisition of these data will be used to determine the thermal regime and calibrate thermal models to understand hydrocarbon system potential. It is anticipated that approximately 10 measurements may be collected across the proposed Exploration Area, which would take 10 days to complete.

Seabed and water column samples may be taken for analysis such as hydrocarbon, heavy and trace metal analysis. Additionally a Conductivity, Temperature, Depth (CTD) profiler may be deployed to measure additional parameters such as salinity, temperature, dissolved oxygen and turbidity. For each station it is expected that three water depths will be sampled; near surface (~1 m below surface), mid-water, and near bottom.

**Multi-Beam Echo Sounder and Sub-Bottom Profile Programme**

The Multi-Beam Echos Sounder and Sub-Bottom Profile Programme would be undertaken over the majority of the proposed Exploration Area.

The survey vessel will be equipped with a multi-beam echo sounder to obtain swath bathymetry and a sub-bottom profiler to image the seabed and the near surface geology. The multi-beam system provides depth sounding information on either side of the vessel’s track across a swath width of approximately two times the water depth to produce a digital terrain model of the seafloor. The multi-beam echo sounder emits a fan of acoustic beams from a transducer at frequencies ranging
from 10 kHz to 200 kHz and typically produces sound levels in the order of 207 db re 1μPa at 1m. The sub-bottom profiler emits an acoustic pulse from a transducer at frequencies ranging from 3 kHz to 40 kHz and typically produces sound levels in the order of 206 db re 1μPa at 1m. It is anticipated that data acquisition would take approximately 20 days to complete at a vessel speed around 5 knots.

**Sediment Coring Programme**

The Sediment Coring Programme would include piston coring to sample for natural hydrocarbon seepage identified in the multi-beam and sub-bottom profile data. A piston corer would be used to collect seabed geochemical samples. The piston corer is lowered over the side of the survey vessel and allowed to free fall from about 3 m above the seabed to allow good penetration. Recovered core samples will be visually described and three sets of sub-samples will be retained for further analysis in an onshore laboratory. Any material having geologic or environmental interest will be preserved for further study. The remaining sediment will be returned to the seabed. It is anticipated that approximately 10 core samples would be collected across the Exploration Right area, which would take on the order of 25 days to complete. A larger number of samples could be taken depending on amount of seepage or number of expulsion features identified and also depending on the observed geologic complexity. Each individual core would have a disturbance area and volume of 0.01 m² and 0.07 m³, respectively, resulting for 10 core samples in a total disturbance area and volume of approximately 0.1 m² and 0.7 m³, respectively.

**Autonomous Underwater Vehicle (AUV) Programme**

An AUV is a self-propelled underwater robotic device controlled and piloted by an on-board computer. AUVs constitute part of a larger group of undersea systems known as unmanned underwater vehicles, a classification that includes non-autonomous remotely operated underwater vehicles (ROVs), controlled and powered from the surface by an operator/pilot via an umbilical or using remote control. AUVs are used in the oil and gas exploration to make a detailed map of the sea floor to ensure that exploration activities (ie installation of subsea infrastructure or drilling activities) are undertaken in the most cost effective manner with minimum disruption to the environment. In this regard, the AUV also allows survey companies to conduct precise surveys of exploration areas where traditional surveys would be less effective or too costly. In addition, AUVs can be equipped with specialized sensors to collect and monitor seabed and water column data where necessary.

AUV work for this Project would be carried out using a commercially-available AUV equipped with a multi-beam echo sounder and geochemical sensors to locate, characterise and map hydrocarbon seeps over the Exploration Area to help enhance the chance of exploration success.

**Proposed EMPR Process**

The following steps will be undertaken to ensure compliance with the MPRDA and Regulations thereto (refer to Figure 6):

- A BID (this document) will be compiled and distributed for an initial registration and comment period from 12 December 2013 to 20 January 2014, it will also be made available on the project webpage www.erm.com/deepwaterdurbanEMPR;

- The proposed project and I&AP registration/comment period will be advertised in 6 newspapers, namely one national (ie The Times), two regional (ie PE Herald, & The
Mercury) and three local (ie The South Coast Herald, The South Coast Fever, & The Upper Coast Fever) newspapers;

- An I&AP database will be compiled based on responses to the BID and advert, as well as other databases of previous studies in the area;

- Specialist studies will be commissioned and undertaken to address those issues requiring further investigation;

- An EMPr will be compiled integrating all specialist studies and other relevant information;

- The draft EMPr will be released during February 2014 for a 30-day review and comment period;

- All comments received will be collated and responded to in the Comments Report, which will be appended to the EMPr; and

- The EMPr will be submitted to PASA for consideration on or before 18 March 2014.

Key Environmental Considerations Identified

Seismic surveys are carried out around the world and the potential environmental and social impacts are generally well understood.

Key considerations include the following:

- Effects of noise on marine fauna (especially marine mammals);

- Interference with fishing activities;

- Effects on tourism and recreation;

- Interference with marine traffic; and

- Management of liquid discharges and waste by the survey vessels.

The EMPr will characterise key environmental sensitivities associated with all the proposed activities and determine the controls/mitigation measures that will be implemented to avoid or reduce such environmental and social impacts (see below).

Mitigation Measures

Potential impacts from seismic surveys can be avoided or minimised using a number of standard mitigations measures. While the EMPr will fully describe the mitigations proposed, highlighted below are some of the measures that will be prescribed to protect the environment:

- Planning survey to avoid sensitive periods for marine animals;

- Having a professional Marine Mammal Observer (MMO) on the vessel specifically to watch for sensitive marine animals;

- Delaying start of airgun firing if marine mammals are too close;

- Using a ‘soft-start’ process where the noise generated by the airgun is slowly increased to allow marine animals to move away;

- If necessary, stop airgun firing if marine mammals are too close;

- Use of Passive Acoustic Monitoring (PAM) during the night and times of poor visibility; and

- Adhering to National and International laws applicable to control air emissions, wastewater discharges and waste management and disposal, including MARPOL (73/78).

The survey would also take measures to avoid or minimise disruption to fishing and other marine activities. A Fisheries Liaison Officer (FLO) will be appointed to oversee the process of notifications and communication prior to the survey. During the survey the FLO would monitor activities and coordinate the survey with other marine users. Other mitigation measures to be implemented include:

- Using a support boat to monitor and maintain the safety zone during operations.

- Where appropriate, notifying tourism operators and other relevant stakeholders of exploration activities and timings prior to the commencement of the exploration activities.

- Adoption of standard warning and navigation equipment and procedures to reduce the risk of collisions with other vessels during operations.
Figure 6: EMPr Process
Stakeholder engagement is an important part of the EMPr process. Engagement will occur throughout the process in a variety of forms such as public notices, direct communications and face-to-face meetings.

If you wish to be kept informed directly throughout the EMPr process, please register as an Interested and Affected Party. Please provide your contact details using the attached form or by sending a letter, fax, or email to the contact below.

Do you know of any Interested and Affected Parties that should be informed? Please share this information or provide contact details so we can contact them.

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STAKEHOLDER REGISTRATION
Your input is important. If you have any comments, questions, or concerns, please provide your input below. You may also send a letter, fax, or email to the contact below.

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