



25 October 2013

Dear Sir / Madam

PROPOSED EXPLORATION DRILLING IN THE ORANGE BASIN DEEP WATER LICENCE AREA OFF THE WEST COAST OF SOUTH AFRICA (DEA REFERENCE NO.: 14/12/16/3/3/1/1063): PROJECT NOTIFICATION AND REGISTRATION

This letter provides information on the proposal by Shell South Africa Upstream B.V. ("Shell") to undertake exploration drilling in the Orange Basin Deep Water Licence Area off the West Coast of South Africa and the opportunity to register as an Interested and Affected Party (I&AP) and provide initial comment.

In February 2012 Shell obtained an exploration right for the Orange Basin Deep Water Licence Area in terms of the Mineral and Petroleum Resources Development Act, 2002 (No. 28 of 2002) (MPRDA). As part of the process of applying for the exploration right, an Environmental Management Programme (EMPr) was compiled and approved for the undertaking of seismic surveys and exploration drilling within the licence area. Shell subsequently undertook a 3D seismic survey in an 8 000 km² portion of the licence area. Based on analysis of the seismic data, Shell is proposing to drill one or possibly two exploration wells in the northern portion of the licence area.

In order to undertake the proposed drilling operation authorisation is required in terms of both the National Environmental Management Act, 1998 (No. 107 of 1998) (NEMA), as amended, and the MPRDA. Notice is hereby given that an application for authorisation has been submitted to the Department of Environmental Affairs (DEA) and that a Basic Assessment process is being undertaken in terms of the Environmental Impact Assessment (EIA) Regulations 2010. In addition, Shell's approved EMPr will be amended in terms of Section 102 of the MPRDA to take account of any changes in the project scope compared to the current approved exploration right work programme. Further detail on the proposed exploration drilling and the legislative processes is provided in the attached Background Information Document (BID).

CCA Environmental (Pty) Ltd (CCA), in association with NMA Effective Social Strategists (Pty) Ltd (NMA), has been appointed by Shell to undertake the Basic Assessment process and compile the EMPr Addendum.

You have been identified as an I&AP for this project and you are therefore receiving this correspondence. Should you wish to be removed from the Register of I&APs, update your contact details, or raise any initial issues or concerns regarding the proposed project, please make use of the attached Registration and Response Form and forward it to NMA using the contact information provided below by **no later than Monday 2 December 2013**.

Mfowabo Maphosa: NMA Effective Social Strategists
PO BOX 32097, BRAAMFONTEIN, 2017
Tel: 011 447 9737 Fax: 086 601 0381
E-mail: mfowabom@nma.org.za

Notice is also hereby provided that public open days (PODs) and information-sharing meetings will be held in Cape Town and Saldanha to present the proposed project and impact assessment process.

Date:	Monday 11 November 2013	Tuesday 12 November 2013
Location:	Cape Town	Saldanha
Venue:	Granger Bay Hotel School Beach Road, Mouille Point	Protea Hotel 51 Main Road, Saldanha
Time:	POD	14h00 - 17h30
	Meeting	17h30 - 20h00

Please note:

This letter and the BID are also available in Afrikaans and isiXhosa upon request.

Hierdie brief en die Agtergrondinligtingsdokument (AID) is ook op versoek in Afrikaans en Xhosa beskikbaar.

Le ncwadi noXwebhu loLwazi lweMvelaphi (BID) ziyafumaneka kananjalo ngeAfrikaans nangesiXhosa ngokwesicelo.

Should you have any queries on the above, or require any further information, please do not hesitate to contact us.

Yours sincerely



**MFWABO MAPHOSA
DATABASE ADMINISTRATOR- PUBLIC CONSULTATION**

Proposed Exploration Drilling in the Orange Basin Deep Water Licence Area off the West Coast of South Africa

The background of the cover features silhouettes of an offshore oil rig and construction cranes against a light green background. The rig is a tall, lattice-structured tower with several platforms. To its right, there are two large cranes with long jibs. The foreground shows a dark silhouette of a structure with a complex lattice of beams, possibly a platform or part of the rig's support structure.

BACKGROUND INFORMATION DOCUMENT OCTOBER 2013

1. Project Background

In February 2012 Shell South Africa Upstream B.V. (hereafter referred to as “Shell”), a subsidiary of Royal Dutch Shell plc, obtained an exploration right for the Orange Basin Deep Water Licence Area in terms of the Mineral and Petroleum Resources Development Act, 2002 (No. 28 of 2002) (MPRDA). The licence area is approximately 37 290 km² in extent. The eastern border of the Licence Area is located between approximately 150 km and 300 km off the West Coast of South Africa roughly between Saldanha Bay (33°S) and Kleinzee (30°S), with water depths ranging from 500 m to 3 500 m (see Figure 1).

As part of the process of applying for the exploration right, an Environmental Management Programme (EMPr) was compiled and approved for the undertaking of seismic surveys and exploration drilling within the licence area. Shell subsequently undertook a 3D seismic survey in an 8 000 km² portion of the licence area, which was completed on 22 February 2013.

Based on analysis of the seismic data, Shell proposes to drill one or possibly two exploration wells in the northern portion of the licence area (see Figure 1). Exploration

drilling is undertaken to determine whether geological structures or “prospects”, identified by studying the data from seismic surveys, contain oil or gas in potentially commercial extractable amounts.

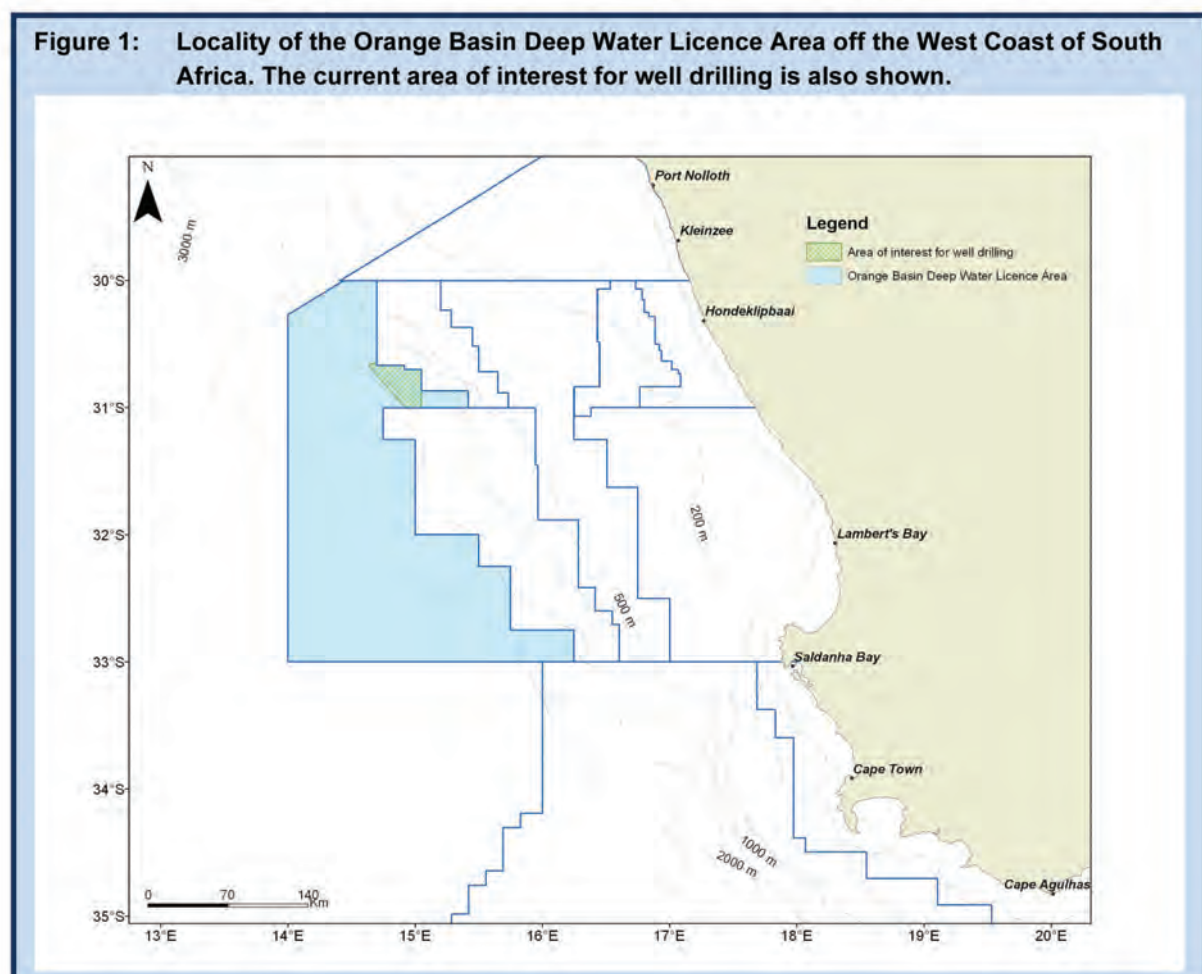
2. Purpose of this Document

This Background Information Document (BID) serves to:

- inform interested and affected parties (I&APs) about the legislative processes that Shell is required to comply with;
- provide a description of the proposed exploration well drilling operation and the Impact Assessment process; and
- present the specialist consultants’ scope of work and how I&APs can participate in the process.

3. Who are the Consultants?

CCA Environmental (Pty) Ltd (CCA), in association with NMA Effective Social Strategists (Pty) Ltd (NMA), has been appointed by Shell to compile an EMPr Addendum in terms of Section 39(6) of the MPRDA and to undertake a Basic Assessment process in terms of the National Environmental Management Act, 1998 (No. 107 of 1998) (NEMA), as amended. CCA will be responsible for



managing and undertaking the EMPr Addendum and Basic Assessment processes, while NMA will undertake the public participation process.

4. What Authorisation is Required?

In order to undertake the proposed drilling operation authorisation is required in terms of both the MPRDA and NEMA.

4.1 Mineral and Petroleum Resources Development Act, 2002: *Environmental Management Programme*

In terms of the MPRDA exploration activities may not begin prior to the issuing of an exploration right. A requirement of obtaining an exploration right is that an EMPr must be compiled in terms of Section 39 of the MPRDA, submitted to Petroleum Agency SA (PASA) for consideration and approval by the Minister of Mineral Resources (or the delegated authority). Shell has an approved EMPr which may be required to be amended to take account of any changes in the project scope on which the current approved exploration right work programme is based.

4.2 National Environmental Management Act, 1998: *Basic Assessment*

The Environmental Impact Assessment (EIA) Regulations 2010 promulgated in terms of Chapter 5 of NEMA provide for the control of certain activities that are listed in Government Notices (GN) R544 (Listing Notice 1), R545 (Listing Notice 2) and R546 (Listing Notice 3). These activities cannot proceed until written authorisation is obtained from the competent authority.

The proposed drilling operation triggers Activity 18(ii) in Listing Notice 1, which relates to the “*depositing of any material of more than 5m³ into the sea*” or “*the removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 m³ from the sea*”. Activities in Listing Notice 1 require that a Basic Assessment process is undertaken in order for the competent authority, the Department of Environmental Affairs (DEA), to consider the application for authorisation to carry out the proposed operation.

5. Project Overview

5.1 Well location and drilling programme

Shell proposes to drill one or possibly two wells in the northern portion of the licence area. At this stage an area of interest has been defined for the drilling locations (see Figure 1), which is 900 km² in extent with water depths ranging between 1 500 m and 2 100 m. The final well location will be based on a number of factors, including further analysis of the 3D seismic data, the geological target and seafloor location obstacles. The expected final depth of the well is between 2 700 m and 3 000 m below

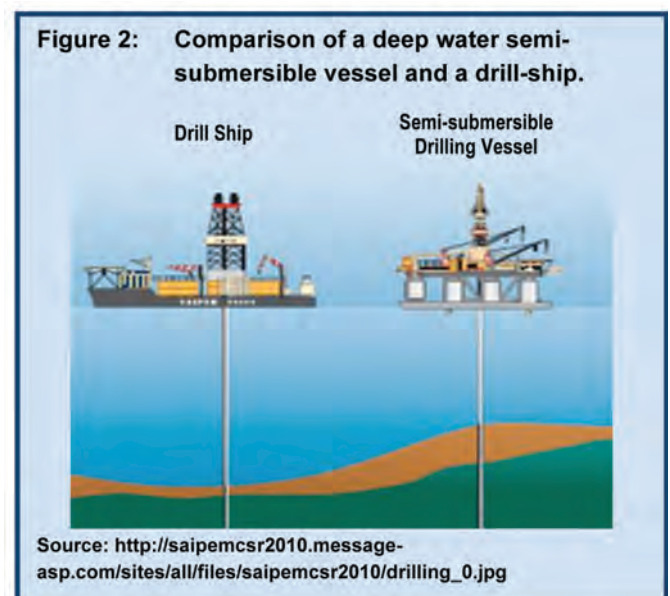
the seafloor and is expected to take in the order of three months to complete. For operational reasons, drilling is expected to take place in a future summer window period between November to April.

Depending on the success of the first well, a second well may be drilled to establish the quantity and potential flow rate of the resource. The “appraisal” well would be drilled in a location and to a depth determined by the results of the first well. It is anticipated that the appraisal well would be drilled at least one year after completion of the first well in order to allow sufficient time for data analysis and planning.

5.2 Drilling unit options

Various types of drilling technology can be used depending on, *inter alia*, the water depth and marine operating conditions experienced at the well site. Shell is currently considering two alternative drilling units, either a semi-submersible drilling vessel (rig) or a drill-ship (see Figure 2).

A semi-submersible drilling vessel is essentially a drilling rig with auxiliary drilling and marine support equipment located on a floating structure comprised of one or a number of pontoons. A semi-submersible rig typically requires a tow vessel or transport barge to transport the vessel to its drilling location. When at the well location, the pontoons are partially flooded (or ballasted), to submerge the pontoons to a pre-determined depth below the sea level where wave motion is minimised. This gives stability to the drilling vessel thereby facilitating drilling operations. In deeper water where anchoring is not practical, the drill rig would be held in position by dynamic positioning thrusters. A drill-ship is essentially a self-sufficient ship with a drilling rig attached, normally located at the centre of the ship where drilling operations are conducted. The



drill-ship would similarly be held in position by dynamic positioning thrusters.

While the drilling unit is operational at a well location, a temporary 500 m operational safety zone around the unit would be in force, i.e. no other vessels (except the support vessels) may enter this area. The safety zone would be described in a Notice to Mariners as a navigational warning.

5.3 Drilling equipment and procedure

Final well location

The area of the proposed drill location would be analysed for hazards on a special high definition seismic dataset, which is a subset of the acquired 3D data. The final well location co-ordinates would be based on the results of this analysis.

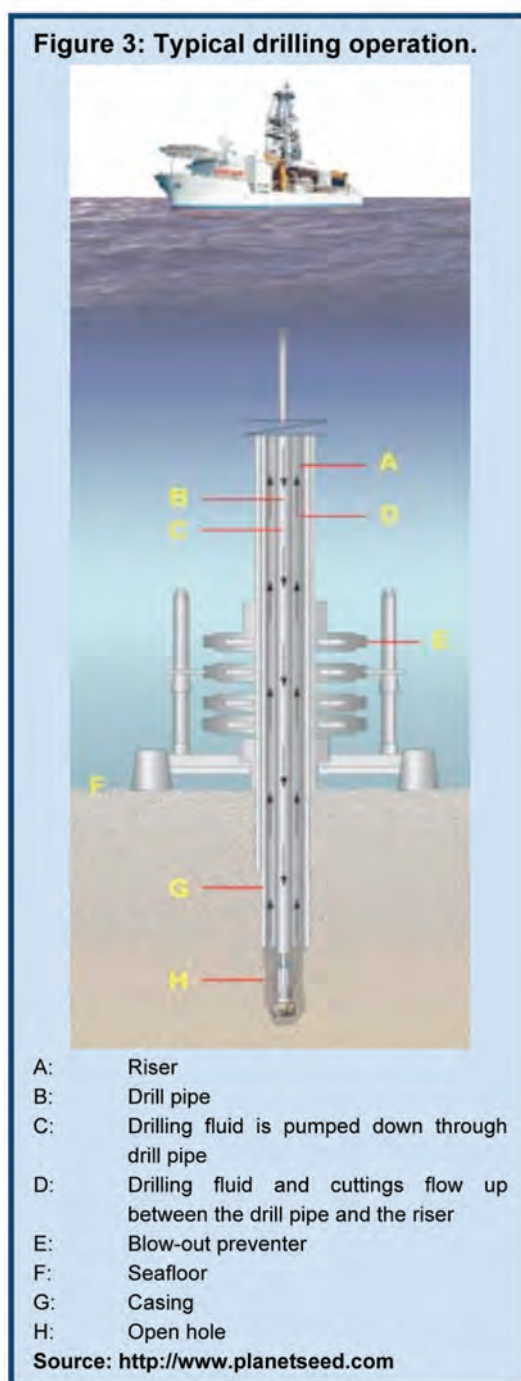
Drilling

The drilling unit would move onto location over the proposed drill site. The 36 inch (91 cm) diameter structural conductor pipe would either be drilled and cemented or jetted into place depending on the shallow seabed properties. The conductor pipe would be approximately 75 m deep.

Below the conductor pipe, a 26 inch (66 cm) diameter hole would be drilled for a 20 inch (51 cm) surface casing, which would extend to approximately 1 000 m below the seabed. The surface casing would be secured into place by pumping cement through the casing at the bottom of the hole and back up into the space between the casing and the borehole wall (annulus).

These first two hole sections would be drilled using seawater with viscous sweeps and water-based mud (WBM). The rotating drill string, causes the drill bit to crush the rock into small particles, called “cuttings”. All cuttings and WBM from this initial drilling stage would be discharged directly onto the seafloor.

Following the initial drilling stage described above, a blow-out preventer (BOP) and marine riser (see Figure 3), which isolates the drilling fluid and cuttings from the environment, is run and installed on the wellhead. The BOP contains high pressure safety valves designed to seal the well and prevent the uncontrolled release of fluids from the well (a ‘blow-out’) in the event that the primary well barrier (normally over balanced drilling fluid) is lost. Drilling is continued by lowering the drill string, with a smaller bit, through the riser to the 20 inch diameter casing shoe and rotating the drill string, causing the drill bit to crush the rock. This stage of drilling would be undertaken using a synthetic-based mud (SBM). While drilling is in progress, drilling fluid is continuously pumped down the inside of the hollow drill string. The



fluid emerges through ports in the drill bit and then rises (carrying the rock cuttings with it) up the annular space between the sides of the hole (the casing and riser pipe) and the drill string, to the drilling unit. The returned drill mud is treated to remove solids and drilled cuttings from the re-circulating mud stream. The cuttings are treated and discharged overboard. The hole diameter decreases in steps with depth as progressively smaller diameter casings are inserted into the hole at various stages and cemented into place.

During the drilling of a well, the primary discharge from the drilling vessel is the drilling cuttings. Cuttings range in size from clay to coarse gravel. The composition of the rock particles reflects the types of sedimentary rocks

penetrated by the drill bit. Although most of the drilling fluids are mechanically separated from the drilling cuttings, the discharged cuttings would contain some residual SBM. Prior to discharge to sea, the drill cuttings would be treated to reduce their oil content to less than 6.9% of dry cuttings weight. Bulk volumes of SBM remaining at the end of well drilling, would either be shipped for onshore treatment and disposal through an approved waste disposal company or re-used during the drilling of the subsequent well.

5.4 Well logging and testing

Once total depth is reached the well is logged and tested. This consists of lowering a logging tool(s) to gather data in order to create a petro-physical evaluation of the wellbore.

If the exploration well encounters hydrocarbons, an “appraisal” well would be drilled, which would be flow-tested to determine the economic potential of the discovery before the well is either abandoned or suspended for later re-entry and completion. If flow-testing is required, hydrocarbons would be burned at the well site. A high-efficiency flare is used to maximise combustion of the hydrocarbons.

5.5 Well completion and abandonment

Based on the results of the drilling, logging and possible testing of the well, a decision would be made as to whether to suspend or abandon the well.

- (a) Suspended wells: If it is verified that a well is commercially viable, it could be suspended. This would entail the following:
- Cement plugs would be set inside the well bore and tested for integrity;
 - The BOP would be removed before the drilling unit is moved off location;
 - The wellhead (total 3 to 4 m high) would remain on the seafloor; and
 - A corrosion cap would be placed over the wellhead to facilitate re-entry.
- (b) Abandoned wells: If a well is unsuccessful, it would be permanently abandoned. This would entail the following:
- Cement plugs would be set inside the well bore and tested for integrity;
 - The BOP would be removed before the drilling unit is moved off location; and
 - The wellhead (total 3 to 4 m high) would either remain on or be removed from the seafloor. Both alternatives will be evaluated in the Impact Assessment.

5.6 Sea- and land-based support

The drilling operations would be supported by at least three vessels, which would facilitate equipment and

Blow-out prevention:

Although the probability of a well blow-out is extremely low, it nonetheless provides the greatest environmental concern during drilling operations. A blowout can be caused by the uncontrolled flow of reservoir fluids into the wellbore, which results in a release of hydrocarbons to the sea. The primary safeguard against a blow-out is the drilling fluid. The density of the fluid can be controlled to balance any abnormal formation pressures. Abnormal formation pressures are detected by primary well control equipment. The likelihood of a blow-out is further minimised by employing a BOP, which is a secondary control system. The BOP is installed on the wellhead and is designed to close in the well if flow from the wellbore is detected. It can usually be operated from a number of stations on the drilling unit. This equipment is thoroughly inspected prior to installation and subsequently pressure and function tested on a regular basis.

Advanced well intervention and capping equipment is available in Saldanha Bay for deployment in the event of a subsea well control incident. This unique piece of equipment is only stored in four international locations, namely Norway, Brazil, South Africa and Singapore and is maintained ready for immediate mobilisation in the event of an incident.

The subsea well intervention system includes four capping stacks to shut-in an uncontrolled subsea well and two hardware kits to clear debris and apply subsea dispersant at a wellhead.

material transport between the drilling unit and port. The standby vessels would also provide support for fire fighting, oil containment/recovery, rescue and any equipment that may be required in case of an emergency.

The logistics shore base would be located in either Cape Town or Saldanha Bay. This shore base would provide for the storage of materials (including wellbore materials, diesel, water and SBM) and equipment that would be transported from/to the drilling unit by sea. The shore base would also be used for bunkering vessels. Transportation of personnel would be provided by helicopter from Kleinsee and fixed-wing flights to and from Cape Town.

6. Impact Assessment Focus Area

Offshore exploration drilling has specific known focus areas that are well documented through impact assessment experience and research gained from well drilling on a global level and in South Africa.

The key focus areas that have been identified, and will

be addressed in the Basic Assessment Report (BAR) and EMPr Addendum, include:

- Disposal of cuttings which could smother and have bio-chemical effects on benthic organisms;
- Waste and waste water discharge to sea, which could have localised pollution effects;
- Temporary loss of access to fishing grounds due to exclusion zone around the drilling operation;
- Abandoned or suspended wellheads on the sea bottom may potentially snag deep trawl nets;
- Potential interference with marine traffic; and
- Potential hydrocarbon spills (i.e. small accidental spills from normal operations to large spills from unplanned failure events such as well blow-outs).

7. The Impact Assessment Process

The key steps in the Basic Assessment process where you can participate and provide input include:

- Distribution of BID for a 30-day comment and I&AP registration period;
- First round of Public Open Days and Information-sharing Meetings;
- Distribution of Draft BAR and Draft EMPr Addendum for a 40-day comment period;
- Second round of Public Open Days and Information-feedback Meetings; and
- Distribution of Final BAR for a 30-day comment period.

The Impact Assessment process (see Figure 4) essentially has two stages, which are described below.

7.1 Stage 1: Public Consultation

This consultation stage is being planned to provide opportunity for I&AP input. Consultation with authorities is also planned so as to ensure that the scope of issues to be addressed in the BAR and EMPr Addendum are adequate. The objectives of this consultation process are to:

- Identify and inform a broad range of I&APs about the proposed project;
- Clarify the scope and nature of the proposed activities and the alternatives being considered;
- Conduct an open and transparent participation process to facilitate the inclusion of I&AP issues and concerns in the decision-making process; and
- Identify and document the key issues to be addressed in the Basic Assessment.

Two rounds of public consultation sessions will be held during the Basic Assessment process. In the first round, Open Days and Information-sharing Meetings will be held in Cape Town and Saldanha Bay to provide an overview of the proposed project and allow I&APs the opportunity to raise any issues or concerns.

Location: Cape Town	Location: Saldanha
Date: Monday 11 November 2013	Date: Tuesday 12 November 2013
Venue: Granger Bay Hotel School, Beach Road, Mouille Point	Venue: Protea Hotel, 51 Main Road, Saldanha Bay
Time: (Public Open Day) 14h00 - 17h30	Time: (Public Open Day) 14h00 - 17h30
Time: (Information-sharing meeting) 17h30 - 20h00	Time: (Information-sharing meeting) 17h30 - 20h00

7.2 Stage 2: Impact Assessment

The purpose of this stage is to gather information and to undertake specialist studies to address the key issues of concern identified in the consultation process. The BAR and EMPr Addendum will include the assessment of alternatives, the identification of impacts and the determination of the significance of impacts. Specialists will provide management actions to enhance positive benefits or avoid/minimise potential negative impacts. The specialist studies identified thus far to respond to the issues of concern and the potential impacts are listed on page 7.

8. Your Invitation to Comment and Participate in the Process

If you or your organisation wish to register as an I&AP and / or wish to raise any initial issues or concerns regarding the proposed project, please contact Mr Mfowabo Maphosa of NMA at the contact details below. For comments to be included in the Draft BAR and Draft EMPr Addendum they should be forwarded to NMA **no later than Monday 2 December 2013.**

Please contact:

Mfowabo Maphosa
NMA Effective Social Strategists (Pty) Ltd
PO BOX 32097, BRAAMFONTEIN, 2017
Tel: 011 447 9737 Fax: 086 601 0381
E-mail: mfowabom@nma.org.za

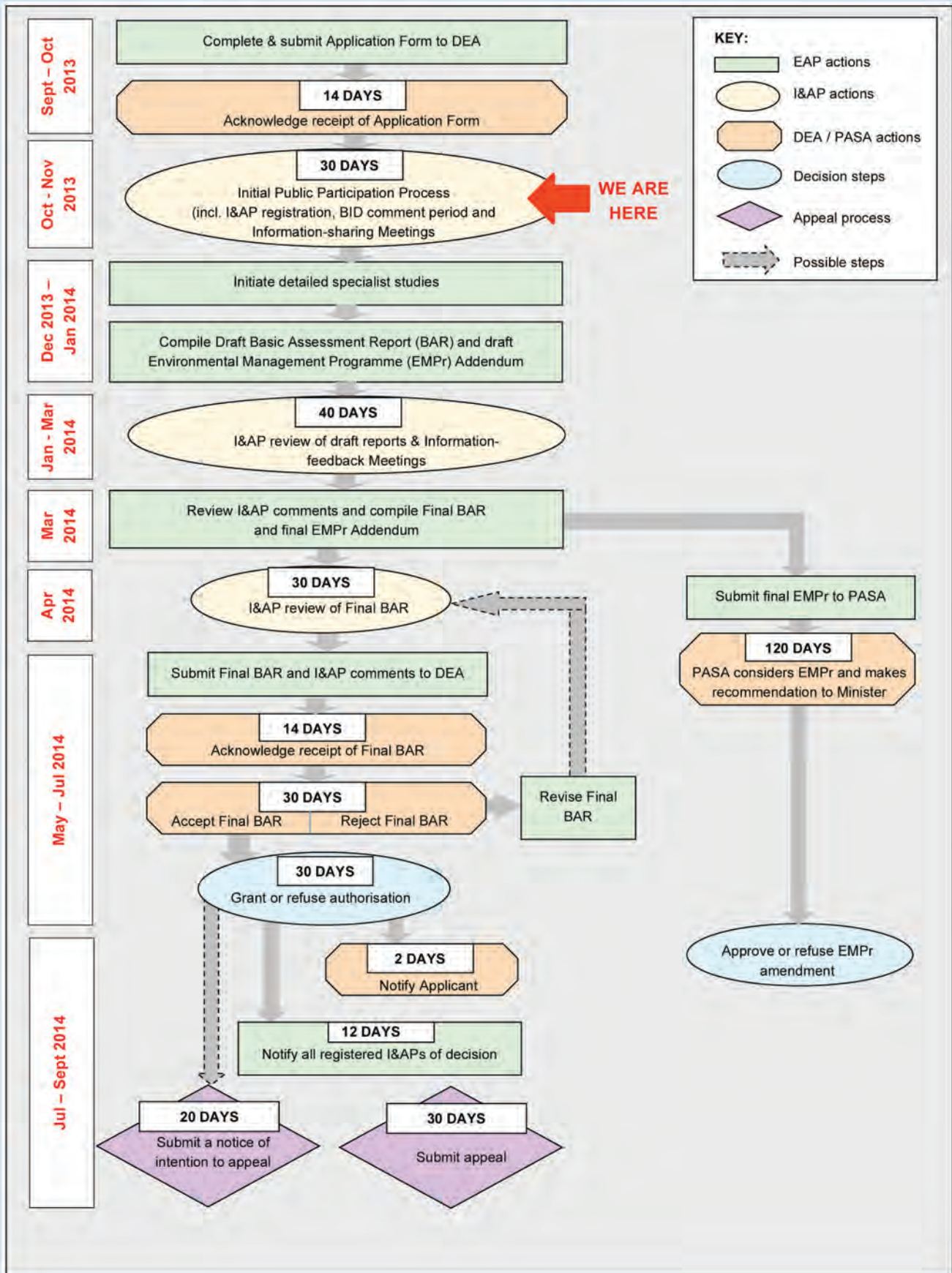


Studies (and specialist)	Scope
Cuttings and Oil Spill Modelling (Prestedge Retief Dresner Wijnberg (PRDW): Stephen Luger)	<ul style="list-style-type: none"> • Model the transport, dispersion and bottom deposition of drill cuttings discharged during drilling operations; • Model the trajectory and fate of oil due to a small operational spill on the water surface at the drill vessel; and • Model the trajectory and fate of oil due to a large blow-out spill at the well head on the seafloor.
Marine Faunal Assessment (Pisces Environmental Services: Dr Andrea Pulfrich)	<ul style="list-style-type: none"> • Describe the local marine fauna in and around the Licence Area; • Determine the primary risks to the marine and coastal environment in the unlikely event of an accidental leak or spill during well drilling; • Identify, describe and assess the significance of potential impacts of the proposed well drilling on the local marine fauna (including the benthic and pelagic environments); • Identify practicable mitigation measures to reduce any negative impacts on marine fauna.
Fisheries Assessment (CapFish SA: Dave Japp & Sarah Wilkinson)	<ul style="list-style-type: none"> • Describe the fishing activities expected in and around the Licence Area; • Undertake a spatial and temporal assessment of expected fishing effort in the proposed drilling area. • Assess the risk of impact of the drilling area on the different fishing sectors; • Assess the impact of the proposed safety zones around the drilling vessel on the fishing activities in terms of estimated catch and due to the loss of fishing grounds; and • Identify practicable mitigation measures to reduce any negative impacts on the fishing industry.

Glossary:

Abandoned well	A well which is officially plugged and abandoned.
Annulus	The space between the casing and the wall of the borehole.
Appraisal well	A well drilled to determine the physical extent, reserves and likely production rate of a field.
Bit	The cutting or boring element used in well drilling.
Blow-out	An uncontrolled flow of oil or gas occurring when formation pressure exceeds the pressure applied to it by the column of drilling fluid.
Blow-out preventers	High pressure wellhead valves designed to shut off the uncontrolled flow of hydrocarbons
Borehole	The hole as drilled by the drill bit.
Casing	Steel pipe cemented in the well to seal off formation fluids or keep the hole from caving in.
Cement casing	To fill the annulus between the casing and hole with cement to support the casing and prevent fluid migration between permeable zones.
Conductor pipe	A conductor pipe is a large diameter pipe that is set into the ground to provide the initial stable structural foundation for the well.
Cuttings	The fragments of rock dislodged by the bit and brought to the surface in the drilling mud.
Drill string	The column, or string, of drill pipe. Often loosely applied to both the drill pipe and drill collars.
Drilling unit	Drilling unit that is not permanently fixed to the seabed, e.g. a drill-ship or a semi-submersible drilling vessel.
Drilling fluid / mud	A mixture of clays, chemicals and water pumped down the drill pipe to lubricate and cool the drilling bit and to flush out the cuttings, as well as to strengthen the sides of the hole. Two main categories of drilling fluids are water-based muds (WBM) and synthetic-based muds (SBM).
Exploration well	A well drilled in an unproven area in order to verify the presence or absence of a hydrocarbon reservoir.
Riser	A pipe between a seabed blow-out preventer and a drilling unit.
Rotary drilling	A drilling method in which the hole is drilled by a rotating bit to which a downward force is applied.
Suspended well	A well that has been capped off temporarily.
Well log	A record of geological formation penetrated during drilling, including technical details of the operation.
Wellbore	A borehole – the hole drilled by the bit.
Wellhead	The equipment installed at the surface of the well bore.

Figure 4: Flow diagram illustrating the Impact Assessment process.



**PROPOSED EXPLORATION WELL DRILLING PROGRAMME IN THE ORANGE BASIN
DEEP WATER LICENCE AREA OFF THE WEST COAST OF SOUTH AFRICA
INTERESTED AND AFFECTED PARTY (I&AP) REGISTRATION AND RESPONSE FORM**

Would you or your organisation like to become a registered I&AP and continue to receive information on the proposed project?

Yes No

Name:

Designation:

Organisation:

Postal address:

Email address:

Telephone number:

Fax number:

Do you or your organisation have any issues or concerns regarding the proposed well drilling programme in the Orange Basin Deep Water License Area?

Yes No

If yes, please provide details below (or use extra pages if necessary):

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Please forward to:
NMA Effective Social Strategists (Pty) Ltd
Attention: Mfowabo Maphosa
PO BOX 32097, BRAAMFONTEIN, 2017
Tel: 011 447 9737 Fax: 086 601 0381
E-mail: mfowabom@nma.org.za



Registration and Response
Forms must reach NMA
Effective Social Strategists
no later than
Monday 2 December 2013



25 Oktober 2013

Geagte Heer / Dame

VOORGESTELDE EKSPLORASIEBOORWERK IN DIE ORANJEKOM-DIEPWATER-LISENSIEGEBIED LANGS DIE WESKUS VAN SUID-AFRIKA (DOS-VERWYSINGSNO. 14/12/16/3/3/1/1063):KENNISGEWING TOV PROJEK EN REGISTRASIE

Hierdie brief verskaf inligting oor die voorstel deur Shell South Africa Upstream B.V. ("Shell") om eksplorasieboorwerk in die Oranjekom-diepwater-lisensiegebied langs die Weskus van Suid-Afrika te onderneem, en bied aan u die geleentheid om as 'n Belangstellende en Geaffekteerde Party (B&GP) te registreer en aanvanklike kommentaar te lewer. In Februarie 2012 het Shell 'n eksplorasierig ontvang vir die Oranjekom-diepwater-lisensiegebied kragtens die Wet op Minerale en Petroleum-hulpbronne, 2002 (No. 28 van 2002) ('MPRDA'). As deel van die aansoekproses om die eksplorasierig, is 'n Omgewingsbestuursprogram (OBPr) vir seismiese opnames en eksplorasieboorwerk binne die lisensiegebied saamgestel.

Shell het sedertdien ook 'n 3D seismiese opname van 8 000 km² binne die lisensiegebied onderneem. Gebaseer op die ontleding van die seismiese data, wil Shell een of moontlik twee eksplorasieboorgate in die noordelike deel van die lisensiegebied uitvoer.

Ten einde die voorgestelde boorwerk te onderneem word magtiging ingevolge beide die Wet op Nasionale Omgewingsbestuur, 1998 (No. 107 van 1998) ('NEMA'), soos gewysig, en die MPRDA verlang. Kennis word hiermee gegee dat 'n aansoek om magtiging by die Departement van Omgewingsake (DOS) ingedien is, en dat 'n Basiese Assesseringsproses onderneem word kragtens die Omgewingsimpakstudie (OIS) Regulasies 2010. Hierbenewens sal Shell se goedgekeurde OBPr gewysig word ingevolge Artikel 102 van die MPRDA om enige veranderinge in die projekomvang vergeleke met die huidige, goedgekeurde eksplorasierig-werkprogram, te akkommodeer. Verdere besonderhede oor die voorgestelde eksplorasieboorwerk en die wetlike prosesse word in die aangehegte Agtergrondinligtingsdokument (AID) verskaf.

CCA Environmental (Edms.) Bpk. (CCA), in samewerking met NMA Effective Social Strategists (Edms.) Bpk. (NMA), is deur Shell aangestel om 'n Basiese Assesseringsproses te onderneem en die OBPr-addendum saam te stel.

U is as een van die B&GP's in hierdie projek geïdentifiseer en dit is die rede waarom u hierdie skrywe ontvang. Sou u verlang dat u naam van die Register van B&GP's verwyder moet word, of as u u kontakbesonderhede wil bywerk, of as u enige aanvanklike kwessies of besorgdhede oor die voorgestelde projek wil opper, moet u asseblief die aangehegte Registrasie- en Responsievorm gebruik en dit stuur na NMA by die kontakinligting hieronder, **voor of op Maandag 2 Desember 2013**.

Mfowabo Maphosa: NMA Effective Social Strategists

Posbus 32097, BRAAMFONTEIN, 2017

Tel: 011 447 9737 Faks: 086 601 0381

E-pos: mfowabom@nma.org.za

Kennis word ook hiermee gegee dat openbare opedae en inligtingsvergaderings in Kaapstad en Saldanha gehou sal word waar die voorgestelde projek en die impakassesseringsproses bekend gestel sal word.

Datum:	Maandag 11 November 2013	Dinsdag 12 November 2013
Ligging:	Kaapstad	Saldanha
Lokaal:	Granger Bay Hotelskool Kusweg, Mouille Point	Protea Hotel Hoofweg 51, Saldanha
Tyd:	Opedag	14h00 - 17h30
	Vergadering	17h30 - 20h00

Indien u enige navrae oor bostaande het, of as u verdere inligting verlang, moet u nie huiwer om ons te kontak nie.

Met vriendelike groete



MFOWABO MAPHOSA
DATABASISADMINISTRATEUR – OPENBARE DEELNAME

The background of the entire page is a light green color. Overlaid on this background are dark green silhouettes of industrial equipment. On the left, there is a tall, lattice-structured oil rig. To the right, there are two cranes of different sizes. In the foreground, there are silhouettes of a building's structural frame, including beams and columns.

Voorgestelde Eksplorasiëboorwerk In Die Oranje-Kom- Diepwater-Lisensiegebied Langs Die Weskus Van Suid-Afrika

AGTERGRONDINLIGTINGSDOKUMENT OKTOBER 2013

1. Projekagtergrond

In Februarie 2012 het Shell South Africa Upstream B.V. (hierna bekend as "Shell"), 'n filiaal van Royal Dutch Shell plc, 'n ondersoekreg vir die Oranjekom-diepwater-lisensiegebied ooreenkomstig die Wet op Minerale en Petroleum-hulpbronontwikkeling 2002 (No. 28 van 2002) ('MPRDA') bekom. Die lisensiegebied is nagenoeg 37 290 km² in omvang. Die oostelike grens van die lisensiegebied is tussen 150 km en 300 km langs die Weskus van Suid-Afrika geleë, min of meer tussen Saldanhabaai (33°S) en Kleinsee (30°S), in water wat tussen 500 m en 3 500 m diep is (sien Figuur 1).

As deel van die aansoekproses om die eksplorasiereg is 'n Omgewingsbestuursprogram (OBPr) vir seismiese opnames en eksplorasieboorwerk binne die lisensiegebied saamgestel en goedgekeur. Shell het sedertdien 'n 3D seismiese opname van 8 000 km² in die lisensiegebied onderneem, wat op 22 Februarie 2013 afgehandel is.

Gebaseer op die ontleding van die seismiese gegewens, wil Shell een of moontlik twee eksplorasieboorgate in die noordelike deel van die lisensiegebied (sien Figuur 1) onderneem. Eksplorasieboorwerk word onderneem om te bepaal of die geologiese strukture of "vooruitsigte" wat tydens die bestudering van die data van die seismiese opnames geïdentifiseer is, olie of gas in potensieel kommersieel-ekstraheerbare hoeveelhede bevat.

2. Doel Van Die Dokument

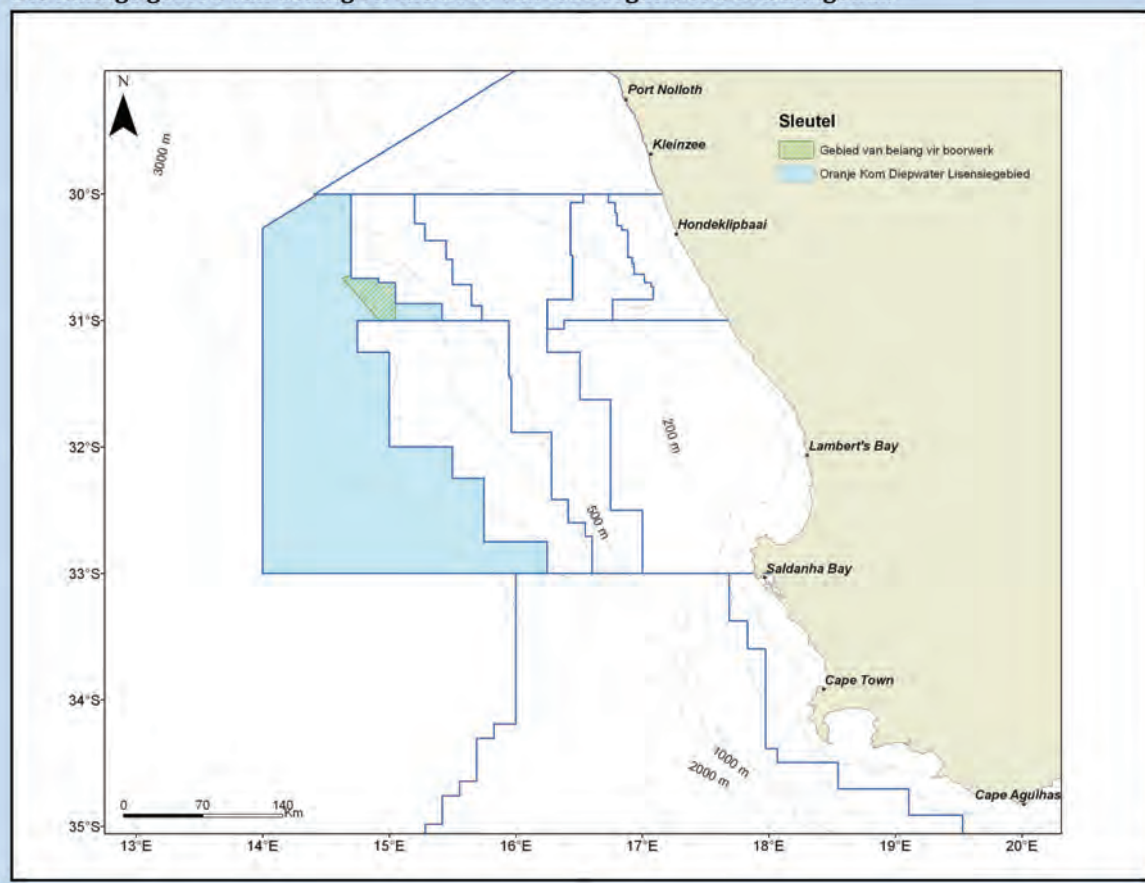
Hierdie Agtergrondinligtingsdokument (AID) beoog om:

- belanghebbende en geaffekteerde partye (B&GP's) oor die wetgewende prosesse waaraan Shell moet voldoen, in te lig;
- 'n beskrywing van die voorgestelde eksplorasieboorwerk en die impakassesseringsproses te verskaf; en
- om die omvang van die spesialis-konsultant se werk aan te bied en te verduidelik hoe die B&GP's aan die proses kan deelneem.

3. Wie Is Die Konsultante?

CCA Environmental (Edms.) Bpk. (CCA), in samewerking met NMA Effective Social Strategists (Edms.) Bpk. (NMA), is deur Shell aangestel om 'n OBPr-addendum saam te stel, ooreenkomstig Artikel 39(6) van die MPRDA en om 'n Basiese Assesseringsproses ooreenkomstig die Wet op Nasionale Omgewingsbestuur, 1998 (No. 107 van 1998) ('NEMA'), soos gewysig, te onderneem. CCA sal verantwoordelik wees vir die bestuur en onderneming van die OBPr-addendum en die Basiese Assesseringsproses, terwyl NMA die openbare deelnameproses sal onderneem.

Figuur 1: Ligging van die Oranje Kom Diepwater Lisensiegebied vanaf die Weskus van Suid-Afrika. Die huidige gebied van belang vir die boor van 'n boorgat word ook aangedui.



4. Watter Magtiging Word Verlang?

Ten einde die voorgestelde boorwerk te onderneem word magtiging ingevolge die MPRDA en NEMA verlang.

4.1 Wet op Minerale en Petroleum-hulpbronontwikkeling ('MPRDA'), 2002, *Omgewings-bestuursprogram (OBPr)*

Ooreenkomstig die MPRDA mag eksplorasietaiwiteite nie begin voor die uitreiking van 'n eksplorasierig nie. 'n Vereiste vir die verkryging van 'n eksplorasierig is dat 'n OBPr ooreenkomstig Artikel 39 van die MPRDA opgestel, en by die Petroleumagentskap van SA (PASA) ingedien moet word vir oorweging en goedkeuring deur die Minister van Minerale Hulpbronne (of sy aangewese volmag). Shell het 'n goedgekeurde OBPr wat aangepas kan word om enige veranderinge in die projekomvang waarop die huidige goedgekeurde eksplorasierig-werkprogram gebaseer is, aan te bring.

4.2 Wet op Nasionale Omgewingsbestuur ('NEMA'), 1998: *Basiese Assessering*

Die Omgewingsimpakstudie (OIS) Regulasies 2010, gepromulgeer ooreenkomstig artikel 5 van NEMA, bepaal hoe sekere aktiwiteite soos in Staatskennisgewing R544 (Lyskennisgewing 1), R545 (Lyskennisgewing 2) en R546 (Lyskennisgewing 3) vervat, uitgevoer moet word. Hierdie aktiwiteite kan nie voortgaan alvorens skriftelike magtiging vanaf die owerheid verkry is nie.

Die voorgestelde boorwerkbedrywighede gee aanleiding tot Aktiwiteit 18(ii) in Lyskennisgewing 1, wat gaan oor die verwydering of verskuiwing van meer as 5 kubieke meter grond, sand, skulpe, skulpklipgruis, spoelklippies of gesteentes uit die see. Aktiwiteite in Lyskennisgewing 1 vereis dat 'n Basiese Assessering onderneem word sodat die owerheid, dit is die Departement van Omgewingsake (DOS), die aansoek om magtiging vir die uitvoer van die voorgestelde bedrywighede kan oorweeg.

5. Projekoorsig

5.1 Ligging van boorgate en boorwerkprogram

Shell wil een of moontlik twee eksplorasiemoorgate in die noordelike deel van die lisensiegebied boor. Op hierdie stadium is 'n gebied van belang vir die ligging van die boorwerk omskryf van 900 km² in water wat tussen 1 500 m en 2 100 m diep is (sien Figuur 1). Die finale boorgatligging sal op 'n aantal faktore gebaseer word, insluitende verdere ontleding van die 3D seismiese data, die geologiese teiken en struikelblokke op die seabodem. Die verwagte finale diepte van die boorgat is tussen 2 700 m en 3 000 m benede die seabodem en daar word verwag dat dit na raming omtrent drie maande sal duur om te voltooi. As gevolg van operasionele redes, word daar verwag dat die boorwerk in 'n toekomstige somertydperk (tussen November en April) sal plaasvind.

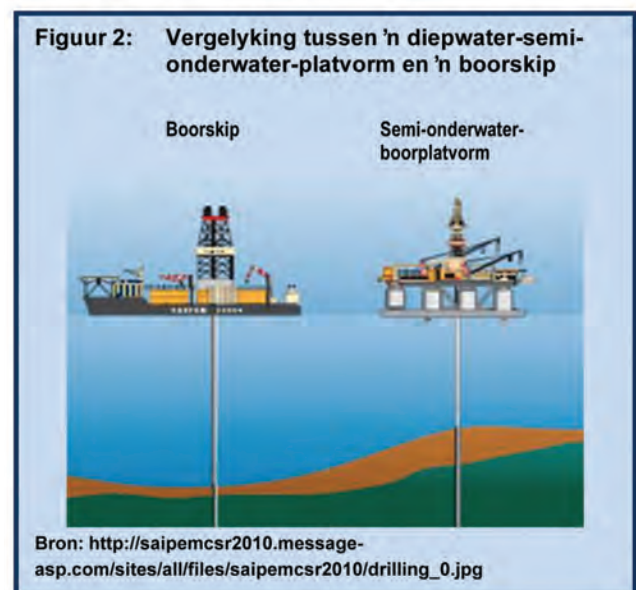
Afhangend van die sukses van die eerste boorgat, sal 'n tweede eksplorasiegat moontlik geboor word om die gehalte en potensiële vloeikoers van die hulpbron te bepaal. Hierdie waarderingsboorgat sal op 'n plek en tot 'n diepte wat deur die resultate van die eerste boorgat bepaal word, geboor word. Daar word verwag dat die waarderingsboorgat minstens een jaar na die voltooiing van die eerste boorgat geboor sal word ten einde genoegsame tyd vir die ontleding van gegewens en beplanning toe te laat.

5.2 Tipe booropsies

Verskeie tipes boorwerktegnologie kan gebruik word, afhangende van onder andere die waterdiepte en marine bedryfstoelele wat by die boorgatperseel ondervind word. Shell oorweeg tans twee alternatiewe booreenhele, 'n semi-onderwater-boorplavorm (boortoring) of 'n boorskip (sien Figuur 2).

'n Semi-onderwaterboorplavorm is in der waarheid 'n boortoring met 'n hulpboor en marine ondersteuningstoerusting op 'n drywende struktuur wat uit een of meer dryfdokke bestaan. So 'n boortoring vereis 'n sleepvaartuig of vervoer-vragboot om dit na sy boorligging te vervoer. By die boorligging word die dryfdokke gedeeltelik met water gevul om die dryfdokke onder water te dompel tot by 'n voorafbepaalde diepte onder seevlak waar minder branderbeweging is. Dit gee stabiliteit aan die boortoring en fasiliteer die boorbedrywighede. In dieper water, waar dit nie geanker kan word nie, sal die boortoring in posisie gehou word deur dinamiese posisioneringstoters. 'n Boorskip aan die ander kant is in werklikheid 'n selfonderhoudende skip met 'n boortoring in die middel van die skip vanwaar boorwerkzaamhede uitgevoer word. Die boorskip sal op soortgelyke wyse in posisie gehou word deur dinamiese posisioneringstoters.

Terwyl die booreenheid by 'n boorperseel in werking is, sal 'n tydelike operasionele veiligheidsone van 500 m rondom die eenheid afgedwing word, met ander woorde,



geen ander vaartuig (buiten die ondersteuningsvaartuig) mag die gebied binnegaan nie. Die veiligheidsone sal as 'n navigasiewaarskuwing in 'n Kennisgewing aan Seevaarders uitgereik word.

5.3 Boortoerusting en -prosedures

Finale boorgatligging

Die gebied van die voorgestelde boorgatligging sal vir gevare ontleed word aan die hand van 'n spesifieke stel hoëdefinisie seismiese data, wat deel uitmaak van die verkrygde 3D-data. Die finale boorgatliggingkoördinate sal op die resultate van hierdie ontleding gebaseer word.

Boorwerk

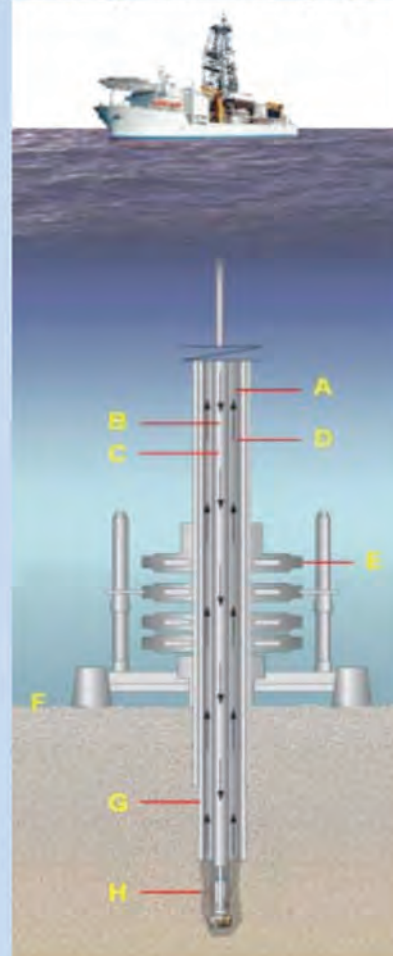
Die booreenheid sal in posisie op die voorgestelde boorperseel geskuif word. Die strukturele geleierpyp van 36 duim (91 cm) in deursnee sal in posisie geboor en gesement word, afhangende van die seabodemeienskappe. Die geleierpyp sal nagenoeg 75 m diep wees.

Onder die geleierpyp sal 'n gat van 26 duim (66 cm) in deursnee vir die oppervlakvoering wat 20 duim (51 cm) in deursnee is, geboor word tot nagenoeg 1 000 m onder die seabodem. Die oppervlakvoering sal veilig in plek gehou word deur sement deur die gat aan die onderkant van die voering en op in die spasie tussen die voering en die boorgatwand (annulus) te pomp.

Hierdie eerste twee gate sal met behulp van seewater met viskeuse hale en watergebaseerde modder geboor word. Die roterende boordraad veroorsaak dat die boorpunt die rots in klein deeltjies of boorgruis opbreek. Alle boorgruis en die watergebaseerde modder van hierdie aanvanklike boorwerk sal direk op die seabodem gestort word.

Na die aanvanklike boorwerk soos hierbo beskryf, word 'n uitbarsting- of lekvoorkomer en opstaner (sien Figuur 3) wat die boorvloeistof en boorgruis van die omgewing isoleer, op die boorgatkop geplaas en geïnstalleer. Die uitbarstingvoorkomer bevat hoëdrukveiligheidskleppe wat ontwerp is om die boorgat te verseël en om ongekontroleerde vrylating of uitbarsting van vloeistowwe uit die boorgat te voorkom, sou die primêre boorgatsperboom wat gewoonlik die boorvloeistof terughou, foutief raak of verloor word. Boorwerk gaan aan deur die boordraad te verlaag en 'n kleiner boorpunt te gebruik, deur die opstaner tot by die 20 duim-voeringskoen. Die roterende boordraad veroorsaak dat die boorpunt die rots opbreek. Hierdie stadium van boorwerk sal met die gebruik van sinteties-gebaseerde modder uitgevoer word. Terwyl die boorwerk aan die gang is, word boorvloeistof voordurend deur die hol boordraad na onder gepomp. Die vloeistof kom by gate aan die kant van die boorpunt uit en styg na bo (saam met die boorgruis), deur die spasie aan die kant van die gat (tussen die voering en die opstaner) en die boordraad, na die booreenheid. Die boormodder word behandel om soliede stukke en boorgruis uit die hersirkuleerde modderstroom te verwyder. Die boorgruis word behandel en oorboord gegooi. Die deursnee

Figuur 3: Tipiese boorbedrywighede



- A: Opstaner
- B: Boorpyp
- C: Boorvloeistof word deur die boorpyp gepomp
- D: Boorvloeistof en boorgruis vloeï op tussen die boorpyp en die opstaner
- E: Lekvoorkomer
- F: Seebodem
- G: Voering
- H: Oop gat

Bron: <http://www.planetseed.com>

van die gat word al kleiner hoe dieper geboor word want kleiner voerings word op verskillende stadiums in die gat geplaas en in plek gesement.

Gedurende die boor van 'n boorgat, is boorgruis die primêre item wat weggedoen word. Boorgruis wissel in grootte vanaf klei tot growwe gruis. Die samestelling van die rotspartikels dui op die tipe sedimentêre gesteentes wat deur die boorpunt binnegedring word. Hoewel die meeste boorvloeistof meganies van die boorgruis geskei word, sal die boorgruis wat weggedoen word, bepaalde residuele sinteties-gebaseerde modder bevat. Voordat dit in die see gestort word, word die boorgruis behandel om die olie-inhoud daarvan na minder as 6.9% van die droë boorgruisgewig

te verminder. Groot volumes van die sinteties-gebaseerde modder wat aan die einde van die boorwerk agterbly, sal óf weggeneem word vir aanlandige behandeling en wegdoening deur 'n goedgekeurde afvalverwyderingsmaatskappy óf weer gedurende die boorwerk van opvolgende boorgate gebruik word.

5.4 Boorgatopnames en -toetse

Sodra die totale diepte bereik is, word dataopnames oor die boorgat gedoen en toetse uitgevoer. Dit behels die neerlaat van opnametoerusting om gegewens in te samel ten einde 'n petro-fisiese evaluering van die boorgat te doen.

Indien die eksplorasieboorgat koolwaterstowwe bevat, sal 'n waarderingsboorgat geboor word waarvan die vloeï getoets word om die ekonomiese potensiaal van die ontdekking te bepaal voordat die boorgat prysgegee of dit opsy gesit word vir latere toegang en afhandeling. Indien 'n vloeitoets uitgevoer moet word, sal koolwaterstowwe by die boorgatperseel gebrand word. 'n Hoogs-doeltreffende vlam word gebruik om die verbranding van die koolwaterstowwe te maksimaliseer.

5.5 Afhandeling en prysgee van die boorgat

Gebaseer op die resultate van die boorwerk, dataopnames en maonlike toetsing van die boorgat, sal 'n besluit geneem word of die boorgat prysgegee of opgeskort word.

(a) Indien die boorgat opgeskort word: Indien daar bevestig word dat die boorgat kommersieel lewensvatbaar is, kan bedrywighede opgeskort word. Dit sal die volgende behels:

- Sementproppe sal binne-in die boorgat geplaas word en vir integriteit getoets word;
- Die uitbarstingvoorkomer sal verwyder word voordat die booreenheid verskuif word;
- Die boorgatkop (3 tot 4 m hoog) sal op die seabodem agterbly; en
- 'n korrosieprop sal oor die boorgatkop geplaas word, om hertoegang te fasiliteer.

(b) Boorgate wat prysgegee word: Indien 'n boorgat onsuksesvol is, sal dit permanent prysgegee word. Dit sal die volgende behels:

- Sementproppe sal binne-in die boorgat geplaas word en vir integriteit getoets word;
- Die uitbarstingvoorkomer sal verwyder word voordat die booreenheid verskuif word; en
- die boorgatkop (3 tot 4 m hoog) sal óf op die seabodem agterbly óf verwyder word. Beide alternatiewe sal tydens die Impakassessering evalueer word.

5.6 See- en landgebaseerde ondersteuning

Boorwerkbedrywighede sal deur ten minste drie vaartuie ondersteun word, wat die vervoer van toerusting en materiaal tussen die booreenheid en hawe sal fasiliteer. Die bystandvaartuie sal ook ondersteuning ten opsigte van brandblussing, olie-indamming/herwinning, redding en enige toerusting wat in 'n noodgeval verlang sal word, bied.

Uitbarstingvoorkoming

Hoewel die moontlikheid van 'n boorgatuitbarsting uiters laag is, sorg dit nogtans vir die grootste omgewingsbesorgdheid gedurende boorbedrywighede. 'n Uitbarsting of lek kan veroorsaak word deur die onbeheerde vloeï van reservoïrvloeïstof na die boorgate, wat sal lei tot 'n vrystelling van koolwaterstowwe in die see. Die boorvloeïstof verskaf primêre beveiliging teen 'n uitbarsting of lek. Die digtheid van die vloeïstof kan beheer word om enige abnormale drukking wat vorm, te balanseer. Abnormale druk wat vorm, word deur die primêre boorgatbeheertoerusting waargeneem. Die waarskynlikheid van 'n uitbarsting of lek word verder geminimaliseer deur 'n uitbarstingvoorkomer te gebruik, wat in effek 'n sekondêre beheerstelsel is. Die uitbarstingvoorkomer word op die boorgatkop geïnstalleer en is ontwerp om die boorgat te sluit indien enige uitvloeï of lek vanaf die boorgat waargeneem word. Dit kan gewoonlik vanaf 'n aantal stasies op die booreenheid beheer word. Hierdie toerusting word deeglik geïnspekteer voor installasie en daarna word die druk en funksionaliteit daarvan op 'n gereelde basis getoets.

Gevorderde boorgatintervensie en proptoerusting is in Saldanhabaai beskikbaar vir ontplooiing indien daar 'n ondersese boorgatvoerval sou plaasvind. Hierdie unieke toerusting word slegs in vier internasionale plekke, genaamd Noorweë, Brasilië, Suid-Afrika en Singapoer gevind, en word onderhou sodat dit onmiddellik gemobiliseer kan word in geval van 'n noodvoerval.

Die ondersese boorgatintervensiestelsel sluit vier propstapels in om die onbeheerde ondersese boorgat af te sluit, twee hardeware toerustingstelle om puin en opdrifsel op te ruim en ondersese disperseermiddels by die boorgatkop toe te dien.

Die logistieke kusbasis sal óf in Kaapstad óf in Saldanhabaai geleë wees. Hierdie kusbasis sal voorsiening maak vir die berging van materiale (insluitende boormateriaal, diesel, water en sinteties-gebaseerde modder) en toerusting wat per see van en na die booreenheid vervoer moet word. Die kusbasis sal ook vir die bunkerskepe gebruik word. Personeel sal per helikopter vanaf Kleinsee vervoer word en vastevlerkvliegtuie sal vir vlugte na en van Kaapstad gebruik word.

6. fokusgebied: Impakassessering

Aflandige eksplorasieboorwerk het spesifieke, bekende fokusgebiede wat goedgeokumenteer is as gevolg van impakassesseringsondervinding en navorsing wat internasionaal en in Suid-Afrika oor die boor van boorgate uitgevoer is.

Die vernaamste fokusgebiede wat geïdentifiseer is, en in die Basiese Assesseringverslag en OBPr-addendum aangespreek word, sluit in:

- Wegdoen van boorgruis wat seabodemorganismes kan

- versmoor en 'n biochemiese uitwerking daarop kan hê;
- Afval en afvalwater wat in die see gestort word, wat gelokaliseerde besoedelingsimpak kan hê;
- Tydelike verlies van toegang tot visvanggebiede as gevolg van die uitsluitingsone rondom boorbedrywighede;
- Boorgatkoppe wat op die seebodem prysgegee is of wat opsy gesit is, kan moontlik aan diepseevangnette vashaak;
- Potensiële versteuring van marinevervoer; en
- Potensiële koolwaterstofstortings (d.i. klein, toevallige stortings as deel van die normale bedrywighede tot groot stortings as gevolg van onbeplande mislukkings soos 'n boorgatuitbarsting of -lek).

7. Die Impakassesseringsproses

Die vernaamste stappe in die Basiese Assesseringsproses waaraan u kan deelneem en insae lewer, sluit in:

- Verspreiding van die AID vir 'n tydperk van 30 dae vir kommentaar en B&GP-registrasie;
- Eerste rondte van Openbare Opedae en vergaderings waartydens inligting gedeel word;
- Verspreiding van konsep Basiese Asseseringverslag en Konsep OBPr-addendum vir 'n tydperk van 40 dae vir kommentaar;
- Tweede rondte van Openbare Opedae en inligting-terugvoervergaderings; en
- Verspreiding van finale Basiese Asseseringverslag vir kommentaar vir 'n tydperk van 30 dae vir kommentaar.

Die Impak Assesseringsproses (sien Figuur 4) het in der waarheid twee fases wat hieronder beskryf word.

7.1 Fase 1: Openbare Oorleg

Die oorlegfase word beplan om 'n geleentheid vir insae vanaf B&GP's te skep. Oorleg met owerhede word ook beplan om te verseker dat die omvang van kwessies in die Basiese Asseseringsverslag en OBPr-addendum wat aangespreek word, genoegsaam is. Die doelstellings van hierdie proses van oorleg is soos volg:

- Identifiseer en lig 'n wye reeks B&GP's oor die voorgestelde projek in;
- Verkry duidelikheid oor die omvang en aard van die voorgestelde aktiwiteite en die alternatiewe wat oorweeg word;
- Voer 'n oop en deursigtige deelnemingsproses uit om die insluiting van die kwessies en bekommernisse van die B&GP's tydens die besluitnemingsproses te fasiliteer; en
- Identifiseer en dokumenteer die vernaamste kwessies wat tydens die Basiese Assesering aangespreek moet word.

Twee rondtes van openbare oorlegssessies sal gedurende die Basiese Assesseringsproses gehou word. Tydens die eerste rondte, sal opedae en inligtingsvergaderings in Kaapstad en Saldanhabaai gehou word om 'n oorsig oor die voorgestelde projek te gee en aan B&GP's die geleentheid te gee om enige kwessies of besorgdhede te opper.

Ligging: Kaapstad	Ligging: Saldanha
Datum: Maandag 11 November 2013	Datum: Dinsdag 12 November 2013
Lokaal: Grangerbaai Hotelskool Kusweg, Mouillepunt	Lokaal: Protea Hotel Hoofweg 51, Saldanhabaai
Tyd: (Openbare Opedag) 14h00 - 17h30	Tyd: (Openbare Opedag) 14h00 - 17h30
Tyd: (Inligtingsvergaderings) 17h30 - 20h00	Tyd: (Inligtingsvergaderings) 17h30 - 20h00

7.2 Fase 2: Impakassessering

Die doel van hierdie fase is om inligting in te samel en spesialisstudies te onderneem om die vernaamste kwessies en bekommernisse wat tydens die proses van oorleg geïdentifiseer is, te ondersoek. Die Basiese Asseseringsverslag en OBPr-addendum sal die assessering van alternatiewe, die identifikasie van impakte en die bepaling van die beduidendheid van die impakte insluit. Spesialiste sal bestuursaksies verskaf om die positiewe voordele te versterk of enige potensieel negatiewe impakte te vermy/minimaliseer. Die spesialisstudies wat tot op hede geïdentifiseer is, spreek die kwessies of bekommernisse en die potensiele impakte wat hieronder gelys word, aan.

8. Uitnodiging Om Aan Die Proses Deel Te Neem En Kommentaar Te Lewer

Indien u of u organisasies graag as 'n B&GP wil registreer, en/of enige aanvanklike kwessies of bekommernisse ten opsigte van die voorgestelde projek wil opper, kontak asseblief vir Mfowabo Maphosa van NMA by die onderstaande kontakbesonderhede. Kommentaar wat in die konsep Basiese Asseseringsverslag en die konsep OBPr-addendum ingesluit moet word, moet die NMA **nie later nie as Maandag 2 Desember 2013** bereik.

Kontak gerus:

Mfowabo Maphosa
NMA Effective Social Strategists (Pty) Ltd
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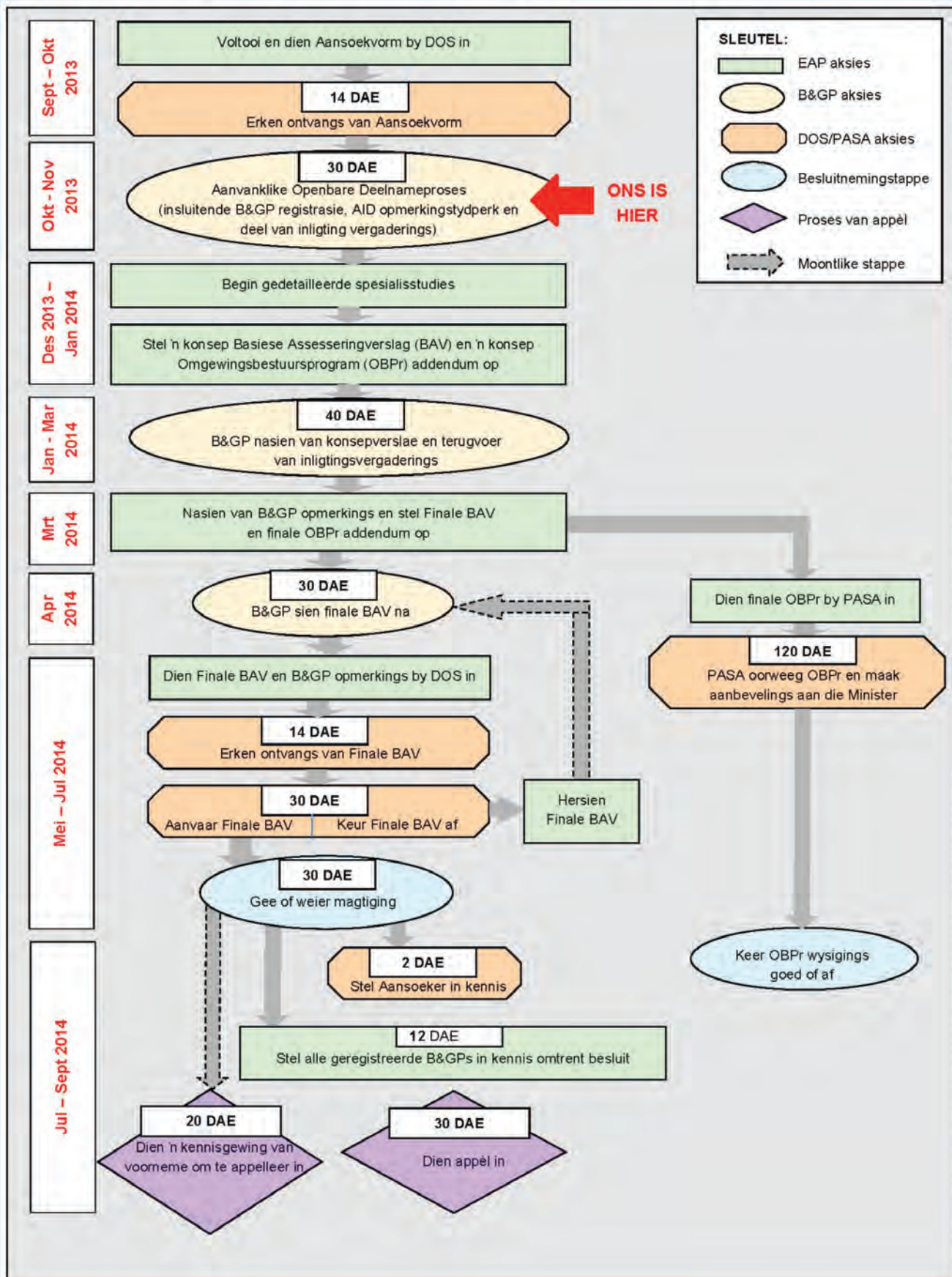


Studies (en spesialiste)	Omvang
Boorgruis- en oliestorting-modellering (Prestedge Retief Dresner Wijnberg (PRDW): Stephen Luger)	<ul style="list-style-type: none"> • Modelleer die vervoer, verspreiding en bodemstorting van boorgruis gedurende boorwerkzaamhede; • Modelleer die oliestortingsbaan en lot van olie as gevolg van 'n klein operasionele storting op die wateroppervlak by die boorvaartuig; en • Modelleer die oliestortingsbaan en lot van olie as gevolg van 'n groot storting as gevolg van uitbarsting of lek by die boorgatkop op die seabodem.
Marine Fauna-assessering (Visomgewingsdienste: Dr Andrea Pulfrich)	<ul style="list-style-type: none"> • Beskryf die plaaslike marine fauna in en om die lisensiegebied; • Bepaal die primêre risiko's vir die marine en kusomgewing tydens die onwaarskynlike voorval van 'n toevallige lekkasie of storting gedurende boorwerke; • Identifiseer, beskryf en assesser die beduidendheid van potensiële impakte van die voorgestelde boorwerk op die plaaslike marine fauna (insluitende bentiese/seebodemlewe en pelagiese/diepseeomgewings); • Identifiseer praktiese versagtingsmaatreëls om enige negatiewe impakte op die marine fauna te verminder.
Visseryassessering (CapFish SA: Dave Japp & Sarah Wilkinson)	<ul style="list-style-type: none"> • Beskryf visvangaktiwiteite wat na verwagting in en om die lisensiegebied voorkom; • Onderneem 'n tyd- en ruimtelike assessering van verwagte visvangpogings in die voorgestelde boorgebied; • Assesseer die impakrisiko van die boorwerkgebied op die verskillende visvangsektore; • Assesseer die impak van die voorgestelde veiligheidsone rondom die boorvaartuig op visvangaktiwiteite ten opsigte van die geraamde vangs en as gevolg van die verlies van visvanggebiede; en • Identifiseer praktiese versagtingsmaatreëls om enige negatiewe impakte op die visserybedryf te verminder.

Woordelys:

Annulus	Die spasie tussen die voering en die wand van die boorgat.
Boordraad	Die kolom, of draad, of boorpyl. Baie maal losserig aan beide kante van die boorpyl en boorperke vasgemaak.
Booreenheid	Booreenhede wat nie permanent aan die seabodem geheg is nie, met ander woorde, 'n boorskop of 'n semi-onderwaterboorvaartuig.
Boorgat	Die holte wat deur die boorpunt geboor word.
Boorgatkop	Die toerusting wat op die oppervlak van die boorgat geïnstalleer is.
Boorgatopnames	Aantekeninge oor geologiese formasies wat deur boorwerk binnegedring word, insluitende tegniese besonderhede oor die werkzaamheid.
Boorgat wat opgeskort word	'n Boorgat waar werkzaamhede tydelik gestaak word.
Boorgat wat prysgegee word	'n Boorgat wat amptelik verseël en prysgegee is.
Boorgruis	Stukkies rots wat deur die boorpunt losgewikkel en in die boormodder na die oppervlak gebring word.
Boorpunt	Die instrument wat tydens boorwerk vir sny- en booraksie gebruik word.
Boorvloeistof / boormodder	'n Mengsel van klei, chemiese stowwe en water wat deur die boorpyl gepomp word om die boorpunte te smeer en te laat afkoel, en om die boorgruis uit te spuit, sowel as om die kante van die gat mee te verstewig. Twee hoofkategorieë van boorvloeistof is die watergebaseerde modder en sintetiese gebaseerde modder.
Eksploorasieboorgat	'n Boorgat wat geboor word in 'n gebied wat nog nie as geskik bewys is ten einde die teenwoordigheid of afwesigheid van 'n koolwaterstofreservoir te bevestig.
Geleierpyl	'n Geleierpyl is 'n pyl met 'n groot deursnee wat in die grond geplaas word om aanvanklik stabiele strukturele fondasie vir die boorgat te verskaf.
Opstaner	Die pyl tussen 'n seabodemlek- of uitbarstingsvoorkomer en 'n booreenheid.
Rotasieboorwerk	'n Boormetode waarvolgens die gat met behulp van 'n rotasieboorpunt geboor word en waarop afwaartse druk toegepas word.
Sementvoering	Om die annulus tussen die voering en die gat met sement te vul om die voering te ondersteun en beweging van vloeistof tussen deurlatende sones te voorkom.
Uitbarsting / lek	Die onbeheerde vloei van olie of gas wat plaasvind wanneer formasiedruk meer is as die druk van die boorvloeistofkolom.
Uitbarstingvoorkomers	Hoëdrukboorkopkleppe ontwerp om die onbeheerde vloei van koolwaterstowwe te stuit.
Voering	'n Staal pyl wat met sement in die boorgat geplaas word om enige rotsformasievloei weg te keer en te voorkom dat die gat insak.
Waarderingsboorgat	'n Boorgat wat geboor word om die fisiese omvang, reserwes en moontlike produksievlak van 'n terrein te bepaal.

Figuur 4: Vloeiendiagram wat die Impakassesseringsproses illustreer





25 Okthobha 2013

Mhlekezzi/Nkosazana obekekileyo

UKUBHOLA OKUCETYWAYO NGENJONGO YOKUNQAWA KWINGINGQI EVUNYIWEYO YE-ORANGE BASIN DEEP WATER NGAKUNXWEME OLUSENTSHONA YOMZANTSI AFRIKA (INOMBOLO YESALATHISO YE-DEA: 14/12/16/3/3/1/1063): UKWAZISWA NOKUBHALISWA KWEPROJEKTHI

Le ncwadi ibonelela ngolwazi lwesindululo sikaShell South Africa Upstream B.V. ("Shell") somsebenzi wokuhlola ngokubhola kwiNgingqi eVunyiweyo yeOrange Basin Deep Water ngakuNxweme oluseNtshona yoMzantsi Afrika kwakunye nethuba lokubhalisa iQela eliNomdla neliChaphazelekayo (I&AP) nokubonelela ngoluvo lokuqalisa.

NgoFebruwari 2012 uShell ufumene ilungelo lokuhlola leOrange Basin Deep Water Licence Area ngokwemimiselo yomthetho weMineral and Petroleum Resources Development Act, 2002 (No. 28 of 2002) (MPRDA). Njengenxalenye yenkqubo yesicelo selungelo lokuhlola, iNkqubo yoLawulo lokusiNgqongileyo (EMPr) iqulunqiwe yaze yamkelwa ngenjongo yokuhlola ubume bomhlaba nokubhola kokuhlola kwingingqi evunyiweyo. Ngokulandelayo uShell uqalise uhlobo lobume bomhlaba elwandle olungu-3D kwinxalenye yengingqi evunyiweyo engama-8 000 km². Ngokusekelwe kuhlalutyo lwedata yobume bomhlaba wolwandle, uShell uceba ukubhola umthombo omnye okanye mhlawumbi emibini yokuhlola kwinxalenye esemantla engingqi evunyiweyo.

Ukuze kuqhutywe ngomsebenzi ocetywayo wokubhola kufuneka ugunyaziso ngokwemimiselo yomthetho weNational Environmental Management Act, 1998 (No. 107 of 1998) (NEMA), njengoko ulungisiwe, kwakunye neyeMPRDA. Ngokwenjenje kwaziswa ukuba isicelo sogunyaziso sithunyelwe kwiSebe yeMicimbi yokusiNgqongileyo (DEA) kwanokuthi inkqubo yoVavanyo lweSiseko luyaqhutywa ngokwemimiselo ye-Environmental Impact Assessment (EIA) Regulations 2010. Ngaphezu koko, iEMPr kaShell eyamkelweyo iya kulungiswa ngokweCandelo 102 leMPRDA ukuthathela ingqalelo naziphi na iinguqu kwindawo yeprojekthi ngokuthelakiswa nenkqubo yangoku evunyiweyo yelungelo lomsebenzi wokuhlola. Iinkcukacha ezongezelelweyo zokubhola zohlolo olucetywayo neenkqubo zomthetho zibonelelwe kuXwebhu loLwazi lweMvelaphi (BID).

I-CCA Environmental (Pty) Ltd (CCA), ngokusebenzisana neNMA Effective Social Strategists (Pty) Ltd (NMA), yalathelwe nguShell ukwenza inkqubo yoVavanyo lweSiseko nokuqulunqa iSihlomelo se-EMPr.

Uchongiwe njengeQela eliNomdla neliChaphazelekayo (I&AP) malunga nale projekthi yaye kungako ufumana le mbalelwano. Ukuba unqwenela ukususwa kwiRejista yamaQela aNomdla naChaphazelekayo (I&Aps), hlaziya iinkcukacha zakho zoqhagamshelwano, okanye phakamisa nayiphi imiba yokuqalisa okanye exhalabisayo ngokuphathelile kwiprojekthi ecetywayo, nceda usebenzise iFomu yokuBhalisa nokuSabela eqhotyoshelweyo uze uyithumele kuNMA usebenzisa iinkcukacha zoqhagamshelwano ezibonelelwe ngezantsi **kungadlulanga uMvulo wama-2 Disemba 2013.**

Mfowabo Maphosa: NMA Effective Social Strategists
PO BOX 32097, BRAAMFONTEIN, 2017
Ifowuni: 011 447 9737 Ifeksi: 086 601 0381
I-imeyile: mfowabom@nma.org.za

Isaziso kananjalo ngokwenjenje sinikelwa ukuze iintsuku ezivulekileyo zoluntu (iiPOD) neentlanganiso zokwabelana ngolwazi ziqhutywe eKapa naseSaldanha ukunikela ngeprojekthi ecetywayo kunye nenkqubo yokuvavanya ifuthe kokusingqongileyo.


Umhla:		Mvulo 11 Novemba 2013	Lwesibini 12 Novemba 2013
Indawo:		EKapa	ESaldanha
Indawo:		EGranger Bay Hotel School Idilesi: Beach Road, Mouille Point	EProtea Hotel Idilesi: 51 Main Road, Saldanha Bay
Ixesha:	USUKU LOLUNTU	14h00 - 17h30	14h00 - 17h30
	Intlanganiso	17h30 - 20h00	17h30 - 20h00

Ukuba unemibuzo nayiphi na ngomba ongentla, okanye ufuna naluphi ulwazi olongezelelweyo, nceda ungathandabuzi ukuqhagamshelana nathi.

Owakho ngokunyanisekileyo



MFOWABO MAPHOSA
UMLAWULI WEDATABASE – UKUBONISANA NOLUNTU

The background of the page features a silhouette of a construction site against a light green gradient. On the left, there is a tall, lattice-structured tower. To the right, a large tower crane is visible, with a smaller crane below it. The foreground shows the structural framework of a building under construction, with various beams and supports.

**Uhlolo Olusisiseko
Lwenkqubo Yokubhola
Okucetywayo Kwingingqi
Evunyelweyo Ye-Orange
Basin Deep Water
Kunxweme Olusentshona
Lomzantsi Afrika**

UXWEBHU LOLWAZI MALUNGA NEMVELAPHI OKTHOBHA 2013

1. Imvelaphi Yale Projekthi

NgoFebruwari 2012 uShell South Africa Upstream B.V. (apha obizwa ngokuthi "nguShell"), ihlumelo leRoyal Dutch Shell plc, ufumene ilungelo lokwenza uhlobo kwiNgingqi Evunyelweyo ye-Orange Basin Deep Water ngokwemimiselo yeMineral and Petroleum Resources Development Act, 2002 (No. 28 ka-2002) (MPRDA). Le ngingqi evunyelweyo imalunga nama-37 290 km² ubukhulu. Umda ongasempuma weNgingqi Evunyelweyo uphakathi kommandla onokuba malunga neekhilomitha ezili-150 nezingama-300 ukusuka kuNxweme oluseNtshona loMzantsi Afrika malunga naphakathi kweSaldanha Bay (33°S) neKleinsee (30°S), yaye ubunzulu bamanzi buphakathi kweemitha ezingama-500 nezingama-3 500 (jonga umZobo 1).

Njengenxalenye yenkqubo yokwenza isicelo selungelo lokuhlola, ibe kukuqulunqwa kwesi Cwanciso sokuPhathwa kweNdalo esiNgqongileyo (EMPr) nokuvunywa kwaso ukuze kuqaliswe ukuhlolwa kobume bomhlaba elwandle nokubhola ngenjongo yokuhlola kwingingqi evunyelweyo yokwenza oko. Ngokulandelayo uShell uqalise uhlobo lobume bomhlaba elwandle olungu-3D kwinxalenye engama-8 000 km² yengingqi evunyelweyo, hlolo olu lugqitywe ngomhla wama-22 kaFebruwari 2013.

Ngokusekelwe kuhlalutyo lolwazi oluqokelelweyo lobume bomhlaba elwandle, uShell uceba ukubhola umthombo omnye okanye emibini ukuba kunokwenzeka kwinxalenye esemntla yengingqi evunyelweyo (jonga umZobo 1). Ukubhola kwenziwa ngenjongo yokuqiniseka ukuba kwiindawo

zobume bomhlaba okanye "iindawo ekungqawa kuzo", ezichongwe ngokuphonononga ulwazi olufunyenwe kuhlolo lobume bomhlaba elwandle, ikhona na i-oyile okanye igesi ekunokwenzeka ibe ninzi ngokwaneleyo ukuze kushishinwe ngayo.

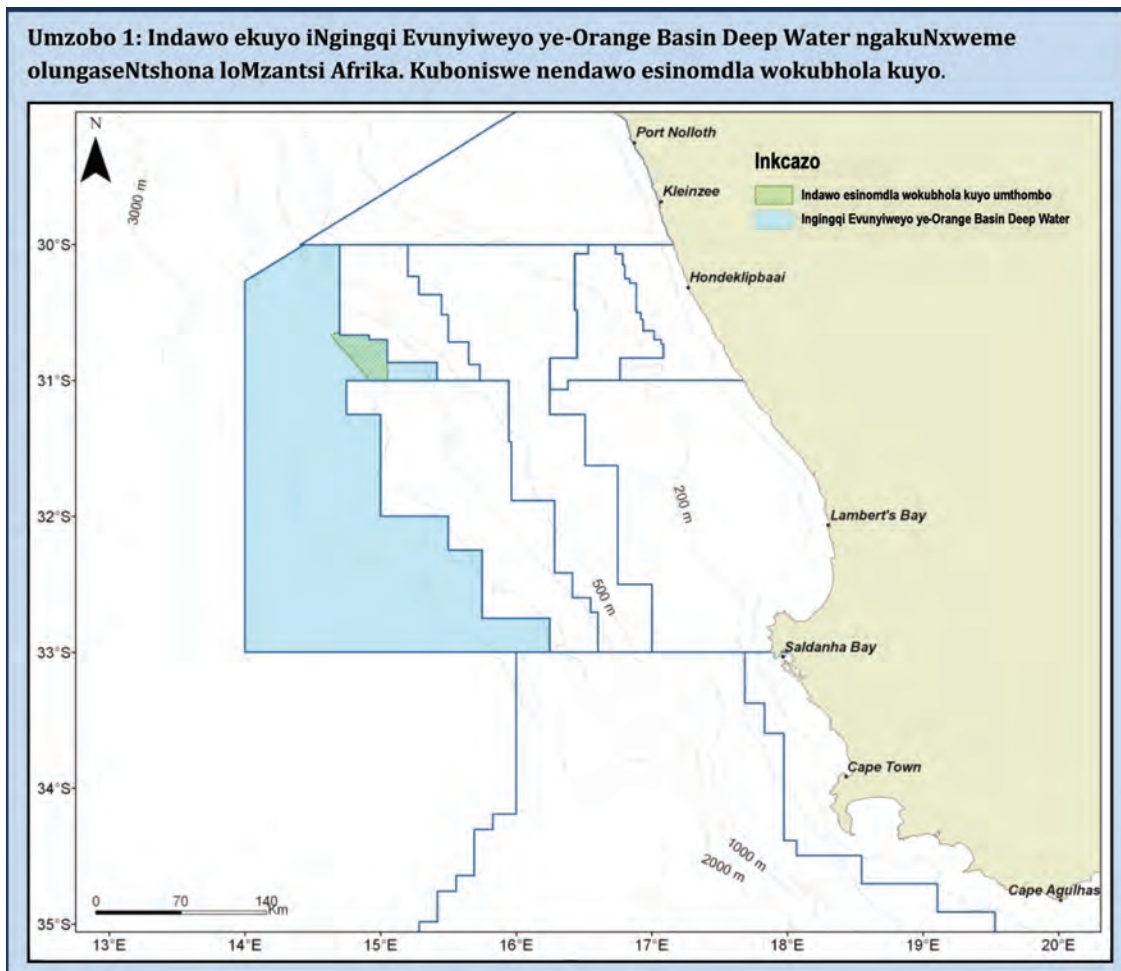
2. Injongo Yolu Xwebhu

Olu Xwebhu loLwazi malunga neMvelaphi (BID) lusebenzela:

- ukwazisa amaqela anomdla nachaphazelekayo (ii-I&AP) malunga neenkqubo ezisemthethweni ekufuneka uShell azithobele;
- ukubonelela ngenkcazo yomsebenzi ocetywayo wokubhola umthombo ngenjongo yokungqawa kwakunye nenkqubo yokuHlola iFuthe elinokubakho; kunye
- nokunika umda womsebenzi owenziwa ziingcali ezicebisayo nokuba ii-I&AP zingenza njani ukuthatha inxaxheba kule nkqubo.

3. Ngoobani Abacebisi?

U-CCA Environmental (Pty) Ltd (CCA), ebambisene noNMA Effective Social Strategists (Pty) Ltd (NMA), uqeshwe nguShell ukuba enze isiHlomelo se-EMPr ngokutsho kweCandelo 39(6) leMPRDA kunye nokuqhuba inkqubo yoHlolo oluSisiseko ngokutsho kweNational Environmental Management Act, 1998 (No. 107 ka-1998) (NEMA), olungisiweyo. Umsebenzi kaCCA iza kuba kukuphatha nokwenza isiHlomelo se-EMPr neenkqubo zoHlolo oluSisiseko, ngelixa uNMA eza kuqhuba inkqubo yokuthatha inxaxheba koluntu.



4. Sisiphi Isigunyaziso Esifunekayo?

Ukuze kwenziwe lo msebenzi ucetywayo wokubhola kufuneka kufunyenwe isigunyaziso ngokutsho kweMPRDA kunye neNEMA.

4.1 Umthetho iMineral and Petroleum Resources Development Act, 2002: *isiCwangciso sokuPhathwa kweNdalo esiNgqongileyo*

Ngokokutsho kweMPRDA imisebenzi yokuhlola ayinakuqaliswa lingekakhutshwa ilungelo lokuhlola. Kuyimfuneko ukuze kufunyanwe ilungelo lokuhlola ukuba kwenziwe i-EMPr ngokuvumelana neCandelo 39 leMPRDA, ingeniswe kwiPetroleum Agency SA (PASA) ukuze iqwalaselwe ze ivunye nguMphathiswa weziMbiwa (okanye umntu onikwe elo gunya). UShell unayo i-EMPr evunyiweyo nekusenokufuneka ilungiswe ukuze ivumelane nazo naziphi na iinguqu ezikhoyo kumda weprojekthi ekusekelwe kuwo isicwangciso sokusebenza selungelo lokuhlola elivunyiweyo sithetha nje.

4.2 Umthetho iNational Environmental Management Act, 1998: *uHlolo oluSisiseko*

ImiMiselo yokuHlolwa kweFuthe kwiNdalo esiNgqongileyo (i-EIA) ka-2010 eyabhengezwa ngokutsho kwesahluko sesi-5 seNEMA ibonelela ngokulawulwa kwemisebenzi ethile edweliswe phantsi kweZaziso zasebuRhulumenteni (GN) R544 (iSaziso Esidweliweyo soku-1), R545 (iSaziso Esidweliweyo sesi-2) no-R546 (iSaziso Esidweliweyo sesi-3). Le misebenzi ayinakwenziwa de kufunyanwe imvume ebhaliweyo kwigunya elifanelekileyo.

Umsebenzi wokubhola ocetywayo uza kubangela kwenzeke iNtshukumo 18(ii) kwiSaziso Esidweliweyo soku-1, emalunga "nokufakwa kwayo nantoni na engaphezu kwe-5m³ elwandle" okanye "ukushenxiswa okanye ukususwa komhlaba, intlathi, amaqokobhe, uhlalutye lwamaqokobhe, iingqalutye okanye amatye angaphezu kwe-5 m³ ewandle". Kwimisebenzi ekwiSaziso Esidweliweyo soku-1 kufuneka kwenziwe inkqubo yoHlolo olunguNdoqo ukuze igunya elifanelekileyo, iSebe leMicimbi yokusiNgqongileyo (DEA), liqwalasele isicelo ukuze likhuphe isigunyaziso sokuba kwenziwe lo msebenzi ucetywayo.

5. Inkcazelo-Jikelele Ngeprojekthi

5.1 Indawo okuyo umthombo nesicwangciso sokubhola UShell uceba ukubhola umthombo omnye okanye emibini ukuba kunokwenzeka kwinxalenye esemntla yengingqi evunyiweyo. Kweli nqanaba indawo anomdla uShell kuyo ibonisiwe apho kuza kubholwa khona (jonga umZobo 1), ubukhulu bayo ngama-900 km² yaye ubunzulu bamanzi buphakathi kweemitha ezili-1 500 nezingama-2 100. Indawo oza kuba kuyo umthombo ekugqibeleni iza kuxhomekeka kwizinto eziliqela, kuquka olunye uhlalutyo lolwazi oluqokelelweyo lwe-3D malunga nobume bomhlaba elwandle, ubume bendawo ekujoliswe kuyo kunye nezithintelo ezinokubakho entseleni yolwandle. Kulindeleke ukuba ubunzulu bokugqibela bomthombo bube phakathi kweemitha ezingama-2 700 nama-3 000 ngaphantsi kwentsele yolwandle yaye kulindeleke ukuba kuthathe iinyanga ezintathu ukuba kugqitywe. Ngezizathu zokuba kusebenzeke, kulindeleke ukuba kubholwe kwihlobo elilandelayo phakathi koNovemba ukuya ku-Epreli.

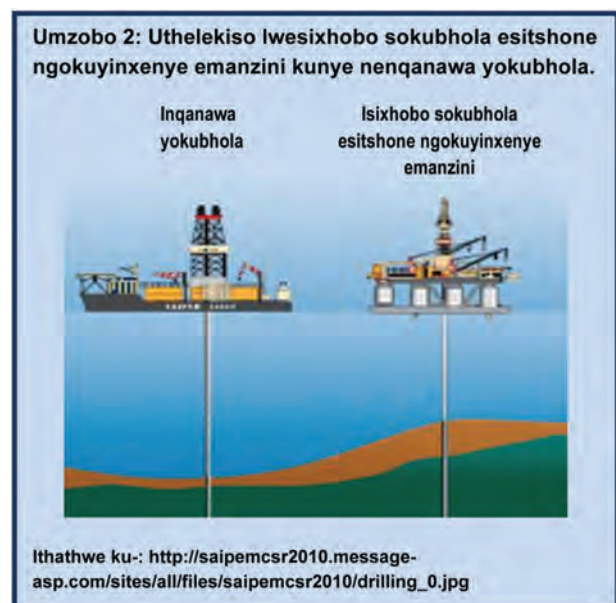
Kuxhomekeka kwimpumelelo yomthombo wokuqala, kungenzeka kubholwe umthombo wesibini ukuze kuqinisekise ubungakanani nezinga lokumpompoza kobutyebi obumbiwayo. Indawo onokubholwa kuyo lo mthombo "wokuqinisekisa" kunye nobunzulu bawo ziza kuxhomekeka kwiziphumo zomthombo wokuqala. Kulindeleke ukuba lo mthombo wokuqinisekisa uza kubholwa ubuncinane emva konyaka omnye ugqityiwe umthombo wokuqala ukuze kuvunyelwe ixesha elaneleyo lokuhlalutya kolwazi oluqokelelweyo nokwenziwa kwezicwangciso.

5.2 Iintlobo zeeyunithi zokubhola

Kunokusetyenziswa iintlobo ezahlukeneyo zobugcisa bokubhola kuxhomekeka, phakathi kwezinye izinto, kubunzulu bamanzi neemeko zokusebenza elwandle ezikhoyo kwindawo okuyo umthombo. Kungokunje uShell ucinga ngeentlobo ezimbini zeeyunithi zokubhola, inqanawa yokubhola ephantse itshone elwandle (eyenzelwe ukubhola) okanye inqanawa yokubhola (jonga umZobo 2).

Ngokusisiseko inqanawa yokubhola ephantse itshone elwandle sisixhobo sokubhola esifakelwe izinto zokubhola nezokusebenza elwandle nezibekwe kwisakhiwo esidadayo esenziwe ngesikhitshana esinye okanye eziliqela. Ngokuqhelekileyo esi sixhobo sokubhola siphantse sitshone elwandle kufuneka sibe nenqanawa yokusirhuqa okanye into yokuthwala esi sixhobo isise kwindawo ekuza kubholwa kuyo. Xa kufikwa kwindawo ekuza kubholwa kuyo, izikhitshana zitshoniswa kancinci, ukuze zibe phantsi kwamanzi ngobunzulu obumiselwe kusengaphambili ngaphantsi komgangatho wolwandle apho kukho intshukumo encinci yamaza. Oku kwenza ukuba inqanawa yokubhola ingagungqi ukuze kube lula ukubhola. Emanzini anzulu kakhulu apho kungekho lula ukufaka ii-ankile, isixhobo sokubhola simiswa ngezinto ezinamandla zokusixhasa. Ngokusisiseko inqanawa yokubhola yinqanawa ekwazi ukuzimela ngokwayo ze kufakelwe isixhobo sokubhola, ngokuqhelekileyo siba sesazulwini senqanawa apho kuqhutywa khona imisebenzi yokubhola. Nayo ngokufanayo inqanawa yokubhola ibanjwa ngezinto ezinamandla zokuyixhasa.

Ngelixa iyunithi yokubhola isebenza kwindawo ekubholwa kuyo, kuza kucandwa indawo eziimitha ezingama-500 yethutyana neza



kuba yeyokhuseleko nejikeleze iyuniti, okuthetha ukuthi azikho ezinye iinqanawa (ngaphandle kweenqanawa ezincedisayo) ezinokungena kule ndawo. Le ndawo yokhuseleko iza kuchazwa kwiSaziso esiya kubaSebenzi baseLwandle njengesilumkiso kwezinye iinqanawa.

5.3 Izinto ezisetyenziswayo nenkqubo yokubhola

Indawo yokugqibela okuyo umthombo

Indawo okuza kuqhutywa kuyo ukubhola okucetywayo iza kuhlalutywa kujongwe iingozi kusetyenziswa ulwazi oluqokelelweyo nolucacileyo lobume bomhlaba elwandle, oluziinkcukacha zolwazi olufunyenweyo lwe-3D. Iinkcukacha zendawo yokugqibela okuyo umthombo ziza kusekelwa kwiziphumo zolu hlalutyo.

Ukubhola

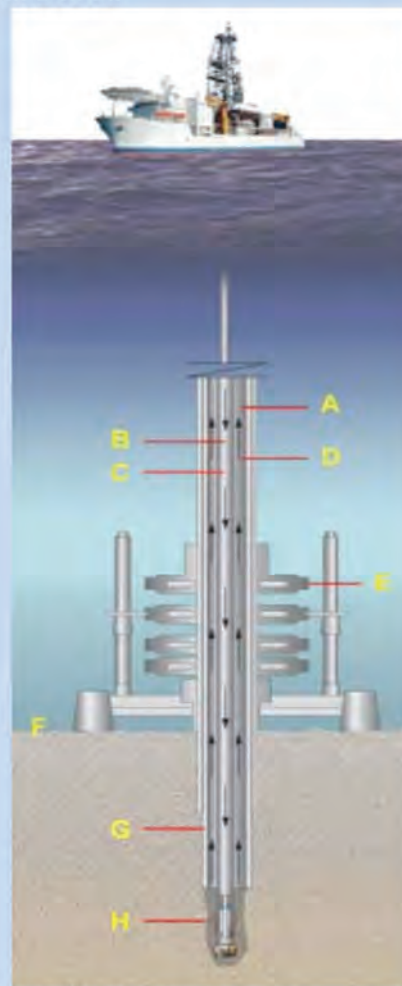
Iyuniti yokubhola iza kusiwa kwisayithi yendawo ekucetywe ukuba kubholwe kuyo. Umbobho wokuhambisa ibhola nonobubanzi obuzii-intshi ezingama-36 (91 sm) uza kombelwa uze utyatyekwe ngesamente okanye ubotshelwe uqine kuxhomekeka kwiimpawu zokungabinzulu kwentsele yolwandle. Lo mbobho uza kuba malunga neemitha ezingama-75 ubunzulu.

Ngezantsi kwalo mbobho, kuza kombiwa umngxuma onobubanzi obuzii-intshi ezingama-26 (66 sm) ukwenzela into yokuhambisa ibhola nezii-intshi ezingama-20 (51 sm), neza kuhla ngomgama omalunga neemitha ezili-1 000 ngaphantsi kwentsele yolwandle. Isigqubuthelo sangaphezulu sinokuqiniswa ngokugalela isamente ngesigqubuthelo emazantsi omngxuma nakwisithuba esiphakathi kwesigqubuthelo nodonga lomngxuma wesitsala-manzi (i-annulus).

La macandelo mabini okuqala omngxuma aza kubholwa kusetyenziswa amanzi aselwandle ngomqukuqela ojijileyo nodaka olwenziwe ngamanzi (WBM). Umtya ojikelezayo wokubhola, ubangela ukuba intsimbi yokubhola ingqushelwe ilitye libe ziingceba ezincinci. Zonke iingceba nodaka olwenziwe ngamanzi ezibangelwa leli nqanaba lokuqala lokubhola ziza kutyekezela ngokuthe ngqo kumgangatho wolwandle.

Emva kwenqanaba lokuqala lokubhola elichazwe ngasentla, isithinteli sogqabhuko-dubulo (iBOP) kunye neriser yasemanzini (jonga umZobo 3), eyahlukanisa ulwelo lokubhola kunye neengceba kokungqongileyo, iyathotywa ze ifakwe kwintloko yomthombo. Le BOP inezivalo zokhuseleko zoxinzelelo oluphakamileyo ezizilelwe ukuvingca umthombo ze zithintele ukuphuma okungalawulekileyo kolwelo emthonjeni ('ugqabhuko-dubulo') ukuba kungenzeka isithinteli esiyintloko (ngokuqhelekileyo ulwelo olunamandla kakhulu lokubhola) soyisakele. Inkqubo yokubhola iyaqhubeka ngokuthi kuthotywe umtya wokubhola, onentsinjana encinci yokubhola, uthotywa ngeriser kwisigqubuthelo esinobubanzi obuzii-intshi ezingama-20 nomtya ojikelezayo wokubhola, into ethi ibangele ukuba intsimbi yokubhola icole ilitye. Eli nqanaba lokubhola lenziwa kusetyenziswa udaka olwenziwe ngokuxuba imichiza ethile (i-SBM). Ngelixa inkqubo yokubhola iqhubeka, ulwelo lokubhola luthe gqolo ukumpompoza lungena kumtya wokubhola ongenanto ngaphakathi. Ulwelo luphuma ngentunja ezithile kwintsinjana yokubhola luze ke lunyuke (lunyuka neengceba zelitye) ngesithuba esiphakathi kwamacala omngxuma (isigqubuthelo nombobho wokunyusa) nomtya wokubhola, ukuya kwiyunithi ebhulayo. Olu daka lubuyiswa yibhola lufakwa imichiza ethile ukuze kususwe izinto eziqinileyo kunye

Umzobo 3: Umsebenzi oqhelekileyo wokubhola.



- A: I-riser
 - B: Umbobho wokubhola
 - C: Ulwelo lokubhola olufakwa ngombobho wokubhola
 - D: Ulwelo lokubhola neengceba ziphuphuma phakathi kombobho wokubhola ne-riser
 - E: Isithinteli sogqabhuko-dubulo
 - F: Intsele yolwandle
 - G: Isigqubuthelo
 - H: Umngxuma ovulekileyo
- Ithathwe ku-: <http://www.planetseed.com>

neengceba zamaty eamanzi anodaka olujikelezayo. Ezi ngceba zifakwa imichiza ethile ze zikhutshelwe ngaphezulu. Ububanzi bomngxuma buyancipha ngokwamanqanaba obunzulu njengoko ngokuqhubekayo kufakwa izigqubuthelo ezincinci kakhulu ngobubanzi emngxunyeni kumanqanaba ohlukeneyo yaye ziqiniswa ngesamente ukuze zingagunqi.

Ngethuba kubholwa umthombo, into eyintloko ephumayo kwisikhitshana sokubhola ziingceba eziphuma xa kubholwa. Ezi ngceba ziyahluka ngobukhulu ukusuka kweziludongwe ukuya kuhlalutyelurhabaxa. Uhlobo lwamasuntswana amatye lubonisa iintlobo zamaty edlula kuwo intsimbi yokubhola. Nakuba inkoliso yolwelo oluphuma xa kubholwa isahlukana ngokuzenzekelayo neengceba zamaty, ezi zinto ziphumayo zinganayo nentlenge yeSBM. Ngaphambi kokuba zilahlwe elwandle, ezi ngceba ziphuma xa kubholwayo ziza kufakwa

imichiza ethile ukuze kuncitshiswe i-oyile ezinayo ibe ngaphantsi kwe-6.9% yobunzima beceba elomileyo. Izixa ezikhulu ze-SBM eseleyo xa kugqitywa umsebenzi wokubhola umthombo, zingathwalwa zisiwe elunxwemeni ukuze zifakwe imichiza ethile ze zilahlwe yinkampani egunyazisiweyo yokulahla inkukuma okanye ziphinde zisetyenziswe xa kubholwa umthombo olandelayo.

5.4 Ingxelo ngomthombo novavanyo

Emva kokuba kufikelelwe kubunzulu obupheleleyo bomthombo kuza kwenziwa ingxelo ngawo ze uvavanywe. Oku kuquka ukuthoba isi(zi)xhobo zokurekhodisha ukuze kuqokelelwe ulwazi ukuze kwenziwe uphononongo lwamafutha nobume bomhlaba emngxunyeneni womthombo.

Ukuba umthombo ekungqawa kuwo udibana neehayidrokharbon, kuza kubholwa umthombo “wokuqinisekisa”, nalapho kuza kuvavanywa izinga lokumpompoza ukuze kuqinisekise ukuba angakanani na amathuba ezoqoqosho onawo loo mthombo ngaphambi kokuba uyekwe okanye umiswe kulindwe ixesha elizayo lokuba kungenwe kuwo kwakhona ze ugqityezelwe. Ukuba kufuneka kwenziwe uvavanyo lwezininga lokumpompoza kwawo, iihayidrokharbon ziza kutshiswa ngasemthonjeni, kusetyenziswa idangatye elinamandla kakhulu ukuze kuqinisekise ukuba iihayidrokharbon zitsha ngokupheleleyo.

5.5 Ukugqitywa nokuyekwa komthombo

Ngokusekelwe kwiziphumo zokubhola, iingxelo novavanyo olunokwenziwa emthonjeni, kuza kwenziwa isigqibo sokuba kumiwe na okanye uyekwe umthombo.

(a) Imithobo emisiweyo: Ukuba kuqinisekisiwe ukuba umthombo ungasebenza ngokwezorhwebo, unokumiswa. Oku kungathetha ukwenziwa kwezi zinto zilandelayo:

- Kunokufakwa izivingco zesamente ngaphakathi emngxunyeneni womthombo ze zihlolwe ukuba ziqinile na;
- Kungashenxiswa iBOP ngaphambi kokuba kususwe iyunithi yokubhola kuloo ndawo;
- Intloko yomthombo (eziimitha ezi-3 ukuya kwezi-4 ukuphakama) iza kusala kumgangatho wolwandle; yaye
- Kungabekwa isiciko esijijwayo phezu kwentloko yomthombo ukuze kube lula ukungena kwakhona.

(b) Imithombo eyekiweyo: Ukuba umthombo awubanga yimpumelelo, uza kuyekwa ngokupheleleyo. Oku kungathetha ukwenziwa kwezi zinto zilandelayo:

- Kunokufakwa izivingco zesamente ngaphakathi emngxunyeneni womthombo ze zihlolwe ukuba ziqinile na;
- Kungashenxiswa iBOP ngaphambi kokuba kususwe iyunithi yokubhola kuloo ndawo; yaye
- Intloko yomthombo (eziimitha ezi-3 ukuya kwezi-4 ukuphakama) ingasala okanye ishenxiswe kumgangatho wolwandle. Zombini ezi ndlela ziza kuphononongwa kuHlolo lweFuthe elinokubakho.

5.6 Inkxaso yaselwandle neyomhlaba

Le misebenzi yokubhola iza kuxhaswa ubuncinane ngeenqanawa ezintathu, eziza kwenza kube lula ukuthwalwa kwezixhobo neemathiriyeli phakathi kweyunithi yokubhola kunye nezibuko lolwandle. Kanjalo iinqanawa ezilindileyo ziza kubonelela ngenkxaso yezinto zokucima umlilo, ukuthintelwa/ukugutyulwa kwe-oyile, ukuhlangula kunye nazo naziphi na izixhobo ezisenokufuneka ngexesha likaxakeka.

Ukuthintela ugqabhuko-dubulo:

Nakuba emancinci gqitha amathuba okuba kubekho ugqabhuko-dubulo kulo mthombo, iba yeyona nto ixhalabisa kakhulu kwindalo engqongileyo xa kusenziwa imisebenzi yokubhola. Ugqabhuko-dubulo lungabangelwa kukumpompoza okungalawulekiyo kolwelo emngxunyeneni, kubangele ukuba iihayidrokharbon zingene elwandle. Into eyintloko yokukhusela ugqabhuko-dubulo lulwelo lokubhola. Amandla okumpompoza kolwelo anokulawulwa ukuze alungelane naluphi na uxinzelelo olungaqhelekanga olunokwenzeka. Ukuyileka koxinzelelo olungaqhelekanga kubhaqwa ngesixhobo esiyintloko sokulawula umthombo. Amathuba okuba kungenzeka ugqabhuko-dubulo ancitshiswa nangakumbi ngokusetyenziswa kweBOP, isixokelelwano sesibini solawulo. Le BOP ifakwa kwintloko yomthombo yaye iyilwe ngendlela yokuba iwuvale umthombo xa ngaba kufunyaniswe ukuba umngxuma womthombo uyavuzwa. Ngokuqhelekileyo ingasetyenziswa ngokusuka kwizitishi eziliqela zeyunithi yokubhola. Esi sixhobo sihlolwa ngenyameko ngaphambi kokufakelwa yaye emva koko uxinzelelo nokusebenza kwaso kuvavanywa ngokuthe rhoqo.

Isixhobo sobugcisa esiphambili kakhulu nesokusingca siyafumaneka eSaldanha Bay ukuze sisetenziswe xa kungenzeka kubekho ingozi emthonjeni ophantsi kolwandle. Esi sixhobo singaqhelekanga sigcinwa kwiindawo ezine kuphela emhlabeni wonke, oko kukuthi eNorway, eBrazil, eMzantsi Afrika naseSingapore yaye sigcinwa silungele ukuba sisetenziswe ngoko nangoko xa kuvela ingxaki.

Isixokelelwano sokungenelela somthombo esingaphantsi kolwandle siquka iziqhuma ezine zokusingca ezenzelwe ukuthintela umthombo ongalawulekiyo phantsi kolwandle kunye neekiti ezimbini ezinamandla zokucoca ukungcola kunye nokusebenzisa izinto zokuchithachitha ukungcola phantsi kolwandle nezikwintloko yomthombo.

Indawo yokwenziwa kwemisebenzi eyenziwa elunxwemeni iza kuba seKapa okanye eSaldanha Bay. Le ndawo eselunxwemeni iza kusetyenziselwa ukugcina iimathiriyeli (kuquka iimathiriyeli zokubhola, idizili, amanzi ne-SBM) nezixhobo eziza kuthwalwa zivela/zisiya kwiyunithi yokubhola zihanjiswa ngolwandle. Kanjalo le ndawo iselunxwemeni iza kusetyenziselwa ukumisa iinqanawa. Abantu abasebenzayo baza kuthuthwa ngenqwelontaka ukusuka eKleinsee nezinye iindlela zohambo ngomoya ezicwangcisiweyo ukuya nokusuka eKapa.

6. Indawo Ekujoliswe Kuyo Kuhlolo Lwefuthe Kokungqongileyo

Xa kubholwa ngenjongo yokungqawa elunxwemeni kubakho iindawo ekujoliswa kuzo nezichazwa kakuhle ngenxa yamava okuhlola ifuthe nophando olufunyenwe ngokubholwa kwemithombo emhlabeni wonke naseMzantsi Afrika.

Iindawo ezingundoqo nekujoliswe kuzo ezichongiweyo, neziza kuqwalaselwa kwiNqubo yoHlolo oluSisiseko (BAR) kunye nesiHlomelo se-EMPr ziquka:

- Ukulahlwa kweengceba zamaty eziinokugqumelela ze zibe nefuthe kwimichiza yezinto eziphilayo;
- Inkunkuma namanzi angcolileyo angena elwandle, nto leyo inokubangela ungcoliseko kwindawo ethile;
- Ukuvalwa kwethutyana kweendlela zokufikelela kwiindawo zokuloba ngenxa yokungabi nakungena kwindawo

- ekuqhutywa kuyo umsebenzi wokubhola;
- Izinto ekuvalwe ngazo imithombo eyakhiweyo okanye esamisiweyo entseleni yolwandle nesenokubhabhisa iminatha yokuloba esenzulwini yolwandle;
- Ukuphazamiseka okunokwenzeka kokuhamba kwezinto zaselwandle; kunye
- Nokuchitheka okunokwenzeka kwemichiza yehayidrokarbhon (oko kukuthi amathontsi achitheka ngengozi ngelixa kusenziwa imisebenzi eqhelekileyo ukuya ekuchithekeni kakhulu kwemichiza ngenxa yeziganeko ezingacetywanga ezifana nokugqabhuka kwemithombo).

7. Inkqubo Yokuhlolwa Kwefuthe Elinokubakho

Amanyathelo angundoqo kwinkqubo yoHlolo oluSisiseko onokuthi uthathe inxaxheba nokuthi ube negalelo kuwo aquka:

- Ukusasazwa kweBID ukuvulela ithuba leentsuku ezingama-30 zokwenza amagqaba-ntshintshi nokuba ii-I&AP zibhalise;
- Umjikelo wokuqala weeNtsuku zoluNtu ngokubanzi neeNtlanganiso zokwabelana ngoLwazi;
- Ukusasazwa koYilo lweBAR noYilo lwesiHlomelo se-EMPr ukuvulela ithuba leentsuku ezingama-40 zokwenza amagqaba-ntshintshi;
- Umjikelo wesibini weeNtsuku zoluNtu ngokubanzi neeNtlanganiso zokwabelana ngoLwazi; kunye
- Nokusasazwa kombhalo wokuGqibela weBAR ukuvulela iintsuku ezingama-30 zokwenza amagqaba-ntshintshi.

Ngokusisiseko inkqubo yokuHlolwa kweFuthe elinokubakho (jonga umZobo 4) inamanqanaba amabini, achazwe ngezantsi.

7.1 Inqanaba loku-1: Ukufumana Izimvo Zoluntu

Inqanaba lokufumana izimvo licwangciselwe ukuvula ithuba lokuba ii-I&AP zivelise izimvo zazo. Kanjalo kwenziwe isicwangciso sokufumana izimvo zabasemagunyeni ukuze kuqinisekiswa ukuba umda wemiba ekufuneka ichatshazelwe kwiBAR nesiHlomelo se-EMPr wanele. Iinjongo zale nkqubo yokufumana izimvo:

- Kukuqinisa nokwazisa ii-I&AP ezahlukeneyo malunga nale projekthi icetywayo;
- Kukuqinisa umda nemo yemisebenzi ecetywayo nezinye iindlela eziqwalaselwayo;
- Kukuqinisa inkqubo evulekileyo necacileyo yothatho-nxaxheba ukuze kube lula ukuqinisa kwemiba nezinto ezixhalabisa ii-I&AP ekwenziweni kwezigqibo; kunye
- Nokuchonga nokwenza uxwebhu lwemiba engundoqo emele iqwalaselwe kuHlolo oluSisiseko.

Kuza kuqhutywa imijikelo emibini yeeshini zokufumana izimvo zoluntu ngethuba lenkqubo yoHlolo oluSisiseko. Kumjikelo wokuqala, kuza kubanjwa iiNtsuku zoluNtu neeNtlanganiso zokwabelana ngoLwazi eKapa naseSaldanha Bay ukuze kubonelelwe ngenkcazelo malunga neprojekthi ecetywayo ze kuvulelwe nee-I&AP ithuba lokuphakamisa nayiphi na imiba okanye izinto ezixhalabisayo.

Indawo: EKapa	Indawo: ESaldanha
Umhla: Mvulo 11 Novemba 2013	Umhla: Lwesibini 12 Novemba 2013
Indawo: Isikolo iGranger Bay Hotel Beach Road, Mouille Point	Indawo: EProtea Hotel 51 Main Road, Saldanha Bay
Ixesha: (Usuku loluNtu) 14h00 - 17h30	Ixesha: (Usuku loluNtu) 14h00 - 17h30
Ixesha: (Intlanganiso yokwabelana ngolwazi) 17h30 - 20h00	Ixesha: (Intlanganiso yokwabelana ngolwazi) 17h30 - 20h00

7.2 Inqanaba lesi-2: Ukuhlola Ifuthe Kwezindalo

Injongo yeli nqanaba kukuqokelela ulwazi nokuqhuba uphononongo lobungcali ukuze kuqwalaselwe imiba engundoqo exhalabisayo nechongwe ngethuba lenkqubo yokubonisana. Ingxelo yeBAR nesiHlomelo se-EMPr iza kuquka ukuhlolwa kwezinye iindlela, ukuchongwa kwefuthe elinokubakho kunye nokuqinisekiswa kobukhulu belo futhe. Iingcali ziza kubonelela ngezenzo zokuphatha eziza kunyusa iinzuzo ezintle okanye zokuphepha/zokunciphisa ifuthe elibi elinokubakho. Uphononongo lobungcali oluchongiweyo ukuza kuthi ga ngoku ekuphenduleni kwimiba exhalabisayo nefuthe elinokubakho ludweliswe ngezantsi.

8. Isimemo Esiza Kuwe Sokwenza Amagqaba-Ntshintshi Nokuthatha Inxaxheba Kule Nkqubo

Ukuba wena okanye intlangano yakho ninqwenela ukubhalisa njenge-I&AP yaye / okanye ninqwenela ukuphakamisa nayiphi na imiba yokuqala okanye izinto ezinxhalabisayo malunga nale projekthi icetywayo, nceda uqhagamshelane noMnumzana Mfowabo Maphosa wakwaNMA kwezi nkukacha zoqhagamshelwano zingezantsi. Ukuze amagqaba-ntshintshi afakwe kombhalo weBAR nesiHlomelo sombhalo we-EMPr kufuneka athunyelwe kwaNMA **ungekadluli uMvulo wama-2 kaDisemba 2013.**

Nceda uqhagamshelane no-:

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Development Through Participation

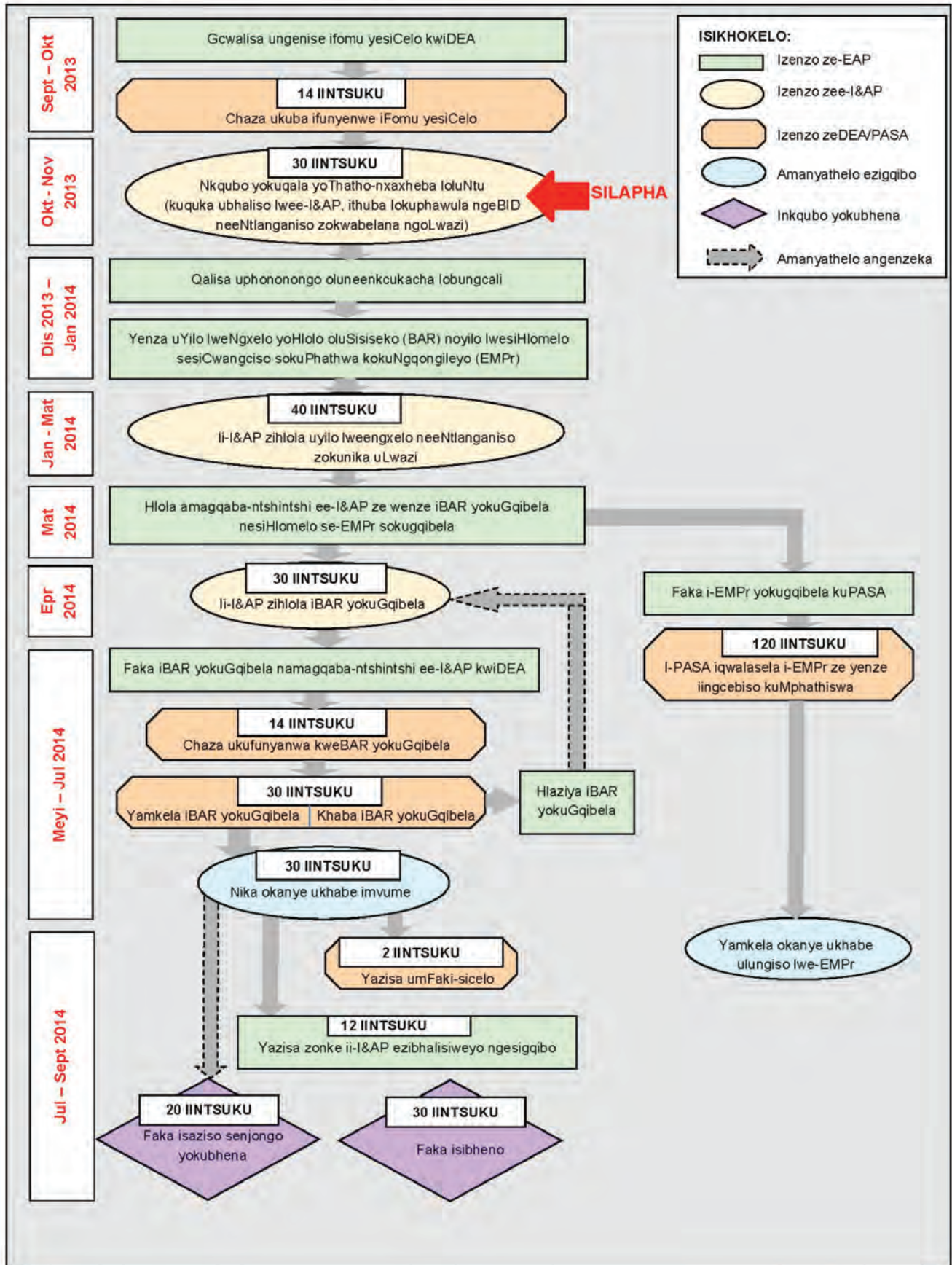


Uphononongo (nengcali)	Umda
Umzekelo Weengceba Nokuchitheka Kwe-oyile (Prestedge Retief Dresner Wijnberg (PRDW): Stephen Luger)	<ul style="list-style-type: none"> • Yenza umzekelo wokuthuthwa, ukuchithwa nokulahlwa emazantsi kweengceba zezinto eziqhekekayo xa kubholwa; • Yenza umzekelo obonisa ukuhamba kwe-oyile nento eyenzekayo kuyo ngenxa yokuchitheka kwayo emanzini angaphezulu kwinqanawa yokubhola; • Yenza umzekelo obonisa ukuhamba kwe-oyile nento eyenzekayo kuyo ngenxa yogqabhuko-dubulo olukhulu olunokwenzeka kwintloko yomthombo entseleni yolwandle.
Uhlolo lweziLwanyana zaselwandle (IPisces Environmental Services: uGqr Andrea Pulfrich)	<ul style="list-style-type: none"> • Chaza izilwanyana zaselwandle ezihlala kule ndawo ijikeleze iNgingqi Evunyiweyo; • Qinisekisa ngeengozi eziyintloko kokungqongileyo kwaselwandle naselunxwemeni ukuba kungenzeka kubekho izinto ezivuzayo okanye zichitheke ngengozi ngethuba kubholwa umthombo; • Chonga, chaza ze uhlole ubukhulu befuthe elinokubangelwa kukubholwa komthombo okucetywayo kwizilwanyana zaselwandle kule ndawo (kuquka okungqongileyo enzulwini nakumphezulu wolwandle); • Chonga amanyathelo asebenzayo okunciphisa naliphi na ifuthe elibi kwizilwanyana zaselwandle.
Uhlolo lokuLoba (nguCapFish SA: Dave Japp & Sarah Wilkinson)	<ul style="list-style-type: none"> • Chaza imisebenzi yokuloba elindelekileyo kwiNgingqi Evunyiweyo nakwiindawo ezijikelezileyo; • Yenza uhlolo kwiindawo ezithile nolwethutyana kumzamo wokuloba okulindelekileyo kwindawo ekucetywa ukubhola kuyo. • Hlola ingozi yefuthe lendawo ekuza kubholwa kuyo kumacandelo ahlukeneyo okuloba; • Hlola ifuthe kwiindawo ezikhuselweyo ezicetyisiweyo ezijikeleze isikhephe sokubhola kwimisebenzi yokuloba ngokweentlanzi ekuqikelelwa ukuba zingabanjiswa nangenxa yokulahlekelwa ziindawo zokuloba; kunye • Nokuchonga iindlela ezisebenzayo zokunciphisa naliphi na ifuthe elibi elinokubakho kwishishini lokuloba.

Iglosari:

Umthombo oyekiweyo	Umthombo ovalwe ngokusesikweni waza wayekwa
I-annulus	Isithuba esiphakathi kwemibhobho nodonga lomngxuma wesitsala-manzi.
Umthombo wokuqinisekisa	Umthombo othi ubholwe ukuze kubonwe ubungakanani, ubuninzi kunye nokuba inganemveliso ngezinga elinjani na intsimi.
Ibhola	Intsinjana okanye isixhobo sokubhola esisetyenziswa xa kubholwa umthombo.
Ugqabhuko-dubulo	Ukumpompoza okungalawulekiyo kwe-oyile okanye igesi okuthi kwenzeke xa uxinzelelo lokutsawula kwayo luba ngaphezulu koxinzelelo olufakwa kuyo ngentsika yolwelo lokubhola.
Izithinteli zogqabhuko-dubulo	Izivalo zoxinzelelo oluphezulu zentloko yomthombo ezenzelwe ukuthintela ukumpompoza okungalawulekiyo kweehayidrokarbhon
Umngxuma wesitsala-manzi	Umngxuma owombiwa ngebhola.
Isigqubuthelo	Umbhobho wentsimbi owogqunywe ngesamente emthonjeni ukuze kuvalelwe ulwelo okanye kuthintelwe umngxuma ungaliliki.
Ukogquma ngesamente	Ukuvala isithuba esiphakathi kwesigqubuthelo kunye nomngxuma ngesamente ukuxhasa isigqubuthelo nokuthintela ulwelo lungadluleli kwiindawo ezikufutshane.
Umbhobho wokuhambisa	Umbhobho wokuhambisa ngumbhobho obanzi othi ufakwe emhlabeni ukuze kwenziwe isiseko esizinzileyo sokuqala sokwakhelwa komthombo.
Iingceba	Amatye amancinci aqhekezwa yibhola nathi aphume ngaphandle nodaka olunyuka xa kubholwa.
Umtya wokubhola	Intsika, okanye umtya, wombhobho wokubhola. Lidla ngokusetyenziswa kumbhobho wokubhola okanye iintsika zokubhola.
Iyunithi yokubhola	Iyunithi yokubhola ayincamatheliswa ngokusisigxina entseleni yolwandle, umz. inqanawa yokubhola okanye isikhithana sokubhola esitshoniswa ngokuyinxenye emanzini.
Ulwelo/ udaka lokubhola	Umxube wodongwe, imichiza namanzi ahanjiswa ngombhobho wokubhola ukuze kuthanjiswe yaye kupholiswe intsimbi yokubhola nokukhupha iingceba zamatye, kunye nokuqinisa umngxuma emacaleni. Iindidi ezimbini eziphambili zolwelo lokubhola ludaka olwenziwe ngamanzi (WBM) kunye nodaka olwenziwe ngokuxutywa kwemichiza ethile (SBM).
Umthombo wokungqawa	Umthombo obholwa endaweni engazange ibholwe ukuze kuqinisekise ubukho okanye ukungabikho kwemichiza yehayidrokarbhon.
Iriser	Umbhobho ophakathi kwesixhobo sokuthintela ugqabhuko-dubulo esisentseleni yolwandle kunye neyunithi yokubhola.
Irotary drilling	Iindlela yokubhola umngxuma ngebhola ejikeleziswayo ngelixa icinezelelwa phantsi ngamandla.
Umthombo omisiweyo	Umthombo ovaliweyo okwethutyana.
Incwadi yomthombo	Irekhodi yolwazi lobume bomhlaba ekudlulwe kuwo ngethuba kubholwa, kuquka iinkcukacha zobuchwepheshe zomsebenzi.
Imbobo yomthombo	Umngxuma wesitsala-manzi – umngxuma obholwe ngentsimbi yokubhola.
Intloko yomthombo	Isixhobo esifakwa kumphezulu wendawo ekumbiwe kuyo umthombo.

Umzobo 4: Idayagram ebonisa inkqubo yokuHlolwa kweFuthe elinokubakho.



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