Referral of proposed action

Project title: Great Australian Bight Exploration Drilling Program

1 Summary of proposed action

1.1 **Short description**

BP Developments Australia Pty Ltd (BP), in its capacity as operator of the proposed Great Australian Bight (GAB) Exploration Drilling Program (herein referred to as the proposed GAB drilling program), proposes to drill four exploration wells in Commonwealth marine waters in the GAB.

Exact well locations are yet to be determined, however they will be drilled within the Ceduna 3D seismic survey area, which was acquired between November 2011 and May 2012 and covered 12 100 km^2 across EPP 37, EPP 38, EPP 39 and EPP 40 permit areas (herein referred to as the proposed GAB drilling area).

The proposed GAB drilling area has water depths of approximately 1 000 – 2 500 m. At the closest point, the proposed GAB drilling area is approximately 400 km west of Port Lincoln and 300 km southwest of Ceduna in South Australia (Figure 1).

The proposed GAB drilling program is scheduled to commence in the summer of 2015-2016, and will be conducted over 18-30 months.

The wells will be drilled using a mobile offshore drilling unit (MODU) which will either be dynamically positioned (DP), or moored with anchors, or a combination of these methods.

1.2 Latitude and longitude

The proposed GAB drilling program will take place within the same area as the previously acquired Ceduna 3D seismic survey, herein referred to as the proposed GAB drilling area. This area is shown in Figure 1 and the boundary coordinates are provided in Table 1.

Table 1 – Boundary coordinates of the proposed GAB drilling area (GDA 94)

Point	Latitude	Longitude
1	35º 03' 42.2892" S	130º 54' 59.4432" E
2	35º 06' 14.4108" S	130º 55' 09.0048" E
3	35º 12' 51.7752" S	130º 46' 07.3056" E
4	34º 20' 21.7860" S	129º 40' 55.2144" E
5	34º 15' 01.6992" S	129º 48' 04.7303" E
6	34º 15' 06.3792" S	130º 19' 59.7576" E
7	33º 45' 10.0404" S	130º 20' 12.8544" E
8	33º 45' 10.0944" S	130º 26' 25.6596" E
9	34º 08' 03.6960" S	130º 54' 48.5712" E
10	34º 27' 33.1272" S	130º 54' 48.8268" E
11	34º 59' 09.3264" S	131º 34' 48.7308" E
12	35º 09' 19.7100" S	131º 34' 48.4176" E
13	35º 17' 22.2072" S	131º 25' 48.4644" E
14	34º 58' 38.0028" S	131º 01' 53.7924" E

1.3 Locality and property description

The proposed GAB drilling area is located in Commonwealth waters in the GAB. At the closest point, the permit areas are approximately 400 km west of Port Lincoln and 300 km southwest of Ceduna in South Australia (Figure 1).

1.4 **Size of the development footprint or work area (hectares)**

The estimated footprint for the proposed GAB drilling program is defined as the area whereby actual physical contact with the seabed occurs, resulting in some level of disturbance. The MODU will either use DP, or will be moored with anchors, or will use a combination of these methods to stay on location. Given the worst case 'footprint' is associated with mooring rather than DP, this is reflected in the calculated area in Table 2.

Table 2 - Mechanical footprint of moored MODU

Description	Area per well	Total area for 4 wells
Well/Wellhead (assumes a 1067 mm (42") surface hole and 36" conductor casing)	0.9 m^2	3.6 m^2
Anchors (~58 m^2/anchor, maximum 8 used per well location)	464 m^2	1,856 m^2
Anchor chain impact area (assuming 550 m of 76 mm diameter chain, 8-point mooring)	1 232 m^2	4 928 m^2
Seabed Transponders – used for the acoustics element of the DP system (assume 6 used per well location)	1.5 m^2	6.0 m^2
Subsea Accumulator - auxiliary hydraulic supply for blowout preventers.	36 m^2	144 m^2

In addition to the mechanical footprint of equipment, drilling mud and cuttings from the wells will also be discharged and this has been modelled to identify the likely area of distribution on the seabed. The modelling was conducted using the SINTEF Marine Environmental Modelling Workbench (MEMW) software, which includes the numeric Dose-related Risk and Effects Assessment Model (DREAM) for chemical releases and Particle Tracking model (ParTrack) for drilling discharges.

The actual well designs for the proposed GAB drilling program have yet to be finalised. Of the well designs currently being considered, the design with the largest overall casing/hole volume was used in the modelling. This ensured that the worst credible case volume discharge of cuttings was considered in assessing the potential environmental impact of the drilling discharges.

The 3-D current and 2-D wind fields used to drive drill cutting dispersion and pollutant transport were generated using the Imperial College Regional Environmental Model System (ReEMS). The model was run in hind cast mode to generate current and wind datasets for the region covering a 5 year period (2006-2010).

Modelling of drilling mud and cuttings discharge examined deposition of sediment, including the thickness and extent of this deposition. Results of the modelling are discussed in detail in Section 3.2(c). To summarise, modelling predicts deposition at a thickness likely to cause smothering impacts on benthic ecosystems over a 0.736 km^2 area around each well. This area equates to an area of disturbance associated with cuttings disposal of approximately 2.944 km^2 for four wells.

To calculate the total footprint of the proposed GAB drilling program, the area of disturbance associated with cuttings disposal needs to be combined with the area of mechanical footprint associated with the moored MODU, as summarised in Table 2. Of the MODU disturbance, only the anchors and anchor chains are expected to cause disturbance outside the area of disturbance associated with cuttings disposal. The predicted area of disturbance associated with anchors and anchor chains is approximately 0.007 km^2. Therefore, the predicted total footprint area is 3.0 km^2, which is equivalent to 300 hectares. This area equates to 0.025% of the 12 100 km^2 proposed GAB drilling area.

1.5 **Street address of the site**

Not applicable.

1.6 **Lot description**

Exact well locations are yet to be determined, however wells will be drilled within the Ceduna 3D seismic survey area, which covers 12 100 km^2 across EPP 37, EPP 38, EPP 39 and EPP 40 permit areas (the proposed GAB drilling area).

1.7 **Local Government Area and Council contact (if known)**

Not applicable. The National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) regulates health and safety, structural integrity and environmental management of all offshore petroleum facilities in Commonwealth waters.

1.8 **Time frame**

Subject to rig availability, the proposed GAB drilling program is scheduled to commence in the summer of 2015-2016 and will be conducted over 18-30 months.

1.9	**Alternatives to proposed action**	X	No. Exploration wells are required to be drilled to test potential targets identified from 3D seismic data collected over November 2011 – May 2012. BP is required to fulfil the work programs nominated for the GAB permit areas, which includes drilling four exploration wells.
			Yes, you must also complete section 2.2
1.10	**Alternative time frames etc**	X	BP will remain in communication with relevant government agencies on progress and timelines as plans mature.
			Yes, you must also complete Section 2.3. For each alternative, location, time frame, or activity identified, you must also complete details in Sections 1.2-1.9, 2.4-2.7 and 3.3 (where relevant).
1.11	**State assessment**	X	No. The proposal is located wholly in Commonwealth waters
			Yes, you must also complete Section 2.5
1.12	**Component of larger action**	X	No. This proposed GAB drilling program follows the Ceduna 3D seismic survey conducted in these permits over November 2011-May 2012. However, the current activities are not linked to survey activities.
			Yes, you must also complete Section 2.7
1.13	**Related actions/proposals**		No
		X	Yes. This proposed GAB drilling program follows the Ceduna 3D seismic survey conducted in these permits over November 2011-May 2012 (EPBC 2011/5969). Exploration wells are required to be drilled to test potential targets identified from this 3D seismic data.
1.14	**Australian Government funding**	X	No
			Yes, provide details:
1.15	**Great Barrier Reef Marine Park**	X	No
			Yes, you must also complete Section 3.1 (h), 3.2 (e)

2 Detailed description of proposed action

2.1 Description of proposed action

BP proposes to drill four exploration wells in the proposed GAB drilling area, located in Commonwealth marine waters in the GAB. This four well program will seek to determine whether or not commercial quantities of hydrocarbon resources exist within the GAB permit areas.

Drill Rig

The four wells will be drilled using a semi-submersible MODU. Currently, efforts are underway to secure a 6th generation harsh environment semi-submersible. The MODU will either use DP, or will be moored with anchors, or will use a combination of these methods to stay on location.

In the DP mode, the MODU maintains its position over the drilling location using thrusters positioned on the hull. These allow the MODU to maintain a fixed position, move the rig slightly away from the drilling location during certain operations, or actually propel the MODU through the water to mobilise/demobilise to other drilling locations.

The standard mooring technique for a MODU to hold position over a well is an eight point spread mooring arrangement using a combination of wire rope, chains, and anchors. The size of the anchors and length of chain are dependent upon the rig's motion characteristics, which in turn are a function of the metocean conditions, the water depth and the seabed soil strengths. Alternative methods, such as using suction pile in lieu of anchors, may also be an option depending upon soil strengths and may be considered.

Well Design

Data collected during the Ceduna 3D seismic survey is still being interpreted. Therefore, the current well designs are preliminary and based on older data. The following information is the current base case and includes contingency hole sizes and casing strings. The total drilling depth for each well, as well as each specific hole section and casing setting depths, will vary depending upon the water depth and formation depths.

A schematic diagram of the base case well design is shown in Figure 2, and described below.

The wells will spud with a 42" diameter (1 067 mm) hole being drilled with seawater and high viscosity sweeps (seawater viscosified by the addition of bentonite clay or polymer). Cuttings will be disposed of to the seabed. Upon reaching the section Total Depth (TD) the hole will be displaced with a high viscosity mud (containing bentonite or polymer) prior to running a 36" (914 mm) conductor casing and the wellhead housing. The conductor casing will then be cemented in place where it is likely that some cement will be discharged to the seabed, as an overflow from the conductor cementing operations.

After cementing the conductor casing, a 26" (660 mm) surface hole will be drilled riserless (taking cuttings and muds to the seabed) using seawater and high viscosity sweeps. At this section TD a high viscosity pill will be spotted in the open hole. Then, a string of 22" (558 mm) surface casing will be run in hole and cemented in place. There is a contingency in place to drill a 34" (864 mm) hole and run a 28" (711 mm) liner should geologic conditions warrant, before the 22" (558 mm) surface casing is run in.

A blowout preventer (BOP) will then be installed on top of the subsea wellhead and a marine riser run. The marine riser provides a closed conduit for the drilling fluid and cuttings to return to surface while drilling the lower sections of the well. A 22" (558 mm) hole section will be drilled with a water based mud (WBM). A string of 18" (457 mm) casing will be run to bottom and cemented in place. It is typical that the following hole section will require the mud density to be increased for wellbore stability and formation pressure control.

The next section will consist of drilling a 17.5" (444 mm) hole. This section will be drilled using synthetic based mud (SBM) to provide well bore and temperature stability. A string of 14" (355 mm) casing will be run to bottom, the casing hanger landed off in the subsea wellhead and the casing cemented in place. This string of casing will serve to provide well integrity as well as isolate potential distinct permeable zones and the previous casing strings from potential higher pressures deeper in the well. Note, a contingency exists to increase this hole size to 20" (508 mm) and install an intermediate 16" (406 mm liner) liner before this string, should geological conditions warrant.

A 12.25" (311 mm) hole section will be drilled utilising the SBM system. Then, a 9.625" (244 mm) liner will be run and cemented in place.

Finally, a 8.5" (216 mm) hole section will be drilled to the well TD with the SBM system. Open hole wireline logging will be performed to measure various geological properties of the well bore.

If no discovery is made, the well will be plugged and abandoned. In the event of successful results, a cased hole Drill Stem Test (DST) may be conducted. In this instance, the section will be cased with a 7.625" (194 mm) liner. A 9.625" (244 mm) tie back would be run from the top of the previously installed 9.625" (1244 mm) liner back to the wellhead to isolate the 14" (355 mm) casing.

It is also possible that prior to running the 7.625" (194 mm) liner, the 8.5" (216 mm) open hole section may be abandoned with cement and a sidetrack (re-drill) of this hole section performed in order to take formation core samples. In the event of geological uncertainty and/or wellbore stability issues, one further contingency of a 6.5" (165 mm) hole with 5.5" (139 mm) casing exists which can be used following the installation of the 7.625" (193 mm) liner.

At the completion of the DST, the well will be plugged and abandoned (described further below).

Drilling Fluid

Although no detailed engineering work has been completed on the fluid design for the project as yet, it is likely that the surface sections will be drilled riserless. This will be done with high viscosity sweeps and displaced to bentonite mud prior to running casing. Mud and cuttings will be discharged at the seabed.

High viscosity sweeps consist of approximately 90% seawater, with the remaining 10% made up of drilling fluid additives that are either completely inert in the marine environment, naturally occurring benign materials or readily biodegradable organic polymers with a very fast rate of biodegradation in the marine environment. Drilling additives typically used include sodium chloride, potassium chloride, bentonite (clay), gel, guar gum, barite and calcium carbonate.

It is planned to drill the section following the riser and BOP installation using a WBM, and the lower hole sections of the wells are likely to be drilled with SBM. The use of SBM is required for the lower sections of the well, as WBM is not well suited for these sections. SBM provides significant improvement in wellbore stability, in addition to providing better lubrication and high temperature stability.

WBM chosen for the proposed GAB drilling program will be a low toxicity mud designed to be discharged overboard. At the completion of drilling operations, low toxicity WBM will be discharged overboard.

The SBM chosen for the proposed GAB drilling program will also be a low toxicity mud. The majority of SBM will be removed from cuttings prior to discharge (discussed further in Drill Cuttings and Fluid Discharge section below). At the completion of drilling operations, SBM will be recycled or disposed of onshore at a licensed facility.

Drill Cuttings and Fluid Discharge

The mud and cuttings containment strategy is required to adhere to applicable BP practices regarding drilling fluid and drill cuttings discharge. The MODU will use solids control equipment while the riser is in place to re-circulate drilling fluid for reuse in the well bore.

All cuttings generated by riserless drilling of the 42" (1067 mm) and 26" (660mm) holes will be returned to the seabed where they will be deposited in the vicinity of the wellhead. The discharge of cuttings at the seabed, whilst drilling the first two hole sections, is planned for all of the wells in the proposed GAB drilling program. This is consistent with other wells within Australian waters and is accepted as industry standard practice for offshore drilling operations.

The lower hole sections of each well, comprising the 22" (558 mm), 17.5" (444 mm), 12.25" (311 mm) and 8.5" (216 mm) sections (+ contingent 6.5" (165 mm) section), will be drilled using a recirculating drilling fluid system.

On the MODU, the drilled cuttings and drilling fluid will be separated and cleaned using solids control equipment. The mud returns carrying the drilled cuttings will initially pass through a shale shaker where the majority of mud will be separated from the cuttings. Where SBM is used, cuttings from the shale shaker will be passed through a cuttings dryer, which will further remove SBM from cuttings. Residual synthetic oil on cuttings discharged will not exceed 6.9% by weight on wet cuttings, as per BP's Group Defined Practice (GDP) 3.6-0001 'Environmental and Social Requirements for New Access Projects, Major Projects, International Protected Areas Projects and Acquisition Negotiations'. Monitoring of the residual base fluid on cuttings levels will be carried out during hole sections involving use of SBM. After recovery of drill fluids, the drill cuttings will be discharged from the MODU at the well site.

Separated SBM will be recycled or disposed of onshore at a licensed facility, whilst WBM will be discharged overboard.

Table 3 summarises the estimated drill cuttings and drilling fluids discharge for a single well. Note that these volumes are averaged for the four wells, and actual volumes will be dependent on the final well designs.

Table 3 – Estimated volumes of drill cuttings and fluids

Base Case		Cuttings Volume			Drilling Fluid	
Interval	Hole Size	m^3	MT	Discharge Location	Type	Volume overboard m^3
Conductor	42" (1067 mm)	87	174	Seabed	Seawater with hi-vis sweeps	300
Surface	26" (660 mm)	173	346	Seabed	Seawater with hi-vis sweeps	1 210
Intermediate	22" (559 mm)	243	486	Sea surface	Water Based Mud	1 050
Intermediate	17.5" (444 mm)	149	298	Sea surface	Synthetic Based Mud	14
Production	12.25" (311 mm)	80	160	Sea surface	Synthetic Based Mud	8
Open hole	8.5" (216 mm)	35	70	Sea surface	Synthetic Based Mud	4
Total		767	1 534			2 586

The drilling fluids and cuttings discharge modelling is discussed in more detail in Section 3.2(c).

Well Control

Whilst detailed plans will be in place to respond to an oil spill (discussed in Section 3.2(c)), BP's priority is to take such actions as to help prevent any such oil spill from taking place. BP's 2010 investigation into the Deepwater Horizon accident, known as the Bly Report, concluded that no single cause was responsible for the accident. A complex, inter-linked series of mechanical failures, human judgements, engineering design, operational implementation and team interfaces (involving several companies including BP), contributed to the accident. Every official investigation report released to date, including those from the Presidential Commission; the US Coast Guard; the Bureau of Ocean Energy Management, Regulation and Enforcement; and the National Academy of Engineering/National Research Council, reinforces the core conclusion that this was a complex accident with multiple causes involving multiple parties.

The Bly Report recommended a number of measures to strengthen BPs operational practices, and these are being addressed through the implementation of enhanced drilling requirements. Key requirements that have been captured in guidance documents and Engineering Technical Practices include:

- Cementing or zonal isolation: BP issued new mandatory requirements and nine associated guides covering key cementing activities. BP also strengthened the technical approval process for cementing operations.
- Integrating process safety concepts into the management of wells: BP produced a technical practice specifying minimum requirements for well barrier management to manage the movement of fluids and gas throughout the life cycle of the well.
- Well casing design: BP updated our design manual for well casing and inner tubing to include new requirements for pressure tests and revised technical practices.
- BOP stacks: BP issued a revised technical practice on well control, defining and documenting requirements for subsea BOP configurations. BP requires two sets of blind shear rams and a casing shear ram for all subsea BOPs used on deep water dynamically positioned rigs. We also require that third party verification be carried out on the testing and maintenance of subsea BOPs in accordance with recommended industry practice, and that remotely operated vehicles capable of operating these BOPs be available in an emergency.

- Rig audit and verification: BP continued the rig audit process that was enhanced in 2011. BP has conducted detailed hazard and operability reviews for key fluid handling systems on all offshore rigs in the BP fleet. All drilling rigs joining the BP fleet are subject to a full independent Safety and Operational Risk (S&OR) assessment and readiness to operate is verified with a detailed go/no-go process assured by S&OR. This verification process includes a checklist which among other things, assists in assessing that the rig conforms to applicable BP practices and industry standards and has the right technical specification, and that all actions required for start-up are completed. All rigs are also subject to subsequent periodic rig audits.

In addition to these technical requirements, BP has focussed on enhancement of capability and competency; verification, assurance and audit; and process safety performance management.

Vertical Seismic Profiling

Following the drilling of each well to its TD, and potentially through some intermediate hole sections prior to reaching TD, the overburden geology may be imaged using Vertical Seismic Profiling (VSP). VSP operations involve deploying an acoustic sound source (air gun) from the MODU, while a number of receivers (geophones) are positioned at different levels within the drilled hole to measure the travel time.

Typically between three and six air guns are used, with a volume of between 150 – 250 cubic inches (cui) each. These guns are generally positioned at 5-10 m below the water surface. Zero-offset VSP operations are typically of short duration, normally taking no more than a day to complete. However, longer duration VSP operations for additional characterisation may be run, which could extend the duration of the VSP by multiple days. Specific details of the VSP will depend on the geological target and the objectives of the VSP operation.

Notwithstanding that VSPs are quieter and shorter in duration than exploration seismic surveys measures outlined in the EPBC Act Policy Statement 2.1 'Interaction between offshore seismic exploration and whales' (DEWHA, 2008a) will be implemented during VSPs.

Well Flow Testing

Well flow testing or DST may be undertaken on individual wells, depending on the results of the well evaluation. Well flow testing is needed to obtain samples from the reservoir and collect further information on reservoir characteristics. Well flow testing will involve flowing the well fluids through temporary test equipment located on the MODU, resulting in flaring. Produced hydrocarbons will be metered, separated (into oil, gas and water) and then incinerated by the well test burner. This process is likely to be conducted over 4-5 days and once complete, the test is ended by circulating heavy density fluid into the test string.

All drilling and well testing operations will be conducted in accordance with a Well Operations Management Plan (WOMP) accepted by NOPSEMA.

Well Abandonment

All wells drilled in the proposed GAB drilling program will be permanently plugged and abandoned after completion of data acquisition and evaluation programs, in accordance with applicable BP practices and the WOMP. Plug and abandon procedures are designed to isolate the well and mitigate the risk of a potential release of wellbore fluids to the marine environment.

Plug and abandon operations will involve setting a series of cement and mechanical plugs within the wellbore, including plugs above any hydrocarbon bearing intervals, at appropriate barrier depths in the well and at the surface. The casing will be cut below the seabed and the wellhead will be removed prior to completion of the proposed GAB drilling program. A seabed survey will be conducted for each well using a remotely operated vehicle (ROV) to survey the seabed for any debris.

Waste Management

Waste generation will be minimised during the drilling program, and waste that is generated will be managed and disposed of in accordance with all relevant regulations and applicable BP practices.

Besides drilling fluid and drill cuttings, all grey water, sewage, and putrescible (food) wastes will be treated in accordance with the requirements of the International Convention for the Prevention of Pollution from Ships (1973) as modified by the Protocol of 1978 (MARPOL) prior to overboard discharge. Any and all other solid waste will be transported onshore for recycling and appropriate disposal, using licensed waste contractors. Any hazardous wastes will be isolated and stored in specified containment as recommended by the item's Material Safety Data Sheets (MSDS).

Deck drainage will be managed in accordance with MARPOL and any fluids collected will be treated and discharged overboard only if uncontaminated. All other drainage that could potentially be contaminated will be captured in the rig's sump system and treated by an oily water separator that ensures water is discharged only if the hydrocarbon content is less than 15 parts per million (ppm). Any liquids not meeting this specification will be captured and transported onshore for disposal by licensed waste contractors. The MODU will also have specific containment zones for areas that have higher risks of chemical or hydrocarbon spills. These zones will have secondary containment and all product or residue will be stored in bunded facilities and containers to prevent overboard release prior to being transported onshore for appropriate disposal by licensed waste contractors. Shipboard oil pollution emergency plan (SOPEP) spill kits will be available on the MODU to manage any spills to deck as part of the vessel operator's safety management system requirements.

MODU Refuelling

Offshore support vessels will be used to re-supply the MODU with fuel during the proposed GAB drilling program. This will be undertaken in accordance with practices and procedures of the MODU operator and BP, using mitigation measures outlined in Section 4.

Support Operations

The drilling operations will require support from both a marine and aviation perspective for equipment, supplies and personnel. The number and specification of workboats and helicopters is still to be determined, but it is likely that up to four workboats and up to three long-range helicopters will be utilised.

Marine operations will be based out of Port Adelaide, South Australia, where onshore storage of equipment, drilling fluids, and cement will be maintained. Offshore support vessels will operate from this base to support the MODU with these and other consumables.

Aviation support includes routine and emergency personnel transfer to and from the MODU. It is expected that flights to the MODU will be performed almost daily. Aviation support will be provided for the program from the Eyre Peninsula, South Australia. It is expected that personnel will fly fixed wing aircraft to and from the Eyre Peninsula from Adelaide, though special fixed wing charters may be utilised from other locations if required.

Quarantine Management

All vessels involved with the drilling program, including the MODU, if entering Australian waters from an international location will comply with the Australian Quarantine and Inspection Services (AQIS) guidelines and requirements. These include the National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (Commonwealth of Australia, 2009) and the Australian Ballast Water Management Requirements (DAFF, 2011).

2.2 Alternatives to taking the proposed action

There are no alternatives to taking the proposed action. Exploration wells are required to be drilled to test potential targets identified from 3D seismic data collected over November 2011 – May 2012. BP is required to fulfil the work programs nominated for the GAB permit areas, which includes drilling four exploration wells.

2.3 Alternative locations, time frames or activities that form part of the referred action

There are no alternative locations or activities for the proposed exploration drilling program. BP will remain in communication with relevant government agencies on progress and timelines as plans mature.

2.4 Context, planning framework and state / local government requirements

BP's work program commitments include conducting 11 400 km^2 of 3D seismic for EPP 37, EPP 38, EPP 39 and EPP 40 and also drilling four exploration wells for EPP 37, EPP 38 and EPP 39. BP is required to fulfil these minimum work requirements as part of the agreed permit conditions.

In addition to the requirements of the *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act), drilling operations will be conducted in accordance with relevant legislation. In particular, the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations* 2009 (OPGGS Environment Regulations) require the development of an Environment Plan (EP) and Oil Spill Contingency Plan (OSCP) for the proposed drilling activities.

Offshore support vessel operations will operate in accordance with all relevant Australian and international statutes, regulations and agreements.

2.5 Environmental impact assessments under Commonwealth, state or territory legislation

BP will develop an EP and an OSCP for the proposed drilling activities, as per the requirements of the OPGGS Environment Regulations. These plans will be submitted to NOPSEMA for acceptance prior to the commencement of the proposed GAB drilling program.

The EP describes and assesses all potential impacts associated with the proposed drilling activities, and includes details regarding management measures to reduce risks to as low as reasonably practicable (ALARP). The EP will also include environmental objectives and measurement criteria by which the environmental performance of the drilling operations will be measured. A summary of the EP will be made publicly available on NOPSEMA's website following its acceptance.

The OSCP will describe the equipment, management and response strategies proposed to be implemented in the unlikely event of a hydrocarbon spill during drilling operations. As part of this process, BP will consult with the Australian Maritime Safety Authority (AMSA), the Australian Marine Oil Spill Centre (AMOSC) and other relevant organisations regarding all aspects of the oil spill preparedness and response planning for the proposed GAB drilling program.

In addition to the EP and OSCP, the *Offshore Petroleum and Greenhouse Gas Storage Act* and associated regulations require the development of a number of other documents, which must also be accepted by NOPSEMA prior to commencement of drilling. These documents include:

- A WOMP - details the design of the well and describes how drilling operations (including any well testing) will be conducted;
- A Safety Case - details the safety management system in place on the MODU; and
- An Emergency Response Plan - describes the equipment, procedures and personnel that are in place to respond to any emergency events that may occur during drilling operations.

2.6 Public consultation (including with Indigenous stakeholders)

BP employs a full time External Affairs Manager and Community Affairs Advisor in South Australia to work primarily on the GAB exploration program. Since being awarded EPP37, EPP38, EPP39 and EPP40 in January 2011, BP has developed a stakeholder database and implemented a stakeholder engagement strategy for the exploration program. This has included:

- Conducting the consultation required for the EP submitted to the then designated authority (Department of Primary Industries and Resources of South Australia), for the Ceduna 3D seismic survey that was approved in May 2011. The survey was successfully completed in May 2012;
- Stakeholder engagement for the Ceduna 3D seismic survey EPBC Act Referral, also submitted in May 2011;
- Consultation for the GAB site investigation EP (accepted by NOPSEMA in February 2013); and
- On-going consultation for the proposed GAB drilling program.

Stakeholders for the proposed GAB drilling program have been identified from BP's existing stakeholder database and correspondence has been sent to these stakeholders over and above our on-going engagement with them (Table 4). Face-to-face briefings were also held with selected stakeholders. Responses to the consultation have been consistent with on-going feedback that BP has received from stakeholders over the whole of the project to date, in that they generally relate to:

- Potential environmental impacts – recognising the environment in which BP will be operating including within a Commonwealth Marine Reserve and in proximity to sensitive areas for marine mammals;
- Potential impacts on, and interactions with, other industries such as the fishing industry;
- Possibility of an unplanned hydrocarbon spill event and corresponding oil spill response arrangements;
- Potential impacts associated with logistical support for drilling operations.

These areas are addressed in this referral, and will be further addressed in the drilling EP.

Consultation will continue throughout the approval, planning and execution stages of the proposed GAB drilling program. In particular BP will consult with stakeholders on key components of the drilling EP as it relates to logistics, environmental risk mitigation, and emergency response and oil spill response.

Table 4 – Stakeholders Consulted

Academic	
Australian School of Petroleum - Adelaide University	South Australian Research and Development Institute - Wild Fisheries
Deakin Whale Ecology Group	Science Panel Working Group
Flinders University	Skadia
Business Organisations	
Eyre Peninsula Regional Development Australia	South Australian Chamber of Mines and Energy
Business SA	Bight Petroleum
Port Lincoln Chamber of Commerce	
Environmental Non-Government Organisations	
Australian Conservation Foundation	Whale & Dolphin Conservation Society
Conservation Council (SA)	Wilderness Society of SA
International Fund for Animal Welfare	World Wild Life Fund-Australia
Wild Migration	
Federal Government	
Martin Ferguson MP – former Minister for Resources, Energy and Tourism	Great Australian Bight Marine Reserve – Steering Committee
Tony Burke MP – Minister for Sustainability, Environment, Water, Population and Communities	Geoscience Australia
Office of the Prime Minister	NOPSEMA
Australian Fisheries Management Authority	National Offshore Titles Administrator
Australian Maritime Safety Authority	Department of Sustainability, Environment, Water, Population and Communities
Department of Resources Energy and Tourism	
Federal Opposition	
Greg Hunt MP - Shadow Minister for Environment	Ian Macfarlane – Shadow Minister for Energy and Resources
Rowan Ramsey MP - Federal Member for Grey	Simon Birmingham - Senator for South Australia – Shadow Parliamentary Secretary for the Environment.
Fishing and Aquaculture	
Abalone Fisheries	Gulf St Vincent Prawns
Australian Southern Bluefin Tuna Industry Association Port Lincoln	South Australian Marine Scalefish Fishery
Blue Crabs Fishery	Northern Zone Rock Lobster Fishery Association
Charter Boat Fisheries	Sardines Fishery
Commonwealth Fisheries Association	Sarin Group
The Seafood Processors and Exporters Council	Seafood Council SA
Great Australian Bight Fishing Industry	South Australian Rock Lobster Advisory Council Inc
Spencer Gulf Prawn	Wildcatch Fisheries of South Australia
Indigenous Community	
Far West Native Title Group	Tjutjunaka Worka Tjuta - Ceduna
Port Lincoln Aboriginal Community Council	Alinytjara Wilurara NRM Board
Local Government	
City of Port Lincoln	District Council of Streaky Bay
District Council of Ceduna	Eyre Peninsula Local Government Association
District Council of Elliston	Kangaroo Island Council
District Council of Lower Eyre Peninsula	

South Australian State Government	
Dept of Planning, Transport and Infrastructure	Dept of Environment, Water and Natural Resources
Hon Paul Caica MP – former Minister for the Environment	Dept for Manufacturing, Innovation, Trade Resources and Energy
Hon Tom Koutsantonis MP – Minister for Mineral Resources and Energy	Dept of Primary Industries and Resources of South Australia - Fisheries and Aquaculture
Office of the Premier	
State Opposition	
Mitch Williams MP – former Deputy Leader of the Opposition and Shadow Minister for Mineral Resources	Peter Treloar MP – State Member for Flinders
Martin Hamilton-Smith – Shadow Minister for Mineral Resources	

2.7 A staged development or component of a larger project

This proposed GAB drilling program follows the Ceduna 3D seismic survey conducted over permit areas EPP 37, EPP 38, EPP 39 and EPP 40 from November 2011 to May 2012.

Any future activities conducted in these permit areas will be subject to separate EPBC Act referrals and approvals under the OPGGS Environment Regulations if required.

3 Description of environment & likely impacts

3.1 Matters of national environmental significance

3.1 (a) World Heritage Properties

Description

There are no World Heritage Properties in or adjacent to the proposed GAB drilling area. The closest World Heritage area is the Australian Fossil Mammal Site (Naracoorte) located onshore approximately 840 km east of the proposed GAB drilling area.

Nature and extent of likely impact

Due to the distance between the proposed GAB drilling area and the nearest World Heritage Property, no direct or indirect impacts are considered likely to occur.

3.1 (b) National Heritage Places

Description

There are no National Heritage Places in or adjacent to the proposed GAB drilling area. The closest National Heritage sites are the two fossil sites: the Ediacara Fossil Site and the Australian Fossil Mammal Sites - Naracoorte. Both sites are located onshore over 800 km from the proposed GAB drilling area.

Nature and extent of likely impact

Due to the distance between the proposed GAB drilling area and the nearest National Heritage Place, no direct or indirect impacts are considered likely to occur.

3.1 (c) Wetlands of International Importance (declared Ramsar wetlands)

Description

There are no Wetlands of International Importance in or adjacent to the proposed GAB drilling area. The closest site is the Coorong and Lower Lakes Ramsar site, located onshore approximately 650 km east north-east of the proposed GAB drilling area.

Nature and extent of likely impact

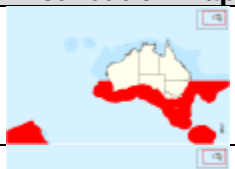
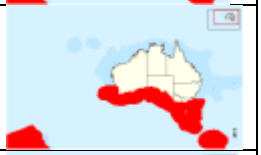
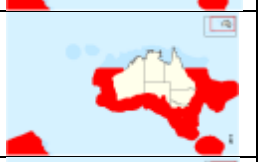
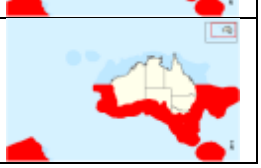
Due to the distance between the proposed GAB drilling area and the nearest Wetland of International Importance, no direct or indirect impacts are considered likely to occur.

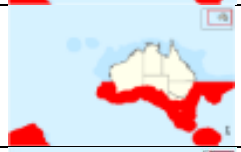
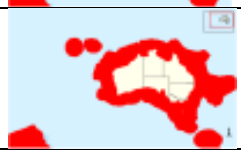
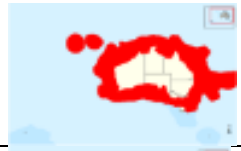
3.1 (d) Listed threatened species and ecological communities

Description

There are no threatened ecological communities reported to occur within the proposed GAB drilling area. The EPBC Act Protected Matters Search Tool identified 18 threatened species that may occur within the proposed GAB drilling area. These species are summarised in Table 5, and discussed in more detail below.

Table 5 – EPBC Act listed threatened species that may occur in the proposed GAB drilling area

Species Type	Scientific Name	Common Name	Status	Distribution Map
Birds	*Diomedea exulans amsterdamensis*	Amsterdam Albatross	Endangered	
	Diomedea exulans exulans	Tristan Albatross	Endangered	
	Diomedea exulans gibsoni	Gibson's Albatross	Vulnerable	
	Diomedea exulans (sensu lato)	Wandering Albatross	Vulnerable	
	Halobaena caerulea	Blue Petrel	Vulnerable	
	Macronectes giganteus	Southern Giant-Petrel	Endangered	
	Macronectes halli	Northern Giant-Petrel	Vulnerable	

	Phoebetria fusca	Sooty Albatross	Vulnerable	
	Pterodroma mollis	Soft-plumaged Petrel	Vulnerable	
	Thalassarche cauta cauta	Shy Albatross, Tasmanian Shy Albatross	Vulnerable	
	Thalassarche chrysostoma	Grey-headed Albatross	Endangered	
	Thalassarche melanophris	Black-browed Albatross	Vulnerable	
Mammals	*Balaenoptera musculus*	Blue Whale	Endangered	
	Eubalaena australis	Southern Right Whale	Endangered	
	Megaptera novaeangliae	Humpback Whale	Vulnerable	
Reptiles	*Caretta caretta*	Loggerhead Turtle	Endangered	
	Chelonia mydas	Green Turtle	Vulnerable	
	Dermochelys coriacea	Leatherback Turtle	Endangered	

Further details regarding distribution, habitat range and ecology for each species listed in Table 5 are provided below.

Birds

The EPBC Act Protected Matters Search Tool identified 12 species of birds listed as endangered or vulnerable that may occur in or adjacent to the proposed GAB drilling area. These species include eight species of albatross and four petrel species.

Both the albatross and petrel species listed in Table 5 have a widespread distribution throughout the southern hemisphere. They forage widely across the ocean, feeding mostly on cephalopods, fish and crustaceans. Most of these albatross and petrel species nest on sub-Antarctic and Antarctic islands, and disperse widely after breeding. There are no breeding colonies or nesting areas for any of these species located in or near the proposed GAB drilling area (SEWPAC, 2012e).

During the Ceduna 3D seismic survey, there were numerous sightings of mollymawks (medium-sized albatross), wandering albatross, yellow nosed albatross, shy albatross and shearwaters, while cape petrel, giant petrel and gannets were observed less often.

Mammals

The EPBC Act Protected Matters Search Tool identified three species of whales listed as endangered or vulnerable that may occur in or adjacent to the proposed GAB drilling area. In addition to these species, BP has extended the review to include the Fin whale *(Balaenoptera physalus)*, which was observed during the Ceduna 3D seismic survey conducted in the same area.

Whilst the EPBC Act Protected Matters Search Tool did not identify the Australian sea lion as likely to occur in the proposed GAB drilling area, potential impact on this species has been raised during consultation with stakeholders. The Australian sea lion rests and breeds in a number of locations in the GAB region, and forages on the shelf out to depths of around 200 m (Goldsworthy et al, 2010). Given this species occurs in depths of less than 200 m, the Australian sea lion is unlikely to occur in the deep waters of the proposed GAB drilling area. No Australian sea lions were observed during the Ceduna 3D seismic survey.

Blue whale

There are two recognised subspecies of blue whale in Australian waters; the Antarctic blue whale (*B. musculus intermedia*) and the pygmy blue whale (*B. musculus brevicauda*) (SEWPAC, 2012c). Both subspecies are found in all Australian waters, with the Antarctic blue whale primarily found in waters south of 60°S and pygmy blues found in waters north of 55°S (SEWPAC, 2012c).

Blue whale migration patterns are thought to be similar to those of the humpback whale, with the species feeding in mid-to high-latitudes (south of Australia) during the summer months and moving to temperate/tropical waters in the winter for breeding and calving. Blue whale migration is oceanic and no specific migration routes have been identified in the Australasian region (DEWHA, 2008b). While migration on the Australian west coast is now better understood, there is no published migration data for the GAB (SEWPAC, 2012c).

There are three locations in the South-west Marine Region where aggregations of pygmy blue whales are known to occur (SEWPAC, 2012b). These are:

- Geographe Bay, which is thought to be an important migratory habitat for pygmy blue whale from September to December, with cows and calves observed resting in the area.
- The Perth Canyon, which is a seasonally important aggregation area, where pygmy blue whales feed on krill at depths of 200–300 m in the canyon from January to May (with feeding peaking in the area from March to May).
- Eastern GAB upwelling and Kangaroo Island canyons, which are another important foraging habitat for pygmy blue whales between November and May (peaking in December).

The Eastern GAB upwelling and Kangaroo Island canyons is the closest aggregation area to the proposed GAB drilling area. At the closest point, this area is approximately 150 km from the proposed GAB drilling area.

Most sightings that occur between late spring to autumn to the east of the proposed GAB drilling area are believed to be pygmy blue whales (DEWHA, 2008b; SEWPAC, 2012d), though aerial surveys indicate that their abundance in the eastern GAB is highly variable between and within seasons (SEWPAC, 2012c). Sound logging studies undertaken by McCauley et al (2012) for the Ceduna 3D seismic survey indicate that pygmy blue whale signals were received in the permit areas and at the Head of the Bight in late 2011 (McCauley *et al*., 2012).

During the Ceduna 3D seismic survey (conducted between November 2011 and May 2012), a total of 12 blue whales were observed, all during November.

Southern Right Whale

The southern right whale is typically distributed between 20°S and 60°S in the southern hemisphere and is present off the Australian coast between May and November (primarily southwest Western Australia and far west South Australia). The Australian population is estimated at 3,500 individuals (Rogers et al., 2012).

Southern right whales occur seasonally in the South-west Marine Region, predominantly during May and November during calving. There are three main areas in the coastal waters adjacent to the South-west Marine Region where calving is known to occur (SEWPAC, 2012b):

- Doubtful Island Bay;
- Israelite Bay; and
- Head of Bight.

The closest aggregation area to the proposed GAB drilling area is the Head of the Bight, approximately 250 km to the north. This is a significant aggregation area, where up to half the population gathers between May and November to calve (DEH, 2006; DEWHA, 2008b). Twilight Bay, Fowlers Bay and Encounter Bay are other known calving areas in the region (DEWHA, 2008b). It is thought that in the spring months (September to November), southern right whales move offshore from the GAB to higher latitude feeding areas including the Antarctic ice edge (Rogers *et al*., 2012).

The migratory pathways of southern right whales between their main foraging grounds in the Southern Ocean to the calving grounds in the GAB are not well understood. A defined near-shore coastal migration corridor is considered unlikely given the absence of any predictable directional movement of southern right whales (SEWPAC, 2012a). From photo identification data, it is thought that relatively direct approaches and departures to the coast are likely, and that there is a seasonal westward movement (SEWPAC, 2012a). Information obtained from sound loggers deployed in the GAB indicates that southern right whales move into the Head of Bight from the south, and possibly from the west (McCauley et al, 2012).

No southern right whales were observed during the Ceduna 3D seismic survey.

Humpback whale

Humpback whales are found in Australian offshore and Antarctic waters. They primarily feed on krill in Antarctic waters south of 55°S. The nearest known humpback whale resting area is in Flinders Bay on the south coast of Western Australia, approximately 1 350 km west of the proposed GAB drilling area. Humpback whales undertake annual migrations between their summer feeding grounds in Antarctic waters to their breeding and calving grounds in sub-tropical and tropical inshore waters (Jenner et al., 2001). Humpback whales migrate up the eastern and western coasts of Australia and do not often travel into the GAB (DEH, 2005; Vang, 2002). The northern migration along the southeast coast starts in April and May, while along the west coast, it occurs towards early June. The west coast southern migration then peaks around November and December, while the east coast southern migration peaks in October and November. Humpback whales have been observed at the Head of the Bight and near

Kangaroo Island in early winter. Given this species known feeding and breeding areas and migration routes, it is considered unlikely to be encountered in the proposed GAB drilling area.

No humpback whales were observed during the Ceduna 3D seismic survey.

Fin whale

The fin whale is widely distributed in temperate waters around the world, between latitudes 20-75° in the Arctic and Antarctic Oceans. Areas of high productivity (upwelling) and interfaces between mixed and stratified waters may be important feeding areas for this species (DEH, 2005). In Australia, sightings information suggests that the species is more common in deeper waters, with dives limited to 100-300 m (Perrin *et al*., 2002).

As the proposed GAB drilling area is located about 150 km west of the nearest upwelling zone (canyon) south of Kangaroo Island (DEWHA, 2008b), it is considered unlikely that fin whales will be encountered in high numbers.

During the Ceduna 3D seismic survey, a total of nine fin whales were observed, during November, April and May.

Reptiles

The EPBC Act Protected Matters Search Tool identified three species of turtles listed as endangered or vulnerable that may occur in or adjacent to the proposed GAB drilling area.

The loggerhead turtle has a global distribution throughout tropical, sub-tropical and temperate waters (SEWPAC, 2013c). In Australia, nesting of loggerhead turtles is mainly concentrated on subtropical beaches, with major aggregations occurring to the north of the region, from Shark Bay to the Pilbara in Western Australia. Loggerhead turtles have been infrequently recorded in South Australia (Limpus, 2008), including northern Spencer Gulf waters and northeast of Kangaroo Island (DENR, 2004). Loggerhead turtles are carnivorous, feeding primarily on benthic invertebrates such as molluscs and crabs in depths ranging from nearshore to 55m (DEWHA, 2008b) in tidal and sub-tidal habitats, reefs, seagrass beds and bays (DEWHA, 2010). Loggerhead turtles undertake extensive migrations of greater than 1000 km (Limpus, 2008). Given this species' preference for shallow waters, it is considered unlikely to be encountered in the proposed GAB drilling area.

Green turtles nest, forage and migrate across tropical northern Australia. They usually occur between the 20°C isotherms (Marquez 1990), although individuals can stray into temperate waters (Cogger et al. 1993) including northern Spencer Gulf and around northeast Kangaroo Island (DENR, 2004). Most green turtles migrate for distances less than 1 000 km but follow no apparent path (Limpus, 2008). Mature turtles settle in tidal and sub-tidal habitat such as reefs, bays and seagrass beds, where they feed on seagrass and algae (Limpus, 2008; DEWHA, 2010). Given this species' habitat preferences, it is considered unlikely to be encountered in the proposed GAB drilling area.

The leatherback turtle is widely distributed throughout tropical, subtropical and temperate waters of Australia (DEWHA, 2010), including in oceanic waters and continental shelf waters along the coast of southern Australia (Limpus, 2009). Leatherback turtles are known to visit the Nuyts Archipelago, Port Douglas, Mount Dutton Bay and northeast Kangaroo Island (DENR, 2004). However, it is unknown if there are nesting sites along the South Australian coast (Limpus, 2009). This species feeds on soft-bodied invertebrates, including jellyfish (Limpus, 2009). This species may therefore be encountered in low numbers in the proposed GAB drilling area.

No turtles were observed during the Ceduna 3D seismic survey.

Nature and extent of likely impact

Given the distance of the proposed GAB drilling area from areas of sensitivity and the management measures to be implemented (see Section 4), the proposed GAB drilling program is considered unlikely to have a significant impact on any listed threatened species or their habitat, as detailed below. Potential impacts associated with the unlikely event of an oil spill, and details regarding oil spill planning and response, are discussed in section 3.2(c).

Birds

There are no islands or other areas of seabird breeding significance, or important feeding grounds for seabirds known to occur in or near the proposed GAB drilling area. The threatened bird species likely to occur in the vicinity of the proposed GAB drilling area forage over an extensive area, and are distributed over a wide geographic area. Only small numbers of these species are expected to be encountered at this offshore location.

In the event that birds are in the vicinity of drilling operations, potential impacts are limited to behavioural changes associated with increased sound and lighting on the MODU, which may affect foraging in the immediate vicinity of operations. Given this potential impact is temporary and localised, and given there are no significant foraging areas in the vicinity of operations, any behavioural changes are unlikely to be significant to the individual or the species.

Mammals

Areas of known sensitivity relating to threatened marine mammals are located a considerable distance away from the proposed GAB drilling area. The Head of Bight, which is an important southern right whale calving ground, is approximately 250 km north of the proposed GAB drilling area. The Eastern GAB upwelling and Kangaroo Islands canyons, which are an important foraging habitat for blue whales, are approximately 150 km east of the proposed GAB drilling area at the closest point.

Marine mammals may be affected by exposure to underwater sound, potentially resulting in behavioural and/or physical effects. Sound in the marine environment is generated by a number of sources, including natural and anthropogenic sources. Whilst there is already sound in the GAB marine environment (ambient sound), drilling operations will add to this ambient level, predominantly from the use of thrusters but also from associated VSP activities and from support vessels that will service the MODU.

Studies conducted regarding potential impacts on whales from continuous sound indicate that no or limited response is likely for sound levels below 120 dB re 1 µPa (RMS). There is an increasing likelihood that animals may exhibit avoidance and other behavioural changes in the presence of received sound levels between 120-160 dB re 1 µPa RMS (Southhall et al, 2007). The 160 dB re 1 µPa RMS level is therefore often used as a threshold for assessment of behavioural disturbance.

Ambient sound levels in the GAB were recently recorded by sound loggers that were deployed in the GAB as part of BP's efforts to investigate underwater sound characteristic of the area: one near the Head of Bight and two along the shelf break at water depths of approximately 200 m. Ambient sound was higher at the shelf break sites compared with the Head of Bight, and the two shelf break sites showed a steady increase in ambient noise over summer and into early winter (McCauley et al, 2012). McCauley et al (2012) found that ambient sound levels:

- At the Head of the Bight ranged from 73.5 – 131.9 dB re 1µPa (RMS), with an average of 97.1 dB re 1µPa (RMS);
- At the shelf break ranged from 74.5 – 144.9 dB re 1µPa (RMS), with an average of 111.7 dB re 1µPa (RMS).

BP engaged the Centre for Marine Science and Technology from Curtin University (CMST) to conduct modelling of the underwater sound expected to be generated during drilling. Modelling was conducted from three locations to reflect potential drilling locations in deep, medium and shallow areas of the proposed GAB drilling area. The modelling predicts that received sound levels at long range will be higher in winter than in summer (Parnum and Duncan, 2013). The winter modelling has therefore been used to assess received sound levels.

For all locations, the predicted received sound pressure level (SPL) during winter dropped below 160 dB re 1µPa (RMS) within 100 m of the MODU, and below 120 dB re 1µPa (RMS) between 10 and 40 km from the MODU (Parnum & Duncan, 2013). With the rig at the most northern point of the proposed GAB drilling area, the sound level is predicted to be less than 106 dB re 1 µPa (RMS) at the Head of Bight and the Kangaroo Islands Pools and Canyons (Parnum and Duncan, 2013) (Figure 3).

Given the predicted received sound levels at whale aggregation areas are below 120dB re 1 µPa (RMS), and therefore significantly below 160dB re 1 µPa (RMS), and are also within the range of measured ambient noise levels, impacts on threatened marine mammals are considered unlikely.

The migratory pathway of southern right whales is not documented. However, information obtained from sound loggers deployed in the GAB indicates that southern right whales move into the Head of Bight from the south, and possibly from the west (McCauley et al, 2012). Therefore, southern right whales may move through the proposed GAB drilling area on their migration to the Head of Bight. Sound is predicted to drop below 160 dB re 1µPa (RMS) within 100 m of the MODU, and below 120 dB re 1µPa (RMS) between 10 and 40 km from the MODU (Parnum and Duncan, 2013). Whilst the width of the migratory path is not known, this area of increased sound is unlikely to represent a significant area within the migration pathway, and it is considered unlikely that migrating southern right whales will be impacted by the drilling activities.

In addition to the use of thrusters for positioning, drilling operations may include VSP (see Section 2.1) typically run for no longer than 24 hours. Notwithstanding the expected low likelihood of whales being in close proximity to the MODU during the short periods of time that VSP will be conducted, BP will implement the EPBC Act Policy Statement 2.1 'Interaction between offshore seismic exploration and whales' (DEWHA, 2008a) during VSP operations. The EPBC Act Policy Statement 2.1 includes management measures such as soft starts, continual visual observations and power down/shut down provisions.

CMST also modelled sound generated during VSP activities. From the most northern point of the proposed GAB drilling area, the sound level associated with VSP is predicted to be less than 120 dB re 1 μPa^2s and <115 dB re 1 μPa^2s at the Head of Bight and the Kangaroo Islands Pools and Canyons (Parnum and Duncan, 2013). Note that impulsive sounds (such as the VSP source) are measured differently than continuous sound (such as the rig sound and ambient noise), and it is not meaningful to directly compare the two. The threshold often used with regard to potential impacts from impulsive sounds is 160 dB re 1 μPa^2s (for example, this value is referenced in EPBC Act Policy Statement 2.1). Given the sound from VSP activities is predicted to be significantly below this level at whale aggregation areas, impacts on threatened marine mammals are considered unlikely. Furthermore, VSP will be conducted over a short duration, and the EPBC Act Policy Statement 2.1 will be implemented, further reducing the likelihood of any impacts.

Sound emissions from support vessels during normal operating conditions (ie when the vessel is idling or moving between sites) are relatively low, and would only be detected at a short distance from the source. For example, Woodside (2003) found that vessel noise levels rarely (<1% of the time) exceeded 120 dB re 1 µPa (RMS) from an acoustic monitoring site 5.1 km from the source when a drilling support vessel was holding position using DP bow thrusters. When vessels are using thrusters at capacity, McCauley (1998) measured underwater broadband noise of approximately 137 dB re 1 µPa (RMS) at 405 m. Levels of 120 dB re 1 µPa (RMS) extended for a distance of approximately 3-5 km from the source, and are unlikely to be received in any areas of sensitivity.

Reptiles

There are no known turtle breeding or nesting areas in the vicinity of the proposed GAB drilling area. Only low numbers of turtles are expected to be encountered at this offshore location. In the event that turtles are in the vicinity of drilling operations, potential impacts are limited to behavioural changes associated with increased sound and lighting on the MODU.

Studies indicate that marine turtles may begin to show behavioural responses to an approaching seismic array at received sound levels of 166 dB re 1uPa (RMS) and avoidance at around 175 dB re 1uPa (RMS) (McCauley et al 2003). Given modelling results predict the received SPL will drop below 160 dB re 1µPa (RMS) within 100 m of the MODU, and below 120 dB re 1µPa (RMS) between 10 and 40 km from the MODU (Parnum and Duncan, 2013), the risk of causing behavioural responses in turtles is assessed as very low.

Management measures for VSP operations, such as "soft start" procedures, will be implemented during drilling operations, which will allow time for turtles to actively move away from the sound source. Likely effects are therefore expected to be limited to temporary and localised disturbance in very low numbers of animals, potentially resulting in temporary displacement.

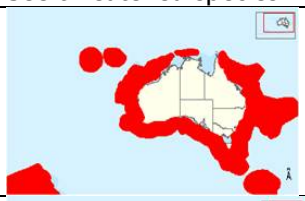
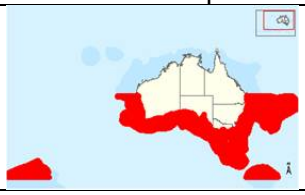
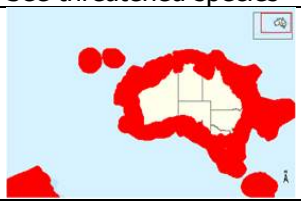
Lighting from the rig may affect foraging in the immediate vicinity of operations. Given this potential impact is temporary and highly localised, and given there are no significant foraging areas in the vicinity of operations, any behavioural changes are unlikely to be significant to the individual or the species.

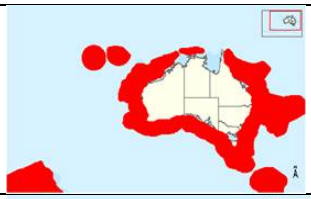
3.1 (e) Listed migratory species

Description

The EPBC Act Protected Matters Search Tool identified 23 migratory species that may occur within or adjacent to the proposed GAB drilling area (Table 6). Many of these species are also listed as threatened species, as described in Section 3.1(d) above.

Table 6 – Migratory Species that may occur in the proposed GAB drilling area

Species Type	Scientific Name	Common Name	Distribution Map
Birds	*Diomedea amsterdamensis*	Amsterdam Albatross	See threatened species
	Diomedea dabbenena	Tristan Albatross	See threatened species
	Diomedea exulans (sensu lato)	Wandering Albatross	See threatened species
	Diomedea gibsoni	Gibson's Albatross	See threatened species
	Macronectes giganteus	Southern Giant-Petrel	See threatened species
	Macronectes halli	Northern Giant-Petrel	See threatened species
	Phoebetria fusca	Sooty Albatross	See threatened species
	Thalassarche cauta (sensu stricto)	Shy Albatross, Tasmanian Shy Albatross	See threatened species
	Thalassarche chrysostoma	Grey-headed Albatross	See threatened species
	Thalassarche melanophris	Black-browed Albatross	See threatened species
Mammals	*Balaenoptera bonaerensis*	Antarctic Minke Whale	
	Balaenoptera edeni	Bryde's Whale	
	Balaenoptera musculus	Blue Whale	See threatened species
	Caperea marginata	Pygmy Right Whale	
	Eubalaena australis	Southern Right Whale	See threatened species
	Lagenorhynchus obscurus	Dusky Dolphin	
	Megaptera novaeangliae	Humpback Whale	See threatened species
	Orcinus orca	Killer Whale, Orca	

	Physeter macrocephalus	Sperm Whale	
Sharks	*Lamna nasus*	Porbeagle, Mackerel Shark	
Reptiles	*Caretta caretta*	Loggerhead Turtle	See threatened species
	Chelonia mydas	Green Turtle	See threatened species
	Dermochelys coriacea	Leatherback Turtle	See threatened species

Birds

Albatrosses and petrels listed above are also listed threatened species, and have been described in more detail in Section 3.1(d).

Mammals

The EPBC Act Protected Matters Search Tool identified nine listed migratory species of whales and dolphins that may occur in or adjacent to proposed GAB drilling area. The blue whale, southern right whale and humpback whale are also listed threatened species, and have been described in more detail in Section 3.1(d).

Antarctic Minke Whale

The Antarctic minke whale is found throughout the southern hemisphere from 55° S to the Antarctic ice edge during summer, and undertakes extensive migration to breeding grounds at mid-latitudes (between 30° S and 10° S) in winter. The distribution of the Antarctic minke whale is thought to be mainly oceanic, beyond the continental shelf break, however there is limited information regarding the distribution of the Antarctic minke whale along the Australian coast (Bannister et al. 1996).

Antarctic minke whales have been recorded in all states, but not in the Northern Territory (Bannister et al. 1996). Sightings have been recorded off Kangaroo Island and the Eyre Peninsula, approximately 500 km south-east and 370 km east of the proposed GAB drilling area respectively (Bannister et al, 1996).

Bryde's Whale

Bryde's whales occur in temperate to tropical waters, both oceanic and inshore, bounded by latitudes 40° N and 40° S, or the 20 °C isotherm (Bannister et al, 1996). Bryde's whales have been recorded from all Australian states except the Northern Territory (Bannister et al. 1996).

The coastal form of Bryde's whale appears to be limited to the 200 m depth isobar, while the offshore form is found in deeper water (500-1 000m) (DEWHA, 2008b). There is no evidence of large-scale movements of the inshore form of Bryde's whales, with strandings recorded throughout the year (DEWHA, 2007). It appears that the offshore form of Bryde's whale may migrate seasonally, heading towards warmer tropical waters during the winter.

No area of significance for this species has been recognised along the southern coastline of Australia. The nearest known area of aggregation for this species is the Abrolhos islands, approximately 1 500 km north west of the GAB (DEWHA, 2008b).

Pygmy Right Whale

Records of pygmy right whales in Australian waters are distributed between 32° S and 47° S, but are not uniformly spread around the coast (Kemper, 2002). The northern distribution of pygmy right whales may be limited on the west and east coasts of Australia by the warm, south-flowing Leeuwin and East Australian currents (Kemper, 2002). Few or no records are available for NSW, eastern Victoria, and the northern part of the GAB, while Western Australia has fewer records than eastern Australian states (Kemper, 2002). Concentrations of stranded animals have occurred at the entrance of the gulfs in South Australia and around Tasmania, but live sightings have predominated in the former region (Kemper, 2002). The numerous strandings in Tasmania may be due to the proximity of the Subtropical Convergence, an apparently important feeding zone for pygmy right whales.

There is no evidence of large-scale movements of Australian pygmy right whales, with strandings recorded throughout the year (Pavey 1992). Young pygmy right whales appear to be restricted to shallower coastal waters (Kemper 2002), possibly moving between areas of coastal upwelling. Considerably more data is required before the timing and pattern of movements in this species become clear. However, areas of significance for this species are believed to be Kangaroo Island and the Eyre Peninsula, approximately 500 km south east and 370 km east of the proposed survey area respectively (Bannister et al, 1996).

Dusky Dolphin

The dusky dolphin is found in temperate and sub Antarctic waters of the southern hemisphere, from around 55° S to 26° S. This species is primarily found in inshore waters for most of the year, but may seek offshore colder waters in summer (DEWHA, 2008b). They occur across southern Australia from Western Australia to Tasmania (Gill et al, 2000), with unconfirmed sightings south of continental Australia but confirmed sightings near Kangaroo Island, South Australia, and off Tasmania. Distribution of this species in Australian waters in poorly understood, and no areas of significance have yet been identified (Bannister et al, 1996). Limited information is available for seasonal movement patterns in Australia but suggest some patterns may be linked to the position of the Subtropical Convergence and/or El Niño/La Niña Southern Oscillation events (SEWPAC, 2013e).

Killer Whale

In Australia, killer whales are recorded from all states, with concentrations reported around Tasmania. Sightings are also frequent in South Australia and Victoria (Ling, 1991; SEWPAC, 2013f).

Little is known about killer whale migration, however it is believed that they undertake seasonal migration depending on food supply. No areas of significance for this species have been recorded within Australian waters. However, it is likely that killer whales may be found in close proximity to pinniped (seal and sea lion) colonies (Bannister et al, 1996). As the proposed GAB drilling area is located more than 200 km from the major pinniped colonies found in the region (mostly along the coast of the Nullarbor, Eyre Peninsula and Kangaroo Island) it is anticipated that low numbers of killer whales may be encountered in the proposed GAB drilling area.

Sperm Whale

Sperm whales are found in waters from the Arctic to the tropics, usually in deep offshore waters. Males are found in higher latitudes and migrate towards lower latitudes for mating during the summer months. Females, calves and juveniles remain in the warmer tropical and sub-tropical waters of the Indian Ocean all year round (DEWHA, 2008b). Sperm whales are rarely observed in waters less than 600 m, with females generally found in deeper waters of at least 1,000 m (SEWPAC, 2012b). Females and juveniles appear to move between the eastern Indian Ocean and Tasman sea down to 55°S while mature males migrate seasonally between Antarctic waters and equatorial breeding grounds. Concentrations of Sperm Whales are found where the seabed rises steeply from great depth, and are probably associated with concentrations of major food in areas of upwelling (Bannister et al. 1996).

Sperm whales are known to occur in waters along the shelf break of the eastern GAB, and waters to the south of Kangaroo island (SEWPAC, 2012b). Whilst the distribution of sperm whales is poorly understood, it is considered likely that they forage along the shelf break (SEWPAC, 2012b). The South-west Commonwealth Marine Reserves Network management plan also identifies that one of the major conservation values of the GAB Commonwealth Marine Reserve is as a foraging area for sperm whales (Director of National Parks, 2013).

During the Ceduna 3D seismic survey, a total of 25 sperm whales were observed during December, April and May.

Fish

Only one species of fish, the porbeagle shark, is listed under the EPBC Act as potentially occurring in the proposed GAB drilling area. The porbeagle shark is widely distributed through temperate and cold-temperate waters of the world (Cavanaugh et al, 2003; IUCN, 2010). In Australia, its distribution is centered on waters off southern, southwest and southeast Australia (DEWHA, 2010). This species is commonly found on continental shelves and can migrate short to moderate distances and feeds mostly on fish and cephalopods (squid and octopus) (IUCN, 2010). The porbeagle shark is considered likely to be present in the proposed GAB drilling area.

Reptiles

The loggerhead, green and leatherback turtle are also listed threatened species, and have been described in more detail in Section 3.1(d).

Nature and extent of likely impact

Birds

See Section 3.1(d) for information regarding potential impacts on migratory birds.

Mammals

With the exception of the sperm whale, information regarding the Antarctic minke whale, Brydes whale, pygmy right whale, dusky dolphin and killer whale indicate that there are no areas of sensitivity for these species in the vicinity of the proposed GAB drilling area. Most of these species have been sighted in the upwelling areas around Kangaroo Island Pools and Canyons, which are ~150 km east of the proposed GAB drilling area at the closest point.

Sperm whales may forage along the shelf break, which is at the 200 m isobath (GA, 2005) approximately 50 km north of the proposed GAB drilling area.

As discussed in Section 3.1(d) potential impacts to marine mammals may be associated with exposure to underwater sound generated during drilling activities. Studies indicate that whales are likely to have no significant or limited response to sound levels below 120 dB re 1 µPa, with an increasing likelihood of avoidance and other behavioural changes in the presence of received sound levels between 120-160 dB re 1 µPa RMS (Southhall et al, 2007).

Sound modelling conducted by CMST predicts that the received SPL will drop below 160 dB re 1µPa (RMS) within 100 m of the MODU, and below 120 dB re 1µPa (RMS) between 10 and 40 km from the MODU (Parnum and Duncan, 2013). The received SPL at the Kangaroo Islands Pools and Canyons is predicted to be <106 dB re 1 µPa (RMS) (Parnum and Duncan, 2013). At the 200 m depth contour where sperm whales may forage, received SPL is predicted to be <115 dB re 1 µPa (RMS) (Parnum and Duncan, 2013).

Sound loggers along the shelf break recorded ambient sound levels from 74.5 – 144.9 dB re 1µPa (RMS), with an average of 111.7 dB re 1µPa (RMS) (McCauley et al, 2012). At the Head of Bight these levels were between 73.5 – 131.9 dB re 1µPa (RMS), with an average of 97.1 dB re 1µPa (RMS).

Given the predicted received sound levels at whale aggregation areas are below 120dB re 1 µPa (RMS), and therefore significantly below 160dB re 1 µPa (RMS), and are also within the range of measured ambient noise levels, impacts on migratory marine mammals are considered unlikely.

Fish

In the event that porbeagle sharks are in the vicinity of drilling operations, potential impacts are limited to behavioural changes associated with increased lighting and food sources in the vicinity of the MODU, which may affect foraging in the immediate vicinity of operations. Sharks are unlikely to be affected by increased sound in the marine environment, as they are more reliant on electromagnetic signals than sound, and also do not have swim bladders (that are susceptible to damage from acoustic impulses).

Increased light and an increase in the availability of food (from discharge of treated foodscraps) may alter foraging behaviour, generally acting as an attractant to the area immediately surrounding the MODU.

Given potential impacts on fish are likely to be temporary and localised, any behavioural changes are considered unlikely to be significant to the individual or the species.

Reptiles

See Section 3.1(d) for more information regarding potential impacts on turtles.

3.1 (f) Commonwealth marine area

Description

The action is in the Commonwealth marine area. Refer to Section 3.2(c).

Nature and extent of likely impact

Refer to Section 3.2(c).

3.1 (g) Commonwealth land

Description

The closest Commonwealth land to the proposed GAB drilling area is the Coomunga Range and the Port Lincoln Training Depot Defence lands, both located approximately 400 km from the proposed GAB drilling area.

Nature and extent of likely impact

Due to the distance between the proposed GAB drilling area and the nearest Commonwealth land, no direct or indirect impacts are considered likely to occur.

3.1 (h) The Great Barrier Reef Marine Park

Description

The proposed GAB drilling program will not be undertaken within the Great Barrier Reef Marine Park.

Nature and extent of likely impact

The proposed GAB drilling program will have no impact on the Great Barrier Reef Marine Park.

3.2 Nuclear actions, actions taken by the Commonwealth (or Commonwealth agency), actions taken in a Commonwealth marine area, actions taken on Commonwealth land, or actions taken in the Great Barrier Reef Marine Park

3.2 (a)	**Is the proposed action a nuclear action?**	X	No
			Yes (provide details below)

If yes, nature & extent of likely impact on the whole environment

3.2 (b)	**Is the proposed action to be taken by the Commonwealth or a Commonwealth agency?**	X	No
			Yes (provide details below)

If yes, nature & extent of likely impact on the whole environment

3.2 (c)	**Is the proposed action to be taken in a Commonwealth marine area?**		No
		X	Yes (provide details below)

If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(f))

The proposed GAB drilling area is located in Commonwealth waters on the continental slope and abyssal plain of the GAB, with water depths ranging between approximately 1 000 and 2 500 m.

The exploration permits overlap with the GAB Commonwealth Marine Reserve Multiple Use Zone, which allows oil and gas activities subject to approval by the Director of National Parks. The values of this marine reserve are discussed in Section 3.3(j).

Routine Events

Likely impacts to the Commonwealth marine environment as a result of routine activities associated with the proposed GAB drilling program are:

- Localised and temporary direct physical disturbance to the seabed from MODU anchoring, subsea drilling equipment and cuttings discharge;
- Localised and temporary changes in water quality around the MODU from routine discharges (treated sewage and grey water; treated galley wastes; treated bilge water; drilling mud and cuttings; cooling water; brine water; and BOP fluid);
- Localised and temporary increase in ambient underwater sound from MODU operations, VSP, helicopter operations and support vessel operations; and
- Localised and temporary increase in light levels due to lighting on the MODU and support vessels.

The impacts outlined above are likely to be limited to a relatively small area surrounding each exploration well, and will be largely limited to the duration of drilling operation. Given the management measures that will be implemented during operations (summarised in Section 4), these impacts are not expected to be significant at either local or regional scales, and matters of National Environmental Significance are not expected to be significantly impacted.

Seabed Disturbance

Anchoring and Subsea Drilling Equipment

The MODU will either use DP, or will be moored with anchors, or will use a combination of these methods to stay on location.

The footprint of disturbance is described in Section 1.4 and the benthic habitat in the proposed GAB drilling area is described in Section 3.3(a).

The area of disturbance does not encroach into areas of recognised seabed sensitivity in the area of the 'ancient coastline at 90-120m depth' and shelf break (located approximately 70km and 50 km from the proposed GAB drilling area respectively), as defined by the South-west Commonwealth Marine Reserves Network Management Plan 2014-24 (Director of National Parks, 2013).

Given there are no known areas of seabed sensitivity in the vicinity of the proposed GAB drilling area, and given any disturbance associated with anchoring of the MODU and placement of subsea drilling equipment will be temporary, the potential for significant impacts to benthic flora and fauna is considered to be negligible.

Cuttings Discharges

Discharge of cuttings overboard will result in localised smothering of benthic fauna and flora in the vicinity of each well. Well design and drilling fluids are discussed in more detail in Section 2.1.

Deposition of >9.6 mm is considered likely to cause smothering impacts on benthic ecosystems (Kjeilen-Eilertsen et al, 2004). Therefore, the 'threshold' deposition thickness of >1-10 mm sediment thickness will be used to assess the potential area of impact.

Modelling of cuttings and drill fluids was undertaken for the worst credible case well design for three representative well locations in the proposed GAB drilling area: shallow, medium and deep. The total area of seabed disturbance was similar for all locations during both winter and summer. However, cuttings from the medium depth location during summer conditions showed the greatest distribution of cuttings in this >1-10 mm band. Therefore, this modelling scenario will be used to assess worst case prediction regarding potential area of impact.

Modelling of drill solids for the medium water depth location during summer predicts two zones of deposition >1-10 mm, which measure 1 600 m x 460 m (0.736 km^2) along the NW-SE and NE-SW axes respectively at their maximum extent. The model predicts a maximum thickness of approximately 7 cm extending out over a 100 m radius on the seabed from the well location (Figure 4).

The proposed GAB drilling area is located approximately 70 km and 50 km respectively from recognised areas of benthic biodiversity along the ancient coastline and shelf break (Director of National Park, 2013). Modelling predicts that discharge of drilling solids is unlikely to affect these areas.

Studies indicate that benthic infauna and epifauna recover relatively quickly, with substantial recovery in deepwater benthic communities within 3-10 years (Jones et al, 2012). Whilst specific recovery times are likely to be dependent on composition of existing sediment and fauna, and composition of cuttings discharged, any impacts associated with discharge of cuttings are likely to be temporary.

Given the predicted area of dispersion, the distance from sensitive benthic habitats, and the temporary nature of smothering impacts, the disposal of drilling solids is considered unlikely to cause any significant impacts.

Routine Discharges

A number of wastes will be routinely produced and discharged during drilling operations, including: treated sewage and grey water; macerated galley wastes; treated bilge water; drilling mud and cuttings; cooling water; brine water; and BOP fluid.

Sewage, Grey Water, Galley Wastes and Bilge Water

Sewage, grey water, galley wastes and bilge water will be treated and discharged in accordance with the requirements of MARPOL 73/78. Discharge of these treated wastes may result in minor, localised increases in water temperature and nutrient levels. However, given treatment of these discharges prior to disposal, and the open water environment of the proposed GAB drilling area, discharges are expected to rapidly disperse and dilute.

Drilling Mud and Cuttings

Drill cuttings are discussed previously in terms of potential smothering impacts to the benthic environment. In addition to likely smothering, small volumes of low toxicity SBM will adhere to drill cuttings, and will be disposed of overboard. This may result in a temporary and localised decrease in the quality of water and sediment around the MODU.

The specific measures to manage cuttings and mud will be determined by BP's 'Best Practicable Environmental Option for disposing of Drilling Waste' process, which will be completed during detailed well planning. At a minimum, treatment measures used on the rig will reduce the synthetic oil on wet cuttings discharged overboard to a maximum of 6.9% by weight.

In addition, used SBM will be recycled or disposed of onshore at a licensed facility rather than discharged overboard.

Given that only a small amount (<6.9% by weight) of low toxicity synthetic oil will remain on wet cuttings when discharged, and the high dispersion of cuttings (see above), it is considered highly unlikely that discharge of cuttings with adhered muds will result in significant impacts to water or sediment quality.

Water Based Muds

At the completion of drilling operations, low toxicity WBM will be discharged overboard. WBM chosen for the proposed GAB drilling program will be a low toxicity mud designed to be discharged overboard. The discharge of this low toxicity material is considered unlikely to result in any long term impacts to water or sediment quality.

Cooling Water

Depending on the type of engine cooling system used on the MODU, cooling water may be discharged overboard. This may result in a temporary and localised increase in water temperature in close proximity to the discharge point.

Cooling water will be discharged above sea level to facilitate cooling prior to entering the marine environment. This, combined with the open water environment of the proposed GAB drilling area, means that surface water temperature is expected to rapidly return to ambient levels.

Brine Water

Depending on the MODU used, it is likely that fresh water will be manufactured onboard using a water maker (reverse osmosis or waste heat). A by-product of water making units is brine water, which is typically generated in relatively small volumes and is discharged overboard. This may result in a temporary and localised increase in salinity in close proximity to the discharge point.

The small volume of brine water discharged, combined with the open water environment of the proposed GAB drilling area means that the brine water is expected to rapidly disperse and dilute.

Blowout Preventer Fluid

As outlined in Section 2, BOPs will be used to assist in the control of the well. In order to confirm that BOPs are performing to specification, function and pressure testing of the BOP is regularly required. These tests will result in the discharge of approximately 470 L of BOP fluid per week, resulting in a temporary and localised decrease in water quality in the immediately vicinity of the BOP. BOP fluid is a low toxicity hydraulic fluid that is typically rated 'D' under the UK Offshore Chemical Notification Scheme classification (meaning it has an LC_{50} of >100 – 1 000 ppm aquatic toxicity and >1 000 – 10 000 ppm sediment toxicity), and is therefore considered acceptable for overboard disposal.

The small volumes of BOP fluid discharged at any one time, combined with its low toxicity and the open water environment of the proposed GAB drilling area, means that the BOP fluid is expected to rapidly disperse and dilute, and not result in significant changes in water quality.

Underwater Sound

The proposed GAB drilling program will generate underwater sound during drilling and associated vessel activities. Potential impacts to marine fauna commonly associated with exposure to underwater sound include changes in behaviour, such as altered swimming patterns or avoidance, and potential physical impacts such as hearing threshold shift. Potential impacts of increased underwater sound on threatened and migratory fauna are discussed in Section 3.1(d).

Lighting

Lighting to meet operational and safety requirements, as well as light from flaring during well testing, may attract fish, turtles and seabirds transiting through the proposed GAB drilling area. Given the temporary duration of drilling activities, the limited extent of light spill and the distance of the proposed GAB drilling area from sites of importance to sensitive marine fauna, lighting impacts are not considered to be significant.

Non-routine events

In addition to routine activities, a number of non-routine or accidental events could potentially result in impacts on the Commonwealth marine environment. These are:

- Interference with other users of the marine environment;
- Spill of SBM during transfer or from riser failure;
- Introduction of invasive marine species;
- Inappropriate disposal of hazardous and non-hazardous waste; and
- Hydrocarbon spills from refuelling incident, vessel collision, loss of well control or from unplanned event during DST.

Interference with other users of the marine environment

Interference with other users of the marine environment, namely fishing and shipping, is addressed in Section 3.3(l).

Synthetic Based Mud Spills

An incident that could result in a major spill of SBM, such as during transfer of product, is considered unlikely, and the risk of any significant impacts from such a spill is assessed as being low.

Transfer of SBM will be conducted in accordance with the MODU contractor's written procedures, which typically outline requirements regarding communications, quantities, assignment of responsibilities and emergency actions. Transfer procedures are also typically conducted under the MODU's permit to work system, and will require approval by the MODU Offshore Installation Manager prior to being conducted.

Given low toxicity SBM will be used, and the open water environment of the proposed GAB drilling area, any accidental spills of SBM are expected to rapidly disperse and not result in significant changes in water quality

Introduction of Invasive Marine Species

Invasive marine species (IMS) have the potential to be introduced via ballast water or by hull fouling. The introduction and colonisation of IMS may result in reduced species diversity and abundance as the foreign species competes with native species for resources.

Successful IMS invasion is considered highly unlikely to occur given the deep water of the proposed GAB drilling area, which is unlikely to support species picked up in port/shallow coastal areas. Furthermore, the MODU will comply with the AQIS quarantine requirements for ballast water exchange, and will follow the risk reduction measures outlined in the National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (Commonwealth of Australia, 2009).

Inappropriate Disposal of Hazardous and Non-hazardous Waste

If accidentally discharged overboard, hazardous and non-hazardous waste has the potential to cause localised and temporary contamination of the marine environment in close proximity to the MODU.

Hazardous and non-hazardous waste will be managed in accordance with the MODU waste management plan, and will be appropriately stored on board prior to transfer to shore for disposal at a licensed waste facility. Transfer of wastes will be conducted in accordance with the MODU contractor's written procedures.

Given the waste management procedures on board, and the open water environment of the proposed GAB drilling area, any waste accidently discharged overboard is expected to rapidly disperse, and is considered unlikely to result in significant changes in water quality.

Hydrocarbon Spills

An incident that could result in a major hydrocarbon release, such as loss of well control, is considered highly unlikely, but nevertheless such an eventuality is carefully guarded against and prepared for. The frequency of loss of well control events from exploration wells in Australia is estimated at 0.031% per well drilled (DNV, 2011). In recent years, additional risk reduction measures have been put in place, which should further reduce the frequency.

BP acknowledges that some stakeholders may view BP's proposal to drill in the GAB in the context of the 2010 Deepwater Horizon accident in the Gulf of Mexico, in which eleven men lost their lives and a significant oil spill occurred. Numerous investigations into this incident have been published, including BP's own investigation, which found that the incident had multiple causes involving multiple parties. Court proceedings in relation to the matter are continuing in the US. Nevertheless, BP has moved swiftly to identify, share and act upon the key lessons from the investigation. The company has restructured into global functions. A Global Wells Organisation brings functional wells expertise into a single organisation with common global practices, and with a mission to deliver safe, compliant and reliable wells across BP. A S&OR function operates independently of the business line to set requirements in this area and to maintain an independent view of implementation of those requirements and of safety and operations risks. The Global Wells Organisation works with the S&OR function to reduce risk in drilling.

Specific lessons from Deepwater Horizon have been organised into five themes: prevention and drilling safety; containment; relief wells; oil spill response; and crisis management. Prevention measures are discussed in Section 2.1, and preparedness and response is discussed below. Prior to obtaining internal approval to commence drilling operations, it must be demonstrated that these corporate requirements have been fulfilled, and will continue to be fulfilled throughout the proposed GAB drilling program

Locally, these lessons have been shared with government and industry, and BP has participated in a number of industry initiatives such as the development of a Mutual Aid Memorandum of Understanding and the procurement of an industry subsea first response toolkit to improve safety and industry capability.

Worst credible case loss of well control modelling

BP has conducted oil spill modelling for a loss of well control scenario in the proposed GAB drilling area. The SINTEF Oil Spill Contingency And Response (OSCAR) model was used, as required by BP's GDP 4.6-0002 'Crisis and Continuity Management – Oil Spill Preparedness and Response'. OSCAR is a 3-dimensional model that calculates and records the distribution (as mass and concentrations) of contaminants on the water surface, on shorelines and in the water column. The model computes surface spreading, slick transport, entrainment into the water column, evaporation, emulsification and shoreline interactions to determine oil drift and fate at the surface. In the water column, horizontal and vertical transport by currents, dissolution, adsorption, settling and degradation are simulated.

Both single spill scenarios and stochastic simulations were run using OSCAR. Stochastic modelling involved running four simulations per month (over a 120 day simulation period) using data for winds and currents from January 2006 through December 2010, thus subjecting the predicted transport and weathering of an oil spill simulation to a range of prevailing wind and current conditions that is historically representative of the time period in question. During each simulation, the model records the grid cells contacted (at or above set threshold levels) by the oil spill trajectory, as well as the time elapsed. This produced statistical outputs around:

- Probability of sea surface, shoreline or water column contact that may occur at a given grid cell; and
- Minimum time before contact could occur at a given grid cell.

Threshold levels specified for sea surface, shoreline and water column were as follows:

- Surface: thickness of oil on the water surface >5 µm, as this is considered the minimum thickness that might lead to a successful spill response.
- Shoreline: volume of oil reaching the shoreline <0.1 litre per m^2 based on the International Tank Owners Pollution Federation guidelines.
- Water column concentration: concentration of oil in the water column >25 ppb of total hydrocarbon based on the Norwegian Oil Industry Association guideline for risk assessment of effects on fish from acute oil pollution.

There were a number of scenarios modelled based on hydrocarbon characteristics, flow rates and duration of spill. These variables are discussed in more detail below.

Hydrocarbon type

Given the GAB is a frontier oil and gas exploration area with no previous hydrocarbon discoveries, the properties of potential hydrocarbons and hydrocarbon phase remain uncertain. Petroleum systems modelling has been used to characterise the range of fluid types and reservoir temperature and pressure through examining the basin evolution of the GAB, potential source rock facies, geological information of the predicted reservoir systems, and predicted reservoir depths.

The modelling work conducted by BP's petroleum systems analysts and regional geologists has concluded that the GAB is likely to be predominantly gas-prone, with condensate to gas ratios varying from dry gas to volatile oil. There are areas with a greater probability of being oil-prone, due both to source rock facies and modelled thermal history. A volatile oil scenario is considered the most likely outcome during the exploration program, given the source rocks and thermal history anticipated in the locations BP is likely to focus on. The term 'volatile or gassy oil' is used to describe hydrocarbons modelled from two source rocks, a marine oil prone source rock and a gas-prone coaly source rock that have reached the gas expulsion window. The likely American Petroleum Institute (API) gravity range for these hydrocarbons is between 36 and 48.

Whilst BP believes that the most likely hydrocarbon type will be a volatile oil, it is an internal BP requirement that oil spill preparedness and response planning must be based on the hydrocarbon type that has the potential for the worst environmental consequence. This outcome is likely to be an oily case scenario rather than volatile oil. There are regions in the GAB where the hydrocarbons could be derived solely from a marine oil-prone source rock that is in a thermal window where little or no gas has been expelled. Modelling suggests that this would result in 'black oil', with a likely API range of 27-33.

Given the above, both oily cases and volatile oil cases were modelled.

Flow rate

The predicted flow rate during a loss of well control event is based on the pressure of the reservoir and the diameter of the well. Reservoir pressure has been predicted based on the petroleum systems modelling discussed above. The results of this model, combined with details of the preliminary well design, have been used to estimate the worst credible case flow rate that may occur during a loss of well control.

Duration

Two different durations were examined for worst credible case scenarios associated with a loss of well control event: 35 days until a capping system is in place, and 158 days until a relief well can be drilled to the point of intersection and kill.

BP has conducted a logistics study to examine the mobilisation of various equipment to the proposed GAB drilling area in the event of a loss of well control event. This study estimates that a capping stack can be mobilised and deployed to site within 35 days of an event occurring, and a relief well can be drilled in 158 days.

Whilst BP believes that it is possible to cap the well within 35 days, and thus prevent further discharge of hydrocarbons into the marine environment until a relief well is drilled, oil spill preparedness and response will be based on the duration for drilling a relief well.

Modelling Scenarios
Given the above variables, the following four scenarios were modelled in shallow, mid-depth and deep locations:

- Scenario 1 - Oily case for 158 days until relief well drilled
- Scenario 2 - Oily case for 35 days until capping stack installed
- Scenario 3 - Volatile oil case for 35 days until capping stack installed
- Scenario 4 - Volatile oil case for 158 days until relief well drilled

As previously outlined, it is considered that Scenario 3, volatile oil for 35 days, is most credible worst case scenario given the predicted hydrocarbon characteristics and the ability to cap the well within 35 days. This is the scenario that will therefore be discussed in further detail in this document. However, as mentioned above, BP will plan a response to address a range of potential scenarios.

Modelling was conducted for three weather 'seasons':

- Summer (October to March) – predominantly S, SE winds
- Winter (June to September) – mainly N, NW winds
- Transitional (April and May) – no defined wind pattern

Modelling Results
Examination of modelling results included predictions for shoreline contact, surface water contact and water column contact. The modelling assumes no mitigation measures, such as oil spill response operations are conducted.

The probability of contact with shorelines is predicted to be relatively low, and varies slightly between seasons and shoreline locations. Time until shoreline contact is predicted to be 19 days at a minimum, thus allowing response measures to be enacted in the unlikely event of a spill. The probability of contact with specific shorelines is summarised in Table 7.

Table 7 – Summary of shoreline contact statistics (volatile oil, 35 day release)

Shoreline	Season	Probability of shoreline contact	Minimum time for shoreline contact	Level of stranding
Kangaroo Island	Summer	<1%	85-100 days	Light - heavy
	Winter	<2%	45-80 days	Light - heavy
	Transitional	2.5-7%	72-100 days	Light - heavy
Eyre Peninsula	Summer	No contact	NA	NA
	Winter	<2%	60-110 days	Light
	Transitional	No contact	NA	NA
Western Australia	Summer	<1%	19 days	light
	Winter	No contact	NA	NA
	Transitional	No contact	NA	NA

The oil spill modelling predictions for surface trajectories show there is no dominant drift direction during the winter and transitional seasons, but in summer trajectories extend out more towards the north west from the release location. The extent of the area with a >50% probability of contamination exceeding the 5 µm threshold thickness measured approximately 175 km by 200 km in the respective SW-NE and NW-SE directions at its maximum extent.

Modelling also shows that the plume of water with a >50% probability of contamination exceeding the 25 ppb total hydrocarbon threshold concentration in the water column extended up to 760 km by 330 km in the respective E-W and N-S directions at its maximum extent.

Diesel spill modelling

BP engaged Asia-Pacific Applied Science Associates (2011) to conduct diesel spill modelling for a vessel collision incident in the middle of the proposed GAB drilling area. A site closest to the mainland was chosen as the modelling location.

The scenario modelled was for a surface release of 509 m^3 of diesel (509 000 litres/ 3 201 barrels) over 12 hours, tracked to a minimum surface thickness threshold of 0.1 g/m^2 (or 1.0 μm or 0.001 mm). This release volume represents around half the maximum volume likely to be stored on a support vessel, as it is considered unlikely that more than one or two fuel storage tanks would be compromised in a collision.

Stochastic modelling predicts that no surface trajectories above 0.1 g/m^2 are likely to reach coastal marine parks or shorelines.

Up to 20% of the trajectories were predicted to travel in all directions from the release site and up to a maximum of 40 km in an easterly direction. The probability of sea surface contact greater than 50% was predicted to be restricted to within 5 km of the release site. The maximum distance travelled corresponded to a lower probability contour (0-10%) and stretched up to approximately 310 km in a southwest direction from the release site.

Oil Spill Preparedness and Response

Detailed oil spill preparedness and response plans will be developed as part of the EP and OSCP submission, which is required under the OPGGS Environment Regulations, and must be accepted by NOPSEMA prior to commencement of drilling operations.

In addition to the requirement to demonstrate capability to respond to contingent events as part of EP acceptance, BP also has internal group requirements on Crisis and Continuity Management (GDP 4.6-0001) and Oil Spill Preparedness and Response (GDP 4.6-0002).

In order to meet these internal and external requirements, detailed planning will be conducted to examine:

- Logistics to mobilise and deploy a cap and contain system;
- Logistics to mobilise and deploy the Australian industry subsea first response toolkit;
- Relief well planning; and
- Logistics to mobilise oil spill response operation.

Oil spill response strategy and oil spill equipment requirements will be designed and calibrated according to the following key steps:

- Identify a range of planning scenarios;
- Model fate and behaviour of oil at sea;
- Identify potential impacted area using oil spill sensitivity mapping;
- Develop oil spill response strategy and select range of applicable oil spill response techniques based on Net Environmental Benefit Analysis (NEBA);
- Mobilisation plans for each specific response technique will be documented in a series of tactical plans; and
- Additional plans will include oiled wildlife response plan, waste management plan, impact assessment and monitoring plans.

Response operations will be managed by BP's response system based upon the Incident Command System, with a 3 tier command structure, supported by in country and global Mutual Response Team that may be called upon as required.

BP's response plans will be developed in conformance with these standards and will be aligned with the requirements of the National Plan framework. The resultant oil spill contingency plan will define arrangements for responses to Tier 1, Tier 2 and Tier 3 events. BP retains full membership access to AMOSC and Oil Spill Response Limited (OSRL) resources and will consult with AMSA to define the most appropriate responses as part of its EP and OSCP preparation.

Potential impacts on Matters of National Environmental Significance

Birds

Volkman et al (1994) identify seabirds as being the most vulnerable organisms to a hydrocarbon spill in oceanic environments. Birds are particularly susceptible due to the high potential for contact with the sea surface or shoreline. Contact with hydrocarbons can have lethal or sub-lethal physical and toxic effects due to external exposure and ingestion. The oiling of feathers can cause a bird to lose its natural buoyancy, as well as the insulation and water repelling properties of the feathers. It is also possible that exposure to fumes from a surface slick could cause impacts to eyes and skin. Further impacts may be observed from ingestion. The impact of the hydrocarbon ingestion is dependent on the hydrocarbon type, stage of weathering and its toxicity.

No significant seabird breeding or feeding areas have been identified in or near the proposed GAB drilling area. However, modelling predicts that shoreline contact may occur in a worst credible case spill scenario. Given the time for oil to reach shorelines, hydrocarbons are expected to be weathered and therefore less toxic. Furthermore, this time until contact will also allow spill response measures to be enacted, reducing the likelihood of shoreline contact.

Mammals

Accurate information on the measured impacts of hydrocarbon spills on marine mammals is limited due to the paucity of historical data from actual spills, due in most part to their reclusive and migratory behaviour, such as that of whales. The information presented herein is available from AMSA (2012). The nature of the oil, location, volume, concentration levels, exposure time and how much it has weathered may affect the potential impacts.

Potential physiological effects on mammals may include:

- Hypothermia due to conductance changes in skin, resulting in metabolic shock (expected to be more problematic for non-cetaceans in colder waters).
- Toxic effects and secondary organ dysfunction due to ingestion of oil.
- Congested lungs.
- Damaged airways.
- Interstitial emphysema due to inhalation of oil droplets and vapour.
- Gastrointestinal ulceration and haemorrhaging due to ingestion of oil during grooming and feeding.
- Eye and skin lesions from continuous exposure to oil.
- Decreased body mass due to restricted diet.
- Stress due to oil exposure and behavioural changes.

Oil spill modelling conducted for the unmitigated worst credible case loss of well control scenario predicts that hydrocarbon slicks or films have a low probability (typically <10%) of reaching surface waters in areas where whales are likely to be foraging (Kangaroo Island pools and canyons and the shelf break). When looking at water column hydrocarbon concentrations, the probability of contact with these areas increases to 50-60% with no intervention. Surface or water column contact is not predicted to occur at the Head of Bight.

Fish

Eggs, larvae and young fish are considered to be sensitive to hydrocarbons. However, there is no definite evidence from case histories to suggest that hydrocarbon pollution has significant effects on fish populations in the open sea.

A wide variety of fish occur in the waters around the proposed GAB drilling area and broader GAB region, however only the Porbeagle shark is listed as a migratory species. The Porbeagle shark is widely distributed throughout waters off southern, southwest and southeast Australia. While individuals may be affected by hydrocarbons, it is not considered likely to impact significant numbers of this species.

Reptiles

Marine turtles are susceptible to impacts of hydrocarbon spills at all life cycles because of their contact with the sea surface. Hydrocarbons could have physical or toxic effects by direct contact at the water's surface, through ingestion of solid residue, inhalation of toxic vapours when the diesel is fresh or irritation to areas such as the head, neck and flippers.

Given the absence of turtle nesting sites on the distant coastline, it is probable that very few turtles, if any, would be exposed to hydrocarbons in the open ocean in the event of a spill.

3.2 (d)	**Is the proposed action to be taken on Commonwealth land?**	X	No
			Yes (provide details below)

If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(g))

3.2 (e)	**Is the proposed action to be taken in the Great Barrier Reef Marine Park?**	X	No
			Yes (provide details below)

If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(h))

3.3 Other important features of the environment

3.3 (a) Flora and fauna

Threatened and migratory species identified by the EPBC Act Protected Matters Search Tool as potentially occurring in the proposed GAB drilling area are discussed in Sections 3.1(d) and 3.1(e).

The Marine Bioregional Plan for the South-west Marine Region identifies the 'ancient coastline between 90 and 120 m depth' as being a key ecological feature of the South-west Marine Region, and describes this feature as supporting benthic biodiversity and productivity where the ancient coastline forms a prominent escarpment, such as in the western GAB, where the sea floor is dominated by sponge communities of significant biodiversity and structural complexity (SEWPAC, 2012b). The plan also describes 'benthic invertebrate communities of the eastern GAB' as a key ecological feature of the South-west Marine Region, and describes this benthic community as among the world's most diverse soft-sediment ecosystems (SEWPAC, 2012b). The South-west Commonwealth Marine Reserves Network management plan lists the 'ancient coastline 90-120 m' and 'benthic invertebrate communities found on the inner shelf of the eastern GAB' as major conservation values of the GAB Commonwealth Marine Reserve (Director of National Parks, 2013). These areas are located approximately 70 km from the proposed GAB drilling area, and are considered unlikely to be affected by drilling operations.

The continental slope (200 – 3 000 m) of the GAB is poorly studied, with only one survey (at three sampling sites) undertaken to date. During 2010, 57 species of infauna and 84 species of epifauna were collected from three depth stratified sampling stations (500 m, 1 000 m and 2 000 m) on the continental slope of the (then) GAB Marine Park Benthic Protection Zone (BPZ) (Currie and Sorokin, 2011). Almost 96% of infauna and 61% of epifauna collected during this survey appear to be undescribed species (Currie and Sorokin, 2011). Species diversity and abundance varied between the three sampling sites, however there is little comparable data available outside the BPZ to be able to compare the BPZ with the wider GAB (Currie and Sorokin, 2011). BP is working with CSIRO and Marine Innovation Southern Australia (MISA) as part of a collaborative science program to obtain additional baseline information and understanding of the GAB. This science program includes studying benthic biodiversity over the wider GAB region.

The only known seabed feature in the proposed GAB drilling area is 'Anna's pimple' which is a cone shaped volcanic pinnacle, approximately 800 m in diameter and approximately 200 m high (Currie and Sorokin, 2011). Anna's pimple is located in a water depth of 2 000 m in the GAB Commonwealth Marine Reserve in the southeast of the proposed GAB drilling area, and is expected to support diverse and unique benthic fauna (Currie and Sorokin, 2011). Drilling activities will avoid Anna's pimple.

The open ocean environment generally supports highly mobile fish species, many of which are brought into the region by the warm tropical Leeuwin current, such as southern bluefin tuna, mackerel, salmon and herring (Edyvane, 1998). The open ocean also supports larger fauna including cetaceans, sea turtles and sharks.

The highest rate of primary productivity in the GAB is in the east where upwelling in summer and autumn results in nutrient enrichment. This area is located ~150 km from the proposed GAB drilling area (at the closest point) and is considered unlikely to be affected by drilling operations. Offshore areas of the eastern GAB have low rates of primary productivity, while mid-shelf and coastal waters have intermediate productivities (Rogers et al, 2012).

3.3 (b) Hydrology, including water flows

Currents

The main currents in the GAB (Rogers et al, 2012) are:

- Flinders Current – westward flowing offshore current that is thought to be stronger in summer than in winter.
- Leeuwin Current – originates from the tropical Indian Ocean and passes down the WA coast. In winter, the Leeuwin Current extends into the GAB, flowing eastward. During summer, the penetration of the Leeuwin Current into the GAB is weak to non-existent.
- Coastal current – flows along the shoreline in a westward direction in summer and eastward direction in winter.
- South Australian Current – mid-shelf current that flows eastward in summer and winter.

Upwellings

Seasonal (summer) upwellings, notably the Kangaroo Island and Eyre Peninsula upwellings, occur in the eastern GAB region (DEWHA, 2008b; Rogers et al, 2012). These upwellings are thought to be linked to mesoscale eddies that form off the Eyre Peninsula, which play a role in lifting cold (14-18°C), nutrient-rich water from depths of 200 - 400 m along the Bonney Coast toward the surface, which enhances the production of plankton communities (DEWHA, 2008b; Rogers et al, 2012).

The upwelled water resides near the bottom and between Kangaroo Island and the Eyre Peninsula as a nutrient rich cold pool that then acts to feed subsequent upwelling events, which in turn drives phytoplankton growth for the region (Rogers et al, 2012). No strong evidence of upwelling is found in the mid-GAB (Rogers et al, 2012).

Downwellings

Within the wide sloping shelf of the mid-GAB, the anti-cyclonic (anti-clockwise) winds drive what is known as a (southward) topographic Sverdrup transport. This transport was originally postulated by Herzfeld and Tomczak (1999) and in conjunction with the westward coastal currents gives rise to an anti-cyclonic circulation within the mid-GAB (Rogers et al, 2012).

This results in a cross-shelf exchange in the mid-GAB dominated by downwelling. Recent research indicates year-round downwelling to 300 m as characteristic of the mid-GAB (Rogers et al, 2012).

Tides

Southern Australian waters experience a tidal cycle varying from normal semi-diurnal tidal variations at springs to almost no tidal movements at neaps. Oceanic swells originate predominantly from the southwest, creating a high wave energy regime along the eastern coastline of the region (Grzechnik, 2000).

Tidal currents on the shelf and within the GAB are generally small (< 0.1 m.s^{-1}) and do not appear strong enough to induce any internal tides of significance (Rogers et al, 2012).

Waves

The GAB has a mixed wind wave/swell environment in which at any location the sea-state rapidly 'deteriorates' during the passage of fronts and low-pressure systems, and then gradually 'moderates' as anti-cyclonic conditions return. The wave climate is mildest in February and most extreme in September (Rogers et al, 2012).

The waves move predominately in an onshore direction at the mean speed of about 0.15 $m.s^{-1}$ (Rogers et al, 2012). Significant wave height is predicted to exceed 3 m for 30-60 days of the year and 6 m for 0-10 days of the year (Rogers et al, 2012).

Eddies

A feature of the circulation in the GAB is the presence of mesoscale eddies during summer and winter. Surface eddy velocities are of the order 0.25 to 0.50 $m.s^{-1}$ and these velocities may penetrate to depth and effect local cross-shelf exchange including both upwelling and downwelling (Rogers et al, 2012).

The sea surface height data suggests the winter eddy variability to be smaller in the mid-GAB region, but quite intense in the far west due to instabilities of the Leeuwin Current. Drifter trajectories, hydrographic surveys and acoustic doppler current profiler data all indicate the frequent formation of large anti-cyclonic eddies off Albany, WA. The eddies here appear to be related to an offshore meander of the Leeuwin Current as it rounds Cape Leeuwin. During summer, the near-slope eddy variability is weaker than in winter. The radial currents associated with the eddies over the shelf slope can influence the Flinders Current and increase upwelling and downwelling through the bottom boundary layer and within canyons (Rogers et al, 2012).

3.3 (c) Soil and Vegetation characteristics

There is no vegetation, other than the seagrass habitats in the nearshore area as discussed under 3.3(a).

Most of the GAB seabed is composed of soft unconsolidated sediments, but due to large variations in bathymetry, there are marked differences in sedimentary composition and benthic assemblage structure across the region. The proposed GAB drilling area is located on the continental slope and abyssal plain.

3.3 (d) Outstanding natural features

Section 3.3(j) provides details regarding the key ecological features in the area of the GAB, as documented in the Marine Bioregional Plan for the South-west Marine Region (SEWPAC, 2012b). These key ecological features link into the 'major conservation values' identified for the GAB Commonwealth Marine Reserve, as outlined in the South-west Commonwealth Marine Reserves Network Management Plan 2014-24 (Director of National Parks, 2013).

3.3 (e) Remnant native vegetation

Not applicable.

3.3 (f) Gradient (or depth range if action is to be taken in a marine area)

Water depths in the proposed GAB drilling area range from approximately 1 000 m to 3 000 m. The proposed GAB drilling area is located on the continental slope and extends into the abyssal plain. The continental slope (up to 250 km wide in the GAB) lies beyond the continental shelf and extends to water depths of around 2 000 m. Further offshore at the foot of the continental slope, the abyssal plain is a flat, relatively featureless expanse of seabed with average depths of 4 000 m.

3.3 (g) Current state of the environment

BP considers the environment within the proposed GAB drilling area to be relatively pristine. There is little data available regarding existing environmental quality of the GAB, and a number of gaps in data regarding the GAB ecosystem have been identified. BP is working with CSIRO and MISA as part of a collaborative science program to obtain additional baseline information and understanding of the GAB. This science program commenced in April 2013 and will be conducted over four years.

Petroleum exploration activities in the Bight Basin commenced in the 1960s, with a number of wells drilled throughout the region. Four wells have previously been drilling within 100 km of the proposed GAB drilling area (Apollo 1, Gnarlyknots 1 and 1A and Potoroo 1) (DEWHA, 2010). None of these wells were successful, and there is no petroleum production in the GAB.

A number of commercial fisheries operate in the offshore GAB. These are discussed further in section 3.3(l).

3.3 (h) Commonwealth Heritage Places or other places recognised as having heritage values

There are no Commonwealth Heritage Places or other places recognised as having heritage values in the vicinity of the proposed GAB drilling area.

3.3 (i) Indigenous heritage values

There are no known indigenous heritage values in the vicinity of the proposed GAB drilling area.

3.3 (j) Other important or unique values of the environment

Commonwealth Marine Reserves

The GAB Commonwealth Marine Reserve intersects the permit areas (see Figure 1) and was originally declared in 1998. The reserve was extended in November 2012 to cover 45,926 km^2 and has a depth range of 15 to 6 000 m, encompassing the former GAB Marine Park. A Management Plan for the South-west Commonwealth Marine Reserve Network has recently been finalised, with the intention that it is in place from 2014 – 2024 (Director of National Parks, 2013).

Several zones are established in the reserve to protect various features. These are:

- Marine National Park Zone (IUCN Category II - 7,728 km2) – protected and managed to preserve its natural condition. Petroleum exploration is excluded from this zone;
- Multiple Use Zone (IUCN Category VI – 22,682 km2) – managed to ensure long-term protection and maintenance of biological diversity with a sustainable flow of natural products and services to meet community needs. Some commercial fishing is permissible and petroleum exploration and development is permissible. Most of the permits intersect this zone; and
- Special Purpose Zone (IUCN Category VI – 15,516 km2) – A small part of the northern-most permit (EPP 37) intersects this zone. Petroleum exploration and development is permissible.

The key ecological features in the area of the GAB have been identified in the Marine Bioregional Plan for the South-west Marine Region (SEWPAC, 2012b). These key ecological features link into the 'major conservation values' identified for the GAB Commonwealth Marine Reserve, as outlined in the South-west Commonwealth Marine Reserves Network Management Plan 2014-24 (Director of National Parks, 2013). The major conservation values for the GAB Marine Reserve are:

- Important foraging areas for the Australian sea lion, white shark, sperm whale and short-tailed shearwater;
- Globally important seasonal calving habitat for the threatened southern right whale;
- Examples of the central and western ecosystems of the GAB Shelf Transition and the easternmost ecosystems of the Southern Province; and
- Includes three key ecological features:
    - Ancient coastline 90-120 m (high productivity).
    - Benthic invertebrate communities of the eastern GAB (communities with high species diversity).
    - Areas important for small pelagic fish (species group with an important ecological role.

The values and features listed above that are in proximity to the proposed GAB drilling area are described in more detail in previous sections.

State Marine Parks

Numerous State Marine Parks have been established in coastal South Australian waters (Figure 1). All of these parks are located along the coastline a significant distance northeast of the proposed GAB drilling area.

3.3 (k) Tenure of the action area (eg freehold, leasehold)

The proposed GAB drilling program will be conducted wholly within Commonwealth waters in the proposed GAB drilling area.

3.3 (l) Existing land / marine uses of area

Fishing

Commonwealth fisheries are managed by the Australian Fisheries Management Authority, with Commonwealth fisheries operating from 3 nm of baseline out to 200 nm (the extent of the Australian Fishing Zone, AFZ). The proposed GAB drilling area overlaps with fishing zones for a number of Commonwealth fisheries, these being:

- Western Skipjack Tuna.
- Southern Bluefin Tuna (SBT).
- Western Tuna and Billfish.
- Small Pelagic.
- Southern and Eastern Scalefish and Shark.
- Southern Squid Jig

Based on consultation that BP has conducted with fisheries since early 2011 regarding proposed exploration activities in the GAB, few of these fisheries operate in or near the proposed GAB drilling area. It is possible that the Southern and Eastern Scale-fish and Shark fishery (which includes the Commonwealth Trawl Sector, GAB Trawl Sector, East Coast Deep-water Trawl Sector and the Gillnet, Hook and Trap Sector) may operate in the area at various times of the year. BP has consulted, and will continue to consult, with these fisheries leading up to and during the proposed drilling activities to aim to ensure any interactions are minimised.

Whilst the SBT fishery does not overlap the proposed GAB drilling area, it is noted that the GAB is an important area for this fish species. SBT are found throughout the southern hemisphere mainly in waters between 30° S and 50° S. The only known breeding area is in the north-eastern Indian Ocean, between Indonesia and the northwest Australian coast, where breeding occurs from September to April. Juveniles migrate down the west coast of Australia and during the summer months (December to April), they congregate near the surface in coastal waters off the southern coast of Australia and spend their winters in deeper, temperate oceanic waters. Juvenile SBT feed predominantly on sardines in the GAB (Rogers et al, 2012). It is generally thought that SBT larvae move south from spawning grounds after hatching in spring, facilitated by the Leeuwin Current, and reach southwest Australian waters in early summer. Juvenile SBT (1-5 years) then undertake large-scale seasonal migrations, frequenting the GAB during the summer and autumn (with tagging data suggesting a preference for waters 15-22°C in the GAB). The SBT then leave the GAB once seasonal upwellings and associated enhanced productivity declines in autumn, moving either west into the Indian Ocean or east and around Tasmania into the Tasman Sea (Rogers et al, 2012). Given the distance between the proposed GAB drilling program and the SBT fishery, no impacts on this fishery are considered likely to occur.

In addition to these commonwealth managed fisheries, there are a number of state managed fisheries in the GAB. However, based on information gathered during consultation, these fisheries are unlikely to overlap with the proposed GAB drilling area as they are restricted to shallower waters.

Shipping

Shipping activity in the GAB is low, with the majority of vessels travelling south of the Bight in a straight line between southwest Western Australia and Melbourne. Vessels travelling into the Port of Adelaide from the west will traverse the GAB, but generally still to the south of the GAB Commonwealth Marine Reserve (and thus the permit areas). Some light shipping traffic between South Australian ports (Thevenard, Adelaide, Port Lincoln, etc) and Cape Leeuwin (the southwest tip of Western Australia) is likely to pass through the permit areas. A Notice to Mariners will be issued to notify all marine users of the presence of the MODU and support vessels prior to the commencement of operations.

3.3 (m) Any proposed land/marine uses of area

There are no known proposed uses of the proposed GAB drilling area.

4 Measures to avoid or reduce impacts

As described in Section 3, the proposed drilling operations are unlikely to result in significant impacts on matters of national environmental significance protected under the EPBC Act. Specific measures to avoid or reduce environmental effects are summarised in Table 8.

Further details regarding these mitigation and management measures will be outlined in the drilling EP, which will be submitted to NOPSEMA for acceptance prior to the commencement of drilling operations. The EP will include a full environmental risk assessment, with specific measures to avoid or reduce potential environmental impacts to ALARP.

Furthermore, all drilling and well testing operations will be undertaken in accordance with a WOMP, which must also be accepted by NOPSEMA prior to commencement of drilling operations.

Table 8 – Summary of mitigation and management measures to be implemented during drilling

Environmental Aspect	Potential Environmental Effect	Mitigation and Management Measures
Routine Events		
Seabed disturbance (from anchoring and subsea drilling equipment)	Localised disturbance to seabed from anchoring	• Anchors and subsea drilling equipment will be deployed away from Anna's pimple • MODU anchoring plan will be developed and implemented • Support vessels will not anchor on location
Seabed disturbance (from tophole drilling)	Localised smothering of seabed fauna and flora from cuttings and drilling muds.	• Location of wells will avoid Anna's pimple • Seawater and high viscosity sweeps will be used to drill top hole section and hole will be filled with bentonite mud prior to running casing
Underwater sound (MODU, vessels, helicopters)	Localised and temporary disturbance to sound-sensitive species such as cetaceans	• Maintenance of MODU engines and thrusters as per manufacturers specifications to ensure they are running efficiently • Flight paths for helicopters will avoid low flying over areas of environmental sensitivity
Underwater sound (from VSP)	Localised and temporary disturbance to sound-sensitive species such as cetaceans	EPBC Act Policy Statement 2.1 'Interaction between offshore seismic exploration and whales' will be implemented during VSP
Atmospheric emissions (from engines on MODU, vessels, helicopters)	Temporary and localised (local air shed) increase in particulate matter	• Engines maintained as per manufacturers specifications to ensure they are running efficiently • Fuel consumption records will be reported via Daily Reports • Low sulphur diesel fuel will be used

Emissions from well testing	• Temporary and localised (local air shed) increase in particulate matter • Temporary and localised pollution of surrounding surface waters and acute toxicity to marine fauna from fall-out of liquid hydrocarbons to sea	Well test will be planned and executed as per BP Engineering Technical Practice GP 10-80 'Well Testing', which includes requirement for a fully backed up robust ignition system to ensure effective ignition of both oil and gas
Light emissions	Temporary and localised disturbance to fauna from rig lighting	Lighting to be managed to meet applicable Australian maritime safety standards
Discharge of treated sewage and grey water	Temporary and localised increase in the nutrient load of surface waters	All sewage will be treated and discharged through a MARPOL compliant sewage treatment plant
Discharge of cooling and brine water	Temporary and localised increase in water temperature and salinity	• Maintenance of engines and water maker unit as per manufacturers specifications to ensure they are running efficiently • Cooling water will be released above sea level to allow cooling prior to entering the marine environment
Discharge of putrescible waste	Temporary and localised increase in the nutrient load of surface waters.	• All food waste will be macerated prior to overboard discharge when >12 nm from shore • When vessels are <12 nm from shore, food waste will not be discharged overboard
Discharge of deck drainage and bilge water	Temporary and localised pollution of surrounding surface waters and acute toxicity to marine fauna.	• Equipment with the potential for spills of chemicals or fuels will be located within a bunded area • Chemicals or fuel stored on deck will be stored in contained areas • Bilge water will be discharged via an approved and maintained oily water system to ensure oil in water is <15 ppm • Spills to deck to be cleaned up as soon as possible to minimise overboard discharge • SOPEP clean up kits will be available throughout the MODU
BOP Fluid discharged from BOP functions	Temporary and localised decrease in water column quality	• Function and pressure testing of BOP will be performed as per the required schedule • Low toxicity BOP fluid will be used

Overboard discharge of drill cuttings and adhered drilling muds (except top hole sections)	• Temporary and localised decrease in surface water and water column quality • Temporary and localised decrease in sediment quality • Localised smothering of benthic fauna and flora	• Cuttings and mud managed as determined by BP's 'Best Practicable Environmental Option for disposing of Drilling Waste' process • Low toxicity WBM and SBM will be used • Cuttings discharged overboard will have a maximum of 6.9% by weight synthetic oil on wet cuttings • Used SBM will be recycled or disposed of onshore at a licensed facility
Discharge of WBM at well completion	• Temporary and localised decrease in surface water and water column quality. • Localised smothering of benthic fauna and flora	• Low toxicity WBM will be used • The WBM inventory will be managed to minimise excess remains at the completion of drilling each well
Unplanned Events		
Interference with other users of marine environment	• Damage to fishing equipment • Disruption to commercial activities resulting in reduced catch	• Consultation with commercial fishers prior to and during drilling activities to minimise interference • Anti-collision monitoring equipment and procedures used on the MODU • A Notice to Mariners will be issued prior to drilling • AusCoast warnings will be issued by AMSA to alert ship traffic to the presence of the MODU • A 500 m radius Petroleum Safety Zone will be applied around the MODU • The support vessel(s) on station will act as a chase vessel if any approaching vessels do not heed safety advice
Diesel spill from refuelling incident or vessel collision	• Temporary decrease in surface water and water column quality • Injury or death of exposed marine fauna	• Anti-collision measures described above will be implemented • Refuelling procedures for bunkering will be implemented • Dry break couplings will be used • Integrity of refuelling hoses will be inspected regularly • Refuelling will be conducted under a permit to work system • An OSCP will be in place • An oil spill response exercise will be conducted

Drilling mud/fluids spill during transfer	• Temporary and localised decrease in surface water and water column quality • Injury or death of exposed marine fauna	• Transfer procedures for drilling mud and base fluids will be implemented • Dry break couplings will be used for mud hoses • Integrity of mud hoses will be inspected regularly
SBM spill from riser failure or accidental riser unlatch	• Temporary and localised decrease in surface water and water column quality • Injury or death of exposed marine fauna	• Riser fatigue analysis will be performed • Operational and maintenance procedures will be in place to assure riser integrity
Hydrocarbon spill from loss of well control	• Temporary decrease in water surface and water column quality • Injury or death of exposed marine fauna	• A NOPSEMA accepted Safety Case and WOMP will be in place • Well operations program in place to maintain overbalance • A BOP will be installed • Regular BOP system function and pressure testing will take place • Only highly trained and experienced personnel will be supervising operations on the drill floor • An ROV Intervention Plan will be in place • A Well Capping Plan will be in place • A Relief Well Plan will be in place • An OSCP will be in place • An oil spill response exercise will be conducted
Hydrocarbon spill from unplanned event during DST	• Temporary decrease in water surface and water column quality • Injury or death of exposed marine fauna	• Appropriate rig design • A NOPSEMA accepted Safety Case and WOMP will be in place • A BOP will be installed • Regular BOP system function and pressure testing will take place • An ROV Intervention Plan will be in place • An OSCP will be in place • An oil spill response exercise will be conducted • Well test will be planned and executed as per BP Engineering Technical Practice GP 10-80 • Operational and maintenance procedures will be in place to assure integrity of DST equipment

Introduction of invasive marine species	The survival, colonisation and spread of foreign species that may compete with native species for resources, reducing species diversity and abundance	• Valid International Anti-fouling System Certificate will be in place • Vessels will be assessed and managed in accordance with the National Biofouling Management Guidance for the Petroleum Production and Exploration Industry • MODU and vessels will fulfil the requirements of the Australian Ballast Water Management Requirements
Inappropriate disposal of non-hazardous waste	• Marine pollution • Injury and entanglement of marine fauna and seabirds • Onshore litter (visual pollution)	• A MODU waste management plan will be implemented that includes appropriate requirements regarding storage, segregation and disposal of hazardous wastes on board • Waste will be sent ashore for disposal to licensed facility • Project induction will include information regarding waste handling, storage and disposal requirements • All waste materials will be transferred to support vessels in accordance with the MODU contractor's materials handling and transfer procedure
Inappropriate disposal of hazardous waste	• Temporary change in water column quality • Marine pollution • Injury or death of marine fauna • Land or groundwater contamination	• A MODU waste management plan will be implemented that includes appropriate requirements regarding storage, segregation and disposal of hazardous wastes on board • Hazardous waste will be sent ashore for disposal to licenced facility • Project induction will include information regarding hazardous waste handling, storage and disposal requirements • All hazardous waste will be transferred in accordance with the MODU contractor's materials handling and transfer procedure • MSDS will be available in appropriate locations throughout the MODU and support vessels • SOPEP kits will be available in appropriate locations throughout the MODU and support vessels to enable rapid clean up of spills

5 Conclusion on the likelihood of significant impacts

5.1 Do you THINK your proposed action is a controlled action?

X	No, complete section 5.2
	Yes, complete section 5.3

5.2 Proposed action IS NOT a controlled action.

The proposed GAB drilling program is not considered to be a controlled action as it is not likely to have significant impacts on any matter of National Environmental Significance for the following reasons:

- There are no World Heritage or National Heritage places, Wetlands of International Importance or Threatened Ecological Communities in the vicinity of the proposed GAB drilling area.
- Whilst the proposed GAB drilling area overlaps with the GAB Commonwealth Marine Reserve Multiple Use Zone, the values of the GAB Commonwealth Marine Reserve are considered unlikely to be affected by proposed drilling operations.
- The proposed GAB drilling area does not represent significant habitat for any listed threatened species. The proposed GAB drilling area is located more than 150 km from recognised whale aggregation areas around the Kangaroo Island Pools and Canyons and approximately 250 km from the Head of Bight. Sound modelling predicts that received SPL at these locations will be between 100-115 dB re 1 µPa (RMS). This sound level is considered unlikely to result in adverse impacts on whales.
- Migratory sperm whales may forage along the shelf break, approximately 50 km from the proposed GAB drilling area. Sound modelling predicts that received SPL will be less than 115 dB re 1 µPa (RMS) at this location. This sound level is considered unlikely to result in adverse impacts on sperm whales.
- BP has stringent internal requirements regarding the design of wells, operations of drilling activities, and the capability to manage loss of well control situations, as well as regarding preparation for oil spill and crisis management events. These requirements will be addressed prior to the commencement of drilling operations to help reduce the risk of an oil spill incident to ALARP, and to better assess whether appropriate equipment, procedures and personnel are available to respond should an emergency event arise.
- The installation of a BOP and other well controls, which are part of standard offshore drilling, means that the chance of a loss of well control event occurring is extremely remote. The frequency of loss of well control for exploration wells in Australia is estimated at 0.031% per well drilled (DNV, 2011). In recent years, additional risk reduction measures have been put in place, which should further reduce this frequency.
- In the unlikely event of a spill, modelling predicts that even in the worst credible case spill scenario, there is a low probability that hydrocarbons will contact shorelines. Furthermore, modelling predicts that it will take a minimum of 19 days for hydrocarbons to contact shorelines, which means that there is adequate time to mobilise necessary shoreline response measures.
- A number of management measures will be implemented throughout the proposed GAB drilling program to reduce the potential for impacts to occur.
- The proposed GAB drilling program will be conducted in accordance with the OPGGS Act and associated regulations.

5.3 Proposed action IS a controlled action

	Matters likely to be impacted
	World Heritage values (sections 12 and 15A)
	National Heritage places (sections 15B and 15C)
	Wetlands of international importance (sections 16 and 17B)
	Listed threatened species and communities (sections 18 and 18A)
	Listed migratory species (sections 20 and 20A)
	Protection of the environment from nuclear actions (sections 21 and 22A)
	Commonwealth marine environment (sections 23 and 24A)
	Great Barrier Reef Marine Park (sections 24B and 24C)
	Protection of the environment from actions involving Commonwealth land (sections 26 and 27A)
	Protection of the environment from Commonwealth actions (section 28)
	Commonwealth Heritage places overseas (sections 27B and 27C)

6 Environmental record of the responsible party

		Yes	No
6.1	**Does the party taking the action have a satisfactory record of responsible environmental management?**	X	

Provide details

BP is one of the world's leading international oil and gas companies, providing its customers with fuel for transportation, energy for heat and light, retail services and petrochemicals products for everyday items.

BP's commitment to no accidents, no harm to people and no damage to the environment is the responsibility of everyone in BP and this is continuously reinforced by leaders. The BP Group's annual Sustainability Reports, available from the corporate website www.bp.com, chart the company's progress on Environmental, Health, Safety and other measures. These reports incorporate feedback from our customers, shareholders, suppliers and others, and are independently verified by Ernst and Young.

Our safety and risk management approach is built on deep experience in the oil and gas industry. This includes learning from the conclusions of investigations into the Deepwater Horizon accident in 2010 and the Texas City refinery explosion in 2005, as well as operations audits, annual risk reviews, and other incident investigations, and from industry practice of sharing experience. The enhancements that BP put in place following the Deepwater Horizon accident and oil spill in 2010 are reinforcing a culture in which everyone is focused on safety and managing operational risk. Safety is at the heart of everything we do - driven by our leaders and applied through our operating management system. We reward our people based on their contribution to promoting safety and risk management.

BP established the S&OR function in early 2011. S&OR works alongside the business line as the line seeks to deliver safe, reliable and compliant operations across the group's operated businesses. S&OR does this in four ways:

- It sets and updates the requirements, including in OMS that are used across the businesses for safety and operational risk management.
- It provides expert scrutiny of safety and risk, independent of line managers – advising, examining and providing assurance about what our operations do.
- It provides deep technical expertise to the operations.
- It has the authority to intervene and escalate issues to cause corrective action to be taken.

	The S&OR function is made up of a central team, and also includes members who are deployed in BP's businesses, providing guidance and scrutiny and examining how risks are being assessed on rigs, at refineries and across all our operations. The central team serves as the custodian of group requirements, runs safety and operational risk audit and capability programs and endorses the appointment of individuals for designated safety-critical roles. The central team includes many of BP's top engineers and safety specialists, several of whom have experience in other industries where major hazards have to be managed, including the military, nuclear energy and space exploration. We are sharing the learnings from the Deepwater Horizon accident to help enhance the capabilities needed to help prevent this type of accident from happening again. In Australia, BP operates a downstream refining and marketing business and also has interests (as a non-operator participant) in the North West Shelf Venture, the Browse fields and the Greater Gorgon fields, and thus supports the ongoing development of these projects in accordance with the requisite environmental management conditions and obligations. In 2011, BP was awarded four permits in the GAB, and in 2011/12 conducted the Ceduna 3D seismic survey. This survey was conducted in accordance with an accepted EP under the OPGGS Environment Regulations, as well as with the conditions of a "Not Controlled if conducted in a particular manner" outcome after a referral under the EPBC Act.		
6.2	**Has either (a) the party proposing to take the action, or (b) if a permit has been applied for in relation to the action, the person making the application - ever been subject to any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources?**		X
6.3	**If the party taking the action is a corporation, will the action be taken in accordance with the corporation's environmental policy and planning framework?** **If yes, provide details of environmental policy and planning framework** BP's Health, Safety, Security and Environmental Performance Policy is attached (Attachment 2). Throughout the lifecycle of BP's projects and operations, BP works to manage environmental issues and address any related impacts on local communities. BP manages potential environmental impacts at a local level via the Operating Management System (OMS) and performance targets are set at BP's major operating sites. At a group level, BP reviews the management of key material issues such as greenhouse gas, water, sensitive and protected areas and human rights. BP's OMS, of which the environmental and social practices form part, defines BP's company-wide approach to managing potential impacts to land, air, water, flora or wildlife – as well as the potential social impacts.	X	

BP's OMS helps our businesses around the world to understand and manage their environmental and social impacts throughout the entire operational lifecycle, from initial project planning through to the operational phase and the eventual decommissioning. It lays out the standards and processes required for environmentally and socially responsible operations, including requirements on the way our businesses approach environmental concerns, oil spill preparedness and response in deepwater environments, regulatory compliance, community and stakeholder relations and social responsibility, among other topics.

BP's environmental and social practices follow detailed requirements, including the way they identify and seek to manage potential environmental and social impacts. These are supported by a series of recommended practices and a screening process during the early project stages to identify and assess environmental and social impacts that could arise from the activities.

Throughout the lifecycle of each of our sites, BP uses a continuous improvement approach to help manage risks, including environmental and social risks. From the operational phase onwards, this is delivered through an Environmental Management System certified to ISO 14001:2004 standard.

BP has incorporated what it learned from its Gulf of Mexico response and restoration efforts into its oil spill response planning approach across our business. BP aims to maintain readiness to respond on a global scale, to minimise adverse effects and to facilitate rapid mitigation activities. The Deepwater Horizon accident demanded a response on an order of magnitude never required before. BP learned a great deal and advanced its response technology and systems. As a result, BP has updated its group requirements and is sharing our knowledge with the industry and regulators.

BP has incorporated learnings into a number of technical requirements. New BP drilling operations in deepwater must have access to capping equipment, must pre-plan their relief well, and must be ready to demonstrate to S&OR, as well as to regulators, that their oil spill contingency plans take into account all foreseeable risks and include measures to mitigate environmental and economic consequences – however unlikely - including worst case.

BP has also incorporated learnings to strengthen its group-wide oil spill response requirements across all of its activities, including deepwater drilling. These enhanced requirements obligate relevant businesses to follow a planning process to predict how the spilled oil will behave; identify, assess and understand the environmental and social sensitivities at risk; define effective response strategies; and confirm that appropriate response capabilities are in place. This practice incorporates our deepwater technical requirements, further strengthening a single, consistent process across BP.

The requirements drive the use of industry-leading predictive oil spill modelling tools, which, coupled with recently enhanced ocean current and wind modelling data in our operating basins, will better inform our oil spill response planning.

	BP continues to engage with our peer companies in the oil and gas industry to share what has been learned about oil spill response and to work together to implement recommendations for improving oil spill prevention, intervention capabilities and response. BP is active in a number of industry forums related to oil spills, including work groups facilitated by the International Association of Oil and Gas Producers, the American Petroleum Institute, the International Petroleum Industry Environmental Conservation Association and the Australian Petroleum Production and Exploration Association, and non-profit oil spill response co-operatives, such as Oil Spill Response Limited. BP is also engaged with a number of country-specific collaborations on oil spill containment and response. For instance, in Australia, BP is a foundation member of the Australian subsea first response toolkit project.		
6.4	**Has the party taking the action previously referred an action under the EPBC Act, or been responsible for undertaking an action referred under the EPBC Act?** **Provide name of proposal and EPBC reference number (if known)** Ceduna 3D Marine Seismic Survey (EPBC 2011-5969).	X	

7 Information sources and attachments

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7.2 Reliability and date of information

See references above

7.3 Attachments

		✓ attached	Title of attachment(s)
You must attach	figures, maps or aerial photographs showing the project locality (section 1)	✓	
	figures, maps or aerial photographs showing the location of the project in respect to any matters of national environmental significance or important features of the environments (section 3)	✓	
If relevant, attach	copies of any state or local government approvals and consent conditions (section 2.5)	NA	
	copies of any completed assessments to meet state or local government approvals and outcomes of public consultations, if available (section 2.6)	NA	
	copies of any flora and fauna investigations and surveys (section 3)	NA	
	technical reports relevant to the assessment of impacts on protected matters that support the arguments and conclusions in the referral (section 3 and 4)	NA	
	report(s) on any public consultations undertaken, including with Indigenous stakeholders (section 3)	NA	

7.3 List of Acronyms

ALARP	As low as reasonably practicable
AMOSC	Australian Marine Oil Spill Centre
AMSA	Australian Maritime Safety Authority
AQIS	Australian Quarantine Inspection Service
BOP	blowout preventer
BP	BP Developments Australia Pty Ltd
DP	dynamically positioned
DST	drill stem test
EP	Environment Plan
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
GAB	Great Australian Bight
GDP	Group Defined Practice
IMS	invasive marine species
MARPOL	International Convention for the Prevention of Pollution from Ships (1973) and Protocol (1978)
MEMW	Marine Environmental Modelling Workbench
MODU	mobile offshore drilling unit
MSDS	material safety data sheet

NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
OPGGS Environment Regulations	Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009
OSCAR	Oil Spill Contingency And Response
OSCP	Oil Spill Contingency Plan
OSRL	Oil Spill Response Limited
RMS	root mean square
ROV	remotely operated vehicle
SBM	synthetic based mud
SBT	southern Bluefin tuna
SEWPAC	Department of Sustainability, Environment, Water, Populations and Communities
SINTEF	The Foundation for Scientific and Industrial Research
SOPEP	Shipboard oil pollution emergency plan
SPL	sound pressure level
TD	total depth
VSP	vertical seismic profiling
WBM	water based mud
WOMP	Well Operations Management Plan

8 Contacts, signatures and declarations

Project title: Great Australian Bight Exploration Drilling Program

8.1 Person proposing to take action

Name	Phil Home
Title	Managing Director, BP Exploration and Production Australia
Organisation	BP Developments Australia Pty Ltd
ACN / ABN (if applicable)	ABN 54 081 102 856
Postal address	Lv 8 QV1 Building, 250 St Georges Tce, Perth WA 6000
Telephone	08 9420 1820
Email	Phil.home@bp.com
Declaration	I declare that to the best of my knowledge the information I have given on, or attached to this form is complete, current and correct. I understand that giving false or misleading information is a serious offence. I agree to be the proponent for this action. I acknowledge that I may be liable for fees related to my proposed action following the introduction of cost recovery under the EPBC Act.
Signature	 Date 13.5.13

8.2 Person preparing the referral information (if different from 8.1)

Name	Rochelle Smith
Title	Environment Manager
Organisation	BP Developments Australia Pty Ltd
ACN / ABN (if applicable)	ABN 54 081 102 856
Postal address	Lv 8 QV1 Building, 250 St Georges Tce, Perth WA 6000
Telephone	08 9420 1820
Email	Rochelle.smith@bp.com
Declaration	I declare that to the best of my knowledge the information I have given on, or attached to this form is complete, current and correct. I understand that giving false or misleading information is a serious offence.
Signature	 Date 13/5/13

REFERRAL CHECKLIST

NOTE: This checklist is to help ensure that all the relevant referral information has been provided. It is not a part of the referral form and does not need to be sent to the Department.

HAVE YOU:

- ☑ Completed all required sections of the referral form?
- ☑ Included accurate coordinates (to allow the location of the proposed action to be mapped)?
- ☑ Provided a map showing the location and approximate boundaries of the project area?
- ☑ Provided a map/plan showing the location of the action in relation to any matters of NES?
- ☑ Provided complete contact details and signed the form?
- ☑ Provided copies of any documents referenced in the referral form?
- ☑ Ensured that all attachments are less than two megabytes (2mb)?
- ☑ Sent the referral to the Department (electronic and hard copy preferred)?

Attachment 1 – Figures

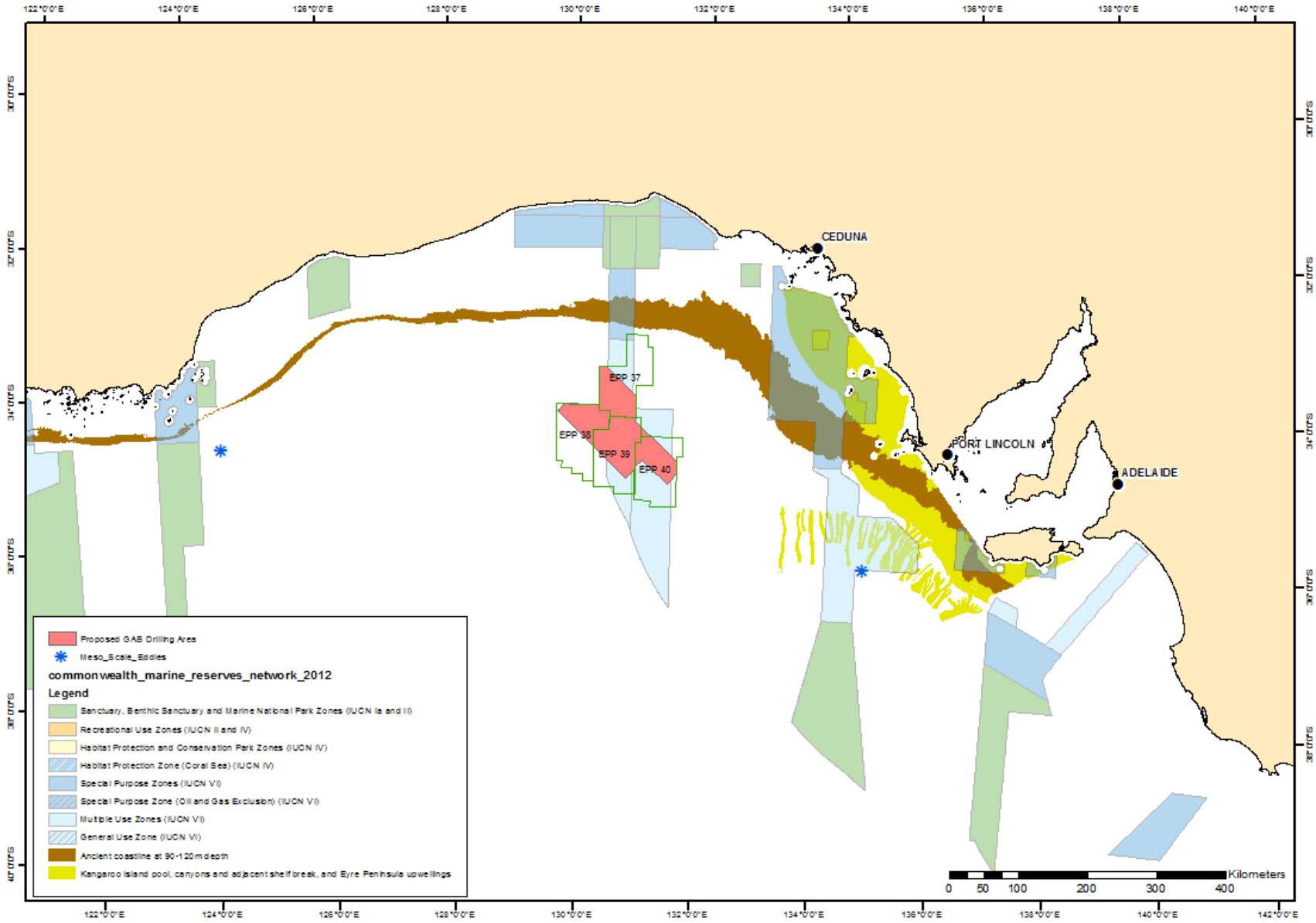

Figure 1 – Location of the proposed GAB Drilling Area

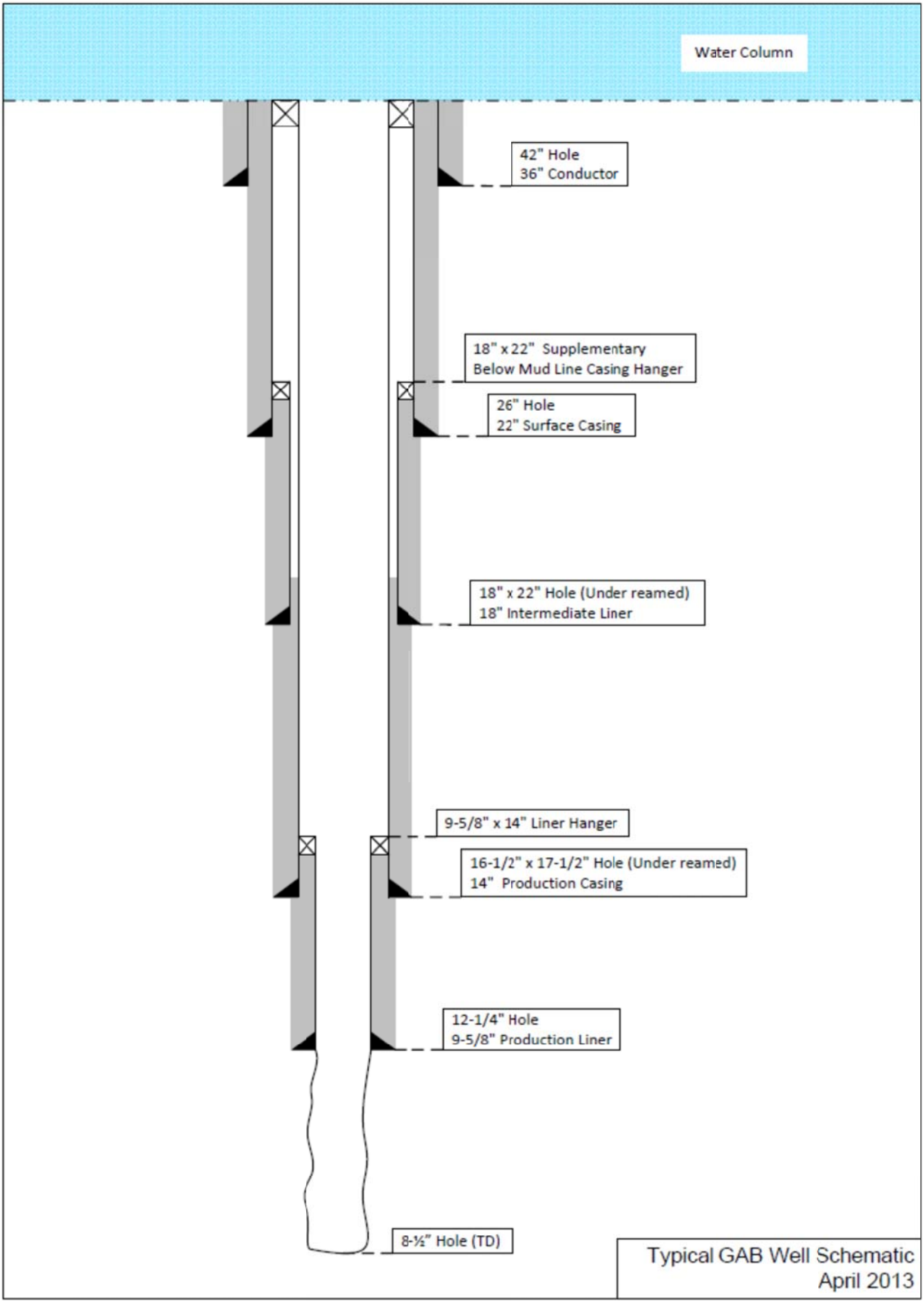

Figure 2 - Base case well design

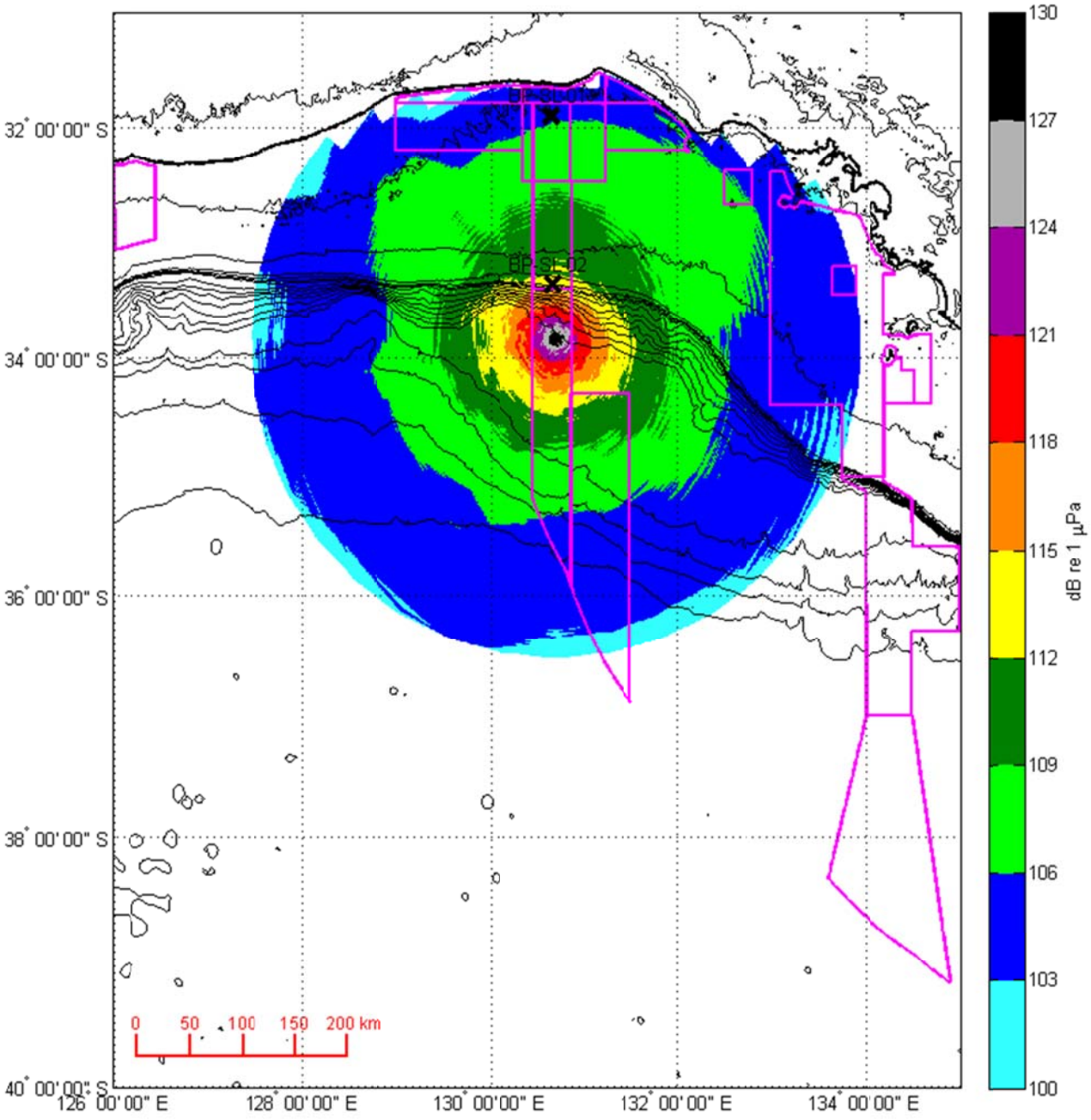

Figure 3 – Maximum SPL dB re 1 µPa (RMS) (at any depth) for shallow location during winter. Commonwealth Marine Reserves are indicated by the magenta lines. The locations of the ambient noise loggers are also shown.

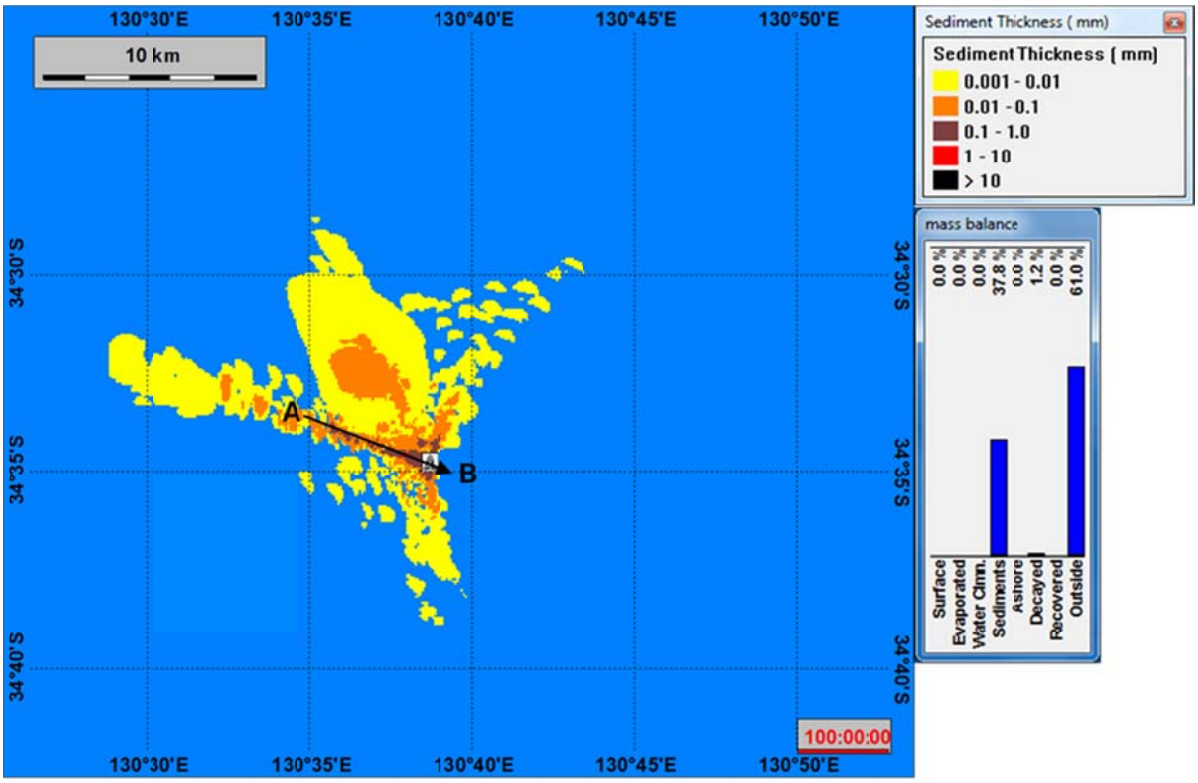

Figure 4a - Seabed deposition footprint of drilling discharges for medium water depth during summer

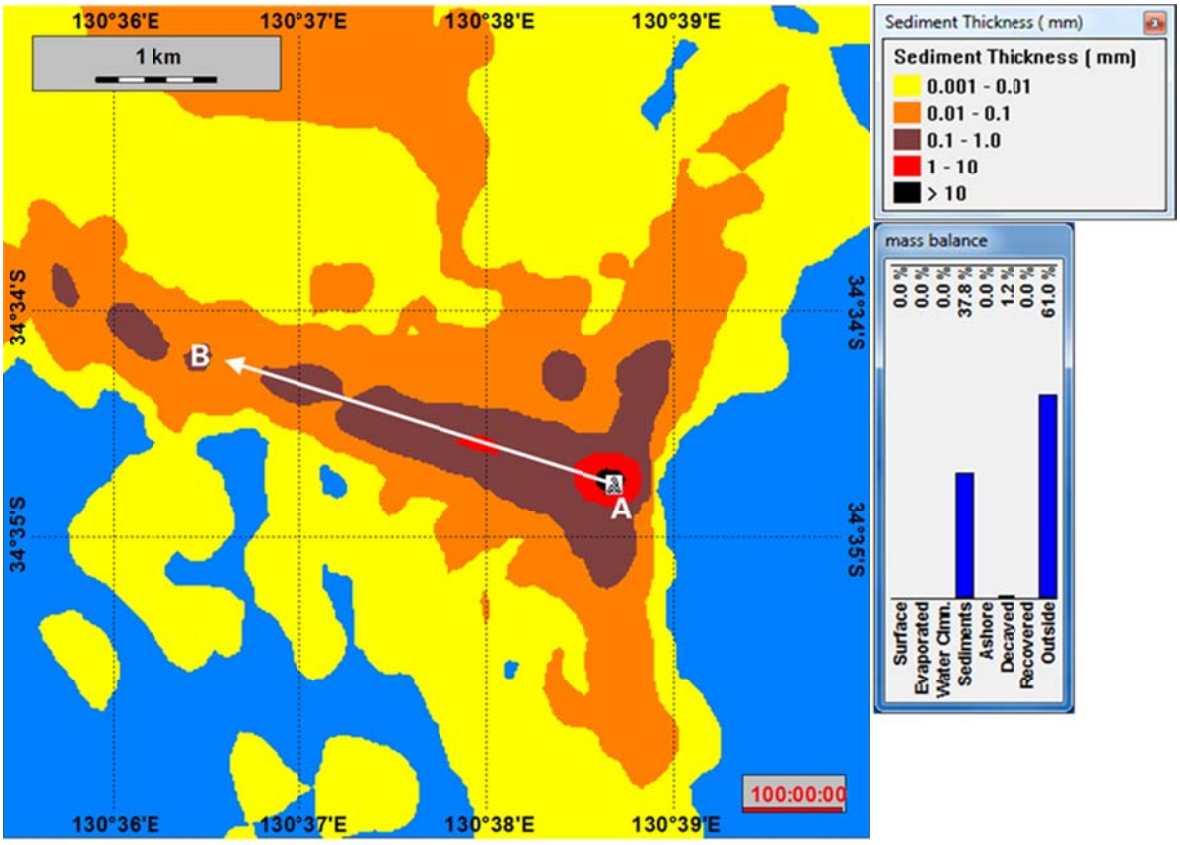

Figure 4b - Near-field seabed deposition footprint of drilling discharges for medium water depth during summer

Attachment 2 - BP's Health, Safety, Security and Environmental Policy

BP's commitment to **health, safety, security** and **environmental** performance (HSSE)

Our goals are simply stated. No accidents, no harm to people, and no damage to the environment.

Our goals are simply stated – no accidents, no harm to people, and no damage to the environment.

We will operate our facilities safely and reliably and care for all those on our sites or impacted by our activities. Everybody who works for BP, anywhere, is responsible for getting HSSE right. The health, safety and security of everyone who works for us are critical to the success of our business.

We will continue to drive down the environmental and health impact of our operations by reducing waste, emissions and discharges, and using energy efficiently. We will produce quality products that can be used safely by our customers.

We will:

- **Systematically manage** our operating activities to continuously reduce risk and deliver performance improvement.
- **Comply** with all applicable local laws and company policies and procedures.
- **Consult,** listen and respond openly to our customers, employees, neighbours, public interest groups and those who work with us.
- **Work with others** – our partners, suppliers, competitors and regulators – to raise the standards of our industry.
- **Openly report** our performance, good and bad.
- **Recognize those who contribute** to improved HSSE performance.
- **Continuously improve** our performance by improving the leadership, capability and capacity of our organization.

Our business plans include measurable HSSE targets. We are all committed to meeting them.

Bob Dudley
Group Chief Executive
31 December 2011

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