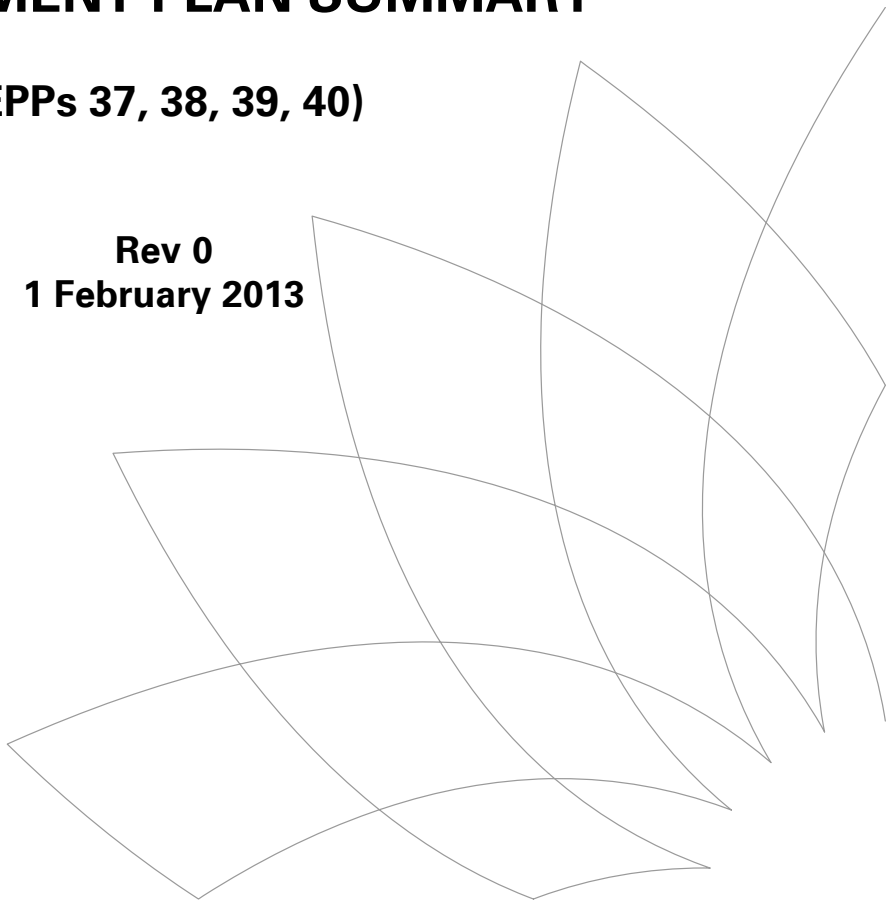
Great Australian Bight
Site Investigation Programme

ENVIRONMENT PLAN SUMMARY

(EPPs 37, 38, 39, 40)

Rev 0
1 February 2013



Revision	Comment	Author	Reviewer	Date
Rev 0	Internal review comments incorporated.	Giulio Pinzone	RS	1 February 2013
Rev A	Issued for internal review	Giulio Pinzone	RS, MP, AS, LA	30 January 2013

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1 Introduction

BP Developments Australia Pty Ltd (BP) proposes to undertake an offshore geophysical and geotechnical investigation (GAB Site Investigation Programme) in four adjacent Exploration Permits for Petroleum (EPPs 37, 38, 39 and 40, BP 100% interest and operator) located in the Great Australian Bight (GAB) off South Australia, ~400 km west of Port Lincoln and ~300 km southwest of Ceduna (Figure 2.1).

The GAB Site Investigation Programme is scheduled to start in late Q1 2013 and is expected to take 4 to 5 weeks to complete.

The aim of the GAB Site Investigation Programme is to acquire geotechnical and geophysical data to support the safe and compliant design of four exploration wells that BP will drill as part of title commitments.

The Environment Plan (EP) was accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) on the 23rd of January 2013.

1.1 Proponent

BP is the registered titleholder and operator of EPPs 37, 38, 39 and 40. BP is wholly owned by BP Australia Group Pty Ltd and is ultimately owned by BP p.l.c (a company registered in England and Wales).

2 The Activity

2.1 Location

The GAB Site Investigation area is located about 400 km west of Port Lincoln and 300 km southwest of Ceduna (see Figure 1.1). Water depths in the GAB Site Investigation area range from about 200 m in the northern most part of EPP 37 to 3,000 m in the southern part of EPP 39.

2.2 Timing

The GAB Site Investigation Programme is scheduled to commence in late Q1 2013 and will take approximately 4-5 weeks, depending on weather.

2.3 Geophysical Investigation

The geophysical investigation will involve the following:

- Conductivity, temperature and depth (CTD) data collection - using a CTD meter.
- Depth measurement – using a single-beam eco sounder (ES).
- Seabed profiling – using a hull-mounted sub-bottom profiler (SBP) and swath bathymetry (optional).
- Seabed imagery – using a camera on seabed frame (optional).

A description of the equipment and their operating processes is outlined below.

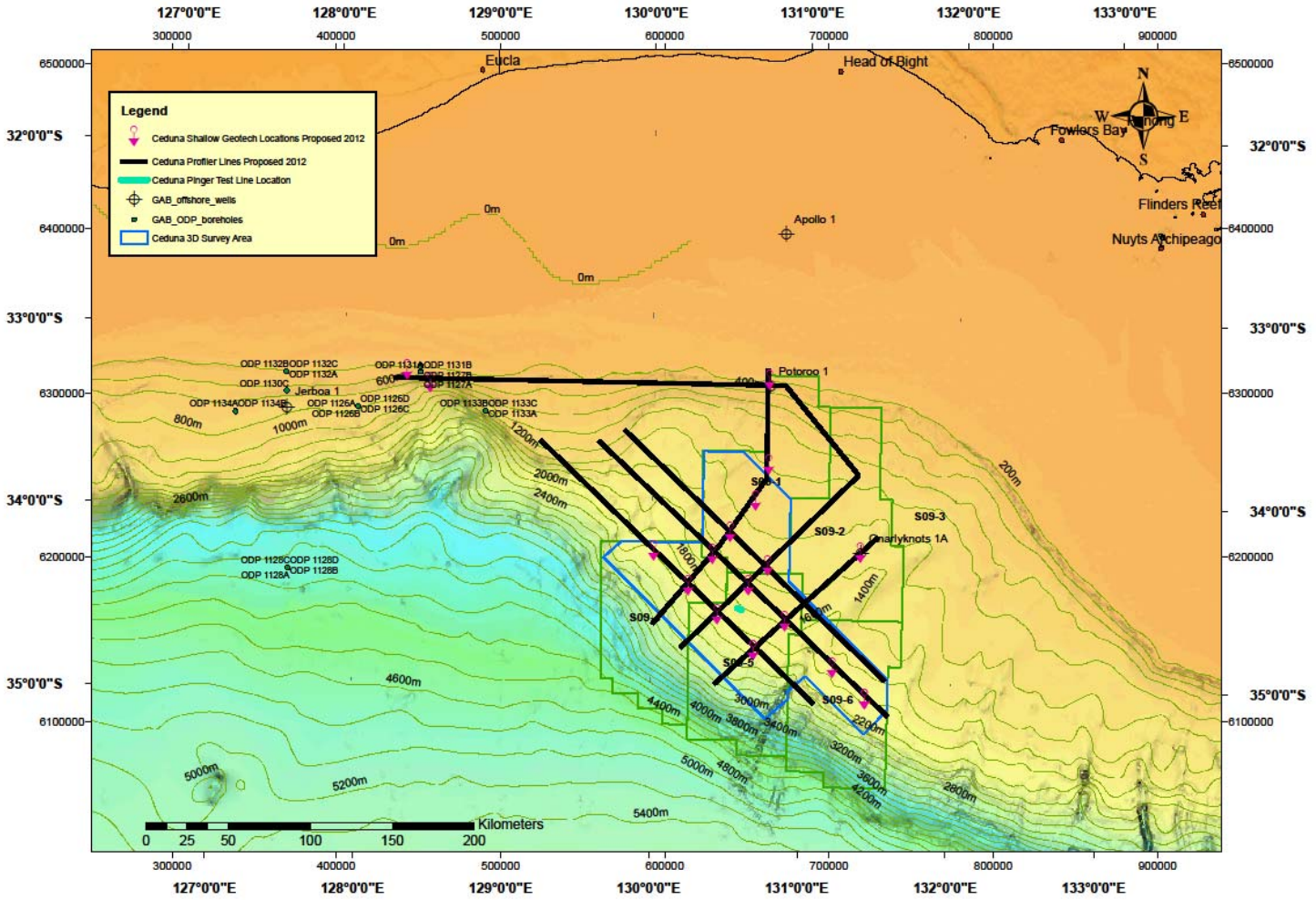

Figure 2.1 Permit locations (green) and indicative 2013 site investigation sampling sites (magenta) and survey lines (black)

2.3.1 CTD Data Collection

The CTD probe gives a measurement of how variable the physical properties of seawater are across the GAB Site Investigation area, and when integrated with metocean data and water depth charts, improve the 3D understanding of water movement in the GAB throughout the year.

The shipboard CTD is lowered on a cable from the vessel and takes readings at designated intervals on both being lowered and retrieved. The data is then processed and available onboard. Accessories and instruments can be attached to the CTD package, including Niskin bottles that collect water samples at different depths for measuring chemical properties.

2.3.2 Depth Measurement

Single-beam echo sounding systems provide a single depth measurement for a location directly beneath the vessel.

An acoustic pulse is emitted from a transducer and propagated in a single, narrow cone of energy directed downward toward the sea floor. A transducer then 'listens' for the reflected energy from the sea floor. Water depth is calculated by using the return travel time of the emitted pulse. The one-way travel time is calculated and multiplied by the measured speed of sound in the water column to derive the depth. The individual values of depth to the sea floor are subsequently tidally corrected and then contoured to generate bathymetric maps.

Echo sounding surveys usually use a single beam echo sounder system in the 12 to 410 kHz frequency range, with lower frequency transducers being necessary in deeper water.

2.3.3 Seabed Profiling

Sub-bottom profiler systems are used to investigate the layering and thickness of the uppermost seabed sediments (usually 0 – 50 m depending on soil strength).

Profiling the seabed can be accomplished by hull-mounted systems as is proposed in this instance, similar to an echo-sounder set-up but slightly lower frequency, or using tow-fish or vehicles surveying nearer to the seabed. The profiler operates in the 4 – 12 kHz range.

The seabed profiling aspect of the site investigation will take about 10 days to acquire (1,600 km of echo-sounder and SBP worked to be acquired simultaneously).

2.3.4 Seabed Imagery

Using seabed camera frames, still images of the seabed at the water depths of the GAB Site Investigation area can be obtained. Frame cameras are lowered on a cable and operated from the vessel.

2.4 Geotechnical Investigation

Geotechnical investigations collect detailed information on the properties of the seabed and the underlying shallow sediments and can often be linked to the SBP geophysical data to build up a picture of the shallow soils across the surveyed area. The geotechnical information is usually collected to determine the load bearing properties of the seabed.

The geotechnical investigation will involve the following:

- Coring – these tubes, typically 10 cm in diameter, vary in length from a 30 – 50 cm multi-corer to a 6 m piston corer.

- Measuring seabed strength - using a Piezo Cone Penetrometer Test (PCPT), which involves landing a frame on the seabed and pushing a small cone up to 25 m long into the sediment, which measures resistance to the push throughout.

2.4.1 Coring - Seabed Sediment Analysis

There are different types of corers. Multi-corers are used mainly for obtaining a sample of the uppermost sediment columns (30 - 50 cm depth) and are best suited for seabed description work.

Piston, vibro and long corers enable deeper data to be retrieved (to approximately 6 m depth) with full recovery, and the sediments can then be cut open to be photographed, described and tested (e.g., geotechnical and geochronological testing).

A corer penetrates the seabed and the sample is captured in a linear manner that can then be partially tested offshore (top/bottom) before being sealed up and returned for more detailed onshore laboratory testing.

Lowering the corers is done by wire from the vessel at approximately 1-2 m/s, so the duration is largely determined by water depth. Sampling itself is of a very short duration at each location.

The plan with the Q1 2013 GAB Site Investigation is to visit up to 17 sites and undertake CTD, multi-coring and piston-coring (to approximately 6 m depth) and a PCPT at each site. This part of the GAB Site Investigation Programme will take less than two weeks.

2.4.2 Piezo Cone Penetrometer Test Function

A PCPT is a method used to determine soil strength and link the profile to other geotechnical engineering and geophysical properties of soil observed to help delineate soil stratigraphy.

PCPT involves the in-situ measurement of the resistance of ground to continuous penetration at a steady penetration (usually 2 cm per second) of push rods that have a cone at the base. The measurements allow high quality interpretation of ground conditions and pore pressure dissipation testing. The resolution of the PCPT in delineating stratigraphic layers is related to the size of the cone tip, with typical cone tips having a cross-sectional area of either 5, 10 or 15 cm^2.

A seabed frame is lowered to the seabed with the PCPT unit integrated into it and operated remotely. Lowering the corers is done by wire from the vessel at approximately 1-2 m/s, so the duration is largely determined by water depth. Sampling itself is of a very short duration at each location.

The plan with the Q1 2013 GAB Site Investigation is to visit up to 17 sites and undertake CTD, multi-coring and piston-coring (6 m) and a PCPT at each site. This part of the GAB Site Investigation Programme will take less than two weeks.

The lightweight PCPT will be able to penetrate to a depth of 25 m below the seabed.

2.4.3 Laboratory Testing

Laboratory analysis of the nature and composition of seabed sediments will be undertaken onboard the vessel and in onshore laboratories. Seabed samples will be measured for visual classification, wet and dry density, moisture content, Torvane and shear strength. Also mobilised to the vessel will be the necessary equipment for the extrusion, cutting, handling and securing the samples. All tests will be performed according to relevant Australian, British or ASTM standards, or other recognised procedures.

3 Stakeholder Consultation

BP employs a full time External Affairs Manager in South Australia working primarily on the Bight Basin exploration programme. Since being awarded EPPs 37, 38, 39 and 40 in January 2011, BP has developed a stakeholder database and implemented a stakeholder engagement strategy for the exploration program.

BP continues to consult widely as it progresses the exploration of the permit areas and moves through the external approval processes. The consultation strategy is to consult with relevant, interested and affected parties based on the nature, location and duration of the proposed geotechnical and geophysical investigation. Given the limited activity and the small scale and duration of the proposed activity, the consultation has been targeted to the organisations identified in Table 3.1.

The objective is to create an understanding of BP's GAB Site Investigation Programme and address any concerns arising, while more generally briefing stakeholders on the exploration program.

Table 3.1 GAB site investigation stakeholders

Group	Stakeholder
Commonwealth Government agencies	Australian Maritime Safety Authority (AMSA)
	Department of Sustainability, Environment, Water, Population and Communities (DSEWPC)
SA Government agencies	Department of Environment, Water and Natural Resources (DEWNR)
	Department of Primary Industries and Regions SA (PIRSA)
	Department for Manufacturing, Innovation, Trade, Resources and Energy (DMITRE) (*formerly Department of Primary Industries and Resources South Australia)*
	Department of Planning, Transport and Infrastructure (DPTI)
Fisheries Authorities	Australian Fisheries Management Authority (AFMA)
	Commonwealth Fisheries Association (CFA)
	Seafood Council SA
Individual Fisheries and Associations	Australian Southern Bluefin Tuna Industry Association (ASBTA)
	Great Australian Bight Fishing Industry Association Inc (GABIA)
	Northern Zone Rock Lobster Fishery Association
	South Australian Rock Lobster Advisory Council (SARLAC)
	Blue Crab fishery
	Marine scalefish fishery
	Abalone fishery
	Sardines fishery
	Sarin Group

	Wildcatch Fisheries SA
	Southern Shark Industry Alliance
	Sustainable Shark Fishing Inc
	Giant Crab fishery
Conservation interests	Conservation Council of South Australia
	Great Australian Bight Marine Park Steering Committee
Local authorities and community representatives	Eyre Regional Development Board

4 Description of the Existing Environment

4.1 Physical Environment

4.1.1 Climate

The GAB has a 'Mediterranean' summer, with mild wet winters and hot dry summers. Average monthly temperatures along the coast range from 28°C in January to 17°C in July.

The sea surface temperatures of the GAB vary from a minimum of 17.8°C to a maximum of 20.8°C. The majority of annual rainfall in the region occurs during the autumn and winter months (April to August), with an annual average of 272 mm at Eucla and 296 mm at Ceduna.

The nearest wind station to the survey area (to the west of the northern part of EPP 37) has an average wind speed of 14.72 knots and maximum wind speed of 44 knots. While winds are variable throughout the year, they tended more from the south to east quadrant during January to March.

4.1.2 Oceanography

Four distinct currents occur within the GAB, these being:

1. Leeuwin – comprises waters of low salinity and high temperatures, originating from the tropical Indian Ocean and passing in an easterly direction along the continental shelf during winter with speeds up to 1 ms^{-1} (Rogers *et al.*, 2012). During summer, the penetration of the Leeuwin Current into the GAB is weak to non-existent (Rogers *et al.*, 2012).
2. Central Bight – characterised by warm, highly saline waters derived from the southwest Indian Ocean and is present in the central and eastern portions of the GAB, especially during winter.
3. West Wind – present in the slope and shelf break parts of the GAB throughout the year and comprises cold water with low salinity.
4. Flinders – a surface current characterized by cool, low saline waters (Edyvane, 1998). It is considered a 'small sister' to the major western boundary currents of the world (Rogers *et al.*, 2012). In the absence of eddies, these data would indicate the Flinders Current to have an amplitude of 20 cms [1] at depths of 500-600 m and to form part of the Leeuwin Undercurrent that penetrates the GAB during winter (Rogers *et al.*, 2012).

No strong evidence of upwelling is found in the mid-GAB. For the mid-GAB, the cross shelf exchange is dominated by downwelling. Recent research indicates year-round downwelling to 300 m as characteristic of the mid-GAB.

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

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.

4.1.3 Seabed

The GAB Site Investigation will mostly be undertaken on the continental slope abyssal plain of the GAB, where water depths vary from 1,000 m to 3,000 m. The continental shelf break is at the 200 m isobath (GA, 2005), which intersects the northern boundary of EPP 37.

The continental slope is up to 250 km wide in the GAB and features mid-slope terraces and numerous deep submarine canyons. Further offshore at the foot of the continental slope, the Australian abyssal plain is a flat, relatively featureless expanse of seabed, with depths averaging 4,000 m.

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.

4.2 Biological Environment

4.2.1 Benthic Habitats and Assemblages

Over 6,640 benthic species are thought to occur in South Australian waters, with a high degree of endemism in the GAB. Invertebrates in the region include non-reef building soft corals, hydroids, molluscs, polychaetes, crustceans and echinoderms. It is believed that habitat diversity decreases with depth and distance from shore, with the seabed becoming more uniform and therefore attracting less diverse communities in deeper waters.

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 GAB Marine Park Benthic Protection Zone. Almost 96% of infauna and 61% of epifauna collected during this survey appear to be undescribed species.

4.2.2 Marine Flora

The inner coastal regions of the GAB support a diverse range of seagrasses, macroalgae habitats and sponge-dominated communities, however, these are restricted by light penetration and therefore are generally limited to water depths less than 100 m. Due to the waters of the GAB Site Investigation area being deeper than this, it is not expected that marine flora is present in the area.

4.2.3 Demersal Fauna

Knowledge of the demersal fish fauna of the GAB is based primarily on a multi-vessel survey undertaken in 1988, which found at least 166 species from 125 genera and 71 families.

4.2.4 Pelagic Fauna

It is recognised that large gaps exist in the understanding of the spatial and temporal variation in the pelagic ecology and productivity of southern Australia, and particularly the central GAB.

According to the EPBC Act Protected Matters Search Tool for the GAB Site Investigation area, there are 22 threatened species and 27 migratory species that may occur in the area.

Fish

Only one species of fish, the Porbeagle shark, is listed under the Environment Protection and Biodiversity Conservation (EPBC) *Act* 1999 (Cth) as potentially occurring in the GAB Site Investigation area.

The porbeagle shark is widely distributed through temperate and cold-temperate waters of the world. In Australia, its distribution is centered on waters off southern, southwest and southeast Australia, and it is commonly found on continental shelves. It feeds mostly on fish and cephalopods (squid and octopus) and is likely to be present in the site investigation area.

Numerous other demersal and pelagic finfish occur in the GAB, including many sharks and migratory fish.

Mammals

There are 29 whale species and five dolphin species recorded under the EPBC Act as potentially occurring within the GAB Site Investigation area. Of the whales, 20 species are 'listed marine species', while there are five threatened species. Only one of the dolphins is migratory, the rest being 'listed'.

Information on cetaceans in the GAB is largely restricted to sighting or stranding records and therefore the population status, population dynamics, foraging ecology and habitat utilization of most species is poorly understood.

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 survey 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. Humpback whales migrate up the eastern and western coasts of Australia and do not often travel into the GAB. Given this species known feeding and breeding areas and migration routes, it is unlikely to be encountered in the survey area. No humpback whales were observed during the 2011-12 Ceduna 3D seismic survey.

There are two recognized subspecies of blue whale in Australian waters; the Antarctic blue whale (*B. musculus. intermedia*) and the pygmy blue whale (*B. musculus. brevicauda*). 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. Both species feed on krill (euphausids, *Nyctiphane australis*), with the nearest feeding area being about 95 km east of the GAB Site Investigation area, along the shelf break to the west and east of Kangaroo Island, extending northwest along the 200 m isobaths. Most sightings that occur between late spring to autumn to the east of the GAB Site Investigation area are believed to be pygmy blue whales. Noise logging studies undertaken by McCauley et al (2012) for BP's Ceduna 3D seismic survey indicates that pygmy blue whale signals were received in the permit areas and at the Head of the Bight in late 2011, corresponding with their south-bound migratory leg. No formal assessments of abundance have been undertaken in Australia. During the 2011-12 Ceduna 3D seismic survey, a total of 12 blue whales were observed, all during November.

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 closest aggregation area to the GAB Site Investigation area is the Head of the Bight, approximately 200 km to the north. This is a significant aggregation area, where up to half the population gathers between May and November to calve. No southern right whales were observed during the 2011-12 Ceduna 3D seismic survey.

Australian seal-lions are endemic to Australia, found only in southern and southwest Australia. The species generally hauls out (rests) and breeds on rocks and sandy beaches on sheltered sides of islands, although some small colonies exist on the mainland. It breeds on at least 73 islands and at several mainland sites within southern Australia, including Dorothy Island and Pearson Isles, approximately 240 km east of the survey area. Australian sea-lions feed on the continental shelf up to 30 km offshore and most commonly in water depths of 20 m to 270 m, eating a wide range of prey including fish, small sharks, invertebrates, cephalopods and occasionally seabirds. No Australian sea-lions were observed during the 2011-12 Ceduna 3D seismic survey.

Eight New Zealand fur seals were observed during the 2011-12 Ceduna 3D seismic survey. New Zealand fur seals are the most abundant pinniped in the GAB. Breeding occurs annually and is highly synchronized, commencing in late November with the bulk of births occurring over a 5-week period. Current data (2008 survey) suggests that over 17,600 New Zealand fur seals are born annually in South Australia, representing about 85% of Australia's total population.

Turtles

Three species of marine turtle (loggerhead, green and leatherback) are listed under the EPBC Act as potentially occurring in the GAB Site Investigation area. All three species are threatened and migratory, though are unlikely to occur in high numbers.

Birds

Sixteen (16) species of seabirds (skua, albatross and petrel) are listed under the EPBC Act as potentially occurring in the GAB Site Investigation area. The majority of these are migratory species that pass through the area on annual migrations to and from feeding and breeding areas.

Due to the distance offshore, the GAB Site Investigation area is not known to contain any habitat of significance for these species. During the 2011-12 Ceduna 3D seismic survey, numerous sightings of mollymawks (medium-sized albatross), wandering albatross, yellow nosed albatross, shy albatross and shearwaters (*Ardenna* spp. or *Puffinus* spp.) were sighted, while cape petrel, giant petrel and gannets were observed less often.

4.3 Values and Sensitivities

4.3.1 Commonwealth Marine Reserves

The GAB Commonwealth Marine Reserve intersects BP's permit areas (Figure 4.1) 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 (GABMP) (Commonwealth waters), which covered a smaller area of 19,700 km^2.

4.3.2 Other Sensitive Sites

There are no World Heritage Sites, Commonwealth Heritage Places, National Heritage Places or Wetlands of International Importance (Ramsar wetlands) in or adjacent to the GAB Site Investigation area.

4.3.3 State Marine Reserves

Numerous State Marine Parks have been established in coastal South Australian waters under the National Parks and Wildlife Act 1972 (SA) (see Figure 4.1). All of these are located along the coastline a significant distance north and east of the GAB Site Investigation area.

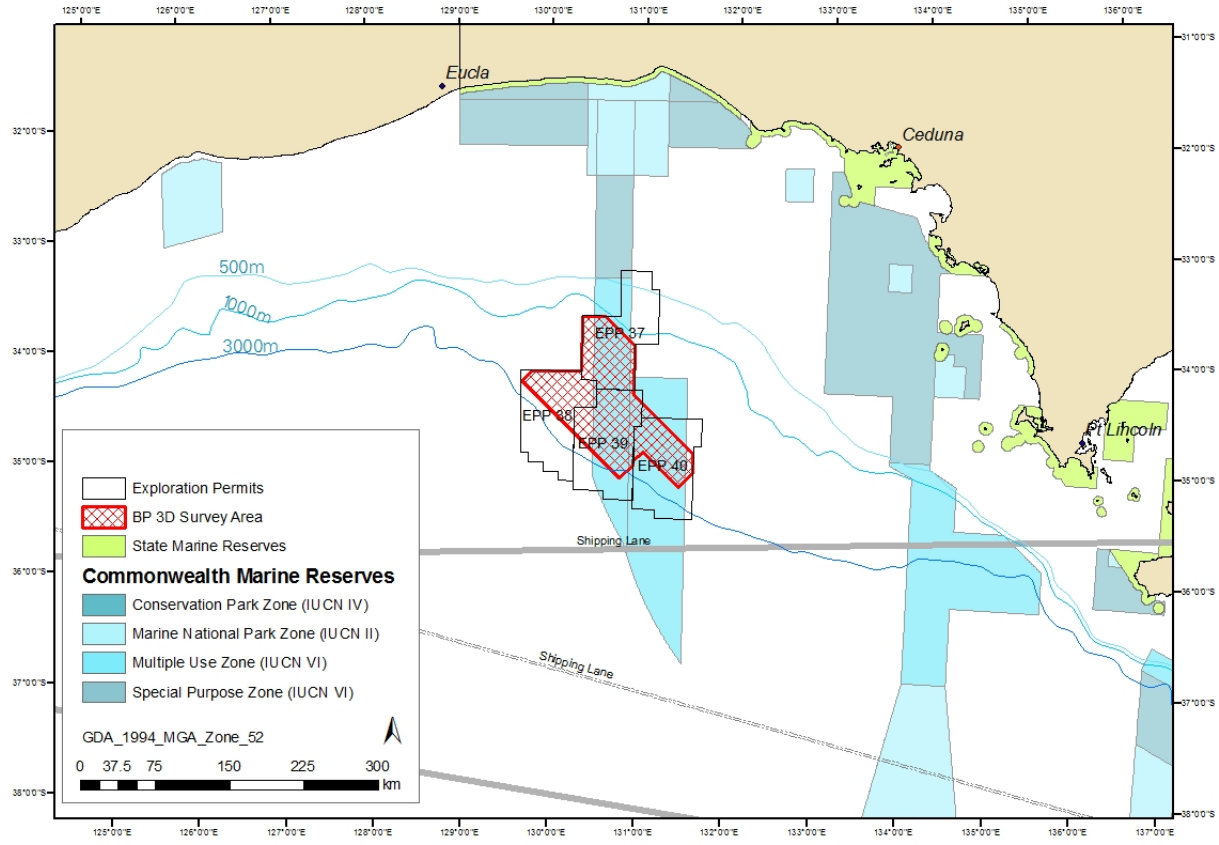

Figure 4.1 Commonwealth and State Marine Reserves and BP's permits

4.4 Cultural Environment

No areas of Aboriginal or non-Aboriginal archaeological heritage are identified in the GAB. The Australian Shipwreck Database does not list any shipwrecks for offshore areas of the GAB, nor are there any historic shipwreck protection zones in the GAB. There are no Native Title claims or applications over any offshore waters of the GAB.

4.5 Socio-economic Environment

4.5.1 Settlements

The GAB Site Investigation area is located a vast distance south of the Australian mainland. This part of the mainland is dominated by the Nullarbor Plain, with very few populated settlements.

Tourism in the region is focused on whale watching from the Bunda Cliffs at the Head of the Bight. Here, southern right whales can be observed from a viewing platform between June and October each year, as they aggregate to breed and calve. The Bunda Cliffs stretch uninterrupted for 200 km west of the Head of the Bight and are themselves an attraction, being limestone cliffs 60-80 m in height.

Ceduna and Port Lincoln are the largest towns in the region. Ceduna's economy is centred on crop and sheep farming, tourism (especially recreational fishing for King George whiting, snapper, prawns and oysters) and port activities that ship salt, gypsum and heavy mineral concentrate from mines located to its north (the Thevenard Port is located 3 km east of the town). Port Lincoln is known as the seafood capital of Australia, well regarded for its tuna fishing. Like Ceduna, its economy is based on crop, sheep and beef farming, as well as tuna, prawn, abalone and scale fish.

4.5.2 Commercial Fishing

The GAB Site Investigation area is overlapped by the jurisdiction of several Commonwealth and State-managed fisheries, as outlined below.

Commonwealth-managed Fisheries

Commonwealth fisheries are managed by AFMA, with Commonwealth fisheries operating from 3 nm of baseline out to 200 nm (the extent of the Australian Fishing Zone, AFZ). The GAB Site Investigation area lies within an area encompassed by several Commonwealth managed fisheries.

BP will continue to consult with trawl fisheries that operate in the vicinity of the 200 m isobar (as advised by the GABIA) to ensure that any impacts to their activities are minimised during the GAB Site Investigation.

State-managed Fisheries

State-managed fisheries are managed by PIRSA, and may overlap Commonwealth fisheries. The GAB Site Investigation area lies within the Giant Crab (Northern Zone) fishery. This fishery targets the giant crab (*Pseudocarcinus gigas*) that generally lives in water depths down to 400 m. The greatest fishing effort is south of Kangaroo Island, well east of the GAB Site Investigation area (based on data from 1986/87 to 2007/08). Representatives of the Giant Crab fishery have advised BP that the fishery will be operating 80 to 100 nm west of Kangaroo Island at the time of the GAB Site Investigation, and that there is no potential for interaction or conflict with their vessels or equipment. However, ongoing consultation with the Giant Crab fishery will be conducted throughout the GAB Site Investigation.

4.5.3 Recreational Fishing and Tourism

The majority of marine-based tourism in the GAB is based around the coast and shallow waters. The closest charter boat fishing operators are based on Kangaroo Island, the Eyre Peninsula and at Streaky Bay and operate primarily around Flinders Reef and the offshore islands of the Nuyts Archipelago, about 300 km east of the GAB Site Investigation area.

Marine mammal watching tours are popular tourist attractions in the region, particularly to view southern right whales and Australian sea-lion colonies at the Head of the Bight, where these animals can be viewed from the shoreline. Boat tours also operate around the Nuyts Archipelago. The GAB Site Investigation area is too far offshore to intersect with tourism activities.

4.5.4 Petroleum Exploration and Production

Six EPPs currently exist within the Bight Basin; four of these are 100% operated by BP and two are 100% operated by Bight Petroleum. Three permits (S12-1, S12-2 and S12-3) were released for consideration in May 2012, with bidding due to close in May 2013.

Prior to the release of BP's EPPs, most petroleum exploration had been limited to seismic surveys, which cover a large area of the shallower areas of the GAB. Within 100 km of the GAB Site Investigation area are three exploration wells, all abandoned as dry holes.

There is no petroleum production in the GAB.

4.5.5 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 GABMP (and thus the permit areas).

4.5.6 Defence Activities

The Commonwealth Department of Defence training areas do not extend into any offshore waters of the GAB. The closest training areas are in Investigator Strait (a body of water lying between the Yorke Peninsula and Kangaroo Island) used for military flying and firing, and waters off Port Lincoln used for firing and naval operations.

5 Environmental Risk Assessment

This section briefly outlines the results of an Environmental Risk Assessment conducted for the proposed GAB Site Investigation. The avoidance, mitigation and management measures, and the As Low As Reasonably Practical (ALARP) analysis for each risk, have been developed using the combined experience of BP staff and specialist upstream petroleum environmental advisors to BP using the principles of BP's risk assessment process (documented in Group Defined Practice (GDP) 3.1-0001 (Assessment, Prioritisation and Management of Risk)).

Sixteen (16) environmental hazards were identified, each having a residual risk ranking of low or tolerable, and each determined to be ALARP.

A list of the environmental hazards identified for this GAB Site Investigation and their pre-treatment and residual risk rankings is provided in Table 5.1.

Table 5.1 GAB Site Investigation environmental risk assessment summary

Hazard	Risk Treatment	Residual Risk Ranking
Planned events		
Underwater noise from vessel operations	• Vessel engines and thrusters will be maintained in accordance with its Planned Maintenance System (PMS) to ensure they are running at peak efficiency. • The Australian Guidelines for Whale and Dolphin Watching (2005) for sea-faring activities will be implemented. • Cetacean observations will be recorded on DSEWPC cetacean sighting proformas and returned to DSEWPC.	Tolerable
Light emissions	• Vessel lighting will be managed to meet maritime safety standards at a minimum, including: o Marine Orders Part 21 (Safety of navigation and emergency procedures). o Marine Orders Part 30 (Prevention of Collisions). o The Australian Offshore Support Vessel Code of Safe Working Practice (Section 9.1.4 Deck lighting) (AMSA, Version 3, 2002).	Tolerable
Atmospheric emissions	• Waste will only be incinerated if the incinerator was installed after 1 January 2000 and is IMO-certified to comply with Appendix IV of Annex VI of MARPOL. • Only marine-grade diesel will be used for the vessel engines (not heavy fuel oil). • Engines and fixed and mobile equipment are maintained in accordance with the PMS to ensure they operate at maximum efficiency.	Tolerable
Discharge of cooling and brine water	• Engines and the reverse osmosis plant will be maintained in accordance with the PMS so that they are running within operating parameters.	Tolerable
Discharge of sewage and grey water	• All sewage will be treated and discharged through a MARPOL-approved sewage treatment plant (STP). • The vessel will have a valid Statement of Compliance for Sewage Pollution Prevention Certificate. • The STP will be maintained in accordance with the PMS. • If there is a failure of the STP, all sewage will be contained within the system's storage tanks until such time as the STP is fixed or storage has reached capacity. Only failing that will sewage be released untreated (in accordance with MARPOL Annex IV, when the vessel is > 12 nm from shore).	Tolerable

Discharge of putrescible waste	• The galley macerator will macerate food scraps to a diameter of less than 25 mm before being disposed of overboard, in compliance with MARPOL Annex V. • If the macerator fails, all food waste will be bagged and sent ashore for disposal until the macerator is repaired or replaced.	Tolerable
Discharge of deck drainage and bilge water	• Equipment with the potential for spills of chemicals or fuels will be located within a bunded area. • Bilge water will be directed to an oily water separator set to prevent discharge of oil in water greater than 15 ppm. • Treated bilge water will only be discharged >12 nm from shore and volumes discharged will be recorded in the Oil Record Book. • Chemicals will be stored in chemical storage lockers. • Spills to deck will be cleaned up as per SOPEP	Tolerable
Underwater noise associated with geophysical operations	• The Australian Guidelines for Whale and Dolphin Watching (2005) for sea-faring activities will be implemented. • Cetacean observations will be recorded on DSEWPC cetacean sighting proformas and returned to DSEWPC.	Low
Seabed disturbance associated with geotechnical operations	• Anna's Pimple (subsea geological feature) will be avoided. • No drilling muds or chemicals will be used for coring.	Tolerable
Unplanned events		
Interference with other marine users	• The vessel is equipped with anti-collision equipment. • The vessel will be manned by competent, trained and experienced marine crews (e.g., Vessel Master will have STCW certification). • Stakeholder consultation has taken place with affected maritime safety authorities, fishing industry bodies and individual fishing companies to notify them of the location and timing of the investigation. Consultation will continue in the lead up to and during the investigation, particularly with regard to preventing or minimising impacts with fishing vessels and equipment. • The location of the GAB Site Investigation area will be noted in the Notice to Mariners, issued by the Australian Hydrographic Office.	Low

Diesel spill	• The vessel will maintain 24 hour visual, radio and radar watch. • The location of the investigation will be noted in the Notice to Mariners, issued by the Australian Hydrographic Office. • No offshore refuelling will be conducted. • SOPEP material is available on board and personnel are trained in its use • The vessel SOPEP and BP Incident Management Plan will be implemented in the event of a spill to sea. • Diesel spills will be reported in accordance with regulatory requirements. • Consultation has taken place with AMSA regarding spill response control roles.	Low
Seabed disturbance from vessel operations	• Anchors will not be deployed from the vessel in the GAB Site Investigation area – thrusters will be used to maintain stationary positioning. • In the event of an emergency, the survey vessel will seek shelter closer to shore and only anchor where necessary. • Adherence to contractor's materials handling and transfer procedure to minimise the risk of dropped objects. • Incident reports will be prepared as necessary as per internal and regulatory requirements	Low
Collision with cetaceans	• The survey vessel will generally be moving slowly or stationary while conducting the investigation, posing little risk of collision with cetaceans. • The Australian Guidelines for Whale and Dolphin Watching (2005) for sea-faring activities will be implemented. • Cetacean observations will be recorded and reported to DSEWPC.	Low
Introduction of invasive marine species	• The vessel will comply with AQIS and DAFF quarantine requirements for the entry of vessels, equipment and goods to Australian waters and ballast water exchange. • If an international vessel, it will have valid International Anti-fouling System Certificates to verify that they comply with the International Convention on the Control of Harmful Anti-fouling Systems on Ships.	Tolerable

Discharge of non-hazardous waste	• A vessel-specific waste management plan will be in place, specifying that: o Wastes are segregated for onshore recycling, wherever possible. o A Garbage Record Book will be maintained, recording the types and volumes of waste offloaded. o Wastes will be compacted where possible and stored in covered waste receptacles. o All waste receptacles are appropriately labeled and secured. o No solid waste will be discharged overboard (except macerated food waste). o There will be a high focus on housekeeping. • A vessel-specific procedure for vessel-to-vessel loading and backloading is in place to reduce the risk of dropped objects. • Only licensed shore-based waste contractors will be used, who will dispose of waste appropriately.	Low
Discharge of hazardous waste	• A vessel-specific waste management plan will be in place, specifying that: o Hazardous wastes are segregated for onshore recycling, wherever possible (e.g., oily waste, fluorescent tubes). o A Garbage Record Book will be maintained, recording the types and volumes of waste offloaded. o Wastes will be compacted where possible and stored in covered (lid or netting) waste receptacles (skips and 'wheelie' bins). o All waste receptacles are appropriately labelled, secured and water-tight. o No hazardous waste will be discharged overboard. o High focus on housekeeping. • A vessel-specific procedure for vessel-to-vessel loading and backloading is in place to reduce the risk of dropped objects. • Only licensed shore-based waste contractors will be used, who will dispose of waste appropriately.	Low

6 Implementation Strategy

The Implementation Strategy for the GAB Site Investigation is based on BP systems, practices and procedures (the BP Operating Management System (OMS)) to manage the environmental risk associated with its activities to ALARP.

The OMS sets out BP's principles for operating and provides a framework to help deliver the essentials, then excellence, in operating. The OMS provides a systematic and consistent approach for managing its operating activities, and delivering competitive performance while meeting BP's commitment to HSSE performance.

6.1 Contractor Management System

Through specific contract requirements, BP requires that its contractors have in place a health, safety and environment (HSE) management system that provides a systematic approach for controlling risk, complying with regulatory requirements and continually improving HSE performance. For vessel-based activities, this includes the vessel operator's Environmental Management System (EMS).

Pre-survey consultation between the BP Environment Manager and the Survey Manager will ensure these systems are in place prior to the survey commencing, while the onboard Client Representative will ensure the systems are implemented.

6.2 Training and Competencies

BP employees are selected, trained, developed and evaluated to ensure that they attain and maintain the level of competency required for the position they hold.

BP selects its contractors based on a detailed tendering process, whereby the qualifications and experience of tendering companies are used to select companies to fulfill specific duties that cannot be met by internal resources.

For the GAB Site Investigation, BP and the vessel contractor will reinforce environmental expectations by way of a shore-based HSE induction. In addition to the induction, regular onboard HSE meetings will be conducted, with results recorded and communicated to all crew, as well as task-specific 'toolbox talks'.

6.3 Emergency Response

The OMS requires that BP entities prepare for and respond promptly to crisis and emergency events. Emergency response plans will be refined specifically for the GAB Site Investigation Programme. A thorough review, and where necessary, revision of the vessel's Shipboard Oil Pollution Equipment Plan (SOPEP) will take place to ensure that chemical or hydrocarbon spills can be adequately responded to.

6.4 Incident Recording and Reporting

The OMS requires that BP records and reports environmental incidents. There are obligations under the OPGGS (Environment) Regulations to report incidents to NOPSEMA within a specified time period. The requirements for reporting and recording incidents will be adhered to.

6.5 Environmental Monitoring & Record Keeping

Environmental monitoring will be undertaken for many of the hazards identified in Table 6.1, relating primarily to routine vessel discharges and emissions. Records of this monitoring will be reported in various ways, such as vessel maintenance records, incident reports, oil record book, garbage record book and training records. Ultimately, the results of this monitoring will be reported to NOPSEMA in the EP Performance Report once the GAB Site Investigation is complete.

6.6 Auditing and Review

For the GAB Site Investigation Programme, the BP Environment Manager or delegate will conduct the environmental audit on board the vessel against the EP measurement criteria. This is likely to occur early in the investigation so that any compliance issues are identified and rectified while there is adequate time to implement corrective actions. Audit findings will be recorded and communicated to key vessel crew through an audit exit meeting and formal audit report, and corrective actions will be recorded and tracked to closure.

The Client Representative and Environment Manager will regularly review EP compliance and conformance as standard practice, using daily observations and weekly checklists to ensure compliance with the EP.

7 Contact Details

For further information, please contact:

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