

Browse Basin Exploration Drilling Campaign Environment Plan

Public Summary

1. Project Description

ConocoPhillips (Browse Basin) Pty Ltd (COP) proposes to conduct an exploration drilling campaign of three to six wells within adjacent permit areas (WA-314-P, WA-315-P and WA-398-P) in Commonwealth Waters within the Browse Basin, located approximately 400km north of Broome, WA (Figure 1). The first well of this campaign, Poseidon-1 was completed on the 29th May 2009. Kontiki-1 will be the next well to be drilled in the campaign. Detailed in Table 1 are the surface locations of all wells currently proposed in the campaign as well as the final survey co-ordinates of the Poseidon-1 well. It should be noted that for the upcoming wells only the Kontiki-1 well location has been finalized at this time and the exact locations and number of subsequent wells may change depending on drilling results and continued interpretation of geophysical and geological data. Water depths at well locations will range from approximately 307 m at the preliminary Lion-1 location to approximately 570 m at the Kontiki-1 well location.

COP has contracted a semi-submersible drilling rig to undertake the drilling campaign. The campaign is scheduled to commence in the third quarter of 2009 and continue for a period of at least 150 days.

The drill rig will be supported by three vessels in the field. These vessels will supply materials loaded out from the base in Broome. A helicopter based in Broome will be used to transfer personnel to and from the drilling rig. An intermediate pick up and return point located at Lombadina may be used to maximise the available flying hours and payload of the helicopter in the event of inclement weather or other non-routine operations. In this event, personnel will travel between Broome and Lombadina by fixed wing aircraft.

The wells will be drilled using low-toxicity water-based mud (WBM) and synthetic-based mud (SBM) systems. The 914 mm (36") and 445 mm (17 1/2") hole sections will be drilled riserless using seawater and periodic high viscosity gel sweeps. The drilling fluid returns will be discharged to the seabed and the cuttings are anticipated to accumulate close to the wellhead. The 311 mm (12 1/4") hole section will be drilled with a closed mud system using a potassium chloride (KCl) polymer water based drilling fluid. All cuttings will be discharged over board after passing through shale shakers. The 216 mm (8 1/2") and 152 mm (6") hole sections will be drilled with a closed mud system using a synthetic based drilling fluid. As was the case in the 311 mm (12 1/4") hole section all cuttings will be discharged over board, but a cuttings dryer will be used to ensure the volume of SBM discharged with cuttings to the marine environment is minimized. All synthetic based mud recovered will be retained on-board or on supply vessels for re-use in subsequent wells.

Table 1 Proposed well location coordinates (GDA 94)

Location Point	Latitude (S)			Longitude (E)		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
Poseidon-1*	13	37	22.32	122	18	25.70
Grace-1	13	18	48.74	122	16	49.68
Kontiki-1	13	24	44.02	122	08	46.82
Lion-1	14	22	39.44	122	14	03.38
Poseidon-2	13	40	8.35	122	13	50.02
Calista-1	14	17	20.75	122	06	23.68

***Poseidon-1** final survey co-ordinates, well completed on 29th May 2009

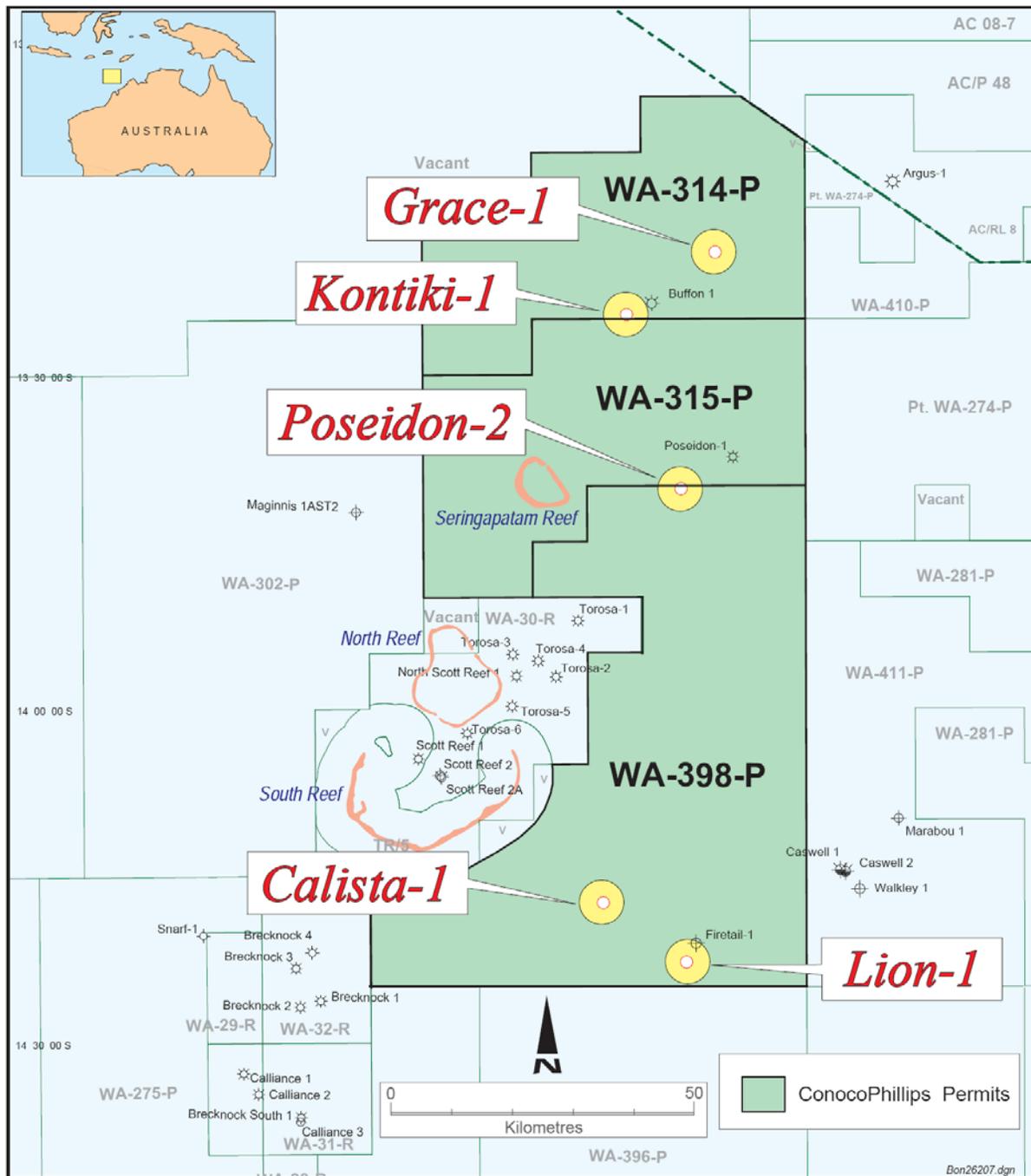


Figure 1. Location of Survey Area

3. Description of the Receiving Environment

3.1 Physical Environment

The water depths of the proposed well locations range from approximately 307 m to 570 m and the seabed is expected to be relatively undulating with no significant features. Seringapatam Reef is located within permit area WA-315-P and Scott Reef is located to the west of permit area WA-398-P (Figure 1).

3.2 Biological Environment

Species that are rare or endangered are protected under the Commonwealth Environment Protection and Biodiversity Conservation (EPBC) Act 1999 and the Western Australian Wildlife Conservation Act 1950. The EPBC Act also provides protection for cetaceans. Six listed threatened species were identified from a search of the EPBC Act Protected Matters Database. These species may occur in the area but are likely to be transient through the area; it is highly unlikely that the area is a habitat critical to the survival of any listed threatened species.

The search of the EPBC Protected Matters database also returned 68 species covered by the marine provisions of the EPBC Act that may occur in the WA-314-P, WA-315-P and WA-398-P permit areas. These comprise:

- The Streaked Shearwater (migratory bird, Table 5.2)
- 30 species of fish (pipefish, seahorses and pipehorses)
- One species of shark (Whale Shark, Table 5.1)
- 13 species of seasnake
- Three species of turtle (the vulnerable, migratory species listed in Table 5.1)
- 20 species of cetaceans (including the six whale species listed in Tables 5.1 and 5.2).

The bird, seasnake, turtle and cetacean species may transit through the area, however there are no known roosting or breeding habitats for these species within, or adjacent to, the proposed well locations. It is likely that the fish species identified by the search were listed due to the proximity of the permit areas to Scott and Seringapatam Reefs. However, the drilling activities are highly unlikely to impinge upon either of these reef systems.

3.3 Cultural Environment

The program area is about 300 km from the Australian mainland and about 400 km from the town of Broome, Western Australia. The closest proposed well location is some 40 km distant from Sandy Islet (Figure 1). Whilst the program area is partly within the Indonesian Traditional Fishing Zone (Memorandum Of Understanding (MOU) 74 Box), the program will be conducted in water depths of >350 m and is therefore unlikely to impact these fishing activities. The area is not known to be used by Australian Aboriginal people for hunting or fishing purposes. A search of the Department of Indigenous Affairs (DIA) Aboriginal Heritage Sites Register did not identify any heritage values within the permit areas.

3.4 Socio-Economic Environment

Commonwealth-managed fisheries permitted to operate in this area are the North West Slope Trawl Fishery, the Southern Blue Fin Tuna Fishery, the Western Skipjack Fishery and the Western Tuna and Billfish Fishery (Northern Sector). Details of these fisheries are available from the Australian Fisheries Management Authority (AFMA) website (http://www.afma.gov.au/fisheries/fisheries_index.htm). Correspondence from AFMA indicated that vessels in the North West Slope Trawl Fishery reported operating in the survey area during 2005 and 2006. There are currently seven permit holders in this fishery.

The State-managed West Coast Demersal Scalefish Fishery operates in the survey area. The fishery comprises 20 vessels but rarely operates in water depths greater than 100 metres, and never in water depths greater than 200 metres. Shark fishing is licensed in this area but activity is expected to be limited.

Indonesian and Timorese fishermen, using traditional methods, are legally permitted to harvest marine products in the MOU74 Box. Sea cucumbers (holothurians), *Trochus* and sharks are targeted by the fishers. Fishing effort is difficult to estimate, though in 1998, 89 Indonesian fishing vessels were recorded anchored at Scott Reef. Between August to October, up to 60 boats may be visiting the reef, though they often depart the region at the onset of the North-west Monsoon season.

The survey area is remote from the main commercial shipping routes off the Australian coastline. Military training activities are unexpected as the survey area is not within a Defence maritime exercise area.

4. Major Environmental Hazards and Controls

An environmental hazard analysis process was applied to the survey, based on the ConocoPhillips internal environmental risk assessment methodology and in accordance with the principles of Australian Standard AS/NZS 4360:2004. Environmental hazardous events have been identified from a review of the proposed drilling activities and the environmental setting for the activities.

Hazardous events have been assessed according to their potential environmental effects in the categories of atmospheric emissions, discharges to marine environment, physical presence, waste generation, and socio-economic effects.

High and significant residual risks are not deemed to be tolerable, and require further evaluation to determine practical risk management controls to treat and reduce the risk to as low as reasonably practicable (ALARP). Moderate residual risks are deemed to be tolerable, subject to on-going verification that risk management controls are effective. Low residual risks are deemed to be tolerable and do not warrant additional risk treatment. Nevertheless, they require regular review.

The hazard analysis process identified 17 moderate risks and 11 low risks. These are presented in Table 2, along with the associated management approach. There were no high or significant risks identified.

5. Management Approach

Environmental management of ConocoPhillips-operated activities is implemented through a hierarchy of policies and procedures that cascade from the corporate level through to the business units and their individual operations. These policies and procedures are framed and implemented within the Health, Safety and Environmental (HSE) Management System.

Six environmental management strategies have been formulated to address the identified environmental hazards for the survey, categorised in the following groups: Exhaust Emissions, Spills, Waste, Physical Presence and Socio-economic Impacts.

The environmental objectives defined in the Environmental Management Strategies are based on the identified environmental hazardous events, associated environmental effects and the assessed risks, corporate policies and performance commitments, and applicable legal requirements.

Table 2. Summary of Environmental Hazards, Potential Effects and Management Approach.

Drilling Program Activity	Potential Environmental Effect	Management Controls and Mitigation	Residual Risk	Management Strategy
Fuel consumption by drilling rig and supply/support vessels	Exhaust gas emissions	Monitoring of fuel consumption. Use of low sulphur diesel. Regular equipment inspection and maintenance schedules to maximise fuel efficiency.	Moderate	Management of Exhaust and Ozone Depleting Emissions
Well flow testing	GHG and ecotoxic gas emissions (NO _x , SO _x , HCs & CO).	Gas will only be flared during well testing and possibly during an emergency. Constant monitoring during flaring operations. Regular burner equipment inspection and maintenance schedules.	Low	Management of Flaring
Shallow gas blowout	Potential for protracted release of hydrocarbon gas until well brought under control.	Review of available seismic data indicates very low probability (1%) of encountering shallow gas.	Low	Management of Marine Spills and Discharges
Loss of well control whilst drilling	Loss of raw gas to atmosphere and marine environment.	Monitor for abnormal pressure parameters during drilling. Blowout prevention (BOP) control and testing in accordance with P(SL)A Schedule, clauses 505 and 506.	Moderate	Management of Marine Spills and Discharges
Ozone depleting substances (ODS)	Ozone depleting substances to atmosphere.	ODS will not be used during the drilling campaign.	Low	Management of Exhaust and Ozone Depleting Emissions
Onboard spill or release of hydrocarbons and chemicals	Marine pollution if spill reaches sea (small volumes).	Spill response in accordance with Oil Spill Contingency Plan and Shipboard Oil Pollution Emergency Plan. Absorbent materials and containers will be available onboard to clean up small amounts of oil and grease accumulation around deck and work areas.	Moderate	Management of Marine Spills and Discharges

Spill or release of hydrocarbons to the sea	Marine pollution if spill reaches sea (volumes 100 litres or greater).	Spill response in accordance with Oil Spill Contingency Plan and MODU Shipboard Oil Pollution Emergency Plan. Absorbent materials and containers will be available onboard to clean up small amounts of oil and grease accumulation around deck and work areas.	Moderate	Management of Marine Spills and Discharges
Fuel spill during bunkering operations	Marine pollution if fuel is lost to sea.	Transfer hoses will be fitted with dry break couplings. Annual hydrostatic testing of hoses used for fuel oil bunkering. Strict adherence to rig specific transfer procedures including full time watcher in place with radio contact to vessel.	Moderate	Management of Marine Spills and Discharges
Loss of well control and blowout during drilling	Potentially large scale marine pollution	Test the BOP prior to the commencement and during drilling operations. Continuously monitor for abnormal pressure parameters during drilling.	Low	Management of Marine Spills and Discharges
Cooling water discharges	Cooling water may contain some residual chlorine in very low, environmentally insignificant concentrations.	Cooling water stream will be kept free of hydrocarbon or chemical contamination through equipment inspections and good housekeeping practices.	Moderate	Management of Marine Spills and Discharges
Deck drainage discharge	Potential pollution of local water column with hydrocarbons.	Any machinery space bilge water to be discharged overboard is routed to the MARPOL approved oily water separator before disposal. Discharged drainage water is to contain less than 15 ppm hydrocarbons. Discharge levels recorded in the oil record logbook as per required under MARPOL 73/78 regulations.	Moderate	Management of Marine Spills and Discharges
Synthetic based drilling muds	Potential pollution of local water column with hydrocarbons.	Synthetic drilling based muds will not be discharged overboard and will be recovered to a containment tank for future reuse. SBM section drilled using a riser system.	Moderate	Management of Marine Spills and Discharges

Drill cuttings discharge	Localised smothering of benthic communities and anoxic conditions due to natural degradation.	Use of DoIR approved low toxicity WBM for majority of drilling, containing low environmental risk chemicals. Target of 10% SBM by dry weight of base fluid on cuttings in accordance with <i>Petroleum Guidelines: Drilling Fluids Management</i> (DoIR).	Moderate	Management of Marine Spills and Discharges Management of Seabed Impacts
WBM discharge	Temporary and transient increase in turbidity in water column. Ecotoxic effects on marine biota and potential for bioaccumulation in the ecosystem.	DoIR approved low toxicity drilling fluids, comprising seawater and PHG sweeps for the top sections of the hole and KCL polymer water based gel for the middle section, are to be used. Discharge of WBM may be required for maintenance of fluid properties and changing mud systems.	Moderate	Management of Marine Spills and Discharges Management of Seabed Impacts
Cement discharges	Turbid plume, sediment contamination with cement and additives	Cement and additives (e.g. inorganic salts, lignins, bentonite, barite, defoamers and surfactants) will be assessed, and those with risks ALARP will be selected by COP for use.	Moderate	Management of Marine Spills and Discharges Management of Seabed Impacts
Well flow testing	Minor marine pollution with hydrocarbons (produced formation water) and chemicals from drilling fluids	Concentration of petroleum in any PFW discharged into the sea must not be greater than 30 mg/L during each period of 24 hours.	Moderate	Management of Marine Spills and Discharges
Waste oil and chemicals	Potential pollution of local water column with hydrocarbons and chemicals.	Waste oil and chemicals will be stored aboard the MODU and transferred to the mainland for disposal.	Moderate	Management of Marine Spills and Discharges

Handling and disposal of sewage, grey water and putrescible wastes	Marine pollution from raw sewage waste and increased biological oxygen demand (BOD) as a result of organic material.	All sewage waste to be treated in the vessel's sewage treatment facility and macerated to not larger than 25 mm prior to disposal, in accordance to MARPOL Annex IV, prior to discharge. Food scraps to be macerated to a diameter of less than 25 mm prior to disposal (in accordance with MARPOL Annex V).	Low	Management of Waste
Ballast Water Operations	Transport of marine pest species into Australian waters.	All vessels to conform to Australian quarantine guidelines (AQIS 2001) relating to ballast water exchange and hull fouling.	Moderate	Management of Social and Economic Impacts on Marine Users
Antifouling system	Introduction of biocides into environment from the antifouling system.	Antifouling application records to be maintained showing that organotin or mercury based anti-fouling systems are not used. Records are to be maintained by each vessel as per AQIS requirements.	Low	Management of Marine Spills and Discharges
Handling and disposal of non-hazardous solid waste	Potential contamination of the atmosphere, and water resources.	No discharge of solid wastes. Store all solid wastes in appropriate containers, for transport ashore to be disposed of in accordance with Commonwealth regulations and <i>International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 relating thereto</i> (MARPOL 73/78).	Low	Management of Waste
Handling and disposal of hazardous waste	Potential contamination of the atmosphere, and water resources.	No discharge of hazardous wastes. Hazardous wastes (such as medical waste, lithium batteries and aerosol cans) will be segregated from other wastes for onshore recycling or disposal by certified contractor.	Moderate	Management of Waste
Handling and storage of hazardous materials	Potential pollution of local water column with chemicals, explosives or radioactive materials.	Hazardous materials storage and handling must be conducted in accordance with MSDS.	Low	Management of Waste

Collision of support vessel or rig (whilst under tow) with marine fauna	<p>Potential disturbance to local marine fauna.</p> <p>Potential injury or mortality of wildlife due to physical impact.</p>	<p>Cetaceans in the area will be observed and their behaviour will be monitored and recorded.</p> <p>Protected species are able to move away from slow moving rig and support vessels.</p>	Moderate	Management of Interactions with Wildlife
Rig positioning, anchor deployment and retrieval	<p>Potential damage to seabed features of environmental interest.</p> <p>Anchor scarring on the seabed.</p>	Continuous monitoring of anchor strains.	Low	Management of Seabed Impacts
Rig and support vessel lighting during night	May result in a temporary local concentration of marine fauna that are attracted to the lights on the rig and support vessels during night.	Light is a safety and navigational requirement for night operations. Any marine fauna attracted to the light are expected to disperse during daylight hours and permanently when rig and support vessels have vacated the area.	Low	Management of Interactions with Wildlife
Vertical Seismic Profiling (VSP)	Physiological effects on marine fauna (e.g. cetaceans and turtles) due to seismic sound source.	<p>VSP considered a best practice technique and is widely used by industry.</p> <p>Short duration, approximately eight hours per well.</p> <p>Marine mammal watch prior to VSP.</p>	Moderate	Management of Interactions with Wildlife
Interference with commercial and recreational fishing vessels, commercial shipping, and other marine users	Temporary navigation hazard and associated exclusion zone.	<p>Watch (visual, radio and radar) maintained at all times.</p> <p>Navigation aids (lights, flags, radar, etc.) on vessels.</p> <p>Presence of rig support vessels with guard functions.</p>	Low	Management of Social and Economic Impacts on Marine Users

Environmental Hazardous Event	Potential Effect	Management Approach	Residual Risk	Management Strategy
Exhaust gas emissions from power generation on survey vessels	Greenhouse and ecotoxic (NO _x , SO _x , HCs and CO) gas emissions. Release of particulate matter.	Equipment maintenance to sustain efficient fuel burning. Use of low sulphur diesel.	Moderate	Management of Exhaust Emissions
Spill of fuel during bunkering operations	Marine pollution if fuel is lost to sea. Impact on marine species (including oiling and ingestion).	Dry break hoses used for bunkering operations. Onboard spill kits.	Moderate	Management of Spills
Rupture of, or leakage from, survey vessel fuel tanks (e.g. from collision or grounding)	Marine pollution with hydrocarbons if spill reaches sea.	Watch (visual, radio and radar) maintained at all times that survey vessel is under way. Onboard spill kits. Maritime notification of seismic vessel and chase vessel locations to AMSA.	Moderate	Management of Spills
Discharge of engine oil from survey vessel	Marine pollution with hydrocarbons if spill reaches sea.	Onboard spill kits. Any machinery space bilge water to be discharged overboard is routed to the MARPOL approved oily water separator before disposal.	Moderate	Management of Spills
Loss of hydraulic fluid	Marine pollution with hydraulic fluid if spill reaches sea (small volumes).	Onboard spill kits.	Moderate	Management of Spills
Release of hydrophone streamer fluid into marine environment	Marine pollution from streamer fluid. Considered non-hazardous.	Solid streamers.	Low	Management of Spills
Onboard spillage of hydrocarbons and chemicals	Marine pollution if spill reaches sea (small volumes)	Onboard spill kits.	Moderate	Management of Spills

Inappropriate handling and disposal of sewage and grey water	Marine pollution from raw sewage waste, increased biological oxygen demand (BOD) as a result of organic material.	All sewage waste to be treated in the vessel's sewage treatment facility, according to applicable standards, prior to discharge. Waste logs shall be maintained.	Moderate	Management of Waste
Inappropriate handling and disposal of domestic waste	Changes to local habitats through addition of foreign food sources. Contamination of marine environment from packaging waste.	Food scraps to be macerated to a diameter of less than 25 mm prior to disposal. Waste logs shall be maintained.	Moderate	Management of Waste
Inappropriate handling and disposal of hazardous and non-hazardous solid waste.	Consequences may include contamination of the atmosphere, soil and/ or water resources, either on location or at the waste disposal facility.	Recyclable and non-hazardous wastes will be segregated from other wastes and returned to shore for reuse, recycling or disposal. Waste logs shall be maintained.	Moderate	Management of Waste
Potential effects on marine organisms such as physical disturbance to benthic communities residing on shoals. Possible interference to commercial fishing and shipping	Physical damage to benthic communities. Property damage to other vessels	Strict adherence to streamer handling procedures. Vessels supplied with detailed bathymetric charts. All reasonable measures will be taken to retrieve any lost equipment. All relevant stakeholders informed of vessels movements during the survey.	Moderate	Management of Seabed Impacts Management of Interactions with Wildlife

<p>Collision of survey vessel with marine fauna, or their disturbance by marine noise from vessel engines or survey equipment.</p>	<p>Potential disturbance to local marine fauna.</p> <p>Potential injury or mortality of wildlife due to physical impact.</p> <p>Behavioural changes, including approaching or avoidance of towed bolt airguns.</p>	<p>Management Measures for Organisations/Vessels Conducting Seismic Surveys in Australian Waters, pp7-12 of EPBC Act Policy Statement 2.1 – Interaction between offshore seismic exploration and whales, DEW, May 2007</p> <p>Watch maintained at all times that survey vessel is under way.</p> <p>Survey being conducted outside of known humpback whale peak migration periods.</p> <p>Survey corridors not believed to traverse significant feeding, breeding or resting areas for protected marine species (cetaceans, turtles, etc.).</p> <p>Protected species are able to move away from slow moving survey vessel.</p>	<p>Moderate</p>	<p>Management of Interactions with Wildlife</p>
<p>Survey vessel lighting during night-time survey</p>	<p>May result in a temporary local concentration of marine fauna that are attracted to the night lights on the vessel.</p>	<p>Any marine fauna attracted to the light are expected to disperse during daylight hours.</p> <p>Survey corridors are sufficiently distant (~30 km) from known turtle nesting sites for there to be negligible risk of impact upon nesting turtles or hatchlings.</p>	<p>Moderate</p>	<p>Management of Interactions with Wildlife</p>

Environmental impact on the seabed from dropped objects	Physical damage to seabed benthic communities	Certified lifting/winching equipment	Low	Management of Seabed Impacts
Interference with commercial and recreational fishing vessels, commercial shipping, Navy and Customs vessels and other marine users.	Temporary navigation hazard and exclusion zone around the survey vessel and associated survey equipment (streamers).	<p>Watch (visual, radio and radar) maintained at all times that survey vessel is under way. Navigation Aids (lights, flags, radar, etc.) on survey vessel.</p> <p>Notification of survey vessel's location to AMSA – AusCoast warnings. Notifications to commercial and recreational fishermen, AFMA, and any other relevant stakeholders.</p>	Low	Management of Social and Economic Impacts on Marine Users
Transport of marine pest species into Australian waters.	Elimination of a commercially important native Australian marine species through competition with introduced pest species.	Vessels to conform to Australian Quarantine Inspection Service (AQIS) guidelines relating to ballast water exchange and hull fouling.	Moderate	Management of Social and Economic Impacts on Marine Users

6. Stakeholder Consultation

Prior to the commencement of drilling activities, various agencies and stakeholders were contacted in an attempt to identify any concerns or conflicts that might arise from the program activities. The purpose of the stakeholder consultation is to effectively communicate planned activities with stakeholders or individuals who use and/or have a specific interest in the waters surrounding the proposed well locations.

Consultation activities were undertaken with the following stakeholders:

- A Raptis and Sons;
- Austfish Pty Ltd
- Australian Customs Service (Coastwatch);
- Australian Fisheries Management Authority (AFMA), Environmental Policy Section;
- Australian Hydrographic Office (HO) Surveying Ships and Units, Surveying Operations;
- Australian Maritime Safety Authority Rescue Coordination Centre;
- Broome Port Authority;
- Commonwealth Fisheries Association;
- Dampier Port Authority;
- Department of Fisheries (WA);
- Department for Planning and Infrastructure (WA);
- Department for Resources, Energy and Tourism (Commonwealth);
- Kimberley Professional Fishermans Association;
- Northern Fishing Companies Association;
- Western Australian Fishing Industry Council; and
- Western Australian Northern Trawl Owners Association.

COP will also advise AMSA in advance of the drilling activities to allow appropriate communication to other stakeholders who may utilise the area.

7. Contact Details

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