



## WA-390-P DEEP WATER DRILLING PROGRAM ENVIRONMENT PLAN: PUBLIC SUMMARY

This revised summary of the Hess Exploration Australia Pty Ltd (Hess) deep water drilling program Environment Plan (EP) has been submitted to the Western Australia Department of Mines and Petroleum (DMP) to comply with Regulations 11(7) and 11(8) of the Petroleum (submerged Lands) (Management Environment) regulations 1999.

### INTRODUCTION

Hess proposes to drill up to 16 offshore exploration wells over two phases between during 2007-2010 to investigate potential gas reserves within petroleum Exploration Permit WA-390-P. The exploration wells are located on the North West shelf in Commonwealth marine waters approximately 145 km from the mainland of Western Australia. Drilling will be undertaken by the semi-submersible drill rig 'Jack Bates'.

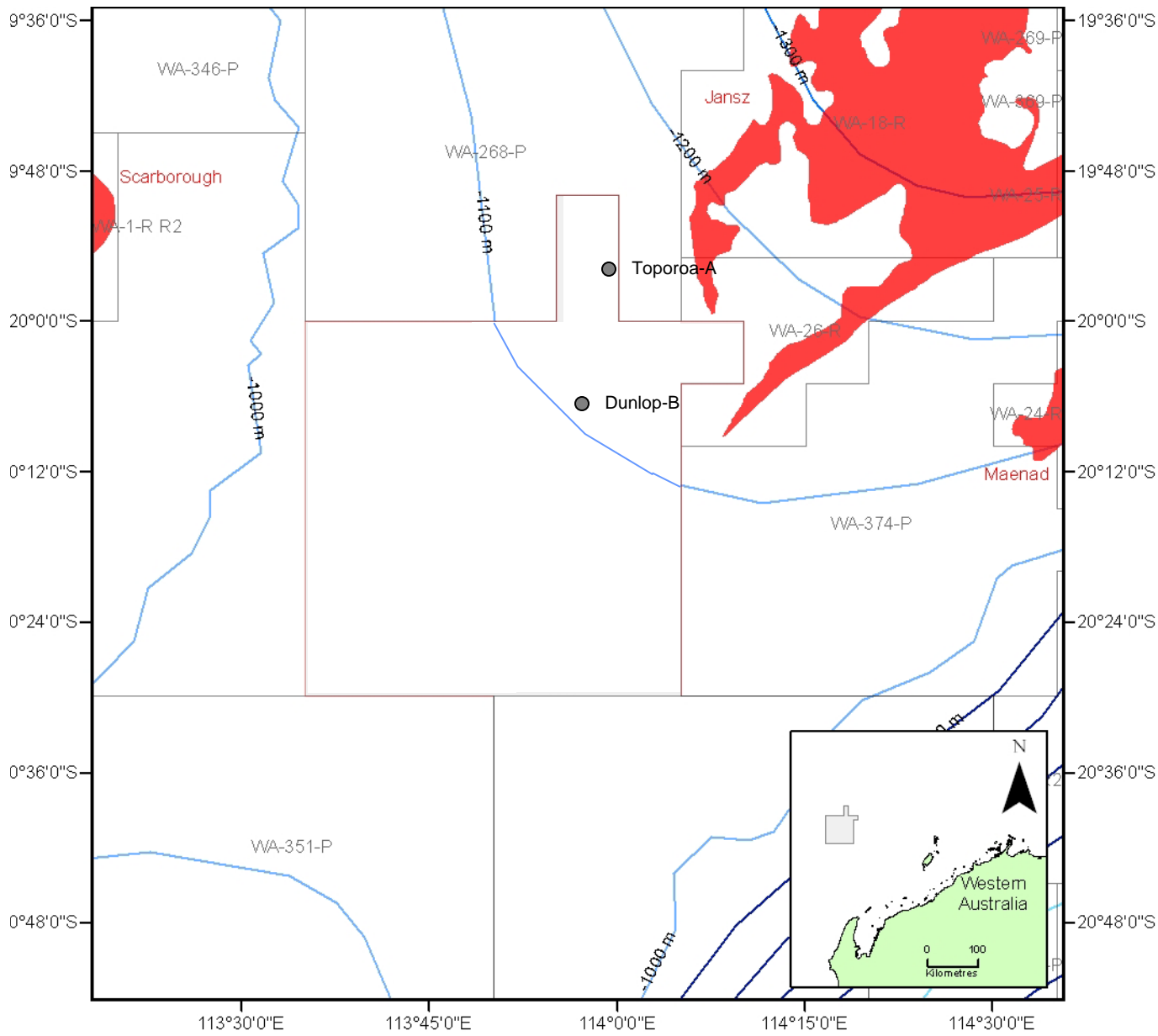
An Environment Plan (EP) was developed and approved by the Western Australia Department of Mines and Petroleum (DMP; formerly DoIR) in September 2007. The EP was revised following completion of 4 Phase 1 wells in October 2008, and prior to the start of Phase 2, where the remaining 12 wells will be drilled between 2009 and 2010.

### COORDINATES OF THE PETROLEUM ACTIVITY

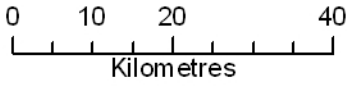
The exploration wells are located in Commonwealth marine waters within Exploration Permit WA-390-P. Phase 1, completed in October 2008, covered 4 of the 16 well commitment. Phase 2 is scheduled for a Quarter 2 2009 start and will cover the remaining 12 wells. The locations of 2 of the 12 wells have been determined (Table 1; Figure 1). The location of the remaining ten wells will be dependant on further geological interpretation.

**Table 1: WA-390-P Well Locations**

Phase	Well	Latitude (South, GDA94)			Longitude (East, GDA94)		
		Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
1 (completed)	Glencoe	20	05	33	113	48	22
	Briseis	20	04	26	113	55	59
	Nimblefoot	20	10	52	113	43	00
	Warrior	20	18	24	113	56	11
2	Toporoa-A	19	54	37.9	113	59	15.0
	Dunlop-B	20	5	40.1	113	57	24.5
	Tba	Exact locations to be finalised pending further geological interpretation					
	Tba						
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Bathymetry reproduced from the GEBCO Digital Atlas published by the British Oceanographic Data Centre on behalf of IOC and IHO, 2003 Datum, GDA94



**Legend**

- Proposed survey boundary (Permit WA-390-P)
- Known Gas / Condensate accumulations
- Proposed well site
- Exploration Permits

**Figure 1**  
**Well Location Map**



## DESCRIPTION OF THE ACTION

In Phase 2, expected to span across 2009 – 2010, Hess proposes to drill the remaining 12 offshore exploration wells required to investigate potential gas reserves within Petroleum Exploration Permit WA-390-P. Drilling will be undertaken by the semi-submersible drill rig 'Jack Bates', the same rig which drilled all of the Phase 1 wells. Drilling will take approximately 30 to 40 days at each location, inclusive of downtime and mobilization/demobilization between each wellsite. Preliminary locations have been identified for 2 of the remaining 12 wells (Figure 1). The remaining 10 wells will be dependant on further geological interpretation but will remain within the permit area.

The base-case well design applicable to all 12 of the phase 2 wells is as follows:

- A 762mm (30") casing jetted in using seawater with high viscosity sweeps (water-based mud – WBM) to approximately 70m Below Mud Line (BML)
- A 444mm (17-1/2") hole will be drilled riserless with sea water and high viscosity sweeps (water-based mud – WBM) to approximately 940m BML. A 340mm (13-3/8") casing will be run and set in the 444mm (17-1/2") hole
- A 311mm (12-1/4") hole will be drilled using Synthetic Based Mud (SBM) in a closed circulating system to approximately 2,240m BML. There is no requirement for additional casing strings.
- In the event of hole problems a contingent 216mm (8-1/2") hole may be required. Under such circumstances the 311mm (12-1/4") hole will be stopped shallow at 1640m BML and a 244mm (9 5/8") liner will be run. The 216mm (8-1/2") hole will then continue drilling to 2,240m BML as per plan. This contingent section will also be drilled with a synthetic-based drilling fluid (synthetic-based mud, SBM) on a closed mud circulating system.

As the campaign progresses modification to the above base case may be required. There is a potential that the riserless drilling may be extended to as deep as 1575m BML and thereby eliminating the requirement for a contingent 216mm (8-1/2") hole.

The wells will be engineered with primary and secondary blowout prevention suitable for all conditions that might be experienced in the program.

Sections of the wells drilled riserless will use seawater with high viscosity (bentonite/guar gum) sweeps. The water based drilling fluids that will be used at shallower depths are recognised to have minimal offshore environmental impact.

For sections drilled with a closed-fluid system, SBM has been selected for improved safety, environmental (reduced time on location, better well control), operational and economic performance. The SBM has a low environmental toxicity and is biodegradable under both aerobic and anaerobic conditions. Following connection of the riser, drill cuttings will be returned to the surface and SBM recovered for recycling. No whole SBM will be discharged during the drilling program.

After reaching total depth, electrical wireline logs will be run in the well to determine the presence of any hydrocarbons. Vertical seismic profiling (VSP) may also be conducted. There may be flaring or other testing on a limited number of the 12 Phase 2 wells.

At the completion of drilling, the well(s) will be abandoned in accordance with the requirements of the Petroleum (Submerged Land) Act 1967 and industry best practice.



## DESCRIPTION OF THE RECEIVING ENVIRONMENT

### Physical Environment

The proposed exploration wells are located on the continental slope of north-western Australia, over 145 km north of North West Cape. Water depths in the area range from 1,100 to 1,200 m. There are no islands, emergent land or shallow seabed features in the permit area, the nearest landfall being Barrow Island, some 135km to the south-east.

The substrate over the permit area is expected to comprise loose, silty carbonate sands with occasional exposed hard substrate and is likely to be broadly homogenous over extensive areas of similar water depth and distance offshore along the continental slope of the North West Shelf.

### Biological Environment

The deep offshore environment of the proposed drilling program is typical of wide expanses of the continental slope and is not expected to represent habitat of particular significance for any macro fauna.

Some marine migratory species with broad distributions, such as cetaceans, fish, sharks, sea turtles and seabirds, may traverse the area, at least on occasion. Six species listed as Threatened/ Migratory under the EPBC Act and 4 other listed Migratory species could occur in the area (DEWHA, 2008a). However, the permit area does not contain recognised critical habitat for any Threatened or Migratory fish, sharks, sea turtles, cetaceans or seabirds.

Further detail regarding the main fauna groups that might occur in the area is provided in the following sections.

#### Fish

A number of sharks and pelagic finfish, including mackerels, tunas and billfishes, occur in the waters of the North West Shelf and would be expected to occur in the area of slope of north-western Australia and is not expected to represent habitat of particular significance to sharks and finfish.

#### Sea Turtles

Three species of marine turtles may occur in the permit area: Green (*Chelonia mydas*), Leatherback (*Dermochelys coriacea*) and Flatback (*Natator depressus*) turtle, all of which are listed as Vulnerable under the EPBC Act. Sea turtles, particularly Green turtles, undertake extensive migrations and low numbers of individuals may transit the permit area. Migration and nesting activity generally occurs between September and April. The permit area does not contain any emergent land or shallow reef and the nearest areas of known turtle breeding or feeding importance are more than 135km distant. The likelihood of significant numbers of any turtle species occurring at a given drilling location during operations is very low.

#### Cetaceans

Several species of whale and dolphin are known to frequent the waters of the North West Shelf, including the Blue whale (*Balaenoptera musculus*), which is listed as Endangered, and the Humpback whale (*Megaptera novaeangliae*) which is listed as Vulnerable under the EPBC Act.

The Humpback, which is the most common whale species in the region, migrates between Antarctic waters and the Kimberley each winter to mate and breed. The northbound migration



passes Barrow Island and Montebello Islands (135km to the south-east) from June to mid August and the southbound migration occurs between mid September until the end of November, although the exact timing of migration may vary by up to three weeks.

The permit area is outside (seaward) of the main Humpback migration routes and distant from the nearest known whale aggregation areas. Although drilling of some wells is expected to overlap with the migration periods, the likelihood of Humpback whales occurring in significant numbers in the area of drilling is very low.

Blue whale migration patterns are similar to the Humpback, with the species feeding in mid-high latitudes (south of Australia) during the summer months and temperate/tropical waters in the winter for mating and breeding. However, the Blue whale tends to be more widely dispersed and rarely present in large numbers outside aggregation areas. The permit area does not include any recognised Blue whale migratory routes or known feeding, breeding or resting areas, hence the likelihood of encountering significant numbers of Blue whales during drilling operations is very low.

Four whales listed as migratory species under the EPBC Act; the Antarctic Minke whale (*Balaenoptera bonaerensis*), Bryde's whale (*Balaenoptera edeni*), Killer whale (*Orcinus orca*) and the Sperm whale (*Phseter macrocephalus*), may occur in the proposed drilling area on occasion. Given their widespread distributions and the absence of particular bathymetric features in the area, it is unlikely to represent important habitat for any of these species.

Dolphin species known to occur in depths greater than 500m are the Striped (*Stenella coeruleoalba*), Risso's (*Grampus griseus*) and Rough-toothed (*Steno bredanensis*) dolphins, although a number of other dolphins (e.g., Common Spotted, Long-Snouted, Fraser's, Bottlenose) also occur in the region and could be encountered during the program. None of these species are considered threatened or likely to occur in significant numbers in the permit area.

#### Sea Birds

The Southern Giant Petrel (*Macronectes giganteus*) is listed as Endangered under the EPBC Act and may be found in the drilling area. The southern giant petrel breeds in the sub-Antarctic waters during the summer, while in winter most disperse north from 50°S to the tropic of Capricorn and sometimes beyond. The Tropic of Capricorn is located some 400km south of the proposed drilling operations area and the Southern Giant Petrel is not expected to be present in significant numbers during any time of the year.

#### Benthic Assemblages

The biological productivity of the benthic environment is expected to be limited due to low light availability at depth, low nutrient availability and limited extent of exposed hard substrata.

The seafloor is likely to comprise predominantly unconsolidated soft sediments inhabited by sparse communities of relatively larger benthic species (urchins, seastars and crustaceans). Infaunal communities are likely to be comprised of smaller burrowing invertebrates. Any areas of exposed hard substrate that occur may support more diverse assemblages, including deep water filter feeding organisms, such as hydroids and sponges.

#### **Socio-Economic Environment**

Extensive petroleum exploration and production activity occurs in the region and the industry has developed major production and/or storage operations on Barrow, Thevenard, Airlie and Varanus Islands. However, there is no existing petroleum infrastructure in WA-390-P or adjacent permit



areas. The nearest land based production facility is situated on Barrow Island, 135km south-east of the proposed drilling operation.

Consultation with Commonwealth and State fishing authorities and commercial operators, indicates that fishing activity in the area is likely to be low. No tourism, recreational or game fishing is known for the area.

Commercial shipping is known to traverse the area; however, there are no bathymetric features or other navigational hazards in the area that will restrict ships avoiding the drill rig and support vessels.

The nearest conservation reserves include the Barrow Island Marine Management Area, Muiron Islands Nature Reserve and the Ningaloo Marine Park, which are over 130km south and south-east of the permit area. These areas are not likely to be affected by the proposed action.

## MAJOR ENVIRONMENTAL HAZARDS AND CONTROLS

Risk analysis has been used to determine risk likelihood and severity and to evaluate the environmental risks and effects, as summarised in table 2.

The risk analysis indicates that because of the short term nature of the drilling for each well, coupled with the low volumes of discharges and high dilution and dispersion rates, drilling at the well locations is unlikely to have any discernible effect on the environment beyond a small area beneath and adjacent to the drilling rig. The localized nature of the impact and the uniformity of the seafloor and associated biota over broad expanses in the vicinity of the wells suggest that any impacts associated with the drilling program will be insignificant on a regional scale.

**Table 2: Summary of Environmental Risks & Management Approach**

Hazard/Event	Potential Hazard Consequence	Risk and Mitigation Methods
<b>Anchoring</b>	Localised reduction in benthic productivity. Damage to sensitive benthic habitat or habitats of conservation significance	Low – Adherence to anchoring procedures to minimize anchor drag.
<b>Artificial Lighting</b>	Alteration in fauna behaviour resulting from attractant/ disturbance effect of lighting.	Low – Lighting minimum required for navigation and safety requirements.
<b>Underwater noise generated by operations</b>	Physiological damage or disruption to behaviour patterns of sensitive marine fauna	Medium – DEWHA seismic guidelines (DEWHA, 2008b) implemented during VSP operations to ensure no sensitive fauna in vicinity. Minimise use of thrusters to maintain position during whale migration periods. Vessels report sightings of cetaceans and marine turtles to DEWHA.
<b>Vessel movements</b>	Disturbance to migrating whales and other sensitive marine fauna.	Medium – Maintain cetacean watch on all transits. All vessels to maintain adequate separation distances from cetaceans where practicable and implement whale watch guidelines. Minimise use of thrusters to maintain position during migration periods.



Hazard/Event	Potential Hazard Consequence	Risk and Mitigation Methods
<b>Flight noises (helicopters)</b>	Biological impacts to birds along flight paths due to behavioral disturbance	Low – flight paths selected to minimize potential for disturbance. Minimise low flying and/or flying over recognised nesting areas.
<b>Discharge of SBM</b>	Localised and temporary acute/ chronic toxicity effects to marine life.	Medium – Selection of low toxicity, biodegradable SBMs. Use of BAT (shakers, solids control equipment) to optimize recovery from cuttings. Cuttings dryer to further reduce residues and minimize cutting aggregates. Recycling of return of recovered SBM to shore based storage, no discharge to sea.
<b>Discharge of cuttings</b>	Localised reduction in benthic productivity. Damage to sensitive benthic habitat or habitats of conservation significance.	Low – Discharge at surface to maximize dispersion. Use of cuttings dryer to reduce potential for cuttings aggregates.
<b>Grey water/sewage disposal</b>	Adverse effects on marine life due to reduction in water quality. (e.g. nutrient enrichment)	Low – Biodegradable detergents only. Approved onboard sewage treatment plant. Treat in accordance with P(SL)A schedule clause 222 and MARPOL 73/78 prior to discharge. Offshore discharge (>12 nm from land) only.
<b>Putrescible galley waste disposal</b>	Adverse effects on marine life due to reduction in water quality. (e.g. nutrient enrichment)	Low – Maceration to <25mm prior to discharge. Discharge in accordance with MARPOL 73/78 and P(SL)A schedule clause 222.
<b>Wastes disposal</b>	Reduction in habitat/water quality from incorrect disposal	Low – Wastes segregates and recycled where possible. Disposal to licensed facility via licensed wastes contractor.
<b>Cooling water discharged</b>	Elevation in sea temperature affects marine life.	Low – Discharge above sea surface.
<b>Discharged of oily water</b>	Potential localized and temporary acute toxic effects	Low – All potentially contaminated water collected and passed through an oil/water separator prior to discharge at <15ppm. Discharge quality automatically monitored with alarm.
<b>Flaring of Hydrocarbons</b>	Potential for hydrocarbon loss to sea surface with localized and temporary acute toxic effects	Low – Use of “green” type burners to optimise efficiency. Operation proceduralised and reviewed via HAZID. Continuous monitoring and test shut-in if fallout observed.
<b>Atmospheric emissions</b>	Localised reduction in air quality	Low – Engines maintained to operate at optimum efficiency to minimise emissions.
<b>Navigation hazards / Collision</b>	Potential for hydrocarbon or debris discharge to environment following collision.	Low – 500m exclusion zone. Rig and vessels carry all appropriate navigation lighting and well lit for operations. All vessels operated by accredited seamen maintaining 24 hour visual, radio and radar watch for other vessels. Notification of rig presence via Notice to Mariners.
<b>Drilling blowouts</b>	Potential smothering or acute/chronic toxic effects on marine organisms from liquid hydrocarbons.	Low – Approved well application. Adherence to well integrity standards/ best practice. BOPs as per DMP requirements. Approved OSCP. AMOSC oil spill response resources available offsite.





Hazard/Event	Potential Hazard Consequence	Risk and Mitigation Methods
<b>Drilling material discharged</b>	Potential contaminations of marine environment.	Low – All substances transported and stored in accordance with Rig Specific Procedures, relevant legislation and Australian Standards.
<b>SBM loss during transfer</b>	Potential acute/chronic toxic effects on marine organisms	Low to Medium – Transfer operations conducted in accordance with Rig Specific Procedures (Ref: MAR-Fluid Transfer-013). Operation restricted to daylight hours only.
<b>Diesel fuel loss during transfer</b>	Potential acute/chronic toxic effects on marine organisms from hydrocarbon loss.	Low – Strict adherence to rigs refueling procedure. Operation restricted to daylight wherever possible. Approved OSCP. AMOSC oil spill resources available offsite. Reinforced hoses with dry break couplings and fail safe fittings.
<b>Diesel fuel loss through rupture of supply vessel or rig fuel tanks</b>	Acute/chronic toxic effects on marine organisms from hydrocarbon loss.	Low – Strict adherence to rigs refueling procedure. Approved OSCP. AMOSC oil spill resources available offsite.
<b>Chemical spill run off to sea</b>	Localised and temporary acute toxic effects.	Low – All materials stored and handles in accordance with relevant procedures and MSDS. Chemicals stored in bunded store. Bund integrity ensured through regular inspections. Drains maintained closed and regularly inspected. Absorbent materials available onboard.
<b>Quarantine-introduction of exotic marine species</b>	Alteration to community composition and function – competition with indigenous species.	Low-Medium – All vessels will comply with Australian quarantine laws. Ballast exchanges conducted outside the Australian 12 nautical miles limit.
<b>Displacement of other users of marine environment</b>	Disruption of commercial fishing/ shipping activity.	Low – Notice to Mariners issued. Liaison with AMSA, AFMA, fisherman and other commercial mariners to minimize conflict.

## MANAGEMENT APPROACH

The drilling program has been planned and will be implemented in accordance with the strategy for managing Environment, Health, Safety and Social Responsibility (EHS&SR) risks that has been established by Hess Corporations Exploration and Production Leadership Team (EPLT). Hess' overall environmental objective for the program is to avoid or minimise environmental risks to as low as reasonably practicable (ALARP)

The environmental management approaches relevant to each aspect of the drilling program are summarised in Table 2. All activities will be conducted to the satisfaction of the DMP and in accordance with relevant legislative and regulatory requirements.

## CONSULTATIONS

Consultations and/or notifications regarding the proposed drilling program have been undertaken with all relevant stakeholders including:

- Department of Environment, Water, Heritage and the Arts (DEWHA)
- Australian Maritime Safety Authority (AMSA), Canberra
- Australian Fisheries Management Authority (AFMA)
- Department of Defense (Royal Australian Navy and the Royal Australian Air Force)





- Department of Mines and Petroleum
- Western Australian Fisheries Department
- Western Australian Fishing Industry Council (WAFIC)
- Commonwealth Fisheries Association
- Western Tuna and Billfish Fishery
- North-west Slope Trawl Fishery
- Southern Bluefin Tuna Fishery
- Western Deepwater Trawl Fishery
- Western Skipjack Fishery
- Deep Water Wet Line Fishery
- WA North Coast Shark Fishery
- West Coast Deep Sea Crab Fishery
- Recfishwest

These consultations have indicated that conflicts with other users of the area are unlikely as commercial and recreational fishing activity in the area is absent or at low levels, the Learmonth military restricted airspace areas will not be active during the drilling program, no commercial tourism activity occurs in the area, no sensitive environmental resources are known for the area and it is unlikely there will be any significant impact of national environmental significance, including fauna species listed as threatened and/or migratory and the Commonwealth marine environment.

#### **FURTHER DETAILS**

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