PTTEP Australasia

TECHNICAL DOCUMENT

Approval Status: **APPROVED**

Title:	**Dillon South-1 Environment Plan Summary**		
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Belongs To:	**Corporate Common**	System:	**Drilling**
Technical Discipline	**HSE**		
Class:	**Other**	Sub-Class:	
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Signature:	Signature:	Signature:	Signature:	Signature:
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Revision Number	Revision Date	Revision Remarks	Originator
0	06/11/2013	Summary of Dillon South-1 EP	GLEN NICHOLSON

TABLE OF CONTENTS

TABLE OF FIGURES

TABLE OF TABLES

1 INTRODUCTION

PTTEP Australasia (Ashmore Cartier) Pty Ltd (PTTEP AA), a part of the PTTEP Australasia Group, is the operator of the exploration permit AC/P4. PTTEP AA proposes to drill a single exploration well at the Dillon South-1 well location located in exploration permit AC/P4.

The Dillon South-1 Drilling Environment Plan (CORP-HSE-D41-831645) was accepted by NOPSEMA on 30th October 2013.

This EP summary document has been prepared to comply with the requirements of Regulation 11(7) and (8) of the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009*.

2 LOCATION OF ACTIVITY

The Dillon South-1 well is located in Commonwealth waters within exploration permit AC/P4 in the Timor Sea between Australia and the island of Timor approximately 600 km north-west of Darwin and 750 km north-east of Broome (refer to Figure 1). Water depth is 125 mAHD at the proposed well site with coordinates listed in Table 1.

Table 1 Location of the Dillon South-1 Well

Location	Latitude	Longitude
Dillon South-1 Well	11º 16´ 29.967" S	125º 25´ 45.395" E

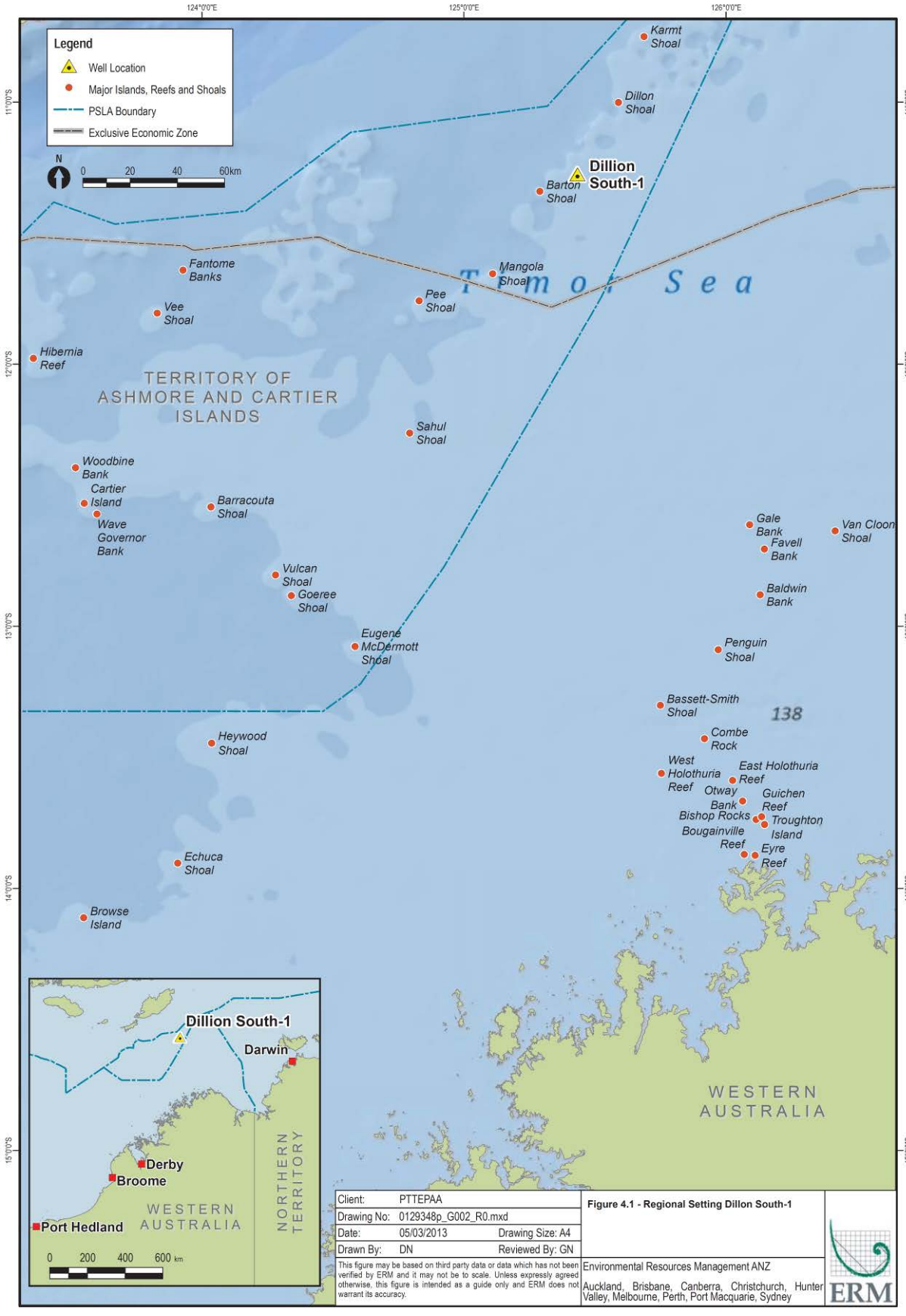

Figure 1 – Site Location of Dillon South-1 Well

3 DESCRIPTION OF ACTIVITY

The activity will involve drilling a single exploration well to determine whether potentially commercial hydrocarbon resources exist within the Triassic Nome Formation. Drilling of Dillon South-1 is scheduled to commence within Q4 2013 and last for a period of approximately 26 days. Actual commencement date, duration and completion are subject to MODU availability, operational efficiency and weather conditions.

A summary of the drilling activity is provided in Table 2 below.

Table 2 Summary of Drilling Activity

MODU	The drilling contractor selected to execute the drilling program is Stena Drilling (Australia) Pty Ltd with the well to be drilled using the semi-submersible Stena Clyde Mobile Offshore Drilling Unit (MODU). The Stena Clyde is a self-propelled, semi-submersible, twin pontoon, column stabilised drilling unit.
Anchoring	The MODU will be held in position using a mooring spread consisting of eight mooring lines with an anchor fitted to the end of each line and set into the seabed. The mooring line will be a chain and anchors will be deployed by a support vessel keeping the MODU on well centre by maintaining tension on the anchor chains.
Drilling Method	The Dillon South-1 well is planned as a vertical well that will be drilled to a total vertical depth of approximately 1,972 mAHD. The first and the largest section of the well, the 36'' hole section is established from the seabed and as drilling progresses the well is drilled deeper and the cased sections become progressively smaller in diameter. Active drilling will be undertaken 24 hours per day, 7 days per week for the Dillon South-1 well and is expected to last for 9 of the 26 days that the MODU will be on location, dependent on weather conditions and operational efficiency. The first or top hole section of the well will be drilled riserless for approximately 60 m and rock cuttings will be deposited on the seabed in the immediate vicinity of the spud location. The 445 mm (17.5") or surface hole will be drilled riserless for 1,400 m with cuttings from this hole section also deposited on the seabed. The 311 mm (12.25") hole section will intersect the target formation with a length of approximately 400m and a blowout preventer (BOP) and riser system will be installed before commencing drilling of this section. The wells will be drilled with water based muds (WBMs) and no synthetic based muds (SBMs) will be used. All cuttings and fluid solids will be disposed overboard in accordance with normal industry practice with the total volume of cuttings and fluid solids to be discharged equating to approximately 287.1 m^3 and 83 m^3 respectively, for the drilling campaign. Cement is used to secure the steel casing in the well bore and cementing chemicals are used to modify the technical properties of the cement slurry. During cementing operations, the majority of these chemicals are left downhole but a small quantity of cement may be discharged onto the seabed around the top of the casing.
Well Evaluation	**Formation Evaluation** Mud-logging will be undertaken during drilling to evaluate the drilled formations. Wireline logging may be required if the formation differs significant to that expected. If it occurs, Wire line logging, would be undertaken at the end of drilling and may require a check-shot survey to be undertaken, whereby a single airgun shot is fired to a known depth within the borehole. **Vertical Seismic Profiling** At present, it is not anticipated that a Vertical Seismic Profile (VSP) will be undertaken as part of the activity. However, should logging data indicate significantly different formation is encountered than expected, VSP may be

	required. **Well Abandonment** At the end of the drilling campaign, the Dillon South-1 well will be plugged and abandoned in accordance with the accepted Application to Undertake Well Activity and the applicable Well Operations Management Plan (WOMP).
Support Operations	The MODU is expected to have a complement of between 100 – 130 personnel and will be supported by up to three support vessels as well as regular helicopter flights from the mainland. At least one support vessel will be present at all times for safety purposes. Support vessels will primarily be used to transport equipment and materials between the MODU and the port of Darwin. They will also be used to tow the MODU to the Dillon South-1 well location. Helicopter support is based at Mungalalu – Truscott air base to undertake personnel transfers between Mungalalu-Truscott and the MODU for crew changes; down-manning of the MODU for tropical cyclone response; and emergency response, including medivac, evacuation of the MODU, and search and rescue. Helicopter transfers may occur five to six days of the week to allow planned/preventative maintenance on the other day(s). There will be approximately 5 to 7 helicopter flights to the MODU per week that will service regular crew change requirements and facilitate transfer of specialist personnel required to carry out short term duties.

4 DESCRIPTION OF RECEIVING ENVIRONMENT

4.1 PHYSICAL AND BIOLOGICAL ENVIRONMENT

The Dillon South-1 well area is located on Australian continental shelf in the Timor Sea. In general, the continental shelf is a flat featureless submarine plain that dips gently northward toward the edge of the shelf, but scattered throughout the region are sea mounts, shoals and occasional islands that support a diverse flora and fauna. The Timor Trough, with water depths up to 9,000 m, marks the northern boundary of the continental shelf.

Regionally, the Dillon South-1 well is located in the Timor Province Bioregion of the North West Marine Region and within the larger Northwest Marine Region (NWMR) Planning Area. The variety of geomorphic features in the Timor Province results in several distinct habitats and biological communities, many of which are in close proximity to each other. The reefs and islands of the bioregion are regarded as particular hotspots for biodiversity and support a range of important pelagic and benthic ecological communities. A high level of endemism has been identified in demersal fish communities of the continental slope in the Timor Province, with two distinct communities identified (upper slope and mid slope). Almost half of the reefs in the NWMR occur in the Timor Province Bioregion, including Ashmore Reef, Cartier Island, Seringapatam Reef and Scott Reef which occur in excess of 280 km south west of the well location.

A number of ecologically rich shoals are found within a 200 km radius of the permit area, and include Barracouta, Vulcan, Eugene McDermott, Echuca, Barton, Karmt, Dillon, Mangola and Pee Shoals. Studies of a number of these shoals by the Australian Institute of Marine Science and ERM (2012) confirmed that they contained diverse communities of flora and fauna dominated by photosynthetic organisms and there are pronounced differences in abundances of species between each shoals yet similarities in the species found (Heyward et al., 2010; Heyward et al, 2011). In addition, there are a number of unnamed shoals to the north and west of the well location.

The permit area falls in the continental shelf zone on the Sahul Shelf in approximately 125 m of water. The Sahul Shelf is predominantly comprised of soft sediment with little topographic relief and subsequently little diversity in habitat. The extensive soft sediment habitat, in combination with little topographic relief, has very large expanses of monotonous benthos because there are limited different habitats or niches for animals to occupy.

PTTEP AA commissioned ERM to carry out a benthic habitat assessment at nearby Cash Maple Oliver and Southern gas fields (ERM, 2012). The closest of the three gas fields is the Oliver gas field approximately 50 km south west of the well location. The benthic habitat assessment revealed a flat, featureless, soft sediment habitat across the fields, with an abiotic cover predominately consisting of sand and small rubble fragments (ERM, 2012).

4.2 PROTECTED FAUNA

An EPBC Act Protected Matters Database search for endangered and vulnerable marine species was undertaken based on a 20 km radius of the Dillon South-1 well by PTTEP AA and identified fourteen threatened and and/or migratory species that may occur or have habitat in the permit area. The listed threatened and/or migratory species are in Table 3 below.

Table 3 EPBC Listed and or Migratory Species that May Occur in the Permit Area

Species Type	Scientific Name	Common Name	Status
Cetaceans	*Balaenoptera musculus*	Blue whale	Endangered, Migratory
	Megaptera novaeangliae	Humpback whale	Vulnerable, Migratory
	Balaenoptera bonaerensis	Antarctic minke whale	Migratory
	Balaenoptera edeni	Bryde's whale	Migratory
	Orcinus orca	Killer whale, orca	Migratory
	Physeter macrocephalus	Sperm whale	Migratory
Marine Reptiles	*Caretta caretta*	Loggerhead turtle	Endangered, Migratory
	Chelonia mydas	Green turtle	Vulnerable, Migratory
	Dermochelys coriacea	Leatherback turtle	Endangered, Migratory
	Eretmochelys imbricata	Hawksbill turtle	Vulnerable, Migratory
	Lepidochelys olivacea	Olive ridley turtle	Endangered, Migratory
	Natator depressus	Flatback turtle	Vulnerable, Migratory
Marine Birds	*Calonectris leucomelas*	Streaked shearwater	Migratory
	Puffinus leucomelas	Streaked shearwater	Migratory

Cetaceans

The EPBC Act Protected Matters database did not identify known foraging, feeding, breeding or aggregation areas for cetaceans within 20 km of the Dillon South-1 well. However, transient marine species have the potential to traverse the permit area; therefore descriptions on the known distribution and occurrence of potential transient species within the permit area are provided below.

Two species are listed as threatened under the EPBC Act and may occur in or around the permit area.

- Blue Whale (endangered/migratory).
- Humpback Whale (vulnerable/migratory).

Blue Whale (Endangered/Migratory)

Blue whales (*Balaenoptera musculus*) have been documented from all around Australia, suggesting that the species has a broad distribution (DSEWPaC, 2013) and are widely distributed throughout the worlds' oceans. There are two subspecies in the Southern Hemisphere: the southern blue whale (*Balaenoptera musculus intermedia*) and the pygmy blue whale (*Balaenoptera musculus brevicauda*) (DEWHA, 2008). In general, the southern blue whale is found south of 60° S and pygmy blue whales are found north of 55° S (DEWHA, 2008), it is therefore likely that any blue whales encountered in the permit area would be pygmy blue whales.

Blue whale migration is thought to follow deep oceanic routes, although little is known about their precise migration routes (DSEWPaC 2013). Sea noise loggers set at various locations along the coast of Western Australia have detected a seasonal presence indicating a pattern of annual northbound and southbound migration of pygmy blue whales past Exmouth and the Montebello Islands and locations to the north (McCauley and Jenner 2010). Pygmy Blue whales appear to migrate south from Indonesian waters passing Exmouth through November to late December each year. Observations suggest most Pygmy Blue whales pass along the shelf edge out to water depths of 1,000m but centred near the 500 m depth contour. The northern migration passes Exmouth over an extended period ranging from April to August (McCauley and Jenner 2010).

The Perth Canyon is the only area so far identified off the Western Australia coast where pygmy blue whales aggregate with some predictability. The area represents a significant feeding ground for pygmy blue whales between January and April (McCauley and Jenner 2010). Blue whales are believed to calve in tropical waters in winter and births peak in May to June, however the exact breeding grounds of this species are unknown (Bannister *et al.* 1996).

The EPBC Act Protected Matters database indicates that the permit area and a 20 km buffer is located outside of the recognised Blue whale migratory routes, known feeding breading or resting areas. Insignificant numbers of based on pygmy, Blue whales migrating south from Indonesia waters passing Exmouth although this species may occasionally pass through the area (DSEWPaC, 2013).

Humpback Whale (Vulnerable/Migratory)

Humpback whales (*Megaptera novaeangliae*) have a wide distribution and have been recorded from the coastal areas off all Australian states except the Northern Territory (Bannister et al., 1996). Humpback whales migrate north and south along the eastern and western coasts of Australia from calving grounds in the tropical north to feeding grounds in the Southern Ocean (DSEWPaC, 2013). Peak northward migration off the north-western coast of Australia occurs from late July to early August and peak southward migration from late August to early September. From June to mid-September the inshore waters landward of the 100 m isobath between the Lacepede Islands and Camden Sound (300 400 km south-west) are used as a calving area by this species (Jenner et al., 2001).

The EPBC Act Protected Matters database indicates that the permit area and a 20 km buffer are located outside of the recognised Humpback whale migratory routes which are usually within 30 kilometres of the coastline.

Other Migratory Cetaceans

In addition to the humpback whale and blue whale, four other migratory cetacean species have the potential to occur within the permit area:

- Antarctic minke whale;
- Bryde's whale;
- Killer whale; and
- Sperm whale.

Surveys conducted in response to the Montara incident recorded a total of 462 individual cetaceans. Four different species were positively identified: false killer whale, common bottlenose dolphin, pantropical spotted dolphin and long-snouted spinner dolphin (Watson *et al.* 2009). Twenty-four individuals could not be identified.

Due to the open oceanic conditions of permit area, there are no features such as feeding or breeding grounds that will cause cetaceans to concentrate. The permit area is not located near any known migration route (Jenner *et al.* 2001). There is potential for cetaceans to travel through the area however, most of these species tend to move individually or in small pods and do not aggregate.

Dugongs

Dugongs (*Dugong dugon*) are protected under the *Wildlife Conservation Act 1950 WA* and are listed as migratory and protected species under the EPBC Act. Dugongs feed exclusively on seagrass and are found in shallow, protected waters in tropical and sub-tropical regions. The distribution of dugongs in Australia ranges from Shark Bay in WA extending around the Northern Territory coastline to Moreton Bay in Queensland (Marsh and Lefebvre 1994). A recent survey of Vulcan Shoal observed an extensive area of seagrass (Heyward *et al.* 2010) and, while not observed, it is possible that dugongs frequent the shoal.

Dugongs are known to frequent Ashmore Reef, with estimates of between 10 to 60 individuals (Whiting and Guinea 2005), and are likely to extend to Cartier Island as critical seagrass habitat is available (Commonwealth of Australia 2002). A dugong has also been recorded 130 km east of Ashmore Reef, indicating that dugongs may also use other shallow shoals on the Sahul Banks (Whiting and Guinea 2005).

Although there is limited information on the presence of dugongs in deeper offshore waters, the absence of food suggests that this is unlikely.

Turtles

The EPBC search recorded six species of marine turtle that may occur in the permit area (loggerhead, green, leatherback, hawksbill, olive ridley and flatback turtle). Marine turtles undertake extensive migrations and low numbers of individuals may transit through the permit area and are most likely to occur near the shallower seamount habitats, which may provide occasional feeding habitat.

While sea turtles are expected to pass through the permit area during their migration, the open oceanic conditions of the permit area means there are no features, such as emergent land, shallow sub-tidal features or other habitats, to support feeding or breeding grounds that will result in concentrations of these species directly adjacent to the well location. Ashmore Reef, Cartier Island and Hibernia Reef, all in excess of 280 km south west of the well location, are important feeding grounds and/or nesting sites for Green, Loggerhead and Hawksbill Turtles.

Sea Snakes

All sea snakes in Australia are listed as protected species under the EPBC Act. The Kimberley region is noted as supporting some of the highest abundance of sea snakes anywhere off the Australian coast (Guinea and Whiting 2005).

Twenty species of sea snakes occur in the NWMR, and three are species endemic to the North West Shelf area (DSEWPaC 2013). Sea snakes are air-breathing reptiles which feed in shallow, benthic areas and are typically found in shallow inshore regions and islands however, they also occur at nearby islands and further offshore at atolls such as Scott Reef, Ashmore Reef, Cartier Island and Hibernia Reef (Guinea 2006). Only a few species of sea snake are known to inhabit deep pelagic environments, with observations indicating that most sea snakes are rarely found in depths exceeding 30 m (Cogger 1975).

A search of the EPBC Act Protected Matters database identified 12 species of sea snake that may occur in, or have habitat in, the permit area. The general distribution and movements of sea snakes are largely species-dependent with some species travelling large distances, while others are usually more residential to a particular area. Tagging of sea snakes at Ashmore Reef has also confirmed this, with some species remaining within the reef area for some years (Guinea and Whiting 2005).

Marine Birds

Numerous species of birds frequent the Timor Sea area or over fly it on annual migrations. Seabird feeding grounds, roosting and nesting areas are found on the offshore atolls, particularly Ashmore Reef. Many species are listed under the Japan-Australia Migratory Bird Agreement (JAMBA), China-Australia Migratory Bird Agreement (CAMBA) or Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA). Most seabirds breed at offshore sites, such as Ashmore Reef, Cartier

Island and Browse Island, between mid-April to mid-May (Clarke 2010). Peak migration time of migratory shorebirds is between October to December (Clarke 2010).

It is expected that some individuals of these species would pass through the permit area during their annual migrations and may form temporary feeding aggregations, subject to the availability of food

Ashmore Reef, Cartier Island and Browse Island are important foraging areas for migratory shorebirds visiting the region from the northern hemisphere, with numbers highest between October and April (Clarke 2010). However, large numbers of shorebirds are present year round as many species 'over winter' in their first years of life (Australian National Parks and Wildlife Service 1989, Higgins and Davis 1996, cited in Clarke 2010).

4.3 SOCIAL ENVIRONMENT

Fisheries

The North Coast bioregion of Western Australia (Pilbara/Kimberley) supports a number of commercial fisheries (Department of Agriculture, Fisheries and Forestry (DAFF 2013).

Consultation with AFMA and WA DoF confirmed that only the Northern Demersal Scalefish Fishery may currently operate in the permit area or in close proximity.

Northern Demersal Scalefish Fishery

The Northern Demersal Scalefish Fishery is managed by the Western Australian Department of Fisheries (DoF) and includes an extensive area adjacent to Western Australia from the Bonaparte Gulf to the west and the Pilbara to the south (DoF 2011). There are a total of 11 licences issued for the fishery and it is actively fished by five vessels based out of Broome, Pilbara and Darwin. Fish traps and lines are used to principally target high-value scalefish species such as red emperor, gold-band snapper and cod. WA Dof has advised that this fishery has the potential to have operations within or close proximity to the permit area but due to the low fishing effort and management measures in place no impact is expected.

Shipping

The major commercial shipping route through the Timor Sea passes to the north of the permit area. Vessels utilising this route include bauxite carriers servicing terminals at Gove (Northern Territory) and Weipa on the Cape York Peninsula, Queensland, and coal carriers and container vessels departing Queensland ports for destinations in the Middle East, Europe and South Africa. Based on AMSA AusRep position reports for the Timor Sea there are no known recognised shipping routes through the permit area, although trading vessels may pass through the general area.

Areas of Conservation Significance

Ashmore Reef

Ashmore Reef, approximately 280 km south west of the well location, is protected by the Commonwealth managed Ashmore Reef National Nature Reserve and is also a designated RAMSAR wetland of international significance (Clarke 2010). Ashmore Reef is a large platform reef characterised by an atoll-like structure with three low, vegetated (shrubs and herbs) islands, numerous shifting sand banks and two large lagoon areas. The surrounding reef consists of a well developed reef crest most prominent on the south and east sides, and a broad reef flat. The edge of the reef flat has large areas of sand which become exposed at low tide. The islands located within the lagoon are mostly flat, being composed of coarse sand with a few areas of exposed beach rock and limestone outcrops. Ashmore Reef is internationally recognised as a significant breeding area for green turtles and also for its abundance and diversity of sea snakes (Guinea 2007). Ashmore Reef also has a high coverage of seagrass which supports a small dugong population.

Cartier Island

Cartier Island, approximately 247 km south west of the well location and surrounding reefs are protected by the Cartier Island Marine Reserve. Cartier Island is characterised by an un-vegetated sand cay which is stabilised by patches of beach rock and surrounding mature reef flats. The effects of wind, tides and rain periodically expose and remove areas of shifting sandbanks. The island supports a large population of nesting marine turtles.

Hibernia Reef

Hibernia Reef is part of the same group as Ashmore Reef and Cartier Island and is located approximately 240 km southwest of the well location however it does not form part of the Ashmore Reef and Cartier Island External Territory of Australia. Hibernia Reef is located 42 km northeast from Ashmore Reef and 62 km northwest of Cartier Island and is an oval-shaped reef that tapers to a point on the western side. While the reef has no permanent land, large areas can become exposed at low tide. Hibernia Reef is also characterised by a deep central lagoon and drying sand flats.

Scott Reef

Scott Reef (North Scott Reef and South Scott Reef) is located approximately 400km southwest of the well location and is listed as a Commonwealth Heritage Place, it is also listed on the Register of National Estate.

North Scott Reef is an annular reef enclosing a deep lagoon that is connected to the ocean by passages in the northeast and southwest. South Scott Reef is a crescent shaped reef which subtends North Scott Reef and partially encloses another deep lagoon. South and North and Scott Reef are separated by a deep (400 m to 700 m) channel.

Corals communities at Scott Reef occur across shallow (<30 m) and deep (>30 m) habitats, with 306 species from 60 genera and 14 families having been identified (Gilmour *et al.* 2009).

Shallow water environments supported a higher diversity of corals (295 species) than deeper waters (51 species). Of the corals recorded, none were endemic to Scott Reef (Gilmour *et al.* 2009) and all predominantly widespread Indo–Pacific species. Coral species diversity at Scott Reef has been found to be comparable to other reefs in the region, such as Ashmore, Seringapatam and Mermaid Reef also known as Rowley Shoals, with clear affinities to coral assemblages at Ashmore Reef and the Indonesian provinces.

Seringapatam Reef

Seringapatam Reef, located approximately 400km southwest of the well location, is listed as a Commonwealth Heritage Place and is also listed on the Register of National Estate. Seringapatam Reef covers an area of approximately 55 km² and encloses a lagoon of relatively consistent depth of 20 m with a maximum depth of 30 m. The lagoon is connected to the ocean by a narrow passage in the northeast part of the reef (DSEWPaC 2012).

The reef is a regionally important scleractinian coral reef as it has a high biodiversity. A 2010 survey by Heyward *et al.* (2010) on the condition of shallow reef communities at Seringapatam Reef (in response to the Montara oil spill) noted that the coral cover on slopes (20-25%) and reef flats (<10%) to be similar to Ashmore Reef and Cartier Island surveyed in the same study. Mean coral abundance at 6 m depth sites across the whole reef however was significantly higher at Seringapatam than at either Ashmore Reef or Cartier Island.

Browse Island

Browse Island, approximately 370 km southwest of the permit area, and the waters surrounding it for a distance of three nautical miles are in WA State Territorial Waters. Browse Island is a Nature Reserve and managed by the Department of Parks and Wildlife (DPaW). The island is a sand (up to 10 m above sea level) and limestone cay situated on a limestone and coral reef. Browse Island is vegetated with herbs and low shrubs (Clarke 2010). The island represents an important marine turtle nesting site in the region for the Green turtle (*Chelonia mydas*). No seagrass communities have been observed surrounding Browse Island.

5 ENVIRONMENTAL RISK ASSESSMENT

An environmental hazard identification and risk assessment was undertaken using methods consistent with AS/NZS ISO 31000:2009 (AS/NZS 2009) and the PTTEP AA SSHE Risk Management Standard (SSHE-106-STD-400, Rev 3).

The key environmental hazards and control measures for the activity are presented in Appendix A. All control measures detailed in the EP will be implemented to ensure risk is managed to as low as reasonably practicable (ALARP) and will be of an acceptable level.

6 MANAGEMENT APPROACH

PTTEP AA is committed to proactive management of its environmental responsibilities in all its activities. The elements of the management approach include the specific systems, procedures and practices which are used to ensure that the environmental impacts and risks of the activity are reduced to ALARP and that the environmental performance objectives are met. The implementation strategy include roles and responsibilities of personnel, training and awareness of personnel, reporting framework, mitigation and emergency response arrangements, and compliance monitoring and auditing procedures.

PTTEP AA, as the operator of the activity, is responsible for ensuring the activity is managed in accordance with the accepted Environment Plan.

Environmental performance objectives, standards and criteria have been defined in the accepted EP and are monitored and reviewed to ensure effective implementation of the environmental requirements and continual improvement in achieving environmental outcomes.

All incidents that have the potential to cause significant effects on the environment will be reported and investigated according to legislative requirements, vessel procedures and the procedures laid down in the EP.

NOPSEMA will be notified of all reportable incidents within two hours of the incident first occurring (or the operator becomes aware of the incident), according to the requirements of Regulation 26 of the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009.*

A written report will be provided to NOPSEMA within three days of the initial notification of a reportable incident. Reportable incidents for the activity are:

- an uncontrolled release of hydrocarbons or hazardous chemicals >80L to the environment;
- an uncontrolled gaseous release to atmosphere of >300kg; and
- disturbance to a particular sensitivity associated with an activity e.g. injury or death of a species of conservation value or damage to habitat of importance to those species.
- Loss of well control incident
- Diesel spill due to vessel collision

7 STAKEHOLDER CONSULTATION

The following relevant stakeholders have been consulted via email and letter in regards to the activity during preparation of the EP with details on the location, timing and activity provided along with a request for any feedback on potential issues or concerns:

Commonwealth Government

Australian Fisheries Management Authority (AFMA); Australian Hydrographic Service, Department of Defence; Australian Maritime Safety Authority (AMSA); Border Protection Command; Department of Agriculture, Fisheries and Forestry (DAFF); Department of Resources, Energy and Tourism (DRET); Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC); Department of Foreign Affairs and Trade (DFAT).

State/Territory Government

Department of Primary Industry and Fisheries, NT; Department of Mines and Energy, NT; Department of Transport, Marine Branch (DLP Marine), NT; Department of Transport, WA; Department of Fisheries, WA; Department of Parks and Wildlife, WA.

Responsible State/Territory Minister

NT Office of the Chief Minister

Organisation(s) whose functions, interests or activities may be affected

Commonwealth Fisheries Association (CFA); NT Seafood Council; Northern Prawn Fishery; Pearl Producers Association; WA Fishing Industry Council (WAFIC); Western Australian Northern Trawl Owners Association (WANTOA); Australian Southern Bluefin Tuna Industry Association; commercial fishing operators within relevant identified fisheries; adjacent Oil & Gas operators.

Organisation also considered relevant

Darwin Port Corporation; Australian Marine Oil Spill Centre (AMOSC); Recfishwest, OSRL.

Indigenous stakeholders are not likely to be affected by the proposed action due to the distance offshore and absence of any Indigenous sites of significance Therefore, consultation has not, and is unlikely to, be undertaken with Indigenous stakeholders.

PTTEP AA will continue to consult with above listed organisations in response to any issues that may be raised. Consultation with all of the stakeholders listed above, plus additional others identified during the consultation process, will continue prior to and during the activity if necessary.

8 CONTACT DETAILS

Further details on the activity can be obtained from:

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APPENDIX A: ENVIRONMENTAL RISK ASSESSMENT SUMMARY

ROUTINE/ PLANNED ACTIVITIES			
Hazard	**Impacts**	**Control and Mitigation Measures**	**Residual Risk**
Socio-Economic			
Presence of the MODU safety exclusion zone. Interference with commercial fisheries and shipping activities	Potential for obstruction to fishing and shipping operations due to presence of exclusion zone around the MODU (loss of access to fishing ground). Economic costs to fisheries.	Consultation with the Commonwealth and State management authorities, and with specific fisheries and shipping operators as identified through consultation All mariners alerted to exclusion zone/MODU presence MODU and support vessels are equipped with navigation aids and required lighting specification.	Low
Disturbance to Marine Environment			
Potential for the physical presence of the MODU and associated support vessels and helicopters to interact with marine fauna	Potential changes in faunal behavior and/or physiology due to MODU presence and vessel activity, such as avoidance behaviour, increased dive times, stress behaviour.	Implementation of the EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans: ▪ Support vessels will not travel greater than 6 knots within 300 m of a whale and approach no closer than 100 m from a whale ▪ Helicopters shall not operate lower than 500 m or within the horizontal radius of 500 m of a whale known to be present in the area.	Low
Introduction of invasive marine species via biofouling and/or ballast water from MODU and support vessels	Invasive marine species taking hold and altering local ecosystem. IMS can impact on native populations/fauna populations – increase competition for resources and habitat; predation of native/endemic species/food sources and can impact on human uses/resources (e.g. biofouling).	MODU and all vessels will have AQIS clearance prior to mobilisation to well location. MODU and all vessels will have valid antifouling certification prior to mobilisation to well location. Risk assessment to be undertaken on MODU and vessels in accordance with National Biofouling Management Guidance for the Petroleum Production and Exploration Industry.	Low
Disturbance to marine fauna from light emissions from MODU and support vessels deck lighting	Light spill on to ocean attracting seabirds, fish, turtles and other sea life - causes disruption to natural behavior patterns (e.g. foraging)	Lighting is minimum required for navigation and safety requirements	Low
Seabed disturbance from anchors and anchor chains mooring the MODU	Disturbance to seabed or epifauna causing damage or loss of habitat, Localised loss, disturbance and/or	Use of site survey data to identify seabed features to be avoided by anchors	Low

ROUTINE/ PLANNED ACTIVITIES			
Hazard	**Impacts**	**Control and Mitigation Measures**	**Residual Risk**
	smothering of seabed features and benthic habitat. Reduction in water quality (i.e. Total Suspended Solids)	Adherence to rig move procedures to minimise potential impacts on the seabed	
Noise from MODU	Disturbance to marine fauna, mammals and fish; possible physical damage to immobile plankton such as fish eggs and larvae in immediate proximity to MODU.	MODU preventative maintenance program implemented to optimise the efficiency of equipment	Low
Noise from support vessels	Potential behavioural changes in fish and marine mammals due to increase in background marine noise levels. Possible localised avoidance/ attraction.	Implementation of the EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans: ▪ Support vessels will not travel greater than 6 knots within 300 m of a whale and approach no closer than 100 m from a whale	Low
Noise from helicopters	Potential behavioural changes in fish and marine mammals due to increase in background marine noise levels. Possible localised avoidance.	Implementation of the EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans: ▪ Helicopters shall not operate lower than 500 m or within the horizontal radius of 500 metres of a whale known to be present in the area.	Low
Noise from airgun during VSP/check shot survey	Potential behavioural changes in fish and marine mammals due to increased noise levels.	Implementation of EPBC Policy 2.1 and conditions of EPBC Approval 2013/6849 during use of VSP including ▪ Pre-start-up Visual Observations ▪ Soft Start Procedures ▪ Operating procedures ▪ Low visibility operating procedures:	Low
Discharges to Atmosphere			
Power generation from MODU and support vessels producing atmospheric emissions: Increase in greenhouse effect.	Power generation by the MODU and fuel use by support/supply vessels and helicopters releases combustion products to the atmosphere. These emissions may contribute to global warming (CH4, CO2), acid effects (SOx, NOx). There may be the potential for localised smog formation.	Engines maintained to operate at optimum efficiency to minimise emissions Power generation equipment to be regularly maintained and operated in compliance with contractors scheduled maintenance program Low sulphur diesel will be used wherever possible and daily fuel consumption reported to PTTEP AA GHG emissions recorded and reported in accordance with PTTEP AA Energy and Emissions Estimation Manual (S32-505264-CORP)	Low

ROUTINE/ PLANNED ACTIVITIES			
Hazard	**Impacts**	**Control and Mitigation Measures**	**Residual Risk**
Waste Management			
Generation and disposal of non-hazardous waste from MODU and supply vessels	Potential pollution to the marine environment; injury and entanglement of marine fauna and seabirds; onshore litter; landfill	Waste Management Plan (PTTEP AA Waste Management Plan Std ID D30-500469) will be in place to ensure: ▪ Minimisation of the amounts of non-hazardous wastes generated at source; ▪ Segregation of waste by type; ▪ Storage in covered skips to prevent emissions and leaks. ▪ Recycling or re-use prioritised where possible ▪ Use of licensed waste contractors and disposal facilities.	Low
Generation and disposal of hazardous waste from MODU and supply vessels	Potential pollution to the marine environment; deterioration in water quality; landfill	Waste Management Plan (PTTEP AA Waste Management Plan Std ID D30-500469) will be in place to ensure: ▪ Minimisation of the amounts of hazardous waste generated at source; ▪ MSDS available onboard; ▪ Segregation of waste by type; ▪ Storage in covered skips to prevent emissions and leaks; ▪ Recycling or re-use prioritised where possible, in particular for scrap metal, waste oil and surplus chemicals; and ▪ Use of licensed waste contractors and disposal facilities.	Low
Discharges to the Marine Environment			
Discharge of putrescible wastes and grey water to marine environment from MODU and supply vessels	Fish and other sea life attracted to food source. Impacts on water quality and changes in fauna behaviour leading to short term impacts on local populations. Plastic waste can cause harm/injury to marine fauna.	All waste treatment systems comply with MARPOL requirements (Annex V – Regulation 3; all food scraps and putrescible wastes comminuted to <25 mm prior to discharge); and Offshore discharge will be released at least 12 nm from land and putrescible waste will be macerated to less than 25 mm prior to discharge.	Low
Discharge to marine environment – sewage from MODU and supply vessels	Degradation of water quality	Compliance with MARPOL Annex IV – Regulations 8 & 11, any discharges to be made through an IMO type-approved sewage treatment plant; and No sewage discharged within 12 nautical miles of land.	Low
Discharge to marine environment – deck drainage and bilge water	Degradation of water quality	Deck drainage from bunded areas will be directed to an oil-water separator; Absorbents and containers available on the MODU and all support vessels to clean up	Low

ROUTINE/ PLANNED ACTIVITIES			
Hazard	**Impacts**	**Control and Mitigation Measures**	**Residual Risk**
from MODU and supply vessels		small accumulations of oil and grease around work areas and decks; Oily water from machinery space bilges will be captured and directed to a bilge holding tank which is sent to the OWS and discharge will not exceed 15 mg/l	
Discharge to marine environment – cooling water from MODU	Temporary and localised increases in sea water temperatures resulting in physical effects (e.g. injury or death) to marine biota.	Cooling water system maintained to ensure efficient operation. The cooling water system is a segregated system, with no hydrocarbons or chemical content	Low
Discharge to marine environment –brine from MODU	Temporary and localised increases in salinity resulting in potential toxic effects on marine biota.	Dilution of brine discharge via discharge with cooling water.	Low
Discharge to marine environment – WBM coated drill cuttings	Low levels of chemicals released; increased localised turbidity; potential depletion of oxygen in surface sediments; possible loss of seafloor habitat. Potential cumulative increase to background contaminant levels and loss of biodiversity.	Timing of the activity to coincide with low predicted impacts to shoals from cuttings dispersion modeling Use of CHARM Gold or Silver or OCNS Category E of D environmentally rated chemicals require no further assessment. If other rated or non- rated chemicals are required the chemical(s) will be assessed for acceptability before use Recovered WBM will be reused/re-circulated where practical and cuttings/mud cleaning equipment will ensure optimal cuttings cleaning prior to discharge	Low
Discharge to marine environment - cement	Possible smothering of seabed around the well site by discharged cement slurry. Potential depletion of oxygen in surface sediments; possible loss of seafloor habitat. Low levels of chemicals released resulting in potential toxic effects on marine biota.	Cement and associated chemicals will be mixed offshore as needed to minimise quantities for disposal Subsea ROV inspection during cementing operations will ensure that excess returns to the seabed are minimized Cement additives of Gold or E environmental rating will be used	Low

NON-ROUTINE/UNPLANNED ACTIVITIES			
Hazard	**Impacts**	**Control & Mitigation Measures**	**Residual Risk**
Discharges to Atmosphere			
Accidental release of Ozone Depleting Substances from MODU or supply vessels	Localised effect on air quality; emissions may contribute to ozone depletion	ODS inventory maintained in compliance with MARPOL Annex VI (Regulation 12); and MODU personnel licensed for handling ODSs.	Low
Discharges to Marine Environment			
Accidental non-hazardous or hazardous waste discharge at sea or incorrect disposal offshore from MODU and supply vessels	Pollution from waste products leading to deterioration in water quality. Potential for impacts to fauna due to ingestion or entanglement of plastics etc. Pollution from hazardous waste products leading to deterioration in water quality resulting in potential toxic effect on marine life.	Implementation of Waste Management Plan (PTTEP AA Waste Management Plan Std ID D30-500469) including compliance with MARPOL requirements, waste log maintained, secure storage and correct segregation of solid and hazardous wastes in all areas on the MODU and support vessels Operational controls for loading, unloading, and movement of materials; Emergency response procedures available in the event of a chemical spill to minimize loss to the environment. Implementation of rig hazardous substances procedure ensuring: ▪ Vessels maintain a file containing the Material Safety Data Sheets (MSDS) for all hazardous chemicals carried aboard; ▪ Copies of the relevant MSDS are also kept in the spaces where these chemicals are stored or handled; ▪ All chemicals are in appropriate containers and clearly marked; and ▪ Designated containment areas onboard for oil, grease and chemical storage. ▪ Minimal amounts of hazardous wastes & only operationally required amounts of hazardous materials to be stored onboard;	Low
Loss of chemicals during general operations and bulk transfers (spills and leaks)	Potential for spills and leaks of base oils, hydraulic fluids which may cause localised toxicity effects on marine life and deterioration in water quality.	Transfer operations undertaken in accordance with rig-specific procedures including surveillance. MODU and support vessel Shipboard Oil Pollution Emergency Plan (SOPEP) that includes procedures for minimising losses to sea.	Low
Loss of hydrocarbons during vessel and MODU refuelling diesel spill (max $5m^3$)	During bunkering operations on the MODU there is the potential for fuel line failure/leaks from hoses which may cause localised toxicity effects on marine fauna and flora. Localised pollution of ecosystems as well as release of fuel to sea which	MODU and support vessels SOPEP that includes procedures for minimising losses to sea. Refuelling to be carried out under MODU specific refueling procedures to ensure zero refueling incidents	Low

NON-ROUTINE/UNPLANNED ACTIVITIES			
Hazard	**Impacts**	**Control & Mitigation Measures**	**Residual Risk**
	may impact local marine communities and rafting seabirds at the sea surface.		
Vessel Collision - Rupture of fuel tank and large diesel spill at sea (maximum 80 m^3)	Reduced water quality and associated biological community impact with potential for damage to sensitive resources. Impacts on water quality and marine fauna in the affected area. Physical presence of MODU presents a navigational hazard, potential for collision.	Adherence to standard maritime safety and navigation requirements to prevent collisions including: ▪ IMO International Regulations for Preventing Collisions at Sea (COLREGS) ▪ Issuance of Notice to Mariners ▪ Auscoast warnings via AMSA and MSA Rescue Coordination Centre notified ▪ MODU and support vessels are equipped with sophisticated navigation aids and competent crew maintaining 24 hour visual, radio and radar watch for other vessels ▪ Radio warnings to mariners as required ▪ Approved vessel SOPEP and assistance from PTTEP AA Oil Spill Contingency Plan (OSCP) and Emergency Management Team (EMT). ▪ Support vessel in constant attendance of the MODU ▪ Support vessel cannot enter 500m zone without permission from MODU ▪ Safety exclusion zone (500m). SOPEP procedures comply with MARPOL 73/78: ▪ Sufficient spill response equipment to prevent spills on deck reaching the environment ▪ Procedures to be followed to minimise losses to sea	Medium
Uncontrolled well flow during drilling Crude (Type I) maximum 176,000 bbl/day over 60 days	Physical oiling and toxicity impacts to marine fauna and flora. Indirect impacts could include: habitat loss, impact on tourism and fisheries, issue of waste disposal Accumulation of oil and chemicals in the food chain and in sediments. Loss of biodiversity and revenue.	Compliance with PTTEP AA Drilling Management System, namely Well Integrity Manual (D41-504807-FACCOM), applicable WOMP & Blow Out Contingency Plan (IC-DR-D41-80550). Response undertaken in accordance with the NOPSEMA accepted Dillon South-1 Drilling OSCP.	Medium