



EAST PUFFIN PTY LTD

AC/L6 PUFFIN FIELD MODIFICATION – RISER DISCONNECTION

SUMMARY ENVIRONMENT PLAN

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1 Background

East Puffin Pty Ltd (EPPL) and AED Oil Limited are the joint titleholders of the Puffin Field in the Ashmore Cartier Exploration Permit (AC/P22) and Production Licence (AC/L6) areas located in the Bonaparte Basin in North Western Australia. EPPL, a wholly-owned subsidiary of Sinopec International Petroleum Exploration and Production Corporation (SIPC), is the nominated operator of the AC/P22, AC/L6 and AC/RL1 areas on behalf of the Joint Venture Participants (JVP).

1.1 Petroleum Activity Location

The Puffin oil field, located in Production Licence AC/L6 and Exploration Permit AC/P22, covers an area of approximately 900km², and is situated in the commonwealth waters of the southern Timor Sea (refer **Figure 1.1**). The closest landfall locations to the Puffin Field Development are:

- Cape Bougainville (WA mainland) located approximately 230km to the south-east;
- Kupang in Timor located approximately 180km to the north-west;
- Ashmore Islands located approximately 120km to the west;
- Cartier Island located approximately 80km to the west; and
- Hibernia Reef located approximately 105km to the north-west.

This area is located approximately 80km south-west of the Jabiru and Challis fields and approximately 15km to the north-west of the Skua oilfield. The coordinates of the Puffin development facilities are presented in **Table 1-1**.

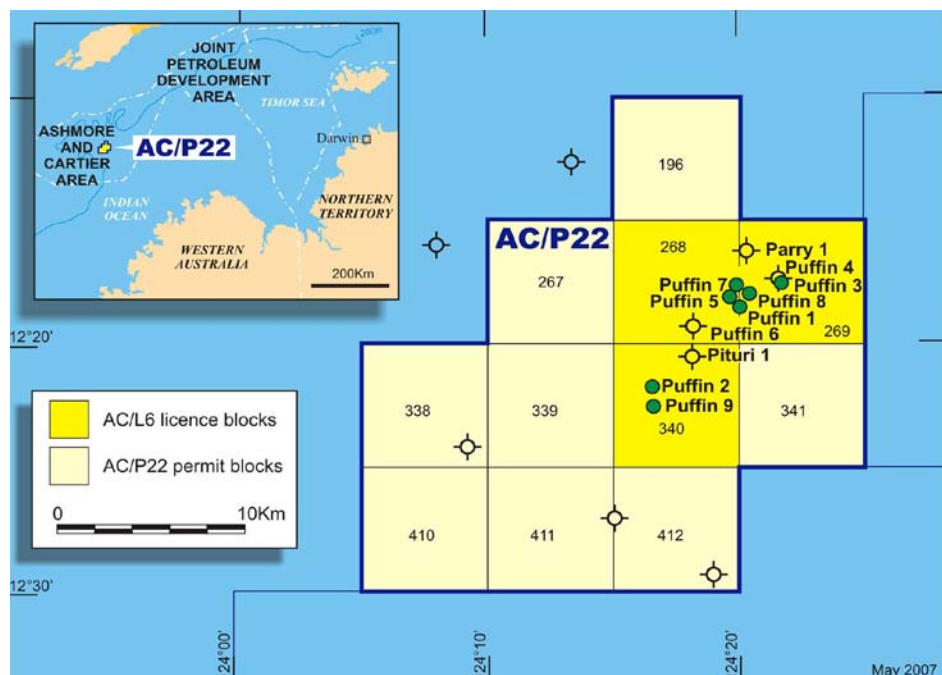


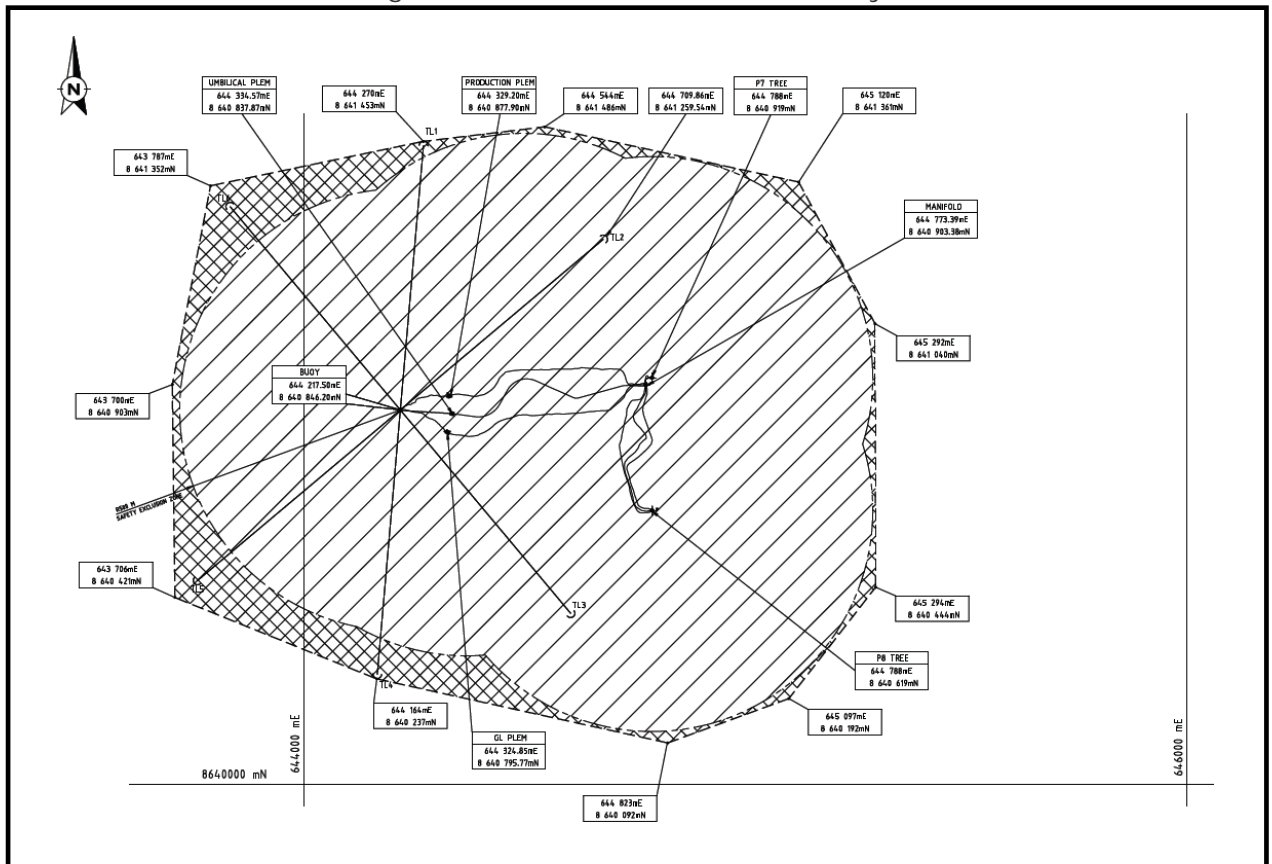
Figure 1-1 Puffin Development Location Map

Table 1-1 Puffin Development Coordinates¹

MGA Coordinates (GDA94) UTM 80 Zone 51				
Well	Longitude	Latitude	Easting (m)	Northing (m)
Puffin-7	124°19'52.99" E	12°17'27.30" S	644 788	8 640 919
Puffin-8	124°19'53.03" E	12°17'37.06" S	644 788	8 640 619
Marker Buoy	124°19'34'10.1"E	12°17'29.80" S	644 217	8 640 845
Anchor-1	124°19'20.15" E	12°17'13.58" S	643 798.1	8 641 345.2
Anchor-2	124°19'35.75" E	12°17'10.24" S	644 269.9	8 641 445.5
Anchor-3	124°19'50.58" E	12°17'16.05" S	644 717.1	8 641 264.8
Anchor-4	124°19'48.07" E	12°17'45.98" S	644 636.7	8 640 345.8
Anchor-5	124°19'32.47" E	12°17'49.32" S	644 164.9	8 640 245.5
Anchor-6	124°19'17.64" E	12°17'43.51" S	643 717.7	8 640 426.2

A Petroleum Safety Zone (PSZ) has been gazetted around the Puffin subsea infrastructure (without FPSO present) as provided in **Figure 1-2**.

Figure 1-2: Gazetted Petroleum Safety Zone



¹ Anchor points are provided as contingency should they not be removed during 4Q 2010 modification works



1.2 Petroleum Activity Scope

1.2.1 Development Concept

EPPL have developed the Puffin Field in a phased development utilising a weather-vaning, disconnectable Floating Production Storage and Offloading (FPSO) development concept. The Puffin Field Development (2007-2009) has been based, to date, on two subsea wells (Puffin-7 and Puffin-8) connected and producing crude oil to an FPSO by multiphase production flowlines and a subsea control umbilical. The FPSO, Front Puffin, was connected to a moored STP Buoy which maintained its position by six (6) drag anchors with associated mooring lines.

The storage capacity of the FPSO allowed for the storage of stabilised crude oil with periodic transfer of oil parcels (0.65MMstBbls) to shuttle tankers for transport to market.

Surface facilities connect to subsea facilities via the following:

- A well service line provided gas lift gas from the FPSO to the subsea wells.
- A hydraulic control umbilical from the FPSO to the subsea trees provided hydraulic valve actuation.
- The subsea tree functions were remotely controlled by the FPSO via the control umbilical; and
- Flowlines and the control umbilical were connected to the FPSO via a Submerged Turret Production (STP) buoy system (*also providing the necessary mooring for the FPSO*).

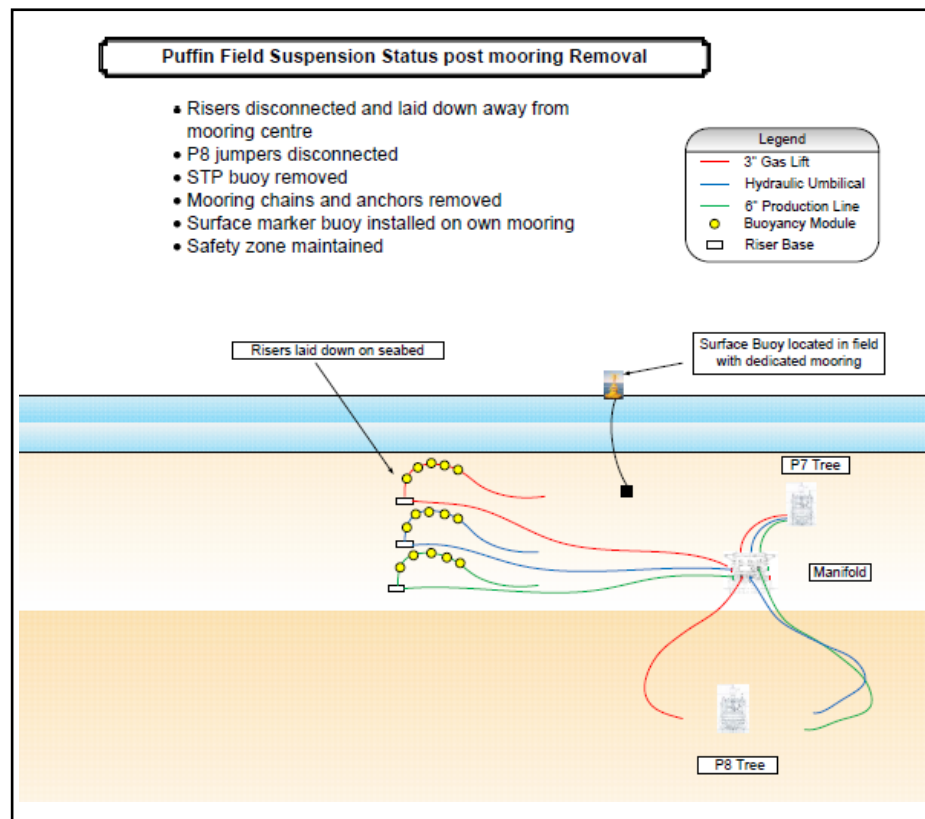
Following a contractual dispute the FPSO departed the Puffin Field in July 2009. Prior to disconnection the field was suspended as follows:

- Downhole Safety Valves (SSSV) were closed;
- All subsea wellhead valves (AWV, AMV, PWV, PMV) were closed;
- Control umbilicals were de-pressured and isolated;
- Flowlines, manifolds and risers (attached to STP Buoy) were flushed with five (5) times their volume and filled with inhibited water; and
- The STP Buoy was left in the field attached to the mooring and risers at approximately 30mBSL with a navigation buoy connected.

This summary covers the modification works to be undertaken during 4Q2010 by the MSV *GeoSea*, to disconnect the risers attached to the STP buoy and remove the STP Buoy and the associated mooring system from the Puffin Field. All subsea production facilities (flowlines, risers, manifolds, jumpers, umbilicals) remain at the Puffin Development site preserved in-situ awaiting finalisation of future development opportunities for the field. **Figure 1-3** provides details of the 'as-left' infrastructure without mooring/anchor chains.

Puffin crude has an API Gravity of 43.6°, wax content of 4.6(%m/m) and gas-oil ratio of approximately 100scf/bbl.

Figure 1-3: 'As-left' Development Infrastructure



1.2.2 Modification Activity Scope of Works

The modification scope of work is defined as follows:

- Mobilisation of vessel(s) for modification works (MSV *GeoSea*, one support vessel² and up to two (2) Anchor Handling Tugs³) during 4Q2010;
- **Stage 1** activities consists of cleaning subsea equipment for disconnection works; venting residual pressure from the Riser System; ROV and diving operations to set equipment up for disconnection activities; unbolting, sealing, capping and laying-forward the flexible gas-lift and production risers from the STP Buoy; disconnection of umbilical from Buoy and lay-down; system isolation and pressure testing and installation of a new Marker Buoy;
- **Stage 2** activities consist of set-up works for the STP Buoy removal activities and removal of the equipment from the field to a nominated delivery location; and
- **Stage 3**⁴ activities consist of setup works for STP Buoy mooring system removal and removal of the mooring system from the field.

² Vessel not yet determined

³ Vessel(s) not yet determined. Vessel(s) will be required for Stage 2 and Stage 3 activities.

⁴ Stage 3 works may be deferred until the Field Decommissioning Phase. Anchors and Mooring Lines may be left in-situ.

2 Description of the Receiving Environment

2.1 Environmentally Sensitive Locations

While no outstanding natural features are present within the Puffin Production Licence Area (AC/L6), sensitive and important habitats in the region such as intertidal coral reefs and Islands occur to the west. The closest of these is Cartier Island with shallow sub-tidal and intertidal habitats; and also Ashmore and Hibernia Reefs (DEH, 2002). These locations all have high conservation significance with the following 'proclaimed' conservation status:

- **Ashmore Reef** (*located approximately 120km west of Puffin wells*) is a declared National Nature Reserve given its significance as a major WA coral reef province; the presence of prolific migratory seabird rookeries; its breeding and feeding habitat for marine turtles; and its rich and diverse marine habitats which support the greatest number of marine species on the WA coast (including the world's greatest abundance and diversity of sea snakes);
- **Cartier Island** (*located approximately 80km west of Puffin wells*) reef and waters within a 4nm radius of the island have been declared a Marine Nature Reserve to be managed by the International Union for Conservation Value (IUCN) category 1A protected area;
- **Hibernia Reef** (*located approximately 105km north-west of Puffin wells*) is a less extensive (1,700ha) reef complex with a deep central lagoon and intertidal sand flats. Hibernia Reef currently has no formal vesting with either the State or Commonwealth Governments.

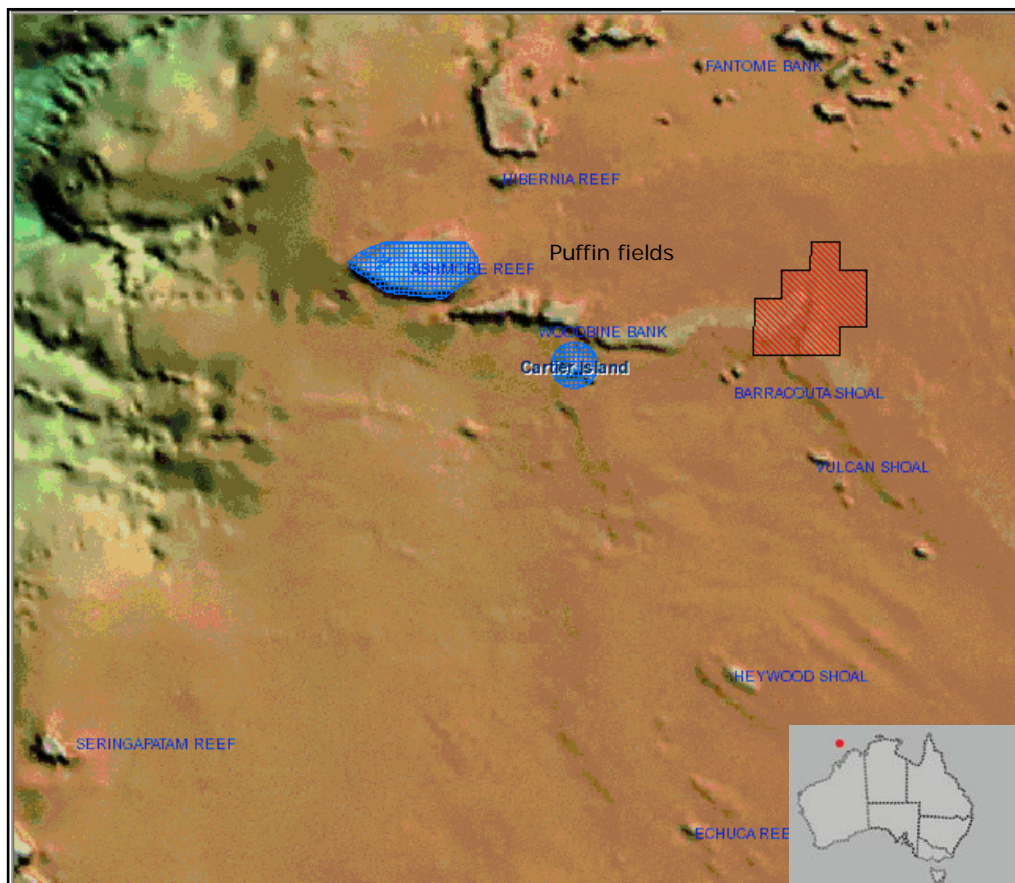


Figure 2-1 Environmentally Sensitive location around Puffin field (GA, 2009)



While there are no sub-tidal shoals or pinnacles occurring within the Puffin permit area, a number of shoals and banks are located to the west and south of the permit area including **Barracouta Shoal** (approx. 40km SW of the Puffin wells); **Vulcan Shoal** (approx. 50km S of the Puffin wells); **Goree Shoals** (approx. 60km S of the Puffin wells); **Woodbine Bank** (approx. 60-75km W of the Puffin wells); **Wave Governor Bank** (approx. 80-85km WSW of the Puffin-wells); and **Heyward Shoal** (approx. 130km S of the Puffin wells). Most of these shoals rise from approximately 150m depth to 10 to 15m below the sea surface.

2.2 Oceanography

The licence/permit area is located on the outer slope of the Australian continental shelf in water depths of 60-110m which dip gently northward toward the edge of the shelf. The Timor trough to the north of the area forms the outer boundary of the continental shelf with water depths up to 9000m. The bathymetry to the east of the development falls gently from approximately 80m to 115m and is generally flat to the west of the Puffin location.

Currents in the Timor Sea region are influenced by the Pacific-Indian Ocean *Throughflow* which transfers warm, low salinity waters from the western Pacific into the Indian Ocean. The *Throughflow* feeds the Southern Equatorial current which is the dominant westward water flow across the South Indian Ocean (Latitude: 8-15°S). The surface currents reflect seasonal wind regimes, predominantly E-NE in summer and W-SW in winter. Local surface currents may attain a speed of 0.6m/s during monsoon or trade surges however normal speeds are approximately 0.3m/s.

Tides in the Echo Shoals area, NE of the Sahul Shelf are semidiurnal, with a tidal range of 4m at springs and 1.8m at neaps. Tidal currents are expected to flow ENE, and ebb WSW in the upper 100m of water column, while flooding SE and ebbing WNW in the lower portion of the water column. Tidal current speeds in the region of 0.6m/s (springs) and 0.2m/s (neaps) are anticipated for the region.

Seawater temperatures measured at the Elang and Jabiru oil fields indicate well mixed surface waters ranging from 30°C (surface) to 26-27°C (seabed). During summer there is a weak thermocline with a decrease in temperatures of 3-4°C from the warmer surface waters to the cooler mid-depth to bottom waters. In winter, the upper 70m of water are isothermal, with no significant variation in vertical depth profile.

2.3 Meteorology

The climate of the Timor Sea is a tropical monsoonal climate which consists of a dry 'winter' from April to September and a wet 'summer' from October to March. During the 'winter', strong easterly to south-easterly trade winds blow almost continually at 15-20knots originating from the Australian mainland. Summer winds are steady, moist and blowing from the WSW to NW. Two transition seasons are evident in the region, the September/October transition when surface winds usually possess a westerly component; and the March/April Transition resulting in south-easterly winds. The area is subject to cyclonic activity between December and April. Severe cyclones with wind speeds exceeding 100km/hr occur on average once every 2.6 years.

Annual rainfall within the permit area is expected to be in the order of 1700mm with the majority of rainfall occurring between November and March. The average mean air temperature is approximately 28°C with little variation.



2.4 Fauna

Resident and migratory fauna, which includes fish, sharks, reptiles (sea-snakes and Turtles) and cetacean species have been observed at the Puffin Development. This includes:

- Cetaceans with an EPBC Act 'threatened' status are not expected to be common inhabitants of the permit/licence area, although a number have broad distributions around Australia. The EPBC database lists twenty-four cetacean species which may occur within 30km of the Puffin Development, seven which are protected under migratory provisions (Antarctic Minke Whale, Blue Whale, Bryde's Whale, Humpback Whale, Killer Whale, Sperm Whale, Spotted Bottlenose Dolphin) and two species having the threatened status of endangered (Blue Whale) or vulnerable (Humpback Whale).
- Six species of marine turtle are listed as threatened under the EPBC Act and are likely to occur in the permit/licence area. These species include the Loggerhead, Green, Olive Ridley, Leatherback, Hawksbill and Flatback Turtles. Ashmore Reef and Cartier Islet (all located more than 80km from the Puffin location) are known breeding areas for large numbers of turtles and some species may migrate through or forage in the Puffin area.
- One species of shark, the Whale Shark (*Rhincodon typus*) listed under the EPBC Act has a 'vulnerable' and 'migratory' status and possibly has habitat occurring in the region. The species has been observed in the waters around Ashmore Reef. However, the Puffin Field is not recognised as a seasonal aggregation site, where 'pulses' of food which attract the species, have been observed. The permit/licence area may also host an additional 30 listed fish species (including pipefish and seahorse species) and an additional two species EPBC-listed migratory shark include the Mako Shark (*Isurus oxyrinchus*) and Longfin Mako (*Isurus paucus*).
- There are no areas within the Puffin area which support seabird rookeries however substantial rookeries are known to exist to the west of the permit area at Ashmore Reef and Cartier Islet. The EPBC database lists one bird species as 'migratory' which may have habitat within 30km of the Puffin Development site, the Streaked Shearwater (*Puffinus leucomelas* & *Calonectris leucomelas*). This seabird, protected under the JAMBA, CAMBA and ROKAMBA Conventions, is pelagic but seeks shorelines for breeding. Migratory seabirds such as the Streaked Shearwater may pass through the area undertaking foraging activities, but given the lack of suitable roosting areas, sustained stays in the area are considered unlikely.

At the Puffin site, the soft substratum habitats are covered by relatively deep water (>60m). At such depths, light is limiting near the seafloor and will inhibit plant growth. While no benthic surveys have been performed at the Puffin site, regional benthic survey data available for soft-sediment benthic habitats show that while abundances of most taxa are low, there is high variability in species. Polychaetes and crustaceans are the most abundant taxa. Empty trochid shells and ostracod carapaces were abundant in the samples.

2.5 Other Marine Users

The Puffin Licence/Permit area is situated in a region recognized for offshore petroleum production and to a lesser extent commercial/traditional fishing. It is also near, but safely east of the major shipping channels between Australia and Southeast Asia.



Commercial fishing activities operating in the Permit/Licence area vary in scale from small Indonesian boats to large trawlers. Six commercial fisheries management area overlap the Puffin area. The commercial fisheries are:

- The Northern Demersal Scale Fishery (managed by Fisheries Western Australia);
- The Joint Authority Northern Shark Fishery – JANSF (jointly managed by the Australian Fisheries Management Authority [AFMA] and Fisheries Western Australia);
- The Northwest Slope Trawl Fishery (managed by AFMA);
- Southern Bluefin Tuna Fishery (managed by AFMA);
- Western Skipjack Fishery (managed by AFMA); and
- Western Tuna and Billfish Fishery (managed by AFMA).

AFMA have indicated that, from fishing log-book data, no commonwealth managed fishing vessels operate within the area and in general, fishing activities are small, non-intensive and utilise methods which accommodate working around petroleum activities.

Traditional and subsistence fishing is conducted over the shoals and seamounts along the north-west edge of the continental shelf of Australia and the emergent reefs of the Timor sea e.g., Hibernia and Ashmore Reefs and Cartier Island. Greater use of the Timor Sea is made by Indonesian shark fisherman. Home ports for their vessels include Papela and Delaba (Roti), Tablolong and Kupang (Timor) and Mola (Buton, Mollucas), with fishing activities conducted between April and December.

Commercial shipping channels between the North-Western Australian Ports (Port Headland, Dampier) and Indonesia/South East Asia are located approximately 210km from the Puffin Field. Vessel movements closer to the Puffin area include those of the 70,000+ and 90,000 DWT tankers servicing the Jabiru and Skua oilfields and smaller refined product carriers and coastal ships servicing Western Australian and Northern Territory ports.

Oil and Gas within the Timor Sea is highly prospective and includes world-scale projects such as the Bayu-Undan Gas Project and the Evans Shoals and Sunrise gas fields. Within the Bonaparte Basin, 68 petroleum accumulations have been identified and commercial production has occurred from 11 of these discoveries. The Puffin Field development is located approximately 80km (43nm) south west of the Jabiru and Challis FPSOs.



3 Major Environmental Hazards & Controls

A risk study has been undertaken for all aspects of the Riser Disconnection and STP Buoy Removal activity on the Puffin Field facilities in accordance with the requirements of ISO14001, AS4360:2004 Risk Management and HB203- Environmental Risk Assessment – Principles and Process. The study indicates that, with the proposed management/mitigation measures implemented, no significant environmental impacts are expected and the activities carry an inconsequential to tolerable residual risk level. Further details of key environmental aspects/impacts associated with the modification activity are provided in **Appendix A**.



4 Environmental Management

EPPL has overall control and responsibility for these modification activities to the Puffin Development and has engaged DOF Subsea (DOF) to manage the day-to-day modification activities. DOF are therefore responsible for ensuring that the activity is managed in accordance with legislative requirements, the accepted Environment Plan (EP) and all associated environmental constraints and procedures.

AGR Asia Pacific (AGR) is the nominated Operator for the Puffin Facilities under the *Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009* for the duration of these activities. As operator, AGR operates under an accepted Emergency Response Plan including Oil Spill Response arrangements and utilises the AGR Integrated Management System (IMS) to ensure systematic implementation of HSE requirements.

EPPL's Health, Safety & Environment (HSE) Policy serves as the pinnacle environmental management document for this activity and guides the development and implementation of AGR's IMS.

AGR's Integrated Management System (IMS) is certified to ISO 14001 and is supported by a set of Management System Standards (MSS) which provide a framework for the management of quality, health, safety and environment throughout AGR's operations and associated activities. The MSS takes into account system components such as:

- Operational structure to implement the IMS and MSS expectations;
- HSE hazards identification and risk management;
- System/activity audit and review;
- Training, awareness and competency needs; and
- Definition, documentation and communication of roles, responsibilities and authorities to facilitate effective environmental management.

Contractor(s) engaged for Puffin Field activities have been assessed utilising the AGR HSE Contractor Assessment Procedure to establish and resolve any inconsistencies, conflicts or system gaps, in accordance with the adopted IMS requirements.



5 Consultation Process

EPPL (and previously AED Oil) has consulted with regulatory agencies, fishery groups, fishing industry bodies over the Puffin Development phases. Regulatory agencies consulted include the Department of Environment, Water, Heritage & the Arts (DEWHA) (formally Department of Environment and Water Resources), NT Department of Resources (DoR), the Australian Maritime Safety Authority (AMSA), the Australian Fisheries Management Authority (AFMA), the WA Department of Fisheries and the NT Department of Fisheries.

EPPL has also consulted extensively with other marine user groups, predominantly commercial fishermen from the following industry groups/organisations:

- Commonwealth Fisheries Association (CFA);
- Northern Demersal Fishery;
- Shark Bay Trawler Association;
- WA Fishing Industry Council (WAFIC);
- Northern Territory Seafood Council;
- WA Northern Trawl Owners Association (WANTOA);
- Northern Fishing Companies Association;
- Raptis & Sons.

Consultation has been held with these parties during the initial development phase (June to September 2005), prior to facility installation and operational activity commencement (February-March 2007) and on a second round of drilling activity (2009). Most recently, fishing groups have been consulted on the 'non-production' phase activities (i.e. modification) of the Puffin Development.

EPPL has committed to continued and regular communications with relevant parties to minimise fishing impacts where possible and ensure that the relevant groups have been consulted on changes to the development strategy which may affect their operations.



6 Contact Details

Further information associated with the environmental and social impacts of the Puffin Field Development during these modification activities may be obtained from EPPL by writing to:

Steve Kanthan
General Manager – Projects and Operations
East Puffin Pty Ltd
Level 35, 525 Collins Street
Melbourne, VIC 3000



Appendix A: Risk Assessment Summary

Aspect/Activity	Impacts	Mitigation Measures	Residual Risk
Physical Presence of Vessels and Seabed Disturbance			
Physical Presence of Modification Vessels	Interference with shipping/fishing vessels (increased risk of collisions)	<ul style="list-style-type: none"> • Commercial shipping/fishing intensity low in the Puffin Field • Navigational lighting and continuous radio/radar surveillance • PSZ gazetted & Navigation Chart Identification • Notice to Mariners issued • Continued consultation/communication with fishing industry • Implemented OSCP/SOPEP 	Inconsequential
	Artificial light attracting marine species (behavioural impacts)	<ul style="list-style-type: none"> • Navigation lighting only (light spill minimised) • Affected species (cetaceans, turtles and birds) transient within Licence Area & not close to sensitive areas • Modification Activities temporary (4 weeks) 	Inconsequential
	Possible collision with marine mammals causing injury or death Disturbance to marine mammals/fauna (altered behaviour)	<ul style="list-style-type: none"> • Cetacean Sighting Forms to DEWHA • Observance of proximity distances contained within the <i>Australian National Guidelines for Whale & Dolphin Watching (2005)</i> • Fauna avoidance due to noise impacts from vessel • Vessel Environmental Induction 	Inconsequential



Aspect/Activity	Impacts	Mitigation Measures	Residual Risk
Infrastructure Removal & Installation Activity	Disturbance to seabed	<ul style="list-style-type: none"> • Vessel on DP while in licence area (no anchoring impacts expected) • Pre-installation survey to un undertaken for new infrastructure; • Installation using approved Installation Procedures; • Use of certified crane operator, riggers and dogmen; • Certified crane and rigging inspected and maintenance; • Adherence to operational weather limitations; • Use of experienced and qualified marine crew; • Minimisation of lift over subsea infrastructure; • Localised/temporary impacts only • Seabed substrate consists of sand/gravel allowing for rapid re-colonisation for disturbed areas 	Inconsequential
	Impacts to Marine Benthic and Pelagic Biota	<ul style="list-style-type: none"> • Endemic species colonisation over local area • Puffin Field to be removed in accordance with the requirements of the OPGGSA at the end of field life • Small area impacted (on a temporary basis) 	Inconsequential
Modification Discharges to Marine Waters			
Release of Cleaning Debris	Water Quality Impacts (turbidity)	<ul style="list-style-type: none"> • Small volumes released • Cleaning undertaken with high pressure water • Rapid dispersion in Timor Sea environment 	Inconsequential
Release of Pressurised Riser Fluids	Water Quality Impacts (Toxicity) Impacts to marine Flora and Fauna	<ul style="list-style-type: none"> • Conservative estimate of 420litres fluid released (max) • Multi-treat 650 is low toxicity chemical • Puffin crude API 43.5° – readily evaporated and biodegraded • Readily dispersed in Timor Sea Environment • Puffin development distant from sensitive environmental resources • Activity monitored to limit possible impacts 	Inconsequential



Aspect/Activity	Impacts	Mitigation Measures	Residual Risk
Release of Hydraulic Fluid	Water Quality Impacts (Toxicity) Impacts to marine Flora and Fauna	<ul style="list-style-type: none"> • Small volumes released (approx 12 litres) • Trans-aqua is readily biodegradable, not expected to bio-accumulate & unlikely to harm aquatic organisms • Readily dispersed in the Timor Sea Environment 	Inconsequential
Release of System Test Fluids	Water Quality Impacts (Toxicity) Impacts to marine Flora and Fauna	<ul style="list-style-type: none"> • Small volumes <i>potentially</i> released (200litres) • Approved Leak Testing Procedures • Low toxicity chemicals utilised in testing activities • Readily dispersed in the Timor Sea Environment 	Inconsequential
Vessel Discharges to Marine Environment			
Ballast Water Discharge (all vessels)	Introduction of exotic species which colonise and create competition for local resources	<ul style="list-style-type: none"> • Puffin Field in deep water distant from sensitive resources • Observe AQIS <i>Australian Ballast Water Management Requirements</i> (2008) • AQIS Clearance Certificates • Ballast Exchange Records 	Inconsequential
Biofouling (all vessels)	Introduction of exotic species which colonise and create competition for local resources	<ul style="list-style-type: none"> • Puffin Field in deep water distant from sensitive resources • Statement of Compliance for International Anti-fouling Inspection Systems • Risk assessment in accordance with <i>National Biofouling Management Guidance for the Petroleum Production and Exploration</i> (2009) with all risk actions closed-out prior to mobilisation 	Inconsequential
Grey water/sewage disposal	Increased nutrients in surrounding marine waters on discharge Visual amenity impacts	<ul style="list-style-type: none"> • Sewage is treated in accordance with MARPOL 73/78 requirements (i.e. approved biological treatment). Macerated to particle size less than 25mm and disinfected prior to discharge. • Current ISPP Certificate • Equipment routinely inspected and maintained in accordance with Manufacturer's specifications • Low volumes and high dispersal/dilution in Timor Sea marine environment 	Inconsequential



Aspect/Activity	Impacts	Mitigation Measures	Residual Risk
Cooling Water	Toxicity impacts to marine flora & fauna (chemical impacts) Water Temperature increases	<ul style="list-style-type: none"> • Biofouling chemicals used are low toxicity • Highly dispersive Timor Sea environment • Cooling water segregated from all oil services • Seals checked and maintained on pumps 	Inconsequential
Oily water discharges from equipment spaces	Toxicity impacts to marine flora & fauna Reduction of water quality	<ul style="list-style-type: none"> • Oily water passes through an oil/water separator and treated to an oil-in-water content <15ppm (MARPOL 73/78 Annex 1) • Oily water discharged via a certified Oil-in-water (OIW) meter as per MARPOL 73/78 Annex 1 requirements (routinely calibrate) • Discharge stream alarmed and re-directed onboard for further treatment if quality is exceeded. • Equipment routinely inspected and maintained in accordance with Manufacturer's specifications • Separated oil store in dedicated tank for onshore disposal (refer <i>Special wastes</i>) • Activity recorded in the Oil Record Log (onboard) • Low volumes discharged and rapid dilution/dispersion in marine waters 	Inconsequential
Putrescible waste (food-scrap) discharges	Increased nutrients in surrounding marine waters on discharge Visual amenity impacts	<ul style="list-style-type: none"> • Waste macerated to less than 25mm particle size in accordance with MARPOL 73/78 and discharged below water line. • Macerator maintained in good condition and checked routinely • Low volumes discharged and rapid dilution/dispersion in marine waters 	Inconsequential



Aspect/Activity	Impacts	Mitigation Measures	Residual Risk
Deck Drainage	Toxicity impacts to marine flora & fauna Reduction of water quality	<ul style="list-style-type: none"> Chemicals are stored in designated areas with appropriate spill materials; Bunding (scuppers) is provided for areas where there is an increased risk of oil/chemical spill; High house-keeping standards are maintained; Drainage containment discharges are via an IMO approved meter meeting OIW concentration of 15ppm (MARPOL Annex 1). 	Inconsequential
Solid Non-biodegradable/Hazardous Waste (disposal onshore)	Toxicity impacts to marine flora & fauna Reduced water quality Visual amenity impacts	<ul style="list-style-type: none"> No solid/hazardous waste overboard (as per Garbage Management Plan) Clear waste identification, segregation, containment (in skips or sealed drums) and labelling; Waste storage areas are routinely inspected; Special waste disposed or recycled onshore (e.g. oils, and chemicals) Training and reinforcement to all crew (& other) personnel of waste management requirements (induction); Documented Disposal Records. 	-
Vessel Discharges to Air Environment			
Emissions from Combustion Sources: Engines	Reduction in air quality Aesthetic impacts of smoke Maximise Fuel Efficiency	<ul style="list-style-type: none"> Fuel consumption monitored Low combustion volumes generated and rapid dilution/dispersion in atmosphere Regular equipment monitoring and maintenance undertaken to ensure maximum efficiencies All emissions from marine utilities in accordance with MARPOL Annex VI Prevention of Air Pollution from Ships and the current IAPP 	Inconsequential



Aspect/Activity	Impacts	Mitigation Measures	Residual Risk
Vessel Noise			
Vessel Movement in Licence Area	Disturbance to marine mammals/fauna (altered behaviour)	<ul style="list-style-type: none"> • Australian National Guidelines for Whale and Dolphin Watching (DEWR, 2005) during manoeuvring and transit activity • Noise levels from vessels below levels where behavioural disturbances may be experienced. • Cetaceans/turtles will practice avoidance if noise levels too high 	Inconsequential
Accidental Releases (Non-Routine)			
Fuel transfer spill	Impacts on water quality and marine life	<ul style="list-style-type: none"> • Fuel transfer at sea will be undertaken in accordance with approved Bunkering Procedures • Constant supervision of activity with good communications established between vessels • Bund at fuel transfer point • Monitoring fuel level in tank and flowrates • Activity undertaken during appropriate sea-state conditions • All equipment is routinely maintained and inspected prior to bunkering activities • Suitable absorbent material is held on the vessel to cleanup small diesel spills; • Availability of implemented and tested SOPEP 	Inconsequential



Aspect/Activity	Impacts	Mitigation Measures	Residual Risk
Diesel spill due to vessel collision/grounding	Impacts on water quality and marine life Disruption to fishing activities	<ul style="list-style-type: none"> • AIS/Radar/VHF/Watch Keeping Procedures • Marine Safety Information warnings as per AUSREP System • Flares and ALDIS Lamp as per SOLAS • Navigational aids – lighting and foghorns • Ability to change heading and move off on DP • Grounding risk low due to distance from nearest landmass and lack of emergent landforms in the Licence area. • All spills >80 litres reported to NT DoR • Availability of implemented and tested SOPEP 	Inconsequential
Inhibited water/hydraulic fluid release from Puffin Subsea Equipment (<i>Dropped Objects</i>)	Toxicity impacts to marine flora & fauna Reduced water quality	<ul style="list-style-type: none"> • Certified crane operator, rigger and dogmen • Certified crane with rigging inspected and maintained • Operational weather limitations on lifting • Experienced and qualified marine crew • Lifting over subsea infrastructure is minimised • Lifts are monitored by ROV/Divers • Anchor removal at least 250m away from subsea infrastructure 	Inconsequential
ROV Hydraulic Oil Hose failure during operations	Toxicity impacts to marine flora & fauna Reduced water quality Visual amenity impacts	<ul style="list-style-type: none"> • Small volumes discharged (2 litres (max)) • Rapid dispersion in Timor Sea environment • Equipment routinely maintained and inspected prior to deployment subsea • Use of Pressure rated Hoses 	Inconsequential



Aspect/Activity	Impacts	Mitigation Measures	Residual Risk
Chemicals spills	Impact on water quality and marine life	<ul style="list-style-type: none"> • Small quantities of chemical are stored onboard • Chemicals are packaged & labelled in accordance with legislation • Crew members trained in the handling and PPE requirements of specific chemicals • Chemical storage areas securely contained and routinely inspected; • MSDSs are to be made available for all chemicals; • Spill kits to be provided in appropriate locations; • Availability of implemented and tested SOPEP. 	Inconsequential
Solid Non-biodegradable/Hazardous Waste (disposal onshore)	Toxicity impacts to marine flora & fauna Reduced water quality Visual amenity impacts	<ul style="list-style-type: none"> • No solid/hazardous waste overboard (as per Garbage Management Plan) • Clear waste identification, segregation, containment (in skips or sealed drums) and labelling; • Waste storage areas are routinely inspected; • Special waste disposed or recycled onshore (e.g. oils, and chemicals) • Training and reinforcement to all crew (& other) personnel of waste management requirements; • Documented Disposal Records. 	Tolerable
Loss of STP Buoy	Shipping Collision Hazard	<ul style="list-style-type: none"> • Pre-planning and defining tow route to avoid major commercial fishing lanes and possible other vessel conflicts; • Tow gear inspected and maintained; • Emergency tow wire attached as contingency; • Navigational aids; • Vessel watch to ensure buoy is attached; • Tow conditions are monitored (weather limitations); • Tow plan to affected Stakeholders • Reporting to AMSA (maritime hazard) if lost 	Tolerable

AC/L6 Puffin Field Modification – Riser Disconnection
Summary Environment Plan

