



**Browse Basin Offshore Drilling Campaign,
WA-424-P**

Environment Plan Summary

December 2013

Controlled Document No: A424-REG-PLN-598, Rev 0.

This page is intentionally blank

TABLE OF CONTENTS

1	OVERVIEW	2
	1.1 Proposed Activity	2
	1.2 Compliance	2
	1.3 Activity Schedule	2
	1.4 Location of the Activities	2
2	DESCRIPTION OF THE ACTIVITY	5
	2.1 Activity Overview	5
	2.2 Pre-Drilling Site Survey(s).....	5
	2.3 Drilling Operations.....	7
3	DESCRIPTION OF THE ENVIRONMENT	8
	3.1 Physical Environment.....	8
	3.2 Biological Environment.....	9
	3.3 Socio-economic Environment.....	9
4	ENVIRONMENTAL HAZARDS AND CONTROLS.....	12
5	MANAGEMENT APPROACH	13
6	CONSULTATION	23
7	OPERATOR CONTACT DETAILS.....	24
8	REFERENCES	25

FIGURES

Figure 1.1 Regional location map	3
Figure 1.2 Location of the proposed exploration well and survey areas within the permit area.....	4
Figure 2.1 Proposed geophysical survey transect lines	6
Figure 3.1 Environmental features in the vicinity of WA-424-P permit area	11

TABLES

Table 1.1 Location of the proposed exploratory well and survey locations (GDA 94, Zone 51).....	3
Table 5.1 Summary of credible environmental hazards and control measures to be applied during the surveys and drilling activity	14

1 OVERVIEW

1.1 Proposed Activity

CalEnergy Resources (Australia) Limited (CRA) proposes to undertake up to two geophysical and/ or geotechnical surveys and to drill a single exploratory well at the proposed Pryderi-1 well location within the Petroleum Permit area WA-424-P located in Commonwealth water within the Browse Basin.

Dependent upon rig availability, using a jack-up for the drilling activity may require both a geophysical and geotechnical survey and using a semi-submersible rig will likely require a geophysical site survey only.

1.2 Compliance

This Environment Plan (EP) summary has been prepared as per the requirements of Regulation 11 (7) and (8) of the Environment Regulations. This document summarises the Browse Basin Offshore Drilling Campaign, WA-424-P Environment Plan (EP), as partially accepted under Regulation 11(1) of the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* (Commonwealth) (Environment Regulations) by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

1.3 Activity Schedule

The drilling schedule is dependent upon rig availability and therefore may occur at any time throughout the year. Drilling is expected to take approximately 11-14 days duration, excluding weather downtime. Geophysical and geotechnical survey operations may take place over approximately 4-6 days per location and prior to drilling operations. The surveys may be undertaken at up to two locations (approximately 8-12 days in total for two locations).

The commencement and duration of the surveys and drilling activity will be dependent upon survey vessel and rig availability, operational constraints and favourable metocean conditions. As such, this EP has been structured around activities that may potentially occur at any time of the year.

1.4 Location of the Activities

The proposed activities will occur in Permit Area WA-424-P located in Commonwealth waters in Western Australia (WA). The Permit Area is located within the Browse Basin, approximately 425 km north-east of the regional population centre and port at Broome (Figure 1.1). The closest landfall to the permit boundary is approximately 75 km to the south-east in the Kimberley region on the WA coastline.

The primary survey will occur prior to drilling the exploration well, 'Pryderi-1' with a second possible site survey to be conducted in the area surrounding either the 'Mathonwy-A' or 'Taliesin-A' location (Table 1.1 and Figure 1.2).

Table 1.1 Location of the proposed exploratory well and survey locations (GDA 94, Zone 51)

Exploratory Well/Survey Location		Longitude			Latitude		
		Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
Pryderi-1	Exploratory Well/Survey location	124	03	43.49	14	35	38.77
Mathonwy-A	Possible survey location	124	00	06.56	14	31	46.06
Taliesin-A	Possible survey location	124	01	25.79	14	31	20.65

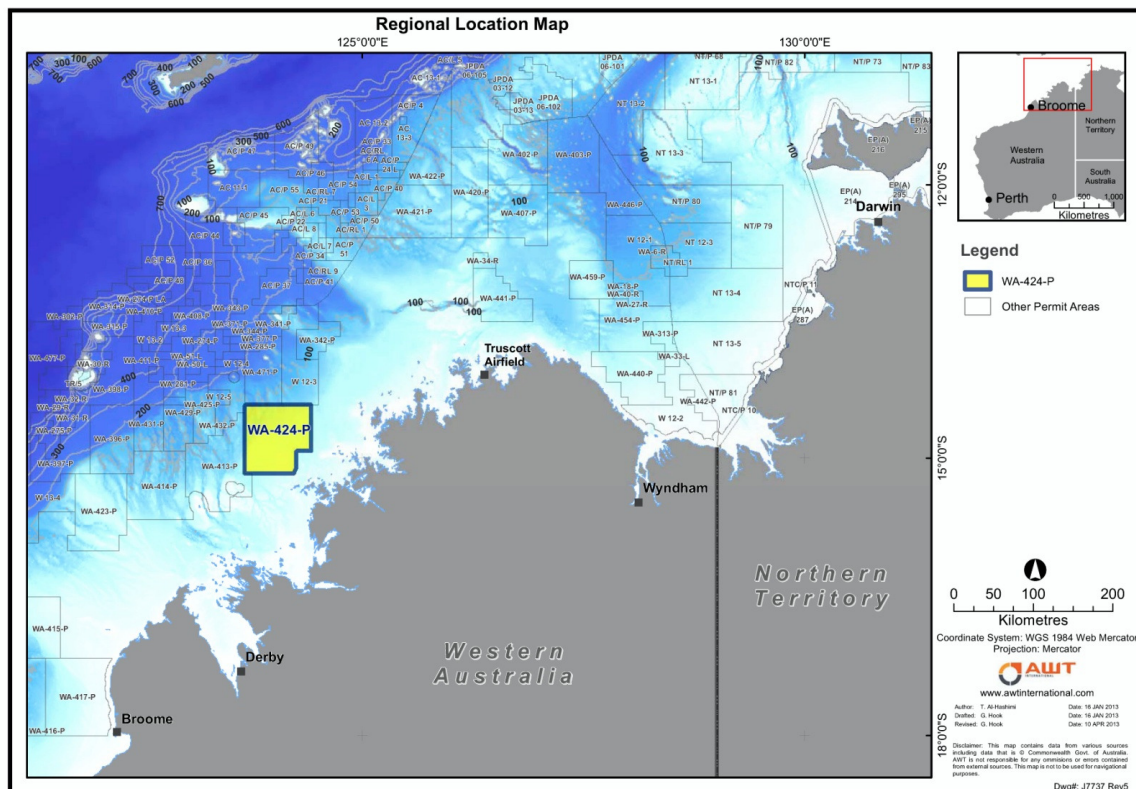


Figure 1.1 Regional location map

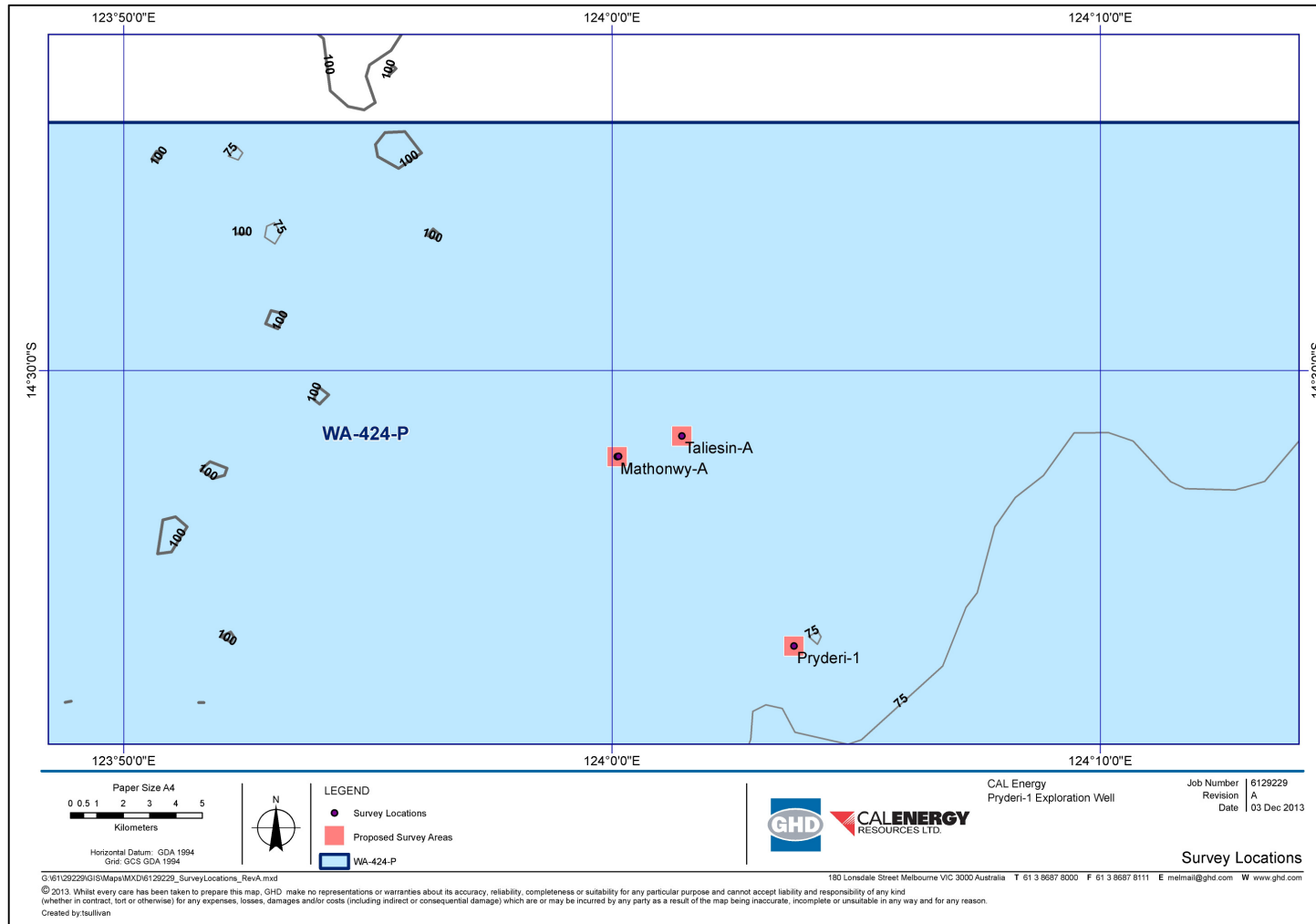


Figure 1.2 Location of the proposed exploration well and survey areas within the permit area

2 DESCRIPTION OF THE ACTIVITY

2.1 Activity Overview

The primary survey will occur in the area surrounding the proposed 'Pryderi-1' exploration well with a second possible site survey conducted in the area surrounding either 'Mathonwy-A' or 'Taliesin-A' well location (Figure 1.2 and Figure 2.1). Either a jack-up mobile offshore drilling unit (MODU) or a semi-submersible MODU may be used for the proposed drilling operation. In each potential scenario, varying surveys are required.

2.2 Pre-Drilling Site Survey(s)

2.2.1 Jack-up MODU

Where a jack-up MODU is contracted for the proposed drilling campaign, both geophysical and geotechnical (drop core) surveys may be required prior to mobilisation of the MODU to site. If undertaken, the geophysical survey will be carried out over an area 1 x 1 km with transect lines spaced 100 m horizontally and cross lines every 250 m (Figure 2.1) centred on the Pryderi-1 location (if an optional survey is undertaken it will be of the same survey design as per Figure 2.1 but centred on the Mathonwy-A or Taliesin-A well location as per Table 1.1).

Geophysical survey components may consist of the following survey types:

- High resolution sub-bottom profiler to determine shallow and surface geology.
- Bathymetric survey.
- Multi-beam bathymetric system – mapping water depths.
- Side-scan sonar or high resolution multi-beam echo sounder – delineating seabed features and identifying any seabed hazards.
- Grab samples – one sample at each survey location. Some analysis of samples of physical parameters will be carried out on the vessel should, with further detailed analysis to be carried out as directed by the Operator, and at a NATA approved laboratory.

The geotechnical survey for the jack-up is required to determine the shallow and surface geology/sediments at each survey location and verify side-scan sonar interpretation. Survey components may comprise taking:

- Core penetration tests (CPTs) – three at each survey location at an approximate spread to represent locations of the jack-up footing. CPT depth will be to 30 m or 2.5 times spud can penetration, or until refusal.

- Boreholes - One borehole at each survey location drilled to approximately 30 m depth and adjacent to one of the CPT locations. Boreholes may be drilled from either a seafloor mounted unit (footprint of 2.5 x 2.5 m) or directly from a drill rig on the survey vessel.

Pre-loading of the jack-up legs on arrival at the well location may be required in the event that the geotechnical survey results report less than favourable conditions for the MODU.

2.2.2 Semi-submersible MODU

In event that a semi-submersible is selected, a geophysical survey may be required to satisfy pre-drill requirements, but not a geotechnical survey. If undertaken, the geophysical survey will be conducted in advance of mobilisation of the MODU into the permit area to ensure suitable seabed conditions exist for anchoring. The geophysical survey will be carried out over a larger area than the geotechnical survey in order to accommodate for MODU anchoring requirements; i.e. 3 x 3 km grid with transect lines spaced 100 m horizontally and cross lines every 500 m is anticipated (Figure 2.1).

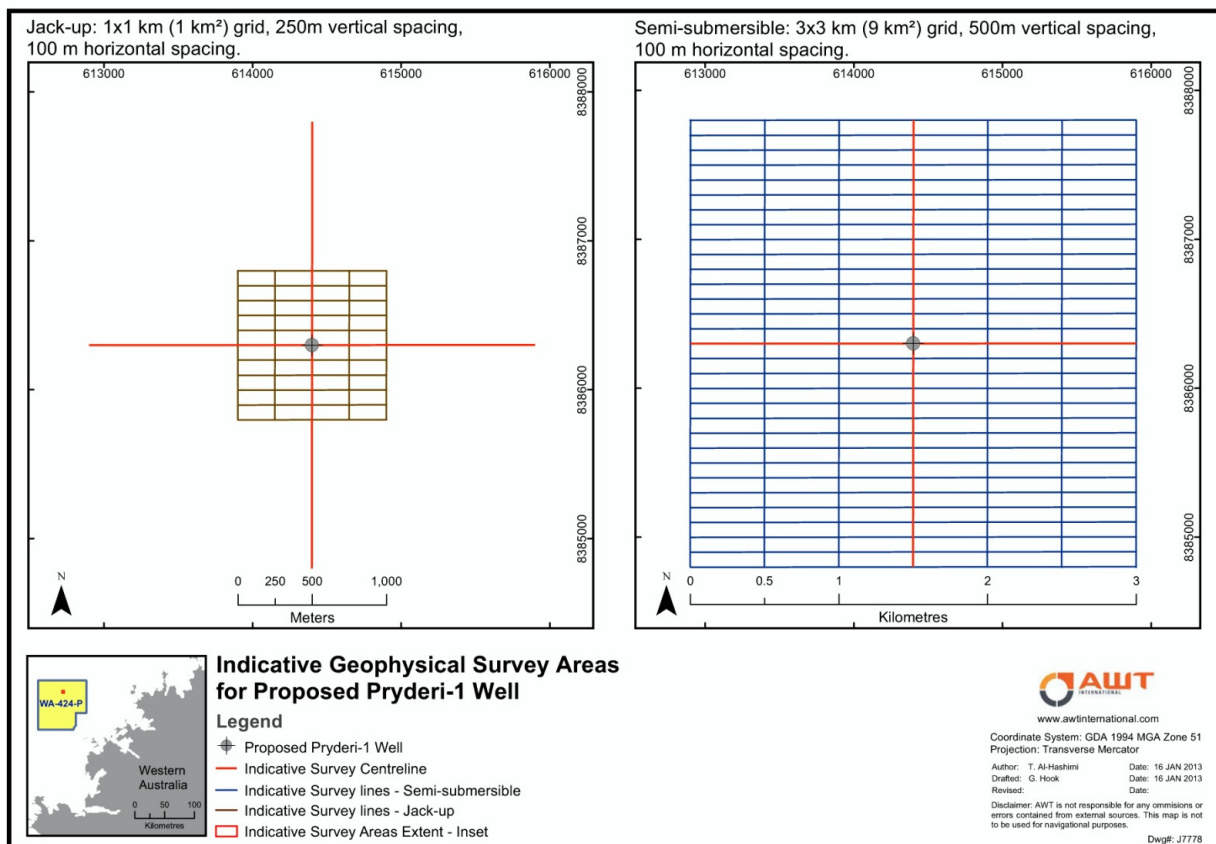


Figure 2.1 Proposed geophysical survey transect lines

2.3 Drilling Operations

The drilling schedule for drilling the Pryderi-1 exploration well is dependant upon rig availability. Drilling is anticipated to take between approximately 11-14 days.

The rig will be supported by a minimum of two support vessels for the duration of the drilling campaign. Another third vessel may be spot-hired as a standby vessel to provide operational support.

3 DESCRIPTION OF THE ENVIRONMENT

3.1 Physical Environment

The WA-424-P permit area lies within the North-West Shelf Marine Bioregion (within the Kimberley Shelf sub-region of North Western Australia. The province is characterised by a dynamic oceanographic environment, influenced by strong tides, cyclonic storms, long-period swells and internal tides.

The region is dominated by the Indonesian Throughflow, which brings warm, low-nutrient, low-salinity water from the western Pacific Ocean through the Indonesian Archipelago to the Indian Ocean (SEWPaC, 2012). Mean sea surface temperatures in the region range between 22 °C in winter and 28 °C in summer (DEWHA, 2008).

During the summer months the north of the region is subject to onshore winds while the region's south experiences strong southerlies. During winter the winds are moderate in the south and are generally offshore in the north. Tropical cyclones typically occur between the months of November to April.

Wave climate in the region is composed of locally generated wind waves and swells propagated from distant western areas. Wind generated waves run mostly in the direction of the prevailing wind. In summer, waves generally approach from the west and southwest and in winter, from the south and east. Mean wave heights are less than 1 m and peak wave heights less than 2 m. During rare tropical cyclones, significant wave heights of up to 5 m can be generated; however the frequency of swells exceeding 2 m is less than 5%.

Large internal waves are experienced in the region as a result of pronounced temperature differences in the water column (i.e. where the warm, low salinity waters of the Indonesian Throughflow overlay colder, more saline, deeper ocean waters), with wave heights of up to 75 m (DEWHA, 2008) recorded.

The Kimberley region has some of the largest tidal ranges in the world. Tides are semi-diurnal (two high tides and two low tides each day) and generally quite large; up to 10 m during spring tides and less than 3 m in the neap tides for the Kimberley region (DEWHA, 2008).

The region is influenced by a complex system of ocean currents that change between seasons and between years, with surface currents exerting a strong influence. Dominant currents in the region include: the South Equatorial Current, the Indonesian Throughflow; the Eastern Gyral Current and the Leeuwin Current.

The WA-424-P permit area is situated on the continental shelf, within the area known as the 'middle shelf', i.e. where water depths range between 30 and 200 m, with the proposed exploration well located in approximately 80 m of water.

3.2 Biological Environment

The benthic habitats within the permit area are likely to include a range of sands and gravels on the shelf, to muds on the slope and abyssal plain (Baker *et al.*, 2008). These substrates are thought to support low density benthic communities of bryozoans, molluscs and echinoids (DEWHA, 2008). Sponge communities are also sparsely distributed on the shelf, and are found only in areas of hard substrate. Seabed surveys conducted over the Ichthys gas field (WA-285-P permit area), recorded populations of filter-feeding communities of sponges, gorgonians (sea whips and sea fans), soft corals, hydroids, bryozoans, fan worms and other polychaetes (INPEX, 2010).

Within the Permit Area there are no shorelines or other emergent features, however in the surrounding area, a range of benthic environments are present, which include coral reefs, macroalgae and seagrass beds and hard substrates with epiflora and fauna. These habitats exist extensively throughout the NWS area in the fringing areas of land masses, including many of the islands and shoals.

Areas of coral reef that are notably large or diverse include that at Ashmore Island (approximately 272km NW of Pryderi-1 location), Camden Sound Marine Park (approximately 70km South), Cartier Island (approximately 227km NW), Hibernia Reef (approximately 297km N), Maret Islands (approximately 101km E), Scott Reef (approximately 234km W) and Seringapatam Reef (approximately 237km NW). Areas of notable seagrass beds include that around Ashmore and Cartier Island that in turn support other fauna including dugongs and seasnakes.

Using the online Protected Matters Search Tool (PMST), a search of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Database was conducted within a 10 km radius of the proposed Pryderi-1 well location. The identified 51 listed marine species and 10 whales and other cetaceans. Of these listed species, 9 threatened species (endangered or vulnerable) of marine fauna were identified, 17 of which are also migratory species. The species listed, or habitat important for these species, may occur within the area.

3.3 Socio-economic Environment

3.3.1 Commercial Fisheries

There are five Commonwealth managed commercial fisheries with licences to operate within or in the vicinity of permit area WA-424-P, with only the Western Tuna and Billfish Fishery that has recorded any recent activity in the area. These include:

- Western Skipjack Tuna Fishery
- Western Tuna and Billfish Fishery
- Southern Bluefin Tuna Fishery

- North-West Slope Trawl Fishery
- Northern Prawn Fishery

WA State Fisheries

There are 10 State managed commercial fisheries with licences to operate within or in the vicinity of permit area WA-424-P and include:

- Mackerel Managed Fishery
- Pearl Oyster Managed Fishery
- Northern Demersal Scalefish Fishery
- Kimberley Prawn Fishery
- North Coast Shark Fishery
- Kimberley Gillnet and Barramundi Managed Fishery

3.3.2 Petroleum Exploration and Production

The Browse Basin currently contains no petroleum production facilities, but is the subject of new developments in this area. The nearest projects are the Ichthys Gas Field Development (in construction), within WA-285-P being developed by INPEX Browse Ltd (INPEX). This project is located approximately 100 km north-west of the proposed Pryderi-1 location.

The Browse LNG Development proposes to commercialise the Browse Joint Venture's three gas and condensate fields: Brecknock, Calliance and Torosa, located 426 km off the Kimberley coast. The proposed Browse LNG Project in WA-28-R, WA-29-R, WA-30-R and WA-31-R is located approximately 240 km west of the proposed Pryderi-1 well location.

3.3.3 Shipping

The ports of northwest Australia (Onslow, Dampier, Cape Lambert, Port Hedland and Broome) handle large tonnages of iron ore and petroleum exports, resulting in very busy shipping routes through the area. There are no known commercial shipping lanes that traverse through the permit area. The Australian Maritime Safety Authority (AMSA) advised through the consultation process that the west coast shipping route passes to the west of the WA-424-P permit; however though traffic along this route is not heavy (*AMSA Maritime Operations, pers comm.*).

3.3.4 Recreational Activities

There are no known recreational activities conducted within the Permit Area.

3.3.5 National Heritage

There are no known or recorded indigenous or non-indigenous archaeological or maritime heritage sites located within the permit area.

3.3.6 Commonwealth and State Marine Parks and Reserves

The Permit Area overlaps the Kimberley Commonwealth Marine Reserves ‘multiple use zone’ in which oil and gas operations may be permitted and are subject to referral under the EPBC Act. The proposed drilling campaign was referred under the Act in December 2011, and the assessment decision received was that the activity is ‘not a controlled action if undertaken in a specific manner’.

The proximity of other marine protected areas to the Permit Area are illustrated in Figure 3.1.

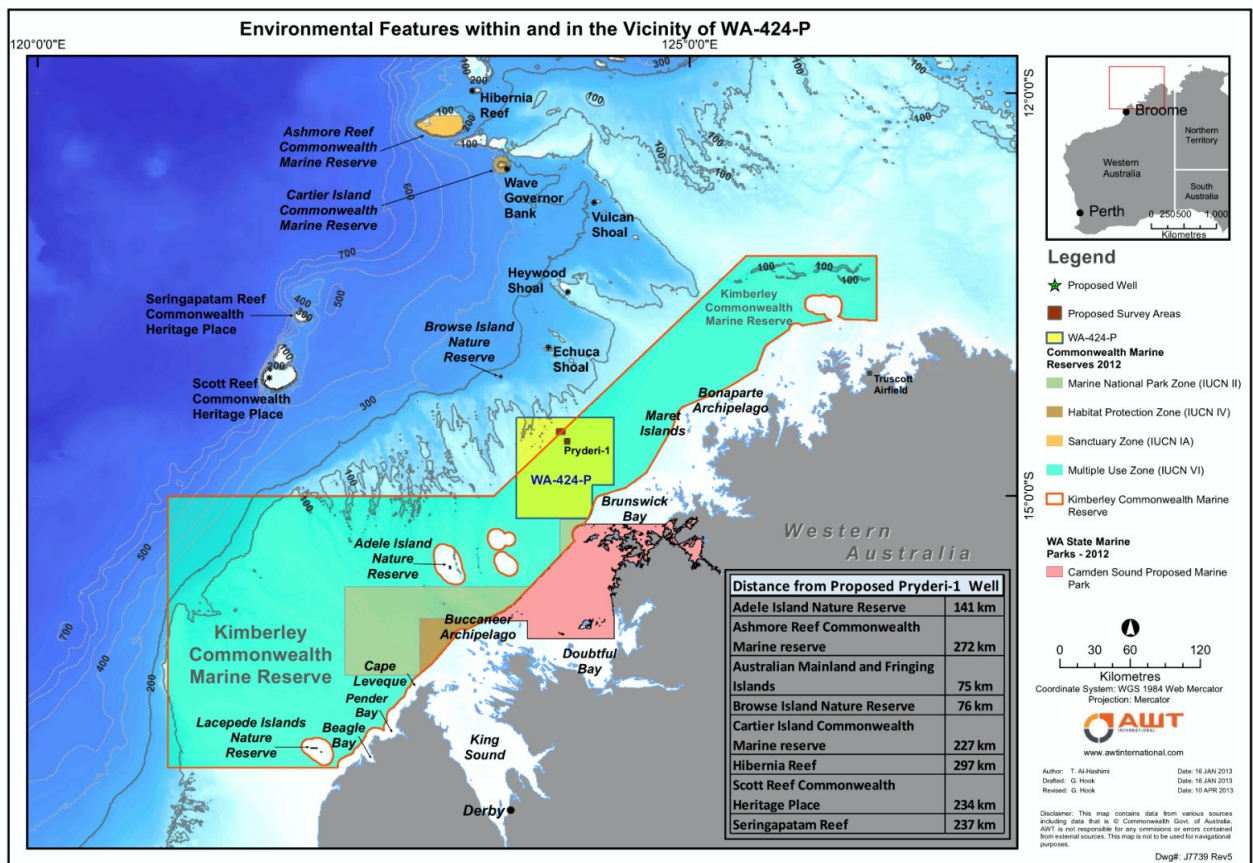


Figure 3.1 Environmental features in the vicinity of WA-424-P permit area

4 ENVIRONMENTAL HAZARDS AND CONTROLS

CRA undertook environmental risk assessment workshops to understand the potential environmental risks associated with the site surveys and drilling activity to ensure they are conducted in a manner that will reduce the risks and impacts to marine sensitivities to As Low As Reasonably Practicable (ALARP) and be of an acceptable level.

A summary of credible environmental hazards, risks and control measures to be applied during the surveys and drilling are shown in Table 5.1.

5 MANAGEMENT APPROACH

The petroleum activity will be managed in compliance with all measures and controls detailed within the EP accepted by NOPSEMA under the OPGGS(E) Regulations, other environmental legislation and CRAs Management System (CER EHSMS).

The objective of the EP is to ensure that potential adverse environmental impacts associated with routine operational events and unplanned events associated with the survey and drilling activity, are identified and assessed and to stipulate mitigation measures to avoid and/or reduce any adverse impacts to the marine environment to ALARP.

The EP details specific performance objectives, standards and procedures, and identifies the range of controls to be implemented (consistent with the standards) to achieve the performance objectives. The EP also identifies the specific measurement criteria and records to be kept to demonstrate the achievement of each performance objective.

As described in the EP, the implementation strategy includes the following:

- Identification of environmental risks (both CER Group and operational level).
- Assessing and ranking the risks associated with operations and activities.
- Definition, implementation and maintenance of a structured system of controls.
- Monitoring the effectiveness of the process, and identifying areas for improvement.

Key roles and responsibilities, training and competencies, reporting requirements (recordable and reportable) monitoring, auditing, management of non-conformance and review, incident response, record keeping and consultation of the activity are also detailed within the EP.

Table 5.1 Summary of credible environmental hazards and control measures to be applied during the surveys and drilling activity

Source of Hazard	Potential Environmental Impact	Preventative Control/Mitigation Measure
<i>Physical Presence</i>		
Seabed Disturbance	<p>Temporary loss/displacement of benthic habitat and associated biota in the direct footprint of the anchors and chain.</p> <p>Disturbance to marine archaeology (i.e. shipwrecks).</p>	<p><u>Preventative Controls:</u></p> <ul style="list-style-type: none"> Any shipwrecks found will be reported to the Maritime Heritage Office and WA Museum. Identification of seabed topography based on offset well data and geophysical survey data. For semi-submersible rig option anchoring pattern design configured to minimise anchor and chain drag. Vessels do not plan to anchor. <p><u>Mitigation Controls:</u></p> <ul style="list-style-type: none"> Support vessels will deploy and retrieve rig anchors to minimise drag. All vessels and rig to comply with anchoring procedures.
Underwater Noise (General)	<p>Injury to hearing or other organs. Hearing loss may be temporary (temporary threshold shift (TTS)) or permanent (permanent threshold shift (PTS)).</p> <p>Masking or interfering with other biologically important sounds (including vocal communication, echolocation, signals and sounds produced by predators or prey).</p> <p>Disturbance leading to behavioural changes or displacement of fauna.</p>	<p><u>Preventative Controls:</u></p> <ul style="list-style-type: none"> Vessel and rig machinery will be maintained in accordance with the manufacturer's maintenance specifications to reduce noise emissions to the marine environment. Crew members with given responsibilities for marine fauna observation on vessels. Staff to be inducted in appropriate cetacean interaction. Cetacean sighting forms will be completed and provided to the Department of Environment (DoE). Helicopter operations to maintain flight height of greater than 150 m, (500 m over the Camden Sound Marine Park 'Special Purpose Zone (whale conservation), above water until the petroleum operations exclusion zone (500 m) is reached. The Australian Guidelines for Whale and Dolphin Watching (DEWHA, 2005) for sea-faring activities will be implemented for vessels including: <ul style="list-style-type: none"> Caution zone (300 m either side of whales and 150 m either side of dolphins) – vessels must operate at no wake speed in this zone. No approach zone (100 m either side of whales and 50 m either side of dolphins) – vessels should not enter this zone and should not wait in front of the direction of travel or an animal or pod. <p><u>Mitigation Controls:</u></p> <ul style="list-style-type: none"> None

Source of Hazard	Potential Environmental Impact	Preventative Control/Mitigation Measure
Underwater Noise (Vertical Seismic Profiling- Drilling Activity Only)	Disturbance or physical damage to cetaceans and other marine fauna	<p><u>Preventative Controls:</u></p> <ul style="list-style-type: none"> VSP operations will be consistent with the Commonwealth conditions attached to the EPBC Act Referral decision [2011/6222] and EPBC Act Policy Statement 2.1 (DEWHA, 2011). Crew members with given responsibilities for marine fauna observation on rig and vessels; particularly prior to drilling and VSP activities. Cetacean sighting forms will be completed and provided to the DoE. <p><u>Mitigation Controls:</u></p> <ul style="list-style-type: none"> VSP will last no longer than 12 hours
Artificial Lighting	Disorientation, attraction or repulsion. Disruption to natural behavioural patterns and cycles.	<p><u>Preventative Controls:</u></p> <ul style="list-style-type: none"> Lighting on the vessels and rig is in accordance with maritime safety regulations/standards. Where practicable, lighting will be limited to minimum required for safe operation. <p><u>Mitigation Controls</u></p> <ul style="list-style-type: none"> Lights will be switched off or directed away from the ocean wherever practicable and safe to do so.
Interference with Other Marine Users	Risk of fishing gear snagging, particularly demersal trawl gear, and disruption of commercial shipping.	<p><u>Preventative Controls:</u></p> <ul style="list-style-type: none"> Establishment and enforcement of 500 m petroleum operations exclusion zone around the rig Standby/support vessels will patrol the safety exclusion zone around the rig Lighting on the vessel and rig are in accordance with maritime safety regulations/standards. The vessels personnel are trained, experienced and competent in watch keeping. Vessels maintain 24-hour visual, radio, vessel radar watch. Notice to Mariners providing timing/duration, location (co-ordinates) and description of planned activities to be issued by the Australian Hydrographic Office. Notification to the relevant regulatory bodies (i.e. DoE, Australian Management Authority and the WA Department of Fisheries), the appropriate maritime safety authorities, commercial fishers and other marine users to inform them of the location coordinates, footprint of well head and elevation above the seabed if remaining after operations cease. Stakeholder consultation has commence with appropriate maritime safety authorities, commercial fishers and other marine users and will be on-going prior to, during and after drilling, in accordance with Stakeholder Consultation Plan <p><u>Mitigation Controls:</u></p> <ul style="list-style-type: none"> None
Routine Discharges		

Source of Hazard	Potential Environmental Impact	Preventative Control/Mitigation Measure
Drill Cuttings and fluids (drilling activity only)	Localised burial/smothering of benthic communities. Localised decline in sediment quality Localised temporary increase in turbidity within the water column. Toxicity to marine fauna.	<u>Preventative Controls:</u> <ul style="list-style-type: none"> • Well designed to minimise the generation of drill cuttings and fluids within the technical constraints of achieving the well's objectives and target depth safely. • Routine sampling of WBM carried out every 12 hours while in operation. • Mud logging unit to record mud tank volumes and are maintained in accordance with manufacturer's specifications. • Mud volumes and sampling results reported in Daily Operations Report. <u>Mitigation Controls:</u> <ul style="list-style-type: none"> • Use of water-based non-toxic muds. • Mud designed to disperse the cuttings materials.
Cement Slurry (drilling activity only)	Localised burial/smothering of benthic communities Localised decline in sediment quality	<u>Preventative Controls:</u> <ul style="list-style-type: none"> • Cement slurry discharge operations will be managed in accordance with the Drilling Program and WOMP, which require the volume of cement mixed will be accurately calculated to ensure only that which is necessary for drilling requirements is generated and subsequently discharged. <u>Mitigation Controls:</u> <ul style="list-style-type: none"> • Only chemicals on the Chemical Register will be used for this campaign.
General Non-hazardous and Hazardous Wastes	Localised decline in water quality. Potential injury to fauna if disposed overboard (e.g. ingestion of plastics or entanglement). Seabed disturbance resulting in localised loss of benthic habitat in footprint of dropped object.	<u>Preventative Controls:</u> <ul style="list-style-type: none"> • General non-hazardous and hazardous solid wastes will be managed in accordance with the project EHSMP and with MARPOL 73/78 Annex V requirements. • Wastes will be segregated at source into recyclable and non-recyclable wastes, and stored in designated containers for transport onshore to a recycling contractor, where practicable, or waste disposal site. • Hazardous wastes materials will be handled and stored in accordance with the corresponding MSDS and detailed in the Chemical Register. • A waste manifest will be maintained detailing types and quantities of waste transported ashore for disposal or recycling. • Staff induction will include waste preventative and mitigation controls practices. • All lifting equipment will be certified and have an up-to-date maintenance/service log. • Lifting and transfer procedure to be in place to minimise the risk of dropping objects. • Lifting and transfers will be undertaken by competent, trained rig and vessel crew. • Recording and reporting of any items lost overboard that were unable to be recovered in the Daily Operations Report. • Accidental release of waste to the marine environment is reported and investigated and corrective actions are implemented.

Source of Hazard	Potential Environmental Impact	Preventative Control/Mitigation Measure
		<p><u>Mitigation Controls:</u></p> <ul style="list-style-type: none"> Any spills or container malfunctions on board will be cleaned up as soon as practicable. Where practicable, material accidentally dropped overboard will be recovered.
Sewage and Sullage	<p>Localised nutrient enrichment of surrounding waters in offshore open ocean waters.</p> <p>Turbidity in the water column.</p>	<p><u>Preventative Controls:</u></p> <ul style="list-style-type: none"> Offshore disposal of sewage and sullage will be managed in accordance with MARPOL 73/78 Annex IV. <ul style="list-style-type: none"> Untreated sewage may be discharged at distances greater than 12 nautical miles (nm) from land (i.e. outside territorial waters). Sewage that has been treated, in accordance with MARPOL 73/78 Annex IV may be discharged within territorial waters but outside State/NT waters (i.e. >3 nm from land). The vessels and rig will use compliant Sewage Treatment Plants (STP) in accordance with MARPOL Annex IV. STPs will be maintained in line with the manufacturer's specifications. Persons-onboard do not exceed the maximum carrying capacity of the vessel's or rigs sewage system. <p><u>Mitigation Controls:</u></p> <ul style="list-style-type: none"> Any spills will be cleaned up and/or disinfected as soon as possible.
Putrescible Wastes	<p>Localised nutrient enrichment of surrounding waters in offshore open ocean waters.</p> <p>Turbidity in the water column.</p>	<p><u>Preventative Controls:</u></p> <ul style="list-style-type: none"> Disposal of food scraps and putrescibles will be managed in accordance with MARPOL 73/78 Annex IV. Vessels and rig will use an organic waste macerator compliant with MARPOL Annex IV. Macerators will be maintained in line with manufacturers' specifications. All cooking oils and greases will be collected, stored appropriately onboard and transported to an onshore registered facility for disposal. All non-food galley wastes will be bagged and transported ashore for recycling or disposal in accordance with <i>Environmental Protection (Controlled Waste) Regulations 2004</i>. <p><u>Mitigation Controls:</u></p> <ul style="list-style-type: none"> Food scraps and wastes will not be discharged within 3 nm of land. Instead putrescible wastes will be collected and transported onshore for disposal at a registered facility or disposed via maceration outside the 3 nm boundary. For the vessels and rig located >3 nm from land (i.e. outside State waters), food scraps will be macerated to a diameter of less than 25 mm prior to being disposed overboard.
Deck Drainage	<p>Localised decline in water quality in the immediate vicinity of the discharge.</p> <p>Turbidity in the water column.</p>	<p><u>Preventative Controls:</u></p> <ul style="list-style-type: none"> OIW separator shut off valve activates when concentration exceeds 15 ppm. Regular maintenance of OIW separator. Biodegradable wash down detergents used.

Source of Hazard	Potential Environmental Impact	Preventative Control/Mitigation Measure
		<ul style="list-style-type: none"> • Main deck drain scuppers closed in the event of a spill on deck. • Recovered oil recovered from the OIW separator will be returned to shore for disposal at a registered facility. • Daily inspections to ensure deck areas are clean of spillages and accumulations of oil, grease and chemicals. All spills and leaks are recorded and reported in Daily Operations Report. • Drainage and discharge overboard in accordance with MARPOL 73/78 Annex I. • Drainage water from areas that may be contaminated with traces of oil (e.g. bilge and machinery spaces) will be treated in an oil in water (OIW) separator. • Deck drains which contain rainwater only are directed overboard. • Minor oil/lubricant spills will be mopped up immediately with absorbent materials that will be disposed of onshore as hazardous waste in accordance with the Shipboard Oil Pollution Emergency Plan (SOPEP). <p><u>Mitigation Controls:</u></p> <ul style="list-style-type: none"> • None.
Cooling Water	<p>Thermal impacts to marine organisms.</p> <p>Localised decline in water quality with lowered dissolved oxygen concentrations due to elevated water temperature.</p> <p>Toxicity to marine biota due to biocides.</p>	<p><u>Preventative Controls:</u></p> <ul style="list-style-type: none"> • Cooling water system is maintained by qualified personnel in accordance with manufacturer's specifications. • MSDS will be available for any biocides used. <p><u>Mitigation Controls:</u></p> <ul style="list-style-type: none"> • Biocides will be kept to a minimum in accordance with manufacturer's specification. • No hydrocarbons will be present in the cooling water discharge.
Desalination Brine	<p>Localised increase in seawater salinity in the offshore open ocean environment.</p> <p>Toxic effects to marine biota due to use of anti-scalants.</p>	<p><u>Preventative Controls:</u></p> <ul style="list-style-type: none"> • Freshwater generation will be limited to volumes necessary to operate. • Potable water system is maintained by qualified personnel in accordance with manufacturer's specifications. • Freshwater generators maintained by qualified personnel in accordance with manufacturer's specifications. • MSDS available for anti-scalants used in dosing. <p><u>Mitigation Controls:</u></p> <ul style="list-style-type: none"> • None.
Atmospheric Emissions	<p>Minor deterioration of local and regional air quality due to emission of pollutants such as NO_x and SO_x.</p>	<p><u>Preventative Controls:</u></p> <ul style="list-style-type: none"> • All combustion equipment to be maintained in accordance with maintenance procedures. • All refrigeration equipment to be maintained in accordance with maintenance procedures.

Source of Hazard	Potential Environmental Impact	Preventative Control/Mitigation Measure
		<ul style="list-style-type: none"> No conventional drill steam or production testing will be carried out during drilling activities <p><u>Mitigation Controls:</u></p> <ul style="list-style-type: none"> Diesel used in vessels will have low sulfur content <4.5%. Equipment fuel consumption to be monitored daily. Reporting of atmospheric emissions as per regulatory requirements.
Non-routine events		
Introduction of Invasive Marine Species	<p>Over-predation of native flora and fauna;</p> <p>Out-competing of native flora and fauna;</p> <p>Human illness through released toxins;</p> <p>Depletion of viable fishing areas and aquaculture stock;</p> <p>Reduction of coastal aesthetics;</p> <p>Damage to marine and industrial infrastructure;</p> <p>Damage to vessel engines and propellers; and</p> <p>Reduction in vessel performance.</p>	<p><u>Preventative Controls :</u></p> <ul style="list-style-type: none"> Vessels and rig will adhere to all AQIS Guidelines on ballast water exchange and biofouling including: <ul style="list-style-type: none"> Australian Ballast Water Management (DAFF, 2011) and National Biofouling Management Guidance for Petroleum Production and Exploration Industry (DAFF, 2009) requirements. The vessels and rig to be in possession of current International Anti-fouling System Certificates. The vessels and rig to have gained AQIS clearance to enter Australian waters (if previously outside Australian waters). There is no planned exchange of ballast water within 12 nm of any coastline. <p><u>Mitigation Controls:</u></p> <ul style="list-style-type: none"> Reporting of a known or suspect IMS immediately
Collision with Marine Fauna	<p>Vessel collision with marine fauna such as cetaceans, whale sharks and turtles.</p> <p>Disturbance leading to behavioural changes or displacement of fauna.</p>	<p><u>Preventative Controls:</u></p> <ul style="list-style-type: none"> All marine mega fauna interactions will adhere to the Australian Guidelines for Whale and Dolphin Watching (DEWHA, 2005). <ul style="list-style-type: none"> Vessel speed limit restrictions will apply within exclusion zone. 'Caution Zone' of 300 m either side of whales and 150 m either side of dolphins Vessels to operate no wake speed in this 'Caution Zone'. 'No Approach Zone' of 100 m either side of whales and 50 m either side of dolphins; vessels should not enter this zone and should not wait in front of the direction of travel of an animal or pod of animals. Cetacean observations to be recorded on DoE cetacean sighting forms and returned to DoE.

Source of Hazard	Potential Environmental Impact	Preventative Control/Mitigation Measure
		<ul style="list-style-type: none"> • Helicopter flights will occur in daylight hours only (unless in the event of an emergency). • Scheduled flight paths to avoid roosting areas such as Lacepede Islands and Adele Island. <p><u>Mitigation Controls:</u></p> <ul style="list-style-type: none"> • Implementation of Cetacean interaction measures in accordance with the Environmental Induction. • Reporting of any collisions with cetaceans to DoE.
Chemical Spills	<p>Temporary localised decline in water quality.</p> <p>Temporary localised decline in sediment quality.</p> <p>Temporary minor toxicity to marine flora and fauna</p>	<p><u>Preventative Controls:</u></p> <ul style="list-style-type: none"> • All crew will be required to attend a basic induction identifying chemical management and spill prevention and response measures. • Chemicals will be labeled and segregated away from flammable sources and high traffic areas. • Chemicals and hydrocarbons will be packaged, marked, labeled and stowed in accordance with MARPOL 73/98 Annex I, II and III regulations. Specifically, all chemicals (environmentally hazardous) will be stored in appropriately banded areas and labeled. • Disposal of hazardous liquid wastes/chemicals will be at a registered onshore facility. • Up-to-date MSDS available onboard used and located in the Chemical Register. • Chemical storage areas will be frequently inspected. • Ship Oil Pollution Emergency Plan (SOPEP) response kits located throughout the vessel/rig and adjacent to chemical storage frequent use areas. The quantity of spill recovery materials will be appropriate to the quantity of chemicals stored onboard the vessel/rig. • Left-over bulk drilling solids (e.g., barite or bentonite) will be stored onboard and legally disposed of. <p><u>Mitigation Controls</u></p> <ul style="list-style-type: none"> • Chemical spills will be immediately cleaned up and contaminated material will be contained onboard for onshore disposal. All shipboard chemical and hydrocarbon spills will be managed in accordance with the SOPEP. • Management and response to spills entering the marine environment will be in accordance to procedures outline in the OSCP.
Aviation Fuel Spill (refueling- drilling only)	<p>Temporary localised decline in water quality.</p> <p>Temporary localised decline in sediment quality.</p> <p>Temporary toxicity to marine flora and fauna.</p>	<p><u>Preventative Controls:</u></p> <ul style="list-style-type: none"> • Maintenance and inspection of refueling system undertaken and recorded by appropriate trained or supervised personnel. • No refueling to be undertaken at night, except in the event of an emergency i.e. medevac. • Vessel Emergency Response Plan details procedures for jettison of fuel storage tanks in the event of an emergency. • Contractors selected in accordance with the Contractor Management Procedure to ensure contractors are appropriately experienced <p><u>Mitigation Controls</u></p>

Source of Hazard	Potential Environmental Impact	Preventative Control/Mitigation Measure
		<ul style="list-style-type: none"> • MODU SOPEP to include oil spill response measures. • Management and response to fuel spills will be in accordance with the procedures outlined in the OSCP and ERMP. • Relevant staff will be inducted and trained in spill response procedure and OSCP.
Diesel Spill (refuelling)	<p>Temporary localised decline in water quality.</p> <p>Temporary localised decline in sediment quality.</p> <p>Temporary toxicity to marine flora and fauna.</p>	<p><u>Preventative Controls:</u></p> <ul style="list-style-type: none"> • No refueling to take place at night (unless safety considerations take priority), or during weather conditions exceeding those identified as safe to refuel. • Refueling only to be carried out and supervised by competent personnel. • Regular equipment checks to include dry break couplings on all fuel lines. • Inspection of all hoses, valves and connections prior to use. • Tank levels will be continuously monitored to prevent overflow. • All vessels will have a SOPEP which includes oil spill response measures. <p><u>Mitigation Controls:</u></p> <ul style="list-style-type: none"> • Management and response to spills entering the marine environment will be in accordance to procedures outline in the Oil Spill Contingency Plan (OSCP) and Emergency Management Plan (EMP). • Relevant staff to be inducted and trained in spill response procedure and the OSCP.
Diesel Spills (Vessel Collision)	<p>Temporary localised decline in water quality.</p> <p>Temporary localised decline in sediment quality.</p> <p>Temporary toxicity to marine flora and fauna.</p>	<p><u>Preventative Controls:</u></p> <ul style="list-style-type: none"> • Notice to Mariners will be issued by the Australian Hydrographic Service with details on survey activities, coordinates and duration. • Establishment and enforcement of a 500 m petroleum operations exclusion zone around the rig. • Competent and experience vessel masters and crew to prevent collisions. • All vessels will have a SOPEP that includes oil spill response measures. • Relevant staff to be inducted and trained in spill response procedure and the OSCP <p><u>Mitigation Controls:</u></p> <ul style="list-style-type: none"> • Management and response to spills entering the marine environment will be in accordance to procedures outline in the OSCP and the ERMP.
Crude Oil, Loss of Well Control (drilling only)	<p>Toxic effects on marine biota and sensitive shorelines from hydrocarbons</p>	<p><u>Preventative Controls:</u></p> <ul style="list-style-type: none"> • Appropriate drilling fluid weight will be used specific to known or predicted reservoir pressure, and continually monitored during drilling. • Adherence to the following procedures: <ul style="list-style-type: none"> ○ WOMP (on commission of the MODU). ○ MODU Safety Case (on commission of the MODU). ○ Vessel Safety Case (on commission of vessels).

Source of Hazard	Potential Environmental Impact	Preventative Control/Mitigation Measure
		<ul style="list-style-type: none"> • Operational personnel inducted into the project EP and OSCP. • Well design and construction in accordance with the well design manual and pre-drill subsurface basis for well design (BfWD). • Blowout control equipment maintenance and testing in accordance with American Petroleum Institute (API) RP 57/64 and Department of Mines and Petroleum (WA) standards. • Relevant operations staff to be certified in well control practices i.e. IWSCA or WellCAP qualifications. • Drilling to be appropriately supervised. • Drilling will be limited to fair weather. • Well isolation barriers and well intervention procedures will be in place. • Establishment of a 500 m petroleum operations exclusion zone will be maintained around the MODU. • 'Drill well on paper' (DWOP) exercise conducted by operational personnel and major service providers prior to mobilisation. • Desktop Project Emergency Response exercise prior to mobilisation. <p><u>Mitigation Controls:</u></p> <ul style="list-style-type: none"> • Implementation of the OSCP including: <ul style="list-style-type: none"> ○ Appropriate training of selected CRA CMT, EMT and ERT personnel in oil spill response and management procedures. ○ Recording and reporting of description of spill, including spill characteristics, prevailing metocean conditions, current operating activities, estimate of volume. ○ Exercises to maintain heightened preparedness for spill response. ○ Management and response to spills entering the marine environment will be in accordance to procedures outline in the Oil Spill Contingency Plan (OSCP) and Emergency Response Management Plan (ERMP).

6 CONSULTATION

CRA's Stakeholder Consultation Plan (SCP) provides for continued and ongoing engagement with stakeholders throughout project planning and operations, and is described in detail in Section 8 of the EP. CRA will maintain communications with all relevant stakeholders prior to, during all operations to ensure that they are informed of the timing of operations, activities being undertaken and how the campaign may affect other users of the area and can contact CRA to discuss any concerns.

CRA has developed and implemented a stakeholder consultation program in line with NOPSEMA's requirements, contacting identified relevant authorities, persons and organisations to inform the preparation of the EP and OSCP. Notably, CRA's Joint Venture partner IPM WA424P Pty Ltd ('IPM') initiated consultation with stakeholders in 2011 as part of the preparation of the EP and OSCP. CRA became Operator in 2012 and since that time, CRA has re-engaged with previously and newly identified stakeholders to inform them of the status of the proposed drilling campaign and seek comment. This has included providing identified stakeholders with information and consultation brochures, regular correspondence, and personal follow-up telephone calls.

Overall, there have been no objections and few specific issues or concerns raised by stakeholders regarding the proposed activities at time of submission. Issues raised by government agencies and non-government organisations include the exact timing and location of operations, potential impacts on fishing operations and marine mammals. CRA has considered this feedback in the development of its management measures.

7 OPERATOR CONTACT DETAILS

Attention: Mr Travis Enman

Business Manager

CalEnergy Resources (Australia) Limited

Level 1, 12 St Georges Terrace

Perth WA 6000

Phone: (08) 6500 8500

Fax: (08) 6500 8599

Email: travis.enman@calenergyresources.com

8 REFERENCES

Department of the Environment, Water, Heritage and the Arts (DEWHA) (2008). The North-West Marine Bioregional Plan: Bioregional Profile: A Description of the Ecosystems, Conservation Values and Uses of the South-West Marine Region. Canberra: DEWHA. Available from: <http://www.environment.gov.au/coasts/mbp/publications/north-west/bioregional-profile.html>.

Department of Sustainability, Environment, Water, Population and Communities (SEWPaC), (2012). Marine bioregional plan for the North-west Marine Region. Commonwealth of Australia 2012.

INPEX (2010). Ichthys Gas Field Development. Draft Environmental Impact Statement. Inpex Browse Ltd. Perth.