Roc-1 Exploration & Appraisal Drilling Environment Plan Summary

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1. INTRODUCTION

Quadrant Energy Australia Pty Ltd (Quadrant) is the registered operator for Petroleum Production Licence WA-437-P. Quadrant Energy plan to develop the oil reserves of the Bedout Basin region in Commonwealth waters within permit area WA-437-P through drilling an exploration and appraisal well.

Quadrant Energy proposes to drill the Roc-1 exploration and appraisal well in this permit area using a mobile offshore drilling unit (MODU). The Roc-1 exploration well, located in the Bedout Basin, will be drilled to assess the lithology and presence of hydrocarbons in the Upper & Lower Barret, as well as the Locker formations

1.1 Compliance

The overall purpose of the *Roc-1 Environment Plan (EA-00-RI-10117)* (the EP) is to comply with statutory requirements of the Commonwealth Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (OPGGS (E) Regulations) and to ensure that the Activity is planned and conducted in line with Quadrant environmental policies and standards, including the corporate Environmental Policy. The EP was assessed and accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) on the 29th September 2015. This EP summary has been prepared in accordance with the requirements of regulation 11 (4) of the OPGGS (E) Regulations.

1.2 Activity Duration and Timing

The time required to drill the well is expected to vary from approximately 40 to 85 days. In the event that re-entry and well testing is undertaken (at a later date) an additional 40 days may be required, totalling up to approximately 125 days.

During the activity, operations will be 24 hours per day. The Activity is scheduled to commence in quarter four 2015 if required subsequent re-entry and well testing will be undertaken within 12 months.

2. ACTIVITY LOCATION

The Activity location is defined by petroleum permit WA-437-P (Operational Area) located within Commonwealth waters of the Bedout Sub-basin in the NW Shelf region of Western Australia.

The Permit Area is approximately 21 km from the nearest shoreline (Bedout Island), 61 km north from the closest mainland coast, 100 km from Port Hedland and 347 km from both Broome and 231km Karratha.

Table 2-1 summarises the proposed locations, approximate water depths and spudding dates of drill sites.

Table 2-1: Summary of drilling sites (proposed spud dates as of December 2014)

Well	Permit	Latitude	Longitude	Water depth (m)	Prop. Spud date
Roc-1	WA-437-P	18° 52' 53.517"S	118° 49' 02.139"E	100	October 2015

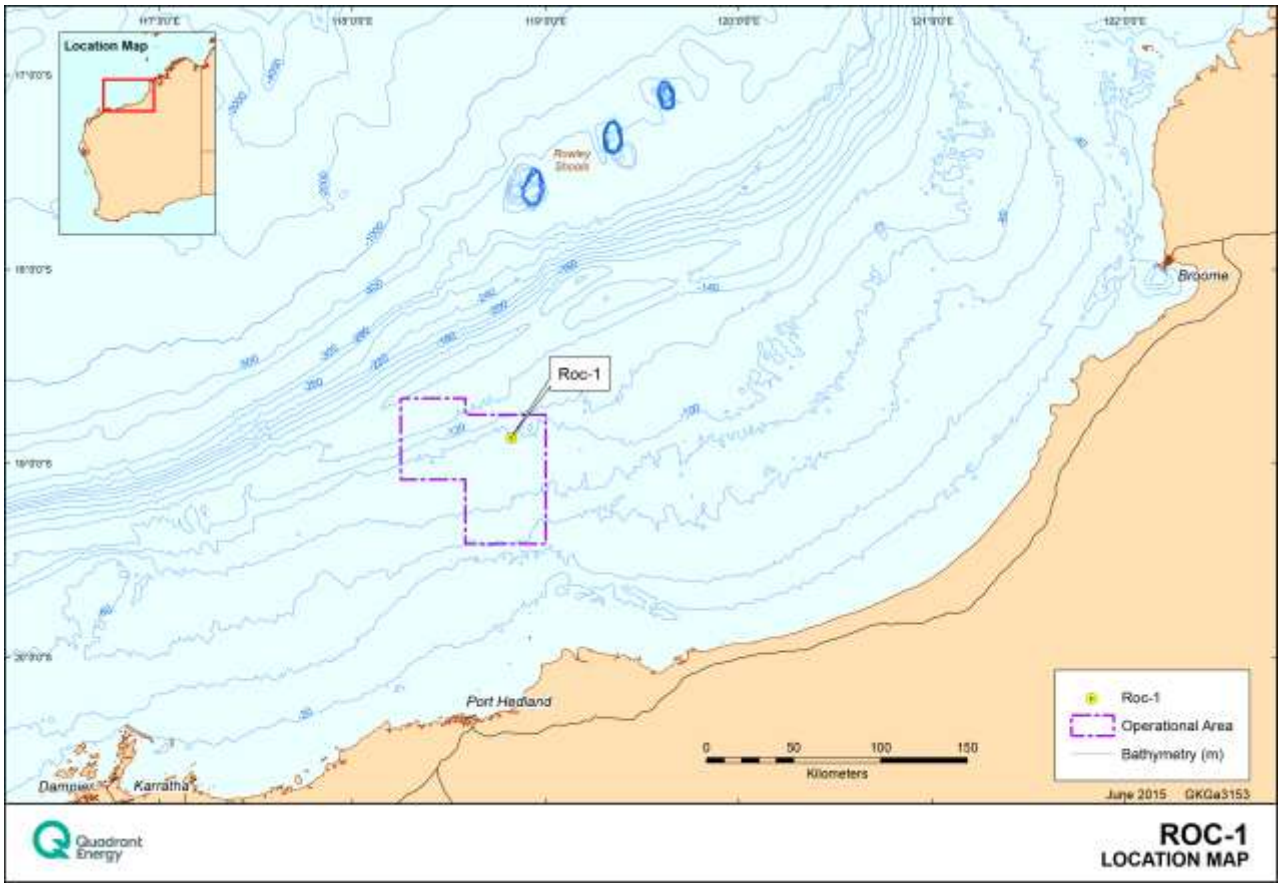

Figure 2-1: WA-437-P Permit area (Operational Area) showing proposed location of Roc-1 well.

3. DESCRIPTION OF THE ACTIVITY

3.1.1 Activities

The EP covers drilling, evaluating, completing, and abandonment activities related to exploration and appraisal drilling, namely:

- Drilling of top hole sections (riserless where assessed appropriate) including setting and cementing of casing strings;
- Installation of a blow-out preventer (BOP);
- Commencement of drilling of lower well intervals using Water Based Muds (WBM);
- Contingency use of Lost Circulation Materials as required;
- Installation of lower and upper completions, if applicable;
- Perforating operations and flowback/clean up, if applicable;
- Use of completion and production appraisal chemical (brines as required);
- Setting and cementing of additional casing strings if required;
- Wireline logging;
- Contingent Vertical Seismic Profiling (VSP);
- Contingent acquisition of core samples;
- Abandonment of exploration wells, or suspending[1], or handing well over to production teams;
- Periodic well testing (sampling, clean up, and flaring);
- Side tracking and/or redrilling sections of wells due to operational difficulties or scope change to acquire additional well evaluation data.

Activities that are not covered in the EP include but are not limited to installation, production and decommissioning activities as well as vessel based seismic surveys.

3.1.2 MODUs

Drilling is proposed to be undertaken using a Jack-up MODU which will remain at location (i.e. drilling site) for the duration of each of the activities.

3.1.3 Exploration and appraisal wells.

These well will be drilled in three sections: surface, intermediate, and production. The surface section will be drilled using seawater and bentonite sweeps and discharges will be returned to the seabed in this uncased section. The intermediate and production sections will be drilled with inhibited polymer water based mud (WBM). The extracted cutting and recoverable fluids (WBM) generated while drilling the lower two well intervals will be brought to the MODU through the riser, before being treated by solids control equipment to separate the drilling fluid from the cuttings before discharge of cuttings to the marine environment at sea surface.

The riserless sections of the well will be drilled with seawater and gel sweeps, the drill cuttings can only be discharged to the seabed. Once the conductor/surface string is installed however, cuttings are returned to

[1] If no discovery is made the well be permanently abandoned and the planned activity is complete.
If a discovery is made then the well may be temporarily suspended and the planned first activity will be complete. Following necessary regulatory approvals, the rig will return as a separate activity (within approx. 12 months) and re-enter Roc-1 to perform a side track and well test.

the surface with the drilling fluid and are screened by the MODU shakers to remove the entrained cuttings. The recovered mud is then pumped to the mud tanks for reuse during the drilling program.

3.1.4 Temporary Abandonment (suspension)

Should Quadrant Energy choose to suspend the well enabling well testing and appraisal at a later date (within 12 months of suspension), down hole barriers (such as cement) will be installed and tested to isolate any open formations, as would be performed for a permanent abandonment. Approximately 2m of 30" diameter casing would be left protruding from the seabed to allow re-establishment in a subsequent programme. The casing contents will be inhibited WBM, and there will be no hydrocarbon inventory in the well.

3.1.5 Well abandonment

After final well operations, the Roc-1 well will be permanently abandoned by installing and testing down hole barriers (such as cement) prior to severing all casing strings below seabed.

3.1.6 Drilling Discharges

Drilling discharges account for:

- Drill cuttings;
- Drilling fluids and solids;
- Brines; and
- Cement (set or unset).

A heat exchanger/heater may also be used in well testing and heated water (i.e. fresh or seawater) will be discharged to sea.

3.1.7 Well evaluation and testing

Well testing and evaluation involves the collection of data on the well and surrounding formation. Wireline logging will be conducted during drilling activities and it is also possible that VSP will be used.

In some cases, the hydrocarbons in the reservoir may need to be tested to appraise their type, quantity and flow rate. To do this, the hydrocarbon from the reservoir is flowed at varying rates for periods ranging from a few hours to a few days. As there are no production handling facilities on the drilling rig, it is customary to dispose of the produced gas and/or oil by burning.

During well testing formation water may be produced from the reservoir. Any formation water produced would be discharged to the marine environment following oil filtration.

3.1.8 Support Vessels

The MODU will be assisted by up to four support vessels that will transfer food, bulk drilling fluid materials, diesel and equipment used in the drilling process.

A support vessel standby mooring may be installed for the activity period.

3.1.9 Helicopters

Crew changes for personnel aboard the MODU will involve transfer by helicopter between the MODU and the regional airports of Karratha. These flights will occur several times a week dependent on the progress of the drilling program and logistical constraints.

3.1.10 ROV Operations

Remotely operated vehicle (ROV) operations and surveys will occur periodically throughout the Activity to determine the condition of subsea infrastructure (including submerged parts of the MODU), monitor drilling operations, manipulate subsea equipment, and confirm site adequacy (site survey if required).

3.1.11 Waste

In addition to the drilling discharges (above), other operational waste streams from the MODU and support vessels are likely to include:

- Deck drainage;
- Putrescible waste and sewage;
- Oily water;
- Cooling water from operation of engines;
- Desalination plant effluent (brine) and backwash water discharge;
- Ballast water; and
- Solid and liquid waste.

3.1.12 Fuel and Chemical Handling

The main engines and equipment (e.g. pumps, cranes, winches, power packs, generators) used on MODUs, and support vessels require diesel for fuel, hydraulic fluid and lubricating oils for operation and maintenance of moving parts.

4. DESCRIPTION OF ENVIRONMENT

4.1 Environment that May Be Affected (EMBA)

Although most events and hazards may only affect the environment within a few hundred metres around the MODU, the worst case potential environmental impact is linked to unplanned hydrocarbon spills and may extend substantially beyond a few hundred metres. The largest predicted impact area is linked to the loss of containment scenario (**Table 4-1**) and it was used to define the Environment that May Be Affected (EMBA) (**Figure 2-1)**. The combined EMBA was used to complete a search of the Matters of National Environmental Significance (MNES) data base, which in turn identified the environmental values and sensitivities within the existing environment.

Table 4-1. Summary of largest credible hydrocarbon spill events considered

Scenario	Hydrocarbon Type	Maximum Credible Volume	Comment
Minor hydrocarbon spills		0.16 m^3	Maximun loss of hydraulic fluid during transfer from a support vessel
Hydrocarbon spill (diesel) during refuelling	Diesel	20 m^3	Maximum credible volume based on 15 minutes of flow at a pumping rate of 1.25 m^3/min.
Hydrocarbon spill (diesel) from vessel collision – vessel tank		250 m^3	Maximum credible volume based on the holding capacity of largest flank fuel tank on support vessel.
Hydrocarbon spill from a loss of containment scenario – **surface** release	Crude	362,650 m^3 (<4710 m^3/d average over 11 weeks)	Highest flow potential derived by combining the most optimistic flow parameters
Hydrocarbon spill from a loss of containment scenario – **seabed** release		346,115 m^3 (<4495 m^3/d average over 11 weeks)	

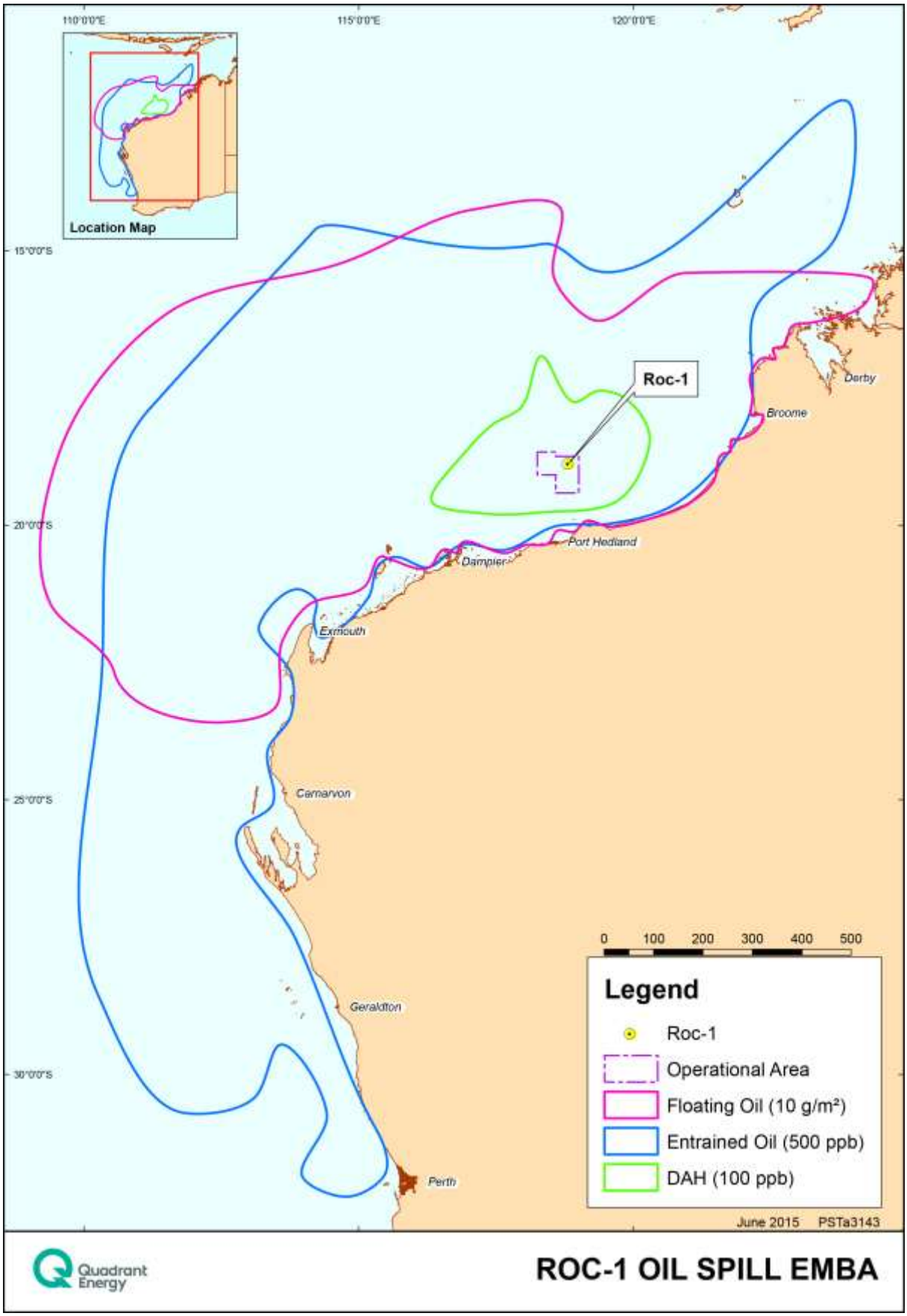

Figure 4-1. Environment that May be Affected (EMBA) from Floating oil, Entrained oil and DAHs.

4.1.1 Physical environment and habitats

Physical environment

North West Shelf (NWS) waters are usually thermally stratified with a marked change in water density at approximately 20 m (SSE, 1993). Surface temperatures vary annually, being warmest in March (32˚C) and coolest in August (19˚C). During summer (October–March), the prevailing non-storm winds are from the southwest, west and northwest at an average speed of less than 10 knots, peak average speeds of 15–25 knots, and maximum speeds of 30 knots. Non-storm winds prevail from the north-east through to south-east at average speeds of 5–6 knots, peak average speeds of 10–15 knots, and maximum speeds of 20 knots. The wave climate is generally composed of locally generated wind waves (seas) and swells that are propagated from distant area (WNI, 1995; 1996). In the open ocean, sustained winds result in wind-forced currents of approximately 3% of the wind speed (Holloway and Nye, 1985).

Tidal and wind-forcing are the dominant contributions to local sea surface currents. The tides of the NWS have a strong semi-diurnal signal with four tide changes per day (Holloway and Nye, 1985) and a spring tidal range of 1.9 m and a highest astronomical tide of 2.9 m (Chevron Australia, 2010). The dominant sea surface offshore current (typically seaward of the 200 m isobath) is the Leeuwin Current, which carries warm tropical water south along the edge of WA's continental shelf, reaching its peak strength in winter and becoming weaker and more variable in summer. The current is described as a sea surface current, extending in depth to 150 m (BHPB, 2005; Woodside, 2005). Closer to the coast, the Ningaloo Current flows in a northerly direction, in the opposite direction to the Leeuwin Current, along the outside of the Ningaloo Reef and across the inner shelf from September to mid-April (BHPB, 2005; Woodside, 2005). The Indonesian Throughflow is the other important current influencing the upper 200 m of the outer NWS (Woodside, 2005). This current brings warm and relatively fresh water to the region from the western Pacific via the Indonesian Archipelago.

Offshore drift currents are represented as a series of interconnected eddies and connecting flows that can generate relatively fast (1–2 knots) and complex water movement. These offshore drift currents also tend to persist longer (days to weeks) than tidal current flows (hours between reversals) and thus will have greater influence upon the trajectory of slicks over time scales exceeding a few hours (APASA, 2014).

4.1.2 Habitats

The Operational Area occurs completely within the Northwest Shelf Province.

This bioregion is located primarily on the continental shelf in water depths from 0 to 200 m (DEWHA 2008). The sandy substrates on the shelf within this bioregion are thought to support low density benthic communities of bryozoans, molluscs and echinoids (DEWHA 2008). Sponge communities are also sparsely distributed on the shelf, but are found only in areas of hard substrate. The region between Dampier and Port Hedland has been described as a hotspot for sponge biodiversity (Hooper & Ekins 2004).

The Operational Area does not contain shoreline habitat, and the nearest land is Bedout Island 21 km away. Available data indicates that the benthic habitat across the Operational Area comprises mostly sand and subtidal soft bottom communities. The benthic habitats within the Operational Area are widely represented at a regional scale on the NWS.

4.1.3 Protected and Significant Areas

Protected and significant areas with the potential to be impacted by this program have also been identified in **Table 4-2.**

Table 4-2: Environmental values and sensitivities – Habitats

Category	Receptor	Operational Area presence	Southwest Bioregion	Central Bioregion				Northwest Bioregion				
			Southwest Shelf transition	Central Western Shelf Transition	Central Western Transition	Central Western Shelf Province	Central Western Province	Northwest Province	Northwest Transition	Northwest Shelf Province	Northwest Shelf Transition	Timor Province
High Environmental Area	**Outer Abrolhos Islands - Shoals Abrolhos Is. Wallabi Gp Abrolhos Is. Pelsaert Gp Abrolhost West Abrolhos Is. Easter Gp Geraldton - Jurien Bay Jurien CMR Jurien Bay - Yanchep Two Rocks CMR Perth Nth Coast Kalbarri - Geraldton Perth Canyon CMR**			**Ningaloo Coast Nth Ningaloo Coast Sth Outer Ningaloo Coast Nth**	**Outer Ningaloo Coast Nth Outer NW Ningaloo**	**Carnarvon - Inner Shark bay Outer Shark Bay Coast Ningaloo Coast South Zuytdorp Cliffs - Kalbarri Kalbarri - Geraldton**	**Outer Abrolhos Islands - Shoals Abrolhost West Perth Canyon CMR**	**Outer NW Ningaloo Outer Ningaloo Coast Nth**	**Mermaid Reef CMR Clerke Reef MP Imperieuse Reef MP**	**Broome –Roebuck Eighty mile beach Kimberley CMR Dampier Archipelago Lowendal Is. Montebello Is. Barrow Is. Barrow- Montebellow Surrounds Muiron Is. Nigaloo Nth Coast Exmouth Gulf Coast**	**Kimberley CMR Kimberley Coast PMZ Camden Sound Sth Coast**	**Ashmore Reef Outer Johnson Bank Cartier Is. CMR Scott Reef Nth Scott Reef Sth Kimberley CMR**
Benthic habitats	*Coral Reefs*	*None present*	• *Houtman Abrolhos Islands* • *Rottnest Island*	*Ningaloo Reef*	*Not Present*	• *Shark Bay* • *Bernier, Dorre and Dirk Hartog Islands*	*Not present*	*Present but no significant areas*	*Rowley Shoals (Imperieuse Reef, Clerke Reef, Mermaid Reef)*	• *Dampier Archipelago* • *Montebello, Lowendal and Barrow Islands*	• *Adele Islands* • *Long Islands* • *Heyward Islands group* • *Bonaparte archipelago* • *Cape Voltaire and Bougainville* • *Montgomery reef* • *Browse island*	• *Ashmore Reef, Cartier Island, Hibernia, Scott and Seringapatam reefs*
	Seagrasses	*None present*	• *Houtman Abrolhos Islands* • *Perth Region*	*Ningaloo Reef*	*Not Present*	*Shark Bay*	*Not present*	*None present*	*Rowley Shoals*	• *Roebuck Bay* • *Dampier Archipelago, Regnard Islands* • *Mary Anne Reef* • *Onslow* • *Montebello and Barrow Islands*	*Southern Kimberly islands*	*Ashmore Reef, Scott Reef, Seringapatam reefs*
	Macroalgae	*None present*	*Houtman Abrolhos Islands*	*Ningaloo Reef*	*Not Present*	*Shark Bay*	*Not present*	*Present but no significant areas*	*Present but no significant areas*	• *Shallow offshore waters of the Pilbara – Montebello, Lowendal and Barrow Islands* • *Dampier Archipelago/ Regnard Islands* • *Thevenard, Serrurier, Airlie Islands*	*Present but no significant areas*	*Ashmore Reef, Scott Reef, Seringapatam reefs*
	Non Coral	*Present but*	*Present but no*	*Present but*	*Present*	*Shark Bay*	*Perth Canyon*	*Present but no*	*Rowley Shoals*	• *Dampier to Port*	*Echuca Shoals*	*Ashmore Reef*

Category	Receptor	Operational Area presence	Southwest Bioregion	Central Bioregion				Northwest Bioregion				
			Southwest Shelf transition	Central Western Shelf Transition	Central Western Transition	Central Western Shelf Province	Central Western Province	Northwest Province	Northwest Transition	Northwest Shelf Province	Northwest Shelf Transition	Timor Province
High Environmental Area	**Outer Abrolhos Islands - Shoals Abrolhos Is. Wallabi Gp Abrolhos Is. Pelsaert Gp Abrolhost West Abrolhos Is. Easter Gp Geraldton - Jurien Bay Jurien CMR Jurien Bay - Yanchep Two Rocks CMR Perth Nth Coast Kalbarri - Geraldton Perth Canyon CMR**			**Ningaloo Coast Nth Ningaloo Coast Sth Outer Ningaloo Coast Nth**	**Outer Ningaloo Coast Nth Outer NW Ningaloo**	**Carnarvon - Inner Shark bay Outer Shark Bay Coast Ningaloo Coast South Zuytdorp Cliffs - Kalbarri Kalbarri - Geraldton**	**Outer Abrolhos Islands - Shoals Abrolhost West Perth Canyon CMR**	**Outer NW Ningaloo Outer Ningaloo Coast Nth**	**Mermaid Reef CMR Clerke Reef MP Imperieuse Reef MP**	**Broome –Roebuck Eighty mile beach Kimberley CMR Dampier Archipelago Lowendal Is. Montebello Is. Barrow Is. Barrow- Montebellow Surrounds Muiron Is. Nigaloo Nth Coast Exmouth Gulf Coast**	**Kimberley CMR Kimberley Coast PMZ Camden Sound Sth Coast**	**Ashmore Reef Outer Johnson Bank Cartier Is. CMR Scott Reef Nth Scott Reef Sth Kimberley CMR**
	Benthic Invertebrates	*no significant areas*	*significant areas*	*no significant areas*	*but no significant areas*	*Hamelin Pool*		*significant areas*		• *Hedland* • *Barrow Island*		
Shoreline habitats	Mangroves	*None present*	*Present but no significant areas*	*Mangrove Bay*	*None Present*	*Shark Bay*	*Not present*	*None present*	*Present but no significant areas*	• *Exmouth Gulf* • *Montebello, Barrow and Lowendal Islands* • *Port Hedland*	• *Prince Frederick Harbour* • *Cambridge Gulf*	*None present*
	Intertidal mud / sand flats	*None present*	*Present but no significant areas*	*Present but no significant areas*	*None Present*	*Shark Bay*	*Not present*	*None present*	*None present*	• *Roebuck Bay* • *Eighty Mile beach*	• *Colllier Bay* • *Walcott inlet* • *Prince Frederick harbour* • *Mitchell River* • *Cambridge Gulf*	*None present*
	Intertidal platforms	*None present*	*Present but no significant areas*	*Ningaloo Coast*	*None Present*	*Ningaloo Coast North-West cape*	*Not present*	*None present*	*Present but no significant areas*	*Present but no significant areas*	*Present across region*	*None present*
	Sandy beaches	*None present*	*Houtman Abrolhos Islands*	*Present but no significant areas*	*None Present*	*Present but no significant areas*	*Not present*	*None present*	*Present but no significant areas*	*Eighty Mile Beach*	*Camden marine Park*	*None present*
	Rocky shorelines	*None present*	*Present but no significant areas*	*Present but no significant areas*	*None Present*	*Ningaloo Coast North-West Cape*	*Not present*	*None present*	*None present*	*Present but no significant areas*	*Present but no significant areas*	*None present*

Commonwealth Marine Reserves, State Marine Parks, Marine Management Areas, World Heritage Areas, Wetlands of International Importance, Commonwealth or National Heritage Places and Key Ecological Features present within the EMBA are listed in **Table 4-3.** None of these areas were identified within, or nearby, the Operational Area for the Activity, with the exception of the 125m Ancient Coastline.

Ancient coastline at 125 m depth contour

The shelf of the North-west Marine Region contains several terraces and steps which reflect changes in sea level that occurred over the last 100,000 years. The most prominent of these features occurs at a depth of 125 m as an escarpment along the North West Shelf and Sahul Shelf (DSEWPaC 2012). Where the ancient submerged coastline provides areas of hard substrate it may contribute to higher biological diversity. Little detailed knowledge is available, but the hard substrate of the escarpment is likely to support sponges, corals, crinoids, molluscs, echinoderms (DSEWPaC 2012).

Parts of the ancient coastline are thought to provide biologically important habitats in areas otherwise dominated by soft sediments. The topographic complexity of these escarpments may also facilitate vertical mixing of the water column providing a relatively nutrient-rich environment for species present on the escarpment (DSEWPaC 2012).

Additional information on KEFs and Commonwealth Protected Areas and Heritage places listed in **Table 4-3** is available at the following link:

http://www.environment.gov.au/topics/marine/marine-bioregional-plans/north-west

Additional information on state Marine Parks listed in **Table 4-3** is available at the following link:

http://www.dpaw.wa.gov.au/management/marine/marine-parks-and-reserves

4.1.4 Hot Spots

The locations that have been ranked priority 1,2 or 3 (identified in Quadrant Energy's *Environmental Sensitivities and Priorities for Protection* guidelines EA-91-ZI-10008) that occur within the EMBA are also listed in **Table 4-2.** These areas are considered regionally to have High Environmental Values (HEVS).

Table 4-3: Environmental values and sensitivities –protected/significant areas

Value/Sensitivity	Distance from Operational Area (km)	EMBA presence
Commonwealth Marine Reserves	960	Abrolhos Commonwealth Marine Reserve
	102	Argo-Rowley Terrace Commonwealth Marine Reserve
	833	Ashmore Reef Commonwealth Marine Reserve
	855	Carnarvon Canyon Commonwealth Marine Reserve
	838	Cartier Island Commonwealth Marine Reserve
	149	Dampier Commonwealth Marine Reserve
	9.5	Eighty Mile Beach Commonwealth Marine Reserve
	503	Gascoyne Commonwealth Marine Reserve
	1,578	Geographe Commonwealth Marine Reserve
	1,252	Jurien Commonwealth Marine Reserve
	291	Kimberley Commonwealth Marine Reserve
	180	Mermaid Reef Commonwealth Marine Reserve
	261	Montebello Commonwealth Marine Reserve
	510	Ningaloo Commonwealth Marine Reserve

	1,011	Oceanic Shoals Commonwealth Marine Reserve
	1,419	Perth Canyon Commonwealth Marine Reserve
	322	Roebuck Commonwealth Marine Reserve
	787	Shark Bay Commonwealth Marine Reserve
	1,607	South West Corner Commonwealth Marine Reserve
	1,378	Two Rocks Commonwealth Marine Reserve
State Marine Parks (MP) and Marine Management Areas (MMA)	566	Lalanggarram/Camden Sound MP
	112	Rowley Shoals MP
	795	Shark Bay MP
	1,239	Jurien Bay MP
	1,398	Marmion MP
	1,455	Shoalwater Island MP
	353	Barrow Island MP
	323	Barrow Island MMA
	310	Montebello Islands MP
	508	Ningaloo MP
	487	Muiron Islands MMA
	77	Eighty Mile Beach MP
	1,602	Ngari Capes MP
	187	Proposed Dampier Archipelago MP
	250	Proposed Regnard MMA
	233	Proposed Roebuck Bay MP
World Heritage	487	The Ningaloo coast
	795	Shark Bay
Wetlands of International Importance (Ramsar)	333	Roebuck Bay
	833	Ashmore Reef National Nature Reserve
	1,468	Becher Point Wetlands
	97	Eighty Mile Beach
	1,628	Hosnies Springs
	1,486	Peel-Yalgorup system
	1,638	“the dales” Christmas Island
	1,605	Vasse-Wonerup system
National Heritage Places	1,068	HMAS Sydney II and HSK Kormoran Shipwreck Sites
	308	Barrow Island and the Montebello – Barrow Islands Marine Reserve (See state and commonwealth reserves)
	287	The West Kimberley
	1,159	Beekeepers-Leseur-Coomallo Area and Nambung National Park
	1,624	Christmas Island Natural Areas

	487	The Ningaloo Coast (see World Heritage)
	205	Dampier Archipelago (including Burrup peninsula)
	1,115	Batavia Shipwreck Site and Survivor Camps Area 1629 – Houtman Abrolhos
	885	Dirk Hartog Landing Site 1616 – Cape Inscription Area
	800	Shark Bay (see World Heritage)
Commonwealth Heritage Places	592	Scott reef and Surrounds
	646	Seringapatam Reef and Surrounds
	833	Ashmore Reef National Nature Reserve (see Commonwealth Marine Reserves)
	1,625	Christmas Island Natural Areas
	86	Mermaid Reef - Rowley Shoals (see Commonwealth Marine Reserves)
	510	Ningaloo Marine Area - Commonwealth Waters (see Commonwealth Marine Reserves)
Threatened Ecological Communities	827	Subtropical and Temperate Coastal Saltmarsh
Key ecological feature (KEF)	Overlaps	Ancient coastline at 125 m depth contour
	1,063	Ancient Coastline at 90m-120m depth
	835	Ashmore Reef and Cartier Island and surrounding Commonwealth waters
	1,411	Carbonate Bank and terrace system of the Van Diemen Rise
	1,614	Cape Mentelle Upwelling
	477	Canyons linking the Argo Abyssal Plain with Scott Plateau
	462	Canyons linking the Cuvier Abyssal Plain with the Cape Range Peninsula
	911	Carbonate bank and terrace system of the Sahul Shelf
	1,085	Commonwealth marine environment surrounding the Houtman Abrolhos Islands (and adjacent shelf break)
	1,064	Commonwealth marine environment within and adjacent to the west coast inshore lagoons
	1,573	Commonwealth marine environment within and adjacent to Geographe Bay
	508	Commonwealth waters adjacent to Ningaloo Reef
	297	Continental slope demersal fish communities
	407	Exmouth Plateau
	157	Glomar Shoals
	104	Mermaid Reef and Commonwealth waters surrounding Rowley Shoals
	1,127	Perth Canyon and adjacent shelf break, and other west-coast canyons
	1,031	Pinnacles of the Bonaparte Basin

	580	Seringapatam Reef and Commonwealth waters in the Scott Reef complex
	1,011	Wallaby Saddle
	939	Western Demersal slope and associated fish communities (of the Central Western Province)
	1,030	Western rock lobster

4.1.5 Marine Fauna

Desktop searches of the Operational Area and larger EMBA were undertaken using DoE's Protected Matters Search Tool for the purposes of identifying species listed under the EPBC Act. The search identified 100 Listed Threatened Species (LTS) and 95 Listed Migratory Species (LMS) as having the potential to occur within the EMBA **.**

An assessment of all the marine and coastal species was undertaken to identify if these species have the potential to occur in either the Operational Area or larger EMBA. Those listed threatened or vulnerable species that have been identified as likely to be present in the Operational Area or EMBA are summarised in **Table 4-4**. Migratory species are only listed for the Operational Area only.

Table 4-4: Environmental values and sensitivities – marine fauna

Value/Sensitivity		EPBC Act Status CE = Critically Endangered E = Endangered V = Vulnerable M = Migratory	Operational Area presence[2]	Particular values or sensitivities within Operational Area	EMBA presence	Particular values or sensitivities within EMBA
Common Name	**Scientific Name**					
Protected Species and Communities: Fish and Sharks						
Great white shark	*Carcharodon carcharias*	V,M	✓	Transient individuals may occur	✓	Foraging, feeding or related behaviour known to occur
Green sawfish	*Pristis zijsron*	V	✓	Transient individuals may occur	✓	Breeding areas known to occur
Whale shark	*Rhincodon typus*	V, M	✓	Transient individuals may occur	✓	Foraging feeding behaviour known to occur
Shortfin mako	*Isurus oxyrinchus*	M	✓	Transient individuals may occur	✓	Species or habitat known to occur
Longfin mako	*Isurus paucus*	M	✓	Transient individuals may occur	✓	Transient individuals may occur
Giant manta ray	*Manta birostris*	M	✓	Transient individuals may occur	✓	Transient individuals may occur
Grey nurse shark	*Carcharias taurus*	V			✓	Species or habitat known to occur

[2] Determined from an EPBC search of the Operational Area boundaries

Value/Sensitivity		EPBC Act Status CE = Critically Endangered E = Endangered V = Vulnerable M = Migratory	Operational Area presence[2]	Particular values or sensitivities within Operational Area	EMBA presence	Particular values or sensitivities within EMBA
Common Name	**Scientific Name**					
Dwarf sawfish	*Pristis clavata*	V			✓	Breeding areas known to occur
Largetooth Sawfish	*Pristis pristis*	V			✓	Breeding areas known to occur
Northern River Shark, New Guinea River Shark	*Glyphis garricki*	E			✓	Species or habitat known to occur
Blind cave eel	*Ophisternon candidum*	V			✓	Species or habitat likely to occur
Blind gudgeon	*Milyeringa veritas*	V			✓	Species or habitat likely to occur
Protected Species and Communities: Marine Mammals						
Blue whale	*Balaenoptera musculus*	E,M	✓	Migration route known to overlap PA	✓	Foraging feeding related behaviour known to occur within the area.
Humpback whale	*Megaptera novaeangliae*	V,M	✓	Transient individuals may occur	✓	Breeding known to occur
Bryde's whale	*Balaenoptera edeni*	M	✓	Transient individuals may occur	✓	Species or habitat may occur
Killer whale	*Orcinus orca*	M	✓	Transient individuals may occur	✓	Transient individuals may occur

Value/Sensitivity		EPBC Act Status CE = Critically Endangered E = Endangered V = Vulnerable M = Migratory	Operational Area presence[2]	Particular values or sensitivities within Operational Area	EMBA presence	Particular values or sensitivities within EMBA
Common Name	**Scientific Name**					
Antarctic minke whale	*Balaenoptera bonaerensis*	M	✓	Transient individuals may occur	✓	Species or habitat may occur
Sperm whale	*Physeter macrocephalus*	M	✓	Transient individuals may occur	✓	Foraging feeding related behaviour known to occur within the area.
Dugong	*Dugong dugon*	M	✓	Transient individuals may occur	✓	Breeding known to occur
Indo-pacific humpback dolphin	*Sousa chinensis*	M	✓	Transient individuals may occur	✓	Species or habitat likely to occur
Spotted bottlenose dolphin	*Turdiops aduncus*	M	✓	Transient individuals may occur	✓	Species or habitat likely to occur
Sei whale	*Balaenoptera borealis*	V, M			✓	Species or habitat may occur
Fin whale	*Balaenoptera physalus*	V, M			✓	Species or habitat may occur
Southern right whale	*Eubalaena australis*	E, M			✓	Breeding known to occur
Australia sea-lion	*Neophoca cinerea*	V			✓	Breeding known to occur
Protected Species and Communities: Marine Reptiles						

Value/Sensitivity		EPBC Act Status CE = Critically Endangered E = Endangered V = Vulnerable M = Migratory	Operational Area presence[2]	Particular values or sensitivities within Operational Area	EMBA presence	Particular values or sensitivities within EMBA
Common Name	**Scientific Name**					
Loggerhead turtle	*Caretta caretta*	E,M	✓	Transient individuals may occur	✓	Breeding areas known to occur
Green turtle	*Chelonia mydas*	V,M	✓	Transient individuals may occur	✓	Breeding areas known to occur
Leatherback turtle	*Dermochelys coriacea*	E,M	✓	Transient individuals may occur	✓	Foraging or feeding behaviour known to occur
Hawksbill turtle	*Eretmochelys imbricata*	V,M	✓	Transient individuals may occur	✓	Breeding areas known to occur
Flatback turtle	*Natator depressus*	V,M	✓	Transient individuals may occur	✓	Breeding areas known to occur
Short-nosed seasnake	*Aipysurus apraefrontalis*	CE	✓	Transient individuals may occur	✓	Species or habitat known to occur
Olive ridley turtle	*Lepidochelys olivacea*	E, M			✓	Foraging or feeding behaviour known to occur
Protected Species and Communities: Marine Birds						
Lesser frigatebird	*Fregata ariel*	M	✓	Transient individuals may occur	✓	Breeding known to occur
White tailed tropicbird	*Phaethon lepturus fulvus*	E, M	✓	Foraging or feeding behaviour likely to occur	✓	Breeding likely to occur

Value/Sensitivity		EPBC Act Status CE = Critically Endangered E = Endangered V = Vulnerable M = Migratory	Operational Area presence[2]	Particular values or sensitivities within Operational Area	EMBA presence	Particular values or sensitivities within EMBA
Common Name	**Scientific Name**					
Lesser crested tern	*Sterna bengalensis*	M	✓	Transient individuals may occur	✓	Breeding known to occur
Roseate tern	*Sterna dougallii*	M	✓	Transient individuals may occur	✓	Breeding known to occur
Brown booby	*Sula leucogaster*	M	✓	Transient individuals may occur	✓	Breeding known to occur
Australian lesser noddy	*Anous tenuirostris melanops*	V			✓	Breeding known to occur
Streaked Shearwater	*Calonectris leucomelas*	M	✓	Transient individuals may occur	✓	Species of species habitats may occur
Northern royal albatross	*Diomedea epomophora sanfordi*	E			✓	Foraging or feeding behaviour known to occur
Amsterdam albatross	*Diomedea exulans amsterdamensis*	E			✓	Species or habitat may occur
Tristan albatross	*Diomedea exulans exulans (D. dabbenena)*	E			✓	Species or habitat may occur
Wandering albatross	*Diomedea exulans (sensu lato)*	V			✓	Foraging or feeding behaviour known to occur
Sooty Albatross	*Phoebetria fusca*	V			✓	Species or species habitat may occur in area

Value/Sensitivity		EPBC Act Status CE = Critically Endangered E = Endangered V = Vulnerable M = Migratory	Operational Area presence[2]	Particular values or sensitivities within Operational Area	EMBA presence	Particular values or sensitivities within EMBA
Common Name	**Scientific Name**					
Northern giant-petrel	*Macronectes halli*	V			✓	Species or habitat may occur
Soft-plumaged petrel	*Pterodroma mollis*	V			✓	Foraging or feeding behaviour known to occur
Blue petrel	*Halobaena caerulea*	V			✓	Species or habitat may occur
Australian Painted Snipe	*Rostratula australis*	E			✓	Species or habitat likely to occur
Australian fairy tern	*Sternula nereis nereis*	V			✓	Species or habitat known to occur
Indian yellow-nosed albatross	*Thalassarche carteri*	V			✓	Foraging or feeding behaviour may occur
Shy albatross	*Thalassarche cauta cauta*	V			✓	Foraging or feeding behaviour likely to occur
White-capped albatross	*Thalassarche cauta steadi*	V			✓	Foraging or feeding behaviour likely to occur
Black-browed albatross	*Thalassarche melanophris*	V			✓	Species or habitat may occur
Campbell albatross	*Thalassarche melanophris impavida*	V			✓	Species or habitat may occur

4.2 Socio-economic Environment

Socio-economic activities that may occur within the Roc-1 EMBA include commercial fishing, shipping and oil and gas exploration and production (**Table 4-5**).

Table 4-5: Environmental (Socioeconomic) Values and Sensitivities in the Roc-1 EMBA

Category	Receptor within EMBA	Present in Operational area	Present in EMBA
Commonwealth Commercial fisheries	North West Slope Trawl Fishery	×	✓
	Western Tuna and Billfish Fishery	✓	✓
	Skipjack Tuna (Western) Fishery	✓	✓
	Western Deepwater Fishery	✓	✓
	Southern Bluefin Tuna Fishery	✓	✓
State Commercial Fisheries	Marine Aquarium Fish Fishery	×	✓
	Northern Demersal Scalefish Managed Fishery	×	✓
	Pilbara Line Fishery	×	✓
	Nickol Bay Prawn Managed Fishery	✓	✓
	Broome Prawn Managed Fishery	×	✓
	Onslow Prawn Managed Fishery	×	✓
	Pilbara Fish Trawl Managed Fishery	✓	✓
	Pearl Oyster Managed Fishery	✓	✓
	Pilbara Trap Managed Fishery	✓	✓
	Aquaculture Pearling Sites	×	✓
	Specimen Shell Managed Fishery	✓	✓
	Beche-de-mer Fishery	✓	✓
	Mackerel Managed Fishery (Area 2 – Pilbara and Area 3 - Gascoyne/West Coast)	✓	✓
	Octopus	✓	✓
	West Coast Deep Sea Crab (Interim) Managed Fishery	✓	✓
	Kimberley Prawn Managed Fishery (KPMF)	×	✓
	The Kimberley Gillnet and Barramundi Managed Fishery (KGBF)	×	✓
	Gascoyne Demersal Scalefish Fishery	×	✓
	Exmouth Gulf Prawn Fishery	×	✓
	West Coast Rock Lobster Fishery	×	✓
	Shark Bay Prawn and Scallop Limited Entry Fishery	×	✓

Category	Receptor within EMBA	Present in Operational area	Present in EMBA
	Shark Bay Crab Interim Managed Fishery	×	✓
	Abrolhos Islands and Mid West Trawl Managed Fishery (AIMWTMF)	×	✓
	West Coast Demersal Scalefin Interim Managed Fishery	×	✓
	West Coast Rock Lobster Fishery	×	✓
Shipping	The Roc-1 permit area is located within reasonable proximity to a designated shipping route (AMSA 2014) with two north-south oriented lanes servicing Port Hedland. Commercial shipping moves through the offshore waters en route to or from the marine terminals at, Barrow and Varanus Islands. Shipping using NW Shelf waters includes iron ore carriers, oil tankers and other vessels proceeding to or from the ports of Dampier, Port Walcott and Port Hedland; however, these are predominantly heading north from these ports. Large cargo vessels carrying freight bound or departing from Fremantle, transit along the WA coastline heading north and south in deeper waters.	×	✓
Recreational fishing	Within the North Coast Bioregion, recreational fishing is experiencing significant growth, with a distinct seasonal peak in winter when the local population increases significantly. Increased recreational fishing has also been attributed to those involved in the construction or operation of developments within the region. Consultation has indicated recreational fishing hotspots include Eighty Mile Beach, the Montebello Islands, Barrow Island, the Lowendal Islands, the Muiron Islands, Dampier Archipelago, the Broome North Coast and the Ningaloo and Exmouth Coast are of high value to recreational fishers. Charter Boat and tourism operators also frequent those areas not easy accessible by recreational fishers including Mermaid Reef, Imperieuse Reef, Clerke Reef, Camden Sound, the Lacepede Islands and the Kimberley Coast.	×	✓
Oil and Gas	The area of the NW Shelf is a major oil and gas hub in Australia, with several companies operating on the Shelf. The area of activity occurs in a particularly isolated area of the NW Shelf with respect to the main oil and gas operational and exploratory fields. There are currently no operating fields in the Operational Area. The nearest operating facility is Woodside's Angel oil field and associated infrastructure, located > 171 km southwest from the Operational Area	×	✓
Tourism	In the waters immediately surrounding the Operational Area, tourism activities are limited due to its distance from the mainland and island shorelines. However, there are many sources of marine-based tourism within the environment that may be affected. Aquatic recreational activities such as boating, diving and fishing occur near the coast and islands off of the Pilbara and Ningaloo coasts. These activities are concentrated in the vicinity of the population centres such as Broome, Roebuck Bay, Exmouth, Dampier and Onslow.	×	✓

Category	Receptor within EMBA	Present in Operational area	Present in EMBA
Cultural Heritage	No known sites of Cultural Heritage significance within the operational area or wider environment.	×	✓

5. STAKEHOLDER CONSULTATION

Quadrant recognises that its development activities have the potential to impact the community and the environment, particularly in locations which feature or are near sensitive receptors, or that overlap with other economic, cultural or community uses.

To facilitate informed assessment by stakeholders of the likely potential impact of Quadrant activities, Quadrant seeks to establish long-term and meaningful dialogue with those stakeholders who have an interest in its present and planned future activities in Australia.

Quadrant clearly articulates engagement and consultation standards, goals, and mechanisms, seeks to effectively manage change during the life of its projects and activities, and strives to continuously improve all aspects of its stakeholder engagement processes. The key stakeholders identified for the activity are based on the operational area and EMBA and are provided in **Table 5-1**.

Table 5-1: Summary of Key Stakeholders Consulted for the Activity

Group	Stakeholder
Marine Conservation	• Department of Fisheries (DoF) • Department of Parks and Wildlife (DPaW) • Marine Parks and Reserves Authority
Shipping safety and security	• Australian Maritime Safety Authority (AMSA) • Department of Defence (DoD) • Department of Transport (DoT)
Adjacent regulator	• Department of Mines and Petroleum (State)
Fishing groups	• A Raptis and Sons • Austral Fisheries • Australian Fisheries Management Authority (AFMA) • Commonwealth Fisheries Association (CFA) • Marine Tourism WA • MG Kailis • Pearl Producers Association • Recfishwest • Shark Bay Seafoods • Western Australian Fishing Industry Council (WAFIC) • WestMore Seafoods • Individual Fishing Licence Holders
Port Hedland Stakeholder Reference Group	• Pilbara Port Authority • Town of Port Hedland

Quadrant maintains a comprehensive stakeholder database, which is overseen by a dedicated Consultation Coordinator. The purpose of the database is to enable the identification, initial and ongoing contact with an appropriate group of stakeholders for any given project, and to facilitate the building of long-term and meaningful dialogue with those stakeholders with whom Quadrant has regular contact.

Details of the Roc-1 drilling program were included in the second, third and fourth editions of Quadrant Energy's *Jack Up Drilling Campaign Consultation Package* (distributed by Apache Energy at the time) which was distributed to stakeholders quarterly from October 2014 to April 2015. Stakeholders were additionally issued a Consultation Package regarding five-year drilling activities in the Bedout Basin on March 12, 2015.

Quadrant circulated to relevant stakeholders a Consultation Update regarding this EP on September 8, 2015, to ensure stakeholders were aware this EP covered temporary abandonment (suspension) and the chance of returning to the well location with a rig for well testing, at a later date. Given stakeholders had a minimal time period to review this Consultation Update prior to EP submission, stakeholders who were identified as potentially being at higher risk of impact by this activity were contacted by phone.

5.1 Addressing consultation feedback

Quadrant's Consultation Coordinator is available before, during and after completion of the proposed activity to ensure opportunities for stakeholders to provide feedback are available. Consultation feedback is provided to relevant activity personnel to ensure the Quadrant Energy business has a thorough understanding of how the activity is being received by relevant persons.

Prior to commencement of an activity covered by this EP, a risk assessment will be undertaken to identify potentially affected stakeholders. This stakeholder set will be notified prior to commencement of the activity, ensuring that any commitments arising from the consultation process are recognised as performance standards required for that activity.

5.2 Summary

Quadrant Energy considers that consultation with regulators and key stakeholders for this activity has been adequate; all stakeholders and relevant parties have been actively engaged by Quadrant Energy regarding it's activities on the NW Shelf (including this Activity) and also, where applicable the proposed oil spill response strategies for these activities.

No concerns with the Roc-1 activity were raised during this consultation period.

All correspondence with external stakeholders is recorded in the stakeholder database and Quadrant Energy will remain available before, during and after completion of the development activity. Concerns will be listed against contact details for the relevant project personnel. Consultation material will be provided to relevant personnel and is summarised in **Table 5-2**.Quadrant Energy has detailed communications procedures for the life of the project and will maintain two-way communications with stakeholders regarding the Activity and all current or proposed activities undertaken on the NW Shelf. Many stakeholders have stated that they will contact Quadrant Energy by exception, that is, if upon receiving the Stakeholder Information Package they feel the activity poses a risk to them, they will contact Quadrant Energy.

Table 5-2: Consultation summary for activity

Stakeholder	Assessment of Consultation Undertaken
Commercial Fishers	
Australian Fisheries Management Authority	AFMA received the Bedout Basin Consultation Package and did not provide comment on the activity. AFMA have received all *Quarterly Project Updates*. Previous interaction with stakeholder has reassured Quadrant Energy that a response would only be received in the event of concern. No response was received on this consultation.
Department of Fisheries	DoF provided advice for permit WA-437-P on August 24, 2015, which included fishing activities in the area, pollution emergency plans, fish spawning grounds and biosecurity. This information was included in the production of this EP. DoF previously provided advice in relation to the Roc-1 well dated December 8, 2014.
Western Australian Fishing Industry Council	WAFIC received the Bedout Basin Consultation Package and did not provide comment on the activity. WAFIC have received all *Quarterly Project Updates.* No response on this consultation was received. WAFIC has previously suggested Quadrant Energy consult directly with fishing licence holders which Quadrant Energy commenced by providing all relevant licence holders with the *Quarterly Project Update*.
Commonwealth Fishing Association	The CFA received the Bedout Basin Consultation Package and did not provide comment on the activity. The CFA have received all *Quarterly Project Updates*. No response on this consultation was received.
A Raptis and Sons	A Raptis and Sons received the Bedout Basin Consultation Package and did not provide

Stakeholder	Assessment of Consultation Undertaken
	comment on the activity, and have received all *Quarterly Project Update*s. Stakeholder has previously confirmed that no response means 'no concern' with the given activity. No response had been received.
Austral Fisheries	Austral Fisheries received the Bedout Basin Consultation Package and did not provide comment on the activity and have received all *Quarterly Project Updates*. Stakeholder has previously confirmed that no response means 'no concern' with the given activity. No response had been received.
WestMore Seafoods & Shark Bay Seafoods	These fishers received the Bedout Basin Consultation Package and did not provide comment on the activity, and have received all *Jack Up Rig Schedule* documents and have all *Quarterly Project Updates.* Gary Kessell at Westmore Seafoods also represents Shark Bay Seafood, and operates within the Western Deep Water Trawl Fishery, North West Slope Trawl Fishery, Shark Bay Prawn Fishery, Pilbara Fish Trawl, Nickol Bay Prawn Fishery and the Kimberley Prawn Fishery zones. Stakeholder has previously confirmed that no response means 'no concern' with the given activity. No response had been received.
MG Kailis	MG Kailis received the Bedout Basin Consultation Package and did not provide comment on the activity.
Pearl Producers Association	The PPA received the Bedout Basin Consultation Package and did not provide comment on the activity. The PPA have engaged with Quadrant Energy regarding concerns raised in consultation on other projects, particularly around drilling and seismic work in Quadrant Energy permits WA 437P and WA 438P. It is noted that diving operations of the Pearl Producers Association (PPA) may occur up to the 40 m bathymetric contour. As this activity occurs beyond the PPA's area of interest, consultation for this activity is considered adequate.
Individual fishing licence holders	Licence holders have received *Quarterly Project Updates* by post (which included the Roc-1 well); no response has been received regarding this Activity. Quadrant Energy does not anticipate a response from licence holders given the locations distance offshore and short duration of the Activity. License holders are represented by WAFIC, Recfishwest, The Charter Boat Association and DoF, who have all been consulted.
Recreational Fishers	
Recfishwest	Recfishwest received the Bedout Basin Consultation Package and did not provide comment on the activity, and have received all *Quarterly Project Updates*, and provided no comment on the Roc-1 activity.
Marine Tourism WA	MTWA received the Bedout Basin Consultation Package and did not provide comment on the activity and have received all *Quarterly Project Updates.* No comment has been received relating to Roc-1; previous interaction with stakeholder has reassured Quadrant Energy that a response would only be received in the event of concern.
Marine Conservation	
Department of Parks and Wildlife	DPaW have received all *Jack Up Rig Schedule* documents and noted the projects significant distance from shore and Bedout Island means the activity does not raise concern for DPaW in email consultation on November 12, 2014. DPaW received the Bedout Basin Consultation Package and did not provide comment on the activity.
Shipping safety and security	
Australian Maritime Safety Authority	AMSA provided updated shipping traffic plots for the Roc-1 location via email on May 22, 2015. Quadrant Energy ensures control measures are in place during drilling activities to

Stakeholder	Assessment of Consultation Undertaken
	manage and minimise risk in relation to the presence of other sea users, marine navigation and vessel safety. Quadrant Energy undertakes extensive consultation, and has developed a strong working relationship, with AMSA regarding vessel movements. This will continue throughout the duration of this activity.
Department of Defence	Defence responded to the Bedout Basin Consultation Package on March 30, 2015 with no objection. The Hydrographic Office receives updates regarding vessel movements, prior to activity commencement, as requested.
Hydrocarbon spill response	
Australian Marine Oil Spill Centre	AMOSC received the Bedout Basin Consultation Package and did not provide comment on the activity, and have received all *Jack Up Rig Schedule* documents and have received all *Quarterly Project Updates*. Previous interaction with stakeholder has reassured Quadrant Energy that a response would only be received in the event of concern. No response received on this consultation. Roles and responsibilities of AMOSC have been clearly defined in prior consultation relating to Quadrant Energy OPEPs. Quadrant Energy are working with AMOSC to have an MOU in place for support in relation to all of Quadrant Energy's oil spill response plans for the NWS. Currently AMOSC are engaged specifically for their support to each plan.
Department of Foreign Affairs and Trade	DFaT have been provided an activity summary for activities in the Bedout Basin, including Roc-1 Exploration Drilling, with spill modelling map at their request to show potential impact to international waters. Information is provided to DFaT as a courtesy. DFaT have responded with thanks for the information on January 14, 2015, and not raised any concern at time of submission.
Department of Transport	DoT responded to the Bedout Basin Consultation Package on March 16, 2015 with no objection and noted they would review the OPEP at the appropriate time. The DoT has received all *Quarterly Project Updates* and advice received through previous consultation and interaction with DoT regarding Quadrant Energy's OPEPs has been adopted by Quadrant Energy in the preparation of this OPEP.
Adjacent Regulators	
State Department of Mines and Petroleum	DMP were provided extensive consultation material on this activity as per DMP's Consultation Guidelines. DMP responded to this information on 1/7/15 noting no additional information was required from Quadrant Energy. Quadrant Energy commits to providing a pre-start and cessation notification for all Roc-1 activities. DMP regularly receive all *Quarterly Project Updates* which includes updates on Roc-1 and will continue until the activity is completed.

6. ENVIRONMENTAL HAZARDS AND CONTROLS

The impact and risk assessment approach is consistent with the requirements of AS/NZS ISO 31000:2009 Risk Management – Principles and guidelines and ISO/IEC 31010 Risk management – Risk management techniques. The approach can be mapped to the requirements of the OPGGS (E) Regulations for an EP, as described by NOPSEMA (N4700-GN1074 Rev 1 2013). The key steps are illustrated in **Figure 6-1**.

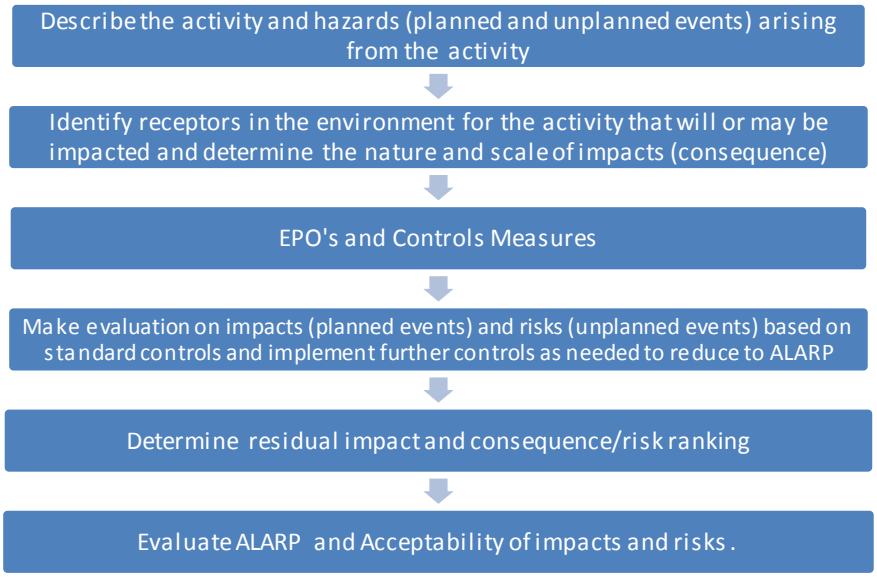

Figure 6-1: Risk and Impact Process

An assessment against the Activity was undertaken and the environmental hazards or aspects were then identified. The risk assessment identified 4 potential unplanned events and 8 planned events. Environmental aspects/hazards identified for the Activity are summarised in **Table 6-1** and

Table 6-2.

The extent of actual or potential impacts from each planned or unplanned event is assessed using, where required, modelling (e.g. for hydrocarbon spill modelling) and scientific reports. Impact mechanisms and any thresholds for impact are determined and described, using scientific literature and modelling where required. This step looks at the causal effect between the aspect/hazard and the identified receptor. Impact thresholds for different critical life stages are also identified where relevant.

The consequence level of the impact is then determined for each planned and unplanned events based on the severity of the impact to relevant receptors. This process determines a consequence level based on set criteria for each receptor category and takes into consideration the duration and extent of the impact, receptor recovery time and the effect of the impact at a population, ecosystem or industry level.

For unplanned events, a risk ranking is also determined using an assessment of the likelihood (likelihood ranking) of the event as well as the consequence level of the potential impact should that event occur.

For each planned and unplanned event a set of Environmental Performance Outcome(s), Environmental Performance Standards and Measurement criteria are identified. The definitions of the performance outcomes, standards and measurement criteria are consistent with the OPGGS (E) Regulations. For planned and unplanned events, an ALARP and Acceptability assessment is also undertaken.

6.1 ALARP Evaluation

The ALARP principle is that the residual impacts and risk shall be 'as low as reasonably practicable'. It has particular connotations as a route to reduce risks when considering law, regulation and standards.

For an impact or risk to be ALARP it must be possible to demonstrate that the cost involved in reducing the impact or risk further would be grossly disproportionate to the benefit gained. The ALARP principle arises from the fact that infinite time, effort and money could be spent on the attempt of reducing a risk to zero. It should not be understood as simply a quantitative measure of benefit against detriment. It is more a best common practice of judgement of the balance of impact or risk and societal benefit.

For planned and unplanned events, an ALARP assessment is undertaken to demonstrate that control measures adopted reduce the impact or risk to as low as reasonably practicable (ALARP). This process relies on demonstrating that further potential control measures would require a disproportionate level of cost/effort for the level of impact or risk reduction they would provide. If this cannot be demonstrated then the further controls are implemented. The level of detail included within the ALARP assessment is based upon the nature and scale of the potential impact and risks. .

6.2 Acceptability Evaluation

Quadrant consider the impacts or risks associated with the program to be acceptable if they meet the following set of criteria:

1. A consequence from a planned event is ranked as A or B; or a risk of impact from an unplanned event is ranked low to medium/high;
2. An assessment has been completed to determine if further information/studies are required to support or validate the consequence assessment;
3. Performance standards are consistent with legal and regulatory requirements;
4. Performance standards are consistent with Quadrant Environmental Management Policy;
5. Performance standards are consistent with stakeholder expectations; and
6. Performance standards have been demonstrated to reduce the impact or risk to ALARP.

Table 6-1 and

Table 6-2 summarise the identified hazards and potential impacts associated with the activity. The table also lists the controls to prevent or mitigate impacts such that impacts and risks are reduced to ALARP and are at acceptable levels.

Table 6-1: Environmental Risk Treatment Summary for Planned Events

Event	Potential Impacts	Consequence	Management Controls	Effectiveness Control
Physical Presence/seabed disturbance	The presence of the project vessels and the operational area could potentially inhibit commercial shipping, fishing and other oil and gas activities, and the presence of vessels could pose a collision risk and inconvenience to fishing practices during these operations. Disturbance of the seabed as a result of planned activities, leading to disturbance of benthic habitat and associated marine flora and fauna.	Negligible	• Maritime notices • Regulatory notifications	Information provided on MODU arrival and departure so that the maritime industry is aware of petroleum activities (including how the site is left)
			• Quadrant Energy Stakeholder Consultation Strategy	Stakeholders are aware in advance of proposed activities to reduce the impact to them.
			• MODU identification system	MODU has a RACON (radar transponder) or Automatic Identification System (AIS) to aid in its detection at sea. This will minimise impacts from physical presence.
			• MODU move procedure • MODU station keeping system • Standby vessel	No accidental contact with the seabed and subsea infrastructure during the MODU move limiting seabed disturbance.
	IMs can be introduced by vessels carrying IMS on external biological fouling, internal systems (sea chests, seawater systems etc.), on marine equipment (ROVs etc.), or through ballast water exchange. Cross contamination between vessels can also occur. Some IMS pose a significant risk to environmental values, biodiversity, ecosystem health, human health, fisheries, aquaculture, shipping, ports and tourism.		• Biofouling vessel risk assessment (VRASS) • Australian Quarantine Inspection Service (AQIS) clearance to be in Australian waters.	An international and domestic (interstate) plying MODU or support vessel has a completed biofouling vessel risk assessment (VRASS) to reduce the risk of introduced marine species.

Light Emissions	Continuous lighting in the same location for an extended period of time may result in alterations to normal marine fauna behavior.	Negligible	• No standard controls are in place other than those required for navigational and safety requirements which are detailed in each Vessel Safety Case.	
Noise Emissions	Noise generated by the project vessels and pressure washing during the removal activity may result in physiological or behavioural impacts to marine fauna.	Negligible	• Procedures for interacting with cetaceans • MODU seismic survey procedures • Quadrant Energy HSE Coordinators	Vessels maintain distance from cetaceans to reduce noise impacts from propellers. Helicopter complies with Part 8 of EPBC Regulations for interacting with cetaceans to reduce noise impacts. Includes controls that reduce the risk of harm to marine fauna. Monitors conformance with environmental performance outcomes and standards
Atmospheric Emissions	Air emissions through the release of ozone depleting substances (ODS), and use of fuel may result in a temporary, localised reduction of air quality in the environment immediately surrounding the discharge point.	Negligible	• Fuel oil quality • Air pollution prevention certification • Ozone-depleting substance handling procedures • Well test procedures	Reduced sulphur emissions during the activity. MODU and support vessels will maintain a current International Air Pollution Prevention (IAPP) Certificate which certifies that measures to prevent ozone-depleting substance (ODS) emissions, and reduce NOx, SOx emissions during the activity are in place. Ozone-depleting substances (ODS) managed in accordance with MARPOL Annex VI to reduce the risk of an accidental release of ODS to air. Includes control measures that reduce the risk of poor quality incineration of hydrocarbons entering the atmosphere.
Planned Operational Discharges – Surface and subsea	Operational discharges will be small and depend on rainfall, machinery activity and the number of persons onboard. Discharges include sewage, brine (from desalination), cooling water, deck drainage, oily water and small volumes	Negligible	• Sewage treatment system • Deck cleaning product selection procedure • Oily water treatment system	Stipulates sewage disposal conditions and limitations Improve water quality discharge (reduce toxicity) to the marine environment Oily mixtures discharged to sea in accordance with MARPOL Annex I. to reduce impacts of planned oil

	of chemicals (e.g. corrosion inhibitor and hydraulic fluid). The small volumes of non-hazardous discharges may cause localised nutrient enrichment, organic and particulate loading, thermal impacts and increased salinity primarily in surface (<5 m) waters.		• Ballast water management plan	discharges The plan addresses requirements for compliance with the International Convention for the Control and Management of Ships' Ballast Water and Sediment 2004 regarding sediment management in ballast waters.
Drilling discharges	Environmental receptors have the potential to be impacted through smothering (sediment deposition and toxicological effects) and through reduction to water quality (turbidity and toxicological effects).	Minor	• Chemical selection procedure for drilling and completions chemicals • Water based mud (WBM) will be used during the Activity, with NAF only used as contingency; • Cuttings management system • Decision list for disposal of bulk powders, brines, and water based drilling fluids remaining on the MODU at the end of the well	Aids in the process of chemical management that reduces the impact of drilling discharges to sea. Only environmentally acceptable chemicals are used. Reduces the concentration of drilling mud on cuttings prior to discharge. Determines the most appropriate disposal method for unmixed bulk powder, brine and water based drilling fluids.
Hydrocarbon spill response (refer **Section 8**)	Impacts to the environment from implementing source control, monitoring and evaluation, oiled wildlife response and scientific monitoring include those operational impacts previously specified from the operation of vessels and aircraft. Implementing oiled wildlife response may cause additional distress, physical and behavioral impacts, separation and increased predation to wildlife if not undertaken correctly.	Minor/Medium (risk ranking)	Standard Management Controls as per above, and in addition; • Spill response has an overall net environmental benefit • Light spill onto shorelines and coastal waters is reduced to ALARP during spill response • Noise emissions reduced to ALARP during spill response • Spill response vessel emissions meet MARPOL requirements • Impacts from spill response operational discharges are reduced to ALARP • Prevention of secondary contamination of oily waste and litter during spill response • Disturbance to habitats, fauna and culturally	(refer **Section 8**)

			sensitive areas during spill response is reduced to ALARP • Additional impacts from dispersant application are reduced to ALARP • Reduce disruption to other users of marine and coastal areas and townships during spill response is reduced to ALARP	

Table 6-2: Environmental Impact Treatment Summary for Unplanned Events

Event	Potential Impacts	Consequence	Management Controls	Effectiveness of control
Marine Operations (Collision with marine fauna)	During the Activity, use of a MODU and support vessels have the potential to result in direct impacts to fauna through collisions with marine mega fauna (cetaceans, whale sharks, turtles).	Low	• Procedures for interacting with cetaceans • Quadrant Energy HSE Coordinators	Vessels maintain distance from cetaceans to reduce noise impacts from propellers. Helicopter complies with Part 8 of EPBC Regulations for interacting with cetaceans to reduce noise impacts. Monitors conformance with environmental performance outcomes and standards
Non-hydrocarbon release (surface) – liquid	An accidental release of chemicals and other non-hydrocarbon liquids into the marine environment may result in a reduction of water quality and potential toxicity impacts to local marine fauna. Ballast exchange may also result in the unplanned introduction of marine species (IMS).	Low	• Dropped object prevention procedures • Bulk liquid transfer procedures [DC-CM • Hazardous chemical management procedures • Maritime Dangerous Goods Code • Biofouling vessel risk assessment • Ballast water management plan	Minimises drop object risk during MODU lifting operations that may cause secondary spill (discharges) resulting in reduction in water quality Reduces risk of accidental discharge to sea Reduces the risk of spills and leaks (discharges) to the sea by controlling the storage, handling. and clean up. Dangerous goods managed in accordance with International Maritime Dangerous Goods Code (IMDG Code) to reduce the risk of an environmental incident, such as an accidental release to sea or unintended chemical reaction Aids in the process of chemical management that reduces the risk of accidental discharge to sea. Any international and domestic (interstate) MODU or support vessel

				has a completed biofouling vessel risk assessment (VRASS) to reduce the risk of introduced marine species. Reduce risk of introduced marine species.
Non-hydrocarbon release (surface) – solid	Non-hydrocarbon solids such as plastics have the potential to smother benthic environments and harm marine fauna through entanglement or ingestion. Release of hazardous solids (e.g. wastes) may result in the pollution of the immediate receiving environment.	Low	• Dropped object prevention procedures • Hazardous chemical management procedures • General chemical management procedures • Maritime Dangerous Goods Code • Bulk solid transfer procedure	Minimises drop risk during MODU lifting operations that may cause seabed disturbance. MODU objects dropped overboard are recovered to mitigate the environmental consequences from objects remaining in the marine environment, unless the environmental consequences are negligible or safety risks are disproportionate to the environmental consequences. *As above* *As above* *As above* Bulk solids transferred in accordance with bulk transfer procedures to reduce the risk of an unintentional release to sea
Hydrocarbon spill - minor	Accidental loss of fuel and other hydrocarbons, used or stored onboard the MODU and support vessels, during the Activity to the marine environment resulting in a reduction of water quality and potential impacts to local marine fauna.	Low	• Dropped object prevention procedures • Hazardous chemical management procedures • Bulk liquid transfer procedures • Standby vessel	Minimises drop risk during MODU lifting operations that may cause secondary spill (discharges) resulting in reduction in water quality Reduces the risk of spills and leaks (discharges) to the sea by controlling the storage, handling. and clean up. Reduces risk of accidental discharge to sea

			• Oil pollution emergency plan (OPEP) • Remotely operated vehicle (ROV) inspection and maintenance procedures • Well test procedures	Refer **Section 8** Maintenance on ROV completed as scheduled to reduce the risk of hydraulic fluid releases to sea Includes control measures that reduce the risk of hydrocarbons from entering the marine environment.
Hydrocarbon release – diesel	<u>Diesel spill</u> as a result of: • Vessel collision • Refuelling incident (fuel hose failure/rupture, coupling failure or tank overfilling) Other minor diesel spills (Structural failure of infrastructure containing diesel on vessel or MODU and Lifting – dropped objects damaging diesel infrastructure	Low	• Refer **Section 8**	•
Hydrocarbon realease (loss of containment)	<u>Loss of containment</u> (surface and subsurface) due to: • Shallow gas • Well kick • Failure to keep the hole full • Working over live well • Tripping/swabbing • Loss of primary and secondary well containment Failure to keep the correct mud density	Medium	• Well operations management system • Refer Section 8	Well integrity control measures reduce the risk of unplanned discharges to the marine environment.

7. MANAGEMENT APPROACH

The Roc-1 drilling 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 Quadrant's Management System (e.g. Environmental Management Policy).

The objective of the EP is to ensure that potential adverse environmental impacts associated with unplanned events and planned events associated with the survey, are identified and assessed, and to stipulate mitigation measures to avoid and/or reduce any adverse impacts to the 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 controls for the activities are summarised in **Section 6**. 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 relevant details of the following:

1. Environmental management policy
2. Environmental performance standards and outcomes
3. Environmental Management System including ownership and objectives, audits, monitoring and review
4. Leadership and responsibilities
5. Workforce training and competency
6. Performance review and continuous improvement
7. Records
8. Management and review of the EP
9. Routine and incident reporting

During the period that activities described in this EP are undertaken, Quadrant will ensure environmental performance is managed through an inspection and monitoring regime undertaken by Quadrant representatives or delegates based on the MODU or vessels.

Environmental compliance of an activity with the EP (and the EPO's) is measured using planned and systematic audits or inspections to identify weaknesses and non-conformances in the system and processes so that they can be identified. Improvement opportunities identified through monitoring, audits and incident investigations are implemented in a controlled manner and communicated to all relevant workforce, contractors and relevant third parties. Audits and inspections are in place to identify possible incidents and actions taken to prevent them from happening.

Non-conformances found are addressed and resolved by a systematic corrective action process and are reported to NOPSEMA where relevant.

Senior Quadrant and vessel contractor personnel will be accountable for ensuring conformance with environmental performance outcomes and standards and all personnel will be empowered to 'stop-the-job' to ensure the activity is being implemented in an environmentally responsible manner. The EP identifies specific responsibilities for each role during the activity.

Incident notification and reporting to NOPSEMA and other regulators will be conducted as per the OPGGS (E) Regulations, as detailed within the EP. Reported HSE incidents and hazards will be communicated to personnel during daily operational meetings.

8. HYDROCARBON SPILL RESPONSE ARRANGEMENTS

Credible hydrocarbon spill scenarios are identified in **Table 4-1**. In the event of a spill, initial actions will be undertaken by the Rig OIM/Vessel Master in line with the MODU/ vessel Shipboard Oil Pollution Emergency Plan (SOPEP). Should the spill require further action, such responsibilities will be taken over by the Combat Agency, in this instance Quadrant Energy in accordance with the Roc-1 Drilling Oil Pollution Emergency Plan (OPEP) (EA-00-RI-10117.02).

The following response strategies may be applied to credible spill scenarios:

- Monitor and evaluate: surveillance and spill fate modelling;
- Source control: relief well and well intervention including the use of a capping stack. Subsurface dispersant operations will be required in association with the source control strategy of capping stack;
- Containment and recovery of oil;
- Mechanical dispersion of floating oil: mechanical dispersion through use of vessels;
- Chemical dispersion of floating oil;
- Wildlife operations: including hazing and capture/treatment;
- Shoreline operations for protection/deflection and clean-up; and
- Operational and scientific monitoring: to determine extent of spill and impact and recovery assessment of sensitive marine receptors exposed to oil – tier 3 spills.

A justification and description of the strategies is provided in **Table 8-1.**

Table 8-1: Applicable oil spill response strategies for the Activity

Strategy	Applicability		Justification and Description
	Crude	Diesel	
Source control	Yes	Yes	Source control is one of the first response strategies implemented when mounting a spill response. Source control minimises the volume of hydrocarbons lost to the environment by securing the source of the spill. For diesel refuelling spills and diesel tank rupture (collision scenarios source control options include ESD of pumps, closing drainage system, implementing shipboard spill clean-up equipment, redistributing stored hydrocarbons into slack tanks or into other vessels, vessel trimming and plugging and repairing of leaks. For a loss of well control scenario, source control options include MODU ESD systems and BOP, implementing subsea response tool kit and capping stack and drilling for a relief well.
Source control (subsurface chemical dispersion)	Yes (only as part of source control)	No	In the event of a loss of well control (at the seabed), dispersants can be used to clear the water around the wellhead to maintain safe operating conditions and assist in well intervention activities. Supply of dispersant is not required until the subsurface dispersant system can be deployed and installed. Subsurface chemical dispersants will only to be used at the wellhead location where the release has occurred.
Monitor and evaluate	Yes	Yes	Monitor and Evaluate activities include vessel and aerial surveillance, spill fate modelling and use of tracking buoys. Surveillance activities are used to monitor and evaluate the dispersion of the released hydrocarbon, and to identify and report on any potential impacts to flora and fauna that may occur while the spill disperses. Surveillance results are used to assist in escalating or de-escalating response strategies as required.
Mechanical dispersion	No	No	Mechanical dispersion will not be applied to a diesel or crude spill because of the nature of the product—preferentially relying on evaporation rather than dispersing toxic components of the fuel into the water column.
Surface chemical dispersion	Yes	No	Surface chemical dispersant may be viable, either by vessel or plane. Quadrant Energy considers Legendre crude to be the closest analogue hydrocarbon during a loss of containment event from the Activity. Legendre crude is light crude with relatively low viscosity and low asphaltene content and volatilisation or evaporation is its preferred fate. There is a window of 30-72 hours post optimal evaporation time and prior to weathering beyond the ability of potential effective chemical dispersion, in which surface chemical dispersant could be applied. Chemical dispersants increase the oil concentrations in the water column and increase risk of exposure to organisms that live in the water column. Although the effect of dilution rates in the water column should not be underestimated. Chemical dispersion will only be considered when there is a net environmental benefit. Applicability of chemical dispersant is limited to the conditions and circumstances described in the OPEP (EA-00-RI-10117.02).
Protection and deflection	Yes	No	Booms can be used to create physical barriers on the water surface to protect sensitive receptors in nearshore environments in close proximity to the area requiring protection and/or in deeper water further from the protection priority with the intent of taking the oil plume off its trajectory path to the sensitive receptors. Booms can also deflect the oil spill to easier locations for other response strategies. Activities are focused on areas of high protection value in low energy environments based upon real time operational surveillance provided the

Strategy	Applicability		Justification and Description
	Crude	Diesel	
			environmental and metocean conditions are favourable for an effective implementation. Consequently, this strategy may not be applicable across all receptors identified as priority for protection. The diesel spill is not predicted to impact shorelines.
Containment and recovery	Yes	No	For a spill resulting from this Activity, volatilization/evaporation is the preferred way to remove hydrocarbons from the water surface before the risk of contacting shorelines/sensitive receptors. Applicability of containment and recovery is undertaken once maximum evaporation has occurred and only to be considered if a net environmental benefit.
Shoreline clean-up	Yes	No	This response has potential to cause more harm due to secondary disturbance associated with the clean-up than light oiling of shorelines, so applicability is based on using aerial surveillance reconnaissance, the Oiled Shoreline Response Team (OSRT) and Net Environmental Benefit Analysis (NEBA) in the shoreline clean-up assessment. Shoreline clean-up activities, dependent on the outcome of a shoreline cleanup assessment, may include the use of water flushing, sorbent pads and booms and the use of manual hand tools to remove oil residues and oiled sediment. High volume, low pressure flushing may be considered if the oil enters high priority/ slow recovery habitats such as mangroves or wetlands. The diesel spill is not predicted to impact shorelines.
Oiled wildlife response	Yes	Yes	Applicable for marine fauna that come close to the spill when on the water and shorelines and those affected by hydrocarbons. Response will be in accordance with best practice procedures as outlined within the WA Oiled Wildlife Response Plan. Hazing only is to be considered for the diesel spill due to the highly evaporative and non-persistent nature of the diesel, and the distance offshore of the drill location.
Operational and Scientific Monitoring	Yes	Yes	Operational monitoring activities include initial surveillance monitoring, hydrocarbon characterisation and weathering, shoreline and coastal habitat assessment and megafauna assessment. Scientific monitoring activities may include water and sediment quality monitoring, shoreline and coastal habitat monitoring (including sandy/rocky shores, intertidal zones and mangroves), benthic habitat monitoring and monitoring of seabird/shorebirds, marine mammals and turtles. In addition fish, fisheries and aquaculture and seafood monitoring may be initiated. Extent/impact of spill to determine the extent of operational and scientific monitoring. Resources are available to implement operational and scientific monitoring as required.
In situ burning	No	No	In-situ burning is not an applicable response strategy given several limiting factors that are likely to prevent implementation. For in-situ burning to be undertaken oil has to be thicker than 1-2 mm and as diesel and 'light oil' spills (non-persistent oil - Group II) tend to have high evaporation rates and spread into very thin films this strategy is not applicable for this activity. In-situ burning cannot be undertaken in rough conditions as containment is likely to be interrupted by winds greater than approximately 20 knots and waves are higher than 3 feet. As such, this response strategy is not applicable for this crude.

8.1 Net Environmental Benefit Analysis

During any response incident, there is a documented decision making process to ensure that response strategies are identified and evaluated prior to implementation via the Incident Action Plan (IAP). The Incident Control Team use a Net Environmental Benefit Analysis (NEBA) process to inform the development and refinement of the IAPs, to ensure the most effective response strategies with the least detrimental environmental impacts are identified, documented and executed. The Environmental Team Lead is responsible for reviewing the priority receptors identified within the EP and the OPEP, and with real time knowledge of the fate and transport of the spill, apply the NEBA.

The application of the NEBA is to:

- Identify sensitivities within the area potentially affected by a spill at that time of the year;
- Assist in prioritising and allocating resources to sensitivities with a higher ranking; and
- Assist in determining appropriate response strategies.

8.2 Oil Spill Response Resources

Oil spill response equipment and resources are a combination of Quadrant, AMOSC, AMSA, DoT, National Plan (NatPlan), OSRL, and other operator resources available through the AMOSPlan mutual aid arrangements. Under the MOU between AMSA and Quadrant, AMSA will provide all resources available through NatPlan to support an Quadrant spill response. The DoT coordinates the State Response Team (SRT) oil spill response personnel and equipment resources. The DoT will work with Quadrant in an oil spill response and will define termination criteria for the shoreline operations designed to reduce the environmental impacts and risk to as low as reasonably practicable (ALARP) in State waters. Where oil contacts shorelines in Commonwealth waters, Quadrant will work with the Department of the Environment to establish shoreline clean-up priorities, activities and termination criteria.

In the event of an oiled wildlife response, Quadrant will activate the West Australian Oiled Wildlife Response Plan (WAOWRP) and work with DPaW in determining resources and capability requirements. DPaW and Industry (AMOSC) Oiled Wildlife Advisors (OWAs) ensure minimum standards for oiled wildlife response, as outlined within the WAOWRP, are met and ensure timely mobilisation of appropriate resources (equipment and personnel) through communication with the wildlife logistics team. Quadrant are able to access:

- AMOSC core group responders;
- DPaW staff and approved volunteers/SMEs;
- Additional local resources under current contracts and suppliers; and
- Access international support through Wildlife Response Services.

During and post-spill scientific response monitoring activities require resources external to Quadrant and include specialist technical capabilities. Astron Environmental Services Pty Ltd (Astron) is contracted as Quadrant's primary control support agency for scientific response monitoring activities. If additional support is required, Quadrant has Master Service Agreements with other service providers to support scientific response monitoring activities.

9. CONTACT DETAILS

Further information about the Roc-1 drilling Activity can be obtained from:

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