Cliff Head Field Offshore Operations Environmental Plan Summary

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1 Introduction

1.1 Project Background

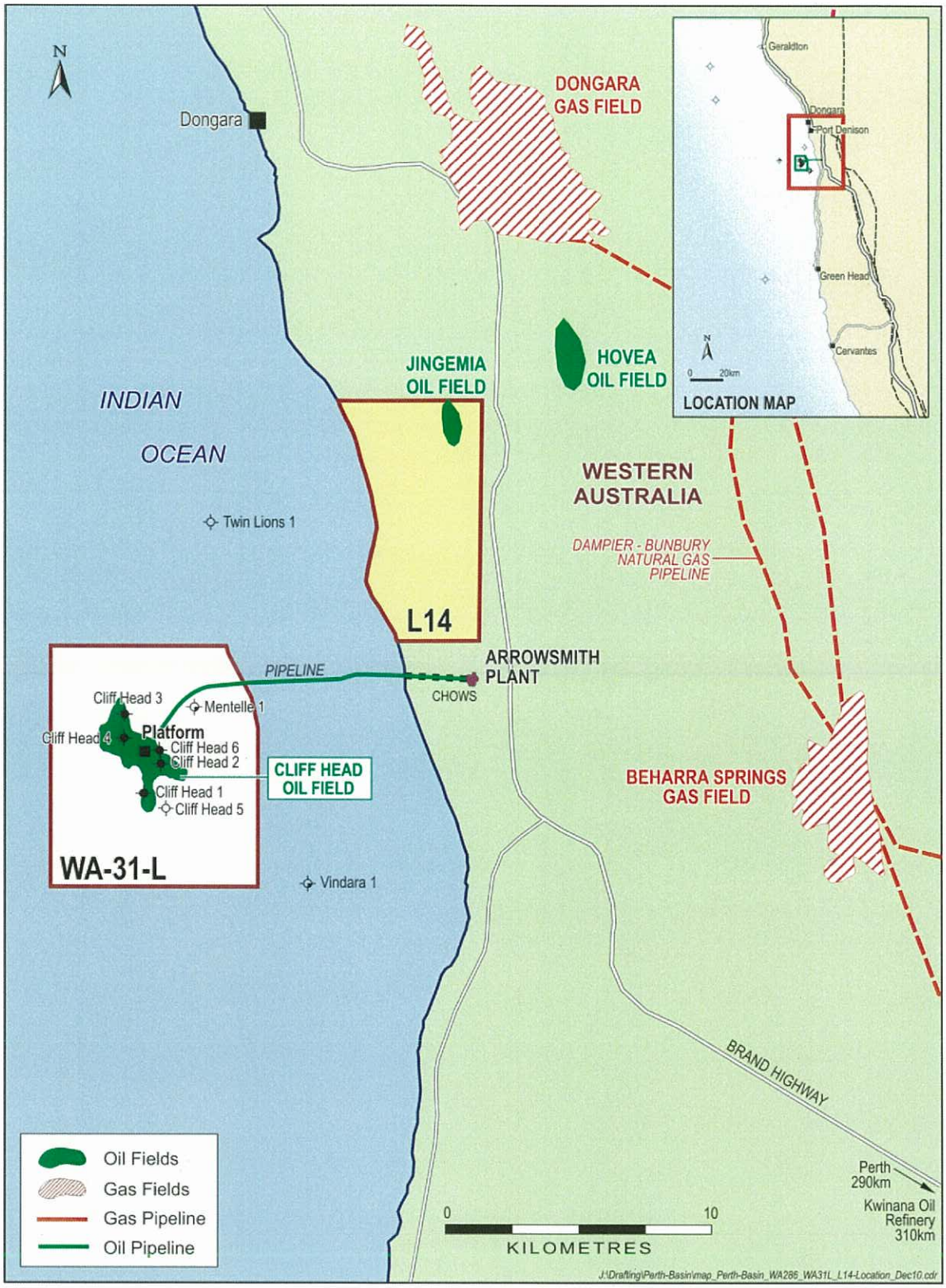
Roc Oil Company Limited ("ROC") is the Operator of the Cliff Head Oil Field development (Production Licence Area WA-31L) on behalf of the Cliff Head Joint Venture Partners (JVP). The JVP consist of:

- Roc Oil (WA) Pty Ltd (Operator): 42.5%
- AWE Oil (Western Australia) Pty Ltd: 27.5%
- AWE (Offshore PB) Ltd 30%

The Cliff Head oil field is located off the Western Australian coast approximately 20km south of the Town of Dongara. The field itself is approximately 1,260m below sea level and the closest landfall is some 11 km due east.

The Cliff Head oil field facility consists of the following infrastructure (refer Figure 1-1):

- An unmanned well head platform, Cliff Head Alpha (CHA) to accommodate the well heads and support equipment;
- Eight well heads with the current arrangement of five production wells with electrical submersible pumps (ESPs) to enable artificial lifting of the produced fluid (i.e. crude oil and water), and three water injection wells;
- An insulated subsea production pipeline, which transports the produced fluids from CHA to the onshore Arrowsmith Stabilisation Plant (ASP);
- An insulated subsea water injection pipeline from ASP to the three injection wells at CHA; and
- A subsea power and control cable, and chemical supply umbilical running from ASP to CHA.



NOTE: * CH Field outline is PSDM Robertson outline
* Well locations are TD

Figure 1-1: Cliff Head Oil Field Location

2 Location

The Cliff Head oil field is located off the Western Australian coast (Production Licence WA-31-L), west of the Big Horseshoe Reef; approximately 20 km south-southwest of Dongara. The water depth in the vicinity of the field is approximately 18 m and the closest landfall is some 11 km due east. The field itself is approximately 1,260 m below sea level. The wells are tied to a wellhead platform located at 29° 27' 00.4" S 114° 52' 12.1" E. The production and water injection pipelines traverse the seabed within Commonwealth waters, avoiding sensitive areas such as Horseshoe reef. The pipelines cross into State waters at approximately -29° 23' 59.9994" S 114° 54' 0" E.

A Petroleum Safety Zone (PSZ) of 500m has been gazetted around the CHA Platform facility.

3 Description of Activities

3.1 Overview of the Cliff Head Oil Field Development

Production from the Cliff Head Oil Field Development involves transferring oil and produced formation water (PFW) from the offshore wellhead to the ASP via the offshore and onshore pipeline. At the ASP the PFW is removed from the product stream, the crude oil is stabilised and then transferred to road tankers and transported to the BP Refinery at Kwinana for refining.

The Environment Plan considers only the offshore components of the Cliff Head development, namely those that occur beyond the Commonwealth-State boundaries at 3nm from the coastline, these are:

- Eight well heads with the current arrangement of five production wells with electrical submersible pumps (ESPs) to enable artificial lifting of the produced fluid (i.e. crude oil and water), and three water injection wells;
- An offshore well head platform (CHA);
- An insulated offshore subsea pipeline to transport the produced fluids towards shore;
- A subsea water injection pipeline from the onshore plant to the three injection wells at the Cliff Head Oil field locations; and
- Umbilical power, control and chemical supply lines running from the onshore stabilisation plant to the wellhead platform.

3.2 Offshore Platform and Wellhead

Extraction of the crude oil from the reservoir occurs on the offshore wellhead platform CHA. The CHA platform is a steel parallel 4-leg jacket complete with drilled and grouted piles through each of the legs. Production and re-injection utilises up to nine well slots, which include the following:

- Three water re-injection wells, which receive injection water from the ASP and inject it into the reservoir to aid oil production;
- Five production wells which receive crude oil and PFW from the reservoir;
- One spare well slot.

The platform will operate unmanned except for periodic visits for maintenance and inspection. During normal operations, helicopter visits are fortnightly. During workover operations, there are two trips daily.

The wellhead platform covers an area of approximately 10m by 30m and stands 12m clear of the sea surface. It is designed and constructed to enable complete removal upon decommissioning.

CHA is controlled remotely from the Central Control Room (CCR) at the ASP. All critical operating and safeguarding parameters are monitored at this location, with facility for the operator to adjust set points and reset limited trips.

The crane on the CHA has a fuel tank capacity of 1100L. Bunding on CHA has a total volume of 19.6m^3 to contain any leaks on the platform.

3.3 Offshore Pipeline

The Cliff Head development includes the operation of two pipelines:

- The production pipeline carries the well stream fluids from the wellhead platform (CHA) to the onshore plant (ASP).
- The water injection pipeline, transports PFW and additional make-up injection water from the ASP to CHA.

The two pipelines are essentially identical in size (273.1mm, i.e. 10") and design, they are constructed from steel (wall thickness 14.3mm) and insulated with special high-density polyurethane foam and encased in concrete (concrete thickness is 25-40 mm).

In addition, there is an 80mm integrated power cable complete with fibre optic cables and a 60mm umbilical flat pack for the chemical injection fluids. Both the power cable and umbilical are strapped to the production line.

The pipeline system includes an offshore and onshore component. At CHA the pipeline is tied into the platform riser using flanged connected spool pieces. The offshore pipeline then runs 10.4 km along the seabed from the CHA to the shore crossing. The offshore component of the pipeline is unburied and uses the concrete coating weight ~~and rock bolting~~ to provide stability.

3.4 Helicopter and Support Vessel

Personnel and light equipment will be transferred to the platform primarily by dedicated helicopter which is based at Dongara. Helicopter refuelling will not be undertaken on CHA. Secondary transport can be by support vessel. Support vessels will be contracted as and when they are required. The maximum fuel tank size of any support vessel will not exceed 500m^3. The vessel will have an implemented and tested Shipboard Oil Pollution Emergency Plan (SOPEP), in accordance with Regulation 37 of Annex I of MARPOL 73/78. Vessels will only anchor in emergency situations, outside of the exclusion zone and avoiding sensitive habitats where possible.

The support vessel and helicopter will be available for oil spill monitoring (as required). Additionally, the helicopter will be available for medivac.

4 Description of the Environment

4.1 Regional setting

The Cliff Head A unmanned platform is located in the Perth Basin, which is a large (172,300 km^2) sedimentary basin extending approximately 1,300 km along the south-western coast of Australia in a north to northwest direction. License area WA-31-L in which Cliff Head A platform is situated, is located in the northern offshore Perth Basin in the South West Marine Region (SEWPAC, 2012). The bathymetry of the block ranges from intertidal to approximately 28m water depths. The field location is in water depths ranging from 10 to 20 m.

4.2 Physical environment

4.2.1 Climate

The oil field is within a region that has a Mediterranean type climate characterised by seasonal patterns of hot, dry summers and mild, wet winters, with a low number of rain days. The highest temperatures occur in January and February (19.2 to 32.4 ºC) while the lowest temperatures occur in August (8 to 19.5 ºC). There is a dominant winter rainfall with approximately 86% of annual rainfall occurring between April and September. During summer months, rainfall is uncommon with only 70 mm expected between October and March (Pearce, 1997).

Winds over the region are relatively strong (mean 12–16 knots; maximum 30–35 knots) and are most frequently from the northwest during the summer months (September to February) and from the southeast during the winter months (May to July). March, April and August are transitional months where the wind can be from either the northwest or southeast (Pearce, 1997).

Three classes of storm have been identified for the region; 1) brief squalls which may occur between December and April, 2) tropical cyclones in the area occur roughly one in every three years and are most common between January and April; these can generate potential destructive, extremely high wind speeds, an 3) extra-tropical cyclones which occasionally pass south of Geraldton during winter. These winter gales can generate gusts of up to 35 m per second (126 km/hr), initially from the northwest and gradually moving around to southerly as the cyclone passes through the area (Pearce, 1997).

4.2.2 Hydrology and Oceanography

Water circulation in the area is primarily influenced by wind-driven currents, although localised wave-forced currents may occur around the shallow reefs, particularly during large swell events. As a result of the strong land/sea breezes, seas are slightly greater than swell in summer. Oceanic swells predominantly arrive from the southwest during summer. The Leeuwin Current is the dominant oceanic current in the region. It draws warm, low salinity water of tropical origin southwards along the coast of Western Australia. This current flows all year round but is strongest during the southern hemisphere winter. In general, the Leeuwin current runs along the shelf break, although meanders, occasionally passing well out at sea and sometimes close to the shelf. The Leeuwin Current is weakest in summer (November to March) when winds blow from the south. Typically the current and its eddies are about 1 knot (0.5 m/s) (Pearce, 1997).

4.2.3 Water quality

The waters of the temperate coastal ecosystems of Western Australia in the vicinity of Cliff Head A platform are nutrient-poor as a result of both low riverine inputs and the absence of significant upwelling of nutrient rich waters from the deeper ocean (Pearce, 1997). Low concentrations of dissolved inorganic nitrogen limit biological productivity which, as a result, are characterised by a low standing crop of plankton and high water clarity. Primary production in these ecosystems is driven by benthic plant communities, typically consisting of extensive macroalgal communities and perennial seagrass meadows.

4.3 Ecological Environment

4.3.1 Benthic Habitats

The development area lies within the 'Central West Coast' meso-scale region according to the IMCRA classification (IMCRA, 1997). The region is characterised by a relatively narrow continental shelf with diverse moderate energy coastal landforms (IMCRA, 1997). The area has a range of temperate species and is also at the southern limit of a suite of sub-tropical and tropical species.

Between the outer reefs and seaward limit of Western Australia's territorial waters, the seabed consists of virtually uninterrupted limestone pavement that drops from around 18 m to approximately 40 m (Morrision *et al.*, 2006). This creates an offshore environment which is a mosaic of limestone reefs and platforms, sandy mobile seafloor and beds of algae and seagrass. A high diversity of invertebrates is often associated with limestone reefs and seagrass meadows.

4.3.2 Marine Fauna

The EPBC Act Protected Matters Database search identified 20 threatened (endangered or vulnerable) marine species, 15 of which are also migratory; in total there were 26 migratory species (Table 4-1). No threatened ecological communities or recorded sensitive environments at the Cliff Head platform, or the surrounding 10 km buffer, were identified.

Table 4-1: Listed threatened and migratory marine species which may occur at the location of the Cliff Head platform and the 10 km buffer.

Species	Scientific name	EPBC Act status	Type of presence
Birds			
Australian Lesser Noddy	*Anous tenuirostris melanops*	Vulnerable	Species or species habitat may occur in area
Amsterdam Albatross	*Diomedea exulans amsterdamensis*	Endangered Migratory	Species or species habitat may occur in area
Tristan Albatross	*Diomedea exulans exulans*	Vulnerable Migratory	Species or species habitat may occur in area
Wandering Albatross	*Diomedea exulans (sensu lato)*	Vulnerable Migratory	Species or species habitat may occur in area
Southern Giant-Petrel	*Macronectes giganteus*	Endangered Migratory	Species or species habitat may occur in area
Northern Giant-Petrel	*Macronectes halli*	Vulnerable Migratory	Species or species habitat may occur in area
Flesh-footed Shearwater,	*Puffinus carneipes*	Migratory	Species or species habitat likely to occur in area
Bridled Tern	*Sterna anaethetus*	Migratory	Foraging, feeding or related behaviour may occur within area
Caspian Tern	*Sterna caspia*	Migratory	Foraging, feeding or related behaviour may occur within area
Roseate Tern	*Sterna dougallii*	Migratory	Foraging, feeding or related behaviour may occur within area
Soft-plumaged Petrel	*Pterodroma mollis*	Vulnerable	Species or species habitat may occur in area
Indian Yellow-nosed Albatross	*Thalassarche carteri*	Vulnerable Migratory	Foraging, feeding or related behaviour may occur within area
Shy Albatross,	*Thalassarche cauta cauta*	Vulnerable Migratory	Species or species habitat may occur in area
Fork-tailed Swift	*Apus pacificus*	Migratory	Species or species habitat likely to occur in area
Great Egret	*Ardea alba*	Migratory	Species or species habitat likely to occur in area
Marine mammals			
Bryde's Whale	*Balaenoptera edeni*	Migratory	Species or species habitat may occur in area
Blue Whale	*Balaenoptera musculus*	Endangered Migratory	Species or species habitat may occur in area

Species	Scientific name	EPBC Act status	Type of presence
Southern Right Whale	*Eubalaena australis*	Endangered Migratory	Species or species habitat likely to occur in area
Humpback Whale	*Megaptera novaeangliae*	Vulnerable Migratory	Species or species habitat known to occur in area
Dusky dolphin	*Lagenorhynchus obscurus*	Migratory	Species or species habitat may occur in area
Orca	*Orcinus orca*	Migratory	Species or species habitat may occur in area
Australian Sea-lion	*Neophoca cinerea*	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Marine reptiles			
Loggerhead Turtle	*Caretta caretta*	Endangered Migratory	Foraging, feeding or related behaviour likely to occur within area
Green Turtle	*Chelonia mydas*	Endangered Migratory	Foraging, feeding or related behaviour likely to occur within area
Leatherback Turtle	*Dermochelys coriacea*	Endangered Migratory	Foraging, feeding or related behaviour likely to occur within area
Flatback Turtle	*Natator depressus*	Vulnerable Migratory	Foraging, feeding or related behaviour likely to occur within area
Fish			
Grey Nurse Shark	*Carcharias taurus*	Vulnerable	Species or species habitat may occur in area
Great White Shark	*Carcharodon carcharias*	Vulnerable Migratory	Species or species habitat likely to occur in area
Whale Shark	*Rhincodon typus*	Vulnerable Migratory	Species or species habitat may occur in area
Porbeagle	*Lamna nasus*	Migratory	Species or species habitat may occur in area

Cetaceans

The EPBC Act Protected Matters Database search identified three whale species listed as threatened in which they, or their habitat, may be present in the area of and surrounding the Cliff Head platform; the blue whale (*Balaenoptera musculus*), the humpback whale (*Megaptera novaeangliae*) and the southern right whale (*Eubalaena australis*).

The blue whale is a migratory threatened species under the EPBC Act and is listed as 'endangered' by the IUCN (IUCN, 2013). They are widespread in all Australian waters at various times of year and may be encountered in the vicinity of the Cliff Head platform

Humpback whales, northbound migration occurs between mid-June and mid-July, while the southbound migration occurs between October and November (Jenner et al., 2001). The migratory path of the humpback whale stock off WA covers approximately 3,600 nautical miles (nm) (Jenner *et al.*, 2001). Within the region, it is considered that the whales follow a predictable migratory pattern within the continental shelf boundary (200 m bathymetry) and between the Houlman Abrolhos Islands and the mainland (> 30 nm offshore). Northward migration is generally offshore, whereas southward migration is typically closer to the coastline.

The migratory patterns of the southern right whale, a vulnerable listed EPBC Act species, are less well known than the humpback. The species is pelagic, in summer foraging in the open Southern Ocean (Bannister *et al.* 1996). During the winter and spring period, occasional sightings of southern right whales have been made as far north as Geraldton.

Pinnipeds

Australian sea lions are regularly observed feeding around the larger reefs in the area. The nearest breeding grounds are on the Beagle Islands some 35 km to the south and the Abrolhos Islands approximately 100 km northwest of the area, and therefore may be present in, or transiting through, the area close to the Cliff Head platform.

Marine reptiles

A search of the EPBC Act Protected Matters Database found four species of marine turtles that may occur in, or relate to, the survey area (Table 4-1); the loggerhead turtle (*Caretta caretta*), the green

turtle (*Chelonia mydas*), the leatherback turtle (*Dermochelys coriacea*) and the flatback turtle (*Natator depressus)*. Turtles are oceanic species except at nesting time when they come ashore. The nesting season is species-dependent, but generally occurs between September and March (Pendoley, 2005).

No biologically significant areas (i.e. feeding, breeding or migratory pathways) for the green, leatherback or flatback turtle are recorded at, or in proximity to, the Cliff Head platform, therefore, these species would, at most, transit through the area.

Fish

Great white sharks are often found in regions with high prey density, such as pinniped colonies (DEWHA 2009). As a result of their migratory nature and the presence of Australian sea lion colonies, great white sharks may be present in the vicinity of the Cliff Head platform.

The grey nurse shark (*Carcharias Taurus*) (west coast population) is listed as vulnerable under the EPBC Act.. Grey nurse sharks may be present in the proximity of the Cliff Head platform as it contains suitable habitat, although their highly migratory nature and lack of sightings suggest that there will not be significant numbers.

The whale shark (*Rhincodon typus*), a migratory species listed as vulnerable under the EPBC Act are known to aggregate in the waters adjacent to North West Cape in late March to early May, with the largest numbers being recorded in April. Due to their widespread distribution and highly migratory nature, whale sharks may occur, albeit in very low numbers, in the Cliff Head development area.

The diverse range of ecological niches afforded by the patch reefs across the region would be expected to provide suitable habitat for the listed *Osteichthyes* species of seahorses, seadragons and pipefish.

Key fish species which may be spawning within the are overlapping and adjacent to the permit block, including key habitat. Reef associated fishes, such as scalyfin (*Parma* spp.) and wrasse (*Labridae* spp.) are common, along with commercial species such as baldchin groper (*Choerodon rubescens*) and dhufish (*Glaucosoma hebraicum*) on outer reefs. Offshore, pelagic fishes such as Spanish mackerel (*Scomberomorus commerson*) and Samson fish (*Seriola hippos*) also occur.

Seabirds

Nine species of marine birds listed as threatened on the EPBC Protected Matters Database may occur at, or in proximity to, the Cliff Head platform. Seabirds may either pass through the region or use the waters within and near to the permit area as their main habitat. Shoreline species may pass through the permit area during migrations, or enter for short periods during foraging. The majority of the species listed in Table 4-1 utilise the Houtman Abrolhos Islands for breeding and the surrounding waters for foraging. These islands are used year round by the high diversity of avifauna which has variable breeding seasons.

Crustaceans

The western edge of the development area is an area of lobster breeding. Rock lobsters are found all around the Australian coast sheltering in caves and crevices during the day and moving out at night to forage in surrounding areas. The western rock lobster (*Panulirus cygnus*) supports the most valuable single species fishery in Australia.

4.4 Socio Economic Environment

The development area is located adjacent to the Shire of Irwin, in the Mid-West region of Western Australia. The twin towns of Dongara and Port Denison are the nearest townships to the development.

4.4.1 Fisheries

There are a number of Commonwealth and State administered fisheries that are known to have, or may have, fishing permit areas/zones that overlap the location of the Cliff Head platform. The fisheries have differing levels of fishing effort and areas of operations over the year:

Commonwealth

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

WA State

- Western Rock Lobster Fishery;
- Mackerel Fishery
- West Coast Demersal Suite;
- Marine Aquarium Fishery; and
- Specimen Shell Fishery.

Recreational Fishing

Recreational fishing is a key activity around the Abrolhos Islands, mostly within the islands state waters and charter fishing is a growing activity in the area. The Abrolhos Islands are 112 km from the Cliff Head platform and therefore it is possible that recreational fishing vessels may be present in close proximity to the exclusion zone. However, vessel presence is variable and seasonal peaks will exist.

4.4.2 Petroleum Exploration and Production

Permit WA-31-L, in which the Cliff Head platform is located, abuts and is partially surrounded by the exploration permit WA-481-P. Eleven wells have been drilled within Permit area WA-481-P, including nine new field wildcat wells and two appraisal wells. Production License WA-31-L, directly adjacent to Release Permit area WA-481-P, includes two exploration wells and 12 extension/appraisal and development wells in the Cliff Head oil field. Two exploration wells have been drilled in State Waters directly adjacent to the permit area (DoRET, 2011).

4.4.3 Shipping

Due to the proximity of the Cliff Head platform to the shoreline (~11 km), high levels of shipping traffic is not expected within the 500 m exclusion zone of Cliff Head platform.

4.4.4 Tourism

Tourism operations occur in the Abrolhos Islands and Jurien Bay Marine Park. The Houtman Abrolhos Islands are an A-Class Reserve managed by the Department of Fisheries for the conservation of flora and fauna, for tourism and for purposes associated with fishing and aquaculture industries. Tourism at the Abrolhos Islands includes scuba diving, fishing and sightseeing activities. Similar activities also occur in the Jurien Bay Marine Park which is a multiple use reserve that caters for a wide range of activities.

Given that the Abrolhos Islands are 112 km from the Cliff Head platform, and Jurien Bay Marine Park 68 km, it is unlikely that the activity will interfere with tourism in either these locations.

4.4.5 National Heritage

There are no national or world heritage sites in the permit area. The Cliff Head platform is approximately 160 km to the south east of one National Heritage Place, the Batavia Shipwreck Site and Survivor Camps Area 1629 – Houtman Abrolhos, Wallabi Group via Houtman Abrolhos.

The nearest World Heritage properties are Shark Bay and The Ningaloo Coast located over 300 km respectively from the Cliff Head platform.

4.4.6 Indigenous Heritage

No indigenous heritage values have been identified in the permit area.

4.4.7 Non-Indigenous Heritage

No non-indigenous heritage values have been identified at or close to the Cliff Head platform. Some of the rock lobster fisherman's huts in the Abrolhos may have heritage interest.

4.4.8 Key Ecological Features

Two Key Ecological Features (KEFs) are present in or adjacent to the permit area, these are:

1. Commonwealth marine environment surrounding the Houtman Abrolhos

The Commonwealth marine environment surrounding the Houtman Abrolhos Islands has conservation value as an area of high biodiversity and endemism in benthic and pelagic habitats. It provides important foraging habitats for globally important seabird breeding colonies.

2. Western Rock Lobster

The western rock lobster has conservation value because of its presumed ecological role on the west coast continental shelf. This species is the dominant large benthic invertebrate in this bioregion. The lobster plays an important trophic role in many of the inshore ecosystems of the Southwest Marine Region. Western rock lobsters are an important part of the food web on the inner shelf, particularly as juveniles.

4.4.9 Environmentally Sensitive Areas

A search of the EPBC Protected Matters Database did not indicate that there were any conservation areas overlapping with the Cliff Head platform. However, the Cliff Head platform is 53 km to the Abrolhos Commonwealth Marine Reserve, and 80 km to the Jurien Bay Commonwealth Marine Reserve. In State waters, the Cliff Head platform is 105 km from the Abrolhos Islands' Fish Habitat Protection Area declared under the WA Fish Resources Management Act and 68 km to the Jurien Bay Marine Park.

4.4.10 Shipwrecks

Although there are a number of shipwrecks north of the proposed area, there are no known significant shipwrecks nearby to the offshore platform site.

4.4.11 Defence

The Cliff Head platform overlaps with restricted airspace R131G which is described as 'non-controlled' airspace. While it is unlikely that the activities at Cliff Head platform are unlikely interfere with defence activities, the use of helicopters to service the platform has potential to disrupt activities and therefore defence stakeholders were consulted by ROC Oil. The consultation has revealed no potentially conflicting activities.

5 Assessment of Environmental Effects & Risks

5.1 Potential Environmental Effects Identification

This section assesses the environmental effect of the production phase of the Cliff Head development activities on the environment, identifies mitigation measures to address and minimise these impacts and assesses the inherent environmental risk with these measures implemented.

Environmental aspects/activities with the potential for impact from the Cliff Head Operations are:

Planned Activities

- All operational activities
  - Noise;
  - Artificial light;
  - Interference with other sea users;
  - Seabed disturbance;
- Support / standby vessels;
  - Introduction of Invasive Marine Species (IMS);
  - Planned discharges;
  - Vessel presence;
- Cliff Head platform operations;
  - Contaminated drainage water and waste oils;
  - Waste management;
- CTU/HWU operations;
  - Work-over emissions;
  - Combustion emissions;

Unplanned Activities

- Crude, diesel, chemical, workover and Produced Formation Water (PFW) spills.

For planned activities and unplanned activities, implemented control measures identified in Table 5-1 and Table 5-2 respectively, ensure that the environmental risks associated with these impacts are as low as reasonably practicable (ALARP). Control measures are taken into consideration in calculating the residual risk associated with the activity of impact reflected in Table 5-1 and Table 5-2.

Table 5-1: Risk Assessment Summary: Planned Activities

Aspects	Impacts	Management/Mitigation Measures	Mitigated Risk
PLANNED ACTIVITIES:	**OFFSHORE (PLATFORM & SUBSEA PRODUCTION PIPELINES)**		
All operational activities:			
Noise (e.g.. helicopter, vessel operations, work over activities)	Disturbance and displacement of marine fauna	• Offshore equipment appropriately maintained and selected minimises noise emissions • Compliance with the requirements of the Australian National Guidelines for Whale & Dolphin Watching (DEW, 2005) • Cetacean sighting data will be collected during activities and will be forwarded to Department of Sustainability, Environment, Water, Population and Communities (SEWPAC).	**Low**
Artificial light	Disturbance and displacement of marine fauna	• Non-essential lighting will be switched off when possible without compromising safety • Routine vessel and helicopter transfers will only occur during daylight hours	**Low**
Seabed disturbance - dropped equipment, anchoring	Seabed disturbance to benthic habitats Fishing snag	• Environmental induction for all personnel • Recording and reporting of any dropped objects • Retrieval of large dropped objects • Weather limitations on lifting events • Vessels will only anchor in emergency situations, outside of the exclusion zone and avoiding sensitive habitats where possible.	**Low**
Interference with other sea users Commercial fisheries	Disruption to vessel activities	• There is a 500m-radius exclusion zone maintained around the platform for all third party vessels except Zone B commercial rock lobster fishers. • Consultation with local tourism, AMSA, fishermen and Department of Defence	**Low**
Recreational fishers			**Low**
Shipping			**Low**
Support Vessel:			
Introduction of IMS	Disturbance and displacement of	• Vessels will be sourced and work routinely from local ports where possible	**Low**

Aspects	Impacts	Management/Mitigation Measures	Mitigated Risk
PLANNED ACTIVITIES:		**OFFSHORE (PLATFORM & SUBSEA PRODUCTION PIPELINES)**	
	endemic flora/fauna	• No ballast exchange water on location at CHA • No ballast discharge or hull cleaning on location at CHA	
Planned discharges	Deck drainage Toxicity impacts to marine flora and fauna Reduction in water quality	• High standards of house-keeping maintained on vessels • Bunding (temporary or permanent) is provided for those areas/activities with increased risk of oil/chemical spill; • Spill material removed prior to any deck washing activities; • Absorbent material, used for cleanup, is containerised and sent to shore as hazardous waste; • Material Safety Data Sheets are available for all chemicals used (includes spill response requirements); • Chemicals used are assessed for environmental impact prior to purchase (e.g. fully biodegradable detergent).	**Low**
	Equipment / machine space drainage Toxicity impacts to marine flora and fauna Reduction in water quality	• Equipment and machine spaces are fully contained and have dedicated drains leading to the bilge water system for oily waste products • Oily residues collected in this system are containerised in transit tanks and returned to shore for disposal • When stationary, oily water mixtures contained onboard	**Low**
	Sewage, greywater and food scraps Toxicity impacts to marine flora and fauna Reduction in water quality	• Personnel will be briefed on environmental sensitivities of the region • Equipment will be maintained in accordance with manufacturers' specifications	**Low**
	Cooling water Reduction in water quality	• Engine maintained with manufacturers specification • Biocide dosage maintained at minimum dosage required to maintain system. • Cooling water will be discharged above surface waters to allow rapid cooling of water before it reaches marine waters.	**Low**

Aspects	Impacts	Management/Mitigation Measures	Mitigated Risk
PLANNED ACTIVITIES:		**OFFSHORE (PLATFORM & SUBSEA PRODUCTION PIPELINES)**	
Vessel presence	Behavioural disturbance and physical injury of cetaceans, turtles, seabirds and large fish.	• Low speed of support vessels allow greater response time for whale or vessel to avoid collision • Whale & Dolphin sighting reports will be completed and submitted by all vessels to SEWPAC • All mobile vessels will adhere to proximity distances contained in the 2005 Australian National Guidelines for Whale & Dolphin Watching (DEWHA, 2005) • All crew will be provided with environmental induction to ensure requirements are understood • Roc Oil Whale Interaction Guidelines detailing observation, response and reporting procedures employed for cetaceans near work site	**Low**
Cliff Head platform: - normal operations (no workover)			
Contaminated Drainage and Waste Oils	Impacting on sea life and coastal environment including reef and sea grass habitat.	• All hydrocarbons and contaminated water collected and stored in leak-proof containers and removed from site for disposal onshore. • Deck drainage during manned activities on the platform is controlled via the Controlled Use of Drains on CHA Platform Procedure *(10/HSEQ/ENV/PC02)*. • At the end of each maintenance period the equipment is cleaned, the decks washed-down and all liquids collected for disposal onshore. • The main and cellar decks on the platform are designed with plating and perimeter bunds (inverted half-pipe or kick-plate) to contain spillage and wash water.	**Low**
Waste Management	<u>Domestic and industrial waste</u> Waste discharge to sea will result in litter/pollution that will impact the planktonic or benthic communities due to reduced water quality Injury or death to marine fauna and seabirds from ingestion or entanglement with rubbish	• Solid waste will be segregated into covered marked skips of collection area prior to disposal at an appropriate site onshore. • Solid wastes will be contained in a single container and transported offsite for recycling or disposal onshore • Care will be taken to ensure all wastes are contained and not blown overboard (e.g. waste skips and rubbish bins will be covered to contain wastes) • Induction covering waste management to all project personnel working offshore • Any spills or leaks of chemicals or hydrocarbons to deck will be cleaned	**Low**

Aspects	Impacts	Management/Mitigation Measures	Mitigated Risk
PLANNED ACTIVITIES:		**OFFSHORE (PLATFORM & SUBSEA PRODUCTION PIPELINES)**	
		up immediately	
	NORM waste Harmful low-level radioactive discharges (NORM) to the marine environment and impact on health of humans	• Identify materials with radiation levels above background levels (undertaken by trained radiation specialists) in accordance with Radiation Management Plan (10/HSEQ/GEN/PL09) • Cap pipe, segregate and containerise all NORM wastes clearly identifying and send onshore for further onshore assessment and possible treatment/disposal via water injection system. • Carry out offshore radiation surveys to confirm exposure risks and identify above-background radiation areas (undertaken by trained radiation specialists). • Implement NORM awareness, management and OHS protection measures for all personnel • Establish area entry protocols with clear identification of potential hazards	**Low**
	Cuttings from Milling Operations Reduction in water quality Physical effects of smothering for benthic habitats Reduction of light availability to primary producers	• Cuttings are generated in milling will be separated by the shale shaker and collected in skips for disposal onshore.	**Low**
Cliff Head platform - CTU/HWU operations			
Work-over emissions	Greenhouse Gas Contributor Lost resource	• Well circulated to brine prior to work-over and fluid maintained over balance (fluid monitored) • Degasser unit vents gas to safe location	**Low**
Combustion products- HWU engines, helicopter, support and stand-by vessels	Reduction in air quality Aesthetic impacts of smoke Greenhouse Gas Contributor	• Regular equipment monitoring and maintenance undertaken to ensure maximum efficiencies; • Fuel use monitored and equipment performance assessed	**Low**

Table 5-2: Risk Assessment Summary Unplanned Activities

Aspects	Impacts	Management/Mitigation Measures	Mitigated Risk
UNPLANNED ACTIVITIES:		**OFFSHORE (PLATFORM & SUBSEA PRODUCTION PIPELINES)**	
CHA Spills:		**Crude Oil Diesel, Chemical & Work Over Spills**	
Loss of well control (including workover activities) as a result of equipment failure or mechanical damage as a result of vessel collision with CHA Worst case release volume ~15m^3 Cliff Head crude	Oil Spill causing injury or death of marine fauna and pollution of coastal habitat	• Fully plated and bunded cellar deck to minimise oil spilling into sea. • Flow-lines equipped with a choke valve, oil-water flow meter and sample collection point to allow monitoring; • Automatic low-pressure shutdown; • Remote shutdown capability from onshore • Personnel trained in Emergency Response Plan and Oil Spill Contingency Plan (OSCP); • Local inspection or CCTV to identify leaks • Oil spill equipment will be maintained at the ASP, at Port Authorities • Member of AMOSC for spill response; • All necessary equipment maintained functional and accessible; • Oil spill trajectory modelling undertaken to aid response planning and implementation • Environmental inductions covering oil spill prevention, response, recovery, and waste. • The composition of the workover fluid is constantly monitored to ensure sufficient density to control subsurface pressures; • CHA crane, rigging and lifting connections (designed, constructed and installed to appropriate standards and codes) are inspected and maintained fit-for-purpose; • Lifts will occur after pre-planning/JSEA, in favourable weather conditions and under a PTW; • During heavy lifts production will be shut-in to minimise losses should an incident occur; • Dropped objects onto CHA platform which might result in equipment damage are located within platform bunding; • No lifting activity will occur over subsea equipment (e.g. flowlines, etc);	**Medium**

Aspects	Impacts	Management/Mitigation Measures	Mitigated Risk
UNPLANNED ACTIVITIES:		**OFFSHORE (PLATFORM & SUBSEA PRODUCTION PIPELINES)**	
		• A dropped object analysis will assess lifting risk posed by heavy objects.	
Pipeline leaks as a result of corrosion or damage to pipeline Worst case release volume 334 m^3 Cliff Head crude	Oil Spill causing injury or death of marine fauna and pollution of coastal habitat	• Heavy walled pipe designed to withstand certain fishing vessel collisions & accommodate rock lobster fishermen • Continuous corrosion control system that measures the rate of corrosion in the pipeline. • Rate of corrosion will be continuously monitored and recorded. The pipeline route is provided on marine charts. • Standard maritime safety procedures will be adopted. • Low level of marine traffic in vicinity of the pipeline • The capacity to conduct remote shutdown from onshore control room to isolate the down-hole • CHA crane, rigging and lifting connections (designed, constructed and installed to appropriate standards and codes) are inspected and maintained fit-for-purpose; • Lifts will occur after pre-planning/JSEA, in favourable weather conditions and under a PTW; • During heavy lifts production will be shut-in to minimise losses should an incident occur; • A dropped object analysis will assess lifting risk posed by heavy objects.	**Medium**
Deck spills as a result of equipment failure or damage. Worst case release volume <1.8m^3 marine diesel	Water quality impacts Marine fauna impacts	• Any equipment or machinery with the potential to leak oil will be enclosed in continuous bunding. • Environmental induction for chemical and hydrocarbon management (good housekeeping), as well as spill prevention and response measures. • Strict adherence to lifting and handling procedures with experienced crew. • All chemicals (environmentally hazardous) and hydrocarbons will be stored in appropriately bunded areas • All chemical and hazardous wastes are documented, tracked and segregated from other streams of operational wastes into clearly marked containers prior to onshore disposal.	**Low**

Aspects	Impacts	Management/Mitigation Measures	Mitigated Risk
UNPLANNED ACTIVITIES:		**OFFSHORE (PLATFORM & SUBSEA PRODUCTION PIPELINES)**	
		• High standards of housekeeping will be maintained and verified through audits and inspections. • A Material Safety Data Sheet (MSDS) will be available for all onboard chemicals and hydrocarbons. • Spill response bins/ kits will be located in close proximity to hydrocarbon storage areas. The kits will be checked for their adequacy and replenished as necessary. • Chemical and hydrocarbon spills will be immediately cleaned up and contaminated material will be contained for onshore disposal. • Detailed records of hazardous waste accidentally discharged will be maintained and reported appropriately. • All machinery and equipment containing hydrocarbons are maintained in accordance with manufacturer's maintenance specifications.	
Vessel Spills:		**Diesel Spills**	
Rupture of support vessel fuel tank due to vessel collision or grounding. Worst case release volume 500m^3 marine diesel	Diesel fuel spill causing injury or death of marine fauna and pollution of coastal habitat	• Rigorous Marine Contractor selection (i.e. suitably qualified and experienced); • Vessels maintained (navigation/communication systems, propulsion and steering); • Marine operations undertaken in fair weather only visible to all other vessels; • Observance of the requirements of the Offshore Support Vessel (OSV) Code; • Operate in accordance with an approved SIMOPS Plan; • Recognised transit routes to/from the platform; • Vessels travel at low speed within the PSZ; and • Vessels navigation and communication systems (to SOLAS/Class/AMSA Regulations) are regularly maintained and tested. • Adherence to the requirements of the COLREGS. • The support vessel has an implemented and tested SOPEP • Hydrocarbons located above deck will be stored with secondary containment e.g. bund, containment pallet, transport packs etc.in accordance with MARPOL requirements.	**Medium**

Aspects	Impacts	Management/Mitigation Measures	Mitigated Risk
UNPLANNED ACTIVITIES:		**OFFSHORE (PLATFORM & SUBSEA PRODUCTION PIPELINES)**	
Leakage or spillage from support vessel decks due to equipment failure or damage Worst case release volume <80 L marine diesel	Diesel fuel spill causing injury or death of marine fauna and pollution of coastal habitat	• SOPEP onboard vessel with training and drills as part of vessel operations. • Spill response bins/kits will be located in close proximity to hydrocarbon storage areas for prompt response in the event of a spill or leak. The kits will be checked for their adequacy and replenished as necessary prior to the commencement of activities and on a regular basis thereafter. Identified personnel will be trained in use of this equipment.	**Low**
CHA Spills:		• **Chemical Spills**	
Chemical releases offshore due to loss of integrity of the chemical umbilical failure at the chemical injection unit. Worst case release volume <190L	Spill may cause changes in plankton or benthic communities due to reduced water quality	• Chemicals stored on CHA platform are minimised; • Chemicals are stored in contained areas onboard the platform; • Chemicals are assessed for environmental hazard prior to introduction to platform (refer Appendix A); • Chemical storage and handling areas are routinely inspected for leaks and spills and if detected, are cleaned-up immediately; • CHA has been designed with deck drains to contain spillage and wash water with containment of 19.6m^3. • Training is provided for those personnel handling chemicals and operating the CHA drain system; • Containment system is routinely monitored; • MSDSs are to be made available for all chemicals; and • Spill kits to be provided in appropriate locations. • Operational risk reduction measures for the management of process chemicals and associated spills are outlined in Chemicals Management (10/OP/GO/PC06) • Leaks from the chemical pipeline will be reduced through the following controls: • A heavy walled pipe • A continuous corrosion control system has been put into place. This is accomplished by utilising electrical resistance probes that measure the rate of corrosion in the pipeline. The rate of corrosion will be continuously monitored and recorded. By utilising this data, the corrosion inhibitor dosage rate will be adjusted to effectively eliminate corrosion in the pipeline;	**Low**

Aspects	Impacts	Management/Mitigation Measures	Mitigated Risk
UNPLANNED ACTIVITIES:		**OFFSHORE (PLATFORM & SUBSEA PRODUCTION PIPELINES)**	
		• The pipeline route is provided on marine charts; • Standard maritime safety procedures for attendant vessels will be adopted. • Low Level of marine traffic in vicinity of the pipeline. • The capacity to onshore shutdown reinjection water to CHA • Pipeline designed to withstand certain fishing vessel collisions & accommodate rock lobster fishermen; and • Low pressure alarm in onshore control room.	
CHA Spills:		**Work Over & Produced Water Spills**	
Work Over Spills as result of CHA production system, collection tanks or chemical pipeline leak resulting from corrosion and/or damage to pipeline. Worst case release volume <20L	Spill may cause changes in plankton or benthic communities due to reduced water quality	• Disposal method will prevent discharge into the marine environment • Chemical selected are considered to be of low environmental hazard (Appendix A) • Workover fluid additives are monitored and minimised where possible • Workover fluid releases will be minimised and recorded where they do occur.	**Low**
Produced Water Spills due to pipeline leaks resulting from corrosion and/or damage to pipeline. Worst case release volume ~6.5m^3	Spill may cause changes in plankton or benthic communities due to reduced water quality	• A heavy walled pipe designed to withstand certain fishing vessel collisions & accommodate rock lobster fishermen • Continuous corrosion control system measures the rate of corrosion in the pipeline. The rate of corrosion will be continuously monitored and recorded. • The pipeline route is provided on marine charts; • Standard maritime safety procedures for attendant vessels will be adopted. • Low level of marine traffic in vicinity of the pipeline. • Capacity to onshore shutdown reinjection water to CHA • Low pressure alarm in onshore control room.	**Low**
Unauthorised access to platform posing a risk to platform infrastructure from damage due to sabotage resulting in spills (activists/terrorists)- worst case see	Spill causing injury or death of marine fauna and pollution of coastal habitat or navigation hazard	• CHA is in a remote location i.e. offshore of a low density populated area • Limited access to the platform- basis of design specifies that CHA be inaccessible to public • Gates are provided that will prevent unauthorised access	**Medium**

Aspects	Impacts	Management/Mitigation Measures	Mitigated Risk
UNPLANNED ACTIVITIES:		**OFFSHORE (PLATFORM & SUBSEA PRODUCTION PIPELINES)**	
loss of well control		• Closed circuit TV security cameras are provided to enable the onshore control room operators to monitor petroleum activities • Appropriate warming notices/signage erected • Remote well shut-down capability	
Oil spill response	Disturbance to habitats and fauna Toxicity to marine fauna and flora Additional vessel presence (noise, emissions, discharges, collision risk)	• NEBA will be undertaken to assess potential negative impacts of response strategies considered. • Activation of the Vessel SOPEP Plan • Implementation of the NATPLAN (by AMSA) and the MOSCP (by the DoT) prioritising strategies for managing Type II hydrocarbons in open sea, inshore and near shore locations and shore line responses for different shoreline types • DoT consulted to ensure agreement in place for SOPEP interfaces with WestPlan-MOP and DoT MOSCP • AMSA consulted to ensure agreement in place for SOPEP interfaces with NATPLAN; • AMSA/DoT consulted to ensure arrangements are in place to cover gaps in WestPlan and NATPLAN. • Management of wastes in compliance with the NATPLAN document Management and Disposal of Oil Spill Debris • Monitoring of the spill, response strategy and environment (baseline and impacts) by the Combat Agency as required. • Notification and engagement/liaison with stakeholders identified in this EP • AMSA and DoT both notified immediately in the event of any oil or diesel spills to sea to ensure prompt and appropriate mobilisation of respective response plans.Implementation of SOPEP, AMSA NATPLAN, WestPlan MOP and DoT MOSCP in the event of a spill will be assessed to ensure effectiveness.	**Low**

6 Management Approach

The operations will be managed in compliance with the EP as accepted by NOPSEMA under the Environment Regulations, other relevant environmental legislation and ROC corporate policies. The objective of the EP is to ensure that potential adverse impacts on the environment associated with the operations, during both routine and non-routine operations, are identified, and will be reduced to ALARP and will be of an acceptable level.

Oceaneering as the contract operator of the Cliff Head Oil Field has implemented an Integrated Management System (IMS). The IMS aspects relevant to ensuring that the implementation strategy is appropriately implemented, such as the roles and responsibilities of personnel, record keeping, continual improvement, emergency response and auditing are addressed in the Oceaneering Management System Standards (MSS).

ROC has established a Corporate Safety and Environment Management System (SEMS) for all of its activities within Australia and internationally. The pinnacle document of the Corporate SEMS is the ROC Oil HSE Vision, Goals, Policy and Guiding Principles. This applies to all ROC subsidiary companies such as Roc Oil (WA) Pty Ltd.

Roc Oil (WA) Pty Ltd (Roc Oil) is the titleholder for the Cliff Head facilities. Oceaneering has been contracted by Roc Oil to act as facility operator of the Cliff Head facilities. As titleholder, Roc Oil has a clear interest in the environmentally sustainable development of the operation, and have had input into the IMS where required. However, Oceaneering as the operators have the immediate responsibility for ensuring that activities are managed in such a way to reduce the risk of negative impacts to the environment to As Low As Reasonably Practicable (ALARP).

Oceaneering has in place a Cliff Head Oil Field Operations Bridging Document (10/SP/CPL/PL01) which provides an overview of the interfaces between the Roc Oil SEMS and the Oceaneering IMS.

The Oceaneering IMS includes business and operational systems as well as the management of quality, health, safety and environmental issues. Contained within the IMS is a top-level document called the MSS (00/SP/CPL/0003). This document forms the basis for all the Oceaneering procedures, work instruction and forms for the management of quality, health, safety and the environment throughout Oceaneering's operations. The MSS applies to all aspects of Oceaneering's operations and maintenance activities including contractors and other third parties.

7 Stakeholder Consultation

Since the development of Cliff Head in 1999, ROC has undertaken comprehensive stakeholder consultation. Details of earlier consultation can be found in the Cliff Head PER (April 2004).

Specifically for the revision of this EP for NOPSEMA, stakeholder consultation letters were reissued on the 14th June 2013.

Up to the date of submission of the EP, seven responses have been received—from Border Protection Command, DMP, RAAF, AMSA, DSEWPAC, Department of Fisheries and the Department of Defence.

No other responses to this consultation have been received, and no other issues or concerns regarding the proposed activities have been raised by any other stakeholders contacted during this preparatory consultation. ROC Oil/Oceaneering believes that it has given each organisation/person sufficient information, time and opportunity to allow them to make an informed assessment of the possible consequences of the ongoing operations on their functions, interests or activities. Therefore, in the context of the nature and scale of the proposed activity, the environmental sensitivities and values of the operational area, and the outcomes of the risk assessment conducted in this EP, ROC Oil/Oceaneering are satisfied that further attempts to contact the stakeholders who haven't responded so far will not alter significantly the manner in which the activity will be conducted. A lack of any response from the consultation has been taken as confirmation that the organisation/person contacted has no particular issues or concerns regarding the CHA operations

In addition, specific consultation was undertaken with contractors identified as having specific roles and responsibilities within an oil spill response.

Stakeholder consultation will continue throughout operations and specifically for interventional activity. Consultation and information dissemination will be undertaken through a range of media including:

- Meetings with regulators.
- Consultations with stakeholders.
- Support Vessel communication with maritime traffic
- Notification of workover activities to fishermen.

A system is in place to ensure that there is a response to the stakeholders expectations and concerns through the Complaint Management and Community Liaison procedure.

8 Contact Details

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