

DIANA 3D MARINE SEISMIC SURVEY, WA-286-P: ENVIRONMENT PLAN SUMMARY

This summary of the Environment Plan for the Diana three dimensional marine seismic survey (3D MSS), in permit area WA-286-P, has been submitted in accordance with Regulations 11(7) & 11(8) of the *Petroleum (Submerged Lands) (Management of Environment) Regulations 1999*, as amended by Regulation 13 of the *Petroleum (Submerged Lands) (Management of Environment) Amendment Regulations 2005*. It may not be used for any other purpose without Roc Oil's prior approval.

1 Project Description

Roc Oil (WA) Pty Ltd (Roc) as Operator of the WA-286-P Exploration Permit proposes to undertake a 3D marine seismic survey in Commonwealth waters offshore from Port Denison, Western Australia. The Diana 3D MSS will cover an area of approximately 515 km². The survey is scheduled to occur in the period between mid-January and mid-February 2008 and is expected to be of approximately 35 days duration. The actual duration of acquisition is dependent on the weather and sea state conditions.

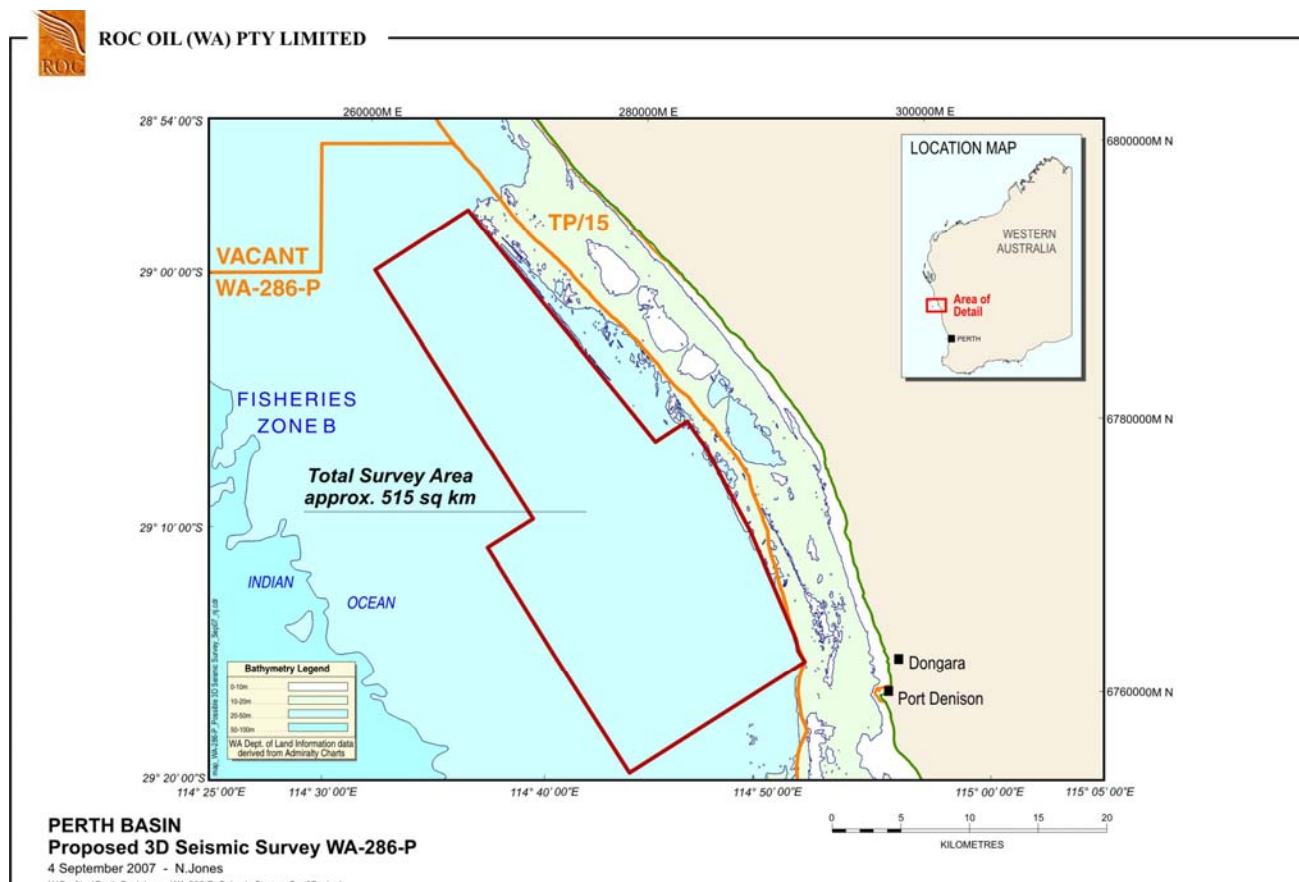
2. Coordinates of the Survey

The WA-286-P Permit Area lies offshore from Port Denison, approximately 330 km north of Perth (Figure 1). The boundary coordinates (GDA94 MGA UTM 50S) for the survey area are listed in Table 1. Water depths across the area of activities range from 20 to 50 m.

Table 1: Boundary Coordinates of the Proposed Diana 3D MSS Survey Area

location point	Latitude			Longitude		
	degrees	minutes	seconds	degrees	minutes	seconds
A	28	59	57	114	32	27
B	28	57	37	114	36	35
C	29	06	40	114	44	52
D	29	05	52	114	46	16
E	29	06	54	114	47	05
F	29	10	13	114	49	05
G	29	10	56	114	49	27
H	29	14	26	114	51	07
I	29	14	52	114	51	12
J	29	15	18	114	51	30
K	29	19	40	114	43	43
L	29	10	50	114	37	19
M	29	09	43	114	39	26

Figure 1: Location of Proposed Diana 3D Marine Seismic Survey, WA-286-P



3. Description of the Receiving Environment

Regional Setting

The project area lies within the 'Central West Coast' meso-scale bioregion according to the IMCRA v4.0 classification. The region is characterised by a relatively narrow continental shelf with diverse moderate energy coastal landforms. The region has a range of temperate species and is also at the southern limit of a suite of sub-tropical and tropical species.

The bathymetry across the survey area ranges from approximately 20 to 50 m water depths. The continental shelf off Geraldton is an extension of the Rottnest shelf. It is relatively flat, grading gently downwards from east to west reaching the 50 m depth contour some 60 km offshore then falling away relatively steeply down the continental slope. At the shelf rim is a morphologically complex linear ridge system capped by the Houtman Abrolhos Islands and reefs. Inshore of the survey area the prominent features are the sub-littoral reefs that occur as a series of broken ribbon reefs approximately three to five kilometres offshore. The wind climate of the project area is highly seasonal. The two primary winds regimes are the sea breeze dominated summer pattern and the synoptically dominated winter pattern. In spring and autumn the winds are in transition between the two main regimes. With the sea-breeze effect less pronounced, the winds are less 'concentrated' and reflect the migratory aspects of weather systems. The proposed timing of survey activity is spring.

Oceanic swells predominantly arrive from the southwest during spring and summer. Water circulation in the shallower eastern areas is primarily influenced by wind driven currents, although localised wave-forced currents may occur around the shallow reefs, particularly during large swell events. The Leeuwin Current, which is the dominant southward flowing oceanic current in the region, may have a

significant effect on the current regime in the inshore area of the proposed survey. Currents are weak and variable on the middle of the continental shelf. Tides are diurnal, with a small maximum range of less than one metre, and have very limited effect on water circulation in the area.

Habitats and Biota

The nearest inter-tidal habitats occur along the shores of the mainland, to the east of the survey area (Figure 1). The main inter-tidal habitats comprise narrow sandy beaches separated by limestone platforms and exposed beach rock. The platforms and beach rock support turf algae and molluscs with a range of small fish and crabs present in rock pools.

In general, the sub-tidal benthic habitats within and to the east of the survey area are expected to be those that occur throughout the regional inshore limestone reef system that is found along the Central West Coast of Western Australia from Kalbarri to south of Fremantle. There has been no specific, detailed benthic habitat mapping for the survey area and adjacent waters. The description of the main benthic habitats given below is from the Cliff Head Development Area, located approximately 12 km south of Port Denison, which are expected to be very similar to those that occur within and adjacent to the Diana 3D MSS survey area.

Sand habitats occur in sub-tidal areas where the sand forms a thick layer over the underlying limestone pavement. The sands are often shifting, and as a consequence the density of epibiota is low. However, in shallower sheltered areas, mostly to the east of the survey area, seagrass can be expected to colonise the sandy seafloors in low or high density. Limestone pavement habitat is widely distributed and the most common habitat across the survey area seawards from about the 20 m depth contour. Red and brown macro-algae are the dominant vegetation with occasional green algae and seagrass species. The extent of vegetation cover depends on the depth of cover of the pavement by sand.

A major physical feature just to the east of the survey area is the numerous limestone patch reefs. These are high profile structures, with steep reef faces, typically rising 1 to 4 m above the surrounding seabed with extensive horizontal ledges. Emergent reefs support an abundant attached invertebrate cover, particularly rich in sponges and ascidians. Horizontal surfaces are characterised by a dense cover of photosynthetic organisms, particularly macroalgae, with lesser scleractinian corals.

Given the extent of the Central West Coast limestone reef system, stretching for more than 400 km from Kalbarri to south of Fremantle, benthic habitat types within this system are broadly represented and regionally widespread – i.e. none of the habitats are expected to be limited to one specific area, or to be significant from a biodiversity conservation perspective.

Review of online databases held by the Commonwealth Department of the Environment and Water Resources (DEW) indicates that there are a total of 54 Marine Listed Species, under the EPBC Act as Endangered, Vulnerable, Migratory or Cetacean, including birds, that may occur, or the species habitat may occur, within or near to the entire survey area. The search of the EPBC Protected Matters database also returned 18 marine species covered by the Migratory Species provisions of the EPBC Act that may occur within the survey area. Twelve of these have also been identified as threatened species and are described above. Of the remaining species; three are cetaceans (Bryde's whale, dusky dolphin and killer whale), two are seabirds (white-bellied sea eagle and Caspian tern) and the dugong. All of these migratory species may transit through the survey area, however there are no known feeding, roosting or breeding habitats for these species within, or adjacent to, the survey area.

Cetaceans

Blue whales are observed from October to March along the south-west coast of Australia between Rottnest Island and Cape Leeuwin with abundances increasing over the summer months. Although little is known of blue whale migratory movements they are usually found at or beyond the shelf break and it is unlikely that they would be found in the relatively shallow waters of the survey area other than occasionally. It is likely that humpback whales follow a predictable migratory path and migrate both north and southbound within the continental shelf boundary (200 m bathymetry).

However, on the southbound migration it is likely that most individuals, and particularly cow/calf pairs, will stay closer to the coast than the northern migratory path. The survey timing means that it will occur after the end of the southbound migration for humpback whales moving down the coast, and well before the commencement of the northbound migration at the start of winter. Therefore, no humpback whales are expected to be encountered in waters in and around the WA-286-P Permit Area during the period of the survey.

Pinnipeds

The survey area lies near the northern end of the Australian sea-lion's normal distribution range. Sea-lions are regularly sighted in and near to the survey area. It is likely that they may occur feeding or passing through the survey area. New Zealand fur seals are widely distributed across southern Australian waters and there are 16 known breeding areas along the south coast of Western Australia. They are deep diving and it is possible that they may feed or pass through parts of the survey area.

Fishes

Fish species listed under the EPBC Act that may occur in the survey area and adjacent waters are not expected to be specifically linked to any specific benthic habitat - i.e. their distributions are likely to be widespread. The pipefishes, seadragons and seahorses (Family Syngnathidae) are most likely to occur in seagrass (pipefishes) and macroalgal (seadragons and seahorses) habitats. However, given the widespread nature of these benthic habitats, all of these species are predicted to have a widespread distribution and to be broadly represented throughout the Central West Coast limestone reef system. The waters within and adjacent to the Diana 3D MSS survey area are not expected to include any particular areas that represent critical habitat for any of the listed fish species. For instance, species in the Family Syngnathidae are egg brooders rather than broadcast spawners - the females lay their eggs in a brood pouch on the males' chest, and the male then fertilizes and incubates the eggs. These species, therefore, don't have spawning aggregations that could be particularly susceptible to disturbance from seismic survey airgun noise.

Typical west coast populations of grey nurse sharks are commonly found in deep offshore waters and distributed between the area just north of Exmouth down the south west coastline and along southern Western Australia. Limited data is available on the grey nurse shark however it is possible they may occur in the survey area. The great white shark is widely distributed and located throughout temperate and sub-tropical regions in the northern and southern hemispheres primarily in coastal and offshore areas of the continental shelf. Archival and satellite tagging research has recorded shark movements mainly restricted to shelf and coastal waters with some swimming depths down to 94 m. The diverse range of ecological niches afforded by the patch reefs across the project area would be expected to provide suitable habitat for the listed species of seahorses, seadragons and pipefish.

Marine Reptiles

The leatherback turtle is a pelagic feeder, found in tropical, subtropical and temperate waters throughout the world. It is possible that the leatherback turtle may be present, either feeding or transient, in the survey area at the time of survey activities. No significant numbers of either of the two EPBC Act listed sea snake species are expected to occur in the waters within or immediately adjacent to the Diana 3D MSS survey area. The nearest substantial populations of sea snakes on the west coast of Western Australia are in Shark Bay, approximately 300 km north of the survey area.

Rock Lobster

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 supports the most valuable single species fishery in Australia. The life cycle of the western rock lobster has been well studied. Breeding occurs in spring and early summer in waters near the edge of the continental shelf of 35 to 90 m depth. The eastern parts of the survey area would be an area of lobster breeding.

Seagrasses

The region has a high diversity of seagrass species with 14 species represented. The area supports

extensive and diverse seagrass communities; nine species have been recorded to date with their distributions and densities varying over the range of habitats represented.

Socio-Economic Considerations

Commercial Fisheries

The survey area is located within the Western Rock Lobster Fisheries Zone B. It is an area of intense commercial fishing. The West Coast Rock Lobster Managed Fishery in Zone B operates from 8th November to 30th June. However, there is a summer closure in the fishery in Zone B from 15th January to 9th February, with fishing re-commencing on the 10th February. This closure was introduced to cover the period between the end of the 'whites' (pale-coloured, recently-moulted juveniles) migration and the beginning of the period when the fishermen start targeting the 'reds' (adult and non-migrating lobsters). Apart from the Western Rock Lobster Fishery, a number of other commercial fishing vessels operate within the region, within the West Coast Demersal Scalefish Fishery and the Demersal Gillnet and Longline (Shark) Fisheries. However, these vessels generally fish in water depths deeper than 50 m, and are therefore not expected to be encountered during the Diana 3D MSS.

Recreational Fisheries and Tourism

Given the location of the WA-286-P Permit Area just to the north-west of Dongara and Port Denison, it is possible that there may be some recreational fishing activities occurring on the inshore reefs adjacent to the survey area. Inshore boating, diving and recreational fishing activities probably occur on the inshore reef areas to the east of the survey area, given its location just north-west of the settlements of Dongara and Port Denison. However, the majority of the recreational fishing activity (particularly rock lobster pots) is expected to take place in water depths less than 20 m, and hence occur largely outside the proposed survey area.

Shipwrecks

A search of the National Shipwrecks Database indicates that there could be as many as 39 known historic shipwrecks within and immediately adjacent to the WA-286-P Permit Area.

Indigenous Heritage

There are no known Indigenous Heritage issues associated with the WA-286-P Permit Area or adjacent waters.

4. Description of the Action

The seismic array will comprise of four (4) streamers, with a maximum length of approximately 3.75 km, and separation distance of 100 m. The source depth will be 5 m and the streamer depth will be 6 m (or deeper, depending on sea state). The operating pressure for the airgun array will be approximately 2,000 psi. Each airgun array will have a volume of approximately 2,500 cui and will produce at source (i.e. within a few metres of the airguns) sound pulses in the order of 220-240 dB re 1 μ Pa-m at frequencies extending up to approximately 110 Hz. Airguns of this size are known to produce sound pulses within a few metres in the order of 220 dB re 1uPa-m at frequencies extending up to approximately 110 Hz. These sound pulses will decrease to levels in the order of 170 to 180 dB re 1uPa-m within 1 km of the source and approximately 160 dB re 1uPa-m within 2 km, dependent on the sound propagation characteristics of the area.

The majority of the survey will be conducted in water depths of 20 to 50 m and therefore it is highly unlikely that any of the towed equipment will make contact with the seafloor or benthic communities. A scout (or chase) vessel will accompany the seismic vessel throughout Diana 3D MSS to ensure adequate separation is maintained between the survey array and other vessels, and also to manage interactions with whales, and with commercial rock lobster fishing activities. This will be in addition to the supply vessel that will also accompany the survey vessel during the survey.

5. Major Environmental Hazards and Controls

An environmental risk assessment has identified environmental hazards and potential environmental effects associated with the Diana 3D MSS. The principal environmental hazards have been determined to be associated with noise generated by the seismic source array.

Other environmental aspects of the marine seismic survey include:

- operation of the seismic vessel and towing of the airgun and streamer (hydrophone) array through the survey area;
- routine waste discharges from the survey vessel;
- accidental fuel and oil spills from the survey vessel;
- accidental loss of streamers and associated equipment; and
- ballast water discharge and hull bio-fouling.

The potential environmental effects associated with the above environmental aspects are:

- acoustic disturbance to marine fauna;
- disturbance to benthic habitats;
- marine pollution;
- introduction of marine pests;
- interactions with commercial fisheries; and
- interactions with shipping.

6. Summary of the Management Approach

Table 2 identifies the key environmental performance objectives, measures and criteria for the Diana 3D MSS.

Table 2: Key Environmental Performance Objectives, Measures and Criteria

Objectives	Measures and Criteria
Minimise disruption to cetaceans	<ul style="list-style-type: none"> • Management procedures in place and adhered to • Observation zone of 3 km radius • Low power zone of 1 km radius • Shut-down zone of 500 m radius • 'Soft start' procedures • Firing of a single airgun during line turns • Dedicated MMO present onboard to keep watch for whales and to monitor soft start and other procedures • Scout vessel used to assist in keeping watch for whales • Responsibilities for monitoring, responding to and recording cetacean sightings clearly identified and conveyed to vessel personnel • Sighting reports completed and returned to Roc and DEW
Minimise disturbance to benthic habitats	<ul style="list-style-type: none"> • No anchoring of the vessel will take place during the survey unless in an emergency • Recording and reporting of all items lost overboard
Minimise interference with commercial fishing	<ul style="list-style-type: none"> • Operations carried out so that the survey operations are not occurring in areas where rock lobster fishing is current • Regular communication of survey operational details to commercial rock lobster fishermen • Use of a scout vessel • Fishermen advised of survey location in time to move/redeploy fishing equipment
Minimise interference with shipping traffic	<ul style="list-style-type: none"> • Notice to Mariners - written and radio warnings to shipping • Operations carried out in a manner that does not interfere with navigation to a greater extent than is necessary

Objectives	Measures and Criteria
Minimise effects of sewage discharge	<ul style="list-style-type: none"> • Procedures for treatment and disposal of sewage are in place • Sewage treatment system operational and includes maceration and disinfection • Relevant discharge requirements are adhered to • Sewage not discharged within 12 nautical miles of the coastline unless vessel has a certified approved sewage treatment plant in place under Regulation 8 (1) (b) of MARPOL 73/78 Annex IV, in which case, sewage must not be discharged within 4 nautical miles of land
Minimise effects of oily water discharge	<ul style="list-style-type: none"> • Oily effluents from bilges and machinery spaces collected in an oily slops storage tank, and treated in an oil-water separator prior to overboard discharge • Deck washdown and drainage water contained and directed into bilges and slops tank, prior to treatment in an oil-water separator. • Vessels are required to have a valid International Oil Pollution Prevention (IOPP) Certificate • An <i>Oil Record Book</i> is maintained which details how, when and where any waste oils/oily effluents are disposed of • Oily effluents from bilges and machinery spaces are treated in an oil-water separator to a 15 ppm oil content specification prior to overboard discharge (MARPOL 73/78 Annex I requirement)
Minimise occurrence of fuel and oil spills	<ul style="list-style-type: none"> • Procedures comply with MARPOL 73/78 requirements • MARPOL <i>Oil Record Book</i> kept up to date • Fuel spill contingency procedures are in place and operational • Designated containment areas onboard the vessel for storage of oils, greases and streamer fluid • Sufficient spill response equipment on board to respond to foreseeable spill events • Appropriate actions are taken to minimise pollution • Any spills >80 litres are reported to the Designated Authority • Personnel responsibilities are clearly identified • Use of solid streamers • Detailed bathymetry and use of scout vessel to minimise vessel grounding and collision risks
Minimise potential impacts of solid and hazardous wastes	<ul style="list-style-type: none"> • Correct segregation of solid and hazardous wastes • A vessel <i>Waste Log Form</i> is kept detailing quantities of wastes transported ashore • Procedures comply with MARPOL requirements
Minimise potential for introduction of marine pests – ballast water	<ul style="list-style-type: none"> • If required, submission of a Quarantine Pre-Arrival Report (QPAR) for the survey and support vessels to AQIS • No ballast water discharge without express written permission from AQIS • Completion of AQIS <i>Ballast Water Log</i>
Minimise potential for introduction of marine pests – ballast water	<ul style="list-style-type: none"> • Seismic and support vessels to have operated continuously in Australian waters for the last 12 months • Seismic and support vessels to have been dry-docked, and had hull inspection, cleaning and new anti-fouling systems applied within the last 12 months

7. Consultation Details

Ongoing consultation during planning and preparation for the proposed Diana 3D MSS has involved, and will continue to involve, discussions with the following agencies and stakeholder organisations:

- WA Department of Industry and Resources (DoIR).
- Commonwealth Department of the Environment and Water Resources (DEW) – Ports & Marine Section, Approvals and Wildlife Division.
- Curtin University Centre for Marine Science and Technology (CMST).
- Western Whale Research (WWR).
- Centre for Whale Research (CWR).

- Geraldton and Dongara Professional Fishermen's Associations.
- WA Fishing Industry Council (WAFIC).
- Western Rock Lobster Council.
- Fisheries WA.

8. Contact Details

For further information about the Diana 3D MSS in WA-286-P please contact:

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