

## EENDRACHT MC3D MARINE SEISMIC SURVEY ENVIRONMENT PLAN: PUBLIC SUMMARY

This summary of the Environment Plan for the Fugro Eendracht MC3D marine seismic survey, which will be acquired within the Carnarvon Basin offshore from Western Australia (WA), has been submitted to the Western Australian Department of Mines and Petroleum (DMP) to comply with sub-regulations 11(7) and 11(8) of the *Petroleum (Submerged Lands) (Management of Environment) Regulations 1999* (P[SL]MoE Regulations).

### INTRODUCTION

Fugro Multi Client Services Pty Ltd (Fugro) proposes to undertake a multi-client (MC) three-dimensional (3D) marine seismic survey (Eendracht MC3D MSS) within the Carnarvon Basin offshore from Western Australia. The Eendracht MC3D MSS will comprise a maximum of 6,100 square kilometres of 3D seismic acquisition.

### COORDINATES OF THE PROPOSED ACTIVITY

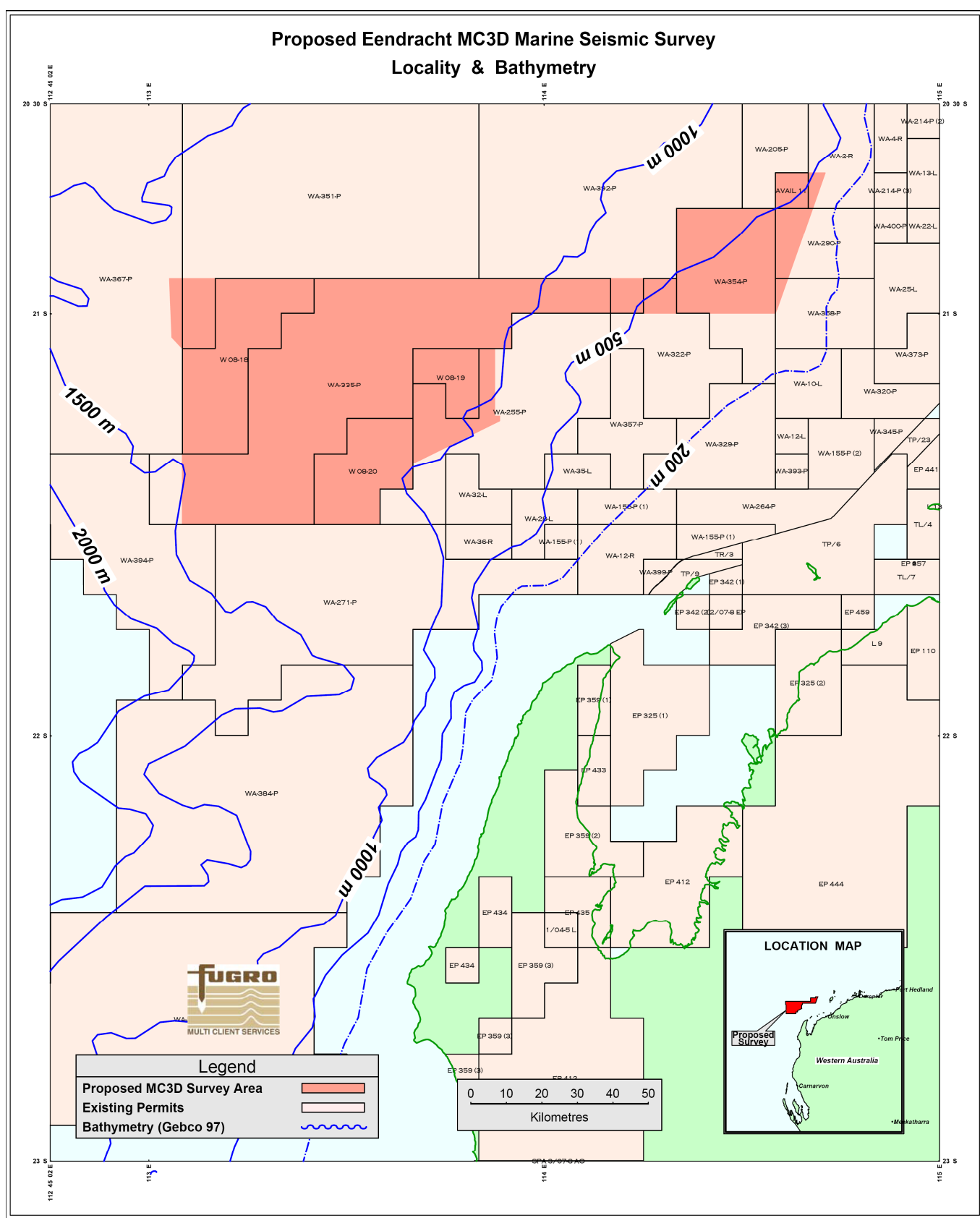
The survey will take place within the following Petroleum Permit Areas: W08-18, W08-19, W08-20, WA-2-R, WA-255-P, WA-290-P, WA-322-P, WA-335-P, WA-351-P, WA-354-P, WA-358-P, WA-367-P, WA-392-P. At the closest point, the survey area is located approximately 67 km to the north-northeast (NNE) of North West Cape, 76 km NNE of the Murion Islands, and approximately 75 km due west of Barrow Island (**Figure 1**).

Survey boundary coordinates are provided in **Table 1** below.

**Table 1: Coordinates of the Proposed Survey Area**

Latitude (S)			Longitude (E)		
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
21	29	55.38	113	05	04.74
21	04	55.44	113	05	04.74
21	03	20.00	113	03	30.00
20	54	55.01	113	03	08.00
20	54	55.32	114	20	04.72
20	44	55.32	114	20	04.71
20	44	55.31	114	35	04.71
20	39	55.31	114	35	04.79
20	39	55.30	114	42	38.43
20	59	55.32	114	35	04.72
20	59	55.34	113	55	04.72
21	04	55.34	113	55	04.72
21	04	55.34	113	52	30.00
21	14	35.00	113	52	30.00
21	14	35.00	113	53	15.00
21	15	15.00	113	53	15.00
21	21	16.44	113	40	04.80
21	24	55.36	113	40	04.74
21	24	55.36	113	35	04.74
21	29	55.36	113	35	04.74
21	29	55.38	113	05	04.74

**Figure 1: Location Map - Eendracht MC3D Marine Seismic Survey**



## DESCRIPTION OF THE PROPOSED ACTIVITY

The survey will take place across a water depth range of 300-1,500 m, with the shallowest water depths located at the eastern end of the acquisition area in Petroleum Permit Areas WA-358-P, WA-290-P and WA-2-R (**Figure 1**). The earliest potential commencement date for the survey is late May 2009, but it is anticipated that the survey is more likely to commence in June 2009. The survey is expected to be of approximately six months duration. Acquisition will not be continuous and the survey should be completed during the first quarter (January to March) of 2010.

During the proposed activities, the survey vessel will traverse a series of pre-determined sail lines within the survey area at a speed of approximately 8-9 km/hr. As the vessel travels along the survey lines a series of noise pulses (every 6-7 seconds) will be directed down through the water column and seabed. The released sound is attenuated and reflected at geological boundaries and the reflected signals are detected using sensitive microphones arranged along a number of hydrophone cables (streamers) towed behind the survey vessel. The reflected sound is then processed to provide information about the structure and composition of geological formations below the seabed in an attempt to identify hydrocarbon reservoirs.

The seismic array will comprise of a maximum of 12 solid streamers, with a maximum length of 7 km. The source (airgun array) tow depth will be 6 m (+/- 1 m) and the streamer tow depth will be 8 m (+/- 1 m). The operating pressure for the airgun array will be approximately 2,000 psi. The airgun array will consist of two sub-arrays, each with a maximum volume of 4,320 cui. These sub-arrays will be fired alternately, with a shotpoint interval of 18.75 m vertical distance, and will produce at source (i.e. within a few metres of the airguns) sound pulses in the order of 260-270 dB re 1 $\mu$ Pa-m at frequencies extending up to approximately 128 Hz.

Fugro proposes to conduct the survey using the purpose-built seismic survey vessel the M/V *Geo Atlantic*. The survey will not traverse, or approach close to, any marine protected areas. A support vessel will accompany the seismic survey vessel to maintain a safe distance between the survey array and other vessels, and to manage interactions with fishing activities, if required. During the survey, it is likely that the survey vessel will be refuelled in Dampier Port, but there is a possibility that some refuelling may take place at sea, either within or immediately adjacent to the survey area.

## DESCRIPTION OF THE RECEIVING ENVIRONMENT

### Physical Environment

Rainfall in the region is generally low with evaporation exceeding rainfall throughout the year. Intense rainfall may sometimes occur during the passage of summer tropical cyclones (generally between December and March) and thunderstorms. The summer and winter seasons fall into the periods September-March and May-July, respectively.

The dominant component of the North West Shelf (NWS) to the north-east of North West Cape is the Rowley Shelf which comprises extensive cemented calcareous sediments (limestone) which forms a shallow, gently inclining seabed extending from the coast to some 40 km offshore where water depths reach 20 m. Sands derived from the erosion of the limestone and biological remains blanket the submarine Rowley Shelf in variable amounts. Emergent islands, cays and reef structures locally interrupt the gently sloping seabed. Seaward of the Rowley Shelf the substrate slopes towards the edge of the Continental Shelf. The continental shelf to the west of North West Cape is very narrow. Waters depths range from 100 m at 6 km from shore to 500 m at 15 km. All of the area covered by the proposed Eendracht MC3D MSS in the Exmouth Sub-basin is in deep waters, in water depths greater than 300 m. Seabed surveys undertaken in the Exmouth Sub-basin in 350 to 900 m water depth have shown that the seabed is dominated by soft fine to medium sediments (silt and sand) with limited patches of outcropping rock along scarp and canyon features in water depths greater than 500 m.

The normal wave climate is composed of locally generated wind waves (seas) and swells that are propagated from distant areas, typically consistently from the southwest throughout the year. Waves originating from the west and northeast dominate the winter months, and tend to be larger, while the calmest months are April and May. The dominant surface offshore current (typically seaward of the 200 m

isobath) in the Exmouth Sub-basin 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 surface current, extending in depth to 150 m.

### **Biological Environment**

The Eendracht MC3D MSS area is located on the continental slope, where the seabed slopes deep over a short area, in water depths ranging from 300–1,500 m. The continental slope supports a sparse seabed community, with species diversity and abundance decreasing with increasing depth. Invertebrate fauna, such as polychaetes, crustaceans, molluscs and sponges dominate the soft sediments, while outcrop areas are dominated by sponges, soft corals and gorgonians. The water column supports highly mobile and seasonal populations of pelagic finfish, as well as mega-fauna such as whale and dolphins. Seabed vegetation does not grow in these deep waters.

A diverse array of marine fauna occurs in and around the Exmouth Sub-basin, including benthic infauna, sponges, echinoderms, crustaceans, molluscs, coral, finfish, turtles, sharks, dolphins, whales, rays, dugongs and seabirds.

#### ***Benthic Infauna***

Benthic infauna have been surveyed at several sites in the Exmouth Sub-basin region. The biota is comparable to that found over similar substratum, and at similar depths in the region. Unconsolidated sediments on the NWS support a diverse benthic infauna consisting predominantly of mobile burrowing species.

#### ***Finfish***

The demersal habitat of the NWS hosts a diverse assemblage of fish, with up to 1,400 species known to occur, with a great proportion of these occurring in shallow coastal waters. Many of these are commercially exploited by trawl and trap fisheries, for example the genera *Lethrinus* (emperor) and *Lutjanus* (snapper). Pelagic fish in this area include tuna, mackerel, herring, pilchard and sardine, and game fish such as marlin and sailfish also occur. Recent seabed biodiversity surveys undertaken at the Pyrenees Development Area found that large schooling fish were present in the deep waters (between 175 and 250 m water depth), such as amberjack and mullet, along with yellowbelly threadfin.

#### ***Whale Sharks***

Whale sharks, the world's largest fish (growing up to 12 m in length), are oceanic and cosmopolitan in their distribution, however, they do aggregate in and near the waters of the Ningaloo Marine Park during autumn. The main period of the whale shark aggregation is late March to June, with the largest numbers being recorded around April. However, the season is variable and individual whale sharks have been recorded at other times of the year. Whale shark presence coincides with the coral mass spawning period, when there is an abundance of food (krill, planktonic larvae and schools of small fish) in the waters adjacent to the reef associated with upwelling of nutrient-rich waters from the deep ocean.

#### ***Marine Turtles***

Five species of marine turtle occur in the waters of and nest on sandy shore sites of the Exmouth region. These are the green turtle, flatback turtle, hawksbill turtle, loggerhead turtle and leatherback turtle. The across shelf distribution, abundance and activity of turtle species is varied but not well known. Common to all species is that hatchlings emerge six to eight weeks after the females have nested. The regional sea turtle population is estimated to be over 49,000 animals. Based on recent aerial surveys undertaken for other petroleum developments in the region, it is unlikely that turtles occur in any great numbers in the Eendracht MC3D MSS area and surrounding waters.

#### ***Dugong***

Dugong occur across the tropical coastal waters of Australia from Shark Bay to Queensland. Dugong are herbivorous and are generally associated with seagrass beds, upon which they feed, and are therefore most commonly found in shallow sheltered areas (less than 5 m deep), often near islands or large bays. Recent aerial surveys of dugong distribution have found that a large population (about 1,000 individuals) occurs along the eastern side of the Exmouth Gulf, with frequent sightings around the Muiron Islands, Serrurier Island group and Ningaloo Reef. The same aerial surveys noted that no dugong were observed in the area around the Van Gogh oil field (just to the south of the Eendracht MC3D MSS area).

### ***Whales and Dolphins***

A number of whale species occur in and/or migrate through the region, including the short-finned pilot whale, false killer whale, tropical Bryde's whale, southern minke whale, killer whale, blue whale, sperm whale and humpback whale. The most commonly sighted whale is the humpback whale. This species migrates between its feeding grounds in Antarctic waters and breeding and calving grounds in the Kimberly region of WA. The migratory whale route, where most whales are observed, occurs in waters within 9 nm (17 km) of the coast (generally <200 m water depth). The peak of the northerly migration in the Exmouth region occurs around late July, concentrated along the 200 m depth contour. The southerly return migration peaks around early September, with pods preferring to travel in shallower waters, typically between 30 and 100 m deep. Many cow/calf pairs use the Exmouth Gulf as a resting ground during the southern migration, with many males entering the gulf intent on mating. The transition period (the crossover between the northern and southern migrations), occurs between early August and early September. Pod sizes during this time are the highest off the North West Cape than at any other time of the year. During the transition period, whale pods are more dispersed, occurring in shallow waters and in waters as deep as 1,100 m, covering the Eendracht MC3D MSS area.

Dolphins are relatively common in the region, with 13 species recorded in the waters of the Ningaloo Marine Park. Species known to occur include the bottlenose dolphin, common dolphin, Indo-pacific humpback dolphins and the striped dolphin. Large pods of dolphins (more than 20 individuals) are likely to occur in waters deeper than 150 m, compared with small pods of dolphins found in Exmouth Gulf.

### ***Seabirds***

Based on the results of two survey cruises and other unpublished records, the occurrence of 18 species of seabirds has been recorded over NWS waters. These included a number of species of petrel, shearwater, tropicbird, frigatebird, booby and tern, as well as the silver gull. Of these, eight species occur year round and the remaining 10 are seasonal visitors. From these surveys, it was noted that seabird distributions in tropical waters were generally patchy except near islands.

## **Socio-Economic Environment**

### ***Heritage Values***

The marine and coastal heritage sites within a radius of approximately 100 km of the Eendracht MC3D MSS area are: Exmouth Gulf and Rowley Shelf islands; Muiron Islands and adjacent marine area; Ningaloo Marine Area/Park – State and Commonwealth waters; and Ningaloo Reef Tract and Cape Range. There are no recorded historic shipwreck sites within or immediately adjacent to the Eendracht MC3D MSS area.

### ***Cultural Values***

It is considered highly unlikely that any items of Aboriginal cultural significance are located in the proposed Eendracht MC3D MSS area. There are no known indigenous cultural heritage values or issues for the waters and seafloor within and immediately adjacent to the survey area. Similarly, there are no Native Title claims or issues covering the waters and seafloor within and immediately adjacent to the Eendracht MC3D MSS area.

### ***Commercial Fisheries***

The region supports a valuable and diverse fishing industry, with the offshore and coastal habitats being significant at all life stages for commercial species in the region. Several commercial fisheries operate out of Exmouth and Onslow.

### ***Recreational Fisheries***

With the close proximity of islands to the coast, and calm lagoonal and gulf waters, recreational fishing and boating is a popular recreational activity in the region for local residents and tourists, concentrated in the cooler months of April to September. Offshore angling takes place from large boats (including charter vessels) past the reef edge and around the islands of the Exmouth Gulf. Such recreational fishing activities are unlikely to extend into the Eendracht MC3D MSS area, given the water depths and distance offshore. Game fishing is concentrated in the deeper waters on the reef edge and around the islands, and targets species such as marlin, sailfish, Spanish mackerel, tuna and trevally.

### ***Oil and Gas Industry***

The Exmouth Sub-basin and surrounding basins contain known or highly prospective hydrocarbon fields that have been subject to exploration activity since the early 1950s. Petroleum field developments that operate in, or are planned for development in the Exmouth Sub-basin include Woodside's Enfield and Vincent Projects, BHP Billiton's Pyrenees and Stybarrow Projects, and Apache's Van Gogh Project. As part of the consultation programs regarding the floating production storage and offtake (FPSO) oil projects either currently planned or under development, the local community and relevant interest groups are familiar with the nature of these developments and potential impacts.

### ***Shipping***

Although there are no defined shipping lanes in the North West Cape region, clear shipping passages emerge when Australian Ship Reporting System (AUSREP) data is analysed. Data obtained from the Australian Marine Spatial Information System (AMSIS) for 2006-2007 indicates a clear north-south shipping passage running parallel to the Cape Range Peninsula and then heading north from west of the North West Cape. Woodside reports that for 1999-2000, about 657 vessels used this passage. Another shipping passage parallels the coast between the North West Cape and the port of Dampier, with significantly fewer vessels using this on an annual basis (less than 150 annually). These shipping passages are likely to overlap with the survey area to some degree.

## **MAJOR ENVIRONMENTAL HAZARDS AND CONTROLS**

All aspects of the Eendracht MC3D MSS have been subjected to risk analysis, which has been used to evaluate the potential environmental risks and effects, and characterize risk likelihood and severity. **Table 2** summarises the risk analysis for the key aspects of the survey.

Given the distance offshore, the water depths, and the absence of sensitive environmental resources within or adjacent to the survey area, and the management requirements for all environmental aspects of operations, the risk of significant adverse environmental effects from the proposed Eendracht MC3D MSS is low. The implementation of specific whale monitoring and encounter procedures will be used to minimise the potential for any adverse effects to whales. These procedures comply fully with the Australian Commonwealth Government Guidelines: *EPBC Act Policy Statement 2.1 – Interaction between offshore seismic exploration and whales* (September 2008). A dedicated, expert Marine Fauna Observer (MFO) will be aboard the survey vessel for the entire duration of the Eendracht MC3D MSS survey. The key role of the MFO will be to visually monitor the waters around the survey vessel for the presence of cetaceans during daylight hours. The MMO will be responsible for recording any cetacean sightings during the survey on the appropriate sightings forms, using the 'Cetacean Sightings Application' software.

## **MANAGEMENT APPROACH**

The environmental management approaches relevant to key aspects of the Eendracht MC3D MSS are summarised in **Table 2**. The survey will be conducted in accordance with all legislative and regulatory requirements, to the satisfaction of the Designated Authority (DMP). Fugro's overall environmental objective for the programme is to avoid or minimise environmental risks to levels as low as reasonably practicable (ALARP).

**Table 2: Summary of Environmental Risks and Management Approach for Key Aspects of the Eendracht MC3D MSS**

Hazard/ Incident	Potential Hazard Consequence	Risk and Management Approach
Disturbance to marine fauna	<p>Whales - behavioural reactions (avoidance, diving, increased dive times).</p> <p>Disturbance to marine turtles.</p> <p>Disturbance to seabirds.</p>	<p>Low (turtles, seabirds), medium (fish) or high (baleen whales) risk.</p> <ul style="list-style-type: none"> <li>• Interaction procedures in place and adhered to</li> <li>• Observation zone of 3 km radius, low power zone of 2 km radius, shut-down zone of 500 m radius</li> <li>• 'Soft start' procedures</li> <li>• Use of an MFO</li> <li>• Cetacean sighting reports completed and returned to Fugro and to the Australian Marine Mammal Centre at the Australian Antarctic Division, using the 'Cetacean Sightings Application' software</li> </ul>
Disturbance to benthic habitats	Small localised disturbance to epibiota in event of loss of equipment	<p>Low risk.</p> <ul style="list-style-type: none"> <li>• Seismic survey lines are in deep waters of the continental shelf and slope (300-1,500 m)</li> <li>• No anchoring of the vessel will take place during the survey unless in an emergency</li> <li>• All reasonable efforts taken to retrieve lost equipment</li> <li>• Recording and reporting of all items lost overboard</li> </ul>
Interference with commercial fishing activities	<p>Interference to commercial fishing vessels operating in the vicinity of the survey area or surrounding waters.</p> <p>Potential direct and indirect noise impacts on target species.</p> <p>Restriction of access to fishing grounds, loss or damage to fishing gear.</p>	<p>High risk.</p> <ul style="list-style-type: none"> <li>• Consultation with fisheries management agencies, fishing industry bodies and individual companies prior to survey commencing, to inform them about the location of survey area and timing of operations</li> <li>• Display of appropriate navigational beacons and lights, radar watch</li> <li>• Recording of sightings of fishing vessels, consultation with fishermen at sea, if necessary</li> <li>• Operations carried out in a manner that does not interfere with fishing to a greater extent than is necessary</li> </ul>
Interference with shipping activities	Interference to commercial shipping operating in the vicinity of the survey areas or surrounding waters.	<p>High risk.</p> <ul style="list-style-type: none"> <li>• Issuance of Notice to Mariners</li> <li>• Display of appropriate navigational beacons and lights, radar watch</li> <li>• Radio warnings to shipping, as required</li> <li>• Operations carried out in a manner that does not interfere with navigation to a greater extent than is necessary</li> </ul>

Hazard/ Incident	Potential Hazard Consequence	Risk and Management Approach
Waste disposal	Localised temporary decrease in ambient water quality from discharge of sewage, grey water, putrescible waste, chemicals and solid and hazardous wastes.	<p>Medium risk.</p> <ul style="list-style-type: none"> <li>• Procedures comply with MARPOL requirements</li> <li>• Procedures for treatment and disposal of sewage are in place and relevant discharge requirements are adhered to</li> <li>• Sewage treatment system operational and includes maceration and disinfection</li> <li>• Sewage not discharged within 12 nautical miles of the coastline unless vessel has a certified approved sewage treatment plant in place, in which case, sewage must not be discharged within four nautical miles of land</li> <li>• Quantities of treated sewage and putrescible wastes discharged overboard are recorded on the vessel's <i>Waste Log Forms</i></li> <li>• Correct segregation of solid and hazardous wastes</li> <li>• A vessel <i>Waste Log Form</i> is kept detailing quantities of wastes transported ashore</li> </ul>
Fuel and oil spills	Acute toxicity effects on marine fauna such as marine turtles, fishes and seabirds.	<p>High risk.</p> <ul style="list-style-type: none"> <li>• Procedures comply with MARPOL 73/78 requirements (e.g. <i>Oil Record Book</i> kept up to date)</li> <li>• Fuel spill contingency procedures are in place and operational</li> <li>• Adherence to the at sea refuelling procedures</li> <li>• Designated containment areas onboard the vessel for storage of oils, greases and streamer fluid</li> <li>• Sufficient spill response equipment on board to respond to foreseeable spill events</li> <li>• Appropriate actions are taken to minimise pollution</li> <li>• Any significant spills (&gt;80 L) are reported to the relevant sections within DMP</li> <li>• Personnel responsibilities are clearly identified</li> </ul>
Introduction of marine pests	Introduction and establishment of non-indigenous (i.e. foreign) marine species with consequent impacts on benthic communities, fisheries etc.	<p>Low risk.</p> <ul style="list-style-type: none"> <li>• Procedures comply with AQIS <i>Australian Ballast Water Management Requirements</i></li> <li>• AQIS ballast water log is kept up to date</li> <li>• Recent hull inspections of survey and support vessels, and AQIS clearances to operate unrestricted in Australian waters</li> </ul>



## **CONSULTATIONS**

Consultation regarding the proposed Eendracht MC3D MSS has been undertaken with stakeholder groups within the commercial fishing industry in Western Australia. The following organisations have been contacted and informed of the proposed operations:

- Australian Maritime Safety Authority (AMSA)
- Australian Fisheries Management Authority (AFMA)
- Western Australian Department of Fisheries, (DoF)
- Western Australian Northern Trawl Owners Association (WANTOA)
- Northern Fishing Companies Association (NFCA)
- Commonwealth Fisheries Association (CFA)
- Western Australian Fishing Industry Council (WAFIC)
- Austral Fisheries Pty Ltd
- TunaWest
- A Raptis and Sons
- Exmouth Professional Fishermen's Association (via MG Kailis Group)

Commercial fishing activity is believed to be minimal in the survey area and surrounding waters. To date none of the fisheries stakeholders consulted has raised any issues or concerns relating to the proposed Eendracht MC3D MSS. Consultation with all of the stakeholders listed above, plus any others identified during the consultation process, will continue during and after the survey, if necessary.

## **FURTHER DETAILS**

For further information about the proposed Fugro Eendracht MC3D MSS within the Carnarvon Basin offshore from Western Australia, please contact:

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