



Pomodoro, Orcus and Chamois 3D MSS

Environment Plan: Public Summary

December 2010

This summary has been submitted to comply with Regulation 11(7)(8) of the Offshore Petroleum and Greenhouse Gas Storage (Environment) (OPGGSE) Regulations 2009

Introduction

Apache Energy Ltd (Apache) proposes to undertake a three-dimensional (3D) marine seismic survey program (MSS) within Commonwealth waters of the offshore Carnarvon Basin, within exploration permits, WA-426-P and WA-427-P (Pomodoro MSS), WA-450-P (Orcus MSS) and in WA-261-P (Chamois MSS) during January – February 2011. The program is referred to as the **Pomodoro, Orcus and Chamois, 3D Marine Seismic Survey Program**.

Location

The three proposed survey areas (see **Figure 1, 2 and 3**) are located within the Carnarvon Basin off Western Australia. The proposed Pomodoro survey covers an area of approximately 317.3 km² within Commonwealth Waters (**Figure 1**), and is located within water depths ranging from 100 to 250 m. The proposed Orcus survey covers an area of approximately 233.5 km² within Commonwealth Waters (**Figure 2**), and is located within water depths ranging from 560 to 720 m. The proposed Chamois survey covers an area of approximately 257.1 km² within Commonwealth Waters (**Figure 3**), and is located within water depths ranging from 40 to 50 m. Coordinates of the Pomodoro, Orcus and Chamois surveys areas are listed in **Table 1**.

Table 1: Proposed Pomodoro, Orcus and Chamois 3D MSS Coordinates

location point	Latitude			Longitude		
	degrees	minutes	seconds	degrees	minutes	seconds
POMODORO 3D MSS						
NW Corner	-20	09	58.46	114	55	07.32
NE Corner	-20	09	58.20	115	00	01.23
SE Corner	-20	29	54.18	115	00	03.19
SW Corner	-20	29	54.14	114	55	06.90
ORCUS 3D MSS						
NW Corner	20	38	20.61	114	33'	18.15
NE Corner	20	38	19.57	114	41'	50.96
SE Corner	20	46	45.24	114	41'	52.03
SW Corner	20	46	46.64	114	33'	19.29
CHAMOIS 3D MSS						
NW Corner	20	19	55.89	116	00'	05.45
NE Corner	20	19	55.55	116	20'	03.99
SE Corner	20	24	38.52	116	20'	04.43
SW Corner	20	23	07.80	116	00'	05.32

Datum: GDA94, UTM Zone: 50. For location points, see **Figure 1, 2, 3**

Timing

The Pomodoro, Orcus and Chamois MSS will be carried out as part of a larger seismic survey campaign by Apache, where five areas will be surveyed. The timing of the Pomodoro, Orcus and Chamois 3D MSS will therefore be dependent upon the timing of the other surveys. **Table 2** shows the anticipated timing for the Pomodoro, Orcus and Chamois 3D MSS.



The last survey (Chamois) is estimated to conclude late February 2009, however any delays to the start date of the survey or adverse prevailing sea and weather conditions encountered during the survey could potentially extend the finish date.

Table 2: Schedule for Pomodoro, Orcus and Chamois Surveys

Program / Permit	Start date	End date	Duration days	Area Size km ²
Pomodoro / WA-426 & 427-P	06/01/2011	17/01/2011	11	317.3
Orcus / WA-450-P	19/01/2011	31/01/2011	12	233.5
Chamois / WA-261-P	02/02/2011	16/02/2011	14	257.1

Project Description

Seismic Operations

The Pomodoro, Orcus and Chamois 3D MSS programmes are typical 3D surveys, similar to most others conducted in Australian marine waters (in terms of technical methods and procedures) (**Figure 4**). No unique or unusual equipment or operations are proposed. The surveys will be conducted using a purpose-built seismic survey vessel.

During the survey 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 (4-5 knots equivalent). As the vessel travels along the survey lines a series of noise pulses (compressed air released every 7-8 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 up to 10 solid/gel filled hydrophone cables (streamers), each with a maximum length of between 4.5 km (Chamois) and 6.6 km (Pomodoro and Orcus). The source (airgun array) tow depth will be 5-6 m, the streamer tow depth will be at 6-8 m and the lead-in line will be at 13 m (during acquisition). The operating pressure for the airgun array will be approximately 14 Mpa (2,000 psi). The airgun array for Pomodoro, Orcus and Chamois will consist of two sub-arrays, each with a volume of 52L (3,200 cui). These sub-arrays will be fired alternately, with a shot point interval of between 12.5 m (Chamois) and 18.75 m (Pomodoro & Orcus) 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 1µPa-m at frequencies extending up to approximately 128 Hz. A summary of the seismic survey parameters are provided in **Table 3**.

Vessels

Apache proposes to conduct the surveys using the purpose-built seismic survey vessel the M/V Geo-Atlantic (**Figure 5a**), which has a complement of approximately 80 crew. The M/V Geo-Atlantic is leased and operated by the geophysical acquisition company Fugro Pty Ltd. This vessel has previously been used by Apache to complete seismic surveys in the company's North West Shelf (NWS) acreage. The vessel will travel within the survey area at an average speed of 4.5 knots (approximately 8.3 km per hour).

Table 3: Seismic survey parameters

Parameter	Pomodoro	Orcus	Chamois
No. of streamers	10		
Streamer length	6,600 m		4,500 m
Streamer depth	6-8 m		
Size of each airgun sub-array	52 L (3,200 cui)		
Operating pressure	14 Mpa (2,000 psi)		
Shotpoint interval	18.75 m (flip flop)		12.5 m (flip flop)
Source depth	5-6 m		
Peak at source sound levels (<1m)	270 dB re 1µPa-m		
Frequency range	0–128 Hz		
Distance between survey sail lines	250 m		

A supply vessel, the M/V Cassandra VI (**Figure 5b**), will accompany the seismic survey vessel to maintain a safe distance between the survey array and other vessels, and also to manage interactions with fishing activities, if required. The supply vessel can accommodate a crew of around 38 personnel. The supply vessel will also re-supply the survey vessel with fuel and other logistical supplies and maybe required to leave the survey area for 2-3 days to transit to and from the port of Dampier. As a precautionary measure during the duration that the supply vessel is away from the field, a locally sourced chase vessel will be deployed to accompany the Geo-Atlantic.

Receiving Environment

A general overview of the receiving environment in terms of its physical and biological aspects is provided in the following sections.

Bathymetry

Pomodoro

The proposed Pomodoro seismic survey area is located within the central section of the continental shelf, at approximately 100 to 250 m depth and is characterised by a thick sequence of carbonate rock that is overlain by thin layers of unconsolidated fine to medium grained, carbonate sediments with occasional shell or gravel patches. Surveys conducted over the NWS indicate that a similar seafloor occurs extensively over this geographic region, but with spatial variation in the grain size and origin of the surface sediments.

Orcus

A recent survey of benthic marine habitats at the Gorgon development (Block WA-37-L), which lies adjacent to WA-450-P, confirmed that the seabed is primarily characterised by soft sediments at a depth of up to 180 m. The sediments were heavily bioturbated, indicating a well-developed infaunal assemblage. These habitats are very widespread in the region and are of low conservation significance.

Soft sediment habitats of the Rowley Shelf generally support limited vertebrae species but include a diverse assembly of burrowing and crawling invertebrate infauna. Fine sediments – such as found in deeper waters - generally accumulate in low energy areas and these generally support more diverse and abundant infaunal assemblages.

Chamois

A survey of the seafloor at the Stag field (adjacent to the proposed Chamois 3D MSS area) at the 50 m isobath, found the surface sediments varied in thickness over

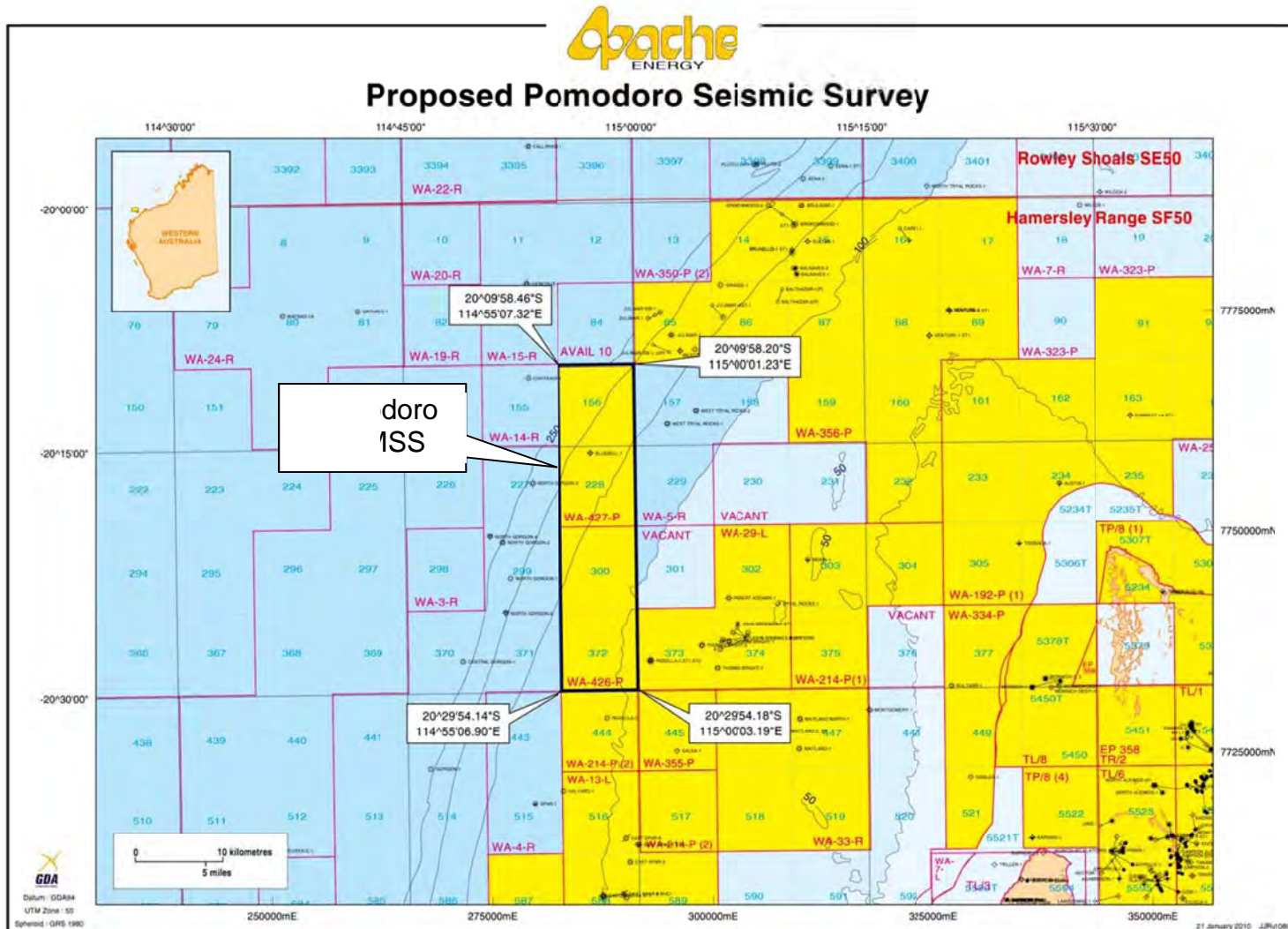


Figure 1: Location of the proposed Pomodoro 3D seismic survey north west of Montebello Islands

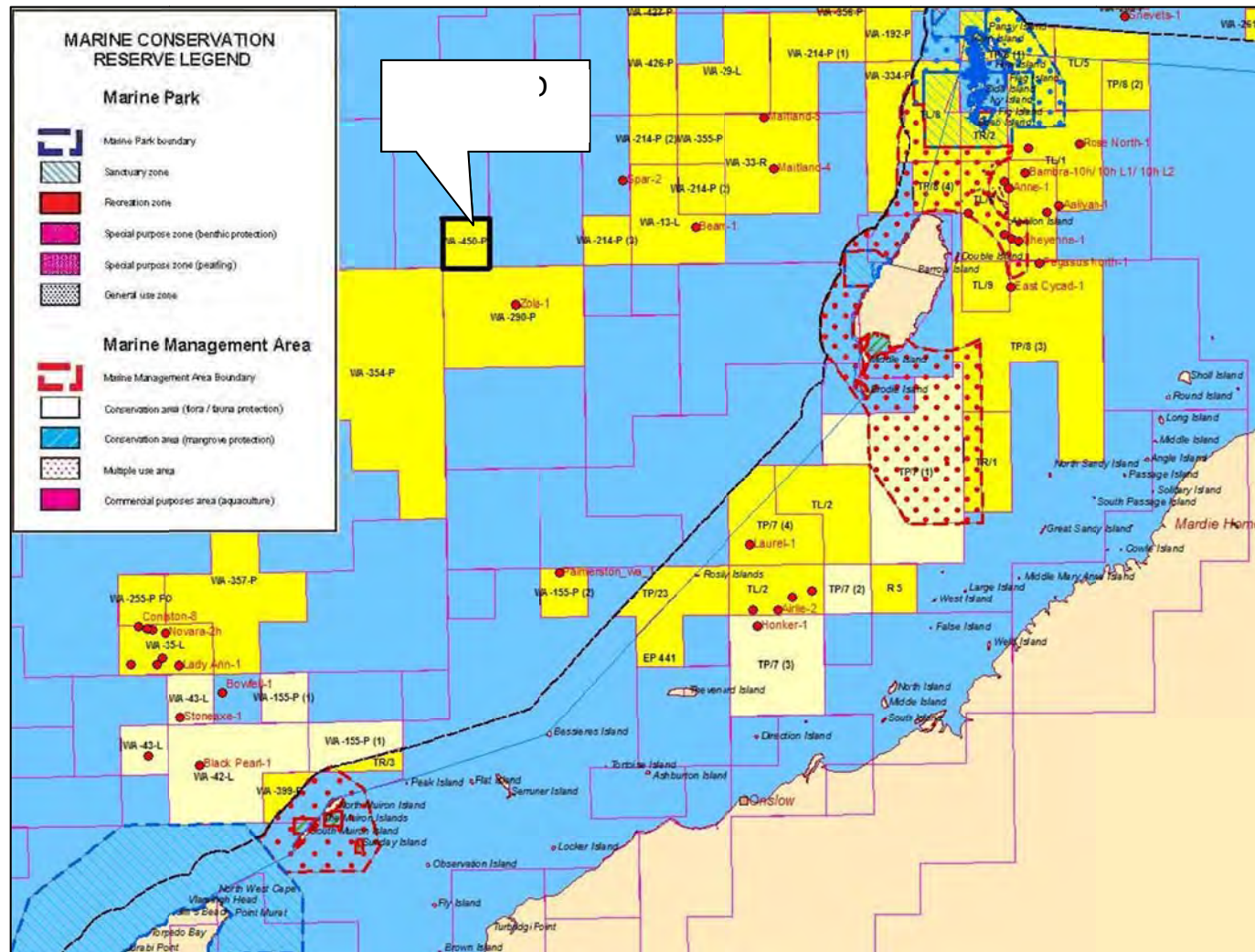


Figure 2: Location of the proposed Orcus 3D seismic survey relative to the Montebello / Barrow Islands.

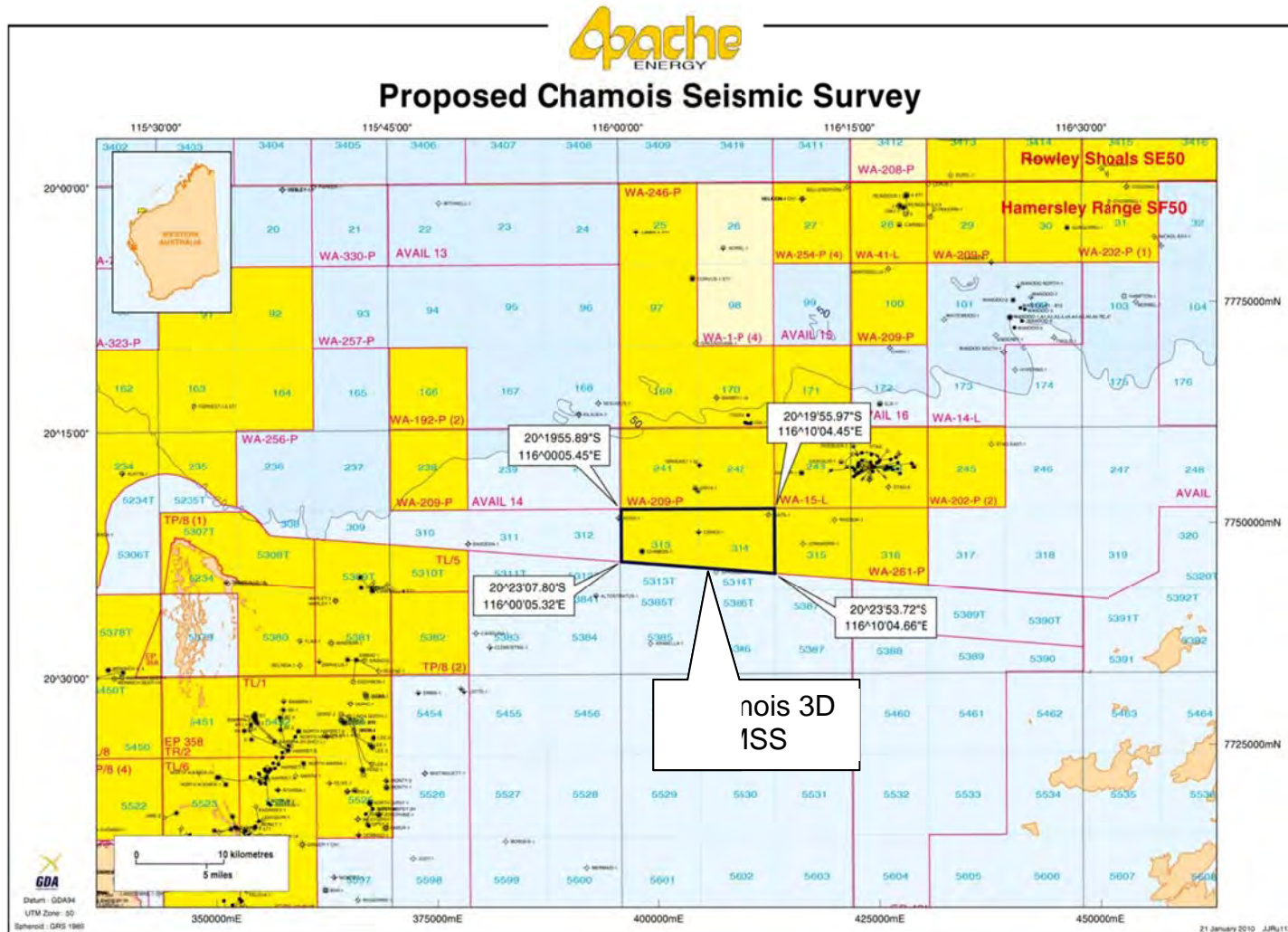


Figure 3: Location of the proposed Chamois 3D seismic survey relative to the Montebello/Barrow Islands.

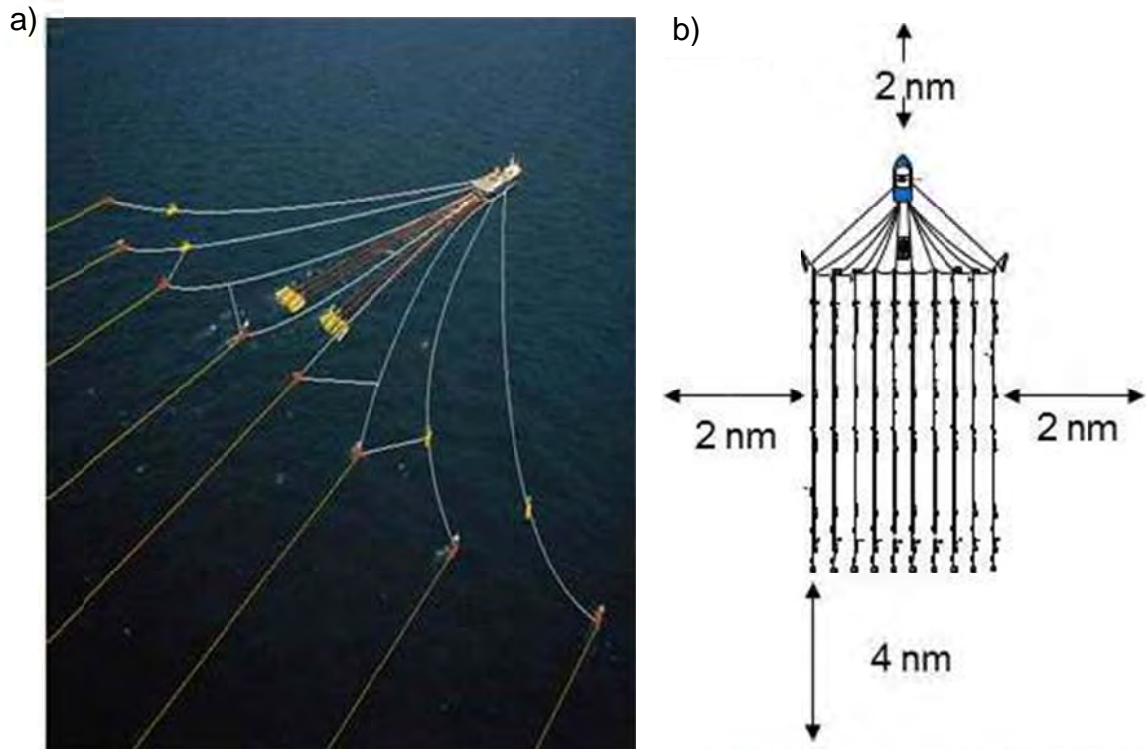


Figure 4: a) Typical Seismic Survey Array Arrangement and b) requested vessel clearances

<p>a) Geo Atlantic</p> <p>Bridge: +47 236 75171 Bridge (Inmarsat) +870 773 180907 Captain (Office) +47 236 75176 Party Chief: +47 236 75172 Client Rep: +47 236 75173 Fax: +870 783 181 366 Emails: pc@atlantic.fugro.geoteam.no master.atlantic@gcrieber-shipping.no Call sign LAO15</p> 	<p>b) Cassandra VI</p> <p>Mobile +61 409 536 728 Inmarsat +870 765 053 032 Email: cassandravi@fleet.omsau.com Call sign 9WKG5</p> 
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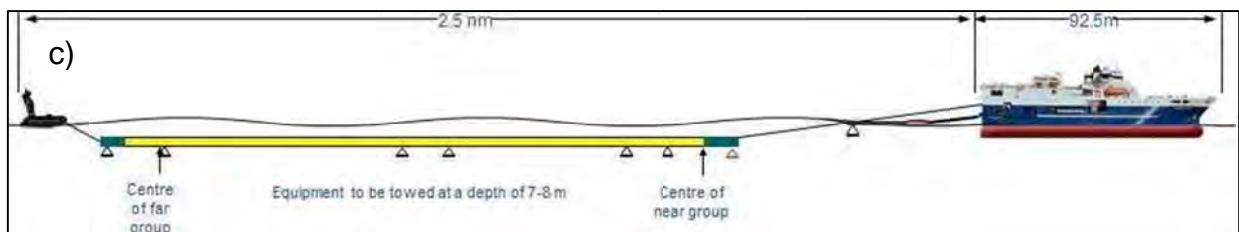


Figure 5: a) Seismic survey vessel M/V Geo-Atlantic and
 b) Support vessel M/V Cassandra
 c) Streamer profile

relatively short distances from less than 0.5 m up to approximately 2 m. The sediments are potentially mobile, but no exposed rock outcroppings were identified during side-scan sonar surveys.

Biological Environment

Marine Habitats

The survey areas are located in the North-west Marine Bioregion, in the Northwest Shelf Province. A description of the marine habitats within the Northwest Shelf Province associated with the proposed survey areas are outlined in this section. The proposed Pomodoro, Orcus and Chamois survey areas are distant from the shallow intertidal and shoreline habitats of the mainland and offshore islands (**Figure 1, 2 and 3**).

Deeper subtidal reefs support a luxuriant and diverse assemblage of filter feeding animals, comprising mostly of sponges, gorgonians, whip corals, bryozoans, ascidians and hydroids. Comparative surveys of the predominant faunal groups indicate that the area supports species characteristic of both the Pilbara coast and islands further offshore (e.g., Ashmore Reef) together with tropical Indo-west Pacific species with a widespread distribution.

Marine Fauna

A summary of the number of fauna that may be encountered within the proposed survey areas is provided in **Table 4**. The proposed Pomodoro, Orcus and Chamois survey areas are not considered a habitat that is critical to the survival of any listed species. Similarly, there are no listed threatened ecological communities as defined in the EPBC Act in the vicinity of the survey areas. There are no known nesting, breeding and feeding areas for these listed species within the seismic survey area.

Table 4: Number of Listed Threatened and Migratory Marine Species per Survey Area

Seismic Survey	Total number of Marine Fauna	Number of listed Threatened marine species	Number of migratory marine species
Pomodoro	69	7	13*
Orcus	51	10	17**
Chamois	63	9	12***

Note: * 7 of these being the same as the threatened species

** 10 of these being the same as the threatened species

*** 9 of these being the same as the threatened species

Source: DSEWPC (2010) Protected Matters Search Tool

A number of marine mammals (whales and dolphins) and turtles are known to occur in the Carnarvon Basin, some being seasonal visitors while others occur at low densities all year round. Several of these species are discussed below with regard to their potential presence in the survey area.

Marine Mammals

A number of whale species, including the blue whale (*Balaenoptera musculus*), humpback whale (*Megaptera novaeangliae*), Bryde's whale (*Balaenoptera edeni*), killer whale (*Orcinus orca*), Antarctic minke whale (*Balaenoptera bonaerensis*) and the sperm whale (*Physeter macrocephalus*) may occur infrequently in the project areas.

The most commonly sighted whale is the humpback whale. Humpback whales are listed as an endangered migratory species under the EPBC Act and are known to migrate between the Antarctic waters and the Kimberly region of Western Australia.

The peak of the northerly migration occurs around mid-June to late July, while the southerly return migration peaks around late August to early September, with a peak of cow and calves occurring in early to mid-October (**Table 5**).

Table 5: North West Shelf biological resources seasons and breeding cycles

SPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Hawksbill turtle nesting	Blue	Yellow	White	White	White	White	Yellow	Yellow	Yellow	Blue	Blue	Blue
Flatback turtle nesting	Blue	Yellow	White	White	White	White	White	White	White	Yellow	Blue	Blue
Green turtle nesting	Blue	Yellow	White	White	White	White	White	White	Blue	Blue	Blue	Blue
Loggerhead turtle nesting	Yellow	Yellow	White	White	White	White	White	White	Yellow	Yellow	Yellow	Yellow
Whale migration	White	White	White	White	White	White	North	Yellow	South	White	White	White
Whale sharks	White	White	Main aggregation period	White	White	White	White	White	White	White	White	White
Seabird nesting (terns and shearwaters)	Blue	Yellow	White	White	White	White	White	White	Yellow	Blue	Blue	Blue
Proposed Seismic programme	Green	Green	White	White	White	White	White	White	White	White	White	White

Key

Blue	Peak activity, presence reliable and predictable
Yellow	Low level of abundance/activity/presence
White	Activity not occurring within the area

The migratory whale route, where most whales are observed, occurs in deeper waters (> 20 metres), passing to the west and north of Serrurier Island, westward of Barrow Island and north of the Montebello Islands (Woodside, 2002).

The timing of the proposed seismic surveys will not coincide with the migration periods of the humpback whale.

Sea Turtles

Four species of marine turtle nest on sandy shore sites of Dampier Archipelago, Montebello Islands, Lowendal Islands, Barrow Island, Airlie Island, Thevenard Island, other coastal islands and the Exmouth region. These include the loggerhead turtle (*Caretta caretta*), the green turtle (*Chelonia mydas*), the hawksbill turtle (*Eretmochelys imbricata*) and the flatback turtle (*Natator depressus*). The leatherback turtle (*Dermochelys coriacia*) is also known to visit open waters. These five species are on the National List of Threatened Species as either endangered or vulnerable under the EPBC Act.

The nearest turtle nesting sites, distant from the three survey areas, are located in the Montebello Islands, Lowendal Islands and Barrow Island. The peak turtle nesting and hatching period occurs from November to January (**Table 5**). The regional sea turtle population is estimated to be over 49,000 animals. The distribution, abundance and activity of turtles vary widely across the NWS and among the different species. For all species, hatchling emergence occurs 6 to 8 weeks after the females have nested.

Fish

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. Pelagic fish in this area include tuna, mackerel, herring, pilchard and sardine, and game fish such as marlin and sailfish.

Whale sharks (*Rhincodon typus*), 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, approximately 120 km south-west of the nearest survey area Orcus, 150 km SW of Pomodoro and 230 km SW of Chamois.

The main period of the whale shark aggregation is late March to June, with the largest numbers recorded around April. However, the season is variable and individual whale sharks have been recorded at other times of the year

Seabirds

At least 64 species of birds feed and nest on the surrounding waters and islands within the Barrow/Montebello/Lowendal islands region. The main seabird breeding/nesting season occurs between October and January on the island group. As the proposed seismic surveys will take place in offshore waters distant from breeding sites it is highly unlikely that the proposed survey areas cover any habitat critical to the survival of any seabirds in the region.

Giant-petrels are migratory species (i.e. Bonn Convention, JAMBA and CAMBA) and tend to be the most oceanic of all seabirds, opting for land primarily for breeding purposes (Environment Australia, 2001). It is highly unlikely that the survey area covers any habitat critical to the survival of any listed migratory seabird species.

It is possible that this species may fly over the survey area, however it is not anticipated that the seismic survey will have any impact on these or other seabirds due to their mobility and distance of the survey areas from any critical nesting or feeding sites.

Areas of Environmental Significance

There are currently 3 Marine Conservation Reserves (MCR) in the North West Shelf region:

- Ningaloo Marine Park and Muiron Islands Marine Management Area
- Montebello/Barrow Islands Marine Conservation Reserves
- Dampier Archipelago Marine Park and Cape Preston Management Area.

All of the above MCR are located a substantial distance from the survey areas (**Figure 1, 2, 3**).

Socio-economic Environment

Commercial Shipping

The Pomodoro and Orcus 3D MSS are located within the main north/south coastal shipping lane paralleling the WA coastline, which then heads north to SE Asia. These survey areas are also partially located within the Dampier inbound and outbound shipping route, associated with vessel movements to and from the ports of the NWS, in particular Dampier. Consequently there is the possibility that the seismic and support vessel could encounter minor merchant vessel traffic during data acquisition.

The Chamois 3D MSS is located outside the main north/south coastal shipping lane, but is partially located within the Dampier inbound and outbound route. Therefore,

there is also the possibility that the seismic and support vessel could encounter minor merchant vessel traffic during data acquisition for this survey.

As part of the normal duties associated with a seismic vessel, the Vessel Master will notify various Australian marine agencies of the vessel's position and progress during the survey. The normal Australian Coast warnings and Notices to Mariners and shipping agents will be issued closer to the survey date, requesting adequate clearance zone around the vessels (see **Figure 4b**).

Major Environmental Hazards and Controls

The main aspects or activities associated with the operations of the seismic programmes that have the potential to result in environmental risks and effects are:

- Operation of the seismic source, recording and deployment vessels and towing of the airgun and cables through the survey area;
- Discharge of the air source arrays in the survey area;
- Routine waste discharges from vessels;
- Accidental fuel and oil spills from the support vessels; and
- Collision with another vessel.

The environmental and social issues potentially resulting from these activities are:

- Disturbance to marine fauna – disruptions to populations of cetaceans (dolphins and whales), fish, reptiles, benthic invertebrates and plankton from the discharge of the airgun array.
- Interference with shipping and boating in the area – disruption to vessels.
- Interference with commercial and recreational fishing – disruption to fishing vessels, disruption to commercial/recreational catches.
- Waste disposal impact on marine environment – sewage, putrescible waste, chemicals and solid and hazardous wastes.
- Fuel spill impact on marine environment – spillage from the support vessels.
- Interference with existing oil and gas production infrastructure (existing or under construction).
- Introduction of exotic marine species.
- Loss of tourism-related values from any oil spills and waste discharges, (if these were to occur).

A qualitative risk assessment has been carried out using a risk assessment matrix based on managing risks to as low as reasonably practical.

Risks and Effects of Routine Operations

Marine seismic surveying involves the discharge of compressed air to create sound pulses that are reflected from layers under the sea floor and recorded back at the surface. Interpretation of these reflections is a key step in exploration for hydrocarbons. There is currently no other method that has sufficient resolution to identify rock structure beneath the surface.

A review of the marine impacts from seismic surveys, as part of an independent scientific review commissioned by the Australian Petroleum Production and Exploration Association (APPEA), concluded the following:

- The response of Australian marine animals to marine seismic survey sounds will range from no effect to various behavioural changes;
- Except for plankton and larvae at close range, few species are likely to be killed outright;
- The sound intensities required to produce pathological changes in marine mammals probably occur at <100 m and at < 200 m for fish;

- Most invertebrates, dugong and small toothed whales have poor hearing at low frequencies (e.g. the range of seismic discharges);
- Some fishes, baleen whales and possibly sea turtles may hear seismic sounds well and behavioural changes may occur at greater distances;
- It is possible that animals will habituate to sound;
- Behavioural impacts can include flight response, displacement, dispersal, and disruption of feeding or breeding activity;
- Operating seismic vessels for protracted periods across narrow, restricted migratory paths may hinder the passage of migrating animals;
- The greatest risk from marine seismic surveys to marine animals appears to be during breeding or spawning periods;
- Provided that seismic surveys are avoided at locations and times of particular sensitivity, and given the relatively small scale of seismic activity, the often large scales over which biological events occur, the low probability of encounter between seismic surveys and 'at risk' populations at an appropriate time and place, then the wider implications of disruption by seismic surveys appear to be small for most species.

The proposed survey airgun array will produce at source (i.e., within a few metres of the airguns) sound pulses in the order of 270 dB re 1 μ Pa-m at frequencies extending up to approximately 128 Hz. Based on a spherical spreading noise propagation model, these sound pulses will decrease to levels in the order of 150-160 dB re 1 μ Pa-m within 1km of the source and approximately 145 dB re 1 μ Pa-m within 2kms dependent on the sound propagation characteristics of the area.

Impacts on Cetaceans

Baleen whales such as blue, southern right and humpback whales, communicate by low frequency sounds and are therefore considered to be the most sensitive of the marine mammals to specific low frequency sounds. The hearing of baleen whales is thought to overlap with the energy output of seismic related noise. The proposed timing of the seismic survey is outside the migration of the Humpback whale.

Marine seismic surveys do not necessarily constitute a threat to marine mammals if care is taken to avoid situations that could potentially harm the animals (JNCC, 1998). As mitigation for this, the guidelines on the application of the EPBC Act Policy Statement 2.1 to interactions between offshore seismic operations and whales will be applied. Given the timing and location of the seismic program and the adherence to DSEWPC cetacean Policy Statement, the risk of effects to cetaceans from the proposed seismic program is considered negligible.

Interference with Commercial and Recreational Fisheries

Potential impacts on commercial fisheries are largely due to navigational conflicts, given that seismic vessels tow long streamers (**Figure 4** and **5**), and fishers often deploy trawl nets or long lines over the same areas. Due to the long length of towed cables the vessels require a 2 NM clearance to the bow, port and starboard side, and a 4 NM clearance to the stern (**Figure 4b** and **5c**).

Adequate clearances, effective communication and up to date notification of the location of the seismic vessel to commercial fishermen in the region will further assist in avoiding any impacts. All vessel operations will be conducted in compliance with the Australian Maritime Safety Authority (AMSA) Offshore Support Vessel Code of Safe Working Practice (OSV Code), which includes standards for radar monitoring and vessel communications.

Onboard Storage and Handling of Materials

All oils or chemicals used or stored onboard the survey vessels will be contained and managed to prevent damage to the containers or leakage/spillage onto the deck or into the ocean. These materials will be stored in bunded areas such that any spills or



leaks can be contained and recovered. Deck drains and bunds will be inspected to ensure their integrity prior to the commencement of operations. Sufficient absorbent materials will be held onboard to mop up possible leaks.

Should onboard spills or leaks occur, they would be cleaned up immediately using absorbent materials held on the vessel. Recovered oils or chemicals and used absorbent materials will be placed in appropriately marked drums for recycling or onshore disposal. The vessels will follow AEL's "*Environmental Requirements For Offshore Marine Vessels*" ([AE-91-IQ-202](#)).

Disposal of Wastes

All wastes generated on the vessels will be managed in accordance with MARPOL 73/78 regulations. The risk of adversely affecting water quality within any of the survey areas is considered negligible based on the constant movement of the vessel, the short duration of the survey, the highly dynamic and extensive receiving water and the small quantity and concentration of pollutants within waste-waters discharged from the support vessel. A quantitative waste tracking log will be maintained in accordance with regulatory requirements for all relevant wastes.

Anchoring

Anchoring will only be required under exceptional circumstances. Under normal operations, no anchoring is required in the field during this seismic programme. Relative depths at the proposed survey areas make it highly unlikely that any of the towed equipment will make contact with the seafloor or benthic communities.

Refuelling

Refuelling at sea is likely to be required during the seismic program. The support vessel will refuel in the Port of Dampier and will be used to refuel other vessels in the field as and if required. All refuelling will be in accordance with Apache's "*Refuelling and Chemical Transfer Management Procedure*" ([AE-91-IQ-098](#)).

In the extremely unlikely event of an accidental oil spill to the ocean, the contractor vessel's approved Shipboard Oil Pollution Emergency Procedure (SOPEP) would be immediately activated, in conjunction with the Emergency Procedures Manual if necessary. All spills must be logged and reported to the Vessel Master. Any spills greater than 80L must also be immediately reported to the DMP.

Exhaust Emissions

The combustion of fossil fuels in vessel engines and onboard power generators will contribute to exhaust emissions including the greenhouse gas CO₂. Emissions will be minimised by ensuring that all engines and generators are serviced to manufacturers specifications.

Risks and Effects from Unplanned Events

Vessel Collision

There is the potential for vessel traffic transiting from and to the Port of Dampier to pass through the survey areas. The potential for a hydrocarbon spill resulting from the collision of the seismic vessels with another ocean going vessel is considered negligible for the following reasons:

- Radio communication will be maintained with any vessels observed transiting the area.
- Information on the location and timing of the seismic program will be communicated to vessels via AMSA through a Notice to Mariners.
- Notification of the position of the seismic vessels and the area proposed to be working in will be communicated to fishing industry representatives and forwarded to respective members (vessel owners). This will ensure no fishing vessels are operating within the nominated daily run line of the survey.



- Seismic vessel will request a 2 NM clearance to the bow, port and starboard side, and a 4 NM clearance to the stern

Introduction of Marine Pests

Australia has mandatory ballast water requirements are enforced under the Quarantine Act 1908. These requirements are consistent with International Maritime Organisation (IMO) Guidelines for minimising the translocation of harmful aquatic species in ship's ballast water.

The vessels proposed to be used for the surveys currently operate within Western Australian waters and pose no risk from the introduction of marine pests. Should a vessel be required to be sourced from outside WA waters, then it will be required to comply with the Australian Ballast Water Management Requirements. This will involve a full ballast water exchange at sea prior to entering Australian waters. Additionally, all vessels will comply with DAFF National Biofouling Management Guidelines. The seismic source array and receivers will be cleaned prior to their deployment.

Management Controls

Controls to be implemented during the seismic programmes to safeguard against the potential environmental risks and effects identified, consist of both procedural and operational practices that will be undertaken during the seismic surveys to protect against any adverse environmental impact. Such controls are recognised as additional measures to further manage environmental risks.

A summary of the main environmental hazards, their potential effect and management controls for the Pomodoro, Orcus and Chamois 3D MSS to be implemented to reduce the risk to as low as practicable is outlined in **Table 6**.

Consultation

The proposed MSS program was previously assessed by the Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) under the Environmental Protection and Biodiversity & Conservation (EPBC) Act. Assessment dates were:

- Pomodoro (WA-426-P and WA-427-P): Received: 04-May-10, Decision: 01-Jun-10 ([2010/5472](#)).
- Orcus (WA-450-P): Received: 05-Nov-10, Decision: 14-Dec-10 ([2010/5723](#)).
- Chamois (WA-261-P): Received: 20-Oct-10, Decision: 24-Nov-10 ([2010/5695](#)).

In addition, an Environment Plan has been prepared in accordance with Regulation 6 of the OPGGSE Regulations, 2009: Pomodoro, Chamois & Orcus 3D Marine Seismic Surveys Environment Plan (EA-00-RI-0174; accepted: 23-Dec-10).

Apache has consulted with the following stakeholders of the proposed 3D MSS Program:

- Department of Minerals & Petroleum (DMP)
- Fisheries WA (DOF)
- WA Fishing Industry Council (WAFIC)
- Australian Fisheries Management Authority (AFMA)
- Commonwealth Fisheries Association (CFA)
- Western Australian Northern Trawl Owners Association (WANTOA)
- Northern Fishing Companies Association
- Western Australian Fishing Industry Council (WAFIC)
- Recfish WA
- A Raptis and Sons



Stakeholder communications will continue for the duration of the seismic survey program.

Table 6: Apache Environmental Guidelines and Environmental Commitments for the Pomodoro, Orcus and Chamois 3D MSS Program

Activity	Requirement
Operational Environmental Awareness	<ul style="list-style-type: none"> • Through inductions and educational material present on the vessels, all personnel are familiar with the environmental requirements of the EP to ensure these guidelines and procedures are being followed. • Ensure all personnel sign off on the vessel register book confirming their induction.
Minimise risk of adverse effect to marine biota and the marine environment.	<ul style="list-style-type: none"> • AEL Site Rep validating compliance with DSEWPC Policy Statement for avoiding interference with cetaceans. • Verify adherence to EP through environmental audit.
Maintain air quality	<ul style="list-style-type: none"> • Include inspections and tuning of engines and equipment on a regular maintenance schedule. • Verify that vessel procedures comply with requirements of MARPOL.
Deck drainage, Liquid Discharges chemical storage and management	<ul style="list-style-type: none"> • All discharges, including sewage, black and grey water, brine, cooling water, bilge, ballast water, deck drainage, to comply with legal requirements, including MARPOL and OPGGS(E) Regulations • Maintain good housekeeping practices. • Store chemicals in banded areas away from open drains and chemical containers are to be intact. • Use drip trays under all machinery and fuel points and valves. • In the event of a spill, take all actions to control the spill and divert deck drainage to on board containment tanks for treatment through the oil in water separator. • Ensure absorbent material is on board to use in soaking up chemical or oil spills on deck. • Maintain oil water separators regularly to ensure 15 ppm oil concentration alarm is functional, in accordance with MARPOL 1973/78 requirements. • Report all spills (including < 80 L) through Apache incident reporting system.
Spillage of diesel fuel or oil	<ul style="list-style-type: none"> • Follow AEL's "<i>Refuelling and Chemical Transfer Management Procedure</i>" (AE-91-IQ-098). • Carry out diesel refuelling during daylight hours only, weather permitting. • In event of a spill take all actions to control it. • Do not use dispersant without AMSA approval. • Report all spills (including < 80 L) through Apache incident reporting system. • Implement Apache's "<i>Oil Spill Contingency Plan</i>" (OSCP), (AE-00- EF-008) if required.

Activity	Requirement
Incident Reporting	<ul style="list-style-type: none"> • Use the AEL's "<i>Hazard Reporting, Incident Notification and Investigation Procedure</i>" (AE-91-IF-002) to report incidents to DMP within 2 hours (OPGGGS Regulations; 26A). • Report all spills > 80 L to DMP within 2 hours either directly by contacting the DMP Duty Inspector on 0419 960 621 (email petroleum.environment@dmp.wa.gov.au) or via the Apache Perth office. • All spills < 80 L are Recordable Incidents under the Offshore Petroleum & Greenhouse Gas Storage Regulations 2009 (26B) and must be reported to DMP at the end of each month via the Apache Perth office. • Recordable incidents to be reported to DMP at the end of each month (OPGGGS Regulations; 26B).
Sewage discharge	<ul style="list-style-type: none"> • Treat sewage to secondary level prior to discharge through the sewage plant (aerates, macerates and chlorinates). Sewage facilities to meet MARPOL 1973/78 requirements. • Maintain the sewage treatment plant in order to ensure effective treatment.
Waste Oil Management	<ul style="list-style-type: none"> • Drum waste oil and grease and return to mainland for recycling. • Record volume of waste oil taken off vessel and forward results to the Apache Environmental Department at the end of the survey.
Solid waste management <ul style="list-style-type: none"> • Food scraps • Garbage • Litter • Scrap metal and wood etc 	<ul style="list-style-type: none"> • Disposal of food scraps in accordance with MARPOL 1973/78 – no disposal of unmacerated food within 12 nm • Do not dispose of debris, garbage or litter into the sea (skips need covers to prevent wind-blown rubbish – especially plastics and cups). • Segregate industrial waste (scrap metals / drums etc) wherever possible for appropriate disposal onshore. • Do not use polystyrene cups. • Reduce, reuse and recycle waste wherever practicable. • Record the volume and type of waste taken off vessels and forward to the Apache Environmental Department at the end of the seismic surveys.
Minimise risk of adverse effect to marine biota and the marine environment.	<ul style="list-style-type: none"> • Verify adherence to EP through Environmental audit. • AEL Site Rep validating compliance with DSEWPC Policy Statement for avoiding interference with cetaceans. • Implement Particular Matter conditions EPBC 2010/5472 (Pomodoro), 2010/5695 (Chamois) and 2010/5723 (Orcus), particularly with regards to soft start procedures and requirements for onboard Marine Mammal Observers (MMO)(Pomodoro only) • Application of the EPBC Act Policy Statement 2.1 to interactions between offshore seismic operations and whales
Light Overspill	<ul style="list-style-type: none"> • Minimise use of non-essential lighting, while maintaining safety standards on the vessels.
Noise	<ul style="list-style-type: none"> • Application of the EPBC Act Policy Statement 2.1 to interactions between offshore seismic operations and whales • Implement Particular Matter conditions EPBC 2010/5472 (Pomodoro), 2010/5695 (Chamois) and 2010/5723 (Orcus), particularly with regards to soft start procedures and requirements for onboard Marine Mammal Observers (MMO) (Pomodoro only) • Minimise noise emissions when operating near noise-sensitive environments.
Fishing	<ul style="list-style-type: none"> • No fishing is permitted from the vessel whilst it is on location.



Activity	Requirement
Large Animal Observations	<ul style="list-style-type: none"> • Implement Particular Matter conditions EPBC 2010/5472 (Pomodoro), 2010/5695 (Chamois) and 2010/5723 (Orcus), particularly with regards to soft start procedures and requirements for onboard Marine Mammal Observers (MMO) (Pomodoro only). • Application of the EPBC Act Policy Statement 2.1 to interactions between offshore seismic operations and whales • To mitigate any potential impacts on humpback whales or whale sharks, DMP's (formerly DoIR) "Guidelines on Minimising Acoustic Disturbance to Marine Fauna" (2007) will be followed. • The DEC Code of Conduct for whale shark interactions shall be adhered to • Fill in whale and turtle observation data sheets and send to the Apache Environmental Department at the completion of the each seismic survey. • All cetacean sighting records will be reported to DSEWPC at the end of each seismic survey.
Anchoring & Disturbance to the seabed	<ul style="list-style-type: none"> • Follow AEL's "Environmental Requirements For Offshore Marine Vessels" (AE-91-IQ-202). • No anchoring required while on location, unless in exceptional circumstances.
Minimise risk of introducing marine pests into Australian waters	<ul style="list-style-type: none"> • Vessel log book records a full ballast water exchange at sea prior to entry into Australian waters. • Compliance with DAFF National Biofouling Management Guidelines for Commercial vessels and DAFF National biofouling management guidance for the petroleum production and exploration industry.
Minimise disturbance to other users.	<ul style="list-style-type: none"> • Advice given to stakeholders with regard to location and timing of seismic surveys.

Further Details

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