



Stag and Reindeer Seismic Surveys Environment Plan Summary

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1. INTRODUCTION

Apache Energy Limited ('Apache') is the appointed Operator of Activity responsible to the instrument holders for the overall management and operation of the survey.

Apache Energy Limited ('Apache') proposes to undertake the Stag 4D and Reindeer Multi-Azimuth (MAZ) Marine Seismic Surveys ('the surveys') in Commonwealth waters of the Carnarvon Basin, Western Australia (WA).

In accordance with the *Offshore Petroleum & Greenhouse Gas Storage Act 2006* Part 2.8 (Petroleum Access Authorities), the instrument holder of the initiating titles will obtain Access Authorities from the National Offshore Petroleum Titles Administrator (NOPTA) as required prior to commencing the activity.

1.1 Compliance

The overall purpose of this EP is not only to comply with statutory requirements of the Commonwealth Offshore Petroleum and Greenhouse Gas Storage (Environment) regulations 2009 (OPGGs (E) Regulations) but also to ensure that the seismic acquisition is planned and conducted in line with Apache environmental policies and standards, including the corporate Environmental Policy. The EP has been reviewed and accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) on the 27th March 2014. This EP summary has been prepared in accordance with the requirements of regulation 11 (7) and (8) of the OPGGS (E) Regulations.

An EPBC Act Referral was submitted in parallel to this EP to the Department of Environment (DoE). A decision on the proposed action approving the seismic survey was provided on 11th February 2014 with '*Not a controlled action if undertaken in a particular manner*'. Apache will undertake the activity in accordance with the particular manners provided in the approval.

1.2 Schedule

The surveys will occur in 2014. The exact timing of the surveys is dependent upon vessel availability, weather conditions and receiving the necessary statutory approvals. To reduce potential impacts to humpback whales, the proposed survey will occur between January and June 2014.

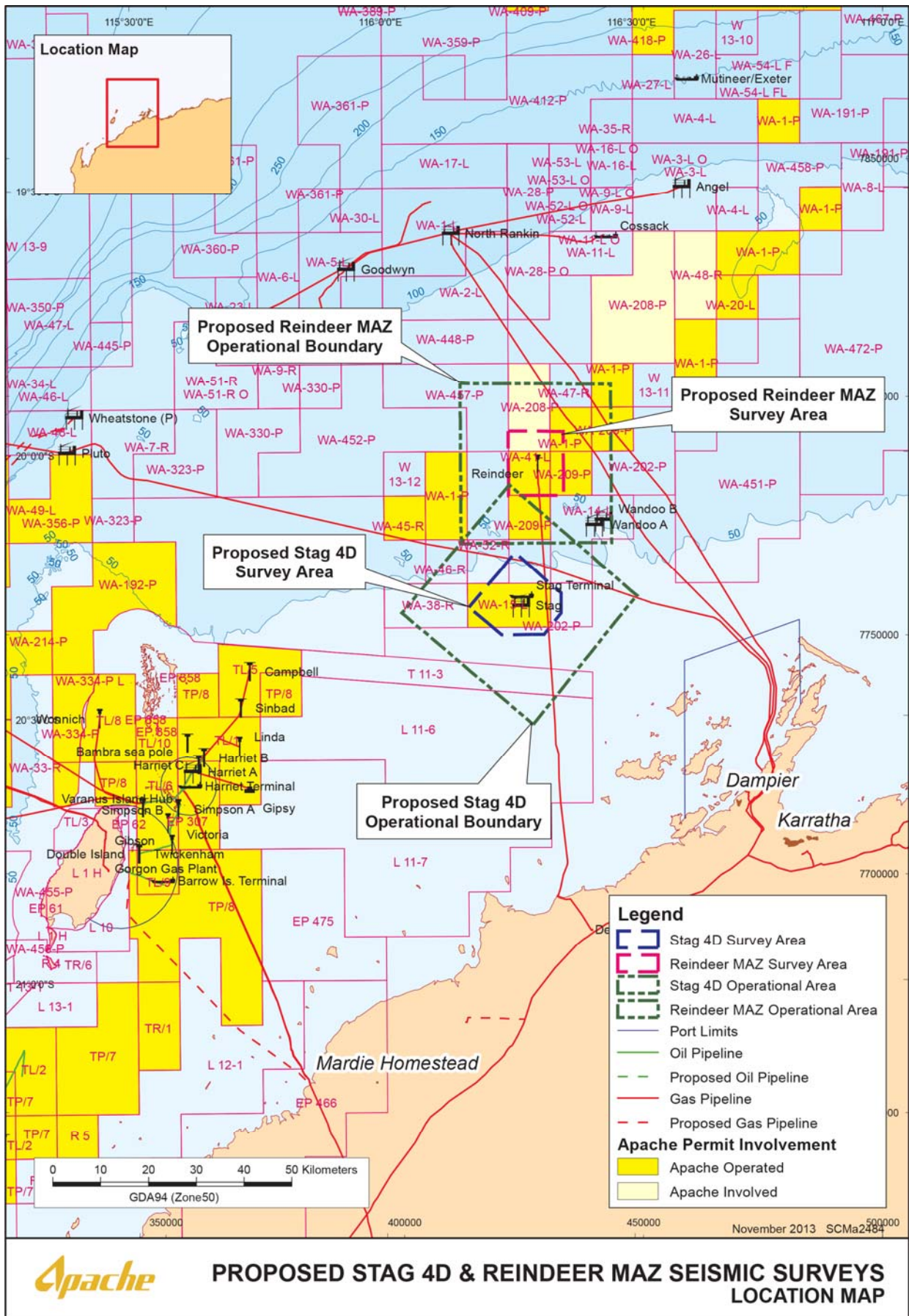


Figure 1-1: Location of the Stag and Reindeer operational and survey areas

2. ACTIVITY LOCATION

The surveys will consist of a 'survey area' and a larger 'operational area' (**Figure 1-1**). The survey area is defined by that area which contains full-fold seismic coverage for the purpose of imaging the subsurface. The operational area is used for conducting operations ancillary to achieving full-fold coverage within the survey area. Activities conducted in the operational area include: acoustic emissions at full power on sail line 'run-outs'; acoustic emissions below full power for the purpose of 'soft start' or 'fauna alert' procedures; miscellaneous maintenance operations; and, vessel turns at the end of each sail line, necessary for the vessel to change to a new sail line.

Bounding coordinates for the operational and survey areas are presented in **Table 2-1**.

Table 2-1: Co-ordinates of the proposed Stag and Reindeer survey and operational areas

SURVEY	LATITUDE			LONGITUDE		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
Stag	<i>Operational area</i>					
	20	18	2.89	116	1	51.57
	20	3	29.6	116	14	55.87
	20	16	19.32	116	31	0.03
	20	30	53.8	116	17	56.08
	<i>Survey area</i>					
	20	17	38.43	116	10	13.89
	20	11	26.15	116	15	48.07
	20	15	55.11	116	21	24.81
	20	18	25.97	116	21	21.66
	20	20	47.53	116	19	14.71
	20	20	47.17	116	14	10.01
Reindeer	<i>Operational area</i>					
	19	52	12.59	116	20	48.76
	19	52	14.53	116	30	57.38
	20	2	31	116	30	55.49
	20	2	29.04	116	20	46.22
	<i>Survey area</i>					
	19	57	36.53	116	15	3.38
	19	57	38.81	116	25	12.33
	20	7	55.26	116	25	10.07
	20	7	52.96	116	15	0.46

3. DESCRIPTION OF THE ACTIVITY

Apache intends to conduct the proposed surveys to supersede existing seismic data sets in the survey areas, using state-of-the-art technology and techniques. The Reindeer MAZ survey comprises a 3D survey employing modern streamer technology (dual sensor, jell filled) and improved survey design parameters, over an area previously surveyed, but with different sail line azimuths to improve the resolution of the geophysical imaging. The survey is designed to support the appraisal and exploration of potential additional recoverable petroleum reserves within the title area and to aid the efficient recovery of such petroleum where commercially viable. The Stag 4D survey will comprise a 3D survey acquired over similar areas previously surveyed, with the objective of gaining an appreciation of how the reservoir is changing over time.

The surveys comprise typical 3D acquisition techniques similar to others conducted in Australian marine waters (in terms of technical methods and procedures). No unique or unusual equipment or operations are proposed. The surveys will be conducted using a purpose-built seismic survey vessel.

During the proposed activities, the survey vessel will traverse a series of pre-determined sail lines within the operational areas at a speed of approximately 4-4.5 knots (8-9 km/hr). As the vessel travels along the sail lines a series of noise pulses (every 5 - 10 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 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.

For both surveys, the seismic array will comprise a maximum of 14 seismic streamers. For the Stag survey the streamers will have an approximate length of 2000 m, for Reindeer 8000 m. The seismic streamers are towed side by side and the spacing between each seismic streamer will be ~40 m for Stag and between 50 - 75 m for Reindeer. The seismic energy source tow depth will be 4 m for Stag and 5 m for Reindeer and the streamer tow depth will be between approximately 7 to 20 m for both surveys. The operating pressure for the seismic energy source will be approximately 2000 psi for both surveys and will consist of two sub-arrays, each with a maximum volume of between approximately 1000 and 2000 cui for Stag and between 3000 and 4000 cui for Reindeer. These sub-arrays will be fired alternately, with a shotpoint interval of 12.5 m horizontal distance.

4. DESCRIPTION OF ENVIRONMENT

4.1 Physical environment

North West Shelf (NWS) waters are usually thermally stratified with a marked change in water density at approximately 20 m (SSE, 1993). Surface temperatures vary annually, being warmest in March (32°C) and coolest in August (19°C). Near bottom water temperature is approximately 23°C, with no discernible seasonal variation.

During summer (October–March), the prevailing non-storm winds are from the southwest, west and northwest at an average speed of less than 10 knots, peak average speeds of 15–25 knots, and maximum speeds of 30 knots. Non-storm winds prevail from the north-east through to south-east at average speeds of 5–6 knots, peak average speeds of 10–15 knots, and maximum speeds of 20 knots. The wave climate is generally composed of locally generated wind waves (seas) and swells that are propagated from distant areas (WNI, 1995; 1996). In the open ocean, sustained winds result in wind-forced currents of approximately 3% of the wind speed (Holloway and Nye, 1985).

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

Offshore drift currents are represented as a series of interconnected eddies and connecting flows that can generate relatively fast (1–2 knots) and complex water movement. These offshore drift currents also tend to persist longer (days to weeks) than tidal current flows (hours between reversals) and thus will have greater influence upon the trajectory of slicks over time scales exceeding a few hours (APASA, 2012).

4.2 Biological environment

The operational area is situated within the Northwest Shelf Province which is located almost entirely on the continental shelf, except for a small area to the north of Cape Leveque that extends onto the continental slope. The shelf gradually slopes from the coast to the shelf break, but displays a number of seafloor features such as banks/shoals and holes/valleys. The dynamic oceanic environment influences sediment distribution throughout the bioregion. The seafloor of this bioregion is particularly strongly affected by cyclonic storms, long-period swells and large internal tides, which can resuspend sediments within the water column as well as move sediment across the shelf (DSEWPac, 2008).

Low density benthic communities of bryozoans, molluscs and echinoids are supported within the bioregion. Sponge communities are also sparsely distributed on the shelf and are found only in areas of hard substrate. However the region between Dampier and Port Hedland is a hotspot for sponge biodiversity. Other benthic and demersal species in the bioregion include sea cucumbers, urchins, prawns and squid. Benthic and pelagic fish communities are also highly diverse and strongly depth-related with a number of hotspots identified between Port Hedland and North West Cape. Numerous migratory species including humpback whales, whale sharks and dugongs travel through the bioregion. The bioregion also supports bottlenose and Indo-Pacific humpback dolphins, turtle nesting sites including green, hawksbill, flatback and loggerhead turtles, and several seabird breeding populations including wedge-tailed shearwaters, crested, bridled and sooty terns, brown boobies and lesser frigatebirds (DSEWPac, 2008).

A search of the EPBC Act Protected Matters Database was conducted on 11 November 2013 using the coordinates of the Stag and Reindeer operational areas (**Figure 1-1**) with a 10 km buffer. Results of the search identified 19 threatened and/or migratory species of marine fauna.

The Stag and Reindeer operational areas do not overlap with any Commonwealth Marine Reserves, State Protected areas or Key Ecological Features (KEFs). However modelled spill trajectory areas do overlap with:

- Montebello Commonwealth Marine Reserve
- Dampier Commonwealth Marine Reserve
- Montebello Islands Marine Park
- Proposed Dampier Marine Park
- Ancient Coastline at 125 m Contour KEF
- Glomar Shoals KEF

4.3 Socio-economic environment

Socio-economic activities that may occur within the operational area and surrounds include commercial fishing, oil and gas exploration and production; and to a lesser extent, recreational fishing and tourism.

Offshore and coastal waters in the North-west Marine Region support a valuable and diverse commercial fishing industry. State fisheries within the operational area that may be active include the Pilbara Trap Managed Fishery and Pilbara Line Fishery.

Commonwealth fisheries, such as the Western Tuna and Billfish Fishery (WTBF), Southern Bluefin Tuna Fishery (SBFTF) and Western Skipjack Tuna Fishery (WSTF), although licensed to fish within the operational areas and spill trajectory area have had no recent fishing effort reported (AFMA, 2011). The North West Slope Trawl Fishery (NWSTF) is the only Commonwealth fishery with historical effort within the operational areas, targeting scampi and prawns. The NWSTF is restricted to depths of greater than 200 m, and therefore, overlaps the deeper areas of the spill trajectory area (AEL, 2011b).

At a distance of approximately 20 km from the Dampier Archipelago and 47 km from the Montebello Islands, the operational areas are unlikely to be visited by recreational fishers especially given the water depths (ranging from 35 - 65 m).

Various petroleum exploration and development activities have occurred within and surrounding the operational areas.

The Wandoo (Vermillion) platform is located within the Reindeer operational area and the Reindeer platform (Apache) is located within the Reindeer survey area. Gas pipelines run from the Reindeer platform to the mainland. The Stag terminal (Apache) is located within the Stag survey area. The operational areas are located ~60 km from Varanus Island where the Apache operated Varanus Island Processing Hub is located.

The Stag operational area overlaps with a shipping fairway, however, AUSREP data suggests less traffic would be encountered in this fairway in comparison to those located further east. Local vessel movement is likely to be associated with commercial shipping, the petroleum industry and to a lesser degree, commercial fishing. The Reindeer operational area is ~10 km north of the closest shipping fairway. As such, encounter of third party vessels during the Reindeer survey are expected to be lower in comparison to the Stag survey.

Given the considerable distance of the operational areas from the nearest population centre at Dampier (approximately 44 km away) and the nearest shoreline at Rosemary Island (approximately 20 km away) there is unlikely to be any tourism-based activities in the waters of the operational areas.

There are no World Heritage properties, National Heritage places, or wetlands of international importance, Aboriginal heritage sites within the operational areas or spill trajectory area.

There is no evidence from seabed surveys that shipwreck sites exist within the operational areas.

5. STAKEHOLDER CONSULTATION

As stated in Apache's Environmental Management Policy, our company is committed to maintaining open community and government consultation regarding its activities and environmental performance.

Apache's operating presence off the North West Shelf (e.g. gas processing facilities at Devil Creek and Varanus Island) ensures that communication is regular with relevant stakeholders, including those potentially affected by this activity. The identified stakeholders are commercial fishers in the region, fishing bodies, federal departments and regulators. Relevant stakeholders identified for the survey activity based on the defined operational area are summarised in **Table 5-1**.

Table 5-1: Summary of stakeholders consulted

Group	Stakeholder
Commercial fisheries	<ul style="list-style-type: none"> • Austral Fisheries • Australian Fisheries Management Authority (AFMA) • Commonwealth Fisheries Association (CFA) • Department of Fisheries (DoF) • MG Kailis • Pearl Producers Association • A Raptis and Sons • Western Australian Fishing Industry Council (WAFIC) • WestMore Seafoods & Shark Bay Seafoods
Recreational fisheries	<ul style="list-style-type: none"> • Marine Tourism WA • RecFish West
Marine conservation	<ul style="list-style-type: none"> • Western Australian Department of Parks and Recreation (DPaW)
Marine activities, spill response and safety	<ul style="list-style-type: none"> • Australian Marine Oil Spill Centre (AMOSOC) • Australian Maritime Safety Authority (AMSA) • Department of Mines and Petroleum (State) • Department of Defence (State) • Department of Transport (State)
Karratha/Dampier Stakeholder Group	<ul style="list-style-type: none"> • Shire of Roebourne • Dampier Port Authority
Port Hedland Stakeholder Group	<ul style="list-style-type: none"> • Town of Port Hedland • Port Hedland Port Authority (PHPA)
Nearby operators	<ul style="list-style-type: none"> • Vermilion Energy

On October 24, 2013, Apache Energy disseminated to all stakeholders advanced notification of seismic activities proposed to commence between January and June 2014. Apache consults with this stakeholder group regularly in the course of its NWS operations, and will notify or consult with stakeholders should there be any further changes, either through the regular consultation process, or through a specific notification, whichever is deemed more appropriate. Apache is confident that the group is adequately informed, and is able to feed back or request further information if required.

No concern was raised with this consultation and the most extensive communication was with the State Department of Parks and Wildlife (DPaW) and the State Department of Fisheries (DoF), whose advice was taken into account when producing the environment plan.

The Apache Energy Quarterly Project Update has been developed in consultation with informed stakeholders and includes a summary of Apache's activities for the next six to nine months (in both Commonwealth and state waters). The quarterly updates (which include these surveys) are intended to trigger feedback, comments and requests for additional information or consultation opportunities for the future activities, and provide update of the activities that are underway, or have previously been consulted on. Stakeholders are urged to contact Apache Energy should they require more information or have concerns with any activities showcased.

6. ENVIRONMENTAL HAZARDS AND CONTROLS

Risk identification involves identifying the sources of risk, such as those hazards and events that could result in an environmental impact from the activity. The identification of hazards and events is based on a detailed understanding and experience of the activities to be carried out (Apache's engineers and project co-ordinators) and knowledge and experience of likely impacts from these activities on the environment (Apache's environmental scientists). The hazard identification workshop is the forum used to capture this expertise and was used to identify hazards and events associated with the planned and unplanned events of the activity. Following on from the workshop the risk assessment is further detailed through smaller working groups/ meetings as required, during the preparation of the environment plan and detailed engineering of the project design to mitigate the environmental risks identified to as low as reasonably practicable (ALARP).

The environmental risk assessment for the surveys was conducted on 5th November 2013, and a further ALARP risk workshop was conducted on 20th February 2014. The risk assessment identified eight potential environmental hazards associated with routine operational activities, and a further six non-routine hazards. These environmental hazards, risks and control measures to be applied to the survey activity are provided in **Section 8**. The control measures are consistent with Apache corporate and project specific performance objectives, standards and criteria. All commitments associated with these will be used to reduce environmental risk to ALARP and will be of an acceptable level.

7. MANAGEMENT APPROACH

The Stag and Reindeer surveys will be managed in compliance with all measures and controls detailed within the EP accepted by NOPSEMA under the OPGGS (E) Regulations, the EPBC referral accepted by DoE under the Environmental Protection and Biodiversity Act 1999 (EPBC Act), other environmental legislation and Apache's Management System (e.g. Apache Environmental Management Policy).

The objective of the EP is to ensure that potential adverse environmental impacts associated with routine operational events and unplanned events associated with the surveys, are identified and assessed, and to stipulate mitigation measures to avoid and/or reduce any adverse impacts to the marine environment to ALARP.

The EP details specific performance objectives, standards and procedures, and identifies the range of controls to be implemented (consistent with the standards) to achieve the performance objectives. The controls for the survey activities are summarised in **Section 8**. The EP also identifies the specific measurement criteria and records to be kept to demonstrate the achievement of each performance objective.

As described in the EP, the implementation strategy includes the following:

1. Details on the systems, practices and procedures to be implemented;
2. Key roles and responsibilities;
3. Training, competencies and on-going awareness;
4. Monitoring, auditing, management of non-conformance and review;
5. Records Management;
6. Incident response including an Oil Spill Contingency Plan (OSCP); and
7. Reporting.

The reporting requirements for routine events and environmental incidents (recordable and reportable) and reporting on overall compliance of the activity with the EP are also detailed.

8. ENVIRONMENTAL IMPACTS AND CONTROLS

The following tables (refer to **Table 8-1** and **Table 8-2** below) provide a summary of potential environmental hazards that could be expected from the surveys for planned activities and unplanned events. The tables lists the controls and measures which eliminate or ensure the environmental risk is reduced to ALARP.

Table 8-1: Environmental risk summary for planned activities

Hazard	Risk Treatment Avoidance, Mitigation & Management Controls
Introduction of invasive marine pest species	<ul style="list-style-type: none"> • Vessel anti-foulant system is maintained. • Vessel has AQIS clearance to be in Australian waters. • A biofouling vessel risk assessment (VRASS) is completed and risk ranked 'low' prior to mobilisation to Australia. • Vessels shall exchange 'high-risk' ballast water, as defined in Australian Ballast Water Management Requirements (AQIS, 2011), > 12 nm from Territorial Sea Baseline. • Onboard ballast water exchange logs detail uptake and discharge volumes and position and water depth of exchange.
Interaction with marine fauna and other marine users through vessel movement	<ul style="list-style-type: none"> • In accordance with Part 8 of the EPBC Regulations 2000, the vessel must: <ul style="list-style-type: none"> - Travel at a constant speed of less than 6 knots and minimize noise within 300 m (caution zone) of a cetacean or whale shark known to be in the area; - Not approach closer than 100 m of a cetacean or whale shark known to be in the area; and - Not change the course or speed of the vessel suddenly if a dolphin approaches the vessel or comes within 100 m • Binoculars and Marine Fauna Sighting Datasheet available on all vessels. • Apache Marine Fauna Sighting Datasheets completed and submitted to DoE. • All crew must attend an environmental induction containing basic information on procedures to manage interactions between vessels and marine fauna. • Access authority for non-Apache permits prior to commencement of activity once survey program finalized • Implementation of the simultaneous operations (SIMOPS) plan to manage interactions between two or more vessels • Support vessel(s) will scout within the MSS operational areas to ensure that possible spatial conflicts between seismic source and other vessels are avoided • Bridge-watch on all support vessels 24 hours per day. • Navigation equipment and vessel procedures compliant with all marine navigation and vessel safety requirements under the <i>International Convention of the Safety of Life at Sea (SOLAS) 1974</i> and <i>Navigation Act 2012</i> (or equivalent). • Vessels equipped with an automatic identification system (AIS) and an ARPA system which can identify, track and project the closest approach for any vessel (time and location) within the operational area and radar range (<70 km away). • Support vessel(s) will remain in communication with survey vessel at all times and with other 3rd party vessels in the vicinity where necessary to prevent interference <p>Deck lighting managed in accordance with <i>Environmental Requirements for offshore marine vessels (AE-91-IQ-202)</i> which requires:</p> <ul style="list-style-type: none"> - No floodlights permitted unless essential as directed by vessel master

Hazard	Risk Treatment Avoidance, Mitigation & Management Controls
	<ul style="list-style-type: none"> - Restrictions on lighting within 10 km of islands/ mainland in August to April (not applicable given distance to shore) • To minimise potential impacts on marine fauna. • Deck lighting managed in accordance with (AE-91-IQ-202) or Vessel Master safety direction.
Artificial Light	<ul style="list-style-type: none"> • Deck lighting managed in accordance with <i>Environmental Requirements for offshore marine vessels</i> (AE-91-IQ-202) which requires: <ul style="list-style-type: none"> - No floodlights permitted unless essential as directed by vessel master - Restrictions on lighting within 10 km of islands/ mainland in August to April (not given applicable given distance to shore) To minimise potential impacts on marine fauna. • Deck lighting managed in accordance with <i>Environmental Requirements for offshore marine vessels</i> (AE-91-IQ-202) or Vessel Master safety direction • Night-time in-sea equipment inspections avoided if practicable to reduce direct lighting onto marine waters
Acoustic Disturbance form Seismic Sources	<ul style="list-style-type: none"> • Implementation of EPBC Act Policy Statement 2.1: <ul style="list-style-type: none"> - Continuous watch, - Precaution zones: <ul style="list-style-type: none"> - observation zone (3 km); - low power zone (2 km); and - shutdown zone (500m); - use of soft starts on every occasion; - recommencement procedures - low visibility / night time restrictions • From 1st June to 30th November, 2 dedicated MFO must be onboard the seismic survey vessel during seismic operations with at least one MFO observing for humpback whales during daylight hours. • If the survey is required to power down 3 or more times per day for 3 consecutive days as a result of sighting Humpback Whales, then the seismic operations must not be undertaken thereafter at night-time or during low visibility conditions. • Seismic operations cannot resume at night-time or during low visibility conditions until there has been a 24 hour period, which included seismic operations during good visibility conditions, during which no powerdowns have occurred for Humpback Whale sightings. • continual observations for whale sharks will be undertaken on the survey vessel during data acquisition by MFOs; • during the pre-start observation period for cetaceans, observations for whale sharks will be undertaken during the final 10 minutes within shutdown zone; • start-up will be delayed or stop work procedure will be implemented if a whale shark is observed in the shutdown zone; • following a whale shark initiated start-up delay or stop work procedure, operations will only commence after the whale shark is observed to

Hazard	Risk Treatment Avoidance, Mitigation & Management Controls
	<p>either move outside the shutdown zone or if 10 minutes has passed since the last sighting.</p> <ul style="list-style-type: none"> • During 1 August to 31 October, if whale sharks are observed within 500 m of seismic source, observation, low power and shut down zones must be implemented in accordance with Part A of EPBC Policy Statement 2.1 • Seismic operations may not occur within the 'Biologically Important Areas' for the Green Turtle, Hawksbill Turtle, Loggerhead Turtle or flatback turtle, during the peak nesting period for these species • Use of smallest possible seismic source to meet geophysical objections of the survey • Relevant personnel (including MFOs) trained in application of EPBC Policy Statement 2.1 Part A: Standard Management Measures • Crew will operate vessels in accordance with Part 8 of the EPBC Regulations 2000, and Apache Whale Interaction and Sighting Procedure (EA-91-11-003), the vessels must not: <ul style="list-style-type: none"> - Travel at greater than 6 knots within 300 m (caution zone) of a cetacean or whale shark known to be in the area. - Approach closer than 100 m of a cetacean or whale shark known to be in the area. • If a dolphin approaches the vessel or comes within 100 m the vessel master must not change the course or speed of the vessel suddenly. • Binoculars and Marine Fauna Sighting Datasheet available on all vessels. • Apache Marine Fauna Sighting Datasheets completed and submitted to DoE. • All crew must attend an environmental induction containing basic information on procedures to manage interactions between survey vessel and marine fauna. • During 1 June to 30 November, a buffer distance of > 50 km must be maintained between the operating survey vessel and the survey vessel conducting Davros MC3D seismic survey to allow passage of migrating humpback whales • All crew must attend an environmental induction containing basic information on procedures to manage interactions between survey vessel and marine fauna • The survey is planned not to take place during peak migration season
Acoustic Disturbance from Vessel/Helicopter	<ul style="list-style-type: none"> • In accordance with Part 8 of the EPBC Regulations 2000, and Apache Whale Interaction and Sighting Procedure (EA-91-11-003), the vessels must not: <ul style="list-style-type: none"> - Travel at greater than 6 knots within 300 m (caution zone) of a cetacean or whale shark known to be in the area. - Approach closer than 100 m of a cetacean or whale shark known to be in the area. - If a dolphin approaches the vessel or comes within 100 m the vessel master must not change the course or speed of the vessel suddenly. • Binoculars and Marine Fauna Sighting Datasheet available on all vessels. • Apache Marine Fauna Sighting Datasheets completed and submitted to DoE. • All crew must attend an environmental induction containing basic information on procedures to manage interactions between survey vessels and marine fauna.

Hazard	Risk Treatment Avoidance, Mitigation & Management Controls
	<ul style="list-style-type: none"> • Unless an action is reasonably necessary to prevent a risk to human health or to deal with an emergency, helicopters will operate in accordance with Part 8 of EPBC Regulations (Aircraft). In particular: <ul style="list-style-type: none"> - must not operate at a height lower than 1,650 feet (500 m) or within a horizontal radius of 500 metres of a cetacean; - must not allow the aircraft to approach a cetacean from head on; and - must not land the aircraft on water so that the aircraft comes within a 500 m radius of the cetacean (if the aircraft can land on water).
Oily water discharges	<ul style="list-style-type: none"> • Oily water discharged to marine waters through filtering equipment in accordance with Regulation 15 of MARPOL Annex I: • Oily water discharged to sea after passing through filtering equipment has an oil content not exceeding 15 parts per million (ppm). • On detection of OIW content greater than 15 ppm, the discharge stream shall automatically shut-in or be directed in-board for further treatment or storage. • Oily water discharged while proceeding en route. • Vessel fitted with oil filtering equipment in accordance with Regulation 14 of MARPOL Annex I. • Oil filtering equipment maintained and calibrated with an alarm system in accordance with specification to ensure oil content is not exceeding 15 parts per million (ppm). • All transfer and movement of oil is recorded in the vessel's oil record book.
Liquid discharges	<ul style="list-style-type: none"> • Treated sewage discharge procedures compliant with Regulation 11 of MARPOL Annex IV. • Untreated sewage is discharged at a distance of more than 12 nautical miles from the nearest land in accordance with Regulation 11 of MARPOL Annex IV. • Sewage treatment system compliant with Regulation 9 of MARPOL Annex IV. • Sewage treatment system maintained in accordance with planned maintenance system. • Maximum carrying capacity of the sewage system is not exceeded. • As per MARPOL Annex IV / AMSA Marine Order 96 any vessel licensed to carry more than 15 persons will have an International Sewage Pollution Prevention certificate. • Food waste collected, stored, macerated and disposed of in accordance with a Garbage Management Plan as required under Regulation 9 of MARPOL Annex V. • In accordance with Regulation 3 of MARPOL Annex V food waste: <ul style="list-style-type: none"> - Discharged more than 12 nautical miles from territorial baseline. - Discharged at least 3 nautical miles from the territorial baseline if macerated to 25 mm or less. • Macerator capable of reducing food to 25 mm and is maintained in accordance with planned maintenance system. • Equipment is MARPOL compliant in accordance with Annex V.

Hazard	Risk Treatment Avoidance, Mitigation & Management Controls
	<ul style="list-style-type: none"> • Cleaning agents or additives that will be released to the sea via deck drains are not ‘harmful substances’ as defined by MARPOL Annex III. • Water treatment system maintained in accordance with planned maintenance system. • Anti-scale products are not ‘harmful substances’ as defined by MARPOL Annex III. • Machinery maintained in accordance with planned maintenance system.
Atmospheric emissions	<ul style="list-style-type: none"> • Vessel machinery maintained in accordance with the vessel’s planned maintenance system. • Vessel engines meet NOx emission levels as required by Regulation 13 of MARPOL Annex VI. • Sulphur content of MGO/fuel oil complies with Regulation 14 of MARPOL Annex VI. • Incinerator certified and operated according to Regulation 16 of MARPOL Annex IV. • ODS to be licensed under the Ozone Protection and Synthetic GHG Regulations. • ODS managed in accordance with Regulation 13 of MARPOL Annex VI • ODS only handled by a qualified or experienced tradesperson.

Table 8-2: Environmental risk assessment summary for unplanned events

Hazard	Risk Treatment Avoidance, Mitigation & Management Controls
Hydrocarbon spill from vessel collision	<ul style="list-style-type: none"> • Navigation equipment and vessel procedures compliant to AMSA: <ul style="list-style-type: none"> - Marine Orders Part 27 – Radio Equipment - Marine Orders Part 21: Safety of Navigation and Emergency Procedures. - Marine Orders Parts 3 and 6 – Seagoing Qualifications and Marine Radio Qualifications • AMSA Marine Order Part 30 – prevention of collisions. Navigational lighting requirements will be adhered to • All vessels undergo an International Marine Contractors Association (IMCA), Common Marine Inspection Audit (CMID) or OCIMF Offshore Vessel Inspection Document (OVID) inspections to confirm that they meet international HSE and maintenance standards. • Vessels equipped with an automatic radar plotting aid (ARPA) system. • Visual vessel bridge-watch 24 hours per day by crew qualified by an accredited trainer. • Implementation of the simultaneous operations (SIMOPS) plan to manage interactions between two or more vessels • Notification provided to key stakeholders including relevant Australian Government agencies. • Use of MGO over more persistent hydrocarbons e.g. HFO • AEL will identify weather sensitive activities and discuss with contractor limits which ensure weather windows are identified prior to commencing activities. • Tier 2/3: Oil spill response executed in accordance with the oil spill contingency plan (OSCP). • Tier 1: Oil spill response executed in accordance with the vessel’s Shipboard Oil Pollution Emergency Plan (SOPEP) as required under MARPOL. • Spill response exercise conducted in accordance with the SOPEP requirements and conducted prior to the commencement of the activity • All crew must attend an environmental induction containing basic information on spill response measures. • Crew undertaking vessel watch qualified in accordance with International Convention of Standards of Training, Certification and Watch-keeping for Seafarers (STCW95), AMSA Marine Orders Part 3: Seagoing Qualifications or certified training equivalent.
Hydrocarbon spill during refuelling at sea	<ul style="list-style-type: none"> • Fuel Transfer will take place as listed below: <ul style="list-style-type: none"> - Refuelling to occur only during daylight hours - Level alarms on fuel tanks. - Use of certified hoses for fuel transfer. - Overflow tanks emptied prior to bunkering. - Predetermined volumes for transfer - Visual inspection of dry break couplings and hoses.

Hazard	Risk Treatment Avoidance, Mitigation & Management Controls
	<ul style="list-style-type: none"> - Permit-to-work (PTW) documentation is complete and signed off to ensure refuelling is undertaken in accordance with the refuelling procedure. - Dry break coupling fitted on fuel supply vessel - All refuelling hoses are fitted with breakaway couplings and are buoyant or fitted with floats. - Adequate bunding beneath the refuelling hose connections on the survey / support vessels. - Fully manned and continuously monitored operation <ul style="list-style-type: none"> • MGO compliant with MARPOL Annex VI Regulation 14.2 (i.e. sulphur content of less than 3.50% m/m) is the only fuel recorded on vessel fuel bunkering register. MGO only used. • Adequate bunding in fuel transfer areas as per MARPOL Annex IV. • Deck drains closed prior to fuel transfer. Drainage and bunding systems are subject to ongoing monitoring and maintenance to ensure integrity and capacity. • Vessels fitted with oil filtering equipment in accordance with Regulation 14 of MARPOL 73/78 Annex I. • Tier 2/3: Oil spill response executed in accordance with the oil spill contingency plan (OSCP). • Tier 1: Oil spill response executed in accordance with the vessel's Shipboard Oil Pollution Emergency Plan (SOPEP) as required under MARPOL. • Fuel storage tanks and fuel transfer hose maintenance undertaken in accordance with the vessels planned maintenance system • Spill response exercise conducted in accordance with the SOPEP requirements and conducted prior to the commencement of the activity. • All crew must attend an environmental induction containing basic information on spill response measures. • All crew involved in refuelling will adhere to Apache endorsed vessel fuel bunkering procedure with a PTW completed. • In line with MARPOL 73/78 Annex 1, vessels over 400 gross tonnage will have a current SOPEP/and IOPP in place.
Environmentally hazardous chemical and hydrocarbon spills from marine operations	<ul style="list-style-type: none"> • Vessel shall maintain a manifest setting forth the environmentally hazardous chemicals and hydrocarbons on board and the location thereof. • Material Safety Data Sheet (MSDS) available for environmentally hazardous chemicals and hydrocarbons onboard. • Environmentally hazardous chemicals and hydrocarbon storage areas inspected weekly. • Any equipment or machinery with the potential to leak chemicals or hydrocarbons will be stored in a continuously banded area. • Maintenance records on vessels indicate that all machinery and equipment containing hydrocarbons and equipment involved in the discharge and transfer of liquids have maintenance scheduled on their respective planned maintenance system. • Spill clean-up equipment located where environmental hazardous chemicals and hydrocarbons are stored and frequently handled. • Scupper plugs deck drainage control measures available where chemicals and hydrocarbons are stored and frequently handled. • Only non-hazardous, biodegradable detergents used for deck washing. • Environmental hazardous chemical and hydrocarbon leaks and spills on the vessel immediately cleaned up (including in deck bunds), and contaminated material contained securely onboard and treated as hazardous waste.

Hazard	Risk Treatment Avoidance, Mitigation & Management Controls
	<ul style="list-style-type: none"> • Shipboard oil spill response executed in accordance with the vessel's current (<12 months) Shipboard Oil Pollution Emergency Plan (SOPEP) as required under MARPOL 73/78. • Oil spill response executed in accordance with the oil spill contingency plan (OSCP). • All crew must attend an environmental induction containing basic information on chemical and hydrocarbon management, as well as spill prevention and response measures. • Spill response exercise conducted in accordance with the SOPEP requirements and conducted prior to the commencement of the activity
Non-hazardous and hazardous solid waste	<ul style="list-style-type: none"> • Non-hazardous and hazardous wastes collected, labelled, segregated, stored, processed and disposed of in accordance with the vessel's Garbage Management Plan as required under Regulation 9 of MARPOL Annex V. • Incinerator meets the requirements of Regulation 16 of MARPOL Annex VI. • Incinerator operated in accordance with Regulation 16 of MARPOL Annex VI. • All crew must attend an environmental induction containing basic information on waste management. • Accidental release of waste to the marine environment is reported and investigated and corrective actions are implemented. • Hazardous wastes (e.g. used oils, lithium batteries, chemical and metallic wastes) documented, tracked, segregated, labelled and stored onboard within secondary containment (e.g. bin located in a bund).
Seismic streamer release	<ul style="list-style-type: none"> • Seismic streamers undergo regular inspection and planned maintenance system checks on streamer towing systems for wear and damaged components. These components are replaced on an 'as required' basis. • A secondary retaining/attachment device is utilized. • Solid-filled seismic streamer contains buoyancy devices and are fitted with marker buoys. • Procedures for streamer deployment and retrieval are reviewed and approved by Apache prior to their use • Notification provided to key stakeholders including relevant Australian Government agencies.
Hydrocarbon and chemical spill response	<ul style="list-style-type: none"> • A NEBA is used to inform response strategies that have the greatest net benefit to the overall environment and reduce impacts associated with the response strategies to ALARP.

9. CONTACT DETAILS

Further information about the Stag and Reindeer Seismic Survey activity can be obtained from:

Minh Hopkinson

Environment Manager

Apache Energy Limited

100 St Georges Terrace, Perth, Western Australia, 6000

Phone: 08 6218 7036

Email: minh.hopkinson@apachecorp.com

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