Baxter Marine Seismic Survey

Environment Plan Summary

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REVISION HISTORY

Revision	Amendment
A	Issued for Internal Review
B	Internal Review
0	Submitted to NOPSEMA
1	Revised following NOPSEMA comment received August 2015

ACRONYMS

Abbreviation	Description
3D	Three dimensional
°C	Degrees Celsius
µPa	Micropascal
AFMA	Australian Fisheries Management Authority
AFZ	Australian Fishing Zone
AHS	Australian Hydrographic Services
ALARP	As Low as Reasonably Practicable
AMSA	Australian Maritime Safety Authority
AQIS	Australian Quarantine Inspection Service
CFA	Commonwealth Fisheries Association
Cmlth	Commonwealth
Cui	Cubic inch
dB	Decibels
DMP	Department of Mines and Petroleum (WA)
DoF	Department of Fisheries (WA)
DoT	Department of Transport (WA)
DPaW	Department of Parks and Wildlife (WA)
DoE	Department of Environment (Cmlth)
EP	Environment Plan
EPBC	Environment Protection and Biodiversity Conservation
ICT	Incident Control Team
IMS	Invasive Marine Species
IMCA	International Marine Contractors Association
IMO	International Maritime Organisation
ISO	International Standards Organisation
km	Kilometre
km/hr	Kilometres Per Hour
m	Metres
MARPOL	International Convention for the Prevention of Pollution from Ships
MFO	Marine Fauna Observer
MGO	Marine Gas Oil

Abbreviation	Description
mm	Millimetres
MSDS	Material Safety Data Sheet
MSS	Marine Seismic Survey
NEBA	Net Environmental Benefit Analysis
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NWS	North West Shelf
ODS	Ozone Depleting Substance
OPEP	Oil Pollution Emergency Plan
OPGGS (E) R	Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009
OWRP	Oiled Wildlife Response Plan
ppm	Parts Per Million
psi	Pounds per square inch
RCC	Rescue Coordination Centre
SOLAS	Safety of Life at Sea
SOPEP	Shipboard Oil Pollution Emergency Plan
SOx	Oxides of Sulphur
WA	Western Australia
WAFIC	Western Australian Fishing Industry Council

CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

Apache proposes to undertake the Baxter 3D Marine Seismic Survey (MSS) ('the survey') in the Commonwealth waters of the Roebuck Basin, in permit area WA-505 P. The survey is covered under the approved Baxter Marine Seismic Survey Environment Plan (EA-00-RI-10106.001) ('the EP'). **Section 2** provides further details on the survey activities.

Apache Northwest Pty Ltd ('Apache') is the titleholder for petroleum activities covered under the EP within the permit area WA-505-P. In Australia, Apache Northwest Pty Ltd is a subsidiary of Apache Energy Ltd, an Australian operating subsidiary of Apache Corporation.

On 5 June 2015, Brookfield Macquarie acquired 100% of Apache Energy Ltd, Apache Energy Ltd will remain the Operator under the new name of Quadrant Energy Australia Ltd. Until all titles and permits have been changed to reflect the name change (through NOPTA), Quadrant Energy Australia Ltd and its subsidiaries will take on all the "Apache" commitments and obligations pursuant to all Environment Plans.

1.1 Compliance

The overall purpose of the EP is to comply with statutory requirements of the Commonwealth Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (OPGGS (E) Regulations) and to ensure that the survey is planned and conducted in line with Apache environmental policies and standards, including the corporate Environmental Policy.

The EP was assessed and accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) on the 11th June 2015. This EP Summary has been prepared in accordance with the requirements of Regulations 11(7) and (8) of the OPGGS (E) Regulations.

1.2 Schedule

The survey will occur between 1st July 2015 and 31st July 2016, subject to vessel availability, weather and scheduling and is estimated to take approximately 14 days.

2. ACTIVITY DESCRIPTION

The EP covers all seismic survey activities and related environmental impacts and risks occurring within the operational area defined in **Section 2.1**. The EP does not cover transit of the survey vessel or support vessels to and from the operational area, i.e. from port (e.g. Dampier) to the operational area; and upon completion of the surveys, from the operational area to either Dampier or another location.

2.1 Location and Operational Area

The survey will be conducted within the 'survey area', which is within a larger 'operational area' (**Figure 2-1**). The survey area is defined as the area that 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, e.g. 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, which are necessary for the vessel to change to a new sail line. Water depth within the operational area is between 1,500 and 2,000 m.

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

Table 2-1: Proposed survey and operational area co-ordinates

LATITUDE			LONGITUDE		
Degrees	**Minutes**	**Seconds**	**Degrees**	**Minutes**	**Seconds**
Operational Area					
16	37	31.029	119	01	24.971
16	37	49.627	118	23	46.943
16	24	09.765	118	23	41.057
16	23	51.436	119	01	16.444
Survey Area					
16	34	54.70	118	50	4.47
16	34	54.55	118	35	0.42
16	26	46.54	118	35	0.86
16	26	46.79	118	50	4.28

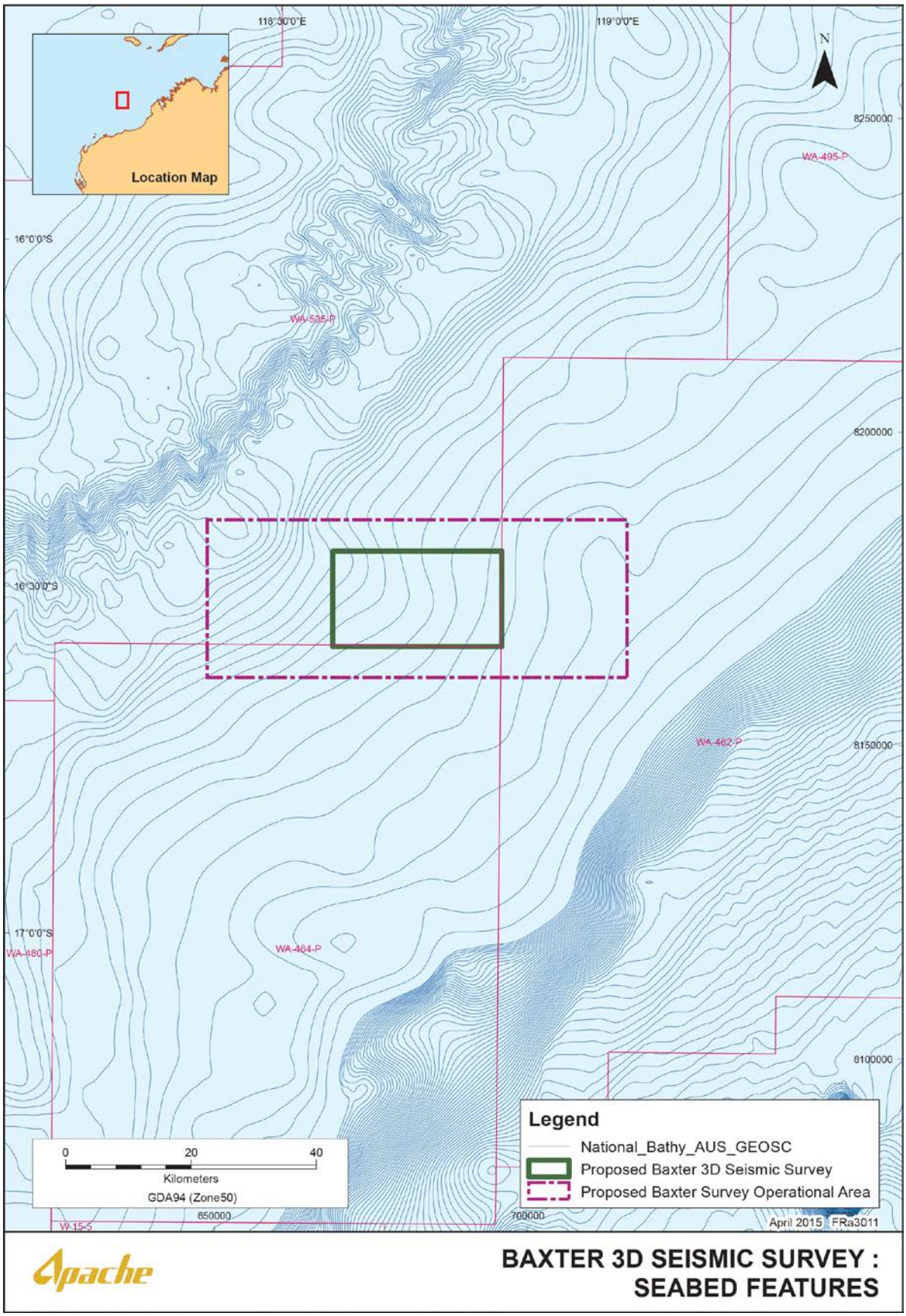

Figure 2-1: Location of the Baxter Operational and Survey Areas

2.2 Seismic Survey Parameters

The survey vessel will traverse a series of pre-determined sail lines within the operational area 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 seismic array will comprise a maximum of 14 seismic streamers, with an approximate length of 8,000 m and with a diameter of 60 mm. The seismic streamers are towed side-by-side and the spacing will be 50 - 75 m between each seismic streamer, resulting in a maximum array width of approximately 1,000 m. The seismic energy source tow depth will be 5 m and the streamer tow depth will be between approximately 7 and 20 m. The operating pressure for the seismic energy source will be approximately 2,000 psi and will consist of two sub-arrays, each with a maximum volume of between approximately 3,000 and 4,000 cui. These sub-arrays will be fired alternately, with a shot-point interval of approximately 12.5 m horizontal distance.

2.3 Vessels

Apache proposes to conduct the survey using a suitable survey vessel available within Commonwealth waters such as the CGG *Viking Vision*. The survey vessel will have all necessary certification/registration and will be compliant with all relevant MARPOL and SOLAS convention requirements for a vessel of this size and purpose. The seismic survey vessel will have an implemented and tested Shipboard Oil Pollution Emergency Plan (SOPEP), in accordance with Regulation 37 of Annex I of MARPOL.

At least one support vessel, will accompany the survey vessel at all times, to provide logistical, safety, equipment management and emergency support.

3. ENVIRONMENT DESCRIPTION

3.1 Environment that May Be Affected (EMBA)

The operational area occurs entirely within the Northwest Transition Bioregion. The area that may be affected, however, needs to encompass the environment that could be affected by unplanned events as well. This area is derived from modelling worst case scenarios which are attributed to spills.

The worst case credible spill scenario (loss of inventory in 1 fuel tank due to vessel collision) has been modelled to identify the worst case environmental extent that may be affected by this activity. The extent of the EMBA is shown in **Figure 3-1.**

3.2 Overview of the Operational Area and the EMBA

The survey operational area and EMBA is situated within Commonwealth waters of the North-west Marine Region (DEWHA, 2008). The North-west Marine Region is further divided into eight provincial bioregions. The operational area and EMBA are located within the Northwest Transition. The EMBA does not include other bioregions that could be contacted by the worst case credible spill. An online search of Matters of National Environmental Significance under the *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) was conducted within a 23 km buffer around the operational area and EMBA to identify potential receptors (refer **Table 3-1** and **Table 3-2)**.

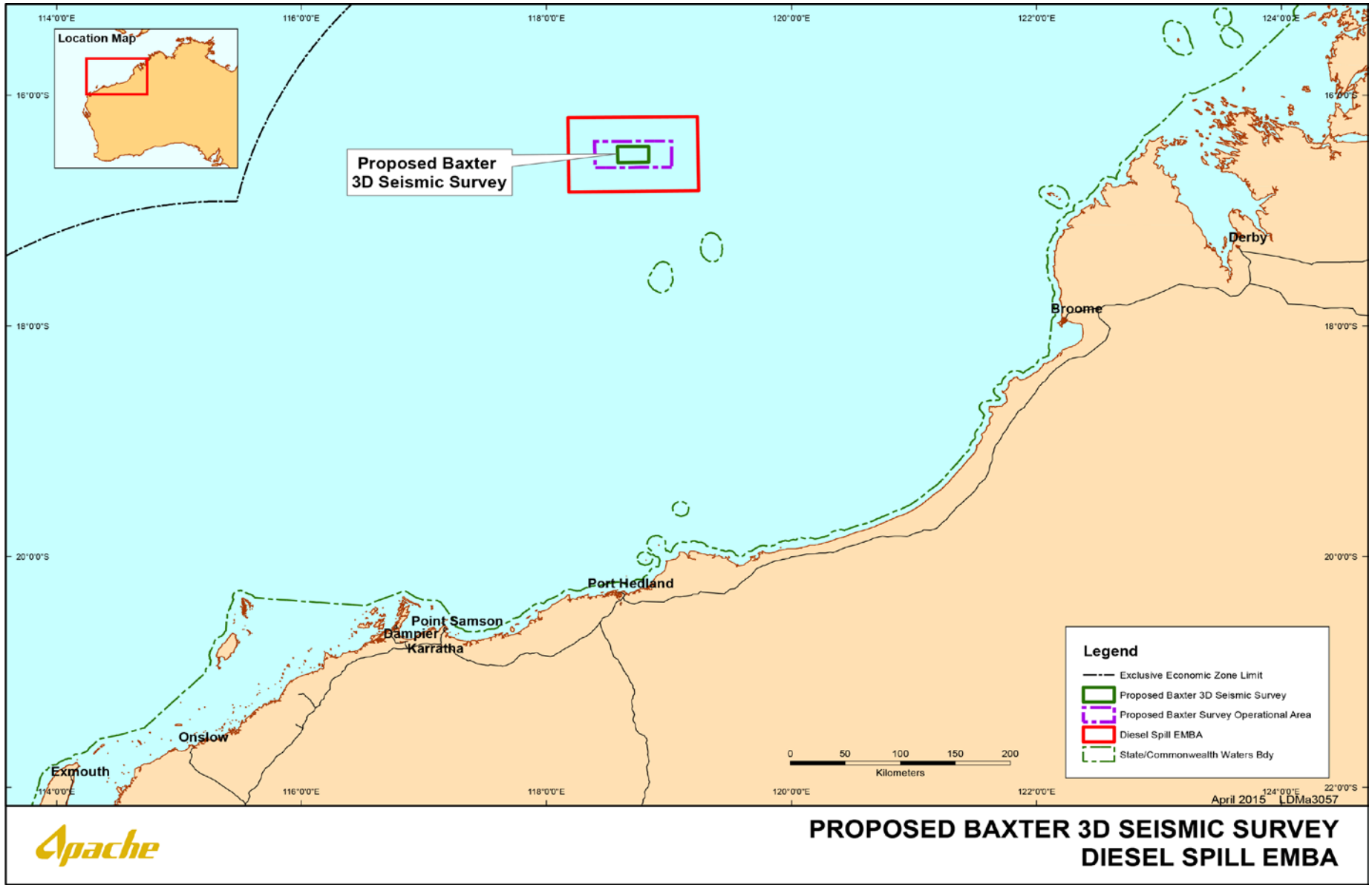

Figure 3-1: Location of the Environment that May Be Affected by the Survey Activities

3.3 Environmental Values and Sensitivities

Table 3-1 and **Table 3-2** present the environmental values and sensitivities (natural, cultural and socio-economic) within the EMBA. Temporal windows of sensitivity for receptors in the vicinity of the EMBA are summarised in **Table 3-3**.

3.3.1 Physical Environment and Habitats

The Northwest Transition Bioregion is located off the shelf between the Dampier Archipelago and Lacepede Islands. This bioregion contributes to 17% of the North-west Marine Region and encompasses a range of water depths, from the shelf break (200 m depth) over the continental slope, to depths of more than 1,000 m. The sediments of the slope are dominated by sands, whereas the sediments of the deep ocean floor are dominated by muds.

Given the water depths in the EMBA (1500-2000 m), and low light availability, only sparse non-coral benthic invertebrates are likely to be present on the seabed.

3.3.2 Protected/Significant Areas

The operational area and EMBA do not overlap any protected or significant areas other than the Argo-Rowley Terrace Commonwealth Marine Reserve (CMR).

The operational area and EMBA occur entirely within the designated multiple use zone of the Argo-Rowley Terrace CMR. This CMR exists to protect foraging areas and habitats for EPBC Act listed migratory seabirds and turtles as well as sharks. Those species that could be found within the EMBA are presented in **Table 3-1.** In addition, the reserve exists to protect communities in the deeper offshore waters and seafloor features and habitats. The CMR contains two key ecological features (KEFs), the 'Canyons linking the Argo Abyssal Plain with the Scott Plateau' and 'Mermaid Reef and the Commonwealth waters surrounding Rowley Shoals', however, the EMBA does not overlap these KEFs.

The Argo-Rowley Terrace CMR is managed under the EPBC Act and is currently under transitional arrangements until a management plan is implemented. The transitional arrangements permit a number of approved actions including 'mining operations' and 'commercial vessel transit', which cover the proposed survey activities, provided the approved action is done in accordance with applicable Commonwealth and State laws.

3.3.3 Threatened and Migratory Marine Fauna

Whales are considered to be most at risk from seismic surveys, including the humpback and pygmy blue whale. Humpback whales do not usually migrate as far away from the coast as the seismic survey (>300km, **Figure 3-2**) and therefore no significant numbers are expected. Recent satellite tagging of southbound humpback whales indicates that whales generally migrated close to the coastline, within a few tens of kilometres from shore and in a corridor frequently less than 100 km wide (Double *et al*. 2010). Aerial surveys and noise logger recordings undertaken for Chevron's Wheatstone Project have indicated that the main distribution of humpback whales were at an average distance of 50 km from the mainland during the northern migration and 35 km from the mainland during the southbound migration.

Pygmy blue whales are more likely to be encountered in the operational area given their preference for deeper waters. Tagging surveys have shown pygmy blue whales migrating northward relatively close to the Australian coastline (100 km), until reaching North West Cape after which they travelled offshore (240 km) towards Indonesia. Furthermore, passive acoustic data has documented pygmy blue whales migrating along the Western Australian shelf break (Woodside, 2012), and the National Conservation Values Atlas has identified a pygmy blue whale migration pathway on the continental shelf edge at depths of 500 to 1,000 m (McCauley & Jenner 2010). This suggests that the whales are unlikely to traverse in large numbers through the operational area during the seismic survey, but individuals could be encountered. Breeding areas have not yet been identified; however, it is likely that pygmy blue whales calve in tropical areas of high localised production such as deep offshore waters of the Banda and Molucca Seas in Indonesia (Double *et al*. 2014,

DoE 2014a). There are no known breeding areas of significance to for pygmy blue whales in waters from Busselton, WA to the Northern Territory border.

Individual foraging turtles and sharks may also be encountered as they migrate or forage in the vicinity of the operational area.

Table 3-1: Threatened and migratory marine fauna

Value/Sensitivity		EPBC Act Status CE = Critically Endangered E = Endangered V = Vulnerable M = Migratory	Operational Area presence	EMBA presence
Common Name	**Scientific Name**			
Antarctic minke whale	*Balaenoptera bonaerensis*	M	✓	✓
Pygmy blue whale	*Balaenoptera musculus*	E,M	✓	✓
Bryde's whale	*Balaenoptera edeni*	M	✓	✓
Flatback turtle	*Natator depressus*	V,M	✓	✓
Giant manta ray	*Manta birostris*	M	✓	✓
Great white shark	*Carcharodon carcharias*	V,M	✓	✓
Green turtle	*Chelonia mydas*	V,M	✓	✓
Hawksbill turtle	*Eretmochelys imbricata*	V,M	✓	✓
Humpback whale	*Megaptera novaeangliae*	V,M	✓	✓
Killer whale	*Orcinus orca*	M	✓	✓
Leatherback turtle	*Dermochelys coriacea*	E,M	✓	✓
Loggerhead turtle	*Caretta caretta*	E,M	✓	✓
Longfin mako	*Isurus paucus*	M	✓	✓
Shortfin mako	*Isurus oxyrinchus*	M	✓	✓
Sperm whale	*Physeter macrocephalus*	M	✓	✓
White-tailed tropicbird	*Phaethon lepturus*	M		

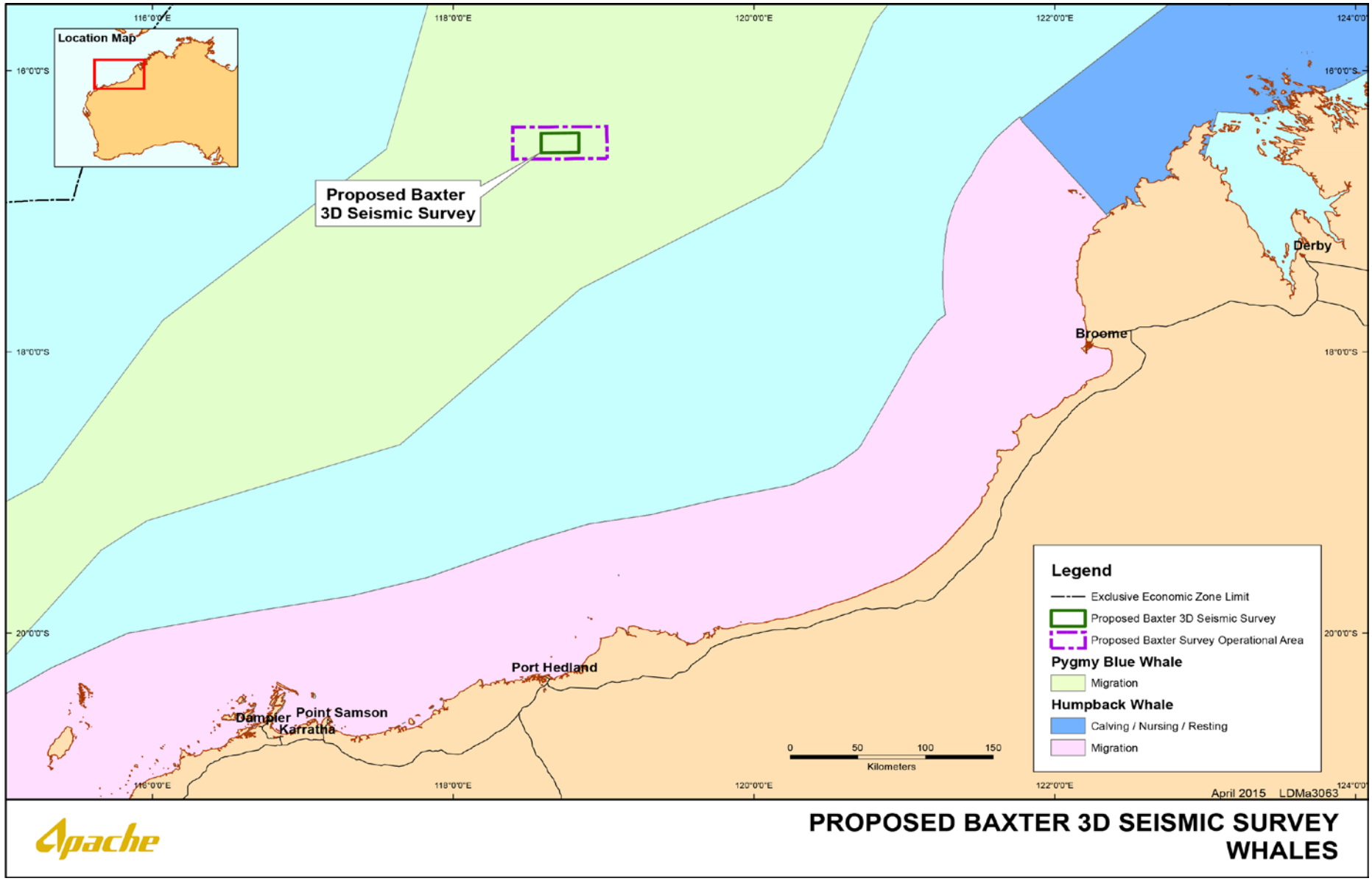

Figure 3-2: Migration Pathways, calving and Resting Areas for EPBC Act protected Whales in the Vicinity of the Baxter MSS 3D EMBA

3.3.4 Socio-economic Environment

The survey operational area is 342 km away from the nearest landfall of Coulomb Point on the mainland, and the nearest town is Port Hedland (406 km South). Karratha, Dampier, Exmouth and Port Hedland are the main service and population centres for the region. Although initially developed for the iron ore industry, these towns have expanded to service the oil and gas industry located on the North West Shelf (NWS).

Table 3-2: Socio-economic values and sensitivities

Value/Sensitivity	Description
Commonwealth-managed fisheries	
North West Slope Trawl	Extends from 114° E to approximately 125° E off the WA coast between the 200 m isobath and the outer limit of the Australian Fishing Zone (AFZ).
Western Tuna and Billfish Fishery	Extends westward from Cape York Peninsula (142°30' E) off Queensland to 34° S off the WA west coast. It also extends eastward from 34° S off the west coast of WA across the Great Australian Bight to 141° E at the South Australian–Victorian border. No current effort on NWS.
Western Skipjack Tuna Fishery	No current effort on NWS.
Southern Bluefin Tuna	No current effort on NWS.
State-managed fisheries	
Marine Aquarium Fish Fishery	All year. Effort within the operational area and EMBA is unknown, but will not occur due to the depth and the dive based method of collection. Will not occur.
Specimen Shell Managed Fishery	All year. Effort within the operational area and EMBA is unknown, but it will not occur due to the depth and the dive based method of collection. Will not occur.
Beche-de-mer Fishery	All year. Although permitted to fish within the operational area and EMBA, the fishery is restricted to shallow coastal waters suitable for diving and wading. Will not occur.
Mackerel Managed Fishery (Areas 2 and 3)	Trolling or handline. Near-surface trolling gear from vessels in coastal areas around reefs, shoals and headlands. Unlikely to occur.
Octopus	Fishery is in development phase. Effort within the operational area is unlikely due to pot collection method and habitat preference of target species. Unlikely to occur.
West Coast Blue Swimmer Crab (West Coast)	Effort within the operational area unlikely due to the depth and the pot method of collection. Unlikely to occur.

Value/Sensitivity	Description
Pearl Oyster Managed Fishery (Zone 1, Zone 2, Zone 3)	Mostly operate March to June. Operational area does occur within the boundaries of the fishery, but fishery is restricted to shallow diving depths. Will not occur.
Commercial shipping	The proposed operational area is located between major shipping routes servicing Port Hedland in the region. It is approximately 100 km from the nearest busier designated shipping route, and 40 km from a lesser frequented designated route (AMSA, 2015). Some vessels may traverse through the operational area. Shipping using NWS waters includes iron ore carriers, oil tankers and other vessels proceeding to or from the ports of Dampier, Port Walcott and Port Hedland; however, these are predominantly heading north from these ports.
Recreational fishing and tourism	Within the operational area there are no known natural seabed features that would aggregate fishes and which are typically targeted by recreational fishers. Given the water depths and distance from the nearest mainland, it is unlikely recreational fishing would occur in the vicinity. There are many sources of marine-based tourism within the environment that may be affected. Aquatic recreational activities such as boating, diving and fishing occur near the coast and islands off of the Pilbara and Ningaloo coasts. These activities are concentrated in the vicinity of the population centres such as Exmouth, Dampier and Onslow. In the waters immediately surrounding the Operational Area, tourism activities are limited due to its distance from the mainland and island shorelines.
Oil and gas	Various petroleum exploration and production activities have been undertaken within the northwest shelf; however, there are none in the vicinity of the operational area or EMBA. Vessels servicing oil and gas operations in the region may pass through the area en route to facilities.
Defence	No known defence areas in the vicinity have been advised by the Department of Defence.
Cultural Heritage	No known sites of Aboriginal Heritage significance within the Operational Area or EMBA.

Table 3-3: Windows of sensitivity in the vicinity of the EMBA

CATEGORY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Benthic Habitats												
Non-coral benthic invertebrates												
Fauna												
Plankton												
Fish/Sharks	Timing of spawning activity varies between species.											
Hawksbill turtles resident adult and juveniles[1]	Widespread throughout NW Shelf waters, highest density of adults and juveniles over hard bottom habitat (coral reef, rocky reef, pipelines etc.)											
Hawksbill turtle mating aggregations[1]												
Hawksbill turtle nesting and internesting[1]												
Hawksbill turtle hatching[1]												
Flatback turtles resident adult and juveniles[1]	Widespread throughout NW Shelf waters, increased density over soft bottom habitat 10 – 60m deep, post hatchling age classes and juveniles spread across shelf waters.											
Flatback turtle mating aggregations[1]												
Flatback turtle nesting and internesting[1]												
Flatback turtle hatching[1]												
Flatback turtle nesting[1]												
Green turtles resident adult and juveniles[1]	Widespread throughout the NW Shelf waters, highest density associated with seagrass beds and macro algae communities, high density juveniles in shallow waters off beaches, amongst mangroves and in creeks.											
Green turtle mating aggregations[1]												
Green turtle nesting and internesting[1]												
Green turtle hatching[1]												
Loggerhead turtles resident adult and juveniles[1]	Widespread throughout the NW Shelf waters, increased density associated with soft bottom habitat supporting their bivalve food source, juveniles associated with nearshore reef habitat.											

CATEGORY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Loggerhead turtle mating aggregations[1]												
Loggerhead turtle nesting and internesting[1]												
Loggerhead turtle hatching[1]												
Leatherback turtles												
Humpback whale migration						northern			southern			
Blue whale migration					northern						southern	
Seabird nesting: terns, shearwaters, petrels												
Migratory shorebirds												
Socio-economic												
Commercial Managed Fisheries (none applicable)												
State Managed Fisheries (none applicable)												
Oil and gas												
Shipping												
Tourism/ recreational fishing (none applicable)												

Key / Notes

- Peak activity, presence reliable and predictable
- Lower level of abundance/activity/presence
- Activity not occurring
- Activity can occur throughout year

[1]Information provided by K. Pendoley

4. STAKEHOLDER CONSULTATION

4.1 Overview

Apache recognises that its operating activities have the potential to impact the community and the environment, particularly in locations which feature or are near sensitive receptors, or that overlap with other economic, cultural or community uses.

To facilitate informed assessment by stakeholders of the likely potential impact of Apache activities, Apache seeks to establish long-term and meaningful dialogue with those stakeholders who have demonstrated an interest in its present and planned future activities in Australia.

Apache clearly articulates engagement and consultation standards, goals, and mechanisms, seeks to effectively manage change during the life of its projects and activities, and strives to continuously improve all aspects of its stakeholder engagement processes. **Table 4-1** provides the stakeholder consultation performance outcome and relevant controls which will be in place to manage the physical presence aspect associated with operating activity.

Table 4-1: Environmental performance standards and outcome table for stakeholder consultation

Planned Event Aspect	Risk Treatment Avoidance, Mitigation & Management Controls
Physical presence associated with operating activity	• Relevant persons (**Table 4-2**) identified and notified of proposed activity by provision of a Stakeholder Notification Package at least four weeks prior to commencement of activity. • All correspondence with external stakeholders is recorded in the stakeholder database. • Apache's Stakeholder Coordinator remains available before, during and after completion of the proposed activity to ensure stakeholder feedback is evaluated and considered during the operational activity phases. • Prior to commencement of an operating activity covered by this EP, an assessment summary is completed recording consultation undertaken on the activity.

4.2 Consultation Process

Apache maintains a database of key stakeholders built from those identified from past and present projects and operations. Its purpose is to facilitate the identification, initial contact and establishment of an ongoing dialogue with an appropriate stakeholder set for any given activity, to assist in the building of long-term and meaningful communications with those stakeholders with whom Apache has regular contact, and to monitor and address stakeholder concerns that span multiple projects or activities.

Apache's standard approach was applied to identify key stakeholders in the operational area, beginning with a review of the stakeholder database, and of the stakeholders consulted over other recent activities in the area. In particular, the operational area for the activity and the EMBA, are used to identify relevant persons on an activity-by-activity basis, and will be used throughout the lifetime of the EP. The key stakeholder set is summarised in **Table 4-2**.

Table 4-2: Summary of stakeholders consulted for seismic activity

Group	Stakeholder
Marine Conservation	• Department of Environment (Commonwealth) • Department of Fisheries (DoF) • Department of Parks and Wildlife (DPaW)
Shipping safety and security	• Australian Maritime Safety Authority (AMSA) • Department of Defence (DoD) • Department of Transport (DoT)
Adjacent regulator	• Department of Mines and Petroleum (State)
Fishing groups	• A Raptis and Sons. • Austral Fisheries • Australian Fisheries Management Authority (AFMA) • Australian Southern Bluefin Tuna Industry Association (ASBTIA) • Commonwealth Fisheries Association (CFA) • Fat Marine/Coral Park Seafoods • Marine Tourism WA • MG Kailis • Pearl Producers Association • Quest Maritime • Recfishwest • RNR Fisheries • Shark Bay Seafoods • Western Australian Fishing Industry Council (WAFIC) • Western Wild Fisheries • WestMore Seafoods • Individual Fishing Licence Holders
Dampier Stakeholder Reference Group	• Dampier Port Authority • Port Hedland Port Authority (PHPA) • Shire of Roebourne • Town of Port Hedland

4.3 Consultation Feedback

Details of the survey, including location and estimated timing, were distributed to stakeholders in February 2015. Given the offshore survey location and water depth (1500-2000 m), stakeholders concerns with the survey were not anticipated. Key stakeholders, including DPaW and DMP, responded to consultation with no comment on the activity given the distance from shoreline.

Stakeholders, including individual fishing licence holders on the North West Shelf, were given brief details on the survey in the March 2015 Apache Quarterly Project Update. No concerns were raised by stakeholders in relation to the survey. In the event any concerns are raised in the future they will be listed against contact details for the relevant project personnel and further consultation will be undertaken.

Apache considers that consultation with regulators and key stakeholders has been adequate; all stakeholders and relevant parties have been actively engaged by Apache regarding the Apache developments on the NWS (including the present survey) and also, where applicable, the proposed oil spill response strategies for these activities. **Table 4-3** summarises the consultation and feedback for the proposed survey.

Table 4-3: Consultation Summary and Feedback for the Survey

Stakeholder	Assessment of Consultation Undertaken
Marine Conservation	
Department of Environment (Commonwealth)	DOE provided no feedback regarding the survey.
Department of Fisheries	DoF has provided no response on this consultation.
Department of Parks and Wildlife	DPaW raised no concern on this project.
Shipping safety and security	
Australian Maritime Safety Authority	AMSA noted vessel traffic in the area and requested a high level of communication between the seismic vessel with all commercial shipping. Apache will notify AMSA RCC and the Australian Hydrographic Service (AHS) of vessel details and timing. AMSA has also kept the Port Hedland Port Authority updated on this activity.
Department of Defence	Defence has provided no comment on Baxter. Apache will notify AHS of vessel details and timing.
Department of Transport	No response from DoT has been received. DoT's advice which was received through previous consultation and interaction with DoT regarding Apache's OPEPs has been adopted by Apache in the preparation of OPEPs.
Adjacent Regulators	
State Department of Mines and Petroleum	DMP responded requesting a pre-start and cessation notification for the activity.
Fishing Groups	
A Raptis and Sons	No response was received on this consultation. Stakeholder has previously confirmed that no response means 'no concern' with the given activity.
Austral Fisheries	No response received on this consultation. Stakeholder has previously confirmed that no response means 'no concern' with the given activity.
Australian Fisheries Management Authority	No concern or advice was provided.
Australian Southern Bluefin Tuna Industry Association (ASBTIA)	No response received on this consultation.
Commonwealth Fishing Association	No response on this consultation was received.
Fat Marine/ Coral Park Seafoods	Baxter MSS consultation package was provided to Fat Marine by email on February 26, 2015. No response to this email has been received.
Marine Tourism WA	No comment has been received relating to the survey; previous interaction with stakeholder has reassured Apache that a response would only be received in the event of concern.
MG Kailis	No concern was raised.

Stakeholder	Assessment of Consultation Undertaken
Pearl Producers Association	In previous consultation, the PPA has raised concern with seismic activity within the 100 m bathymetry contour along 80 Mile Beach. In phone conversation on March 10, 2015, the PPA has confirmed given the distance offshore the perceived risk to pearl oyster from the survey is low.
Quest Maritime	No response received on this consultation.
Recfishwest	Recfishwest responded noting this survey would be unlikely to impact recreational fishers due to the distance from shore.
RNR Fisheries	No response received on this consultation.
Western Wild Fisheries	No response received on this consultation.
Western Australian Fishing Industry Council	No response on this consultation was received. WAFIC has previously suggested Apache consult directly with fishing licence holders and Apache has commenced with this providing all holders with the Apache Quarterly Project Update.
WestMore Seafoods & Shark Bay Seafoods	Gary Kessell at Westmore Seafoods also represents Shark Bay Seafood, and operates within the Western Deep Water Trawl Fishery, North West Slope Trawl Fishery, Shark Bay Prawn Fishery, Pilbara Fish Trawl, Nickol Bay Prawn Fishery and the Kimberley Prawn Fishery zones. No response received on this consultation. Stakeholder has previously confirmed that no response means 'no concern' with the given activity.
Individual fishing licence holders	No response has been received regarding the survey. License holders are represented by WAFIC, Recfishwest, The Charter Boat Association and DoF, who have all been consulted.
Dampier Stakeholder Reference Group	
Dampier Port Authority (DPA)	No response had been received.
Port Hedland Port Authority (PHPA)	No response had been received.
Shire of Roebourne (SOR)	No response had been received.
Town of Port Hedland	No response had been received.

5. ENVIRONMENTAL HAZARDS AND CONTROLS

Environmental impact and risk assessment refers to a process whereby planned and unplanned events that may or will occur during an activity are quantitatively and/or qualitatively assessed for their impacts on the environment (physical, biological, and socio-economic) at a defined location and specified period of time. In addition, unplanned events are assessed on the basis of their likelihood of occurrence which contributes to their level of risk.

Apache has undertaken environmental impact and risk assessments for the survey planned events (including any routine, non-routine and contingency activities) and unplanned events. The impact and risk assessment approach is consistent with the requirements of AS/NZS ISO 31000:2009 Risk Management – Principles and guidelines and ISO/IEC 31010 Risk management – Risk management techniques. The approach can be mapped to the requirements of the OPGGS (E) Regulations for an EP, as described by NOPSEMA (N4700-GN1074 Rev 1 2013).

5.1 Risk Assessment Process

The key steps of the assessment process are:

- Define the activity and subsequent planned and unplanned events;
- Determine the nature and scale of impacts and identify receptors that will or may be impacted;
- Determine the impact consequence level and risk rankings (on the basis that all controls measures have been implemented);
- Describe the Environmental Performance Outcomes, Environmental Performance Standards and Measurement Criteria;
- Undertake an ALARP evaluation on impacts (planned events) and risks (unplanned events); and
- Evaluate acceptability of impacts and risks.

An assessment of the survey was undertaken and the environmental hazards or aspects were identified. The risk assessment identified 6 potential unplanned events and 6 planned events.

Mechanisms and thresholds for impact using scientific studies and modelling were prepared. Evaluation of impact or consequence looks at the causal effect between the aspect/hazard and the identified receptor. The consequence or risk was then evaluated on the basis that environmental performance standards as identified are implemented. Definitions to support the consequence and likelihood evaluation are included within the *Environmental Risk Identification and Analysis Procedure (EA-91-IG-004)*.

In assessing impacts associated with planned events, the likelihood of an event occurring is assumed to be 'expected' as the event is planned. As such, an evaluation of management controls that can be used to reduce the likelihood of the event (i.e. preventative controls) is not necessary. Therefore, assessing the level of impact arising from a planned event is based on the severity of the environmental impact.

In assessing unplanned events, both the likelihood of the event occurring and the severity of the impact that might arise from that unplanned event are evaluated. It is the consideration of both likelihood and consequence levels that informs the level of environmental risk for an unplanned event.

A set of environmental performance outcome(s), environmental performance standards and measurement criteria are then identified for each aspect / hazard. The definitions of the performance outcomes, standards and measurement criteria are consistent with the OPGGS (E) Regulations.

Table 5-1 and **Table 5-2** summarise the identified hazards and potential impacts associated with the activity. The table also lists the controls to prevent or mitigate impacts such that impacts and risks are reduced to ALARP and are at acceptable levels. The residual risk (unplanned events) and consequence (planned events) are also provided in accordance with Apache's *Environmental Risk Identification and Analysis Procedure (EA-91-IG-004)*.

5.2 ALARP Demonstration

For planned and unplanned events, an ALARP assessment is undertaken to demonstrate that the standard control measures adopted reduce the impact or risk to as low as reasonably practicable (ALARP). This process relies on demonstrating that further potential control measures would require a disproportionate level of cost/effort for the level of impact or risk reduction they would provide. If this cannot be demonstrated then further controls are implemented. The level of detail included within the ALARP assessment is based upon the nature and scale of the potential impact and risks.

5.3 Acceptability Evaluation

Apache considers the impacts or risks associated with the survey to be acceptable if the following criteria are met:

- A consequence from a planned event is ranked as A or B; or a risk of impact from an unplanned event is ranked low to medium;
- An assessment has been completed to determine if further information/studies are required to support or validate the consequence assessment;
- Performance standards are consistent with legal and regulatory requirements;
- Performance standards are consistent with Apache Environmental Management Policy;
- Performance standards are consistent with stakeholder expectations; and
- Performance standards have been demonstrated to reduce the impact or risk to ALARP.

Table 5-1: Environmental Risk Treatment Summary for Unplanned Events

Event	Potential Impacts	Residual Risk Level	Risk Treatment Avoidance, Mitigation & Management Controls
Minor Hydrocarbon release (surface)	Accidental loss of fuel during fuel transfer would result in localised reductions in water quality that may be harmful to marine fauna in surface waters and upper layers (~1 m) of the water column.	**Low**	• Fuel and oil transfers undertaken in accordance with contractor's safe work procedure and include dry break connections, constant supervision and break-away couplings. • Refuelling will be undertaken >12 nm from the nearest territorial baseline. • Sulphur content of MGO complies with Regulation 14 of MARPOL Annex VI in order to control SO_X and particulate matter emissions. • Fuel transfer connections are bunded to contain minor spills and leaks. • Vessel Safety Case accepted by NOPSEMA includes control measures to reduce risk of hydrocarbons being lost to the marine environment. • Drainage and bunding systems are subject to ongoing monitoring and maintenance to ensure integrity and capacity. • Project vessels have oily water filtering systems that are compliant and surveyed, as per MARPOL Annex I/ Marine Order 91. • Hydrocarbon containing equipment maintenance undertaken in accordance with the Planned Maintenance System (PMS). • Vessel implements a Shipboard Oil Pollution Emergency Plan (SOPEP), or Shipboard Marine Pollution Emergency Plan (SMPEP), as required under MARPOL Annex I. • Oil spill exercise conducted prior to the commencement of the activity.

Event	Potential Impacts	Residual Risk Level	Risk Treatment Avoidance, Mitigation & Management Controls
Hydrocarbon release from vessel collision (surface)	The worst-case environmental incident resulting from a vessel collision is the rupturing of a vessel fuel tank resulting in the release of MGO to the environment and subsequent impacts to water quality, marine fauna and other sea users.	**Low**	• Australian Hydrographic Office (AHO) (including hydro.NTM@defence.gov.au) notified of operational area, activity and duration prior to mobilisation, which triggers AHO to issue 'Notice to Mariners'. • AMSA RCC notified of operational area, activity and duration prior to mobilisation, which triggers RCC to issue an AusCoast Warning. • 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. • Dynamic positioning systems on vessels are maintained and tested as per the PMS. • Navigation equipment and vessel procedures compliant with all marine navigation and vessel safety requirements under the *International Convention of the Safety of Life at Sea* (SOLAS) 1974 and *Navigation Act 2012* (or equivalent). • Oil spill response executed in accordance with *Baxter MSS 3D Oil Pollution Emergency Plan* (EA-00-RI-10106.002). • Oil spill response executed in accordance with the vessel Shipboard Oil Pollution Emergency Plan (SOPEP) as required under MARPOL. • Oil spill exercises conducted as per the OPEP and SOPEP.

Event	Potential Impacts	Residual Risk Level	Risk Treatment Avoidance, Mitigation & Management Controls
Non-hydrocarbon release (surface) – Liquid	Hazardous liquids including miscellaneous chemicals and waste streams (cleaning and cooling agents, stored or spent chemicals and leftover paint materials) are used or stored on board the seismic vessel or support vessel during the activity. Accidental loss of liquid wastes from vessels to the marine environment could occur via tank pipework failure or rupture, inadequate bunding and/or storage, insufficient fastening or inadequate handling. This may result in impacts to water quality and hence sensitive environmental receptors.	**Low**	• Chemicals (environmentally hazardous), hazardous wastes and hydrocarbons stored in bunded areas. • MSDS available where the chemical is stored. • Chemicals stored in accordance with relevant MSDS. • Chemical storage areas inspected weekly. • All machinery and equipment involved in the discharge and transfer of liquids have maintenance scheduled on their respective planned maintenance system. • Vessel Safety Case accepted by NOPSEMA manages prevention of loss of containment of chemicals and non-hydrocarbon liquids to ALARP. • Contaminated material contained onboard for onshore disposal in accordance with *Environmental Protection (controlled waste) Regulations (2004).* • All shipboard chemical spills managed in accordance with SOPEP/SMPEP. • Spill clean-up equipment located where chemicals are stored and frequently handled. • Scupper plugs or equivalent deck drainage control measures available where chemicals are stored and frequently handled. • Only non-hazardous, biodegradable detergents used for deck washing. • Secondary containment shall be available for all machinery or equipment with potential to leak chemicals to the marine environment.

Event	Potential Impacts	Residual Risk Level	Risk Treatment Avoidance, Mitigation & Management Controls
Non-hydrocarbon release (surface) - Solid	Non-hazardous solid wastes including paper, plastics and packaging, and hazardous solid wastes such as batteries, fluorescent tubes, medical wastes, and aerosol cans may be dropped unintentionally to the marine environment, potentially impacting on sensitive receptors. Plastics for instance have the potential to smother benthic environments and harm marine fauna through entanglement or ingestion. Release of hazardous solids (e.g. wastes) may result in the pollution of the immediate receiving environment.	**Low**	• Non-hazardous and hazardous wastes collected, stored, processed and disposed of in accordance with the vessel Garbage Management Plan, as required under Regulation 9 of MARPOL Annex V. • All shipboard objects lost overboard managed in accordance with Emergency response procedures. • Vessel Safety Case accepted by NOPSEMA manages prevention of loss of containment of non-hydrocarbon solid waste. • Chemicals stored in accordance with relevant MSDS. • Material handling and lifting equipment and remediation equipment maintained in accordance the PMS. • Lifting equipment certified. • Compliance with equipment handling and lifting procedures demonstrated by mitigation measures being included in JSA. • Lifting JSA to include communications during lifts to prevent loss of objects overboard. • Vessel safety case includes control measures for dropped objects that reduce the risk of objects entering the marine environment. • Vessel dropped objects overboard are recovered (if possible) to mitigate the environmental consequences from objects remaining in the marine environment, unless the environmental consequences are negligible or safety risks are disproportionate to the environmental consequences. • 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 is fitted with marker buoys. • Relevant personnel are trained in requirements of the procedures for streamer deployment and retrieval. • Notification provided to key stakeholders including relevant Australian Government agencies.
Marine fauna collision	The main collision risk associated with the activity is through seismic vessel or support vessel collision with large, slow moving cetaceans; potentially resulting in severe injury or mortality.	**Low**	• Marine fauna identification posters and Marine Fauna Sighting Datasheets to be made available on board all vessels. • Implementation of elements of Part B EPBC Act Policy Statement 2.1. • Apache Marine Fauna Sighting Datasheets completed and submitted to DoE. • In accordance with Part 8 of EPBC Regulations (Vessels), all vessels must travel at less than 6 knots within the caution zone of a cetacean (150 m radius for dolphins, 300 m for whales) known to be in the area.

Event	Potential Impacts	Residual Risk Level	Risk Treatment Avoidance, Mitigation & Management Controls
Introduction of Invasive Marine Species (IMS)	IMS can be introduced by vessels carrying IMS on external biological fouling, internal systems (sea chests, seawater systems etc.) on marine equipment (streamers, etc.) or through ballast water exchange. Cross-contamination between vessels can also occur. Some IMS pose a significant risk to environmental values, biodiversity, ecosystem health, human health, fisheries, aquaculture, shipping, ports and tourism.	**Low**	• Anti-foulant systems are maintained in compliance with *International Convention on the Control of Harmful Anti-fouling Systems on Ships*. • Australian Quarantine Inspection Service (AQIS) clearance to be in Australian waters. • A biofouling vessel risk assessment (VRASS) is completed prior to mobilisation to Australia as defined within the *National Biofouling Management Guidance for the Petroleum Production and Exploration Industry* (Commonwealth of Australia, 2008) and ranked as "low risk". • Exchange 'high-risk' ballast water, as defined in *Australian Ballast Water Management Requirements* (AQIS, 2011), outside Australian territorial seas and in waters at least 200 m deep. • Ballast water shall be managed in accordance with Ballast Water Management Plan.

Table 5-2: Environmental Impact Treatment Summary for Planned Events

Event	Potential Impacts	Consequence	Impact Treatment Mitigation & Management Controls
Interactions with other marine users	The presence of the seismic vessel and support vessel in the operational area could potentially inhibit commercial shipping, fishing and other oil and gas activities. The presence of vessels and infrastructure could also pose a collision risk and inconvenience to fishing practices during these operations.	**Minor**	• Australian Hydrographic Office (AHO) (including hydro.NTM@defence.gov.au) notified of operational area, activity and duration prior to mobilisation to the operational area, which may trigger AHO to issue a 'Notice to Mariners'. • AMSA RCC notified of operational area, activity and duration prior to mobilisation, which triggers RCC to issue an AusCoast Warning. • Access authority for non-Apache permits prior to commencement of activity once survey program finalised. • Support vessel(s) will scout within the MSS operational areas and maintain communications with the survey vessel to ensure that possible spatial conflicts between seismic source and other vessels are avoided. • Vessels will be fitted with collision avoidance radar to enable communications between chase vessels and commercial/3rd party vessels.
Light Emissions	Continuous lighting in the same location for an extended period of time may result in alterations to normal marine fauna behavior.	**Negligible**	• No standard controls are in place other than those required for navigational and safety requirements which are detailed in each vessel safety case. • Navigation equipment and vessel procedures compliant with all marine navigation and vessel safety requirements under the *International Convention of the Safety of Life at Sea* (SOLAS) 1974 and *Navigation Act 2012* (or equivalent).

Event	Potential Impacts	Consequence	Impact Treatment Mitigation & Management Controls
Noise Emissions	Noise emitted during seismic activities from vessels and helicopter operations and seismic operations may result in physiological or behavioural impacts to marine fauna, especially to marine mammal species that use sound for navigation and communication.	**Minor**	• In accordance with Part 8 of EPBC Regulations (Vessels), all vessels must travel at less than 6 knots within the caution zone of a cetacean (150 m radius for dolphins, 300 m for whales) known to be in the area. • 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). • Binoculars and Marine Fauna Sighting Datasheet available on all vessels. • Apache Marine Fauna Sighting Datasheets submitted to DoE. • Implementation of Part A of the EPBC Policy Statement 2.1 (3km observation, 2 km low power and 500 m shut down[1]) with an additional use of x 2 MFOs. • If the survey is required to shutdown/power-down 3 or more times per day for 3 consecutive days as a result of sighting Humpback Whales and/or Blue 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 shutdowns/power-downs have occurred for Humpback Whale and/or Blue Whale sighting. • Marine fauna identification posters and Marine Fauna Sighting Datasheets to be made available on board all survey vessels. • Environmental vessel inductions prior to vessel mobilisation, in particular information pertaining to whales, dolphins and turtles. • Inspection of critical equipment maintenance systems.

[1] The 2 km low power zone is required by the EPBC Policy Statement unless the proposed seismic survey can demonstrate through sound modelling or empirical measurements that the received sound exposure level for each shot will not likely exceed 160dB re 1µPa2·s, then a 1 km low power zone is observed

Event	Potential Impacts	Consequence	Impact Treatment Mitigation & Management Controls
Planned Operational Discharges – Surface and subsea	Operational discharges will be small and depend on rainfall, machinery activity and the number of persons onboard. Discharges include sewage, brine (from desalination), anti-scalant, cooling water, deck drainage and oily water. The small volumes of non-hazardous discharges may cause nutrient enrichment, organic and particulate loading, thermal impacts and increased salinity primarily in surface (<5 m) waters.	**Negligible**	• Vessels to have current and valid class survey certificate indicating the vessel meets standards for operating in Australia. • Vessels to have MARPOL certification for applicable equipment including sewage system and garbage management. • Standard Operating Procedures (SOPs) are in place to manage discharges. • Treated sewage will be discharged in compliance with Regulation 11 of MARPOL Annex IV. • Sewage system compliant with Regulation 9 of MARPOL Annex IV. • Sewage system maintained in accordance with PMS. • Food waste processed and disposed of in accordance with the vessel: o Garbage Management Plan as required under Regulation 9 of MARPOL; and/or o Shipboard Waste Management Plan as required under AMSA Marine Order 95: Marine Pollution Prevention – Garbage. • In accordance with MARPOL Annex V regulation 9.1, AMSA placards will be displayed on vessel to provide guidance on garbage disposal requirements. • In accordance with Regulation 3 of MARPOL Annex V food waste: o Discharged at least 12 nautical miles from nearest territorial baseline; o Discharged at least 3 nautical miles from the nearest territorial baseline if macerated to 25 m or less. • Only non-hazardous, biodegradable detergents used for deck washing as per MARPOL. • Water treatment system maintained in accordance with planned maintenance system. • Anti-scale products are not 'harmful substances' as defined by MARPOL Annex III. • As required by MARPOL Annex I Regulations, while in the operational area, vessel may discharge oily water after treatment to 15 ppm in a MARPOL compliant oily water filter system. • If a MARPOL approved OWS is not present/functioning, or oily filtration residue (sludge) requires disposal, the vessel will store oily water/sludge which will be shipped to shore for appropriate disposal at a reception facility or to a carrier licensed to receive the waste. • Oily water treatment system maintained in accordance with PMS.

Event	Potential Impacts	Consequence	Impact Treatment Mitigation & Management Controls
Atmospheric Emissions	Air emissions through the release of ozone depleting substances (ODS), and use of fuel may result in a temporary, localised reduction of air quality in the environment immediately surrounding the discharge point.	**Negligible**	• Sulphur content of fuel oil complies with Regulation 14 of MARPOL Annex VI. • Ozone-depleting substances managed in accordance with Regulation 13 of MARPOL Annex VI. • Vessels to have MARPOL certification for applicable equipment including incinerator (vessels) and engines. • Machinery maintained in accordance the PMS. • Incinerator operated in accordance with Regulation 16 of MARPOL Annex VI.
Hydrocarbon spill response (refer **Section 7**)	Impacts to the environment from implementing source control, monitor and evaluate, mechanical dispersion, shoreline protection, shoreline clean-up, oiled wildlife response and scientific monitoring include those operational impacts previously specified from the operation of vessels and aircraft. Implementing oiled wildlife response may cause additional distress, physical and behavioural impacts, separation and increased predation to wildlife if not undertaken correctly. Implementing shoreline protection and clean-up response may cause additional damage to shoreline and coastal habitats from damage from movement of personnel and equipment and damaging clean-up techniques.	**Negligible**	• Oiled wildlife response strategies will be implemented in accordance with the WA Oiled Wildlife Response Plan (WAOWRP). • Apache maintains Master Service Agreements for Oiled Wildlife Response contractors. • Net Environmental Benefit Analysis (NEBA) undertaken every operational period to determine if response strategy is having a net environmental benefit. • Oiled wildlife response ceased when termination criteria are met, as outlined within the Baxter MSS OPEP. • Apache understands and maintains the AMSA/APACHE MOU. • Apache understand the resources and requirements of the National Plan.

6. IMPLEMENTATION STRATEGY

The survey will be managed in compliance with all measures and controls detailed within the EP accepted by NOPSEMA under the OPGGS (E) Regulations, other environmental legislation and Apache's Environmental Management System (e.g. Environmental Management Policy).

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

The EP details specific control measures, performance standards and measurement criteria to achieve the performance outcomes. The controls for the survey activities are summarised in **Section 5**.

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

- Details on the systems, practices and procedures to be implemented;
- Leadership and responsibilities;
- Workforce training and competency;
- Incident and emergencies response;
- Performance review and continuous improvement including record keeping;
- Management and review of the EP; and
- Reporting.

During the period that activities described in this EP are undertaken, Apache will ensure environmental performance is managed through an inspection and monitoring regime undertaken by Apache representatives or Vessel Master. Given the short duration of this activity, environmental performance will be verified through a pre-mobilisation inspection and HSE checks conducted during the activity.

Environmental performance during survey activities will be continually improved by focusing on:

- Feedback on HSE audit and inspections procedures from audit teams and the HSE Oversight Committee;
- Actions identified in the review of HSE audit and inspection related performance indicators such as on time execution and close out of corrective actions; and
- Actions identified from HSE audit and incident investigation.

Non-conformances (i.e. events and activities that do not satisfy environmental performance outcomes and/or performance standards) identified during audits are formally documented in an audit report. Non-conformances and corrective actions taken will be tracked using Apache's incident management systems (i.e. Enablon). An end-of-activity environmental performance report will be produced, which will include a 'lessons learnt' section to help facilitate continuous improvement for future projects.

All personnel are informed of the need to report HSE incident and hazards through inductions and routine operations meetings. HSE incidents and hazards will be documented in Apache's incident management system and significant incidents will be investigated by root cause analysis. Incident notification and reporting to NOPSEMA and other regulators will be conducted as per the OPGGS (E) Regulations, as detailed within the EP. Reported HSE incidents and hazards will also be communicated to personnel during daily operational meetings.

7. HYDROCARBON SPILL RESPONSE ARRANGEMENTS

Credible hydrocarbon spill scenarios are identified in the EP, including:

- **Tier 1**: Small spill from vessel such as during refuelling;
- **Tier 2**: Vessel collision resulting in a ruptured MGO fuel tank:
    - Tier 1 and 2 Oil Spill Response executed in accordance with *Baxter MSS 3D OPEP* (EA-00-RI-10106.002); and
    - Tier 1 and 2 Oil Spill Response executed in accordance with the vessel's SOPEP, as required under MARPOL.

Through the assessment of the expected hydrocarbon behaviour(s), modelling results of credible worst-case spill scenario, and identified environmental priorities within the predicted spill impact areas, a set of functional, achievable oil spill response strategies have been selected for a tier 2 MGO release (**Table 7-1**). If a spill occurred, the actual oil spill response strategies employed will be defined through the application of a Net Environmental Benefit Analysis (NEBA) which will ensure that the strategies which result in the greatest environmental benefit will be applied.

Table 7-1: Selection of oil spill response strategies

Oil Spill Response Strategy	Applicable	Justification
Source Control	Yes	Source control is one of the first response strategies implemented when mounting a spill response. Source control minimises the volume of hydrocarbons lost to the environment by securing the source of the spill. Source control activities for responding to refuelling spills include: • Pumping operations will cease immediately following the spill; • Drainage network is closed as soon as practicable following the spill to prevent discharge to the ocean; • Recover hose and identify leaking pipe; • Make necessary repairs to pipe; and • Use spill kit resources (i.e. sorbent material) to clean-up spills. For spills of MGO from vessel collision source control activities include: • Reduce the head of cargo by dropping or pumping the tank contents into an empty or slack tank; • Consider pumping water into the leaking tank to create a water cushion to prevent further cargo loss; • If the affected tank is not easily identified, reduce the level of the cargo in the tanks in the vicinity of the suspected area if stability of the vessel will not be compromised; • Attempt repair and plugging of hole or rupture; • Evaluate the transfer of cargo to other vessels; and • Trimming or lightening the vessel to avoid further damage to intact tanks.
Monitor and Evaluate	Yes	Monitor and evaluate activities include: • Vessel surveillance; • Tracking buoys; and • Spill fate modelling. Surveillance is used to monitor and evaluate the dispersion of the released hydrocarbon, and to identify and report on any potential contacts to environmental sensitive receptors that may occur while the spill disperses. Surveillance results are used to assist in escalating or de-escalating response strategies as required.

Oil Spill Response Strategy	Applicable	Justification
Physical Dispersion	No	Physical dispersion is undertaken by running vessels through the hydrocarbon plume and using the turbulence developed by the propellers or hydro-blasting from vessel hydrants to break up the slick. Once dispersed in the water column in the form of smaller droplet sizes, biodegradation processes are enhanced. Considered an opportunistic strategy, it is usually used on targeted, small, breakaway areas. Physical dispersion is not applicable as a response strategy because of the nature of the MGO—preferentially relying on evaporation rather than dispersing toxic components of the fuel into the water column, and the physical environment in the spill location – wave energy able to provide the mixing that could be provided by propellers. However, its applicability will be assessed during the NEBA.
Protection and deflection	No	Protection and deflection activities involve the use of booms to protect sensitive receptors, to deflect spills away from sensitive receptors or shorelines, or to deflect spills to an area that provides increased opportunity for recovery activities. Protection and deflection is not applicable as a response strategy as no shorelines are predicted to be impacted by the worst case MGO spill.
Containment and recovery	No	Containment and recovery of hydrocarbons can offer a preventive form of protection to sensitive receptors. Skimmers (mechanical) and booms may be used at sea. This strategy, however, is often technically unfeasible due to weather conditions and hydrocarbon characteristics e.g. containment and recovery operations need to have a high hydrocarbon thickness, which is not compatible with MGO. Containment and recovery is not applicable as a response strategy due to the ineffectiveness of containment and recovery methods on thin surface MGO films and the rapid evaporation rate of MGO, the use of containment and recovery as a response strategy for a MGO spill is not applicable.
Shoreline clean-up	No	Shoreline clean-up is not an applicable strategy as no shorelines are predicted to be impacted by the MGO spill
Oiled Wildlife Response	Yes	Wildlife operations may be required to deter fauna from an area that has been or is likely to be oiled and if fauna is oiled. It is applicable for marine fauna that contact, or come close to the spill when on the water.
Operational and Scientific Monitoring	Yes	Extent of spill to determine the extent of operational and scientific monitoring. Resources are available to implement operational and scientific monitoring as required. Operational monitoring will focus on obtaining information which will assist in planning and execution of the spill response. Scientific monitoring is focused on determining the degree of impact and recovery of sensitive receptors by collecting high quality spatial and temporally replicated quantitative data suitable for analyses. Given the worst case spill of MGO will remain in offshore waters Operational and Scientific Monitoring will focus on marine megafauna (marine mammals and turtles) and seabirds which may be encountered within the EMBA.
In Situ Burning	No	In-situ burning is not an applicable response strategy given several limiting factors that are likely to prevent implementation. In-situ burning cannot be undertaken in rough conditions as containment is likely to be interrupted by winds greater than approximately 20 knots and waves are higher than 3 feet. Furthermore, for in-situ burning to be undertaken oil has to be thicker than 1-2 mm and as MGO tends to have high evaporation rates and spread into very thin films this strategy is not applicable for this activity. As such, this response strategy is not applicable for this activity.

Regardless of the tier level, during a spill response both a Statutory Agency and a Control Agency will be assigned. Apache intends to remain the Control Agency for any vessel spills, until AMSA or the DoT identifies the need to assume control. This will be based on Apache's ability to respond effectively.

In the event of a tier 2 spill event, the first step in response is the formation of an Incident Command Team (ICT), the role of which is to directly manage the response process from Apache's headquarters in Perth. The ICT management structure reflects the Australian Interagency Incident Management System (AIIMS) and consists of key management roles required to effectively coordinate and execute a response under emergency conditions, including logistics, environmental and human resourcing.

8. CONTACT DETAILS

Further information about the Baxter MSS 3D Survey can be obtained from:

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