



Shell Development (Australia) Pty Ltd
(ACN 14 009 663 576)


Environment Plan DAB 3D Seismic Survey

Summary

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1. Introduction

Shell Development (Australia) Pty Ltd (Shell), proposes to conduct a 3D seismic survey in exploration permits WA-496-P, WA-491-P and WA-439-P.

This Environment Plan summary has been prepared as per the requirements of Regulation 11 of the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations, 2009*.

2. Location of the Activity

The Dirk Adventure Bart 3D Marine Seismic Survey (DAB 3D MSS) will take place within an operational area of approximately 27,159 km² that is situated within three separate permit areas, WA-496-P, WA-439-P and WA-491-P. The operational area is located entirely within Commonwealth waters, 128 km northwest of Ningaloo Reef and 110 km northwest of the Commonwealth Ningaloo Marine Park boundary.

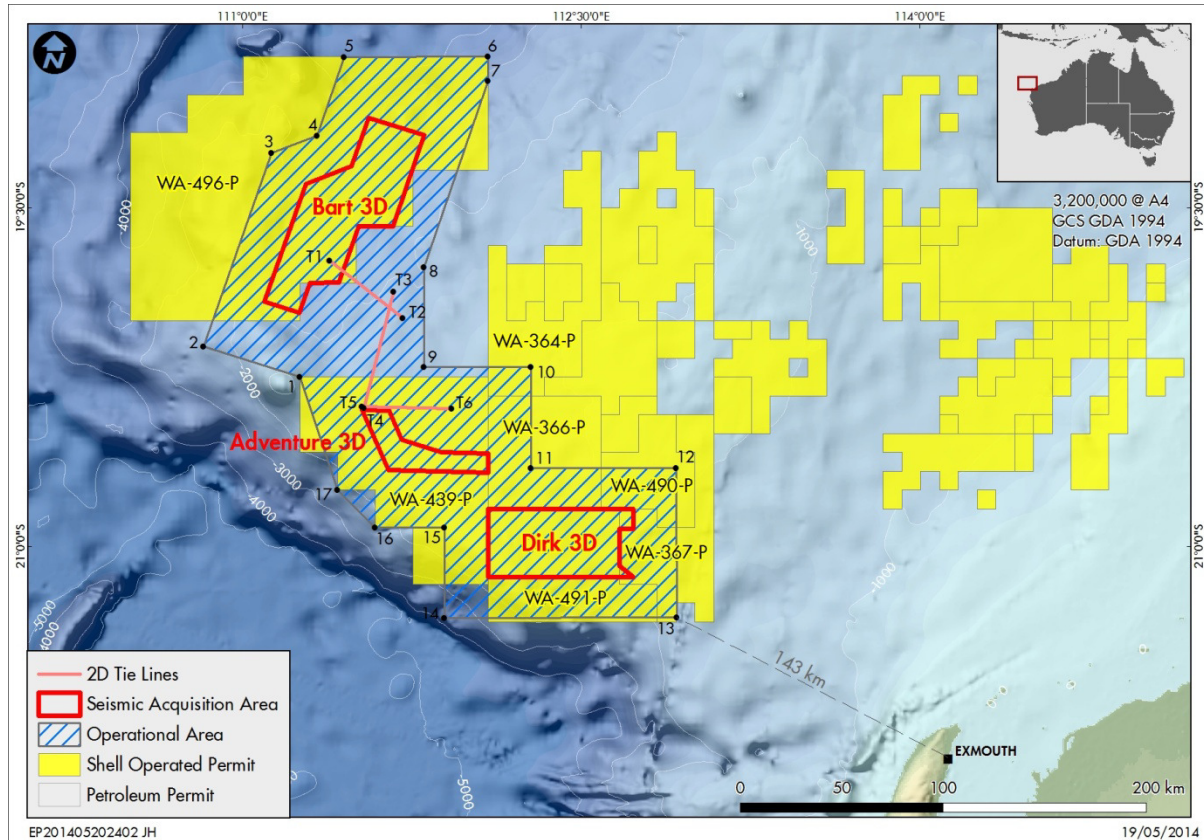
Water depths in the operational area range from approximately 900 m to 4,250 m. A chart showing the survey locations is provided in Figure 1 and the boundary coordinates for the operational area are provided in Table 1 below.

Table 1: Operational area and tie line coordinates for the survey

Location	Point	Latitude	Longitude
Operational Area	1	20° 14' 55.386" S	111° 15' 5.054" E
	2	20° 6' 53.082" S	110° 49' 28.193" E
	3	19° 15' 25.534" S	111° 7' 33.050" E
	4	19° 10' 50.067" S	111° 19' 42.638" E
	5	18° 49' 57.841" S	111° 26' 57.324" E
	6	18° 49' 55.093" S	112° 5' 4.541" E
	7	18° 56' 17.577" S	112° 5' 4.516" E
	8	19° 45' 46.770" S	111° 48' 12.326" E
	9	20° 12' 15.093" S	111° 48' 9.605" E
	10	20° 12' 12.143" S	112° 16' 33.580" E
	11	20° 39' 5.560" S	112° 16' 31.945" E
	12	20° 39' 3.143" S	112° 55' 12.593" E
	13	21° 18' 49.735" S	112° 55' 15.783" E
	14	21° 18' 52.950" S	111° 53' 30.426" E
	15	20° 54' 55.002" S	111° 53' 32.219" E
	16	20° 54' 55.459" S	111° 35' 4.541" E
	17	20° 44' 55.386" S	111° 25' 4.907" E
Bart Tie Lines	T1	19° 44' 5.781" S	111° 22' 58.085" E
	T2	19° 59' 17.001" S	111° 42' 30.025" E
	T4	20° 23' 10.784" S	111° 32' 5.408" E
	T3	19° 52' 21.671" S	111° 40' 1.513" E
	T6	20° 23' 22.397" S	111° 55' 28.833" E
	T5	20° 22' 44.161" S	111° 31' 36.973" E

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Figure 1: Location of the DAB 3D MSS showing the survey area, operational area and petroleum exploration permit boundaries



3. Description of the Activity

The survey is proposed to commence in Q4, 2014 and will take approximately 90 days to complete. The actual time frame will depend on vessel scheduling and the weather conditions during the survey.

The survey will be completed using typical broadband 3D seismic techniques whereby a survey vessel tows two airgun arrays providing the seismic energy source, with a number of streamers at a length of approximately 8,000 m containing receivers used for collecting the seismic reflection data. The airgun source arrays are operated at a pressure of 13,800 kPa and each have a maximum volume of approximately 0.065 to 0.082 m³. The source arrays will be fired alternately at an interval of 18.75 to 25 m. The maximum sound pressure level emitted by each source array is approximately 262 dB re 1 µPa-m at typical frequencies up to approximately 200 - 250 Hz.

The vessel to be used for the survey is expected to be between approximately 90 to 120 m in length and to be manned by a crew of 45 to 55 personnel. The vessel will transit each line at an approximate speed of 7 to 9 km/hr (4 to 5 knots). A maximum of two support vessels will be

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required during the survey. These are expected to have a maximum length of between 25 and 35 m each and to be manned by a crew of 6 to 12 personnel.

Crew change from the survey vessel is normally conducted every five weeks. The survey duration of 90 days will require up to two crew changes that will be undertaken by helicopter from Exmouth.

Support vessels will crew change at Exmouth during scheduled supply runs, anticipated to be on two occasions, 6 weeks apart.

4. Description of the Environment

4.1. Physical

The survey will take place on the outer continental slope, with water depths ranging from approximately 900 m to 4,250 m in the operational area. There are no significant or shallow seabed features known to occur in the area. The seabed of the operational area shows strong gradients to the south, adjacent to some deepwater canyon systems. Due to the depths encountered in the operational area, the seabed cannot support any light dependent coral or seagrass habitats that may inhabit shallower waters. The nearest emergent land mass is North West Cape and near-by islands, some 120 km from the operational area.

The most prominent environmental feature of the broader region is the Ningaloo Reef, which is protected by the Ningaloo Marine Park, under joint State and Commonwealth jurisdiction and forms part of the Ningaloo Coast World Heritage Area. The Ningaloo Marine Park boundary is located approximately 110 km south-east of the operational area. The operational area does not overlap any Marine Conservation Areas.


The climate of the North West Shelf region is arid sub-tropical with two main seasons, summer (September to March) and winter (May to July). Summers are hot and humid with winds predominately from the south-west. In winter, winds from the south dominate. Tropical cyclones typically occur in the region three to four times per year between November and April, bringing strong winds, heavy rain and high seas.

The oceanic circulation of the offshore regions is influenced by the Indonesian Throughflow, while the Leeuwin Current is dominant further south. The Indonesian Throughflow feeds warm, lower salinity water from the western equatorial Pacific, through Indonesia and into the Indian Ocean off Northern Australia. The flow is seasonal, stronger in autumn and winter and weaker in summer. The Leeuwin Current is a seasonal current carrying warm tropical water south along the edge of the continental shelf of Western Australia, fed by the Indonesian Throughflow.

4.2. Biological

4.2.1. Benthic and Pelagic Communities

There is limited information concerning the benthic communities in the operational area, due primarily to the remoteness and water depths of the location. Much of the outer mid-shelf and upper slope is covered by a relatively featureless, sandy-mud seabed with a sparse covering of sessile organisms dominated by filter-feeding heterotrophs. The biological productivity of the

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benthic environment is expected to be limited due to low light availability at depth, low nutrient availability and limited extent of exposed hard substrates.

4.2.2. Endangered and Vulnerable Species

The Environment Protection Biodiversity Conservation (EPBC) Protected Matters Database does not list any Threatened Ecological Communities but the database identified thirteen Threatened Species and eighteen protected Migratory species that may occur in the marine environment. Threatened species (Table 2) that may occur within the operational area include four cetacean species, three bird species, five reptile species and one shark species.

Table 2: Threatened Species that may occur within the DAB 3D MSS operations area

Scientific Name	Common Name	EPBC Act Status
Cetaceans		
<i>Megaptera novaeangliae</i>	Humpback Whale	Threatened (Vulnerable)*
<i>Balaenoptera borealis</i>	Sei Whale	Threatened (Endangered)*
<i>Balaenoptera musculus</i>	Blue Whale	Threatened (Endangered)*
<i>Eubalaena australis</i>	Southern Right Whale	Threatened (Endangered)*
Reptiles		
<i>Natator depressus</i>	Flatback Turtle	Threatened (Vulnerable)*
<i>Chelonia mydas</i>	Green Turtle	Threatened (Vulnerable)*
<i>Dermochelys coriacea</i>	Leatherback Turtle	Threatened (Endangered)*
<i>Eretmochelys imbricata</i>	Hawksbill Turtle	Threatened (Vulnerable)*
<i>Caretta caretta</i>	Loggerhead Turtle	Threatened (Endangered)*
Birds		
<i>Macronectus giganteus</i>	Southern Giant-Petrel	Threatened (Endangered)*
<i>Pterodroma mollis</i>	Soft-plumaged Petrel	Threatened (Vulnerable)
<i>Thalassarche melanophris impavida</i>	Campbell Albatross	Threatened (Vulnerable)
Sharks		
<i>Carcharodon carcharias</i>	Great White Shark	Threatened (Vulnerable)*

*Also listed as Migratory

4.2.2.1. Mammals – Cetaceans

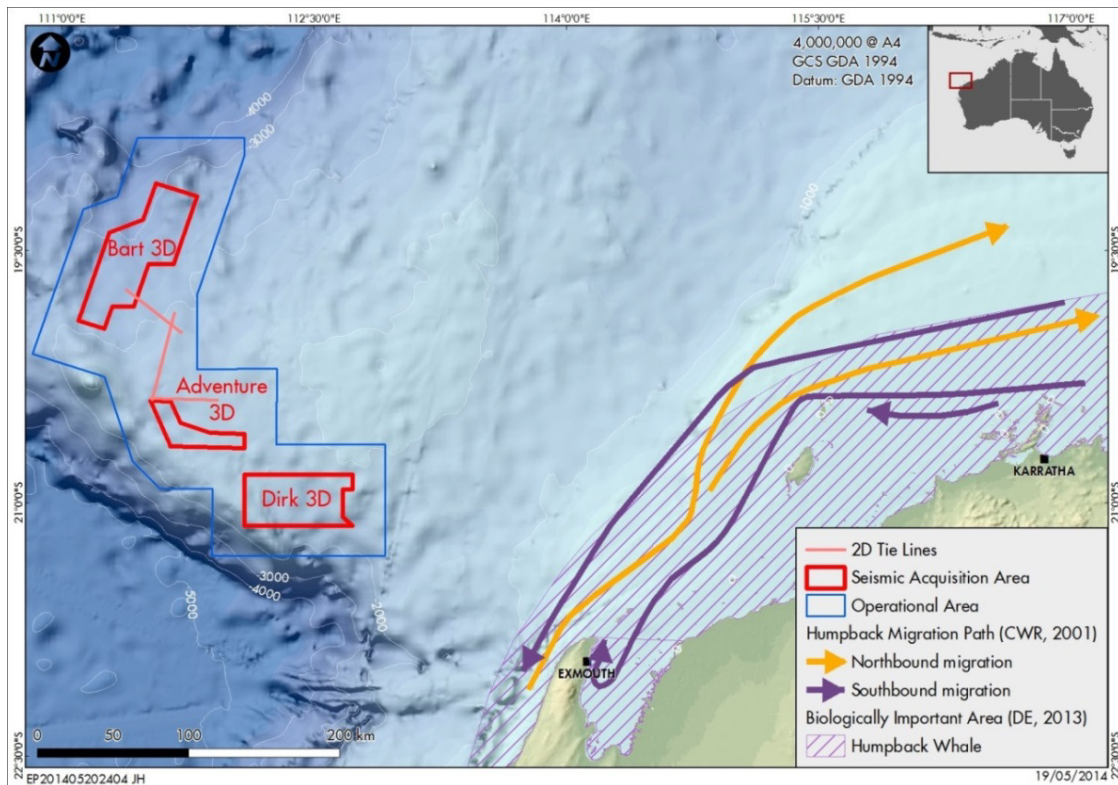
Four species of cetaceans listed as Threatened may potentially traverse through the operational area.

Humpback whale

The humpback whale population migrates north along the coast generally within the 500 m bathymetry inshore. The northern migration, past the North West Cape occurs from July to early August. Humpback whale pods have been observed to show a stronger preference for shallower water during the peak southern migration, with the majority remaining inshore of the 200 m depth contour. The southern migration past the North West Cape occurs from September to October. However, given the water depth of the operational area and that both the northern and southern humpback whale migration routes are located 120 km from the nearest point of the operational area, humpback whale abundance is expected to be very low (see Figure 2).

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Figure 2: Humpback Whale Migratory Routes



Sei whales

The main breeding season for sei whales is in winter in the Southern Hemisphere. Due to low abundance, and distance of operational area from migratory pathways between the Antarctica and the subtropical convergences, it is unlikely that the activity will encounter significant numbers of sei whales.

Blue whale

Blue whales have an extensive oceanic distribution and have been recorded from all Australian states. Australian migration paths are widespread and have not been observed to follow coastlines or oceanographic features and are rarely present in large numbers outside recognised aggregation areas.

There are two recognised subspecies of blue whale in Australia, the 'true' blue whale and the 'pygmy' blue whale.

'True' blues appear to feed mainly, if not exclusively, in the Antarctic and during summer months, therefore, unlikely to be found in the vicinity of the operational area.

Pygmy blue whales are not generally found in the Antarctic and are thought to feed in productive regions in temperate latitudes. It is thought that on their northern migration pygmy blue whales move up the coast passing Exmouth in the period April through to August before continuing north, with animals known to frequent Indonesian waters. The migratory path for

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'pygmy' blue whales can be expected to cover the 500 m to 1500 m depth range off the North West Cape so they may transverse through the operational area. Their southern migration down the Western Australian coast is from October to late December. They tend to pass along the shelf edge at depths of 500 m out to 1000 m, moving faster on the southern migration and coming in close to the coast in the Exmouth–Montebello Islands area.

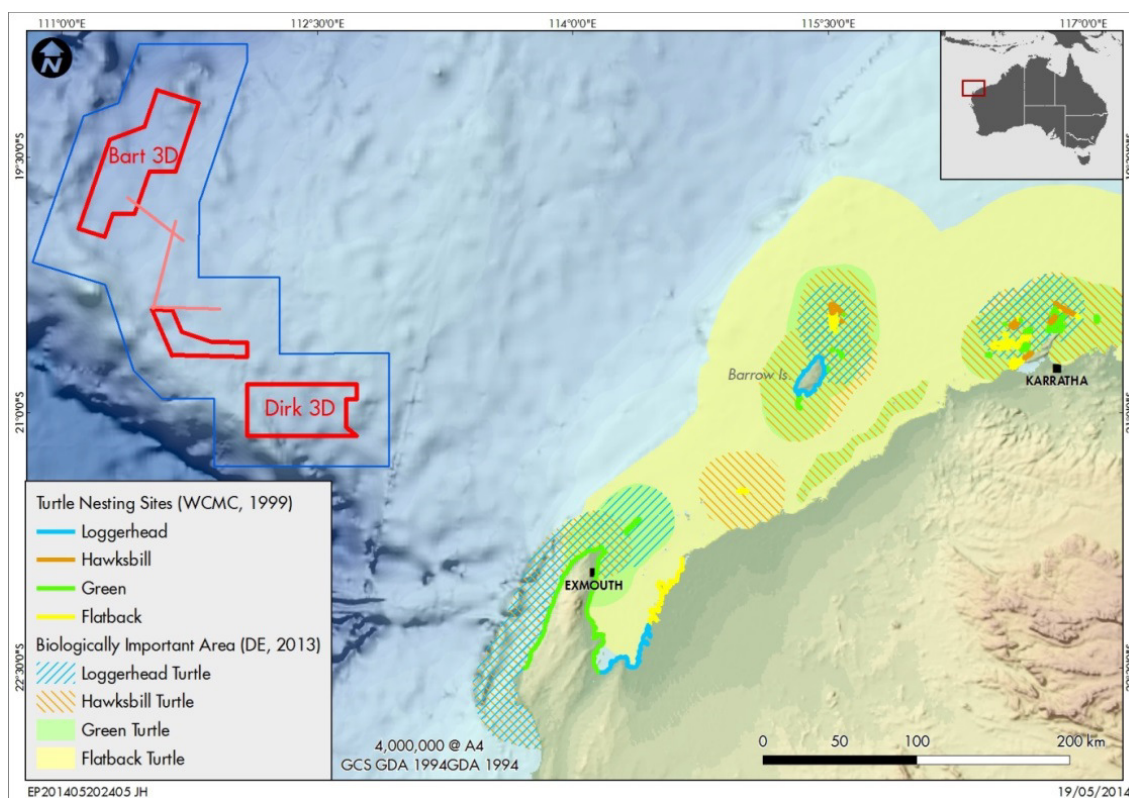
Southern Right Whale

Southern right whales feed in the southern and subantarctic oceans, close to Antarctica, during the summer months and migrate north in winter for breeding. Some individuals have occasionally been recorded in warmer temperate waters as far north as North West Cape off Western Australia 100 km to the east of the operational area. Due to the southern right whales' preference for colder sub-Antarctic waters, it is unlikely that this species will pass through or near the operational area.

4.2.2.2. Reptiles

Up to five species of marine turtle species, listed as Threatened, may occur in or around the operational area. However, given the distance from nesting beaches and the open ocean habitat that lies beyond the operational area, it is thought that there is only a low likelihood that these turtles may migrate through the operational area (see Figure 3).

Figure 3: Turtle Nesting sites



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4.2.2.3. Birds

Three threatened species of birds may occur in or around the operational area, although the likelihood of their presence in this area is very low.

4.2.2.4. Sharks

Great White Shark

Great White Sharks can be found from close inshore around rocky reefs, surf beaches and shallow coastal bays to outer continental shelf and slope areas. The Great White Shark is widely, but sparsely, found in all seas including cold temperate waters in both hemispheres. It has been observed in tropical areas such as the Coral Sea, Papua New Guinea, the central Pacific, northern Brazil and the tropical south-west Indian Ocean.


4.2.3. Listed migratory species

Migratory species that may occur within the operational area (Table 3) include eight cetacean species, one bird species, five reptile species and four fish / shark species. The operational area does not contain any recognised feeding, breeding or aggregation areas for these species, hence large numbers of these species are not anticipated to be encountered during these activities.

Table 3: Migratory species that may occur within the DAB 3D MSS operations area

Scientific name	Common name
<i>Birds</i>	
<i>Macronectes giganteus*</i>	Southern Giant-Petrel*
<i>Cetaceans</i>	
<i>Balaenoptera bonaerensis</i>	Antarctic minke whale
<i>Balaenoptera borealis*</i>	Sei whale*
<i>Balaenoptera edeni</i>	Bryde's whale
<i>Balaenoptera musculus*</i>	Blue whale*
<i>Megaptera novaeangliae*</i>	Humpback whale*
<i>Eubalaena australis*</i>	Southern Right Whale*
<i>Orcinus orca</i>	Killer whale
<i>Physeter macrocephalus</i>	Sperm whale
<i>Reptiles</i>	
<i>Caretta caretta*</i>	Loggerhead turtle*
<i>Chelonia mydas*</i>	Green turtle*
<i>Dermochelys coriacea*</i>	Leatherback turtle*
<i>Natator depressus*</i>	Flatback turtle*
<i>Eretmochelys imbricate*</i>	Hawksbill turtle*
<i>Fish and Sharks</i>	
<i>Carcharodon carcharias*</i>	Great White Shark*
<i>Isurus oxyrinchus</i>	Shortfin Mako, Mako Shark
<i>Isurus paucuspaucus</i>	Longfin Mako
<i>Manta birostris</i>	Giant Manta Ray

* Also identified as a Threatened Species

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4.3. Socio-Economic Environment

The operational area overlaps with a variety of commercial fishing management areas. Given the remote location of the operational area, these activities are unlikely to have any impact the commercial fishing areas. WA State managed commercial fisheries permitted within the operational area include Mackerel Fishery and West Coast Deep Sea Crustacean. Commonwealth managed commercial fisheries, which are permitted within the operational area include Southern Blue Fin Tuna Fishery, Western Tuna and Billfish Fishery, Western Skipjack Fishery and Western Deepwater Trawl.

Nature-based tourism provides a significant economic benefit to the Exmouth region. Tourism is centred around Ningaloo Reef, Shark Bay and other inshore waters that are popular for scuba diving and snorkelling and provide the opportunity to observe whales, whale sharks, dolphins and manta rays. With the exception of some offshore fishing charters, most marine tourism activities occur within State waters close to the coast. Therefore, the survey is unlikely to affect recreational fishing activities due to the remote location of the operational area.

Extensive petroleum exploration and production activity occurs in the region and the industry has developed major production and/ or storage operations on Barrow, Thevenard and Varanus islands and in the waters off North West Cape. There are five existing floating production and storage operations (FPSO) developments south-east of the operational area closer to the Ningaloo Marine Park. There is no existing petroleum infrastructure in the operational area or adjacent permit areas.

Vessels travelling along the shipping lane running parallel to the WA coastline and heading in a northerly direction to the Port of Dampier may pass just to the east of the operational area. However, shipping traffic is limited in the operational area and therefore unlikely to be affected by the survey.

5. Management Approach


The Shell Commitment and Policy on Health, Safety, Security, Environment and Social Performance (HSSE and SP) applies across Shell globally and is designed to protect people and the environment.

Key features of the policy are:

- Systematic approach to HSSE and SP management designed to ensure compliance with the law and to achieve continuous performance improvement;
- Targets for improvement and measurement, appraisal and performance reporting;
- Requirement for contractors to manage HSSE and SP in line with this policy; and
- Effective engagement with neighbours and impacted communities.

All of Shell's operations comply with the Shell HSSE and SP Control Framework, a comprehensive corporate management framework, comprising of a simplified set of mandatory standards applicable to every Shell Company, contractor and joint venture under Shell's operational control.

Within Shell, the HSSE and SP Control Framework requires people in HSSE Critical Positions to have their HSSE-MS competence assured. These people have to attain a set proficiency

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level in three competences: HSSE Lead; HSSE Prepare; and HSSE Apply. People in HSSE Critical Positions are responsible for the development and maintenance of effective barriers to prevent incidents.

This activity will be managed to comply with the relevant State and Commonwealth Acts and Regulations, industry standards and applicable international agreements.

The Shell Company Site Representative is Shell's representative aboard the survey vessel. They are responsible for ensuring the monitoring and operational requirements of the environment plan are communicated to the rig crew and implemented. The Shell Company Representative will also be responsible for vessel compliance checks, with no other audits planned given the short duration of the vessel trips.

If any new or increased risks are identified during the activities, an assessment of the risk and review of the environment plan will be undertaken and, if determined to be a significant new or significantly increased risk, the activity leading to the new risk will not continue until acceptance of the management approach to the new / changed risks has been provided to NOPSEMA. The Shell Project Manager is responsible for the management of any change.

All Environmental incidents and non-conformances are managed in accordance with the Shell HSSE Incident Reporting, Investigation and Follow Up Procedure that describes the process of reporting, classification, investigation, follow-up and close out.

Shell's overall environmental objective for the activity is to avoid or reduce environmental risks to as low as reasonably practicable. Specific objectives, standards and measurement criteria for each aspect of the survey that has the potential to cause adverse environmental impacts have been identified. Environmental performance will be measured and reported against these standards and criteria as part of Shell's commitment to continuous improvement of environmental, health and safety performance.


Environmental Performance report will be submitted to NOPSEMA as required by *OPGGs (E) Regulations 2009*. This report will be submitted within 3 months of completion of the activity, given the activity is less than 1 year long, one report is deemed sufficient. The Shell Project Manager will review environmental performance upon completion of the activity.

As required by the *OPGGs (E) Regulations*, Shell will store and maintain environmental documents and records from the survey activities for the period of 5 years.

The Oil Pollution Emergency Plan will be tested prior to the commencement of the activity by way of a walk-through by the emergency response team to test the communication, emergency response team functionality, Emergency Response Plans, and to ensure that the emergency response team members are aware of their roles and responsibilities in the event of an incident. A summary of Shell's response strategies in the Oil Pollution Emergency Plan is provided in Appendix A.

An Implementation Strategy has been incorporated into the Environment Plan per the *OPGGs (E) Regulations 2009*. This includes:

- Measures, systems and practices to ensure environmental performance objectives and standards are met;
- Chain of Command;

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- Measures to ensure workers are aware of their responsibilities;
- Monitoring and management;
- Records and reporting;
- Oil Pollution Emergency Plan (OPEP); and
- Consultation.

6. Environmental Hazards and Controls

A risk analysis has been undertaken for all aspects of operations, in accordance with the Shell HSSE and SP Control Framework and in line with the principles outlined in the Australian Standard AS/NZS ISO 31000:2009 Risk Management and HB 203:2006 Environmental Risk Management.

The risks for each planned and unplanned event have been determined using a qualitative assessment process. The level of risk has been determined by assessing risk likelihood and consequence using the Shell Risk Assessment Matrix.

This is a 6 by 5 matrix that is used for qualitative assessments of risk and assists determination of appropriate controls and mitigation measures:

- The vertical axis represents increasing consequences (severity levels 0 to 5) in terms of harm to people, damage to assets, effect on the environment and impact on reputation with 5 having the greatest severity; and
- The horizontal axis represents increasing likelihood (levels A to E) of the consequence under consideration, with E having the greatest likelihood.


To demonstrate that risks are as low as reasonably practicable and at an acceptable level, all mitigation measures have been considered and where these measures are practical, they have been included.

Incidents with a consequence severity equal to or greater than level 3 (i.e. moderate to massive) are considered 'Reportable Incidents' in line with Regulation 26 of the *OPGGS (E) Regulations*. For this activity, based on the risk assessment, though the probability of occurrence is low, four possible events are considered to have a moderate or greater consequence, if they occur:

- Physiological damage to sensitive marine fauna from seismic pulses;
- Death or injury of a member of a threatened, migratory or cetacean species;
- Introduction of exotic species; and
- Diesel spill resulting from a collision with another vessel.

Recordable incidents in the OPGGS (E) Regulation are defined as 'an incident arising from the activity that *breaches a performance objective or standard in the Environment Plan that applies to the activity and is not a reportable incident*'.

A summary of the key environmental hazards / risks and control measures to be applied to the activities is provided in Appendix B. These are consistent with Shell and project-specific environmental objectives, standards and measurement criteria. All control measures associated with the hazards will be used to reduce environmental risk to ALARP and will be of an acceptable level.

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7. Consultation

Shell has undertaken consultation with key stakeholders who have an interest in our activities at the operational area in the Exmouth basin. Consultation for this activity is built upon the relationships developed during the consultation undertaken for previous activities in the Exmouth Basin.

In the process of initially identifying and engaging with relevant persons, Shell considered relevant government agencies and persons or organisations whose functions, interests or activities may be affected by the activity. Stakeholders consulted include:

- Department of Industry;
- National Offshore Petroleum Titles Administrator (NOPTA);
- WA Department of Mines and Petroleum;
- WA Department of Fisheries;
- WA Department of Transport;
- Australian Fisheries Management Authority (AFMA);
- Commonwealth Fisheries Association;
- Western Australian Fishing Industry Council (WAFIC);
- RecFish;
- Exmouth Shire Council;
- Australian Petroleum Production & Exploration Association (APPEA);
- Cape Conservation Group;
- World Wildlife Fund (WWF);
- Conservation Council WA;
- Commercial fishing industry associations; and
- Recreational fishing industry associations.

Engagement on the activity will continue throughout 2014/2015 leading up to, during, and post the completion of the activity. Shell has a communications plan in place to ensure stakeholders are kept informed of project progress and outcomes. Stakeholders are able to raise questions / concerns at any time via the following email address, which is posted on the Shell website: naomi.evans@shell.com or sda-exploration@shell.com.

Shell responded to feedback received from stakeholders listed above during the consultation period. Cape Conservation Group requested additional information on the Pygmy Blue Whale migration which Shell provided as requested and will keep them updated as the project progresses.

Australian Fisheries Management Authority requested the coordinates of the survey area to confirm the managed fisheries in the area. Shell provided the co-ordinates of the survey area as requested.

WA Department of Fisheries requested Shell to contact all individual commercial fisheries licence holders that may be impacted by the activity. As a result Shell provided details of the activity to all individual licence holders identified by the WA Department of Fisheries.

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No other concerns / queries were raised by stakeholders during the consultation process. Stakeholders have been and are currently able to raise their concerns via direct communication, primarily through Shell's dedicated Communications focal point (contact details below).


8. Contact Details

For further information about this activity, please contact the titleholders nominated liaison person:

Naomi Evans

Address: 2 Victoria Avenue, Perth, Western Australia, 6000

Tel: +61 (0) 8 9338 6000

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APPENDIX A: Summary of response strategies in the oil pollution emergency plan

The DAB 3D Seismic Survey Oil Pollution Emergency Plan (OPEP) sets out the Shell and Contractor responsibilities and response actions in the unlikely event of an oil spill during the survey activities.

The responsibility for an oil spill is dependent on location and spill origin. The National Plan for Maritime Environmental Emergencies sets out the divisions of responsibility for an oil spill response. For offshore petroleum exploration and production activities, Shell is the control agency for spills emanating from its offshore facilities and AMSA is the Control Agency for spills emanating from vessels in Commonwealth waters, including the vessels utilised for the survey activities.

AMSA (Australian Maritime Safety Authority) was established under the Australian Maritime Safety Authority Act 1990 with responsibilities for maritime safety and combat of pollution in the marine environment or other environmental damage caused by shipping. AMSA manages the National Plan and associated arrangements on behalf of the Australian Government. AMSA and Shell have signed a Memorandum of Understanding (MoU) that outlines roles and responsibilities. The MoU ratifies that AMSA will take over the control of spills originating from vessels for all spill volumes, and that Shell would support AMSA in this response.

Response Actions

Should an oil spill incident occur, Shell would immediately take the following actions:

- Follow the Vessel's procedures (incl. Shipboard Oil Pollution Emergency Plans - SOPEP) to protect human life and equipment and reduce the risk of fire or explosion;
- Cut off supply to the spillage, contain spill on deck if safe to do so;
- Gain situational awareness: i.e. identify the substance, the volume, the location of the spill, where is it travelling to, and how long before it reaches any sensitivities, what is happening to it (e.g. weathering) and define the worst credible scenario; and
- Provide notification of spill to NOPSEMA and other relevant authorities such as AMSA, Department of Fisheries, Department of Transport and Department of the Environment.

For spills extending beyond the initial actions, an Incident Action Plan (IAP) will be developed at the time of a spill, appropriate to the nature, size and scale of the activity and utilising the appropriate response strategies. The pre-spill planning assessment of the applicability of each response strategy, including the Net Environmental Benefit Assessment (NEBA), will be revisited and updated if required based on the actual characteristics of the spill at hand.

The monitor and evaluate strategy will be conducted for all spills including the worst case spill scenario (200 m³ marine diesel oil spill from a vessel collision) to inform response decision making, maintain situational awareness and keep the IAP current.

The options for the monitor and evaluate strategy include:


- Satellite imagery;
- Observation from vessel;
- Modelling;

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- Metocean Data; and
- Aerial Surveillance.

Given the open ocean remote location, short duration of the activity, low likelihood of contact with emergent features, limited volumes of fuel spillage, high evaporation rates of marine diesel oil and by following the NEBA process the most effective response would be the monitor and evaluate strategy. Based on the potential impacts being limited to localised reduction in water quality and a low probability of impacting marine fauna, the monitor and evaluate strategy is deemed sufficient to manage potential spill scenarios.

The approach described above, informed by a NEBA and priorities for protection is considered practical and that will deliver a net environmental benefit. Hence the responses chosen are considered to reduce the risks for each credible spill scenario to an acceptable level and to ALARP.

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APPENDIX B: Summary of key environmental hazards and control measures to be applied to the survey activity

Hazard / Risks	Potential Environmental Impact	Controls – Mitigation Measures
Planned Activities		
Interaction / displacement of other users of the marine environment.	Potential temporary disruption of commercial fishing and shipping activity.	<p>Notice to Mariners will be issued through the Australian Maritime Safety Authority (AMSA) prior to the commencement of the activity.</p> <p>Vessels equipped with suitable navigation aids, navigational lighting and competent crew maintaining a watch for other vessels.</p> <p>A support vessel will be used to manage interactions with other users as required and to warn off any vessels attempting to transit too near the seismic vessel or streamers.</p>
Acoustic pollution from airguns and vessel movements	Physiological damage to sensitive marine fauna from seismic pulses.	<p>Location of seismic survey operations in open ocean, well away from coastal environments and fauna migration routes.</p> <p>During daylight hours the vessels will have a trained and dedicated marine mammal observer on board to undertake fauna observations.</p> <p>Detailed reports of all cetacean sightings will be recorded using the Department of the Environment Cetacean Sightings Application.</p> <p>Seismic vessel will adhere to EPBC Act Policy Statement 2.1 (Part A) as required.</p> <ul style="list-style-type: none"> • pre-start-up visual observation; • soft start; • start-up delay; • operations; and • power-down and stop work.
Discharge of deck drainage waste from the vessel	Localised and temporary acute toxic effects caused by contaminants in waste stream.	<p>Deck spills cleaned up using adsorbents (spill kits) and / or diverted to slops tanks.</p> <p>Potentially contaminated water drained to slops tanks and passed through the oil / water separator prior to discharge at <15 ppm or stored onboard for onshore disposal (<i>MARPOL 73/78 Annex 1 – Regulation for the Prevention of Pollution by Oil from Ships under the Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983</i>).</p>



Hazard / Risks	Potential Environmental Impact	Controls – Mitigation Measures
Discharge of sewage, food scraps and grey water from the vessel	Localised and temporary acute toxic effects caused by contaminants in waste stream (e.g. nutrient enrichment).	Food wastes and grey water treated in accordance with <i>MARPOL 73/78 Annex V – Regulation for the Prevention of Pollution by Garbage from Ships under the Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983</i> . Sewage treated in accordance with <i>MARPOL 73/78 Annex IV – Regulation for the Prevention of Pollution by Sewage from Ships under the Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983</i> .
Atmospheric emissions from fuel combustion and incineration on the vessel	Reduction in air quality through use of diesel fuelled machinery.	Emissions (including the use of low sulphur diesel) will be compliant with <i>MARPOL 73/78 Annex VI – Regulation for the Prevention of Air Pollution from Ships</i> , enforced under the <i>Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983</i> .



Hazard / Risks	Potential Environmental Impact	Controls – Mitigation Measures
Unplanned Impacts		
Vessel collision with marine life	Injury and / or death of a cetacean or other protected fauna.	Support vessels during transit will adhere to the requirements of the EPBC Regulations 2000 Part 8, Australian National Guidelines for Whale and Dolphin Watching (Commonwealth Government of Australia 2005): <ul style="list-style-type: none">• maintain a watch for whales during transit;• not knowingly approach within 300 m of whales or 50 m of dolphins;• if whales are observed within 300-100 m of vessel during transit, vessel will maintain or reduce speed and alter course away from the whales if safe to do so; and• if whales are observed <100 m from vessel, vessel will power down to 'no wake speed' (< 4 knots) and alter course away from the whales if safe to do so.
Introduction of Non Native Marine Species	Introduction of exotic marine species causing alteration to community composition and function, competition with indigenous species.	All vessels will comply with Commonwealth quarantine requirements including: <ul style="list-style-type: none">• Australian Ballast Water Requirements; and• Biofouling Management Protocols.
Accidental discharge of hazardous / non-hazardous wastes into the ocean	Reduction in habitat / water quality, acute / chronic toxic effect on marine organisms.	Garbage Management Plans developed to MARPOL 73/78 Annex V – Regulation for the Prevention of Pollution by Garbage from Ships and Annex II– Regulation for the Prevention of Pollution by Noxious Liquid Substances in Bulk from Ships and Annex III– Regulation for the Prevention of Pollution by Harmful Substances Carried by Sea from Ships under the Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983). Shipboard Oil Pollution Emergency Plans (SOPEP)s. Regulator accepted Oil Pollution Emergency Plan (OPEP).



Hazard / Risks	Potential Environmental Impact	Controls – Mitigation Measures
Diesel fuel spill during refuelling at sea	Potential loss of diesel or aviation fuel to the marine environment causing localised and temporary acute toxic effects and direct physical smothering of marine organisms.	At sea refuelling will occur within the areas of operations with strict adherence to refuelling procedures. Shipboard Oil Pollution Emergency Plans (SOPEPs). Regulator accepted Oil Pollution Emergency Plan (OPEP). Oil Spill Modelling Assessment for all seasons indicates surface spilt hydrocarbons from a refuelling incident have very low probability of reaching any emergent sensitivities.
Diesel spill resulting from a collision with another vessel	Potential acute/ chronic toxic effects and direct physical smothering of marine organisms and or/ contribution to Marine Debris.	A 'Notice to Mariners' advising of the presence of the survey vessel will be issued through AMSA prior to the commencement of the activity. Consultation with Fisheries authorities and other commercial mariners. Vessels routes are pre-determined and risk assessed. Vessels equipped with suitable navigation aids, navigational lighting and competent crew maintaining a watch for other vessels. Regulator accepted Oil Pollution Emergency Plan (OPEP). Oil Spill Modelling Assessment for all seasons indicates hydrocarbons from a loss of containment have very low probability of reaching environmental sensitivities.