Balnaves Operation Cessation Environment Plan Summary

Developments Division
Revision 1
August, 2016

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TABLE OF CONTENTS

List of Tables

List of Figures

1. INTRODUCTION

Woodside Energy Julimar Pty Ltd (Woodside), as Titleholder, under the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* (Cth) (referred to as the Environment Regulations), proposes to undertake riser turret mooring (RTM) and subsea infrastructure removal and subsea system preservation for the project known as Balnaves Operation Cessation (herein referred to as the Petroleum Activities Program).

This EP Summary has been prepared to meet the requirements of Regulations 11(3) and 11(4) of the Environment Regulations, as administered by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA). This document summarises the Balnaves Operation Cessation Environment Plan (the Balnaves Operation Cessation EP), accepted by NOPSEMA under Regulation 10A of the Environment Regulations.

1.1 Defining the Activity

The Petroleum Activities Program is to be undertaken in Production Licence Area WA-49-L (herein referred to as WA-49-L) and is anticipated to include:

- ongoing preservation of the Balnaves subsea systems and RTM until removal
- disconnection and removal of flushed flowlines from manifold and installation of pressure caps on the well heads
- disconnection and recovery of flushed spools from well heads and removal of manifold and supporting infrastructure
- disconnection and removal of flushed risers and electro-hydraulic umbilical (EHU)
- disconnection and removal of the RTM and associated mooring chains (and potentially the RTM anchors)
- ongoing preservation of the Balnaves subsea wells, until the wells are plugged and abandoned.

Well plug and abandonment and final decommissioning will be the subject of a separate EP.

1.2 Environmental Protection and Biodiversity Conservation Act

The Balnaves Development was referred under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act (Cth)) to the Department of the Environment (DoE) (formerly the Department of Sustainability, Environment, Water, Population and Communities) on 25 November 2011. On 10 April 2012, the action received a particular manner decision – i.e. approval to develop, subject to conditions, the offshore Balnaves condensate field within the Northern Carnarvon Basin of the North West Shelf (NWS) (EPBC 2011/6188).

Woodside is committed to undertake the Petroleum Activities Program in accordance with all applicable conditions specified in the EPBC Act (Cth) approval. **Table 1-1** lists the measures required to avoid significant impacts on Matters of National Environmental Significance (MNES), and where requirements are addressed in this EP summary.

Table 1-1 EPBC 2011/6188: Manners in which the proposed action must be taken

Item	Manner in which the proposed action must be taken	EP Summary Section
1	The Environment Plan (inclusive of the Oil Spill Contingency Plan) as described in the referral must be accepted by the National Offshore Petroleum Safety and Environmental Management Authority prior to the proposed action commencing.	Appendix B
2	The Well Operations Management Plan as described in the referral must be accepted by the National Offshore Petroleum Safety and Environmental Management Authority prior to the proposed action commencing.	Appendix A

3	The accepted Environment Plan (inclusive of the Oil Spill Contingency Plan) and the accepted Well operations Management Plan as described in components 1 and 2 must be implemented.	Appendix A Appendix B
4	The following measures must be adhered to and included in an accepted Environment Plan (inclusive of the Oil Spill Contingency Plan):	Appendix A
a.	All infrastructure and materials above the seabed from the Balnaves facility will be removed	
b.	All vessels must not be refuelled within 12 nautical miles of the North and South Muiron Islands, Montebello Islands, Lowendal Islands, and Barrow Island (as defined by the lowest astronomical tide), unless refuelling is to occur in a port or harbour	
c.	Refuelling of all vessels associated with the action must take place between sunrise and sunset, unless otherwise specified in the Environment Plan	

2. LOCATION OF THE ACTIVITY

The Balnaves field is located within Production Licence WA-49-L in the Northern Carnarvon Basin, in Commonwealth waters off the north-west coast of Western Australia (WA). It is located 75 km north-west of Varanus Island and approximately 48 km north-west of the Montebello Islands (**Figure 2-1**), in water approximately 135 m deep. Locations of the Balnaves Development's major infrastructure components are given in **Table 2-1**.

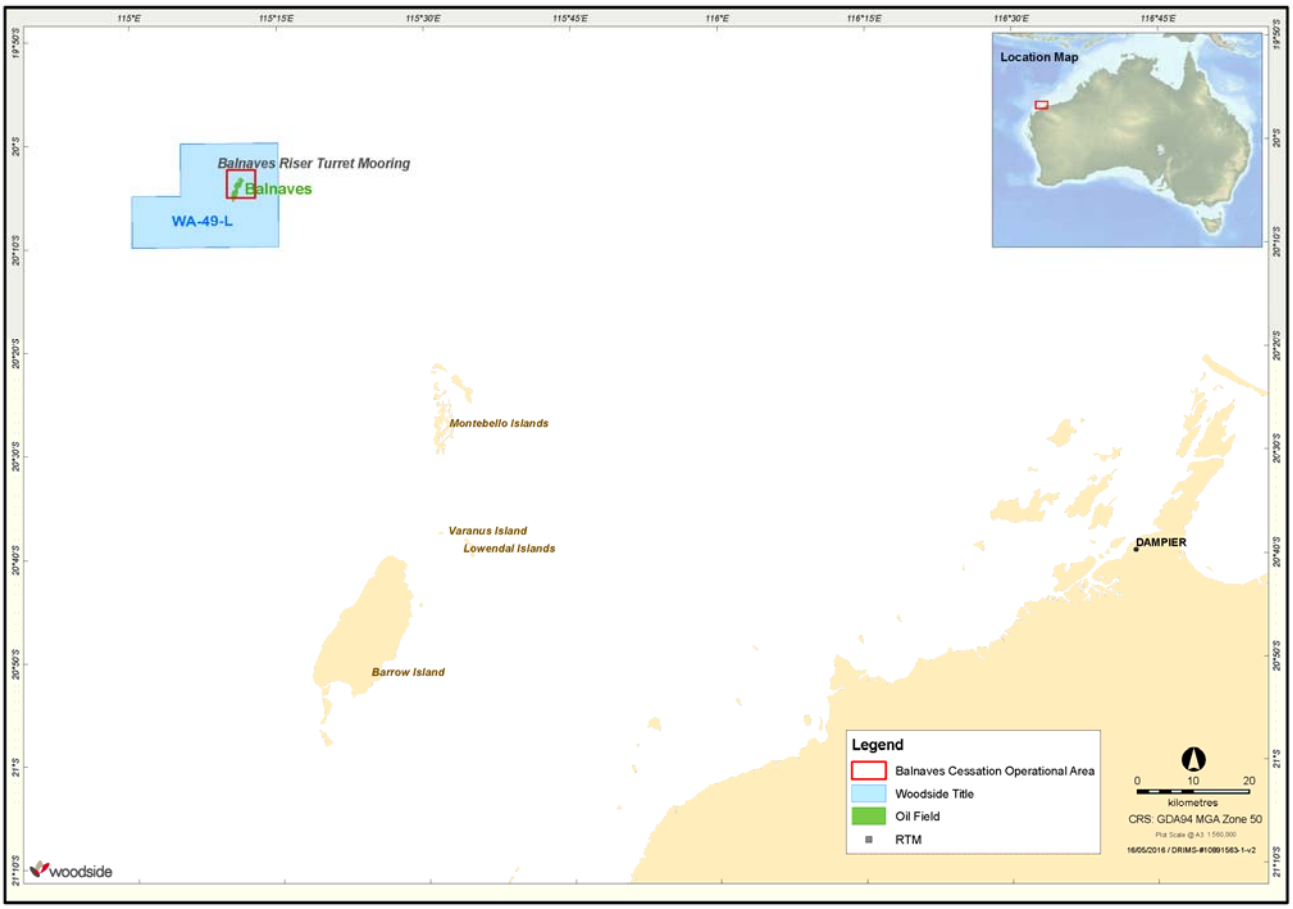

Figure 2-1: Location of Petroleum Activities Program

Table 2-1: Locations details for the Petroleum Activities Program

Infrastructure locations	Coordinates (Datum/Projection: GDA 94 Zone 50)			
	Latitude (South)	Longitude (East)	Easting (m)	Northing (m)
RTM position	-20^0 03' 31.302''	115^0 11' 31.069''	310916.00	7781000.00
Anchor leg 1	-20^0 03' 07.594''	115^0 11' 40. 561''	311183.92	7781732.02
Anchor leg 2	-20^0 03' 12.131''	115^0 11' 48.484''	311415.64	7781594.97
Anchor leg 3	-20^0 03' 51.003''	115^0 11' 48.134''	311418.38	7780399.53
Anchor leg 4	-20^0 03' 55.054''	115^0 11' 40.016''	311183.87	7780272.41
Anchor leg 5	-20^0 03' 34.704''	115^0 11' 03.942''	310128.88	7780886.83
Anchor leg 6	-20^0 03' 25.697''	115^0 11' 04.085''	310131.01	7781163.85
Production 1 well (BAL-6H)	-20^0 04' 12.639''	115^0 11' 00.641''	310044.87.	7779719.24
Production 2 well (BAL-5H)	-20^0 04' 14.438''	115^0 11' 00.267''	310035.38	7779663.79
Gas injection well (BAL-8GI)	-20^0 04' 14.007''	115^0 11' 01.756''	310078.52	7779677.53
Water injection well (BAL-7WI)	-20^0 04' 12.867''	115^0 11' 01.552''	310072.21	7779712.51
Balnaves manifold	-20^0 04' 13.624''	115^0 11' 00.813''	310051.00	7779689.00

The Operational Area defines the spatial boundary of the Petroleum Activities Program, as described, risk assessed and managed by this EP, including vessel related petroleum activities within the Operational Area. Vessels supporting the petroleum activities operating outside the Operational Area (e.g. transiting to and from port) are subject to all applicable maritime regulations and other requirements and are not managed by this EP.

The Operational Area is defined as a 5 km by 5 km area (25 km^2 area in total) centred on the RTM location (**Figure 2-1**).

3. DESCRIPTION OF THE ACTIVITY

3.1 Overview

Balnaves operation cessation is anticipated to involve the following activities:

- preservation of the Balnaves subsea systems and RTM until removal
- disconnection and removal of flushed flowlines from manifold and installation of pressure caps on the well heads
- disconnection and recovery of flushed spools from well heads and removal of manifold and supporting infrastructure
- disconnection and removal of flushed risers and EHU
- disconnection and removal of the RTM and associated mooring chains (and potentially the RTM anchors)
- ongoing preservation of the Balnaves subsea wells, until the wells are plugged and abandoned.

The removal of subsea infrastructure, as outlined above, is in line with conditions set by the Minister for the Environment under the Environmental Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC 2011/6188) (Section 1.2).

Well plug and abandonment and final decommissioning will be covered under a separate EP.

3.2 Timing of the Activities

A subsea system and RTM preservation period commenced following completion of flushing and floating production, storage and offtake vessel (FPSO) disconnection activities (completed under separate EP), and will continue under this EP until the RTM and subsea infrastructure are removed. Ongoing preservation of the subsea wells will then continue until the wells are plugged and abandoned. The work plan for plugging and abandonment of the wells is yet to be determined. As such, the scope of this EP includes the maintenance of a preservation period for the subsea wells of up to the remainder of five years from the acceptance date of this EP.

Removal of the RTM (and potentially the RTM anchors) and subsea field infrastructure is anticipated to take up to 90 days (in field) to complete.

This EP has assessed risks relevant to the Petroleum Activities Program throughout the year (all seasons), to provide operational flexibility in the event of project schedule changes. Plug and abandonment of wells and final decommissioning will be the subject of a separate EP.

3.3 Preservation of Subsea Infrastructure

Prior to FPSO disconnect and sail away, the subsea production system (risers, flowlines and manifold) was de-pressurised, flushed and filled with treated seawater and isolated. Note that the EHU has not been flushed.

The treated seawater consists primarily of filtered sea water, with minor quantities of oxygen scavenger, methanol, scale inhibitor and transaqua subsea control fluid. The total volume of subsea infrastructure filled with treated seawater is approximately 220 m^3. Based on the oil in water (OIW) sampling results less than 10 litres of oil remains in the flushed subsea infrastructure. All chemicals in the treated seawater were selected subject to Woodside's chemical selection process.

Following disconnection of the subsea infrastructure, well head xmas trees will be filled with seawater treated with biocide sticks, pressure capped and tested for integrity. The xmas trees will have pressure retaining cap installed and will be left for future plugging and abandonment (not within the scope of the Balnaves Operation Cessation EP).

3.4 Disconnection of Subsea Infrastructure

Disconnection of Flowlines, Spools and Jumpers

Subsea system isolations will be verified by the remotely operated vehicle (ROV) prior to commencing intrusive scope (i.e. opening up the system) to disconnect the two production flowlines, one gas injection flowline and associated spools and jumpers from the manifold. The water injection flowline will be disconnected from the Balnaves water injection tree. All work will be conducted subsea via ROV. As all flowlines, spools, jumpers and the manifold are expected to be removed and contents discharged during retrieval to the PIV, this infrastructure will not be capped after disconnection. Therefore, the inventory of treated seawater along with any residual hydrocarbon will be lost to the marine environment.

Disconnection of Risers, EHU and Electric Flying Leads

All risers (two production, one gas injection, one water injection, one EHU riser) will be disconnected from the RTM and the individual buoyancy elements removed. Typically, this will be via riser recovery to the Primary Installation Vessels (PIV) for buoyancy removal. ROV operations will release the seabed riser tether and RTM mounted bend stiffener connector as required to allow recovery. As all risers and umbilicals are expected to be removed and contents discharged during retrieval to the PIV, risers and umbilicals will not be capped after disconnection. The EHU can only be disconnected from the RTM by cutting. The manifold end of the EHU is attached to a termination unit that caps the EHU with poppet valves that will prevent fluid loss from this end of the EHU. Consequently, a volume of the EHU contents may be lost when it is cut and laid down on the seafloor and again when the EHU is recovered (from the cut/open end first). A conservative approach has been taken which assumes that the full contents of the EHU may be lost to the marine environment. Therefore, the inventory of the EHU that may be released consists of subsea control fluid (transaqua fluid) (1300 L), scale inhibitor (800 L), and methanal (900 L).

Electric flying leads (EFLs) may be cut at the xmas tree utilising ROV. The disconnection of EFLs is expected to result in the release of minor quantities (approximately 15 L in total) of DC200 silicone oil.

Mooring System Release

Following disconnection of all risers, a towing bridle rigging will be installed on to the RTM. It is anticipated that tow tugs will be used to hold the RTM in position while the PIV individually disconnects the six mooring chains from the RTM. Each chain is lowered to the seabed into predetermined lay corridors, cut at the seabed utilising ROV and then recovered to the PIV.

3.5 Removal of RTM (and Potentially RTM Anchors) from the Operational Area

After mooring disconnect and re-ballasting is complete, the RTM will be towed out of the Operational Area. Once outside the Operational Area, the towing of the RTM is subject to all applicable maritime regulations and other requirements and is not managed by this EP. When preparing the RTM for towing, the RTM will be manoeuvred into a horizontal position and the contents of the central column is expected to be discharged to the marine environment. The central column was filled with approximately 23 m^3 (23,000 L) of treated seawater, containing approximately 10 L of biocide at a concentration of 400 ppm and approximately 5 L of oxygen scavenger at a concentration of 200 ppm, when it was installed approximately three years ago.

Following disconnection of the subsea infrastructure and removal of the RTM, the anchors may be removed from the Operational Area, or they may be left in situ. If retained in situ, the RTM anchors will remain buried, approximately six metres below the surface of the seabed. If anchors are to be removed, this would be completed with the use of tow tugs and/or heavy lift vessel.

3.6 Removal of Subsea Infrastructure

Following disconnection of the subsea infrastructure and removal of the RTM, all subsea infrastructure (excepting well xmas trees) will be removed.

The removal of risers, flowlines and EHU would involve the recovery to a reel on the PIV. Spools, jumpers, manifolds and subsea structures will also be recovered utilising a PIV.

Removal of subsea infrastructure may result in the discharge of small quantities of produced sand and scale at the seabed. Radiological testing indicates that the radioactivity of the produced sand is below the levels at which it would be considered naturally occurring radioactive material (NORM). Given the routine treatment of the subsea infrastructure and the flushing prior to the disconnection of the FPSO, the quantity of produced sand and scale within the subsea infrastructure is expected to be small.

3.7 Preservation period

A subsea system and RTM preservation period commenced following completion of flushing and FPSO disconnection activities, and will extend until the RTM and subsea infrastructure are removed. Ongoing preservation of subsea wells will continue until the wells are plugged and abandoned. The work plan for plugging and abandonment of the wells is yet to be determined. As such, the scope of this EP includes the maintenance of a preservation period for the subsea wells of up to the remainder of five years from the acceptance date of this EP.

Plug and abandonment of wells and final decommissioning in WA-49-L will be the subject of a separate EP.

3.7.1 Subsea Inspections and Interventions

During the subsea preservation period, intervention on the subsea infrastructure is not intended, however this EP allows for these activities to occur should they be required. Activities that may be required include inspection, maintenance and repair (IMR) activities such as ROV cycling of valves, hotstab interventions, isolation/pressure testing, visual inspections and if required the removal of tree caps and corrosion protection. Preparation for final field de-commissioning may include sediment or seabed sampling (grabs/cores typically 0.1m^2 of seabed per sample), water sampling or removal of some sections of the remaining subsea infrastructure for analysis and testing. These activities may

require marine growth removal from subsea infrastructure by one or more of the following methods; water jetting, mechanical brushing, sandblasting, dredging, chemical cleaning.

IMR activities will occur as part of the removal of the RTM and subsea infrastructure. Post removal of the RTM and subsea infrastructure no IMR activities are planned, however some IMR activities may occur to ensure integrity of the remaining infrastructure.

3.8 Project vessels

The RTM removal scope will require the use of an appropriate PIV, at least two tow tugs and support vessels. A heavy lift vessel may also be required for removal of risers, flowlines and EHU. A PIV is yet to be assigned, however, the vessel is likely to have similar specifications to the Deep Pioneer.

Diesel Bunkering

Bunkering of marine diesel between support vessels and the PIV may occur within the Operational Area during daylight hours. Offshore diesel bunkering activities are not planned for IMR vessels that can steam back to Dampier port to refuel (where refuelling of all project vessels can occur at all times of the day as per port authority's procedures). All bunkering operations will be conducted in line with conditions set by the Minister for the Environment under the EPBC Act (Cth) (EPBC 2011/6188).

3.9 Assessment of Chemicals that may be released during the Petroleum Activities Program

All chemicals that may be released or discharged to the marine environment during the Petroleum Activities Program are assessed as per Woodside Chemical Assessment Environment Guideline. This procedure is used to demonstrate that the potential impacts of the chemicals that may be released are acceptable and ALARP and consistent with the Woodside Environmental Performance Standards – Operating Standard.

4. DESCRIPTION OF THE RECEIVING ENVIRONMENT

In determining the spatial extent of the environmental sensitivities that may be affected, Woodside considered both the Operational Area (for planned and unplanned activities), as well as the credible zone of consequence (ZoC) of the credible worse-case hydrocarbon spill scenarios.

4.1 Physical

The Operational Area is located in Commonwealth waters within the North West Shelf (NWS) Province, in water depths of approximately 110 m - 160 m. The NWS Province is part of the wider North West Marine Region (NWMR) as defined under the Integrated Marine and Coastal Regionalisation of Australia (IMCRA v4.0). The NWS Province encompasses the continental shelf between North West Cape and Cape Bougainville and varies in width from approximately 50 km at Exmouth Gulf to greater than 250 km off Cape Leveque and includes water depths of 0–200 m.

The NWMR experiences a tropical monsoon climate, with distinct wet (October to April) and dry (May to September) seasons. Rainfall in the NWMR typically occurs during the wet season (summer), with highest falls observed during late summer, often associated with the passage of tropical low pressure systems and cyclones. Rainfall outside this period is typically low. There are often distinct transition periods between the summer and winter regimes, which are characterised by periods of relatively low winds.

Winds vary seasonally, with a tendency for winds from the south-west quadrant during summer and the south-east quadrant in winter. The summer south-westerly winds are driven by high pressure cells that pass from west to east over the Australian continent. During winter months, the relative position of the high pressure cells moves further north, leading to prevailing south-easterly winds blowing from the mainland. Winds typically weaken and are more variable during the transitional period between the summer and winter regimes, generally between April and August.

Water circulation in the NWS Province and Operational Area is primarily influenced by the Indonesian Throughflow (ITF) and the Leeuwin Current. The ITF and Leeuwin Current are strongest during later summer and winter, respectively. Flow reversals to the north-east associated with strong south-

westerly winds are typically weak and short lived but can generate upwelling of cold deep water onto the shelf. Tides in the NWS Province are semi-diurnal and have a pronounced spring-neap cycle, with tidal currents flooding towards the south-east and ebbing towards the north-west.

The seabed is relatively flat and featureless within the Operational Area, sloping gently and uniformly downward in a north-west direction away from the coast with an average gradient of 0.6°. Surveys found the seabed was composed of predominantly clayey, sandy silts with the clay component gradually increasing towards the west. Drilling cuttings around previous drill locations were noted. The seabed was reported to be uniformly flat with some features, such as depressions and anchor scars, related to previous drilling activities. No debris items were identified.

4.2 Biological

Habitats and Communities

No Critical Habitats or Threatened Ecological Communities as listed under the EPBC Act (Cth) are known to occur within the Operational Area.

Marine Primary Producers

Sea floor communities in deeper shelf waters receive insufficient light to sustain ecologically sensitive primary producers such as seagrasses, macroalgae or reef-building corals. Given the depth of water at the Operational Area (approximately 110 m – 160 m), these benthic primary producer groups will not occur in the Operational Area.

No coral reefs were identified within or adjacent to the Operational Area, as the depth of the Operational Area (110 m – 160 m) is likely to restrict light penetration to below that required for photosynthesis. The only coral reef habitat known to occur within the ZoC is located at Rankin Bank, approximately 43 km away.

Macroalgae and seagrass beds were not identified in the Operational Area and are unlikely to occur in the Operational Area, given the water depth (110 m -160 m) and resulting limited light availability. Within the ZoC, Rankin Bank is the only identified location containing macroalgae. The nearest seagrass habitat is located outside of the ZoC, approximately 48 km south-east of the Operational Area at the Montebello/Barrow/Lowendal Islands Group.

Other Benthic Communities

Benthic infauna have been surveyed at the Operational Area. The two most common taxa were polychaete worms and crustaceans. The infauna assemblages of the Operational Area appear to be homogeneous and reflective of the wider NWMR, likely due to the homogeneity and connectivity of the fine sediment habitats. The infauna are therefore considered to be of low conservation significance given their widespread distribution. Epifauna was identified in the Operational Area, although coverage was less than 5% of the area surveyed. The low cover of epifauna is likely due to the lack of hard substrate in the area that support epifauna assemblages. Within the ZoC, filter feeders make up minor components of the benthic communities at Rankin Bank (approximately 43 km away), approximately 3% of the benthic cover, with sponges among the most abundant filter feeders.

Pelagic and demersal fish populations

Fish species in the NWMR (including the Operational Area and the ZoC) comprise small and large pelagic fish, as well as demersal species. Small pelagic fish inhabit a range of marine habitats, including inshore and continental shelf waters. Large pelagic fish in the NWMR include commercially targeted species such as mackerel, wahoo, tuna, swordfish and marlin. Large pelagic fish are typically widespread, found mainly in offshore waters (occasionally on the shelf) and often travel extensively.

Also within the ZoC, the Montebello CMR and Rankin Bank (5 km south-east and 43 km north-east from the Operational Area, respectively) are the closest areas identified as supporting high demersal fish richness and abundance despite their isolated locations.

Species

The EPBC Act (Cth) Protected Matters Search Tool has been used to identify listed species that may occur within and adjacent to the Operational Area . A total of 58 EPBC Act (Cth) listed marine species

were identified as potentially occurring within the Operational Area. Of those listed, 15 are considered threatened marine species and 24 are considered as migratory species under the EPBC Act (Cth).

Cetaceans

Pygmy blue whales (*Balaenoptera musculus brevicauda*) may occur in the Operational Area, however, individuals generally transit the deeper offshore waters to the west of the Operational Area during their northern and southern migrations. There are no known key aggregation areas (resting, breeding or feeding) located within or immediately adjacent to the Operational Area. However, given the location of the Operational Area in proximity to the pygmy blue whale migration route and BIA, there is potential for individuals to transit the Operational Area during their northbound and southbound migration.

Humpback whales (*Megaptera novaeangliae*) may transit within the Operational Area between June and October, during both their northern and southern migrations. The Operational Area is not located in or adjacent to any known critical habitat areas for this protected migratory whale species (e.g. feeding, breeding or calving). Observed whales are most likely to be transiting between the known aggregation areas distant from the ZoC, including Camden Sound and Exmouth Gulf, rather than feeding, resting or breeding.

Reptiles

Five of the six marine turtle species recorded for the NWMR have the potential to occur within the Operational Area; the loggerhead turtle (*Caretta caretta*), green turtle (*Chelonia mydas*), leatherback turtle (*Dermochelys coriacea*), hawksbill turtle (*Eretmochelys imbricata*) and the flatback turtle (*Natator depressus*).

There is no emergent habitat within the Operational Area, and therefore, nesting aggregations of marine turtles would not be expected. A flatback turtle internesting BIA extends for 80 km from the nesting beaches on the northern end of the Montebello Islands and overlaps with the Operational Area and the ZoC. Within the ZoC, it is also possible that marine turtles forage at Rankin Bank, the nearest submerged shoal (43 km from Operational Area) which contains biota that turtles feed on (e.g. sponges and macroalgae).

Seasnakes occur throughout the NWMR, including at Rankin Bank, in waters up to approximately 100 m deep, and are reported to occur in offshore and nearshore waters. Seasnakes of the families *Hydrophidae* and *Laticaudidae* are widespread in the ZoC and are protected under the EPBC Act (Cth). The short-nosed seasnake (*Aipysurus apraefrontalis*), listed as critically endangered, is found in the area and is endemic to WA. This species prefers the reef flats or shallow waters along the outer reef edge in water depths to 10 m. The most commonly sighted seasnake in the NWMR is the olive seasnake (*Aipysurus laevis*), which is generally found along lower reef edges and upper lagoon slopes of leeward reefs. The olive seasnake is associated with shallow water, as large, deep water expanses create a significant barrier to movement. It is considered that seasnake sightings will be infrequent and likely comprise few individuals within the Operational Area.

Fishes

Anecdotal evidence from sightings data collected from the Woodside offshore facilities indicate whale sharks are present in the NWMR in the months of April, July, August, September and October, corresponding with the whale shark's seasonal migration to and from the Ningaloo Reef. However the numbers of individual whale sharks that transit through the Operational Area is expected to be low based on the number of whale sharks aggregating at Ningaloo and on the different migration paths that the sharks may follow. In the wider region, whale sharks aggregate annually to feed in the waters around Ningaloo Reef (which lies outside the ZoC), from March to July with the largest numbers recorded in April and May. However, seasonal aggregation can be variable, with individual whale sharks recorded at other times of the year.

Eight other shark/ray species, including the grey nurse shark (*Carcharius taurus*), great white shark (*Carcharodon carcharias*), dwarf sawfish (*Pristis clavata*), green sawfish (*Pristis zijsron*), shortfin mako (*Isurus oxyrinchus*), longfin mako (*Isurus paucus*), reef manta ray (*Manta alfredii*) and giant manta ray (*Manta birostris*) may be present within the Operational Area, for short durations when individuals transit the area.

Birds

The Operational Area may be occasionally visited by migratory and oceanic birds but does not contain any emergent land that could be utilised as roosting or nesting habitat and contains no known critical habitats (including feeding) for any species.

Three species of listed birds were identified by the EPBC Act (Cth) Protected Matters Search for the Operational Area, including the southern giant petrel (*Macronectes giganteus*) listed as Endangered and Migratory, the Australian fairy tern (*Sternula neries nereis*) listed as Vulnerable and the osprey (*Pandion haliaetus*) listed as migratory. No critical habitat associated with these species has been identified for the Operational Area, and therefore the presence of these species within the operational area is likely to be infrequent as individuals traverse the area.

The ZoC does not extend to key breeding/nesting areas, roosting areas which are important habitats for seabirds and migratory shorebirds. A number of islands closer to the mainland including the Montebello/Barrow/Lowendal Islands Group (approximately 48 km from the Operational Area and outside the ZoC) are important seabird and shorebird nesting and foraging habitats, including Australian fairy tern, however, these islands are beyond the ZoC.

4.3 Socio-Economic and Cultural

There are no known sites of Indigenous or European cultural heritage significance within the vicinity of the Operational Area; there are no known historic shipwrecks within or immediately adjacent to the Operational Area or the ZoC. There are no heritage listed sites within or immediately adjacent to the Operational Area or within the ZoC. The nearest National Heritage or Commonwealth Heritage listed place is the Dampier Archipelago, approximately 140 km from the Operational Area.

A number of Commonwealth and State fisheries are located within, adjacent to, or in the region of the Operational Area. Commonwealth fisheries include the Western Tuna and Billfish Fishery, Southern Bluefin Fishery, Western Skipjack Fishery and the North West Slope Trawl Fishery. State fisheries include the West Australian Mackerel Fishery, Beche de Mer Fishery, Marine Aquarium Managed Fishery, Specimen Shell Managed Fishery, Pilbara Demersal Scalefish Fisheries (Pilbara Trawl, Trap and Line) and the Onslow Prawn Managed Fishery. There are no aquaculture activities within or adjacent to the Operational Area.

There are no traditional, or customary, fisheries within the Operational Area, as these are typically restricted to shallow coastal waters and/or areas with structure such as reef.

No tourism activities take place specifically within the Operational Area, however, it is acknowledged that there are growing tourism and recreational sectors in Western Australia and these sectors have expanded in area. Due to water depths and distance offshore, recreational fishing is unlikely to occur in the Operational Area. Occasional recreational fishing occurs within the ZoC at Rankin Bank.

The NWMR supports significant commercial shipping activity, the majority of which is associated with the mining and oil and gas industries. The Australian Maritime Safety Authority (AMSA) has introduced a network of marine fairways across the NWMR of WA to reduce the risk of vessel collisions with offshore infrastructure. The fairways are not mandatory but AMSA strongly recommends commercial vessels remain within the fairway when transiting the region. It is noted that none of these fairways intersect with the Operational Area. Additional shipping routes are located within the wider region and it is expected that local vessel traffic will pass through the area. Major shipping routes in the area are associated with entry to the ports of Dampier and Barrow Island. Shipping activities in the region include:

- international bulk freighters/tankers arriving and departing from Dampier including mineral ore, hydrocarbons (LNG, liquefied petroleum gas, condensate) and salt carriers
- domestic support/supply vessels servicing offshore facilities and Barrow Island development
- construction vessels/barges/dredges
- offshore survey vessels.

The Operational Area is located within an area of established oil and gas operations in the broader NWMR. The Operational Area is approximately 2 to 3 km south of the Brunello gas field and approximately 13 km north-east of the Julimar gas field. The Operational Area for the activity is located

approximately 18 km north-east of the gas pipeline from the Wheatstone offshore facilities to the LNG plant at Ashburton on the mainland.

There are designated defence practice areas in the offshore marine waters off Ningaloo and the North West Cape. The Operational Area is within the northern tip of one of the defence practice areas. The Royal Australian Air Force base is located at Learmonth on the North West Cape approximately 214 km from the Operational Area.

4.4 Values and Sensitivities

The offshore environment of the NWMR contains environmental assets (such as habitat and species) of high value or sensitivity including Continental slope demersal fish communities, the Montebello Commonwealth Marine Reserve and Commonwealth offshore waters (**Figure 4-1** and

Table 4-1). Additionally, high value environmental assets within the wider regional context but outside the ZoC include coastal waters and habitats such as the Montebello/Barrow/Lowendal Island Group and the associated resident, temporary or migratory marine life including EPBC Act (Cth) species such as marine mammals, turtles and birds.

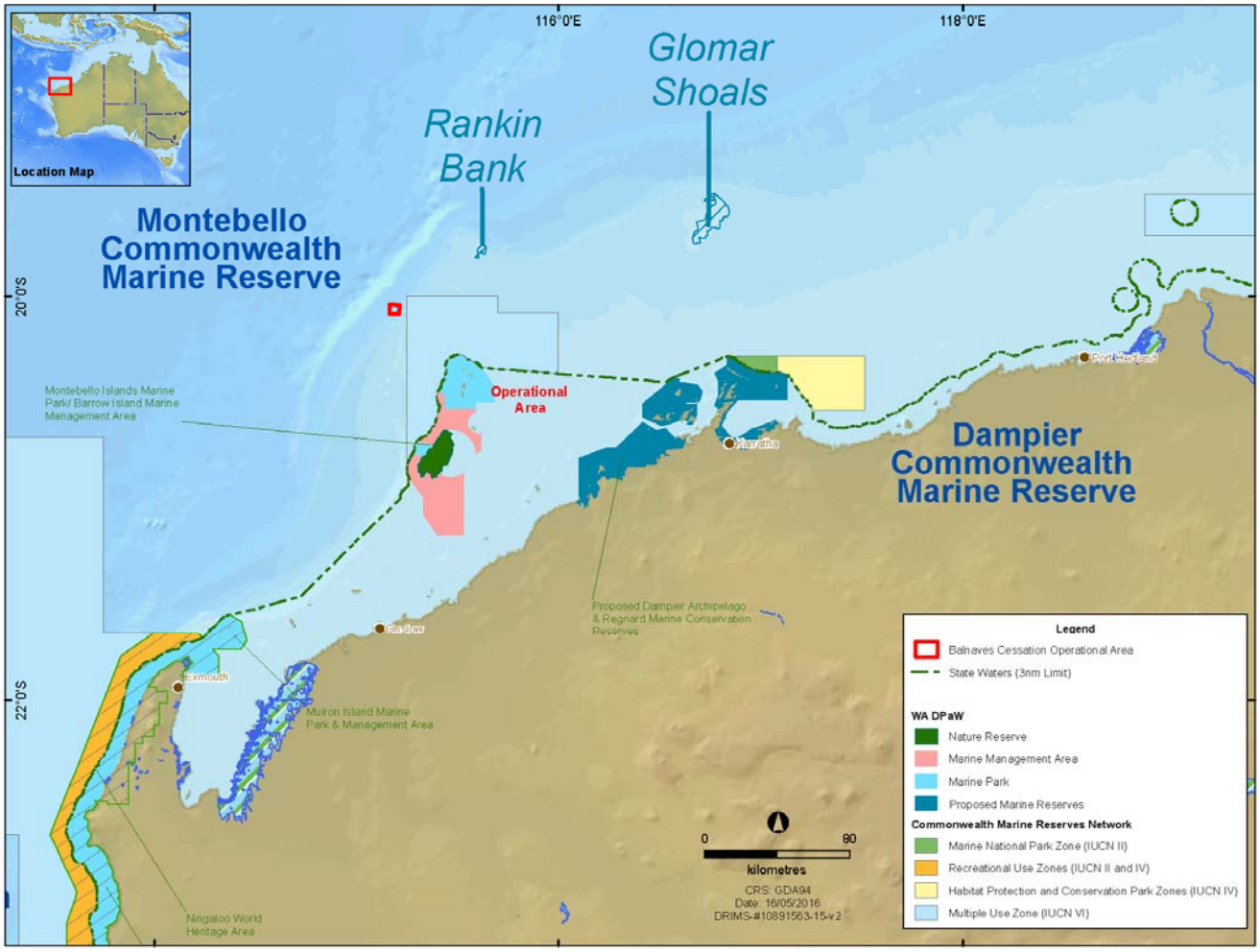

Figure 4-1: Established and proposed Commonwealth and State Marine Protected Areas in relation to the Operational Area

Table 4-1: Summary of Established and Proposed Marine Protected Areas (MPAs) and other sensitive locations relating to the ZoC

	Closest Point from Operational Area over water (km)	Within the ZoC	IUCN Protected Area Category
Commonwealth Marine Reserves (CMR)			
Montebello Commonwealth Marine Reserve	5	Yes	VI – Multiple Use Zone
State Marine Parks and Nature Reserves			
Montebello Islands Marine Park/Barrow Island Marine Park/Barrow Island Marine Management Area	43	No	Ia – Sanctuary Zone
Lowendal Islands Nature Reserve	67	No	Ia – Sanctuary Zone
Barrow Island Nature Reserve (including the Boodie, Double, and Middle Islands Nature Reserve)	67	No	Ia – Sanctuary Zone
Other			
Ancient Coastline at 125 m depth contour (KEF)	Within Operational Area	Yes	N/A
Continental Slope Demersal Fish Communities (KEF)	4	Yes	N/A
Rankin Bank	43	Yes	N/A

5. ENVIRONMENTAL IMPACTS AND RISKS

5.1 Risk Identification and Evaluation

Woodside undertook an environmental risk assessment to identify the potential environmental impacts and risks associated with the Petroleum Activities Program, and the control measures to manage the identified environmental impacts and risks to as low as reasonably practicable (ALARP) and an acceptable level. This risk assessment and evaluation was undertaken using Woodside's Risk Management Framework.

The key steps of Woodside's Risk Management Framework are shown in Figure 5-1. A summary of each step and how it is applied to the Petroleum Activities Program is provided below.

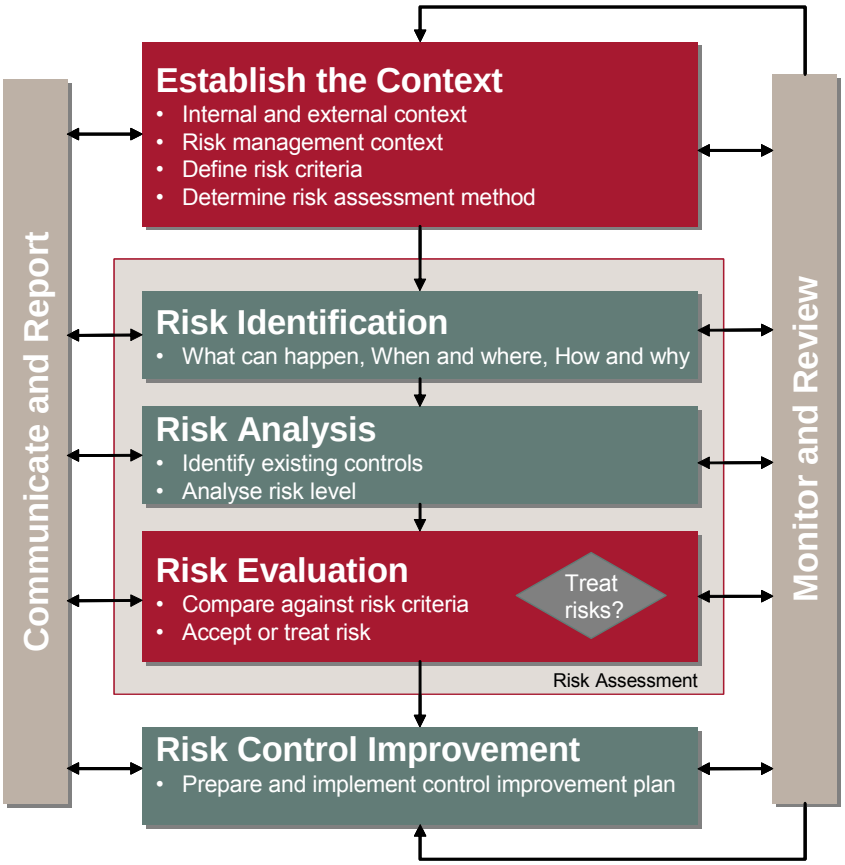

Figure 5-1: Key steps in Woodside's risk management framework

Establish the Context

The objective of a risk assessment is to assess identified risks and apply appropriate control measures to eliminate, control or mitigate the risk to ALARP and to determine if the risk is acceptable.

Hazard identification workshops aligned with NOPSEMA's Hazard Identification Guidance Note (N-04300-GN0107) were undertaken by multidisciplinary teams made up of relevant personnel with sufficient breadth of knowledge, training and experience to reasonably assure that risks and associated impacts were identified and assessed.

Risk Identification

The risk assessment workshop for the Petroleum Activities Program was used to identify risks with the potential to harm the environment. Risks were identified for both planned (routine and non-routine) and unplanned (accidents/incidents) activities.

Risk Analysis (Decision Support Framework)

Risk analysis further develops the understanding of a risk by defining the impacts and assessing the appropriate controls. Risk analysis for the Petroleum Activities Program considered previous risk assessments, review of relevant studies, review of past performance, external stakeholder consultation feedback and review of the existing environment.

To support the risk assessment process, Woodside applied the *United Kingdom Offshore Operators Association (1999) Industry Guidelines on a Framework for Risk Related Decision Support* during the workshops to determine the level of supporting evidence that may be required to draw sound conclusions regarding risk level and whether the risk is acceptable and ALARP.

This is to ensure:

- activities do not pose an unacceptable environmental risk

- appropriate focus is placed on activities where the risk is anticipated to be tolerable and demonstrated to be ALARP
- appropriate effort is applied to the management of risks based on the uncertainty of the risk, the complexity and risk rating.

Identification of control measures

Woodside applies a hierarchy of control measures when considering Good Practice and Professional Judgement. The hierarchy of control is applied in order of importance as follows; elimination, substitution, engineering control measures, administrative control measures and mitigation of consequences/impacts.

Risk rating process

The risk rating process is undertaken to assign a level of risk to each impact measured in terms of consequence and likelihood. The assigned risk level is the residual risk (i.e. risk with controls in place) and is therefore undertaken following the identification of the decision type and appropriate control measures.

The Consequence Level is selected by determining the worse-case credible outcomes associated with the selected event assuming some controls (prevention and mitigation) have failed (**Table 5-1**). Where more than one impact applies, the consequence level for the highest severity impact is selected. The Likelihood Level is selected by determining the description that best fits the chance of the selected consequence actually occurring, assuming reasonable effectiveness of the prevention and mitigation controls (**Table 5-2**). The consequence and likelihood levels are then used to determine the risk rating in accordance with Woodside's Operational Risk Table (**Table 5-3**).

Table 5-1: Summary of Woodside operational risk tables (consequences)

Consequence Level	Environment
A	Permanent impact. Impact on highly values ecosystems, species or habitat.
B	Serious long-term (>10 years) impact. Impact on highly valued ecosystems, species or habitat.
C	Major long-term (5-10 years) impact. Impact on ecosystems, species or habitat.
D	Moderate medium-term (2-5 years) impact but not affecting ecosystem function.
E	Minor short-term (1-2 years) impact but not affecting ecosystem function.
F	Slight and temporary (<1 year) localised effect to ecosystem, species or habitat.

Table 5-2: Summary of Woodside operational risk tables (likelihood)

Likelihood Level	Frequency	Probability	Experience
0	Once every 10,000 – 100,000 years at location.	1 in 100,000 – 1,000,000	Remote: unheard of in the industry.
1	Once every 1,000 – 10,000 years at location.	1 in 10,000 – 100,000	Highly Unlikely: Has occurred once or twice in the industry.
2	Once every 100 – 1,000 years at location.	1 in 1,000 – 10,000	Unlikely: Has occurred many times in the industry, but not in Woodside.
3	Once every 10 – 100 years at location.	1 in 100 – 1,000	Possible: Has occurred once or twice in Woodside
4	Once every 1 – 10 years at location.	1 in 10 – 100	Likely: Has occurred frequently in Woodside.
5	More than once a year at location or continuously.	>1 in 10	Highly Likely: Has occurred frequently at the location.

Table 5-3: Residual risk matrix

		Likelihood					
		0	1	2	3	4	5
Consequence	A	High	High	Severe	Severe	Severe	Severe
	B	Medium	High	High	Severe	Severe	Severe
	C	Medium	Medium	High	High	Severe	Severe
	D	Low	Medium	Medium	High	High	Severe
	E	Low	Low	Medium	Medium	High	High
	F	Low	Low	Low	Medium	Medium	High

The Environmental Hazard Identification (ENVID) for the Petroleum Activities Program identified 16 sources of environmental risk. These risks are divided into two broad categories: planned (routine and non-routine); and unplanned (accidents/incidents) activities. The 16 sources of environmental risk comprised nine planned and seven unplanned sources of risk. Details of environmental risks, impacts and control measures have been presented in **Appendix A**.

Risk evaluation

Environmental risks, as opposed to safety risks, cover a wider range of issues, differing species, persistence, reversibility, resilience, cumulative effects and variability in severity. The degree of environmental risk and the corresponding threshold for whether a risk/impact has been reduced to ALARP and is acceptable has been adapted to include principles of ecological sustainability (given as an objective in the Environment Regulations and defined in the EPBC Act (Cth)), the Precautionary Principle and the corresponding environmental risk threshold decision-making principles are used to determine acceptability.

Demonstration of ALARP

In accordance with Regulation 10A(b) of the Environment Regulations, Woodside demonstrates risks are reduced to ALARP where:

The residual risk is low:

- Good industry practice or comparable standards have been applied to control the risk, because any further effort towards risk reduction is not reasonably practicable without sacrifices grossly disproportionate to the benefit gained.

The residual risk is medium or high:

- Good industry practice is applied for the situation/risk
- Alternatives have been identified and the control measures selected reduce the risks and impacts to ALARP. This may require assessment of Woodside and industry benchmarking, review of local and international codes and standards, consultation with stakeholders etc.

Demonstration of acceptability

In accordance with Regulation 10A(c) of the Environmental Regulations, Woodside applies the following process to demonstrate acceptability:

- Low residual risks are 'Broadly Acceptable', if they meet legislative requirements, industry codes and standards, regulator expectations, Woodside Standards and industry guidelines.
- Medium and High residual risks are ‘Acceptable’ if ALARP can be demonstrated using good industry practice and risk based analysis, if legislative requirements are met and societal concerns are accounted for and the alternative control measures are grossly disproportionate to the benefit gained.
- In undertaking this process for medium and high residual risks, Woodside evaluates the following criteria:

- Principles of Ecological Sustainable Development (ESD) as defined under the EPBC Act (Cth)
- External context – consideration of the environment consequence and stakeholder expectations
- Internal context - the controls and residual risk level are consistent with Woodside policies, procedures and standards
- Other requirements – the controls and residual risk level are consistent with national and international standards, laws and policies.

Severe residual risks are 'Intolerable' and therefore unacceptable. These risks require further investigation and mitigation to reduce the risk to a lower and more acceptable level. If after further investigation the risk remains in the severe category, the risk requires appropriate business sign-off to accept the risk.

5.2 Hydrocarbon Spill Risk Assessment Methodology

Quantitative hydrocarbon spill modelling was undertaken using a three-dimensional hydrocarbon spill trajectory and weathering model which is designed to simulate the transport, spreading and weathering of specific hydrocarbon types under the influence of changing meteorological and oceanographic forces.

Zone of Consequence and Hydrocarbon Contact Thresholds

The outputs of the quantitative hydrocarbon spill modelling are used to assess the environmental risk, if a credible hydrocarbon spill scenario occurred, solely in terms of delineating which areas of the marine environment could be exposed to hydrocarbon levels exceeding hydrocarbon threshold concentrations. All areas where hydrocarbon levels are exceeded are evaluated in the impact assessment. As the weathering of different fates of hydrocarbons (surface, accumulated, entrained and dissolved) differs due to the influence of the metocean mechanism of transportation, the locations potentially affected by each fate will different.

Surface fate and shoreline accumulation concentrations are expressed as grams per square metre (g/m^2), with entrained and dissolved aromatic hydrocarbon concentrations expressed as parts per billion (ppb). Hydrocarbon thresholds are presented in the table below (**Table 5-4**) and described in the following subsections.

Table 5-4: Summary of thresholds applied to the quantitative hydrocarbon spill risk modelling results

Surface Hydrocarbon (g/m^2)	Entrained hydrocarbon (ppb)	Dissolved aromatic hydrocarbon (ppb)	Accumulated Hydrocarbon (g/m^2)
10	500	500	<100

Surface Hydrocarbon Threshold Concentrations

The spill modelling outputs defined for surface hydrocarbon spills (contact on surface waters) using the ≥10 g/m^2 (dull metallic colours) based on the relationship between film thickness and appearance (Bonn Agreement 2004). This threshold concentration expressed in terms of g/m^2 is geared towards informing potential oiling impacts for wildlife groups and habitats that may break through the surface slick from the water or the air (for example: emergent reefs, vegetation in the littoral zone and air-breathing marine reptiles, cetaceans, seabirds and migratory shorebirds).

Thresholds for registering biological impacts resulting from contact of surface slicks have been estimated by different researchers at approximately 10–25 g/m^2 (NOAA 1997; French et al. 1999; Koops et al. 2004).

Dissolved Aromatic Hydrocarbon Threshold Concentrations

The threshold concentration value for dissolved aromatic hydrocarbons has been set with reference to results from ecotoxicity tests. The purpose of the threshold is to inform the assessment of the potential for toxicity impacts to sensitive marine biota. The ecotoxicity tests were undertaken on a broad range of taxa of ecological relevance for which accepted standard test protocols are well established. These ecotoxicology tests are focused on the early life stages of test organisms, when organisms are

typically at their most sensitive. The ecotoxicology tests were conducted on six mainly tropical-subtropical species representatives from six major taxonomic groups.

Based on these ecotoxicology tests, the selected dissolved aromatic hydrocarbon threshold of 500 ppb has been adopted. It is considered reasonable that the 500 ppb threshold remains applicable and appropriate for delineating potential chronic and acute effects to ecosystems, with the assessment recognising the potential for impact to reproductive success and early life stages of the most sensitive species at the adopted threshold value.

Entrained Hydrocarbon Threshold Concentrations

The threshold concentration of entrained hydrocarbons that could result in a biological impact cannot be determined directly using available ecotoxicity data. However, it is likely these data specific to dissolved oil hydrocarbon represents a worse-case scenario. This is owing to the fact that entrained oil hydrocarbons are less biologically available to organisms through absorption into their tissues than dissolved oil hydrocarbons. A conservative entrained threshold concentration of 500 ppb has therefore been adopted.

Accumulated Hydrocarbon Threshold Concentrations

Owens and Sergy (1994) define accumulated hydrocarbon <100 g/m^2 to have an appearance of a stain on shorelines. French Mckay (2009) defines accumulated hydrocarbons ≥100 g/m^2 to be the threshold that could impact the survival and reproductive capacity of benthic epifaunal invertebrates living in intertidal habitat.

6. ENVIRONMENTAL IMPACTS AND RISKS SUMMARY

Table 6-1 presents a summary of the sources of risk, analysis and evaluation for the Petroleum Activities program, using the methodology described in **Section 5.1** of this EP Summary. There are two types of environmental risk sources identified for the Petroleum Activities Program which relate to activities which are planned and either undertaken on a routine or non-routine basis or which may occur from unplanned activities were also identified. These sources of risk range from small scale chemical spills with a low environmental consequence to hydrocarbon spill events with high environmental consequence. Details of sources of environmental risk, impacts and control measures have been presented in **Appendix A**.

Table 6-1: Potential Environmental Risk and Impacts Register Summary

Potential Source of Risk	Key Potential Environmental Impacts	Residual Risk Rating			Acceptability of Risk
		Consequence	Likelihood	Residual Risk	
Planned Activities (Routine and Non-routine)					
Proximity of project vessels to third party vessels (commercial shipping and fishing).	Short-term, localised interference with or displacement of other sea users (e.g. fishing and shipping).	F	1	L	Broadly Acceptable
Presence of the RTM prior to removal from the Operational Area	Short-term, localised interference with or displacement of other sea users (e.g. fishing and shipping).	F	1	L	Broadly Acceptable
Disturbance to seabed from activities including: • laydown of risers, flowlines and mooring chains • subsea infrastructure removal • potential RTM anchor removal • ROV activities • IMR activities	Localised loss of benthic habitat in lay down areas. Short-term, localised disturbance to benthic habitat from movement of ROV. Minor, localised and temporary effects to water quality from disturbance of contaminated sediments.	F	2	L	Broadly Acceptable
Generation of noise from project vessels during normal operations.	Minor and temporary behavioural disturbance (e.g. avoidance or attraction) to fauna, including protected species.	F	1	L	Broadly Acceptable
Lighting associated with the physical presence of project vessels.	Minor and temporary disruption to marine fauna, including protected species.	F	1	L	Broadly Acceptable
Internal combustion engines from project vessels.	Reduced local air quality from atmospheric emissions.	F	1	L	Broadly Acceptable
Routine discharge of sewage, grey water and putrescible wastes to the marine environment.	Minor, localised and temporary reduction in water quality and potential impacts to in-water column biota in offshore waters.	F	1	L	Broadly Acceptable

Potential Source of Risk	Key Potential Environmental Impacts	Residual Risk Rating			Acceptability of Risk
		Consequence	Likelihood	Residual Risk	
Routine discharge of drain, deck and bilge water to marine environment.	Minor, localised and temporary reduction in water quality and potential impacts to in-water column biota in offshore waters.	F	1	L	Broadly Acceptable
Discharge of minor quantities of hydrocarbons/chemicals • disconnection of flowlines from the manifold • disconnection of risers and the EHU from the RTM • removal of flowlines, risers and the EHU • BAL-6H dry gas leak	Minor, localised and temporary reduction in water quality and potential impacts to in-water column biota in offshore waters.	F	2	L	Broadly Acceptable
Unplanned Activities (Accidents / Incidents)					
Loss of hydrocarbons to the marine environment from a project vessel collision.	Minor and temporary disruption to protected species such as localised oiling of marine mammals, reptiles and seabirds. Minor, localised and temporary reduction in water quality and potential impacts to in-water column biota in offshore waters.	F	1	L	Broadly Acceptable
Loss of well integrity resulting in loss of hydrocarbons to the marine environment	Minor, localised and temporary reduction in water quality and potential impacts to in-water column biota in offshore waters. Minor and temporary disruption to protected species such as localised oiling of marine mammals, reptiles and seabirds.	E	1	L	Broadly Acceptable
Loss of hydrocarbons to marine environment during bunkering activities.	Minor and temporary disruption to protected species such as localised oiling of marine mammals, reptiles and seabirds. Minor, localised and temporary reduction in water quality and potential impacts to in-water column biota in offshore waters.	F	1	L	Broadly Acceptable

Potential Source of Risk	Key Potential Environmental Impacts	Residual Risk Rating			Acceptability of Risk
		Consequence	Likelihood	Residual Risk	
Accidental discharge of other hydrocarbons / chemicals from project vessel deck activities and equipment (e.g. cranes).	Minor, localised and temporary reduction in water quality and potential impacts to in-water column biota in offshore waters.	F	1	L	Broadly Acceptable
Accidental discharge of solid, liquid and hazardous wastes to marine environment from project vessels (excludes sewage, grey water, putrescible waste and bilge water).	Minor, localised and temporary reduction in water quality and potential impacts to in-water column biota in offshore waters.	F	1	L	Broadly Acceptable
Accidental collision between project vessels and marine fauna.	Potential injury or fatality of an individual or a number of fauna (including listed threatened to cetaceans due to vessel strike.	F	1	L	Broadly Acceptable
Dropped objects resulting in seabed disturbance	Localised short-term damage of benthic subsea habitats in the immediate location of the dropped object.	F	1	L	Broadly Acceptable

7. ONGOING MONITORING OF ENVIRONMENTAL PERFORMANCE

The Petroleum Activities Program will be managed in compliance with the Balnaves Operation Cessation EP accepted by NOPSEMA under the Environment Regulations, other relevant environmental legislation and Woodside's Management System (e.g. Woodside Environment Policy).

The objective of the Balnaves Operation Cessation EP is to identify, mitigate and manage potentially adverse environmental impacts associated with the Petroleum Activities Program, during both planned and unplanned operations, to ALARP and an acceptable level.

For each environmental aspect (risk), and associated environmental impacts (identified and assessed in the Environmental Risk Assessment of the Balnaves Operation Cessation EP) a specific environmental performance outcome, environmental performance standards and measurement criteria have been developed. The performance standards are control measures (available in **Appendix A**) that will be implemented to achieve the environmental performance outcomes. The specific measurement criteria provide the evidence base to demonstrate that the performance standards (control measures) and outcomes are achieved.

The implementation strategy detailed in the Balnaves Operation Cessation EP identifies the roles/responsibilities and training/competency requirements for all personnel (Woodside and its contractors) in relation to implementing controls, managing non-conformance, emergency response and meeting monitoring, auditing, and reporting requirements during the activity.

Woodside and its contractors will undertake a program of periodic monitoring during the Petroleum Activities Program, starting at mobilisation of each activity and continuing through the duration of each activity until activity completion. This information is collected using appropriate tools and systems, based on the environmental performance outcomes, performance standards and measurement criteria in the Balnaves Operation Cessation EP.

The tools and systems collect, as a minimum, the data (evidence) referred to in the measurement criteria. The collection of this data (and assessment against the measurement criteria) forms part of the permanent record of compliance maintained by Woodside and the basis for demonstrating that the environmental performance outcomes and standards are met, which is then summarised in a series of routine reporting documents.

Monitoring of environmental performance is undertaken as part of the following:

- environmental performance report will be submitted to NOPSEMA annually within twelve months of commencement of the activity to assess and confirm compliance with the accepted environmental performance objectives, standards and measurement criteria outlined in the Balnaves Operation Cessation EP
- activity based inspections undertaken by Woodside's environment function to review compliance against the Balnaves Operation Cessation EP, verify effectiveness of the implementation strategy and to review environmental performance
- environmental performance is also monitored daily via daily progress reports during operations
- senior management regularly monitors and reviews environmental performance via a monthly report which details environmental performance and compliance with Woodside standards.

Woodside employees and contractors are required to report all environmental incidents and non-conformance with environmental performance outcomes and standards in the Balnaves Operation Cessation EP. Incidents will be reported using an Incident and Hazard Report Form, which includes details of the event, immediate action taken to control the situation, and corrective actions to prevent reoccurrence. An internal computerised database is used for the recording and reporting of these incidents. Incident corrective actions are monitored to ensure they are closed out in a timely manner.

The Balnaves Operation Cessation EP is supported by an assessment of the environmental impacts and risks associated with potential hydrocarbon spill scenarios and hydrocarbon spill preparedness and response measures in relation to the risk assessment and the identified hydrocarbon spill scenarios. A summary of Woodside's response arrangements in the oil pollution emergency plan is provided in **Appendix B**.

7.1 Environment Plan Revisions and Management of Change

Revision of the Balnaves Operation Cessation EP will be undertaken in accordance with the requirements outlined in Regulations 17, Regulation 18 and Regulation 19 of the Environment Regulations. Woodside will submit a revision to the Balnaves Operation Cessation EP due to all or any of the following:

- when any significant modification or new stage of the activity that is not provided for in the Balnaves Operation Cessation EP
- before, or as soon as practicable after, the occurrence of any significant new or significant increase in environmental risk or impact not provided for in the Balnaves Operation Cessation EP
- as requested by NOPSEMA.

Management of changes relevant to the Balnaves Operation Cessation EP, concerning the scope of the activity description including review of advances in technology at stages where new equipment may be selected such as vessel contracting, changes in understanding of the environment, including all current advice on species protected under EPBC Act (Cth) and current requirements for Commonwealth Marine Reserves and potential new advice from external stakeholders will be managed in accordance with internal procedures for management of change. These provide guidance on the Environment Regulations that may trigger a revision and resubmission of the environment plan to NOPSEMA. They also provide guidance on what constitutes a significant new risk or increase in risk. A risk assessment will be conducted in accordance with Woodside's Environmental Risk Management Methodology to determine the significance of any potential new environmental impacts or risks not provided for in the Balnaves Operation Cessation EP. Risk assessment outcomes are reviewed in compliance with Regulation 17 of the Environment Regulations.

Minor changes where a review of the activity and the environmental risks and impacts of the activity do not trigger a requirement for a revision, under Regulation 17 of the Environment Regulations, will be considered a 'minor revision'. Minor administrative changes to the Balnaves Operation Cessation EP, where an assessment of the environmental risks and impacts is not required (e.g. document references, phone numbers, etc.), will also be considered a 'minor revision'. Minor revisions and administrative changes as defined above will be made to the Balnaves Operation Cessation EP using Woodside's document control process. Minor revisions will be tracked and incorporated during scheduled internal reviews.

8. OIL POLLUTION EMERGENCY RESPONSE ARRANGEMENTS

Woodside's Oil Pollution Emergency Plan (OPEP) for the Petroleum Activities Program has the following components:

- Oil Pollution Emergency Arrangements (Australia)
- Oil Pollution First Strike Plan – Balnaves Operation Cessation
- Oil Spill Preparedness and Response Mitigation Assessment for Balnaves Operation Cessation.

8.1 Woodside Oil Pollution Emergency Arrangements (Australia)

This document outlines the emergency and crisis management incident command structure (ICS) and Woodside's response arrangements to competently respond to and escalate a hydrocarbon spill event. The document interfaces externally with Commonwealth, State and industry response plans and internally with Woodside's ICS.

Woodside's Oil Pollution Emergency Arrangements (Australia) details the following support arrangements:

- Master services agreement with Australian Marine Oil Spill Centre (AMOSC) for the supply of experienced personnel and equipment
- Access to Wild Well Control's capping stack, subsea first response toolkit (SFRT) equipment and experienced personnel for the rapid deployment and installation of a capping stack, where feasible

- Other support services such as 24/7 hydrocarbon spill trajectory modelling and satellite monitoring services as well as 'on-call' aerial, marine, logistics and waste management support
- Mutual Aid Agreements with other oil and gas operators in the region for the provision of assistance in a hydrocarbon spill response.

8.2 Oil Pollution First Strike Plan – Balnaves Operation Cessation

The Oil Pollution First Strike Plan – Balnaves Operation Cessation is an activity specific document which provides details on the tasks required to mobilise a first strike response for the first 24 hours of a hydrocarbon spill event. These tasks include key response actions and regulatory notifications. The intent of the document is to provide immediate oil spill response guidance to the Incident Management Team until a full Incident Action Plan specific to the oil spill event is developed.

The activity vessels will have Ship Oil Pollution Emergency Plans (SOPEPs) in accordance with the requirements of MARPOL 73/78 Annex I. These plans outline responsibilities, specify procedures and identify resources available in the event of a hydrocarbon or chemical spill from vessel activities. The Oil Pollution First Strike Plan is intended to work in conjunction with the SOPEPs.

Woodside's oil spill arrangements are tested by conducting periodic exercises. These exercises are conducted to test the response arrangements outlined in the Oil Pollution First Strike Plan – Balnaves Operation Cessation and to ensure that staff are familiar with spill response procedures, in particular, individual roles and responsibilities and reporting requirements.

8.3 Oil Spill Preparedness and Response Mitigation Assessment

Woodside has developed an oil spill preparedness and response position in order to demonstrate that risks and impacts associated with loss of hydrocarbons from the Petroleum Activities Program would be mitigated and managed to ALARP and would be of an acceptable level.

The following oil spill response strategies were evaluated and subsequently pre-selected for a significant oil spill event (level 2 or 3 under the National Plan) from the Petroleum Activities Program:

- **monitor and evaluate** - gathering of data and evaluation of data to inform the oil spill response planning and operations. It includes fate and trajectory modelling, spill tracking, weather updates and field observations. Woodside would implement operational monitoring plans to satisfy the requirements of this mitigation control
- **oiled wildlife response** – Staging sites will be established for shoreline or vessel based oiled wildlife response teams. Once recovered to a staging site, wildlife will be transported to the designated oiled wildlife facility for stabilisation and treatment
- **source control (well control and intervention)** - Woodside's strategy is to minimise the volume of hydrocarbons released from an oil spill event. Woodside plans to deploy the following controls specific to well loss of containment scenarios, if required for the Petroleum Activities Program:
    - Subsea first response toolkit (SFRT) deployment to clear debris, assess the well at the sea bed, and if practicable, attempt to close the emergency blowout preventer
    - Source control (deployment of capping stack)
    - Well intervention (relief well drilling).

To support the above response strategies, Woodside has access to Veolia's waste management facilities as well as waste storage equipment from AMOSC, AMSA and OSRL.

Implementation of these response strategies would be re-assessed during a spill event, with consideration of the size of spill, weather conditions and other constraints.

A summary of control measures for oil spill response during the Petroleum Activities Program is included in **Appendix B.**

8.4 Monitoring

Operational Monitoring

To gain an understanding of the spill event, its movement and to direct mitigation activities to the optimal locations, the following operational monitoring programs are available for implementation:

- Predictive modelling of hydrocarbons to assess resources at risk
- Surveillance and reconnaissance to detect hydrocarbons and resources at risk
- Monitoring of hydrocarbon presence, properties, behaviour and weathering in water.

Scientific Monitoring

Woodside would activate its Scientific Monitoring Program (SMP) following a Level 2 or 3 hydrocarbon release, or any release event with the potential, or actual contact to sensitive environmental receptors. The nature and scale of the spill event would dictate the implementation and operational timing of the SMP. Ten targeted scientific monitoring programs may be implemented to address a range of physical-chemical (water and sediment) and biological receptors (species and habitats) including EPBC Act (Cth) listed species, environmental values associated with Protected Areas and socio-economic values such as fisheries. When activated the Woodside SMP has two primary objectives as follows:

- determine the extent, severity and persistence of the environmental impacts associated with the hydrocarbon release and the response activities
- acquire, where practicable, the environmental baseline data required to support the Post-Response SMP in monitoring, evaluating and documenting the recovery of impacted environmental receptors.

9. CONSULTATION

In support of the Balnaves Operation Cessation EP, Woodside conducted a stakeholder assessment and engaged with relevant stakeholders to inform decision-making and planning for continued production activities in accordance with the requirements of Regulation 11A and 14(9) of the Environment Regulations.

Woodside conducted a stakeholder assessment based on the activity location, timing and potential impacts. A consultation fact sheet was sent electronically to all stakeholders identified through the stakeholder assessment process prior to lodgement of the Balnaves Operation Cessation EP with NOPSEMA for assessment and acceptance. Woodside provided information about the Petroleum Activities Program to the relevant stakeholders listed in **Table 9-1**. Woodside considers relevant stakeholders for routine operations as those that undertake normal business or lifestyle activities in the vicinity of the existing facility (or their nominated representative) or have a State or Commonwealth regulatory role.

Table 9-1: Relevant Stakeholder Identified for the Petroleum Activities Program

Organisation	Relevance
Department of Industry Innovation and Science	Department of relevant Commonwealth Minister
Department of Mines and Petroleum	Department of relevant State Minister
Australian Maritime Safety Authority	Maritime safety
Australian Hydrographic Service (AHS)	Maritime safety
Australian Fisheries Management Authority	Commercial fishery management
Pearl Producers Association	Commercial fishery management
Department of Fisheries (Western Australia)	Commercial fishery management

Organisation	Relevance
Commonwealth fisheries	Commercial fisheries – Commonwealth Western Skipjack Fishery Western Tuna and Billfish Fishery North-West Slope Trawl Fishery Southern Bluefin Tuna Fishery
Western Australian Fisheries	Commercial fishery – State Mackerel Fishery Pilbara Trawl Fishery Pilbara Trap Fishery Pearl Oyster Marine Aquarium Fish Management Plan Specimen Shell Management Plan
Australian Maritime Safety Authority	Oil spill preparedness (Australian waters) Maritime safety
Department of Transport	Oil spill preparedness (Western Australian waters)
Western Australian Fishing Industry Council (WAFIC)	Commercial fishery – State

Woodside also made available advice about the Petroleum Activities Program to other stakeholders who may be interested in the activity or who have previously expressed an interest in being kept informed about Woodside's activities in the region. The following are stakeholders that have been identified as 'interested' in the Petroleum Activities Program:

- Australian Maritime Safety Authority (marine pollution)1
- Department of Parks and Wildlife
- Australian Customs Service – Border Protection Command
- Commonwealth Fisheries Association
- Recfishwest
- WWF
- Australian Conservation Foundation
- Wilderness Society
- International Fund for Animal Welfare
- APPEA
- AMOSC
- Marine Tourism WA.

Woodside received feedback on the Petroleum Activities Program from a range of stakeholders, including government agencies and commercial fishing organisations. Issues of interest or concern included the location of the activities across commercial fishing areas. Woodside considered this

[1] Woodside and AMSA have a Memorandum of Understanding whereby AMSA, as managers of the National Plan for Maritime Environmental Emergencies, will provide support to Woodside such as response equipment from national stockpiles. As such, advice about the proposed activities was provided to AMSA by way of an activity update email and provision of the first strike plan.

feedback in its development of control measures specific to the Petroleum Activities Program. A summary of feedback and Woodside's response is presented in **Appendix C.**

9.1 Ongoing Consultation

Consultation activities for the Petroleum Activities Program build upon Woodside's extensive and ongoing stakeholder consultation for offshore petroleum activities in this area.

Feedback received through community engagement and consultation will be captured in Woodside's stakeholder database and actioned where appropriate through the Petroleum Activities Program Project Manager. Implementation of ongoing engagement and consultation activities for the Petroleum Activities Program will be undertaken by Woodside Corporate Affairs consistent with Woodside's External Stakeholder Engagement Operating Standard.

Woodside will continue to accept feedback from all stakeholders throughout the duration of the accepted Balnaves Operation Cessation EP. Stakeholder feedback should be made to the nominated liaison person, identified in **Section 10** of this EP Summary.

10. TITLEHOLDER NOMINATED LIAISON PERSON

For further information about this activity, please contact:

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11. ABBREVIATIONS

Term	Description / Definition
ALARP	As Low As Reasonably Practicable
AMOSC	Australian Maritime Oil Spill Centre
AMSA	Australian Maritime Safety Authority
BIA	Biological Important Area
CMR	Commonwealth Marine Reserve
DoE	Commonwealth Department of Environment
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
EFL	Electric Flying Leads
EHU	Electro-hydraulic Umbilical
EP	Environment Plan
EPBC Act (Cth)	*Environment Protection and Biodiversity Conservation Act, 1999*.
Environment Regulations	*Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations* 2009 (Cth)
ENVID	Environmental Hazard Identification
ESD	Ecological Sustainable Development

FPSO	Floating Production Storage and Offtake
IMR	Inspection, Maintenance and Repair
IOPP	International Oil Pollution Prevention
ISPP	International Sewage Pollution Prevention Certificate
ITF	Indonesian Through Flow
IUCN	International Union for the Conservation of Nature
KEF	Key Ecological Feature
MARPOL	International Convention for the Prevention of Pollution from Ships, 1973
MNES	Matters of National Environmental Significance
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NORM	Naturally Occurring Radioactive Material
NWMR	North West Marine Region
NWS	North West Shelf
OIW	Oil in Water
OPEP	Oil Pollution Emergency Plan
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
OSRL	Oil Spill Response Limited
Petroleum Activities Program	Comprises of activities being undertaken in licence areas WA-49-L and WA-26-PL (as well as within non-Woodside production licence areas): 1. preparation activities 2. operations 3. inspection, maintenance and repair (IMR) activities
PIV	Primary Installation Vessel
PLONOR	OSPAR definition of a substance Poses Little Or NO Risk to the environment
ppb	Parts per billion
ROV	Remote Operated Vehicle
RTM	Riser Turret Mooring
SFRT	Subsea Frist Response Toolkit
SMP	Scientific Monitoring Program
SOPEP	Ship Oil Pollution Emergency Plan
WA	Western Australia
WAFIC	Western Australian Fishing Industry Council
Woodside	Woodside Energy Julimar Pty Ltd, a wholly owned subsidiary of Woodside Energy Limited
Xmas tree	Series of valves installed on well head
ZoC	Zone of Consequence

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APPENDIX A: ENVIRONMENTAL IMPACTS AND RISKS

Planned Activities (Routine and Non-routine)

Physical Presence: Proximity of the project vessels to third party vessels

Impacts and Risks Evaluation Summary												
Potential Source of Risk	Environmental Value Potentially Impacted									Evaluation		
	Water Quality	Marine Sediment Quality	Air Quality	Marine Primary Producers	Other Habitats & Communities	Protected Species	Soil & Groundwater	Socio-Economic	Protected Areas	Consequence	Likelihood	Residual Risk
Proximity of project vessels and subsea infrastructure (during the preservation period) causing interference with or displacement of third party vessels (commercial fishing and shipping, recreational fishing and tourism).								X		F	1	L

Description of Potential Source of Risk

During the Petroleum Activities Program, project vessels will be present within the Operational Area for approximately 90 days to complete the removal of the RTM and subsea infrastructure. Project vessels may also be infrequently and intermittently present within the Operational Area at other times during the Petroleum Activities Program, including monthly inspection to check the condition of the RTM navigational aids, and any unplanned IMR activities.

Additionally, vessels associated with the Wheatstone project, Pluto productions and other oil and gas activities (including the Julimar Operations), may be present in the Operational Area during the course of the Petroleum Activities Program. Vessels associated with these activities may include:

- Wheatstone – inspection vessels (every 1-3 years for approximately 50 to 100 days), maintenance and repair vessels (in response to inspection findings, engineering analyses, and/or external events), major maintenance campaigns, heavy lift vessel (several weeks to remove additional living quarter modules and support vessels (servicing the platform approximately 1 to 3 times a week)
- Pluto – IMR vessels along the flowlines and MEG lines (at a similar frequency to that outlined above for Wheatstone).
- Julimar – Flowline dewatering support vessels in 2016, inspection and IMR vessels at a similar frequency to that outlined above for Wheatstone.

The presence of project vessels within the Operational Area may present a navigational hazard to shipping and commercial fishing activities, leading to displacement of third party vessels.

The RTM anchors will not result in physical presence impacts, as they are buried approximately 6m below the seabed.

Potential Environmental Impacts

Potential Impacts to Socio-Economic Values

General Impacts

Potential impacts to other marine users may include displacement of vessels, such as commercial fishing vessels, maritime traffic and other oil and gas operators.

Detailed Assessment of Impacts

Displacement to commercial fishing activities

The Operational Area is located within, or in proximity, to the fisheries management areas of four Commonwealth fisheries and six State fisheries.

The Operational Area is located in depths ranging from approximately 110m – 160 m (LAT) water depth, with the majority of the area outside the depth range where significant fisheries effort occurs; as the waters beyond the 100 m (including the Operational Area) isobath are generally not considered as being productive for commercial fisheries. The WA Department of Fisheries has previously advised that this is due to low abundance of fish associated with the relative featureless seabed.

Therefore, the presence of project vessels could potentially result in potential impacts that are expected to be limited

to minor interference (navigational hazard) and short-term localised displacement/avoidance by commercial fishing vessels within the immediate vicinity. As such, the potential impact is considered to be low.

Displacement to Commercial Shipping (including vessels associated with oil and gas activities)

The presence of project vessels could potentially cause temporary disruption to commercial shipping. Consultation with AMSA confirms that vessel traffic may be encountered within the Operational Area, however, it is noted that no shipping fairways intersect the Operational Area. Vessel tracking data provided by AMSA indicates that the majority of traffic will be activity vessels associated with existing oil and gas infrastructure. In addition, intermittent vessel activity associated with the Julimar Operations is expected. However, only infrastructure associated with the Petroleum Activities Program is likely to traverse the Operational Area, and hence, vessels associated with other oil and gas activities are not expected to be present in the Operational Area. Additionally, peak vessel presence in the Operational Area is expected to be restricted to 90 days duration.

There may be commercial vessels infrequently in the area. The use of the shipping fairways is strongly recommended by AMSA, but is not mandatory, and shipping vessels still have to adhere to the *International Regulations for Preventing Collisions at Sea 1972*.The potential impacts could include short-term displacement of vessels as they make slight course alteration to avoid project vessels. Therefore, the potential impact is considered to be low.

Displacement of Recreational Fishing and Tourism

Stakeholder consultation did not identify any key recreational fishing or tourism activity within the Operational Area. Recreational fishing and tourism is concentrated around the coastal waters and islands of the NWMR such as the Montebello Islands. Occasional recreational fishing is identified as occurring at Rankin Bank, approximately 43 km from the Operational Area. Due to the distance offshore and water depths, recreational fishing and tourism activities are unlikely to occur in the Operational Area. In the event that a third party vessel was within the Operational Area, displacement as a result of the Petroleum Activities Program would be short-term, localised and temporary. Therefore, the potential impact is considered to be low.

It is unlikely that multiple activities associated with this Petroleum Activities Program will be undertaken in parallel in the Operational Area. As such, the likelihood of multiple vessels being present in the Operational Area for the Petroleum Activities Program is very low.

Summary of Potential Impacts to environmental values(s)

Given the adopted controls, it is considered that any potential impacts resulting from the physical presence of project vessels would be limited to short-term and localised interference with, or displacement of, commercial fishing and shipping, and recreational fishing and tourism in the Operational Area, over the duration of the Petroleum Activities Program.

Vessel-based activities for the Petroleum Activities Program will lead to a small increase in the overall vessel traffic in the Operational Area with a peak period expected to be for 90 days, however, vessels associated with other oil and gas activities are not expected in the Operational Area, and no cumulative impacts from the interference with or displacement of third party vessels are expected.

Summary of Control Measures

- Compliance with OPGGS Act, Section 280 - a 500 m petroleum safety zone to be maintained around the RTM until it is removed.
- Vessels compliant with Marine Order 30 (Prevention of Collisions) 2009
- Vessels compliant with Marine Order 21 (Safety of navigation and emergency procedures) 2012
- Notify AHS to generate a temporary MSIN and temporary NTM for activities where vessels will be in field >3 weeks.
- AMSA RCC is notified 24- 48 hrs prior to commencement and within 48 hrs of completion of vessel activities for removal of RTM and subsea infrastructure
- Consultation program to continue to inform other users of presence and removal of the RTM during the Petroleum Activities Program.

Physical presence: Presence of the RTM prior to removal

Impacts and Risks Evaluation Summary												
Potential Source of Risk	Environmental Value Potentially Impacted									Evaluation		
	Water Quality	Marine Sediment Quality	Air Quality	Marine Primary Producers	Other Habitats & Communities	Protected Species	Soil & Groundwater	Socio-Economic	Protected Areas	Consequence	Likelihood	Residual Risk
The RTM will remain on the sea surface from the commencement of the EP until it is removed								X		F	1	L

Description of Potential Source of Risk

The RTM is a large, cylindrical steel structure located within the Operational Area. The RTM is a floating, partially submerged structure that is maintained in position by the attached anchors and flow lines, prior to disconnection and removal. The presence of the RTM within the Operational Area may present a navigational hazard to shipping and commercial fishing activities, leading to displacement of third party vessels.

The RTM is located within an established 500 m petroleum safety zone and is clearly marked on current nautical charts. This is the same position the RTM was located in when the FPSO was present. Prior to FPSO sail-away, inspection and maintenance of the RTM was confirmed to be up-to-date in accordance with the Safety Case for the Balnaves facilities.

While the FPSO is routinely connected to the RTM during production operations, it is not uncommon for FPSO facilities to disconnect from RTM systems (e.g. to avoid cyclones). As such, the need for other users to avoid the RTM within the petroleum safety zone when the FPSO is absent is not considered unusual.

The RTM is approximately 8 m in diameter and extends 9 m above the sea surface. The RTM is painted in high visibility yellow paint, as per good maritime practice for fixed hazards. The outer casing of the RTM is constructed of steel and is reflective of radar emissions, resulting in a clear signal return for onboard anti-collision radars fitted onboard commercial vessels. Additionally, two radar reflectors are installed on the RTM to enhance the detectability of the RTM by shipboard radar.

The RTM will be removed from the Operational Area as part of this Petroleum Activities Program.

Potential Impact Assessment

Potential Impacts to Socio-Economic Values

General Impacts

The presence of the RTM may present a navigational hazard to shipping and commercial fishing activities. Potential impacts to other marine users may include displacement of vessels, such as commercial fishing vessels, maritime traffic and other oil and gas operators.

Detailed Assessment of Impacts

The presence of the RTM may result in the disruption to commercial fisheries, shipping activities and recreational fishing and tourism. This is expected to consist of the minor displacement of fishing effort and the avoidance of the petroleum safety zone by commercial shipping and tour operators.

In the event of a collision between a vessel and the RTM, there is the potential for perforation of a vessel fuel tank resulting in the loss of fuel to the environment. Given the preventative controls (i.e. those that reduce likelihood) in place, the likelihood of such a collision is considered to be very low. Furthermore, given the standards that commercial vessels are constructed to, the likelihood of such a collision leading to perforation of the hull and fuel tanks is also considered to be highly unlikely. Woodside considers the release of marine diesel scenario assessed in the risk assessment of a vessel collision resulting in a diesel spill to be representative of the maximum credible spill scenario that could occur in the event of a vessel collision with the RTM resulting in the rupture of a fuel tank. Refer to the risk assessment summary on vessel collision resulting in diesel spill for additional information.

Summary of Potential Impacts to environmental values(s)

Given the adopted controls, it is considered that any potential impacts resulting from the physical presence of the RTM would be limited to short-term and localised interference with, or displacement of, commercial fishing and shipping, and recreational fishing and tourism in the Operational Area.

Physical presence of the RTM prior to removal from the Operational Area is not expected to result in cumulative impacts from the interference with or displacement of third party vessels.

Summary of Control Measures

- Compliance with OPGGS Act, Section 280 - a 500 m petroleum safety zone to be maintained around the RTM until it is removed.
- Independent navigation lighting systems to be maintained in accordance with maritime navigation requirements. Monthly inspection (or as soon as practicable following cyclone) to confirm that lighting systems are operating and clearly visible. If found to be not functioning correctly:
    - Additional controls added - RCC (AMSA) notified and nearby support vessels and/ or assets will provide radar coverage of the RTM and alert to passing vessels
    - Resource a repair visit i.e. people and parts (<7 days)
    - Visit planned based on parts arrival and swell height < 1.6 m (weather and parts dependent).
- Consultation program to continue to inform other users of presence and removal of the RTM during the Petroleum Activities Program.
- Radar reflectors to be maintained in functional order. Repairs will be undertaken as soon as practicable if found to be not functioning correctly.

Physical presence: Disturbance to the seabed from laydown and removal of RTM mooring chains and subsea infrastructure, and IMR and ROV activities

Impacts and Risks Evaluation Summary												
Potential Source of Risk	Environmental Value Potentially Impacted									Evaluation		
	Water Quality	Marine Sediment Quality	Air Quality	Marine Primary Producers	Other Habitats & Communities	Protected Species	Soil & Groundwater	Socio-Economic	Protected Areas	Consequence	Likelihood	Residual Risk
Disturbance to seabed from activities including: • laydown of disconnected subsea infrastructure and mooring chains • subsea infrastructure and mooring chain removal • IMR and ROV activities		X			X					F	2	L

Description of Potential Source of Risk

Laydown and Removal of RTM Mooring Chains and Subsea Infrastructure

Laydown of RTM mooring chains and risers on the seabed will result in localised and temporary disturbance to the seabed. During disconnection of the riser and flowlines, it is possible that a minor release of sand could occur. Residual produced sand has the potential to be present throughout the risers and flowlines and may be released to the seabed during disconnection and removal activities.

Removal of subsea infrastructure and mooring chains (i.e. lifting off the seabed) is expected to result in seabed disturbance, with a total disturbance footprint of approximately 5 km^2.

RTM Anchor Removal

If anchor removal is required, scouring during recovery and removal is likely to occur. Assuming each fluke from an anchor is 9m in width and could be dragged approximately 20 m prior to lifting from the seabed and there are six anchors in total that may be removed, anchor removal may result in disturbance footprint of approximately 1 km^2.

ROV and IMR Activities

ROV activities may result in seabed disturbance and suspension of sediment as a result of working close to, or occasionally on, the seabed. The footprint of a typical ROV is approximately 2.5 m x 1.7 m.

IMR activities, if required, are likely to be conducted by ROV and are expected to be of short duration (single days to weeks) rather than extended campaigns.

With regard to cumulative impacts from seabed disturbance in relation to nearby oil and gas activities, the Julimar Operational Area is approximately 4 km away. Seabed disturbance associated with Julimar activities are expected to be confined to the Julimar Operational Area, and as such, are not considered from a cumulative impact perspective.

Potential Impact Assessment

General Impact

Physical disturbance to seabed habitat with the laydown or removal of subsea infrastructure, causing movement of sediments, localised seabed deposition and short-term, localised elevated turbidity of water column and possible sediment deposition of physical habitat that may bury epifauna/infauna.

Detailed Assessment of Impacts

The laydown of RTM mooring chains and subsea infrastructure on the seabed will be for relatively short period of time before recovery and removal (after disconnection and until the RTM is removed). Therefore, impacts are expected to be limited to localised short term physical modification to a small area of the seabed and disturbance to soft sediment. The subsequent removal of subsea infrastructure and mooring chains may result in additional physical modification and disturbance of soft habitat, with an estimated disturbance footprint of approximately 5 km^2 (excluding RTM anchors – see below). The potential discharge of minor quantities of produced sand at or near the seabed may lead to localised smothering and increased sedimentation, as well as localised contamination of the seabed surface sediments. RTM anchor removal (if required) is likely to result in localised disturbance at the point of exit of each anchor fluke, plus scouring to the seabed as a result of dragging of anchors as they are removed. The estimated

disturbance footprint for RTM anchor removal is approximately 1km^2.

Surveys of the seabed in the Operational Area (Furgo 2011, RPS 2012) found sediments dominated by clayey, sandy silts with little epibenthic fauna (<5% cover). There is no identified hard substrate or sensitive benthic habitats within the Operational Area. These habitats are typical of the NWMR and considered to be of low conservation significance, given their widespread distribution. Impacts for short term disturbance are expected to be minimal as the disturbed areas will be relatively small and are expected to physically recover. Therefore, anticipated impacts are expected to be low.

Increased sedimentation from ROV activities (including IMR activities such as water jetting, brushing, sandblasting, dredging and cleaning) near the seabed is likely to result in slight and temporary impacts to benthic communities, which would be highly localised. Sediment loads are not expected to be significant due to the relatively small footprint for each ROV activity, and therefore, potential impacts from ROV and IMR activities are expected to be low.

Although there is a KEF that overlaps the Operational Area (The ancient coastline at 125 m depth contour), no significant escarpments, species of conservation significance, emergent features or areas of high biological productivity characteristically associated with the ancient coastline were recorded at this depth during all seabed surveys of the Operational Area (Neptune Geomatics 2010; RPS 2010a, 2011a). No impacts to the continental slope demersal fish communities are expected, given it is located outside of the Operational Area. Therefore, there are no impacts expected to the values of any KEF from seabed disturbance.

Summary of Potential Impacts to environmental values(s)

With the adopted controls in place, the potential environmental impact from disturbance to the seabed will be limited to localised, short-term disturbance of seabed habitat and benthic communities with full recovery expected, and minor, localised and temporary effects to water quality from disturbance of sediments.

Summary of Control Measures

- Laydown of subsea infrastructure onto seabed is within pre-identified laydown corridors
- If RTM anchors are to be removed, the activity will be completed in accordance with the Woodside approved anchor removal plan
- Subsea and Pipeline Environment Screening Questionnaire (DRIMS #8431725):
    - Questionnaire completed for all planned IMR activities and submitted to an environmental adviser for review.
    - Questionnaire to identify activity location, environment aspects and potential impacts (including benthic disturbance) (if any).
    - Environmental adviser to determine if an impact assessment is required.
    - Where an impact assessment is undertaken, the assessment will consider opportunities for improvement to environmental outcome (e.g. reduce footprint).

Routine acoustic emissions: Generation of noise from project vessels and helicopters

Impacts and Risks Evaluation Summary												
Potential Source of Risk	Environmental Value Potentially Impacted									Evaluation		
	Water Quality	Marine Sediment Quality	Air Quality	Marine Primary Producers	Other Habitats & Communities	Protected Species	Soil & Groundwater	Socio-Economic	Protected Areas	Consequence	Likelihood	Residual Risk
Internal combustion engines from project vessels.						X				F	1	L

Description of Potential Source of Risk

Project vessels

The project vessels generate noise both in the air and underwater, due to the operation of thrusters, engines, propeller movement, etc. These noises contribute to and can exceed ambient noise levels which range from around 90 dB re 1µPa rms (Sound Pressure Level, SPL) under very calm, low wind conditions, to 120 dB re 1µPa rms (SPL) under windy conditions (McCauley 2004).

Subsea activities are typically undertaken from project vessels with DP thrusters to allow manoeuvrability and avoid anchoring when undertaking works in close proximity of subsea infrastructure. Project vessels holding station (e.g. while using dynamic positioning (DP) systems; relying on thrusters and main propellers) are considered to be the main source of underwater noise generated during the activity. McCauley (1998) measured underwater broadband noise equivalent to approximately 182 dB re 1µPa at 1 m rms (SPL) from a support vessel holding station in the Timor Sea. It is expected that similar noise levels will be generated by activity vessels used for this Petroleum Activities Program. Due to project requirements, the PIV will be required to operate DP for the duration of the RTM and subsea infrastructure removal activities (approximately 90 days).

Vessels conducting monthly inspection activities prior to the commencement of the scope to remove the RTM and subsea infrastructure are not anticipated to be operating DP.

Helicopters

The intensity of sound travelling from a source in the air (e.g. helicopter) to a receiver underwater is complex and depends on source altitude and lateral distance, receiver depth, water depth, and other variables. The angle at which the line from the aircraft and receiver intersects the water surface is important. In calm conditions, at angles greater than 13° from the vertical, much of the sound is reflected and does not penetrate into the water (Richardson et al,1995). Therefore, strong underwater sounds are detectable for a period roughly corresponding to the time the helicopter is within a 26° cone above the receiver. Richardson et al, (1995) reported figures for a Bell 214 helicopter (stated to be one of the noisiest) being audible in air for four minutes before it passed over underwater hydrophones, but detectable underwater for only 38 seconds at 3 m depth and 11 seconds at 18 m depth. The maximum received level was 109 dB re 1µPa2.s.

Potential Impact Assessment

Potential Impacts to Marine Fauna including Protected Species.

General Impacts

Elevated underwater noise can affect marine fauna, including cetaceans, fish, sharks and rays in three main ways (Richardson *et al*. 1995; Simmonds *et al*. 2004):

(1) by causing direct physical effects on hearing or other organs (injury)

(2) by masking or interfering with other biologically important sounds (including vocal communication, echolocation, signals and sounds produced by predators or prey)

(3) through disturbance leading to behavioural changes or displacement from important areas.

Permanent injury would be expected to occur at 230 dB re 1 µPa rms (SPL) (peak) (Southall *et al.* 2007).

Detailed Assessment of Impacts

The Operational Area is located in water depths ranging from approximately 110 m - 160 m deep (LAT) water depth. The fauna associated with this area are predominantly pelagic species of fish, with low numbers of transient species

such as turtles, whale sharks and cetaceans passing through the area while transiting between other locations. A discussion on the potential impact to these species groups is provided below.

Cetaceans

Cetaceans are the fauna group that may be present in the Operational Area that are considered most vulnerable to noise impacts. The thresholds of recommended rms SPL that could result in behavioural response for cetaceans is expected to be 120 dB rms SPL for continuous noise sources and 160 rms SPL for impulsive noise sources (Southall *et al*, 2007). Therefore, based on the expected noise levels of 182 dB re 1µPa at 1 m rms (SPL) from project vessels, it is reasonable to expect that individuals may demonstrate avoidance behaviour to the noise generated in the immediate vicinity of the vessels.

There are no known key aggregation areas for pygmy blue whales (resting, breeding or feeding) located within or immediately adjacent to the Operational Area, and their recognised BIA is situated just outside the Operational Area (approximately 4 km to the north). Pygmy blue whale presence typically peaks in later November to early December for North of the Montebello Islands (McCauley & Jenner 2010; McCauley & Duncan 2011, Double et al. 2012). Similarly, the Petroleum Activities Program will also take place outside the identified DoE humpback whale migratory BIA. However, migrating individuals of either species may transit the Operational Area during both their northern and southern migrations, which peaks between July and September in the NWS region.

It is expected that noise associated with DP vessel operations may result in temporary behavioural disturbance to some individuals, however, the noise levels associated with DP vessel operations is well below published thresholds associated with potential for injury or physiological impacts to marine mammals, referred to as permanent threshold shift in hearing (PTS) and temporary threshold shift in hearing (TTS) (Southall et al. 2007).

Impacts to pygmy blue whales, humpback whales or other cetaceans may include avoidance behaviour during the Petroleum Activities Program. Given the nature and scale of underwater noise resulting from the Petroleum Activities Program, such behavioural impacts are expected to be localised to the Operational Area and of short duration. There are no constraints in the vicinity of the Operational Area that could inhibit animals moving away from the noise source (e.g. shallow water). Any potential for behavioural responses are not expected to impact on migratory movements of transiting pygmy blue or humpback whales, or important calving, resting, or foraging areas (Commonwealth of Australia 2015b). Therefore, anticipated impacts are expected to be low.

Noise from helicopters is highly transient and below behavioural thresholds. Therefore, it is not considered to pose any risk of physiological hazard or behavioural effects to cetacean unless they hover above the animal for an extended period of time, which is not required for this activity.

Fish (including sharks and rays)

Fish vary widely in their vocalisations and hearing abilities, but generally hear best at low frequencies below 1 kHz (Ladich 2000). There is no direct evidence of mortality or potential mortal injury to fish from vessel noise (Popper *et al.* 2014). Guidelines for behavioural responses in fish to underwater vessel noise have only been developed for fish where the swim bladder is involved in hearing, primarily through pressure detection, and range from RMS SPL 158 dB re 1 µPa over 12 hours exposure for temporary threshold shift (TTS) to 170 dB re 1 µPa at 1 m over 48 hours exposure for recoverable injury (Popper *et al*. 2014). The operation of project vessels will exceed the range of RMS SPL within close proximity (metres) of the source, however, behavioural effects of noise on open water fish may include changes to schooling behaviour and avoidance of the noise source (Simmonds and MacLennan 2005), suggesting unlikely potential for exposure times required for injury. No impacts to the continental slope demersal fish communities KEF are expected.

A BIA for whale sharks overlaps the Operational Area and therefore, individual whale sharks may transit through the Operational Area during their migration to and from the Ningaloo Coast.Cartilaginous fish (such as whale sharks) lack a swim bladder and are considered less sensitive to sound than bony fish. The hearing capabilities of the whale shark have not been studied, but it has been suggested that they are likely to be most responsive to low frequency sounds (Myberg 2001).

Whale sharks may exhibit some behavioural responses to the noise generated by project vessels. However, the behavioural responses are expected to be minor and temporary, and restricted to individuals transiting the Operational Area. Therefore, anticipated impacts are expected to be low.

Potential impacts to commercial fisheries and target species are not expected. The Operational Area is located in depths ranging from approximately 110m – 160 m (LAT) water depth, with the majority of the area outside the depth range where significant fisheries effort occurs; as the waters beyond the 100 m (including the Operational Area) isobath are generally not considered as being productive for commercial fisheries. Furthermore, the fisheries designated areas of the NWMR that overlap with the Operational Area do not reflect where fisheries activities take place. The only overlapping active fisheries are the Pilbara Demersal Scalefish Fisheries (incorporating the Pilbara Fish Trawl (Interim) Managed Fishery, the Pilbara Trap managed Fishery and the Pilbara Line Fishery) and it is only trap fishing that is permitted in the location of the Operational Area. The Pilbara Trap Fishery targets demersal fish species of snapper, emperor and bream. Such commercially targeted fish species, if exposed to acoustic emissions from vessel activities within the Operational Area, will most likely be temporarily displaced as they avoid exposure to the noise source. Given the Operational Area represents a relatively small portion of the NWMR within which commercial fisheries take place and commercially targeted fish species (such as demersal species of snapper) may be exposed to acoustic emissions, compared to the lager NWMR and area over which commercial fisheries may operate, impacts to the commercially targeted fish stocks and the potential fisheries catch are not expected to occur.

Marine turtles

A BIA for internesting flatback turtles (during summer) overlaps with the Operational Area. Although it is acknowledged that marine turtles may be present transiting the Operational Area, it is considered highly unlikely to contain high numbers of turtles of any species, largely due to the known water depths (110 m – 160 m), lack of significant foraging habitat and distance from shore.

No data exist for underwater vessel noise impacts on marine turtles (Popper *et al.*2014) but it would be expected that marine turtles would implement avoidance measures upon detection of vessel noise. So although vessel noise associated with the Petroleum Activities Program may have a minor disruption to individuals, no threat to overall population viability is expected, and the anticipated impacts are expected to be low.

There are no known critical habitats (i.e. feeding, breeding, calving or constricted migratory pathways) for EPBC Act (Cth) listed species present within the Operational Area. Given this, potential impacts from project vessel noise are likely to be restricted to temporary avoidance behaviour to individuals transiting the Operational Area, and are therefore considered low.

Summary of Potential Impacts to environmental values(s)

Given the adopted controls, potential impacts from noise generated by project vessels and helicopters would be limited to minor and temporary behavioural disruption to marine fauna. No significant cumulative impacts over the life of the Petroleum Activities Program or in relation to other operations and activities in the region (e.g. Pluto or Wheatstone facilities) are expected.

Summary of Control Measures

- Woodside will comply with EPBC Act (Cth) Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans: Project vessels will not travel greater than 6 knots within 300 m of a whale (caution zone) and not approach closer than 100 m from a whale; and a vessel will not approach closer than 50 m for a dolphin and/or 100 m for a whale (with the exception of animals bow riding).
- Whale Shark Code of Conduct (DPaW 2013): Project vessels will not travel greater than 8 knots within 250 m of a whale shark (exclusive contact zone) and not allow the vessel to approach closer than 30 m of a whale shark.
- Woodside will comply with EPBC Act (Cth) Regulations 2000 Division 8.3 (Regulation 8.07) - Interacting with Cetaceans: Helicopters shall not operate lower than 1,650 feet or within the horizontal radius of 500 m of a cetacean known to be present in the area, except for take-off and landing.
- Vessel bridge crews to maintain lookout for marine mammals during operations.

Routine light emissions

Impacts and Risks Evaluation Summary												
Potential Source of Risk	Environmental Value Potentially Impacted									Evaluation		
	Water Quality	Marine Sediment Quality	Air Quality	Marine Primary Producers	Other Habitats & Communities	Protected Species	Soil & Groundwater	Socio-Economic	Protected Areas	Consequence	Likelihood	Residual Risk
Lighting emissions from activity vessels						X				F	1	L

Description of Potential Source of Risk

Vessels undertaking the Petroleum Program Activities will have lighting to allow safe working conditions. Lighting may be required over the side of vessels for night work such as lifting operations. Underwater lighting may be generated over short periods of time while ROVs are in use.

Potential Impact Assessment

Potential Impacts to Marine Fauna including Protected Species.

General Impacts

Light emissions can affect fauna in two main ways:

- Behaviour – many organisms are adapted to natural levels of lighting and the natural changes associated with the day and night cycle as well as the night time phase of the moon. Artificial lighting has the potential to create a constant level of light at night that can override these natural levels and cycles.
- Orientation: organisms such as marine turtles and birds may also use lighting from natural sources to orient themselves in a certain direction at night. In instances where an artificial light source is brighter than a natural source, the artificial light may act to override natural cues leading to disorientation.

Detailed Assessment of Impacts

Given the fauna associated with Operational Area is predominantly pelagic species of fish with a low abundance of transient species such as marine turtles, whale sharks and large whales transiting through the Operational Area, and no known EPBC Act (Cth) listed critical habitat occur within the Operational Area, potential impacts from lighting are highly unlikely.

Light emissions reaching turtle nesting beaches is widely considered detrimental owing to interference with important nocturnal activities including choice of nesting sites and orientation/navigation to the sea by post-nesting females and hatchlings (Lutcavage et al. 1997; Pendoley 1997; Witherington and Martin 1996, 2003). Artificial lighting may affect the location that turtles emerge to the beach, the success of nest construction, whether nesting is abandoned, and even the seaward return of adults (Salmon et al. 1995, Salmon 2005). The Operational Area does not contain any known critical habitat for any species of marine turtle (nearest landfall (Montebello Islands) is located approximately 48km from Operational Area). However, a BIA for internesting flatback turtles (during summer, peak December to January) overlaps with the Operational Area. The BIA is considered very conservative as it is based on the maximum range of the internesting females. Many turtles are likely to remain near to their nesting beaches as the interval between nesting occasions is relatively brief. As female turtles leave beaches, they typically spread out and consequently, density decreases rapidly with increasing distance from a nesting beach. Flatback turtle internesting is carried out in shallow waters and generally on the eastern side of the offshore islands of Barrow, Montebellos and the Lowendals. For flatback turtles associated with the Montebello Islands, it is considered that during internesting they will move either towards Barrow Island or towards, shallower, coastal waters to the east rather than eastern offshore waters. Although unlikely, it is acknowledged that marine turtles may be present transiting the Operational Area in low densities. However, given the distance from the Operational Area to the nearest potential nesting habitat (the Montebello Islands approximately 48 km away) light impacts to hatchlings and nesting turtles are not expected.

The risk associated with collision from seabirds attracted to the light is considered to be low given the there is no critical habitat for these species within the Operational Area and slow moving speeds associated with project vessels.

Demersal fish communities in the Continental Slope Demersal Fish Communities KEF, 4km from the Operational Area, are highly unlikely to be affected by vessel lighting, particularly considering their depth on the seabed. Lighting from the

presence of a project vessel may result in the localised aggregation of pelagic fish below the vessel. These aggregations of fish are considered localised and temporary and any long term changes to fish species composition or abundance is considered highly unlikely.

The Petroleum Activities Program will be undertaken in an open ocean, offshore environment approximately 48 km from the nearest landfall (Montebello Islands). With the exception of subsea infrastructure and RTM removal (expected duration 90 days), vessel activities will be intermittent and of short duration (planned monthly inspection while the RTM is still in place, unplanned maintenance for the life of the EP), with light spill limited to the immediate vicinity of vessels.

Summary of Potential Impacts to environmental values(s)

It is anticipated that light generated by project vessels is highly unlikely to result in a potential impact greater than slight and temporary disruption to a small proportion of the populations and no impact on critical habitat or activity is anticipated. No significant cumulative impacts over the life of the Petroleum Activities Program or in relation to other operations and activities in the region (e.g. Julimar Operations, Pluto or Wheatstone facilities) are expected.

Summary of Control Measures

Given the nature and scale of the environmental risks and impacts of light emissions during vessel activities, the inherent risk is considered to be such that no controls are needed to reduce the risk to a level that is ALARP and acceptable.

Routine atmospheric emissions: Project vessels

Impacts and Risks Evaluation Summary												
Potential Source of Risk	Environmental Value Potentially Impacted									Evaluation		
	Water Quality	Marine Sediment Quality	Air Quality	Marine Primary Producers	Other Habitats & Communities	Protected Species	Soil & Groundwater	Socio-Economic	Protected Areas	Consequence	Likelihood	Residual Risk
Generation of atmospheric emissions from project vessels during normal operations. Internal combustion engines from project vessels			X			X				F	1	L

Description of Potential Source of Risk

Atmospheric emissions will be generated by the project vessels from internal combustion engines (including all equipment and generators) during the Petroleum Activities Program The use of fuel (specifically MGO) to power vessels engines, generators, mobile and fixed plant and equipment to undertake these activities will result in emissions of greenhouse gases (GHG) such as carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O), along with non-GHG such as sulphur oxides (SO_x) and nitrous oxides (NO_x).

Potential Impact Assessment

General impacts

Non-GHG emissions, such as NO_X and SO_X, and GHG emissions from project vessels can lead to a reduction in local air quality which can impact humans and potentially seabirds in the immediate vicinity and add to the national GHG loadings.

Detailed Assessment of impacts

Fuel combustion has the potential to result in localised, temporary reduction in air quality. Potential impacts include a localised reduction in air quality, generation of dark smoke and contribution to greenhouse gas emissions. The quantities of gaseous emissions from the Petroleum Activities Program are expected to be relatively small and will quickly dissipate into the surrounding atmosphere. As the proposed Petroleum Activities Program will occur in offshore waters, the combustion of fuels in such remote locations will not impact on air quality in coastal towns. The nearest landfall (with an operational human workforce) is 75km away at Varanus Island. The nearest town is Dampier, located approximately 165 km away.

Summary of Potential Impacts to environmental values(s)

With the adopted controls in place, the potential environmental impacts from for atmospheric emissions will be limited to slight and temporary reduction in local air quality.

No cumulative impacts associated with atmospheric emissions from activity vessels from Pluto, Julimar or Wheatstone, in combination with the Petroleum Activities Program, are expected.

Summary of Control Measures

- Compliance with Marine Order 97 (marine pollution prevention – air pollution)

Routine and non-routine discharges: Discharges of sewage, grey water, putrescible wastes, and deck, drain, and bilge water to the marine environment

Impacts and Risks Evaluation Summary												
Potential Source of Risk	Environmental Value Potentially Impacted									Evaluation		
	Water Quality	Marine Sediment Quality	Air Quality	Marine Primary Producers	Other Habitats & Communities	Protected Species	Soil & Groundwater	Socio-Economic	Protected Areas	Consequence	Likelihood	Residual Risk
Routine discharge of sewage, grey water and putrescible wastes to the marine environment. Routine discharge of drain, deck, bilge and brine water to marine environment.	X									F	1	L

Description of Potential Source of Risk

During the Petroleum Activities Program, project vessels will be present within the Operational Area for approximately 90 days to complete the removal of the RTM and subsea infrastructure. Project vessels may also be infrequently and intermittently present within the Operational Area at other times during the Petroleum Activities Program, including monthly inspection to check the condition of the RTM navigational aids, and any unplanned maintenance activities. The project vessels routinely generate/discharge the following non-continuous discharges:

- small volumes (up to 15 m^3 per vessel per day) of treated sewage and putrescible wastes to the marine environment
- routine/periodic discharge of relatively small volumes of bilge water. Bilge tanks receive fluids from many parts of the vessel and can contain water, oil, detergents, solvents, chemicals, particles and other liquids, solids or chemicals
- variable water discharge from activity vessel decks directly overboard or via deck drainage systems and may contain small quantities of oil, grease and detergents, if present on deck. Water sources could include rainfall events and/or from deck activities such as cleaning/wash-down of equipment/decks

The Operational Area is located more than 12 nm from land, which exceeds the exclusion zones required by Marine Order 96 (Marine pollution prevention – sewage) 2009 and Marine Order 95 (Marine pollution prevention – garbage) 2013.

Potential Impact Assessment

Potential Impacts to Water Quality

General Impacts

Potential impacts from routine discharge of deck and bilge water, grey water, sewage and putrescibles wastes from the project vessels to the marine environment include;

- temporary reduction in water quality near the release point from increased nutrients, and temperature changes
- potential behavioral, minor stress or toxic effect on marine fauna through exposure to these changes. Pelagic species are at highest exposure risk including plankton, marine fishes and other transient species in the vicinity of the vessel.

In open ocean environments, dispersion and dilution is expected to be rapid due to ocean currents, resulting in only short-term changes in water quality as a result of routine discharges.

Detailed Assessment of Impacts

The Operational Area lies in offshore open waters in a water depth of 110 m – 160 m deep. Coral reefs, seagrass and macroalgae do not occur and the benthic habitat is considered to be of relatively low environmental sensitivity.

While there are no listed EPBC Act (Cth) critical habitats, there are documented BIAs for protected species (including marine turtles, cetaceans and whale sharks) within the Operational Area, it is reasonable to expect that individuals

may pass through the area. In the event that they do during a discharge release, it is likely they will exhibit avoidance behaviour and any impacts are expected to be minor. Additional discussion is provided below.

Sewage, grey water and putrescible waste

Elevated nutrient levels can lead to increased bacterial and phytoplankton production (e.g. phytoplankton blooms). In nutrient poor waters such as those in offshore marine environments, introduction of dissolved nutrients such as ammonia and nitrate to surface waters where high light levels are available will lead to rapid uptake by phytoplankton with associated increased biomass. Increased biomass will be a highly localised feature associated with the availability of dissolved nutrients.

Disposal of treated sewage effluent and putrescible wastes from the project vessels will result in nutrient inputs to the marine environment. However, the estimated daily load (1.42 to 1.77 kg/day of total nitrogen (TN) and 0.22 to 0.25 kg/day of total phosphorous (TP)) is very small and the impact this will have on the environment is considered to be low, given the good mixing environment of the offshore waters of the Operational Area.

Drain, deck and bilge water

Deck drainage water onboard project vessels from rainwater and deck wash down water may contain small quantities of oil, grease and detergents, if present on deck. Bilge water can contain traces of waste oil generated in machinery spaces such as the engine room. Discharge of both deck and bilge water from support vessels can contain contaminants (primarily hydrocarbons), leading to minor, localised increases of contaminants in the receiving environment which will be diluted on entry into surface waters.

No significant impacts from drain, deck and bilge water discharges are anticipated largely due to:

- the expected localised mixing zone and high level of dilution into the open water marine environment of the Operational Area;
- the minor discharge volumes expected; and
- the limited duration of the Petroleum Activities Program.

Summary of Potential Impacts to environmental values(s)

With the adopted controls in place, the potential environmental impacts from for routine or non-routine discharges will be limited to localised and temporary effects to water quality and marine biota in offshore waters.

Summary of Control Measures

- Compliance with Marine Order 96 (Pollution prevention – sewage), as required by vessel class
- Compliance with Marine Order 95 (pollution prevention – garbage), as required by vessel class.
- Bilge water contaminated with hydrocarbons must be contained and disposed of onshore, except if the oil content of the effluent without dilution does not exceed 15 ppm or an International Maritime Organisation (IMO) approved oil/water separator (as required by vessel class) is used to treat the bilge water.

Routine and non-routine discharges: Discharge of minor quantities of chemicals and hydrocarbons

Impacts and Risks Evaluation Summary												
Potential Source of Risk	Environmental Value Potentially Impacted									Evaluation		
	Water Quality	Marine Sediment Quality	Air Quality	Marine Primary Producers	Other Habitats & Communities	Protected Species	Soil & Groundwater	Socio-Economic	Protected Areas	Consequence	Likelihood	Residual Risk
Routine and non-routine discharges to the marine environment from; • Disconnection of subsea infrastructure • Removal of the RTM • IMR Activities • Dry gas leak from the BAL-6H well	X					X				F	2	L

Description of Potential Source of Risk

During the Petroleum Activities Program, small volumes of chemicals and hydrocarbons may be discharged intermittently and for short durations as a result of planned subsea infrastructure disconnection, and non-routine operations and maintenance (IMR) activities. This includes discharges of treated seawater during the disconnection of subsea infrastructure, discharge of the contents of the EHU and discharge from the central turret of the RTM when manoeuvring the RTM to the horizontal position for towing. Additionally, there is a known dry gas leak from the BAL-6H production well, emanating from the tree connector that is suspected to be from the A-annulus due to pressurisation from the gas lift system (previously injected from the FPSO to help lift oil) that is now disconnected and as such will cease over time as the A-annulus depressurises. This was identified through ROV inspection and analysis of a gas sample has confirmed dry gas (ie no liquid hydrocarbon content).

Expected worse-case hydrocarbon releases and expected chemical releases are detailed below:

- The maximum hydrocarbon release expected during disconnection or removal of subsea infrastructure is less than 10 L, based on the loss of the entire inventory of the flushed subsea system and informed by the final flushing returns indicating 28 ppm OIW content.
- Disconnection and removal of the EHU and EFL will result in the release of chemicals with maximum volumes expected to be:
  - 800 L of scale inhibitor
  - 1300 L of Transaqua subsea control fluid
  - 900 L of methanol
  - 15L of DC200 silicone oil
- Disconnection and removal of the risers, flowlines, jumpers, spools and the manifold would also result in small releases of treated seawater containing preservation chemicals. The entire inventory of the preserved subsea system (approximately 220 m^3) is expected to be discharged, as subsea infrastructure will not be capped upon disconnection (with the exception of the xmas trees).
- Manoeuvring the RTM to the horizontal position is expected to result in the release of the treated seawater contained in the central column (approximately 23 m^3), with maximum volumes of chemicals expected to be:
  - approximately 10 L of biocide at 400ppm
  - approximately 5 L of oxygen scavenger at 200ppm
- The maximum dry gas release from BAL-6H is 10 L per minute. The annulus will depressurise over time and the gas leak is expected to reduce and then cease (to be confirmed by monitoring)
- Chemicals and hydrocarbons may be discharged intermittently and for short durations as a result of IMR activities (e.g. discharge of subsea control fluid; acid cleaning) and may include:
  - discharge from subsea cleaning activities such as acid marine growth removal
  - discharge of residual control fluids and hydrocarbons remaining in subsea lines and equipment as a result of subsea intervention isolation works (e.g. hot or cold stab intervention)
  - Discharges associated with IMR activities are expected to be minor volumes. A typical IMR campaign is expected to use up to 200 L of chemical for subsea cleaning and up to 20 L of control fluid.

All chemicals that may be released or discharged to the marine environment during the Petroleum Activities Program are assessed as per *Woodside Chemical Selection and Assessment* Guideline. This procedure is used to demonstrate that the potential impacts of the chemicals that may be released are acceptable and ALARP.

The relatively small planned discharges associated with the Petroleum Activities Program are not expected to have impacts beyond the Operational Area and only infrastructure associated with the Balnaves Development exists in the Operational Area. The nearest oil and gas activity is the Julimar Operations, however planned discharges are unlikely to occur at the same time as the Petroleum Activities Program, and impacts from Julimar planned discharges are expected to be confined to the Julimar Operational Area. Therefore, cumulative impacts on water quality, marine sediment quality, protected species or other habitats in the Operational Area is not expected.

Potential Impact Assessment

Potential impacts to water quality and marine biota

General Impacts

The release of minor hydrocarbon and chemical discharges may reduce local water quality through contamination of the water column, resulting in potential adverse effects to marine biota as a result of hydrocarbon and chemical toxicity. The discharges present a risk to the marine environment due to the contaminants within them, as well as the potential for secondary environmental impacts such as bioaccumulation and biomagnification.

Potential impacts to sensitive receptors may be attributable to dissolved hydrocarbons and suspended oil droplets, dissolved metals and nutrients as well as low residual concentrations of a small number of preservation chemicals such as corrosion and scale inhibitors and biocides. Hydrocarbons however are considered the constituent of most concern to marine fauna, particularly polycyclic aromatic hydrocarbons (PAHs).

Detailed Assessment of Impacts

Minor hydrocarbon release

Hydrocarbon exposure may lead to mortality to marine organisms within the immediate vicinity of the discharge plume, as well as sub-lethal chronic (long exposure) effects such as decreased genetic diversity in communities, decreased growth and fecundity, lower reproductive success, respiratory problems, behavioural and physiological problems, decreased developmental success and endocrine disruption (Neff *et al*., 2011).

A minor loss of hydrocarbon will be much reduced in terms of spatial and temporal scales, and given the minor quantities expected to be released (subsea infrastructure: less than 10 L in solution or dry gas < 10L/min that is expected to dissolve within the water column without a surface expression), impacts to limited transient megafauna, plankton and fish populations (water column biota)) are considered to be highly unlikely. No impacts to commercial fisheries or KEFs are expected.

Chemical releases

The release of treated seawater containing preservation chemicals, the discharge of transaqua control fluid, scale inhibitor, methanol and silicone oil from the EHU and EFLs, and minor discharges of cleaning chemicals and control fluids associated with IMR activities will decrease the water quality in the immediate area of the release; however, the impacts are expected to be slight and temporary, and very localised due to dispersion and dilution in the open ocean environment.

Marine fauna may be affected if they come in direct contact with a release (i.e. by traversing the immediate spill area), and could suffer fouling, ingestion, inhalation of toxic vapours, irritation of sensitive membranes in the eyes, mouth, digestive and respiratory tracts and organ or neurological damage.

The release of treated seawater containing small quantities of biocide and oxygen scavenger from the RTM central column may also result in a localised decrease in water quality. The chemicals were added to the central column during installation/commissioning activities approximately three years ago. Given the dosage concentration of biocide sticks and oxygen scavenger sticks (approximately 15 L in 23 m^3 of seawater), it is expected that the biocide would have broken down to very low levels of activity and pose minimal harm to the environment.

There are no EPBC Act (Cth) listed critical habitats, but noted BIA's for protected species (including marine turtles, cetaceans and whale sharks) within the Operational Area, it is reasonable to expect that individuals of protected species may pass through the area. However, given the small volumes that represent the wors credible releases, and the dilution and weathering of any such spill or release, and that species are likely to exhibit avoidance behaviour, the likelihood of ecological impacts to these marine fauna and habitats is considered to be low.

No impacts to commercial fisheries or KEFs are expected.

Summary of Potential Impacts to environmental values(s)

Given the adopted controls, it is considered that a release of minor hydrocarbons or chemicals, will not result in a potential impact greater than localised and temporary effects to water quality and marine biota in offshore waters.

No significant cumulative impacts are expected to occur due to the relatively small volumes discharged in the open ocean environment, the well mixed nature of the receiving environment and the infrequency of discharges.

Summary of Control Measures

Containment and recovery of discharge fluids was considered but deemed not ALARP due to low environmental risk of chemicals and low hydrocarbon concentrations meaning any minor environmental benefit gained was disproportionate to the increased health and safety risks and cost incurred. However, the following controls have been adopted:

- Chemicals that are on the CEFAS OCNS Ranked List of Notified Chemicals and have OCNS Hazard Quotient Gold, Silver, E and D and have no OCNS substitution warning do not require further assessment.

  All chemicals that are not on the CEFAS OCNS Ranked List of Notified Chemicals and all CEFAS OCNS listed chemicals which have a CEFAS OCNS substitution warning, a OCNS product warning or are OCNS Hazard Quotient white, blue, orange, purple, A, B or C require further assessment and an ALARP Chemical Justification prior to discharge.
- Flush the subsea system, with at least three full system volumes of treated seawater, until oil in water concentration of final flushing returns has plateaued
- Turbulent flow of treated seawater was achieved during flushing of the subsea system to minimise residual hydrocarbon content
- Reduce volume of BAL-6H dry gas release by depressurisation of the A-annulus to 80 bar during well isolations
- Monitoring via ROV inspection to demonstrate BAL-6H dry gas leak has ceased confirming integrity of primary well barrier and source of gas is from A-annulus only.

Unplanned Activities (Accidents, Incidents and Emergency Situations)

Unplanned hydrocarbon release: Vessel collision

Impacts and Risks Evaluation Summary												
Potential Source of Risk	Environmental Value Potentially Impacted									Evaluation		
	Water Quality	Marine Sediment Quality	Air Quality	Marine Primary Producers	Other Habitats & Communities	Protected Species	Soil & Groundwater	Socio-Economic	Protected Areas	Consequence	Likelihood	Residual Risk
Hydrocarbon release to the marine environment due to a vessel collision (due to collision between project vessels or a third party)	X				X	X		X	X	F	1	**L**

Description of Potential Source of Risk

A typical PIV is likely to have multiple isolated fuel tanks distributed throughout the hull of the vessel. Individual fuel tanks are typically less than 500 m^3 in volume, however, for the purposes of a conservative indication of the risks associated with a vessel collision for the Petroleum Activities Program, Woodside has assumed a largest fuel tank volume of 550 m^3 for the PIV. In the unlikely event of a vessel collision involving a PIV during the Petroleum Activities Program, the PIV will have the capability to pump fuel from a ruptured tank to a tank with spare volume in order to reduce the potential volume of fuel released to the environment.

A number of additional support vessels may be required during the Petroleum Activities Program (e.g. heavy lift vessel, two tugs, support vessels). However, it is unlikely that any of these additional vessels would have a single fuel tank capacity greater than the 550 m^3 volume assumed for a PIV.

Industry experience

Registered vessels or foreign flag vessels in Australian waters are required to report events to the Australian Transport Safety Bureau (ATSB), AMSA or Australian Search and Rescue (AusSAR).

From a review of the ATSB marine safety and investigation reports, two vessel collisions occurred in October 2010 in the port of Dampier, where a support vessel collided with a barge being towed and a vessel sunk on being contacted by a passing vessel. There was no reported pollution as a result of either incident. Causes of both incidents are not applicable to the Petroleum Activities Program due to the nature of the incidents, in that they occurred in port under pilot direction. The risk of collision within ports, as it is a nearshore activity, is beyond the scope of this EP. However, it does demonstrate the highly unlikely likelihood of hydrocarbons being released if a vessel collision occurred.

From 2010 to 2011, the ATSB's annual publication (ATSB, 2011) defines the individual safety action factors identified in marine accidents and incidents: 42% related to navigation action, of that 15% related to poor communication and 42% related to poor monitoring, checking and documentation. The majority of these related to the grounding instances. Given the offshore location of the Petroleum Activities Program, vessel grounding is not considered a credible risk.

Description of Credible Spill Scenarios

For a vessel collision to result in the worse-case scenario of a hydrocarbon spill potentially impacting an environmentally sensitive area, several factors must align. The sequence of events is as follows:

- the identified causes of vessel interaction must result in a collision
- the collision must have enough force to penetrate the vessel hull
- the collision must be in the exact location of the fuel tank
- the fuel tank must be full, or at least of volume whereby the fuel level is higher than the point of penetration.

The probability of this chain of events aligning to result in a breach of fuel tanks resulting in a spill that could potentially affect the marine environment is considered highly unlikely.

The environmental risk analysis and evaluation undertaken identified and assessed a range of potential scenarios that could result in a loss of vessel structural integrity and damage could occur to fuel oil storage tank(s) resulting in a loss of marine diesel to the marine environment (**Table 12-1**).The scenarios considered damage to single and multiple fuel storage tanks in the project vessels due to various combinations of vessel to vessel collisions

The scenario considered was a collision between the PIV or support vessel or with a third party vessel (i.e.

commercial shipping, other petroleum related vessels and commercial fishing vessels). The likelihood was assessed as being highly unlikely given standard vessel operations and equipment in place to prevent collision at sea, the nature of the activities the PIV and support vessels would be undertaking (low vessel speed), the establishment of exclusion areas and the construction and placement of storage tank. The largest tanks of a support vessel and a PIV are unlikely to exceed 105 m^3 and 550 m^3 respectively.

Table 12-1 Operational Area Credible Spill Scenarios for Hydrocarbon Spill as a Result of Loss of Vessel Structural Integrity

Scenario	Marine Diesel Volumes	Preventative and Mitigation Controls	Credibility	Max. Possible Volume loss (m^3)
Breach of PIV fuel tanks due to collision with a project vessel	PIV has multiple isolated tanks, largest volume of a single tank is likely to be < 500 m^3	Tank locations midship (not bow or stern). For the majority of Petroleum Activities Program the PIV will be holding location during ROV activities. The PIV may steam from one location to another within the Operational Area at ~ 12 knots; however, normal maritime procedures would apply during such vessel movements.	**Not credible** Collision with support vessels at slow speeds is highly unlikely and if did occur is highly unlikely to result in a breach of support vessel (low energy contact from slow moving vessel)	0
Breach of support vessel fuel tanks due to support vessel – third party vessel collision including commercial shipping/ fishing	Support vessel has multiple tanks typically ranging between 22-105 m^3 each.	Typically double wall, tanks which are located mid ship (not bow or stern) Vessels are not anchored and steam at low speeds when relocating within Operational Area or providing stand-by cover. Normal maritime procedures would apply during such vessel movements	**Credible** Support vessel – third party vessel collision could potentially result in the release from a fuel tank	105 m^3
Breach of PIV fuel tanks due to collision with third party vessel, including commercial shipping and fishing.	PIV has multiple isolated tanks, largest volume of a single tank is likely to be < 550 m^3	Tank locations midship (not bow or stern). For the majority of Petroleum Activities Program the PIV will be holding location during ROV activities. The PIV may steam from one location to another within the project area at ~ 12 knots; however normal maritime procedures would apply during such vessel movements.	**Credible** PIV – third party vessel collision could potentially result in the release forma fuel tank	550 m^3 (volume for modelling)
Dropped object from back-loading/ offloading operations rupturing the PIV or heavy lift vessel fuel tanks (e.g. a container or piece of equipment)	PIV and heavy lift vessel has multiple isolated tanks, largest volume of a single tank is likely to be < 550 m^3	The draught of the vessels and location of tanks in terms of water line prevent the tanks from being breached.	**Not credible** No direct pathway to tanks from dropped objects.	0

Quantitative Hydrocarbon Risk Assessment

The largest credible scenario for this Petroleum Activities Program is considered to be the release of 550 m^3 of marine diesel. Woodside commissioned RPS APASA to undertake hydrocarbon spill modelling to determine the fate of an

instantaneous spill of 550 m^3 of marine diesel. A total of 200 simulations were modelled with each simulation tracked for 42 days. The modelling was undertaken over all seasons to address the risk for any time of year. This approach provides comprehensive modelling on the worse-case credible scenario in the unlikely event of a vessel collision.

Hydrocarbon characteristics

Marine diesel is a mixture of both volatile and persistent hydrocarbons. Predicted weathering of marine diesel, based on typical conditions in the region, indicates that approximately 40% by mass would be expected to evaporate over the first day or two (**Figure 12-1**). After this time the majority of the remaining hydrocarbon is entrained into the upper water column. In calm conditions, entrained hydrocarbons are likely to resurface. Up to 95% of the spill volume is expected to evaporate over time. The remaining 5% is persistent and will reduce in concentration through degradation and dissolution.

Given the environmental conditions experienced in the Operational Area, marine diesel is expected to undergo rapid spreading and this, together with evaporative loss, will result in a rapid dissipation of the spill. Marine diesel distillates tend not to form emulsions at the temperatures found in the region. Therefore there is no potential for the spill to extend beyond a localised area around the release site. The characteristics of the marine diesel used in the modelling are given in **Table 12-2**.

Table 12-2 Characteristics of the marine diesel used in the modelling

Hydrocarbon Type	Initial Density (kg/m^3) at 15˚C	Viscosity (cP @ 25˚C)	Component BP (˚C)	Volatiles <180	Semi volatiles 180-265	Low Volatility (%) 265-380	Residual (%) >380
				Non-Persistent			Persistent
Marine diesel (surrogate for marine gas oil – MGO)	829.1	4.0	% of total	6	34.6	54.4	5

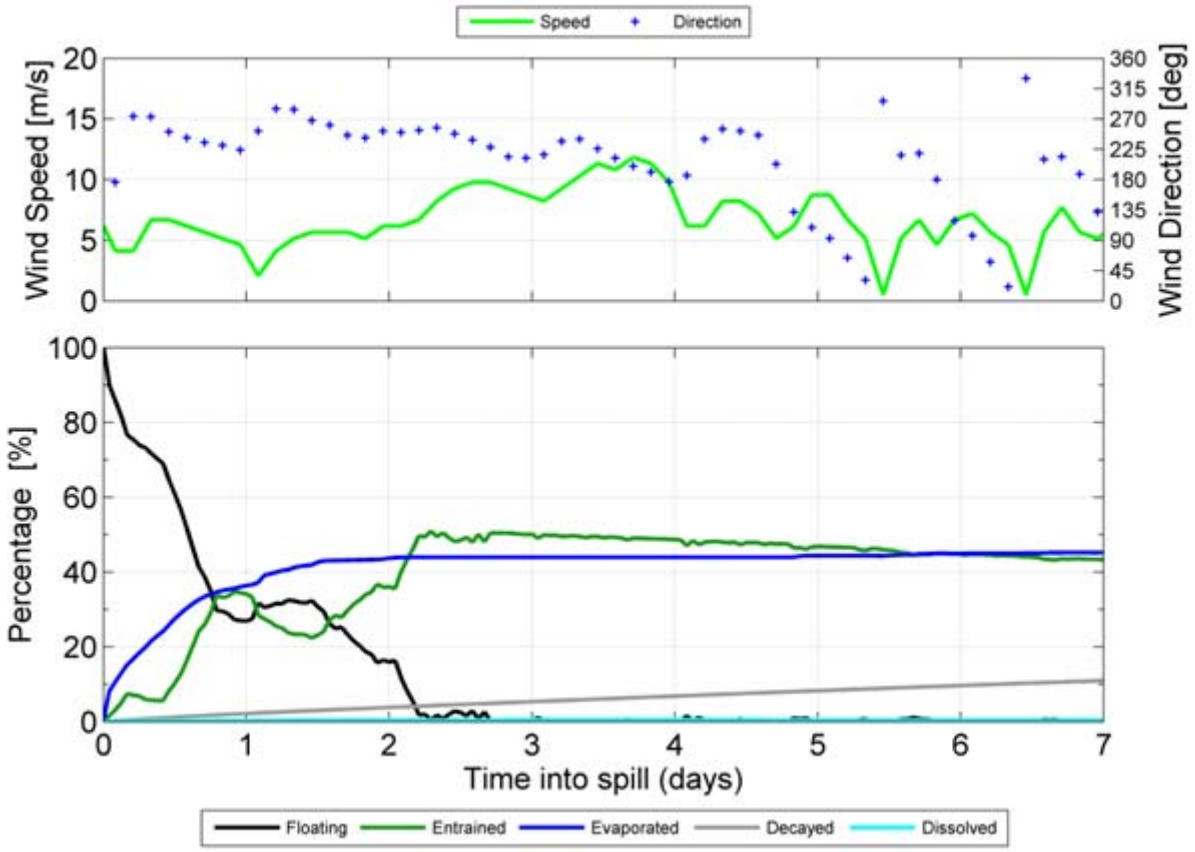

Figure 12-1 Proportional mass balance plot representing weathering of a surface spill of marine diesel

Potential Impact Assessment
Potential Impacts Overview
Zone of Consequence In the event this worse-case vessel collision scenario occurred, a surface hydrocarbon slick would form down current of the release location with the trajectory dependent on prevailing wind and current conditions at the time. The modelling indicates locations within reach of surface hydrocarbon ZoC are restricted to offshore areas with the model results showing concentrations occurring up to approximately 70 km away, with the main drift direction either towards the northeast or southwest. **Entrained hydrocarbons:** In the event this worse-case vessel collision scenario occurred, a plume of entrained hydrocarbons would form down current of the release location with the trajectory dependent on prevailing current conditions at the time. The modelling indicates locations within reach of entrained hydrocarbon ZoC are restricted to offshore areas up to approximately 190 km from the release site with the main drift direction either towards the northeast or southwest. Waters in the upper reaches of the water column with above threshold concentrations were predicted to contact Rankin Bank and the Montebello CMR. No contact above threshold concentration was predicted at the water depths at which Rankin Bank is situated. **Dissolved hydrocarbons**: Dissolved hydrocarbons above threshold concentrations (> 500 ppb) were not predicted by the modelling to occur at any location. Therefore, no contact with any sensitive receptors is predicted, and a ZoC figure is not presented. **Accumulated hydrocarbons**: Accumulated hydrocarbons above threshold concentrations (> 100 g/m^2) were not predicted by the modelling to occur at any location. **Summary of potential impacts** In the unlikely event of a spill of marine diesel as a result of vessel collision, the ZoC will remain small and localised, restricted to the open ocean only (Commonwealth waters). Consequently, a ZoC summary table is not presented. Waters in the upper reaches of the water column containing entrained hydrocarbons > 500 ppb may contact the waters above Rankin Bank and enter the north-west corner of the Montebello CMR.
Summary of Potential Impacts to protected species, other habitats and communities, water quality, protected areas and socio-economic values.

General Impacts

A surface spill of marine diesel would be of short duration and relatively localised. There is the potential for the spill to affect transiting fauna within the spill affected area through fouling or inhalation of toxic vapours (surface slicks), and ingestion of hydrocarbons and contaminated prey (surface slicks and entrained hydrocarbons). Such impacts may lead to irritation of sensitive membranes and skin, contamination of organs and tissues, and in some cases, mortality.

Impacts to water quality may include hydrocarbon contamination to levels above background levels and/or national/international quality standards; however, such impacts to water quality would be short term and highly localised.

Socio-economics impacts may include temporary exclusion zones that would affect commercial fishing and recreational fishing and tourism (considered highly unlikely to occur in the ZoC), including the potential for subsequent economic impacts on commercial fishing and tourism operators, if they were planning on undertaking activities within the area of the spill.

Detailed Assessment of Impacts

Details of impacts specific to a spill of marine diesel associated with the Petroleum Activities Program are provided below. It is noted that the toxic components in marine diesel include alkylated naphthalenes which can be rapidly accumulated by marine biota including invertebrates such as marine oysters, clams, shrimp, as well as a range of vertebrates such as finfish. Marine diesel also contains additives that contribute to its toxicity.

Protected Species

Protected species may be encountered within the Operational Area and therefore, could be impacted by a marine diesel spill. No critical habitats or aggregation areas (feeding, breeding, resting) have been identified within the ZoC and it is therefore considered that protected species that are present will be in low numbers and predominantly transiting through the area.

Cetaceans

Marine mammals that have direct physical contact with entrained or dissolved aromatic hydrocarbons may suffer ingestion of hydrocarbons and inhalation of toxic vapours. This may result in the irritation of sensitive membranes such as the eyes, mouth, digestive and respiratory tracts and organs, impairment of the immune system or neurological damage (Etkins 1997; IPIECA 1995). If prey (fish and plankton) are contaminated, this can result in the absorption of toxic components of the hydrocarbons (PAHs). In a review of cetacean observations on relation to a number of large scale hydrocarbon spills, Geraci & Aubin (1988) found little evidence of mortality associated with hydrocarbon spills, however, behavioural disturbance (i.e. avoiding spilled hydrocarbons) was observed in some instances for several species of cetacean. This suggests that cetaceans have the ability to detect and avoid surface slicks.

In the event of a marine diesel spill as a result of a vessel collision within the Operational Area, surface and entrained hydrocarbons exceeding threshold concentrations may drift across the migratory routes of EPBC Act (Cth) listed whale species, including humpback whales and pygmy blue whales (north- and southbound migrations) and their respective BIAs.

Pygmy blue whales and humpback whales are known to migrate seasonally through the potential spill affected area for dissolved and entrained hydrocarbons. However, feeding during migrations is low level and opportunistic. As such, the opportunity for ingestion of hydrocarbons is low. Migrations of both pygmy blue whales and humpback whales are protracted through time and space (i.e. the whole population will not be within the ZoC), and as such, a spill resulting from a vessel collision is unlikely to affect an entire population.

A spill in June to October would coincide with humpback whale migration in the vicinity of the Operational Area. A spill in April to August or October to December would coincide with pygmy blue whale migration in the vicinity of the Operational Area. Double et al. (2014) suggest that pygmy blue whales migrate in offshore waters to the north of the Operational Area in approximately 200–1000 m of water.

A spill of marine diesel resulting from a vessel collision could result in a disruption to a portion of the humpback or pygmy blue whale populations. Such disruption could include behavioural impacts (e.g. avoidance of impacted areas), sub-lethal biological effects (e.g. skin irritation, irritation from ingestion or inhalation) and, in rare circumstances, death. However, such disruptions or impacts are not predicted to impact on the overall population viability of cetaceans within the ZoC. These species are expected to detect and avoid entrained spills. Given cetaceans are smooth skinned and hydrocarbons would not tend to adhere to body surfaces, the biological consequences of physical contact with hydrocarbons is likely to be in the form of irritation and sublethal stress.

Individual pygmy blue whales and humpback whales may occur in the Operational Area during their migration periods; the relatively small ZoC and the rapid dispersion of marine diesel indicates that any potential impacts will be low and temporary in nature, and of no consequence at a population level.

Marine Turtles

Adult sea turtles exhibit no avoidance behaviour when they encounter hydrocarbon slicks (Odell and MacMurray, 1986). Contact with surface slicks, or entrained hydrocarbons, can therefore, result in hydrocarbon adherence to body surfaces (Gagnon and Rawson, 2010) causing irritation of mucous membranes in the nose, throat and eyes leading to

inflammation and infection (NOAA 2010). Oiling can also irritate and injure skin which is most evident on pliable areas such as the neck and flippers (Lutcavage *et al*, 1995). A stress response associated with this exposure pathway includes an increase in the production of white blood cells, and even a short exposure to hydrocarbons, such as crude oil, may affect the functioning of their salt gland (Lutcavage *et al*. 1995).

Hydrocarbons in surface waters may also impact turtles when they surface to breathe and inhale toxic vapours. Their breathing pattern, involving large 'tidal' volumes and rapid inhalation before diving, results in direct exposure to petroleum vapours which are the most toxic component of the hydrocarbon spill (Milton and Lutz, 2002). This can lead to lung damage and congestion, interstitial emphysema, inhalant pneumonia and neurological impairment (Etkins, 1997 and IPIECA, 1995).

Due to the absence of potential nesting habitat and offshore location (approximately 48 km from nesting beaches), the Operational Area is highly unlikely to represent important habitat for marine turtles. It is, however, acknowledged that the Operational Area overlaps with the flatback turtle internesting BIA for the Montebello Islands, which extends for ~80 km from known nesting locations. The Montebello/Barrow/Lowendal Islands Group is recognised as a significant rookery site for flatback turtles, and as such, this species may be present foraging in the waters within, and surrounding, the ZoC. During periods of increased nesting activity, marine turtles may be present transiting through, or nearby to, offshore open waters or transit the ZoC in low densities. However, the relatively small ZoC and the rapid dispersion and evaporation of marine diesel indicates that any potential impacts will be low and temporary in nature, and of no consequence at a population level**.**

Seasnakes

Impacts to seasnakes from direct contact with surface hydrocarbons are likely to result in similar physical effects to those recorded for marine turtles and may include potential damage to the dermis and irritation to mucous membranes of the eyes, nose and throat (ITOPF, 2011). They may also be impacted when they return to the surface to breathe and inhale the toxic vapours associated with the hydrocarbons, resulting in damage to their respiratory system.

In general, seasnakes frequent the waters of the continental shelf area, around offshore islands and potentially submerged shoals (water depths <100 m) and while individuals may be present in the Operational Area, their abundance is not expected to be high, given the deep water and offshore location of the activity. There is the potential for sea snakes to be present at submerged shoals within the ZoC, such as Rankin Bank. However, surface hydrocarbons above threshold concentrations are not expected to reach the waters surrounding Rankin Bank, and entrained concentration above 500 ppb are predicted to be restricted to the upper reaches of the water column at Rankin Bank. Therefore, a hydrocarbon spill may have a minor disruption to a portion of the population, however, there is no threat to overall population viability.

Sharks (including whale sharks) and Rays

Hydrocarbon contact may affect whale sharks through direct physical coating (surface slicks) and ingestion (surface slicks and entrained/dissolved hydrocarbons), particularly if feeding. Whale sharks may transit offshore open waters when migrating to and from Ningaloo Reef, where they aggregate for feeding from March to July. Whale sharks may also carry out opportunistic feeding in offshore waters and the Operational Area, and therefore the ZoC. The ZoC and Operational Area overlaps a whale shark BIA within which, whale sharks are seasonally present between April and October. Therefore, individual whale sharks that have direct contact with hydrocarbons within the spill affected area may be impacted but the consequences to migratory whale shark populations are likely to be minor.

Impacts to sharks and rays may occur through direct contact with hydrocarbons and contaminate the tissues and internal organs, either through direct contact or via the food chain (consumption of prey). In the offshore environment, it is probable that pelagic shark species are able to detect and avoid surface waters underneath hydrocarbon spills by swimming into deeper water or away from the affected areas. Therefore, any impact on sharks and rays is predicted to be minor and only a temporary disruption.

Seabirds

Offshore waters are potential foraging grounds for seabirds associated with the coastal roosting and nesting habitat. There are confirmed foraging grounds off the Barrow/Montebello/Lowendal Island Group. The Operational Area overlaps with the wedge-tailed shearwater foraging area BIA during its breeding season (August to April). Seabirds and migratory shorebirds (such as the southern giant petrel, Australian fairy tern and osprey) that come into contact with surface slicks at or above 10 g/m^2,can ingest hydrocarbons through contaminated prey resulting in reduced survival and lifetime reproductive success (Wiese et al 2001). Therefore, a hydrocarbon spill may result in impacts on feeding habitat and a disruption to a portion of foraging habitat, but this is not expected to result in a threat to the overall population viability of seabirds or shorebirds.

Other habitats and communities

There is the potential for plankton communities, including planktonic larval stages of marine fauna such as fishes (including commercially important species), to be impacted by a marine diesel spill where entrained hydrocarbon threshold concentrations are exceeded, however, communities are expected to recover quickly (weeks/months) due to high population turnover (ITOPF 2011). Impacts to larval stages of marine fauna such as fishes, molluscs and crustaceans are very unlikely to result in decreased recruitment of such species given the nature and scale of the ZoC (relatively small and primarily surface waters) and the broadly represented planktonic habitat. Additionally, no species are known to be endemic to the Operational Area or ZoC; population scale impacts by a spill affecting planktonic larvae will not occur. With the relatively small ZoC and given the fast population turn-over of open water plankton

populations, it is considered that any potential impacts will be low and temporary in nature.

Fish populations in the open water offshore environment of the Operational Area are highly mobile and have the ability to move away from a marine diesel spill. The spill affected area will likely be confined to the upper surface layers, and is therefore unlikely to impact demersal fish species, including the continental slope demersal fish communities KEF. It is therefore unlikely that fish populations would be exposed to hydrocarbon contamination. Fish populations are likely to be distributed over a wide geographical area so impacts on populations or species level are considered to be highly unlikely. Combined with these factors and the relatively small ZoC and the rapid dispersion of marine diesel, it is considered that any potential impacts will be low.

Impacts to benthic organisms, including the infauna and epifauna discussed in Section 4.5.1, are not expected, given that entrain hydrocarbon concentrations above 500 ppb are predicted to be restricted to the upper water column.

Submerged Shoals

The submerged shoal features of Rankin Bank (approximately 43 km north-east of the Operational Area) are not expected to have contact with entrained hydrocarbons > 500 ppb in the event of a diesel spill, however, the surface layer waters above Rankin Bank are predicted to be contacted by entrained hydrocarbons > 500 ppb. These permanently submerged seabed habitats, which represent sensitive open water benthic community receptors, extend from deep depths to as shallow as approximately 18 m. Due to the nature of any marine diesel release that may reach Rankin Bank, resulting in surface and entrained hydrocarbons within the upper water layers, this would preclude contact with benthic biota (such as coral communities and resident fish populations).

Air breathing reptiles such as sea snakes and turtles which may be resident (sea snakes, only) or frequent the shoals to forage periodically would be vulnerable to potential impacts from surface and entrained hydrocarbons in the upper water layers.

Water quality

It is likely water quality will be reduced at the location of the spill to contamination levels above background levels and/or national/international quality standards; however, such impacts to water quality would be short term and highly localised in nature due to the relatively small ZoC and the rapid dispersion of marine diesel. The potential impact is therefore, considered low.

Protected areas

The ZOC is predicted to extend in to the north-west corner of the Montebello CMR, with entrained hydrocarbons (at or exceeding the set thresholds) predicted to contact the Montebello CMR. The environmental values of the Montebello CMR include habitat for seabirds, foraging areas for migrating whale sharks and marine turtles, and a migratory pathway for humpback whales. Potential impacts to protected species that may be present in the offshore waters of the CMR are described above. Potential impacts to plankton and fish populations and water quality as relevant to the CMR are also described above.

The benthic habitats of the CMR, such as shelf and slope habitats, pinnacle and terrace seabed features and the Ancient coastline at 125 m depth contour KEF are not expected to be impacted by a surface release of marine diesel as a result of a vessel collision, as hydrocarbon spill modelling indicates entrained hydrocarbons would be restricted to the upper water column.

Therefore, impacts to the environmental values within the Montebello CMR would be temporary and highly localised in nature due to the relatively small ZoC and the rapid dispersion of marine diesel. The potential impact is therefore, considered low.

Surface and entrained hydrocarbons at or above threshold concentrations are not predicted to contact the Montebello/Barrow Islands Marine Conservation Reserves. Potential impacts to the sensitivities and habitats of the reserves are considered highly unlikely. Marine fauna that may use the reserves, and hence, pass through the ZoC on transit to the reserves, has been identified and the potential impacts to these fauna if coming into contact with the ZoC are described above. Therefore, the potential for impact to the Montebello/Barrow Islands Marine Conservation Reserve is considered highly unlikely.

Socio-economic

A marine diesel spill is considered unlikely to cause significant direct impacts on the target species fished by the Commonwealth Northwest Slope Trawl fishery and the Pilbara Trawl, Trap and Line fishery component of the Northern Demersal Scalefish fishery. These fisheries target species (demersal finfish and crustacean) that inhabit waters in the range of >60 - 200 m depth and any in-water hydrocarbons are likely to be confined to the upper surface layers. The tuna fisheries (Western Tuna and Billfish, Skipjack Tuna, Southern Bluefin Tuna) for which limited fishing activity has occurred in this area in recent years and the Western Australian Mackerel fishery target pelagic fish species. Adult pelagic fish species are highly mobile and have the ability to move away from the spill affected area or avoid surface waters. The relatively small spill affected area and temporary nature of the predicted marine diesel spill would infer that it is unlikely the hydrocarbon concentrations in the upper surface layers would lead to potential exposure of pelagic or demersal fish to contamination. Given these pelagic and demersal species are distributed over a wide geographical area, the impacts at the population or species level are considered very minor in the unlikely event of a marine diesel spill. However, there is potential that a fishing exclusion zone would be applied in the area of the spill, which would put a temporary ban on fishing activities and therefore potentially lead to subsequent economic impacts on commercial fishing operators if they were planning on undertaking fishing within the area of the spill.

Limited recreational fishing and tourism takes place in the offshore waters of the Operational Area.

Summary of potential impacts to environmental values

In the unlikely event of an unplanned hydrocarbon release to the marine environment due to vessel collision, combined with the adopted controls, it is considered that any potential impact would be localised, and short term in nature to water quality in comparison to background levels and/or international standards with localised, and temporary impacts to habitats, portions of populations and socio-economic concerns.

The overall environmental consequence is defined as F, as outlined below.

Value	Potential Consequence	Rank	Explanation
Protected species	Minor and temporary disruption or impact on a small portion of the population. No threat to overall population viability	F	A marine diesel spill will be of a short duration and relatively localised. However, as the timing and location of the Petroleum Activities Program may coincide with the pygmy blue whale and humpback whale northern and southern migration, there is the potential for individuals to come into contact with the localised ZoC.
Other communities /habitats	Localised and short-medium term effect on community/habitat structure. Full recovery expected.	F	There is the potential for plankton communities that may potentially be impacted by a marine diesel spill where dissolved or entrained hydrocarbon threshold concentrations are exceeded, but communities are expected to recover quickly (weeks/months) due to high population turnover refuge and a source of prey items for fish assemblages.
Water quality	Minor and/or short term contamination above background levels and/or national/international quality standards	F	Based on the exceedance of hydrocarbon thresholds for ecological impacts if a spill occurs, water quality impacts to marine waters (direct temporary contamination) will occur in offshore, open waters, only.
Socio-economic	Minor, temporary impact on commercial fishery operators	F	There is the potential that a fishing exclusion zone would be applied in the area of the spill, which would put a temporary ban on fishing activities and therefore, potentially lead to subsequent economic impacts on commercial fishing operators if they were planning on undertaking fishing within the area of the spill.
Protected areas	Minor and short term effect on one or more of the protected areas values. Full recovery expected.	F	Potential for short term contamination of pristine water quality of the Montebello CMR.

Summary of Control Measures

- Vessels compliant with Marine Order 30 (Prevention of Collisions) 2009
- Vessels compliant with Marine Order 21 (Safety of navigation and emergency procedures) 2012
- Notify AHS to generate a temporary MSIN and temporary NTM for activities where vessels will be in field >3 weeks
- AMSA RCC is notified 24- 48 hrs prior to commencement and within 48 hrs of completion of vessel activities for removal of RTM and subsea infrastructure
- All project vessels have undertaken a Woodside Marine Assurance Inspection (or equivalent) to review compliance with marine laws and Woodside safety and environment requirements.

Unplanned hydrocarbon release: Loss of well integrity

Impacts and Risks Evaluation Summary												
Potential Source of Risk	Environmental Value Potentially Impacted									Evaluation		
	Water Quality	Marine Sediment Quality	Air Quality	Marine Primary Producers	Other Habitats & Communities	Protected Species	Soil & Groundwater	Socio-Economic	Protected Areas	Consequence	Likelihood	Residual Risk
Hydrocarbon release to the marine environment due to a loss of well containment.	X	X				X		X		**E**	**1**	**L**

Description of Potential Source of Risk

Background

A loss of well integrity is an uncontrolled release of reservoir hydrocarbon or other well fluids to the marine environment, resulting from an over-pressured formation fluid (hydrocarbon). Woodside has identified a well leak as the most credible worse-case scenario as a result of loss of well integrity.

Credible scenario – 'loss of well containment'

Prior to FPSO sail away, the subsea production system was flushed with treated seawater and all wells shut in by the closure of the production master valve (PMV) and production wing valve (PWV) on the subsea tree as well as the SCSSV. All valves were confirmed as meeting leak off-acceptance criteria in March 2016 following shut in. Given the absence of hydraulics to open the valve following FPSO sail away, a catastrophic well blowout has been deemed not credible. The remaining credible scenario is considered to be:

- A loss of well integrity, following removal or complete failure of the xmas tree (from dropped object or anchor drag) accompanied by a partial failure of the SCSSV, resulting in an instantaneous release of 4.2m^3 followed by an ongoing release of 5.76 m^3 per day of Balnaves crude oil.

This scenario is considered the maximum credible spill scenario. Smaller releases may occur, however such releases are considered to be covered in the assessment of this maximum credible spill scenario. For BAL-6H an equivalent ongoing release volume could occur through current leak paths if the primary barriers fail. This scenario is also covered in the assessment of this maximum credible spill scenario.

Quantitative hydrocarbon spill modelling – 'loss well integrity'

Spill modelling was undertaken by RPS APASA, on behalf of Woodside, to determine the fate of hydrocarbon released for the loss of well integrity scenario, based on the assumptions in **Table 12-3**. Modelling was undertaken over all seasons to address the Petroleum Activities Program potentially occurring at any time of the year.

Table 12-3: Summary of credible scenario-loss of well integrity

	Loss of well integrity
Total discharge at Seabed	Initial instantaneous release of 4.2 m^3 Ongoing release of 5.76 m^3 per day for 77 days from time of detection
Water Depth	135 m
Fluid	Balnaves crude oil

Three deterministic simulations with durations of 180 days each were modelled, commencing in different seasons to account for seasonality. This allowed for the estimation of time taken for floating or entrained concentration above thresholds to drop below thresholds (10 g/m^2 and 500 ppb respectively), and determination of the distance from the release point at which this occurs for each simulation. As each simulation indicated that the released hydrocarbon is highly likely to disperse in close proximity to the release location, and that threshold concentrations (10 g/m^2 for surface hydrocarbons and 500 ppb for entrained and dissolved hydrocarbons) were not exceeded after day one of the release, stochastic modelling was not considered necessary.

Hydrocarbon Characteristics

Balnaves crude oil is considered a light oil. The characteristics of Balnaves crude oil are presented in **Table 12-4**.

Table 12-4: Characteristics of Balnaves crude oil

Oil Type	Density (g/cm3)	Viscosity (CP)	Component	Volatile (%)	Semi-Volatile (%)	Low Volatility (%)	Residual (%)	Aromatics (%)
			Boiling Point (°C)	< 180 C4 to C10	180-265 C11 to C15	265-380 C16 to C20	> 380 > C20	Of whole oil < 380 °C BP
Balnaves crude oil	0.780	1.399 (at 20°C)	% of total	46.0	20.0	20.0	14.0	5.3
			% of aromatics	0.9	3.7	0.7	-	-

Table 12-4indicates that approximately 66% (volatile and semi-volatile components) of the mass exposed to the atmosphere is predicted to evaporate over the first two days of the release, depending on the prevailing conditions. Upon reaching the surface, the heavier (low volatility) components are likely to entrain in the upper water column and may resurface in certain conditions. The residual component (14%) may remain on the sea surface or entrained in the water column for an extended period.

Subsea Plume dynamics

Table 12-5 shows a summary of the input parameters for the OILMAP Deep model. **Table 12-6** and **Table 12-7** show the outputs from OILMAP Deep. Two gas to oil ratios (GOR) were investigated.

Table 12-5: Inputs for OILMAP Deep model, for subsea loss of well integrity

Variable	Balnaves crude oil
Release Depth (m)	135 m
Hydrocarbon temp (C°)	98°C
Gas:oil ratio (scf/bbl)	Varies – two GORs investigated
Hydrocarbon flow rate (m^3)	Initial instantaneous release of 4.2 m^3 Ongoing release of 5.76 m^3 for 180 days
Diameter of exit hole (m)	0.178 m

Table 12-6: Output parameters for the initial subsea release of 4.2 m^3 of Balnaves crude oil

OILMAP	Parameter	GOR 1	GOR 2
Inputs	Gas:oil ratio (scf/bbl)	1,602	1,610.3
	Oil flow rate (m^3)	4.2	4.2
Outputs	Plume diameter (m)	8.8	8.8
	Plume height (m ASB)	Surface	Surface
	Plume initial rise velocity (m/s)	2.30	2.30
	Plume terminal rise velocity (m/s)	1.61	1.62
Predicted oil droplet size distribution	16.5% droplets of size (µm)	230.1	228.7
	26.0% droplets of size (µm)	460.2	457.5
	23.6% droplets of size (µm)	690.3	686.2
	17.2% droplets of size (µm)	920.4	914.9
	10.7% droplets of size (µm)	1,150.5	1,143.7
	6.0% droplets of size (µm)	1,380.7	1,372.4

Table 12-7: Output parameters for the ongoing subsea release of 5.76 m^3 of Balnaves crude oil

OILMAP	Parameter	GOR 1	GOR 2
Inputs	Gas:oil ratio (scf/bbl)	1,602	1,610.3
	Oil flow rate (m^3)	5.76	5.76
Outputs	Plume diameter (m)	11.2	10.8
	Plume height (m ASB)	49.3	49.3
	Plume initial rise velocity (m/s)	0.68	0.68
	Plume terminal rise velocity (m/s)	0	0
Predicted oil droplet size distribution	16.5% droplets of size (µm)	1,666.7	1,666.7
	26.0% droplets of size (µm)	3,333.3	3,333.3
	23.6% droplets of size (µm)	5,000.0	5,000.0
	17.2% droplets of size (µm)	6,666.7	6,666.7
	10.7% droplets of size (µm)	8,333.3	8,333.3
	6.0% droplets of size (µm)	10,000.0	10,000.0

For the initial release, the plume is predicted to reach the surface, and hydrocarbon droplets entrained within the plume will initially be mixed into the surface layer of the water column. For the ongoing release, the plume is predicted to reach a trapping height within the water column, with the entrained hydrocarbon droplets then potentially rising to the surface at a rate determined by their buoyancy relative to the surrounding water density. There are only minor differences in the plume characteristics and oil droplet sizes for each of the gas-to-oil ratios.

Potential Impact Assessment

Potential Impacts Overview

Zone of Consequence

Surface Hydrocarbons: Hydrocarbon spill modelling results indicated that the ZoC for surface hydrocarbons ≥ 10 g/m^2 would remain small and localised, restricted to the offshore Commonwealth waters of the Operational Area. No sensitive receptor locations are predicted to be contacted by surface hydrocarbons ≥ 10 g/m^2, including the open waters of the Montebello CMR

Entrained Hydrocarbons: Hydrocarbon spill modelling results indicated that the ZoC for entrained hydrocarbons ≥ 500 ppb would remain small and localised, restricted to the offshore Commonwealth waters of the Operational Area. No sensitive receptor locations are predicted to be contacted by entrained hydrocarbons ≥ 500 ppb.

Dissolved Hydrocarbons: Dissolved hydrocarbons above threshold concentrations (> 500 ppb) were not predicted by the modelling to occur at any location. Therefore, no contact with any sensitive receptors is predicted, and a ZoC figure is not presented.

Accumulated hydrocarbons: Accumulated hydrocarbons above threshold concentrations (> 100 g/m^2) were not predicted by the modelling to occur at any location.

Summary of potential impacts

In the unlikely event of a well loss of integrity, the ZoC will remain small and localised, restricted to the open ocean only (Commonwealth waters) within the Operational Area. Consequently, a ZoC summary table is not presented.

Summary of Potential Impacts to protected species, other habitats and communities, water quality, marine sediment quality and socio-economic values

The potential biological and ecological impacts associated with hydrocarbon spills are presented in vessel collision release scenario assessed above, further detail on impacts specific to a release of Balnaves crude oil as a result of a loss of well integrity are provided below.

The biological consequences of such a small volume spill on identified open water sensitive receptors relate to the potential for minor impacts to megafauna, plankton and fish populations (surface and water column biota) that are within the spill affected area and minor impacts to commercial fisheries are expected (e.g. localised temporary closure). Modelling indicates that a pressurised release of Balnaves crude oil would atomise into droplets that would be transported into the water column. As a result the extent of potential impacts to the seabed area at and surrounding the release site would be confined to a highly localised footprint. Marine sediment quality may be reduced (contamination above national/international quality standards) as a consequence of hydrocarbon contamination for a very small area within the immediate release location. Therefore the values of the ancient coastline at 125 m depth contour are not expected to be impacted, and the continental slope demersal fish communities KEF is outside the ZoC.

The extent of the ZoC associated with this scenario will be reduced in terms of spatial and temporal scales, and hence potential impacts are considered low.

Summary of potential impacts to environmental values

In the unlikely event of an unplanned hydrocarbon release from a loss of well integrity to the marine environment, combined with the adopted controls, it is considered that any potential impacts will not be greater than minor and temporary contamination of water quality which may lead to toxic effects on marine biota in offshore waters, and minor and temporary disruption to protected species such as oiling of marine mammals, reptiles and seabirds.

The consequence ranking for water quality was considered to be an E with all other environmental values considered to be an F (refer to the table below).

Value	Potential Consequence	Rank	Explanation
Protected species	Localised and short-medium term effect on community/habitat structure. Full recovery expected.	F	The ZoC from a loss of well containment is expected to be highly localised. There is potential to affect transiting megafauna within the spill affected area.
Other communities /habitats	Localised and short-medium term effect on community/habitat structure. Full recovery expected.	F	Benthic infauna communities and epifauna in close proximity to the release location may be affected, however, the broader benthic community to the release location are unlikely to be affected by a hydrocarbon spill. Planktonic communities may be impacted, however are expected to recover rapidly with no long-term effects. Demersal fish species in the vicinity of the release location may be exposed to hydrocarbons, however, the impact is expected to be localised and short term while impacts to pelagic fish species are likely to be negligible due their motility and the small size of the ZoC.
Water quality	Minor and/or short term contamination above background levels and/or national/international quality standards	E	Based on the exceedance of hydrocarbon thresholds for ecological impacts if a spill occurs, water quality impacts to marine waters (direct temporary contamination) will likely occur in a localised area of offshore, open waters, only.
Marine sediment quality	Medium to short-term contamination above background and/or national/international quality standards and/or known biological effect concentrations on	F	Possible exceedance of defined hydrocarbon thresholds for marine sediment if a hydrocarbon release occurs thereby resulting in marine sediment impact, short contamination, on the scale of <2 km from the release location.

	scale >2 km.		
Socio-economic	Minor, temporary impact on commercial fishery operators	F	There is the potential that a fishing exclusion zone would be applied in the highly localised area of the spill, which would put a temporary ban on fishing activities and therefore potentially lead to subsequent economic impacts on commercial fishing operators if they were planning on fishing within the area of the spill.

Summary of Control Measures

- Prevention of loss of integrity by:
  - Isolation of wells at subsea tree valves and SCSSV Leak off tests confirmed subsea tree and SCSSV valves passed acceptance criteria
- Wells inspected in accordance with Woodside's accepted Well Operations Management Plan (WOMP) to ensure well integrity of the wells.
- Risk management process will identify, assess, mitigate and manage well integrity risks.
- Prevention of loss of integrity by Safe Work Procedures developed to prevent dropped objects
- Subsea first response toolkit available for use
- Mutual Aid MoU (for relief well drilling) is in place.
- Well Blowout Contingency Planning: an approved Blowout Contingency Plan shall exist prior to commencement of the Petroleum Activities Program, including: feasibility and any specific considerations for relief well kill.

Unplanned hydrocarbon release: Bunkering

Impacts and Risks Evaluation Summary												
Potential Source of Risk	Environmental Value Potentially Impacted									Evaluation		
	Water Quality	Marine Sediment Quality	Air Quality	Marine Primary Producers	Other Habitats & Communities	Protected Species	Soil & Groundwater	Socio-Economic	Protected Areas	Consequence	Likelihood	Residual Risk
Loss of hydrocarbons to marine environment from bunkering.	X					X				F	1	**L**

Description of Potential Source of Risk

In line with conditions set by the Minister for the Environment under the Environmental Protection and Biodiversity Conservation Act (Cth) (EPBC 2011/6188) bunkering of marine diesel may occur within the Operational Area during daylight hours.

Credible Scenario

Two credible scenarios for the loss of containment of marine diesel during bunkering operations were identified:

- partial or total failure of a bulk transfer hose or fittings during bunkering, due to operational stress or other integrity issues could spill marine diesel to the deck and/or into the marine environment, in the order of <200 L, based on the likely volume of a bulk transfer hose (assuming a failure of the dry break and complete loss of hose volume).
- partial or total failure of a bulk transfer hose or fittings during bunkering, combined with a failure in procedure to shutoff fuel pumps, for a period of up to five minutes, resulting in approximately 8 m^3 marine diesel loss to the deck and/or into the marine environment

Quantitative Spill Risk Assessment

Woodside has commissioned RPS APASA to model several small marine diesel spills, including surface spill volumes of 8 m^3 in the offshore waters of northwest WA. The results of these models have indicated that exposure to surface hydrocarbons above the 10 g/m^2 threshold is limited to the immediate vicinity of the release site, with little potential to extend beyond 1 km. No entrained or dissolved hydrocarbons above 500 ppb are expected. Therefore, it is considered that exposure to thresholds concentrations from an 8m^3 surface spill from bunkering activities would be well within the ZoC for the vessel collision scenario detailed in the preceding vessel collision risk assessment. Given this, the offshore location of the Operational Area, and the fact that the same hydrocarbon type is involved for both scenarios, specific modelling for an 8 m^3 marine diesel release was not undertaken for this Petroleum Activities Program.

Hydrocarbon Characteristics

Refer to the preceding vessel collision risk assessment for a description of the characteristics of marine diesel, including detail on the predicted fate and weathering of a spill to the marine environment.

Potential Impact Assessment

Potential Impacts Overview

Zone of Consequence

Previous modelling studies for 8 m^3 marine diesel releases, spilt at the surface, as result of bunkering activities, indicated that the potential for exposure to surface hydrocarbons exceeding 10 g/m^2 was confined to within the immediate vicinity (approximately 1 km) of the release sites. Therefore, it is considered that there is no potential for contact with sensitive receptor locations above surface threshold concentrations (10 g/m^2) from an 8 m^3 spill of marine diesel within the Operational Area.

Potential Impacts to Protected Species and Water Quality

The potential biological and ecological impacts associated with much larger hydrocarbon spills are presented in the preceding vessel collision risk assessment, further detail on impacts specific to a spill of marine diesel from a bunkering loss are provided below.

The biological consequences of such a small volume spill on identified open water sensitive receptors relate to the potential for minor impacts to megafauna, plankton and fish populations (surface and water column biota) that are within the spill affected area and no impacts to commercial fisheries are expected. Please refer to the preceding vessel collision risk assessment (potential impacts of unplanned hydrocarbon release to the marine environment from vessel collision) for the detailed potential impacts; however, the extent of the ZoC associated with a marine diesel spill from loss during bunkering will be much reduced in terms of spatial and temporal scales, and hence, potential impacts from bunkering are expected to be low.

Summary of Potential Impacts to environmental values(s)

Given the adopted controls, it is expected that a bunkering spill will not result in a potential impact greater than minor and temporary contamination of water quality which may lead to toxic effects on marine biota in offshore waters, and minor and temporary disruption to protected species such as oiling of marine mammals, reptiles and seabirds.

Summary of Control Measures

- Compliance with MARPOL 73/78 Annex I, as applied in Australia under the Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983 (Part II Prevention of pollution from oil); and Marine Order 91 (Marine pollution prevention – oil) 2006, requires, where applicable
- A detailed bunkering plan and procedures will be developed for all vessels that will bunker in Operational Areas.

Unplanned hydrocarbon release: Accidental discharge of other hydrocarbons/chemicals from project vessel deck activities and equipment (e.g. cranes)

Impacts and Risks Evaluation Summary												
Potential Source of Risk	Environmental Value Potentially Impacted									Evaluation		
	Water Quality	Marine Sediment Quality	Air Quality	Marine Primary Producers	Other Habitats & Communities	Protected Species	Soil & Groundwater	Socio-Economic	Protected Areas	Consequence	Likelihood	Residual Risk
Accidental discharge of other hydrocarbons / chemicals from project vessel deck activities and equipment (e.g. cranes).	X					X				F	1	**L**

Description of Potential Source of Risk

Accidental discharge of other hydrocarbons/chemicals to the marine environment can result from deck spills originating from stored hydrocarbons/chemicals or equipment (e.g. cranes) on the project vessels.

Typically, project vessels store hydrocarbon/chemicals in various volumes (20 L, 205 L; up to approximately 4,000–6,000 L). Storage areas are typically set up with effective primary and secondary bunding to contain any deck spills. Releases from equipment are predominantly from the failure of hydraulic hoses, which can either be located within bunded areas or outside of bunded or deck areas (e.g. over water on cranes).

The ROV hydraulic fluid is supplied through hoses containing approximately 20 L of fluid. Hydraulic lines to the ROV arms and other tooling may become caught resulting in minor leaks to the marine environment. Small volume hydraulic leaks may occur from equipment operating via hydraulic controls subsea (subsea control fluid). These include the diamond wire cutter, bolt tensioning equipment and other ROV tooling. Data from previous Woodside activities demonstrates that spill are most likely to originate from hydraulic hoses and are typically less than 25 L.

Potential Impact Assessment

Potential Impacts to protected species, other communities and habitats and water quality

General Impacts

The potential impacts associated with the discharge of minor quantities of hydrocarbons or chemicals are described in the preceding risk assessment of discharges of minor quantities of chemicals and hydrocarbons.

Detailed Assessment of Impacts

The assessment of impacts from minor hydrocarbon and chemical releases is provided in the preceding risk assessment of discharges of minor quantities of chemicals and hydrocarbons.

Further details on potential biological and ecological impacts associated with hydrocarbon spills are presented in the preceding risk assessment of hydrocarbon spill resulting from a vessel collision.

An accidental deck spill of hydrocarbons or chemicals from the project vessels, or ROV hydraulic fluids leaks will decrease the water quality in the immediate area of the spill; however, the impacts are expected to be slight, temporary and very localised due to dispersion and dilution in the open ocean environment in the Operational Area.

In the event that individuals pass through the Operational Area during a release of it is likely they will exhibit avoidance behaviour and any impacts are expected to be localised and minor. In addition, given the small area of the potential deck spill or ROV hydraulic fluid leak, and the dilution and weathering of any such spill or release, the likelihood of ecological impacts to marine fauna (protected species), other communities and habitats is considered to be low.

Plankton populations in the upper surface layers may be affected in the immediate discharge; however, given the fast population turn-over of open water plankton populations, the potential ecological impacts are considered low. Therefore, localised, short-term and temporary impacts are predicted.

No impacts to commercial fisheries or KEFs are expected.

Summary of Potential Impacts to environmental values(s)

Given the adopted controls, it is considered that other hydrocarbon/chemical deck spills to the marine environment is unlikely to result in a potential impacts greater than localised and temporary effects to water quality and marine biota in offshore waters.

Summary of Control Measures

- Compliance with MARPOL 73/78 Annex I, as applied in Australia under the Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983 (Part II Prevention of pollution from oil); and Marine Order 91 (Marine pollution prevention – oil) 2006
- Chemicals that are on the CEFAS OCNS Ranked List of Notified Chemicals and have OCNS Hazard Quotient Gold, Silver, E and D and have no OCNS substitution warning do not require further assessment.

  All chemicals that are not on the CEFAS OCNS Ranked List of Notified Chemicals and all CEFAS OCNS listed chemicals which have a CEFAS OCNS substitution warning, a OCNS product warning or are OCNS Hazard Quotient white, blue, orange, purple, A, B or C require further assessment and an ALARP Chemical Justification prior to discharge.
- Chemicals will be stored safely and handled to prevent the release to the marine environment.
- Spill response bins/kits are maintained and located in close proximity to hydrocarbon storage areas and vessel deck equipment / bunkering areas for use to contain and recover deck spills.

Unplanned discharges: Loss of hazardous and non-hazardous waste

Impacts and Risks Evaluation Summary												
Potential Source of Risk	Environmental Value Potentially Impacted									Evaluation		
	Water Quality	Marine Sediment Quality	Air Quality	Marine Primary Producers	Other Habitats & Communities	Protected Species	Soil & Groundwater	Socio-Economic	Protected Areas	Consequence	Likelihood	Residual Risk
Accidental discharge of solid, liquid and hazardous wastes to marine environment from project vessels (excludes sewage, grey water, putrescible waste and bilge water).	X				X	X				F	1	**L**

Description of Potential Source of Risk

The project vessels generate a variety of hazardous and non-hazardous wastes, which have the potential to be lost overboard (primarily windblown or dropped overboard) if incorrectly disposed of or accidentally discharged.

Non-hazardous wastes include domestic and industrial wastes, such as aluminium cans, bottles, paper and cardboard and scrap steel. Hazardous wastes include recovered solvents, excess or spent chemicals, oil contaminated materials (e.g. sorbents, filters and rags), batteries and used lubricating oils. Sand may also be generated during clean-up operations and vessel maintenance.

Potential Impact Assessment

Potential Impacts to protected species, other communities and habitats and water quality

General Impacts

Improper management of hazardous or non-hazardous wastes on project vessels may result in pollution and contamination of the environment, in reduction of water quality and toxic effects to marine biota. There is also the potential for secondary impacts on marine fauna that may interact with wastes, such as packaging and binding, should these enter the ocean. Marine fauna can become entangled in waste plastics and waste plastics can be ingested when mistaken as prey (Ryan et al, 1988), and lead to injury and death of individuals.

Detailed Assessment of Impacts

Woodside's marine function has not reported any significant loss of solid wastes to the marine environment during the past 12 months of operations. Wastes that have been recorded as being lost (primarily windblown or dropped overboard) have included the loss of a wooden crate lid. These have occurred during back loading activities, periods of adverse weather and incorrect waste storage.

There are no critical habitats for protected species (including marine turtles, cetaceans and whale sharks) within the Operational Area, however it is reasonable to expect that transient individuals may pass through the area (including transient species of cetaceans, whale sharks or marine turtles).

As such, the temporary or permanent loss of waste materials from project vessels into the marine environment is not likely to have a significant environmental impact, based on the location of the Operational Area, the types, size and frequency of wastes that could occur and the frequency of species present. Any impacts are expected to be localised and minor.

Summary of Potential Impacts to environmental values(s)
Given the adopted controls, it is considered that the accidental discharge of solid, liquid and hazardous waste described will not result in a potential impact greater than minor and temporary effects to water quality and marine biota in offshore waters.
Summary of Control Measures
• Compliance with MARPOL 73/78 Annex V Garbage and Marine Order 95 (pollution prevention – garbage), as required by vessel class • Compliance with MARPOL 73/78 Annex III: Packaged Harmful Substances and Marine Order 94 (pollution prevention – packaged harmful substances) as required by vessel class • Recovery of dropped objects determine safe and practicable • Current Safety Data Sheets (SDS) for all hazardous materials readily available onboard vessels

Physical Presence: Vessel collision with marine fauna

Impacts and Risks Evaluation Summary												
Potential Source of Risk	Environmental Value Potentially Impacted									Evaluation		
	Water Quality	Marine Sediment Quality	Air Quality	Marine Primary Producers	Other Habitats & Communities	Protected Species	Soil & Groundwater	Socio-Economic	Protected Areas	Consequence	Likelihood	Residual Risk
Accidental collision between project vessels and threatened and migratory marine fauna.						X				F	1	L

Description of Potential Source of Risk

During the Petroleum Activities Program, project vessels will be present within the Operational Area for approximately 90 days. The presence of project vessels and removal of subsea infrastructure within the Operational Area may present a collision risk for marine fauna within the Operational Area.

Potential Impact Assessment

Potential Impacts to Protect Species

General Impacts

The presence and movement of project vessels may result in collisions between the vessel (hull and propellers) and marine fauna (including listed threatened or migratory species), potentially resulting in superficial injury, serious injury that may affect life functions (e.g. movement and reproduction) and mortality. The factors that contribute to the frequency and severity of impacts due to collisions vary greatly. This variance is due to vessel type, vessel operation (specific activity, speed), physical environment (e.g. water depth) and the type of animal potentially present; coupled with their behaviour.

Detailed Assessment of Impacts

Species presence in the Operational Area

The likelihood of vessel/whale collision being lethal is influenced by vessel speed; the greater the speed at impact, the greater the risk of mortality (Laist *et al*. 2001, Jensen & Silber 2003). Vanderlaan and Taggart (2007) found that the chance of lethal injury to a large whale as a result of a vessel strike increases from about 20% at 8.6 knots to 80% at 15 knots. Vessel collisions have been recognised as a threat in the most recent conservation management plan for the blue whale (Commonwealth of Australia 2015). Project vessels within the Operational Area are generally stationary or transiting at relatively low speeds (≤8 knots). Vessel-whale collisions at this speed are uncommon and, based on reported data contained in the US National Ocean and Atmospheric Administration (NOAA) database (Jensen and Silber 2003) there only two known instances of collisions when the vessel was travelling at less than 6 knots, both of these were from whale watching vessels that were deliberately placed amongst whales. Vessel collisions have been recognised as a threat in the most recent conservation management plan for the blue whale (commonwealth of Australia 2015).

There are no known key aggregation areas (resting, breeding or feeding) for threatened species located within or immediately adjacent to the Operational Area. However, the pygmy blue whale migration corridor BIA is just north of the Operational Area. Therefore, it is possible that the Petroleum Activities Program will overlap with the pygmy blue whale northern and southern migration seasons. This could result in pygmy blue whales transiting the Operational Area during these months.

Humpback whales may also transit through the Operational Area but this is more likely to be between the months of June and October. Other whale species known to frequent the area are expected in low numbers only.

Whale sharks may traverse offshore waters of the NWMR, including the Operational Area, during their migrations to and from Ningaloo Reef. A whale shark BIA is located along the 200 m isobath which traverses the Operational Area. However, it is expected that whale shark presence within the area would be of a relatively short duration and not of significant numbers given the main aggregations are recorded in coastal waters, particularly, the Ningaloo Reef edge.

A BIA for internesting flatback turtles (during summer) overlaps with the Operational Area. Although it is acknowledged that marine turtles may be present transiting the Operational Area, it is considered highly unlikely to

contain high numbers of turtles of any species, largely due to the known water depths (110 m – 160 m), lack of foraging habitat and distance from shore.

The project vessels operating in and around the Operational Area may present a potential hazard to cetaceans and other protected marine fauna such as whale sharks and marine reptiles. However, it is considered unlikely that vessel movement associated with the Petroleum Activities Program will have a significant impact on marine fauna populations given (1) the low presence of transiting individuals, (2) avoidance behaviour to vessels commonly displayed by whales, whale sharks and turtles and (3) low operating speed of the project vessels (generally less than 8 knots or stationary, unless operating in an emergency).

Summary of Potential Impacts to environmental values(s)

Given the adopted controls, it is considered that a collision, were it to occur, is unlikely to result in a potential impact greater than potential injury or fatality of an individual or a number of individuals of marine fauna.

Summary of Control Measures

- Woodside will comply with EPBC Act (Cth) Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans: Project vessels will not travel greater than 6 knots within 300 m of a whale (caution zone) and not approach closer than 100 m from a whale; and a vessel will not approach closer than 50 m for a dolphin and/or 100 m for a whale (with the exception of animals bow riding).
- Whale Shark Code of Conduct (DPaW 2013): Project vessels will not travel greater than 8 knots within 250 m of a whale shark (exclusive contact zone) and not allow the vessel to approach closer than 30 m of a whale shark.

Physical presence: Dropped object resulting in seabed disturbance

Impacts and Risks Evaluation Summary												
Potential Source of Risk	Environmental Value Potentially Impacted									Evaluation		
	Water Quality	Marine Sediment Quality	Air Quality	Marine Primary Producers	Other Habitats & Communities	Protected Species	Soil & Groundwater	Socio-Economic	Protected Areas	Consequence	Likelihood	Residual Risk
Dropped subsea infrastructure during laydown or removal activities Accidental sinking of the RTM					X					F	1	**L**

Description of Potential Source of Risk

During the Petroleum Activities Program, the controlled lifting and laydown of subsea infrastructure is expected to occur. During these activities there is the potential for subsea infrastructure to disturb the seabed. There is also the potential for objects to be dropped overboard from project vessels to the marine environment. The area of disturbance to the seabed that could result from dropping subsea infrastructure could range from relatively small (a 25 m long spool piece) to an area of 69 m2 (if the manifold was dropped), or a length of approximately 1,600 m if and 0.2 m diameter flowline was dropped during recovery.

During the Petroleum Activities Program, the RTM will be removed from the Operational Area. This will occur after mooring disconnect and re-ballasting is complete.

It is possible (but highly unlikely) that during de-ballasting and /or removal operations, the RTM may sink. Modelling of the de-ballasting operations will be completed to verify the procedure sequence and mitigate this risk. Handover procedure will be prepared and a suitable weather window will be required prior to commencement of operations.

In the highly unlikely event that the RTM sinks to the seabed, it will result in localised disturbance to the seabed at that location. The potential disturbance footprint of the RTM would be approximately 99 m in length and 6 m in diameter.

Potential Impact Assessment

Potential Impacts to other habitats and communities

General Impacts

Refer to the specific risk above for the general impacts associated with seabed disturbance.

Detailed Assessment of Impacts

The detailed assessment of impacts associated with seabed disturbance are discussed in the preceding risk assessment of disturbance to seabed from laydown and removal of RTM mooring chains and subsea infrastructure, and IMR and ROV activities.

With regard to cumulative impacts from seabed disturbance in relation to nearby oil and gas activities, the Julimar Operational Area is approximately 4 km away. Seabed disturbance associated with Julimar activities are expected to be confined to the Julimar Operational Area, and as such, are not considered from a cumulative impact perspective.

In the unlikely event that a piece of subsea infrastructure was dropped to the seabed, or the RTM was accidently sunk, such an event would add to the estimated seabed disturbance footprint for planned activities (approximately 1 km^2). However, additional disturbance would be confined to the Operational Area, within which the seabed consists of soft sediments, widely represented throughout the region. Therefore, any cumulative impacts would be minor, in addition to the expected disturbance footprint for planned activities.

Summary of Potential Impacts to environmental values(s)

Given the adopted controls and the predicted small footprint of a dropped object, it is considered that a dropped object will not result in a potential impact greater than localised short-term damage of benthic subsea habitats.

Significant cumulative impacts resulting from a dropped object are not expected.

Summary of Control Measures

- Project vessels Safe Work Procedures to prevent dropped objects.
- Recovery of dropped objects determine safe and practicable
- Personnel will be trained with regard to the prevention of dropped objects during relevant meetings and the appropriate inductions
- RTM de-ballasting carried out in accordance with approved RTM de-ballasting procedure (based on modelling of de-ballasting operations)
- RTM removal from the Operational Area conducted in accordance with approved RTM handover procedure

APPENDIX B: CONTROL MITIGATION MEASURES FOR POTENTIAL ENVIRONMENTAL IMPACTS ASSOCIATED WITH SPILL RESPONSE ACTIVITIES

Response Activity / Source of Potential **Risk**	**Resource/ Receptors** — **Physical**: Subsidence & Compaction	Land/ Sea Use	Sediment Quality/ Composition	Seabed Features/ Profile	Air Quality	Visibility	Ozone Layer	Climate	Marine Water Quality	Water Flow Characteristics (marine)	Terrestrial Noise Levels	Underwater Noise Levels	**Ecology**: Fish & Pelagic Communities	Benthic Marine Flora/ Fauna	Marine mammals	Marine Habitats	Communities/ Biodiversity	Coral Reefs	Sea Turtles	Seabirds	Natural Resource Depletion	Employment/ Income	**Human**: Public Health & Safety	Aesthetics	Tourism / Recreation	Cultural/ Historical Sites	Fishing	Navigation/ Traffic & Transport	**Potential Impact Description / Reference**	**Control Mitigation Measures**
Monitor and Evaluate																														
Air Emissions					■			■															■	■	■				Refer to Routine atmospheric emissions in Appendix A.	• Potential impacts of the response activities will be monitored and reported back for input into the daily planning and operational net environmental benefit analysis (NEBA) process. • Operational NEBAs will be undertaken to determine if there is net environmental benefit to continuing the response activity. SMP documentation including an SMP Operational Plan, SMP Implementation Plan and SMP Process and Methodology Guideline will be used to steer the SMP planning and execution. • The SMP will be continually reviewed and updated based on the situational awareness information generated by the OMPs.
Vessel operational discharges			■						■				■	■	■			■	■										Refer to Routine and non-routine discharges: Discharge of minor quantities of chemicals and hydrocarbons in Appendix A	
Vessel anchoring	■													■				■											Refer to Physical presence: Disturbance to the seabed from laydown and removal of RTM mooring chains and subsea infrastructure, and IMR and ROV activities in Appendix A	
Proximity to other vessels (shipping and fisheries)																									■		■	■	Refer to Physical presence: Proximity of the project vessels to third party vessels in Appendix A.	
Noise emissions												■	■		■				■										Refer to Routine acoustic emissions: Generation of noise from project vessels and helicopters in Appendix A.	
Lighting for night work/ navigational safety						■													■	■				■				■	Refer to Routine light emissions in Appendix A.	
Invasive Marine Species (IMS)													■	■	■	■	■	■	■	■							■		Invasive marine species (IMS) management was assessed as not being applicable to the Operational Area however, Woodside will assess and manage IMS risks for all vessels entering an IMS Management Area through the Woodside Invasive Marine Species Management Plan.	
Collisions with marine fauna															■					■									Refer to Physical Presence: Vessel collision with marine fauna in Appendix A	
Drilling of an Intervention Well																														
If required, risks, impacts and controls will be identified within a separate Well Operational Management Plan																														
Source Control																														
Air emissions					■			■															■	■	■				Refer to Routine atmospheric emissions in Appendix A.	• Deployment of the SFRT would

Response Activity / Source of Potential Risk	Resource/ Receptors: Physical: Subsidence & Compaction	Physical: Land/ Sea Use	Physical: Sediment Quality/ Composition	Physical: Seabed Features/ Profile	Physical: Air Quality	Physical: Visibility	Physical: Ozone Layer	Physical: Climate	Physical: Marine Water Quality	Physical: Water Flow Characteristics (marine)	Physical: Terrestrial Noise Levels	Physical: Underwater Noise Levels	Ecology: Fish & Pelagic Communities	Ecology: Benthic Marine Flora/ Fauna	Ecology: Marine mammals	Ecology: Marine Habitats	Ecology: Communities/ Biodiversity	Ecology: Coral Reefs	Ecology: Sea Turtles	Ecology: Seabirds	Human: Natural Resource Depletion	Human: Employment/ Income	Human: Public Health & Safety	Human: Aesthetics	Human: Tourism / Recreation	Human: Cultural/ Historical Sites	Human: Fishing	Human: Navigation/ Traffic & Transport	Potential Impact Description / Reference	Control Mitigation Measures
Vessel operational discharges			■						■				■	■	■			■	■										Refer to Routine and non-routine discharges: Discharge of minor quantities of chemicals and hydrocarbons in Appendix A	• Refer to Routine and non-routine discharges: Discharge of minor quantities of chemicals and hydrocarbons in Appendix A be controlled under Woodside's existing offshore construction management system and the relevant SFRT operating procedures. • Deployment of the capping stack would be controlled under the service provider's management system with overall control of the construction vessel(s) controlled by Woodside. • Woodside has a MoU with Australian offshore operators to provide mutual aid to facilitate and expedite mobilising a MODU and the intervention well would be drilled under a specific approved well delivery management plan with relevant regulatory approvals.
Vessel anchoring	■													■				■											Refer to Physical presence: Disturbance to the seabed from laydown and removal of RTM mooring chains and subsea infrastructure, and IMR and ROV activities in Appendix A	
Proximity to other vessels (shipping and fisheries)																									■		■	■	Refer to Physical presence: Proximity of the project vessels to third party vessels in Appendix A.	
Noise emissions												■	■		■				■										Refer to Routine acoustic emissions: Generation of noise from project vessels and helicopters in Appendix A.	
Invasive Marine Species (IMS)													■	■	■	■	■	■	■	■							■		Invasive marine species (IMS) management was assessed as not being applicable to the Operational Area however, Woodside will assess and manage IMS risks for all vessels entering an IMS Management Area through the Woodside Invasive Marine Species Management Plan.	
Waste generation/disposal		■															■												Refer to Unplanned discharges: Loss of hazardous and non-hazardous waste in Appendix A.	
Lighting for night work/ navigational safety						■													■	■				■				■	Refer to Routine light emissions in Appendix A.	
Collisions with marine fauna															■					■									Refer to Physical Presence: Vessel collision with marine fauna in Appendix A	
Oiled Wildlife Response																														
Air emissions					■			■															■	■	■				Refer to Routine atmospheric emissions in Appendix A.	• The Operational and Scientific Monitoring Plan outlines the programs that will apply during wildlife response. • Woodside will have access to trained personal and equipment through internal and external
Vessel operational discharges			■						■				■	■	■			■	■										Refer to Routine and non-routine discharges: Discharge of minor quantities of chemicals and hydrocarbons in Appendix A	
Vessel anchoring	■													■				■											Refer to Physical presence:	

Response Activity / Source of Potential Risk	Resource/ Receptors: Physical: Subsidence & Compaction	Land/ Sea Use	Sediment Quality/ Composition	Seabed Features/ Profile	Air Quality	Visibility	Ozone Layer	Climate	Marine Water Quality	Water Flow Characteristics (marine)	Terrestrial Noise Levels	Underwater Noise Levels	Ecology: Fish & Pelagic Communities	Benthic Marine Flora/ Fauna	Marine mammals	Marine Habitats	Communities/ Biodiversity	Coral Reefs	Sea Turtles	Seabirds	Human: Natural Resource Depletion	Employment/ Income	Public Health & Safety	Aesthetics	Tourism / Recreation	Cultural/ Historical Sites	Fishing	Navigation/ Traffic & Transport	Potential Impact Description / Reference	Control Mitigation Measures
	■													■				■												Disturbance to the seabed from laydown and removal of RTM mooring chains and subsea infrastructure, and IMR and ROV activities in Appendix A	arrangements. • Response personnel will be trained in appropriate techniques a have access to appropriate equipment to mitigate impacts associated with and Oiled Wildlife response. • Potential impacts of the response activities will be monitored and reported back for input into the daily planning and operational NEBA process. • Operational NEBAs will be undertaken to determine if there is net environmental benefit to continuing the response activity. • Implementation in accordance with the primary, secondary and tertiary response strategies outlined in the Pilbara Regional Oiled Wildlife Response Operational Plan. • Waste management contract for safe disposal of carcasses after necessary autopsies.
Proximity to other vessels (shipping and fisheries)																									■		■	■	Refer to Physical presence: Proximity of the project vessels to third party vessels in Appendix A.	
Noise emissions												■	■		■				■										Refer to Routine acoustic emissions: Generation of noise from project vessels and helicopters in Appendix A.	
Invasive Marine Species (IMS)													■	■	■	■	■	■	■	■							■		Invasive marine species (IMS) management was assessed as not being applicable to the Operational Area however, Woodside will assess and manage IMS risks for all vessels entering an IMS Management Area through the Woodside Invasive Marine Species Management Plan.	
Capturing wildlife											■				■						■	■		■	■	■			Ecological Receptors: • Inefficient capture techniques could cause undue stress. • Pre-emptive capture could cause undue impacts when risk of oiling is not certain. • Injury to wildlife. • Exhaustion • Disturbance from noise Human Receptors: • Exclusion of use of the area where oiled wildlife response is taking place • Health implications for individuals coming into contact with oiled wildlife.	
Transporting wildlife					■						■				■						■	■		■	■	■			Physical Receptors: • Refer to Routine atmospheric emissions in Appendix A	

Response Activity / Source of Potential Risk	Resource/ Receptors: Physical: Subsidence & Compaction	Land/ Sea Use	Sediment Quality/ Composition	Seabed Features/ Profile	Air Quality	Visibility	Ozone Layer	Climate	Marine Water Quality	Water Flow Characteristics (marine)	Terrestrial Noise Levels	Underwater Noise Levels	Ecology: Fish & Pelagic Communities	Benthic Marine Flora/ Fauna	Marine mammals	Marine Habitats	Communities/ Biodiversity	Coral Reefs	Sea Turtles	Seabirds	Human: Natural Resource Depletion	Employment/ Income	Public Health & Safety	Aesthetics	Tourism / Recreation	Cultural/ Historical Sites	Fishing	Navigation/ Traffic & Transport	Potential Impact Description / Reference	Control Mitigation Measures
																													Ecological Receptors: • Disturbance from noise • Injury to wildlife. • Thermoregulation stress. Human Receptors: • Exclusion of use of the area where oiled wildlife response is taking place • Health implications for individuals coming into contact with oiled wildlife.	
Stabilisation of wildlife																													Ecological Receptors: • Refer to Routine atmospheric emissions in Appendix A • Injury to wildlife. • Thermoregulation stress. • Triage process means potential for some animals to be euthanized. Human Receptors: • Exclusion of use of the area where oiled wildlife response is taking place • Health implications for individuals coming into contact with oiled wildlife. • Stress to public	
Cleaning and rinsing (incl. Post-cleaning stabilisation)																													Physical Receptors: • Refer to Routine atmospheric emissions in Appendix A Ecological Receptors: • Injury to wildlife. • Exhaustion • Removal of water-proofing of feathers. Human Receptors:	

Response Activity / Source of Potential Risk	Resource/ Receptors: Physical: Subsidence & Compaction	Physical: Land/ Sea Use	Physical: Sediment Quality/ Composition	Physical: Seabed Features/ Profile	Physical: Air Quality	Physical: Visibility	Physical: Ozone Layer	Physical: Climate	Physical: Marine Water Quality	Physical: Water Flow Characteristics (marine)	Physical: Terrestrial Noise Levels	Physical: Underwater Noise Levels	Ecology: Fish & Pelagic Communities	Ecology: Benthic Marine Flora/ Fauna	Ecology: Marine mammals	Ecology: Marine Habitats	Ecology: Communities/ Biodiversity	Ecology: Coral Reefs	Ecology: Sea Turtles	Ecology: Seabirds	Human: Natural Resource Depletion	Human: Employment/ Income	Human: Public Health & Safety	Human: Aesthetics	Human: Tourism / Recreation	Human: Cultural/ Historical Sites	Human: Fishing	Human: Navigation/ Traffic & Transport	Potential Impact Description / Reference	Control Mitigation Measures
																													• Exclusion of use of the area where oiled wildlife response is taking place • Health implications for individuals coming into contact with oiled wildlife. • Stress to public	
Rehabilitation (diet quality, cage sizes, flooring substrate, ambient temperature, housing density etc.)																													Ecological Receptors: • Stress. • Captive diet (lack of nutrition). • Injury to wildlife. • Thermoregulation stress. Human Receptors: • Exclusion of use of the area where oiled wildlife response is taking place • Stress to public	
Release of wildlife																													Ecological Receptors: • Release site unfamiliar. • Return to oiled area of capture (for animals with high site fidelity). • Stress of adjusting back to natural environment conditions. • Stress of transport to release site. • Stress of additional human presence (e.g. media). Human Receptors: • Exclusion of use of the area where oiled wildlife response is taking place • Stress to public	

Response Activity / Source of Potential Risk	Resource/ Receptors: Physical: Subsidence & Compaction	Physical: Land/ Sea Use	Physical: Sediment Quality/ Composition	Physical: Seabed Features/ Profile	Physical: Air Quality	Physical: Visibility	Physical: Ozone Layer	Physical: Climate	Physical: Marine Water Quality	Physical: Water Flow Characteristics (marine)	Physical: Terrestrial Noise Levels	Physical: Underwater Noise Levels	Ecology: Fish & Pelagic Communities	Ecology: Benthic Marine Flora/ Fauna	Ecology: Marine mammals	Ecology: Marine Habitats	Ecology: Communities/ Biodiversity	Ecology: Coral Reefs	Ecology: Sea Turtles	Ecology: Seabirds	Human: Natural Resource Depletion	Human: Employment/ Income	Human: Public Health & Safety	Human: Aesthetics	Human: Tourism / Recreation	Human: Cultural/ Historical Sites	Human: Fishing	Human: Navigation/ Traffic & Transport	Potential Impact Description / Reference	Control Mitigation Measures
Waste generation/disposal																													Refer to unplanned discharges: Loss of hazardous and non-hazardous waste in Appendix A. Physical and Ecological Receptors: • Secondary contamination	
Lighting for night work/ navigational safety																													Refer to Routine light emissions in Appendix A.	
Collisions with marine fauna																													Refer to Physical Presence: Vessel collision with marine fauna in Appendix A	
Waste Management																														
Air emissions																													Refer to Routine atmospheric emissions in Appendix A.	
Noise emissions																													Refer to Routine acoustic emissions: Generation of noise from project vessels and helicopters in Appendix A.	• Contract with waste management provider Veolia. • Waste Management Plan for Oil Spill Response which includes: -Immediate waste storage capability -Plans for handling, storage and transport of all waste types during a response. -Waste remediation options to reduce volumes to landfill or incineration. • Waste treatment strategies in place: - Contaminated solids treated to allow disposal in landfill - Higher-contaminated solids will be treated and recycled, used in clean fill. - Incineration - Safe disposal of carcasses after necessary autopsies (OWR).

Response Activity / Source of Potential **Risk**	**Resource/ Receptors**																															**Potential Impact Description / Reference**	**Control Mitigation Measures**
	Physical													**Ecology**														**Human**						
	Subsidence & Compaction	Land/ Sea Use	Sediment Quality/ Composition	Seabed Features/ Profile	Air Quality	Visibility	Ozone Layer	Climate	Marine Water Quality	Water Flow Characteristics (marine)	Terrestrial Noise Levels	Underwater Noise Levels	Fish & Pelagic Communities	Benthic Marine Flora/ Fauna	Marine mammals	Marine Habitats	Communities/ Biodiversity	Coral Reefs	Sea Turtles	Seabirds	Natural Resource Depletion	Employment/ Income	Public Health & Safety	Aesthetics	Tourism / Recreation	Cultural/ Historical Sites	Fishing	Navigation/ Traffic & Transport						
Waste generation/disposal																																Refer to Unplanned discharges: Loss of hazardous and non-hazardous waste in Appendix A. Physical and Ecological Receptors: • Secondary contamination of habitat and wildlife	

Key:

- Positive Impact
- Negative Impact (Minor, short-term)
- Negative Impact (Moderate, medium term)
- Negative Impact (Major, long term)
- Impact negative but not evaluated

APPENDIX C: SUMMARY OF STAKEHOLDER FEEDBACK AND WOODSIDE'S RESPONSE

Organisation	Method	Feedback	Woodside assessment	Woodside's Response
Department of Industry Innovation and Science	Email with fact sheet	**Date:** 12 April 2016 **Feedback summary:** No response at the time of submission.	Woodside will accept and assess feedback from stakeholder post EP submission to NOPSEMA.	**Response/Action:** No further action required.
	Email with revised fact sheet	**Date:** 16 May 2016 **Feedback summary:** No response at the time of submission.	Woodside will accept and assess feedback from stakeholder post EP submission to NOPSEMA.	**Response/Action:** No further action required.
Department of Mines and Petroleum	Email with fact sheet	**Date:** 12 April 2016 **Feedback summary:** No response at the time of submission.	Woodside will accept and assess feedback from stakeholder post EP submission to NOPSEMA.	**Response/Action:** No further action required.
	Email with revised fact sheet	**Date:** 16 May 2016 **Feedback summary:** No response at the time of submission.	Woodside will accept and assess feedback from stakeholder post EP submission to NOPSEMA.	**Response/Action:** No further action required.
Australian Maritime Safety Authority (marine safety)	Teleconference and email	**Date:** 1 April 2016 **Feedback summary:** Woodside spoke with the Authority to advise that the Armada Claire FPSO will permanently depart the WA-49-L permit on 4 April 2016. Woodside provided advice that the FPSO will depart the field on 2 April and anchor approximately 44 nautical miles from Dampier before permanently departing to south-east Asia on 4 April. Woodside provided history of the Apache acquisition for Balnaves and advice that the FPSO services contract was terminated for performance-related issues. AMSA thanked Woodside for the update and advised that the next AHS notice is the following week and suggested Woodside makes contact. AMSA requested a map that shows the anchorage coordinates.	The stakeholder raised no claims or objections. Woodside to engage with AHS.	**Date:** 1 April 2016 **Response/Action:** Woodside emailed AMSA a map outlining the coordinates for the anchorage point off Dampier.
	Email with fact sheet	**Date:** 14 April 2016 **Feedback summary:** Woodside phoned AMSA asking if additional information was required for recent advice sent about Balnaves. AMSA confirmed that vessel traffic was plotted and raised no concerns about the activity. AMSA's Nautical Advice department will pass on Woodside's fact sheet to its Marine Environment Standards Manager to provide feedback also. Woodside confirmed the timeframe for submitting the two environment plans to NOPSEMA. AMSA confirmed it will reply to Woodside's email.	The stakeholder raised no claims or objections. Woodside to accept feedback from AMSA's Environment department.	**Date:** 21 April 2016 **Response/Action:** No further action required.
	Email	**Date:** 14 April 2016 **Feedback summary:** AMSA acknowledged via email Woodside's advice about operations cessation for Balnaves and the Armada Claire FPSO sail away. AMSA provided a vessel traffic plot that covered the permit and sounding area, and advice that majority traffic was from support vessels and survey craft. AMSA advised that minimal international commercial traffic should be encountered. AMSA advised that radio-navigation warnings were not necessary unless subsea activities and support vessels operate outside of the charted exclusion zones that previously existed for the FPSO. AMSA advised that AHS is informed on removal of subsea and surface infrastructure.	The stakeholder raised no claims or objections. Woodside to continue to engage with AHS.	**Date:** 21 April 2016 **Response/Action:** Woodside accepts AMSA's vessel plot data. Woodside notes AMSA's advice about radio usage and future engagement with AHS.
	Email	**Date:** 14 April 2016	The stakeholder raised no claims or	**Response/Action:**

		Feedback summary: AMSA advised via email that the fact sheet had been passed onto its Environment division for comment.	objections. Woodside to accept feedback from AMSA's Environment department.	No further action required
	Email	**Date:** 21 April **Feedback summary:** AMSA advised that its Environment division had no comments.	The stakeholder raised no claims or objections.	**Response/Action:** No further action required
	Email with revised fact sheet	**Date:** 17 May 2016 **Feedback summary**: The Authority advised via email on 17 May 2016 that its comments from the email sent on 14 April 2016 were still relevant.	The stakeholder raised no claims or objections. Woodside to continue to engage with AHS.	**Date:** 17 May 2016 **Response/Action:** Woodside accepts AMSA's vessel plot data. Woodside notes AMSA's advice about radio usage and future engagement with AHS.
Australian Hydrographic Service (AHS)	Teleconference and email	**Date:** 1 April 2016 **Feedback summary:** Woodside spoke with AHS to advise that the Armada Claire FPSO will permanently depart the WA-49-L permit on 4 April 2016. Woodside provided advice that the FPSO will depart the field on 2 April and anchor approximately 44 nautical miles from Dampier before permanently departing to south-east Asia on 4 April. Woodside provided history of the Apache acquisition for Balnaves and advice that the FPSO services contract was terminated for performance-related issues. AHS advised that it needs to know what buoys, beacons, lights will be on the RTM when the FPSO sail away. AHS confirmed that the next notice to mariners will be issued on 7 April 2015.	The stakeholder raised no claims or objections.	**Date:** 1 April 2016 **Response/Action:** Woodside sent email to advise AHS on coordinate of anchorage points and description of lights on the RTM.
	Teleconference and email	**Date:** 12 April 2016 **Feedback summary:** AHS phoned Woodside confirming if the FPSO has sailed away and if another FPSO will be moving to the permit. Woodside confirmed that the Armada Claire has permanently sailed away and the RTM is planned to be removed within 6-12 months. Woodside advised that stakeholder consultation on the preservation and removal of the RTM will commence today and that AHS can expect to receive an email formal comment. AHS requested the colour of the light on the RTM and flash character. AHS advised it will issue a temporary notice to mariners.	The stakeholder raised no claims or objections. Woodside notes advice from AHS about issuing of NTM.	**Date:** 14 April 2016 **Response/Action:** Woodside emailed AHS fact sheet about proposed activities for the preservation and RTM removal. Woodside sent a separate email confirming the light colour and flash character of the RTM lights.
	Email with revised fact sheet	**Date:** 16 May 2016 **Feedback summary:** An email was received from AHS on 16 May 2016 to confirm that Woodside's email was received.	The stakeholder raised no claims or objections.	**Response/Action:** No further action required.
Australian Fisheries Management Authority	Email with fact sheet	**Date:** 12 April 2016 **Feedback summary:** No response at the time of submission.	Woodside will accept and assess feedback from stakeholder post EP submission to NOPSEMA.	No further action required.
	Email with revised fact sheet	**Date:** 16 May 2016 **Feedback summary:** No response at the time of submission.	Woodside will accept and assess feedback from stakeholder post EP submission to NOPSEMA.	**Response/Action:** No further action required.
Department of Fisheries (Western Australia)	Teleconference	**Date:** 31 March 2016 **Feedback summary:** Woodside spoke with the Department to advise that the Armada Claire FPSO will permanently depart the WA-49-L permit on 4 April 2016. Woodside provided advice that the FPSO will depart the field on 2 April and anchor approximately 44 nautical miles	The stakeholder raised no claims or objections.	Woodside to send the Department a follow up email on 31 March outlining the detail from the teleconference.

		from Dampier before permanently departing to south-east Asia on 4 April. Woodside provided history of the Apache acquisition for Balnaves and advice that the FPSO services contract was terminated for performance-related issues. The Department requested an email is sent summarising this advice and a map to show the proposed anchorage point. Woodside advised it will be consulting the Department in the coming weeks about a revised Environment Plan submission to NOPSEMA. Woodside requested WAFIC phone back to discuss further. The Department suggested we discuss the revised environment plan at the next meeting Woodside has scheduled with the Department on 18 April.		
	Teleconference	**Date:** 14 April 2016 **Feedback summary:** Woodside phoned the Department to seek if additional information was required about Balnaves, after receiving the Activity Update on 12 April. The Department confirmed that its Biosecurity Department were comfortable and raised no concerns. The Department confirmed that it will reply to the email received. Woodside confirmed its scheduled meeting with the Department on 18 April to discuss upcoming environmental approvals requiring stakeholder consultation.	The stakeholder raised no claims or objections.	No further action required.
	Email	**Date:** 14 April 2016 **Feedback summary:** The Department advised via email that it confirms the two activity phases noted in the Activity Update. The Department confirmed it will provide formal feedback for the phase 2 activities before EP is submitted in June.	The stakeholder raised no claims or objections.	No further action required.
	Email with revised fact sheet	**Date:** 16 May 2016 **Feedback summary:** No response at the time of submission.	Woodside will accept and assess feedback from stakeholder post EP submission to NOPSEMA.	**Response/Action:** No further action required.
Commonwealth fisheries - Western Skipjack Fishery - Western Tuna and Billfish Fishery - North-West Slope Trawl Fishery - Southern Bluefin Tuna Fishery	Email with fact sheet and map	**Date:** 12 April 2016 **Feedback summary:** No response at the time of submission.	Woodside will accept and assess feedback from stakeholder post EP submission to NOPSEMA.	No further action required.
	Email with revised fact sheet	**Date:** 16 May 2016 **Feedback summary:** No response at the time of submission.	Woodside will accept and assess feedback from stakeholder post EP submission to NOPSEMA.	**Response/Action:** No further action required.
Western Australian Fisheries - Mackerel Fishery - Pilbara Trawl Fishery - Pilbara Trap Fishery - Pearl Oyster - Marine Aquarium Fish Management Plan - Specimen Shell Management Plan	Email with fact sheet and map Letter with fact sheet and map	**Date:** 12 April 2016 **Feedback summary:** No response at the time of submission.	Woodside will accept and assess feedback from stakeholder post EP submission to NOPSEMA.	No further action required.
	Email with revised fact sheet Letter with revised fact sheet	**Date:** 16 May 2016 **Feedback summary:** No response at the time of submission.	Woodside will accept and assess feedback from stakeholder post EP submission to NOPSEMA.	**Response/Action:** No further action required.
Department of Transport	Email with fact sheet	**Date:** 12 April 2016 **Feedback summary:** No response at the time of submission.	Woodside will accept and assess feedback from stakeholder post EP submission to NOPSEMA.	No further action required.
	Email with Draft Oil Pollution First Strike Plan	**Date:** 22 April 2016	Woodside will accept and assess feedback from stakeholder post EP	**Response/Action:**

		Feedback summary: No response at the time of submission.	submission to NOPSEMA.	No further action required.
	Email with revised fact sheet	**Date:** 16 May 2016 **Feedback summary:** No response at the time of submission.	Woodside will accept and assess feedback from stakeholder post EP submission to NOPSEMA.	**Response/Action:** No further action required.
Western Australian Fishing Industry Council (WAFIC)	Teleconference	**Date:** 31 March 2016 **Feedback summary:** Woodside left a voice message to advise that the Armada Claire FPSO will permanently depart the WA-49-L permit on 4 April 2016. Woodside will be consulting with WAFIC in the coming weeks about a revised Environment Plan submission to NOPSEMA. Woodside requested WAFIC phone back to discuss further.	Woodside will accept and assess feedback from stakeholder.	No further action required.
	Email with fact sheet	**Date:** 14 April 2016 **Feedback summary:** WAFIC advised via email that it is the representative body for state-managed fisheries and is a key stakeholder. WAFIC noted that consultation was two EPs that will two phases of activities. WAFIC sought advice about Woodside's future plans to leave infrastructure above the seabed. WAFIC provided new contact details for future engagements.	The stakeholder raised no claims or objections.	**Date:** 15 April 2016 **Response/Action:** Woodside noted WAFIC's new contact details. Woodside advised that all infrastructure and materials above the seabed from the Balnaves facility is required to be removed, under the EPBC Act referral decision. Woodside advised that it will engage stakeholders on options for leaving equipment in-situ when nearing the final decommissioning phase. Woodside welcome WAFIC's future input on the option. Woodside confirmed that approval is currently being sought for the phase two activities (as described in fact sheet) for up to five years.
	Teleconference	**Date:** 16 May 2016 **Feedback summary:** Woodside phoned WAFIC on 16 May 2016 to confirm that an EP for the phase 2 activities will be submitted to NOPSEMA in early June. Woodside advised that the Phase 2 activity scope had been amended and will now remove the flushed flowlines, flushed risers and EHU, associated mooring lines and anchors. WAFIC advised that it was a key stakeholder on behalf of commercial fishers and was interested in decommissioning activities. WAFIC advised that there is a lack of awareness for decommissioning as it is a new activity for the oil and gas industry. WAFIC advised that water depths between 110 m-160 m is prone fishing waters and therefore subsea equipment suits being left in-situ. Woodside advised that the Balnaves facility was acquired from Apache and in line with the EPBC Act (Cth) was required to remove infrastructure from above the seabed for this facility. Woodside confirmed that commercial fishers were sent a letter and revised fact sheet to advise on change in scope. Woodside suggested engagement with WAFIC for future decommissioning activities. Woodside and WAFIC scheduled a meeting to discuss Woodside's proposed activities, including decommissioning. Woodside confirmed it would send an email with an updated fact sheet.	Woodside notes WAFIC's identification as a key stakeholder and its interest in decommissioning activities. Woodside's notes WAFIC has no direct comments about this proposed activity.	**Response/Action:** Woodside to send email to WAFIC following teleconference.

	Email with revised fact sheet	**Date:** 16 May 2016 WAFIC thanked Woodside via email on 16 May for its advice that commercial fishers were contacted. WAFIC confirmed the scheduled meeting with Woodside to discuss overall oil and gas activities and future decommissioning projects and potential 'rig-to-reef' projects. Woodside advised that all infrastructure and materials above the seabed from the Balnaves facility is required to be removed, under the EPBC Act (Cth) referral decision. Woodside advised that it will engage stakeholders on options for leaving equipment in-situ when nearing the final decommissioning phase. Woodside welcome WAFIC's future input on the option. Woodside confirmed that approval is currently being sought for the phase two activities (as described in fact sheet) for up to five years.	The stakeholder raised no claims or objections. Woodside notes the stakeholder's interest in decommissioning activities.	**Response/Action:** In previous correspondence, WAFIC has agreed to meet with Woodside on a quarterly basis to discuss Woodside activities. Woodside will ensure ongoing engagements include discussions on decommissioning.
Pearl Producers Association	Email with fact sheet	**Date:** 12 April 2016 **Feedback summary:** No response at the time of submission.	Woodside will accept and assess feedback from stakeholder post EP submission to NOPSEMA.	No further action required.
	Email with revised fact sheet.	**Date:** 16 May 2016 **Feedback summary:** No response at the time of submission.	Woodside will accept and assess feedback from stakeholder post EP submission to NOPSEMA.	**Response/Action:** No further action required.