



Okha FPSO Operations Environment Plan Summary

January 2014

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1. INTRODUCTION

Woodside Energy Ltd (Woodside) is operator of the Okha Floating Production Storage and Offloading (FPSO) facility, which is located offshore approximately 135 km North West of Karratha, Western Australia. The FPSO and associated infrastructure are within Production Licences WA-9-L, WA-11-L and WA-16-L in the Dampier Sub-basin. The Okha FPSO is a converted double-hull suez-max and connects through an external bow mounted riser turret mooring (RTM) system to the Cossack Wanaea Lambert Hermes (CWLH) subsea infrastructure. The Okha FPSO is moored centrally above the Wanaea field and was commissioned in 2011 as a single standalone FPSO. The Cossack, Wanaea, Lambert and Hermes (CWLH) fields have been producing since 1995.

Woodside operates the Okha FPSO on behalf of the CWLH Joint Venture Participants which include Woodside Energy Ltd, BHP Billiton Petroleum (North West Shelf) Pty Ltd, BP Developments Australia Pty Ltd, Chevron Australia Pty Ltd and Japan Australia LNG (MIMI) Pty Ltd. (*Note: The titleholders also include CNOOC NWS Private Limited and Shell Australia Pty Ltd*).

The Okha FPSO consists of subsea wells, associated topside processing and subsea infrastructure and a single Gas Export Line (GEL). The FPSO currently produces crude oil from the Lambert and Hermes reservoir. Crude oil is offloaded from the vessel via a flexible line to bulk tankers moored astern. The FPSO also exports LPG-rich gas from the Cossack and Wanaea fields to the North Rankin Complex, before being transferred to the Karratha Gas Plant for processing.

This Environment Plan (EP) summary has been prepared as per the requirements of Regulation 11 of the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* (Commonwealth) (Environment Regulations). This document summarises the Okha FPSO Operations EP, which was accepted under the Environment Regulations by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) on 10 December 2014.

2. DESCRIPTION OF THE ACTIVITY

2.1 Location of the Activity

The Okha FPSO and associated infrastructure (Figure 2-1) is located in Commonwealth waters on the North West Shelf (NWS) of Western Australia in Production Licence Areas WA-9-L, WA-11-L and WA-16-L. The FPSO is situated in 80 m of water over the central area of the Wanaea field.

The export pipeline is covered by Pipeline Licence WA-4-PL, and depths along this pipeline range from 80 m at its Eastern end (Okha FPSO) to 125 m at its Western end (NRC which is approximately 32 km East of the Okha FPSO). Oil from the Okha FPSO is dispatched to trading tankers, whilst gas produced is exported onshore for processing.

The closest nearshore sensitive habitats to the Okha FPSO are the Glomar Shoals (33 km North East), Montebello Commonwealth Marine Reserve (72 km South West), Rankin Bank (86 km West), and the Dampier Commonwealth Marine Reserve (88 km South East).

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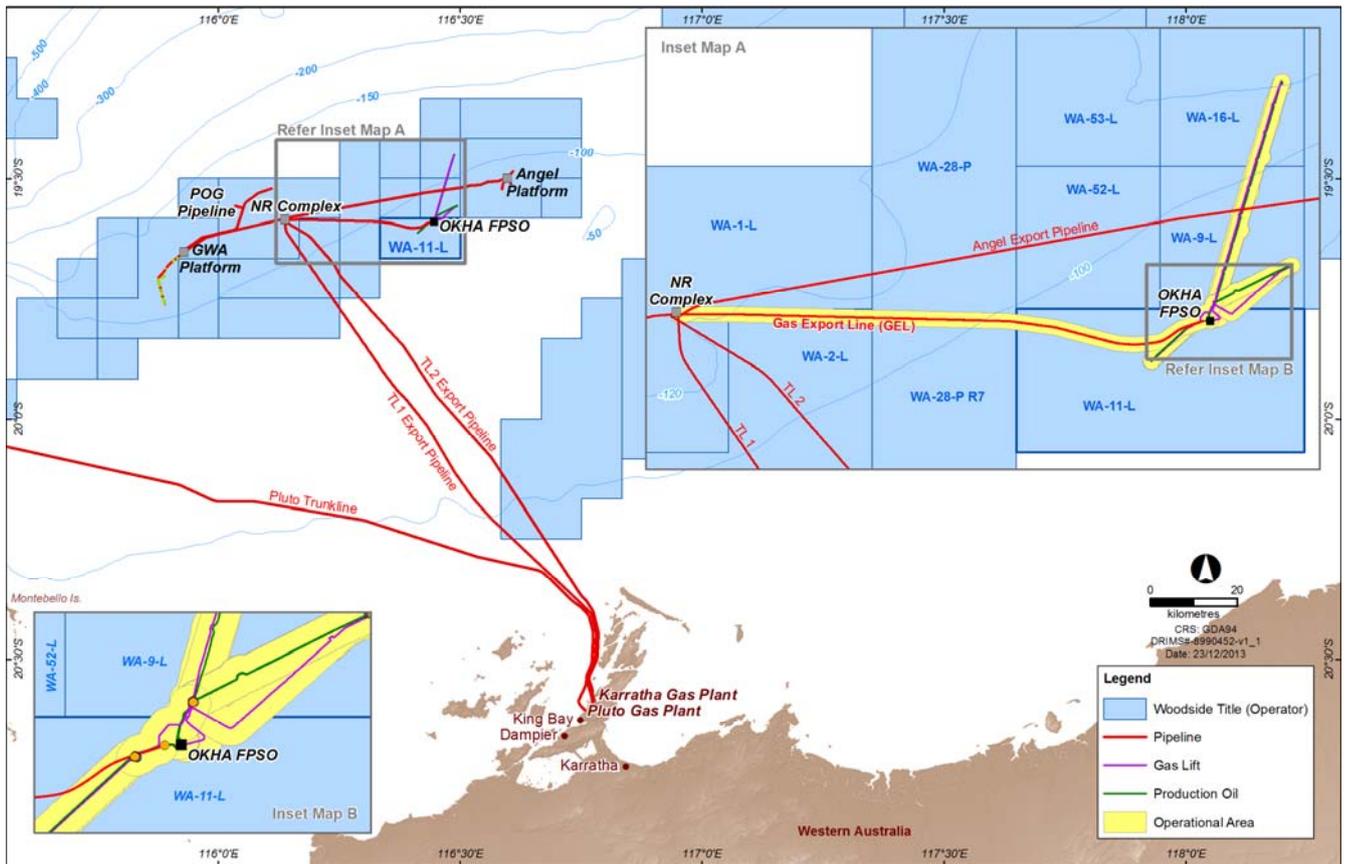


Figure 2-1: Location of the Activity

The coordinates and permit areas of the Okha and associated infrastructure are outlined in **Table 2-1**.

Table 2-1: Okha FPSO and associated infrastructure locations

Structure	Latitude	Longitude	Title
Okha FPSO	19° 35' 13"S	116° 26' 29"E	WA-11-L
East end of Okha GEL (Okha facility)	19°35'20.92"S	116°26'33.75"E	WA-11-L
West end of Okha GEL (NRA facility)	19°35'07.14"S	116°08'21.88"E	WA-1-L

2.2 Timing of the Activity

The Okha FPSO commenced production in September 2011 as part of the CWLH re-development project. Prior to Okha, the CWLH oil fields were produced through the *Cossack Pioneer* FPSO which commenced production in 1995. The Okha FPSO operates 24 hours per day, 365 days per year. Supporting operations, such as maintenance activities, take place as required.

Tie-back opportunities are continuously being reviewed for Woodside's offshore facilities, which have the potential to extend the life of the field. Any future decommissioning or tieback plans will be the subject of a separate EP.

2.3 Operational Area

The Operational Area applicable to the scope of the Okha FPSO EP is shown in Figure 2-1. The area includes:

- The Okha FPSO and the area within a 500m exclusion zone around the facility and extending out to 1500m to allow for offtake activities; and
- The Okha FPSO subsea infrastructure, including wells and flowlines, and an area 1500 m from the infrastructure; and
- The Gas Export Line (GEL) to NRA covered by WA-4-PL and an area within 1500 m around the infrastructure.

Vessel-related activities within the Operational Area will comply with the Okha FPSO EP.

2.4 Operational Details

The Okha FPSO is a converted double-hull Suezmax with an overall length of 317 m and breadth of 48 m. The topsides processing facilities consists of oil, water and gas separation systems, and water injection and gas compression equipment. The Okha FPSO directly exports processed, stabilised crude oil via offloading to offtake tankers, whilst export gas is transported via the Gas Export Line (GEL) to North Rankin Complex (NRC). From NRC gas is subsequently transported to the Karratha Gas Plant (KGP) along the 186 km long 12" pipeline via the NRC 1TL.

The Okha FPSO is designed with a closed loop flare system so that under normal operating conditions no continuous flaring occurs. The surplus gas from the production system is redirected to the cargo tanks to provide the 100% hydrocarbon blanket and subsequently utilised as lift gas or export gas.

Normal operations at the Okha FPSO fall under the following modes of operation:

- Production and maintenance - Production covers hydrocarbon receipt from the reservoirs via subsea wells and equipment, topside separation and processing of oil, water and gas and the storage of oil within the FPSO cargo tanks for subsequent offloading to export tankers. Gas is utilised for cargo tank blanketing as well as lift gas to support oil extraction with excess gas exported via the gas export line. Separated water (Produced Formation Water) is processed and discharged within required limits.

Maintenance covers a range of Inspection, Maintenance and Repair (IMR) activities which are undertaken at regular and/or planned intervals to maintain performance, reliability and prevent deterioration or failure of equipment and ensure safe and reliable operation of the facility. This includes maintenance of the topside component of the FPSO (including Marine Mode equipment) as well as subsea infrastructure and may include, for example, activities such as cycling of valves, pressure and leak testing, lubrication of rotating equipment and painting activities for corrosion protection.

- Production and major projects - Major Projects involve refurbishment, modification or major maintenance on the facility. These activities are generally managed by a specific project group which involves a specific environmental assessment to ensure the activity and associated potential impacts and risks are in accordance with the accepted EP.
- FPSO Marine (Disconnected) Mode - The Okha FPSO is moored over the central area of the Wanaea field. During normal production operations, the riser turret production and mooring system enables the FPSO to freely weathervane whilst allowing production from the reservoir through a fluid swivel stack. In marine mode, the FPSO disconnects from its mooring to operate as a self-propelled vessel to avoid adverse weather conditions or for remedial/maintenance or modification works at a shipyard. Once disconnected from the RTM buoy the FPSO complies with all applicable maritime regulations.

Additional operational activities in relation to the EP include:

- Operational and emergency flaring of excess gas through flare systems;

- Processing and discharge of drainage, cooling and brine water; and
- Processing and discharge of Produced Formation Water (PFW) within discharge limits.

A number of activities also support the overall operation of the facility, these include:

- Utility systems such as lighting, heating, ventilation and air conditioning, water systems and power generation;
- Collection, treatment and disposal of sewage and putrescible wastes;
- Lifting operations;
- Transfer of supplies from vessels including food, equipment and fuel;
- Helicopter operations for transporting personnel and urgent freight;
- Subsea inspection, maintenance and repair activities; and
- Platform Well Management and Maintenance Activities.

3. DESCRIPTION OF THE ENVIRONMENT

The Okha FPSO is located in Commonwealth waters on the North West Shelf (NWS), in water depths of approximately 80 m, with subsea infrastructure located in depths from approximately 125 m. The NWS is part of the wider North-West Marine Region (NWMR) (**Figure 3-1**) as defined under the Integrated Marine and Coastal Regionalisation of Australia (IMCRA v4.0). The Okha Operational Area does not overlap with any established or proposed marine protected areas.

3.1 Physical Environment

The climate in the region is dry tropical, including hot dry summers and mild winters. Transition periods between summer and winter are characterised by relatively low winds. Tropical cyclone activity can occur between November and April and is most frequent in the area during January to March, with an annual average of approximately one storm per month.

The large-scale ocean circulation of the NWS is primarily influenced by the Indonesian throughflow (ITF) (Meyers *et al*, 1995; Potemra *et al*, 2003), and the Leeuwin Current (Godfrey and Ridgway, 1985; Holloway and Nye, 1985; Batteen *et al*, 1992; James *et al*, 2004). The currents are driven by pressure differences between the equatorial waters, and the higher density, cooler and more saline waters of the Southern Ocean. The ITF and Leeuwin Current are strongest during late summer and winter (Holloway and Nye, 1985; James *et al*, 2004). The Ningaloo Current flows in the opposite direction to the Leeuwin Current and closer to shore.

The Okha FPSO is located on the middle of the continental shelf in water depths of approximately 80m. Subsea infrastructure is located in depths ranging from 125 to 145 m. Surveys in the vicinity (2-3 km) of Okha have indicated the seabed is flat and featureless with no areas of hard substrate or outcrops. The seabed composition in the vicinity of the Okha FPSO is characterised by deep (>5 m) soft silty sediment.

3.2 Biological Environment

No Critical Habitats or Threatened Ecological Communities, as listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), occur within the Okha FPSO Operational Area. Critical life stage activities for a number of EPBC Act Listed Species occur in the wider region, outside of the Operational Area.

The Commonwealth Protected Matters database includes a total of 48 listed marine species that may occur within or traverse the Okha FPSO Operational Area. Of the listed species identified, nine are threatened marine species and 15 are migratory species.

Twenty-two cetacean species may occur within the Okha FPSO Operational Area, with five categorised as threatened and/or migratory. The Endangered Pygmy Blue Whale (*Balaenoptera musculus breviceauda*) and the Vulnerable Humpback Whale (*Megaptera novaeangliae*) are two whale species that seasonally migrate through the NWS province as they travel between northern breeding grounds and southern feeding grounds. Other cetacean species are likely to occur at low densities and may traverse the Okha FPSO Operational Area infrequently throughout the year.

Five marine turtle species are recorded for the region and may occur in the Okha FPSO Operational Area and adjacent waters. The marine turtles identified were: the Green Turtle (*Chelonia mydas*), Leatherback Turtle (*Dermochelys coriacea*), Loggerhead turtle (*Caretta caretta*), Hawksbill Turtle (*Eretmochelys imbricata*), and the Flatback Turtle (*Natator depressus*). With consideration of the distance offshore (approximately 194 km from the Dampier Archipelago), depth range of surrounding offshore waters (approximately 80 m), and absence of potential nesting or foraging sites (i.e. no emergent islands, reef habitat or shallow shoals), the Okha FPSO Operational Area is not considered an important habitat for marine turtles. Furthermore, while it is acknowledged that there are significant nesting sites along the mainland coast and islands of the region, the primary nesting locations (such as Dampier Archipelago) are at least 94 km from the Okha FPSO Operational Area.

Migratory marine fish species that may occur within the Okha FPSO Operational Area include Whale Sharks and the two species of Mako Shark. Whale Sharks (*Rhincodon typus*) may traverse the Okha FPSO Operational Area during their migrations to and from Ningaloo Reef. However, it is expected that Whale Shark presence within the Okha FPSO Operational 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 (MPRA, 2005). There is very little information about Mako sharks in Australia, with no available population estimates or distribution trends. Longfin and Shortfin Mako Sharks may be encountered within the Okha FPSO Operational Area but occurrences are likely to be of short duration with individuals transiting the area.

The Okha FPSO Operational Area may be occasionally visited by migratory and oceanic birds but does not contain critical habitats for any species and there are no Ramsar Convention protected sites in the surrounding area (DEWHA, 2010a). The nearest Ramsar sites, Eighty Mile Beach and Roebuck Bay, are located over 350 km to the East. There are a number of notable mainland coastal and island locations that are important seabird (e.g. Terns, Shearwaters and Tropicbirds) and shorebird (e.g. Sandpipers and Greenshanks) feeding, breeding and nesting sites. A number of island groups such as the Montebello's and closer to the mainland, such as the islands of the Dampier Archipelago, and the Great Sandy and Passage Island Groups (Pilbara Inshore Region), are important seabird and shorebird nesting and foraging habitats. The Okha FPSO is located over 94 km from the closest of these locations.

Dugongs (*Dugong dugon*) were not identified in the EPBC Protected Matters Report as occurring in the Operational Area, although they may be present in the wider region. Dugongs are considered Specially Protected under Schedule 4 of the Wildlife Conservation Act 1950 (WA) and are listed as migratory species under the EPBC Act (Cth). A significant proportion of the world's dugong population occurs in the coastal waters of the west-Pilbara nearshore as well as Ningaloo Reef and Exmouth Gulf (Marsh *et al*, 2011). Dugongs are typically found in wide shallow bays (5-10 m depth), mangrove channels of inshore islands and shallow areas near seagrass habitats on which they feed (URS, 2013).

The short-nosed seasnake (*Aipysurus apraefrontalis*) is listed as Critically Endangered and was identified as occurring within the Okha FPSO Operational Area by the EPBC Act Protected Matters Search Tool. This species of sea snake inhabits shallow reefs and has been recorded from Exmouth Gulf to the reefs of the Sahul Shelf (DSEWPaC, 2012c). Given the deep water location of the Okha FPSO, it is unlikely sea snakes will be present within the Operational Area. If present, they are likely to only be transiting through the region between breeding and foraging grounds.

3.3 Socio-Economic Environment

There are no known sites of Indigenous or European cultural or heritage significance or known shipwreck sites within the vicinity of the Okha FPSO Operational Area, however, it is noted that there are a number of historic shipwreck protected places in Commonwealth waters of the North West Region.

No tourism activities take place specifically within the Okha FPSO Operational Area, however, it is acknowledged that there are growing tourism and recreational sectors in Western Australia and these sectors have expanded in area over the last couple of decades. Potential for growth and further expansion in tourism and recreational activities in the Pilbara and Gascoyne regions is recognised, particularly with the development of regional centres and a workforce associated with the resources sector (Gascoyne Development Commission, 2012).

The Okha FPSO Operational Area is located within an area of established oil and gas operations. The closest subsea infrastructure includes flowlines, umbilicals, manifolds and wellheads associated with the Woodside operated Angel and NWS trunklines.

The Operational Areas are located within/adjacent to five Commonwealth and seven State fisheries. Due to water depths and distance offshore, recreational fishing is unlikely to occur in the Okha FPSO Operational Area and recreational fishing vessels will be subject to a 500 m exclusion zone around the Okha FPSO.

The region supports significant commercial shipping activity, mostly associated with the mining and oil and gas industries. Major shipping routes in the area are utilised for entry to the Port of Dampier and Barrow Island.

The Okha FPSO Operational Area does not overlap with any established or proposed marine protected areas. The marine protected areas within close proximity to the operational area are the Dampier Archipelago Marine Park (88 km), Montebello Commonwealth Marine Reserve (121 km), Montebello Islands Marine Park/ Barrow Island Marine Management Area (121 km) and Dampier Commonwealth Marine Reserve (88 km).

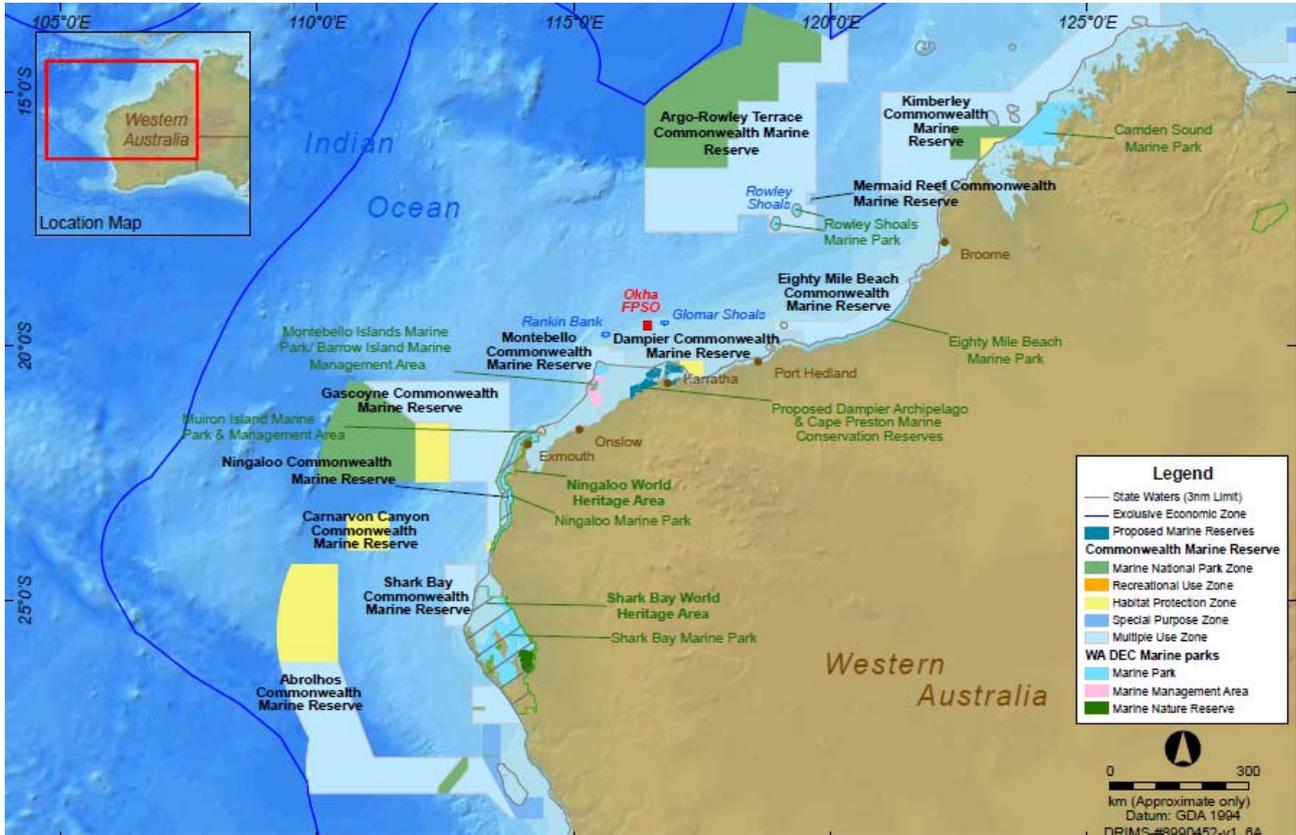


Figure 3-1: Established and Proposed Commonwealth and State Marine Protected Areas in relation to the Operational Area.

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4. ENVIRONMENTAL HAZARDS AND CONTROLS

4.1.1 Risk identification and evaluation

Woodside recognises that risk is inherent to its business and that effective risk management is vital to delivering objectives, success and continued growth. Woodside is committed to managing all environmental risks in a proactive and effective manner.

Woodside undertook an environmental risk assessment to identify the potential environmental impacts and risks associated with the proposed Program and identification of 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 4-1**. A summary of each step and how it is applied to operation of the Okha FPSO is provided below.

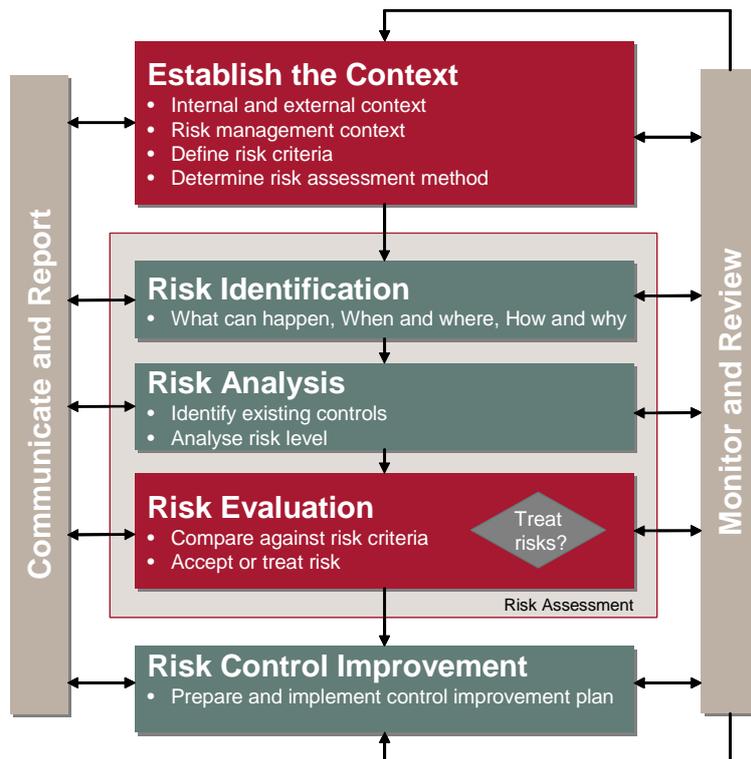


Figure 4-1: Key Steps in Woodside’s Risk Management Framework

1. 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.

2. Risk Identification

The risk assessment for the Okha FPSO 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.

3. Risk Analysis

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

4. Risk Evaluation (Decision Support Framework)

To support the risk assessment process, Woodside applied the UKOOA (1999) *Industry Guidelines on a Framework for Risk Related Decision Support* (HS006) 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; and
- Appropriate effort is applied to the management of risks based on the uncertainty of the risk, the complexity and risk rating.

5. 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.

6. 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 environmental risk assessment for the Okha FPSO identified 29 sources of environmental risk. These risks are divided into two broad categories: Planned (routine and non-routine); and Unplanned (accidents/incidents) activities.

4.1.2 Planned (Routine and Non-Routine) Activities

The majority of the sources of environmental risk identified for the Okha FPSO relate to those activities which are planned and either undertaken on a routine or non-routine basis. These sources of risk include:

- Physical presence of the platform generating light and noise emissions;
- Atmospheric emissions from gas flaring and fuel combustion;
- Discharge of Produced Formation Water (PFW), drainage, cooling and brine water;
- Routine discharges to the marine environment, including subsea chemicals, sewage and putrescible wastes;
- Storage, handling and disposal of waste; and
- Chemical selection and use.

Generally, the sources of risk from planned activities present a lower environmental consequence compared to the potential impact from unplanned accident or incident events. However, as these sources of risk relate to planned activities which occur routinely or more frequently, the EP contains a variety of control and mitigation measures which ensure potential impacts and risks will be reduced to ALARP and will be of an acceptable level. A summary of the key environmental hazards and control measures for planned activities, as well as the residual risk assigned through the risk ranking process, have been presented in **Appendix A**.

4.1.3 Unplanned (Accidents/Incidents) Activities

During the risk assessment process, a number of potential environmental impacts 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 large-scale hydrocarbon spill events with high environmental consequence.

Unplanned activities with a lower source of risk include:

- Introduction of invasive marine species;
- Unplanned venting and release of atmospheric emissions;
- Chemical spills; and
- Hydrocarbon releases during bunkering operations.

The risk assessment for the Okha FPSO identified that there are eight unplanned activities which would be considered a Major Environment Event (MEE), should they occur. The classification of a MEE is based on the potential for a higher level of environmental consequence if a credible worst case scenario was to occur.

Although the likelihood of such an event occurring is extremely low, a further level of rigour is applied to the assessment due to the potential consequence of a MEE. The process used in the assessment assists in identifying the critical barriers to prevent the event occurring as well as mitigation measures to limit the potential consequence.

The MEEs identified for the Okha FPSO are:

- Hydrocarbon release caused by a well loss of containment;
- Hydrocarbon release caused by a subsea loss of containment;
- Hydrocarbon release caused by a topside loss of containment;
- Hydrocarbon release caused by a offloading equipment loss of containment;
- Hydrocarbon release caused by a cargo tank loss of containment;
- Hydrocarbon release caused by a loss of structural integrity;
- Hydrocarbon release caused by loss of marine vessel separation; and
- Hydrocarbon release caused by loss of control of suspended load.

A summary of the key environmental hazards and control measures for unplanned activities, as well as the residual risk assigned through the risk ranking process, is presented in **Appendix A**.

5. ONGOING MONITORING OF ENVIRONMENTAL PERFORMANCE

Operation of the Okha FPSO will be managed in compliance with the *Okha FPSO Operations Environment Plan* 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 EP is to ensure that potential adverse impacts on the environment associated with the operation of the Okha FPSO, during both routine and non-routine operations, are identified, will be reduced to ALARP and will be of an acceptable level.

The Okha FPSO Environment Plan (EP) details for each environmental aspect, the specific performance outcomes and standards and control/mitigation measures (controls are summarised in **Appendix A**) to be implemented and measurement criteria to demonstrate performance outcomes are achieved.

The implementation strategy detailed in the *Okha FPSO Operations Environment Plan* 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.

The EP also details the types of monitoring and auditing that will be undertaken to ensure environmental performance outcomes and standards are being met. Key systems include:

- Annual Environmental Compliance and Performance Reports which are submitted to NOPSEMA to assess and confirm compliance with the accepted environmental performance outcomes, standards and measurement criteria outlined in the EP;
- Annual site based inspections undertaken by Woodside's Environment Function to review compliance against the Okha FPSO EP, verify effectiveness of the EP implementation strategy and to review environmental performance;
- Performance Assessment Tool (PAT) reviews and self assessments related to the management of environmental risks and impacts of the Okha FPSO which are completed to verify competency and compliance;
- Environmental performance is also monitored daily by key personnel via the Production Accounting System; and
- Senior management regularly monitor and review environmental performance of the Okha FPSO via a variety of monthly reports which detail 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 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 EP is supported by an assessment of the environmental impacts and risks associated with potential oil spill scenarios and oil spill preparedness and response measures in relation to the risk assessment and the identified oil spill scenarios. A summary of Woodside's response arrangements in the oil pollution emergency plan is provided in Section 6.

Environment Plan Revisions

Revision of the Okha FPSO EP will be undertaken in accordance with the requirements of the Environment Regulations. Woodside will submit a proposed revision of the Okha FPSO EP to NOPSEMA as a result of the following:

- When any significant modification or new stage of the activity that is not provided for in the EP is proposed;
- 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 EP;
- At least 14 days before the end of each period of 5 years commencing on the day in which the original and subsequent revisions of the EP is accepted under Regulation 11 of the Environment Regulations; and
- As requested by NOPSEMA.

6. OIL SPILL CONTINGENCY PLANNING

6.1 Woodside's Oil Spill Response Arrangements

Woodside's Oil Pollution Emergency Plan (OPEP) for the Okha FPSO consists of the following documents:

6.1.1 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 an oil spill event. The document interfaces externally with Commonwealth, State and industry response plans and internally with Woodside's ICS.

The Oil Pollution Emergency Arrangements (Australia) describes Woodside's role as a Control agency and details the following support arrangements:

- Master services agreement with Australian Marine Oil Spill Centre (AMOSC) for the supply of experienced personnel and equipment, including a subsea first response toolkit and national dispersant stockpiles;
- Access to Wild Well Control's capping stack, SFRT equipment and experienced personnel for the rapid deployment and installation of a capping stack, where feasible.
- Participating membership with Oil Spill Resources Limited (OSRL), which allows access to OSRL's international holding of response equipment and response capabilities, including incident management expertise and specialist personnel;
- The Woodside and Australian Maritime Safety Authority (AMSA) Memorandum of Understanding (MoU) whereby AMSA, as managers of the National Plan for Maritime Environmental Emergencies, will provide support to Woodside such as response equipment from national stockpiles. The equipment stockpiles are located around Australia in strategic locations such as the ports of Dampier, Darwin and Fremantle.
- Other support services such as 24/7 oil 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 an oil spill response.

6.1.2 Okha FPSO Oil Pollution First Strike Plan

The Okha FPSO Oil Pollution First Strike Plan is a facility specific document providing 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.

In accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009*, Woodside's oil spill arrangements are tested at least annually.

6.2 Oil Spill Preparedness and Response Mitigation Assessment for the Dampier Region

Woodside has developed an oil spill preparedness and response position for the Dampier Region in order to demonstrate that risks and impacts associated with loss of containment from the Okha FPSO are mitigated and managed to as low as reasonably practicable (ALARP) and would be of an acceptable level.

6.2.1 Response Strategies

During consideration of response strategies, a pre-operational Net Environmental Benefit Assessment (NEBA) was undertaken to broadly evaluate each potential oil spill response strategy and decide whether implementation was of potential net environmental benefit, as well as considering its feasibility. The NEBA process allows for the identification of positive as well as negative impacts of response strategies relative to

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unmitigated spill impacts. The underlying principle behind the NEBA is that response actions should result in an overall benefit to the environment, even in cases where there may be potential for some damage from the response action itself. Response strategies that are not beneficial are rejected at this stage and not assessed further.

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 Okha FPSO. The potential environmental impacts of these strategies, identified during the pre-operational NEBA, are summarised in Table 6-1. Implementation of these response strategies would be assessed during a spill event, with consideration of the size of spill, weather conditions and other constraints:

Monitor and Evaluate - 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;
- Pre-emptive assessment of sensitive receptors at risk; and
- Monitoring of contaminated resources and the effectiveness of response and clean-up operations.

Source Control (Well intervention) - Woodside's strategy is to minimise the volume of hydrocarbons released from an oil spill event. Woodside plans to deploy the following possible control specific to well loss of containment scenarios at the Okha:

- Subsea dispersant application (includes subsea first response toolkit);
- Source control (well capping); and
- Well intervention (relief well drilling).

Open Water Containment and Recovery - Involves the physical containment and mechanical removal of hydrocarbons from the marine environment. Suitable vessels would be drawn from Woodside's integrated fleet, other operators in the region and from the charter market. Other open water containment and recovery equipment (e.g. booms and skimmers) would be sourced from AMSA, AMAOSC and OSRL stockpiles.

Shoreline Protection – Shoreline protection equipment would be deployed either from a vessel or from the shore, depending on the prevailing conditions, shoreline type and access. Additional resources would be mobilised depending on the scale of the event to increase the number of shorelines being protected.

Shoreline Cleanup – Woodside has access to equipment stockpiles to support initial response requirements and would supplement resources, depending on the type of cleanup required, through contractors. Some equipment may be procured locally on the day with additional equipment being sourced within Western Australia, interstate and internationally, commensurate with the scale and progressive nature of shoreline impact.

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.

Waste Management – The objectives of Woodside's waste management response are:

- To mobilise waste storage and transport resources on day one of a potential oil spill event to support containment and recovery and shoreline protection responses; and
- Arrange for sufficient waste storage, handling, transport and disposal capability to support continuous response operations.

To achieve these objectives, Woodside has access to waste storage in Exmouth and Karratha as well as waste storage equipment from AMOSC, AMSA and OSRL.

Table 6-1: Potential Environmental Impacts of Oil Spill Response Activities for the Okha FPSO

Source of Risk	Key Potential Impact considered as part of ALARP assessment
General Impacts relating to vessel, vehicle and aircraft activity	<p>Air Emissions</p> <ul style="list-style-type: none"> • Temporary reduction in air quality beyond localised area; • Contribution to global greenhouse gas emissions. <p>Physical presence of work activity, light and noise emissions</p> <ul style="list-style-type: none"> • Localised water column pollution and accumulation of toxicants in sediments affecting biota as a result of vessel operational discharges; • Collision with marine fauna resulting in injury or fatality; • Seabed disturbance including localised mortality/disturbance of benthos as a result of vessel anchoring; • Exclusion of other users including shipping and fishing; • Introduction of invasive marine species, possibly resulting in alteration of the natural ecosystem; • Disturbance to marine fauna, particularly whales, marine turtles and fish, potentially as direct physical damage or as a behavioural effect resulting from noise emissions; • Disturbance to marine fauna, particularly seabird's, marine turtles and fish as a result of light emissions.
Monitor and Evaluate	General Impacts relating to vessel, vehicle and aircraft activity
Subsea Dispersant Use	<p>General Impacts relating to vessel, vehicle and aircraft activity</p> <ul style="list-style-type: none"> • Seabed disturbance including localised mortality/disturbance of benthos as a result of vessel anchoring and Remotely Operated Vehicle (ROV) operations during subsea dispersant use; <p>Dispersant Use</p> <ul style="list-style-type: none"> • Acute and chronic toxicity to marine biota.
Well Intervention	If required, risks, impacts and controls will be identified within a separate Well Operational Management Plan.
Capping Stack	<p>General Impacts relating to vessel, vehicle and aircraft activity</p> <p>Physical presence of the capping stack</p> <ul style="list-style-type: none"> • Seabed disturbance including localised mortality/disturbance of benthos as a result of capping stack installation operations.
Containment and Recovery	<p>General Impacts relating to vessel, vehicle and aircraft activity</p> <p>Equipment/ materials/ worker transport</p> <ul style="list-style-type: none"> • Response equipment (booms and skimmers) may act as obstacles and restrict wildlife movement or trap wildlife; • Sorbent material could be consumed by wildlife.
Shoreline Protection	<p>Equipment/ materials/ worker transport</p> <ul style="list-style-type: none"> • Response equipment (booms and skimmers) may act as obstacles and restrict wildlife movement or trap wildlife; • Minor disturbance to substrate at shoreline anchor points; • Improper consideration of hydrocarbon movements could result in diverted oil causing significant shoreline impact downwind and down current. <p>General Impacts relating to vessel, vehicle and aircraft activity</p> <ul style="list-style-type: none"> • Vehicle and foot traffic to and from boom sites resulting in disturbance of wildlife, physical damage to habitat and compaction of shoreline. <p>Waste Generation/Disposal</p> <ul style="list-style-type: none"> • Pollution of the marine and terrestrial environment and potentially chronic and acute toxicity impacts on flora and fauna; • Secondary impacts on fauna (e.g. entanglement).
Shoreline Clean-up	<p>General Impacts relating to vessel, vehicle and aircraft activity</p> <ul style="list-style-type: none"> • Removal of vegetation for access pathways and work station set-up. <p>Chemical Cleaning</p> <ul style="list-style-type: none"> • Toxic effects of chemical cleaning agent and resulting fumes to the environment; • Run-off from cleaning activities back into the marine environment. <p>Mechanical Cleaning</p> <ul style="list-style-type: none"> • Secondary contamination from removed hydrocarbons by machinery or personnel movement; • Physical damage to shoreline and access paths from machinery and personnel movement; • Excessive removal of vegetation causing further penetration of hydrocarbons into substrate;

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Source of Risk	Key Potential Impact considered as part of ALARP assessment
	<ul style="list-style-type: none"> • Shoreline compaction from heavy machinery and work activity resulting in further penetration of hydrocarbons into substrate; • Potential habitat depletion via removal of surface layers of intertidal sediments; • Excessive removal of substrate causing shoreline erosion and instability; • Physical abrasion to substrate and biota during hydrocarbon removal. <p>Waste Generation/Disposal</p> <ul style="list-style-type: none"> • Pollution of the marine and terrestrial environment and potentially chronic and acute toxicity impacts on flora and fauna; • Secondary impacts on fauna (e.g. entanglement). <p>Sediment Disturbance</p> <ul style="list-style-type: none"> • Remobilised hydrocarbons resulting in impacts to marine water quality; • Remobilised hydrocarbons resulting in spread of impacted locations.
Oiled Wildlife Response	<p>General Impacts relating to vessel, vehicle and aircraft activity</p> <p>Wildlife Capture/ Treatment/ Release</p> <ul style="list-style-type: none"> • Pre-emptive capture of un-oiled wildlife causing undue impacts; • Physical injury and stress caused to wildlife during capture, transport, treatment and release; • Euthanasiation of wildlife; • Impacts to wildlife health due to captive diet; • Release of wildlife to unfamiliar sites resulting in health impacts; <p>Waste Generation/Disposal</p> <ul style="list-style-type: none"> • Pollution of the marine and terrestrial environment and potentially chronic and acute toxicity impacts on flora and fauna; • Secondary impacts on fauna (e.g. entanglement).
Waste Management	<p>A General Impacts relating to vessel, vehicle and aircraft activity</p> <p>Waste Generation/Disposal</p> <ul style="list-style-type: none"> • Pollution of the marine and terrestrial environment and potentially chronic and acute toxicity impacts on flora and fauna; • Secondary impacts on fauna (e.g. entanglement).

6.2.2 Scientific Monitoring

In addition to the above response strategies, a scientific monitoring program (SMP) will be activated following a significant oil spill (defined as a level 2 or 3 spill). 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 listed species, environmental values associated with Protected Areas and socio-economic values such as fisheries. The SMPs to be activated are as follows:

- Desk-based review and assessment of hydrocarbons in marine waters;
- Assessment of the presence, quantity and character of hydrocarbons in marine sediments;
- Assessment of impacts and recovery of subtidal and intertidal benthos;
- Assessment of impacts and recovery of mangroves / saltmarsh;
- Assessment of impacts and recovery of seabird and shorebird populations;
- Assessment of impacts and recovery of nesting marine turtle populations;
- Assessment of impacts to pinniped (seal and sea lion) colonies including haul-out site populations;
- Desk-based assessment of impacts to other non-avian marine megafauna;
- Assessment of impacts and recovery of marine fish associated with benthic habitats; and
- Assessment of physiological impacts to commercially important fish and shellfish species (fish health and seafood quality/safety) and recovery.

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7. CONSULTATION

Woodside conducted an assessment to identify potentially affected stakeholders, based on activities associated with operation of the Okha FPSO. This included location of the facility, timing of the activities and potential environmental and social impacts.

Consideration was given to stakeholder feedback (comments and information) provided to Woodside in preparation for a number of recent NWS Project production facility EPs including the Goodwyn A, North Rankin Complex and Angel platforms.

For the purposes of the Okha FPSO EP and consistent with Section 11A of the Environment Regulations, Woodside consulted with stakeholders that it considered relevant to the operation of the Okha FPSO. The stakeholders engaged are listed in **Table 7-1**.

Table 7-1: Stakeholders Engaged for the Okha FPSO EP

Organisation	Relevance
Department Industry (formerly the Department of Resources, Energy and Tourism (representing the Minister for Industry))	Department of relevant Commonwealth Minister
Department of Mines and Petroleum (representing the Minister for Mines and Petroleum)	Department of relevant State Minister
Australian Maritime Safety Authority (marine pollution)	Commonwealth marine pollution response
Department of Transport (Western Australia)	State marine pollution response
Australian Maritime Safety Authority (maritime safety)	Maritime safety
Australian Fisheries Management Authority	Commonwealth fisheries management
Commonwealth fisheries <ul style="list-style-type: none"> - Commonwealth Western Tuna and Billfish Fishery - Commonwealth Western Skipjack Fishery - Commonwealth Southern Bluefin Tuna Fishery 	Commonwealth commercial fisheries
Western Australian Fisheries <ul style="list-style-type: none"> - Mackerel - Pilbara (NCDSF) - Onslow Prawn 	State fisheries
Department of Environment (formerly the Department of Environment, Water, Population and Communities) (representing the Minister for Environment)	Matters of National Environmental Significance and Department of relevant Commonwealth Minister
Department of Defence – Defence Property Services Group	Defence estate management
Department of Fisheries (Western Australia)	State fisheries management
Department of Parks and Wildlife	State environment and wildlife
Department of Environmental Regulation	State environment regulation
Australian Hydrographic Office	Marine safety (navigation and charts)
Australian Customs Service – Border Protection Command	Boarder protection
Department of Broadband, Communication and the Digital Economy	Telecommunications infrastructure
Department of Agriculture, Fisheries and Forestry	Commonwealth commercial fisheries policy
Commonwealth Fisheries Association	Commercial fishery representation
Western Australian Fishing Industry Council	Commercial fishery representation
Pearl Producers Association	Pearl fishery representative
Recfishwest	Recreational fishery representation
Dampier Port Authority	State port authority
North West Slope Trawl	Commercial fishery
Nickol Bay Prawn Fishery	Commercial fishery
World Wildlife Fund	Non-government organisations (environment)
Australian Conservation Foundation	Non-government organisations (environment)
Wilderness Society	Non-government organisations (environment)
International Fund for Animal Welfare	Non-government organisations (environment)
Conservation Council of WA	Non-government organisations (environment)
Australian Petroleum Production and Exploration Association	Oil and gas industry representation

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Australian Marine Oil Spill Centre	Oil spill response – industry contractor
Federal Member for Durack	Relevant Federal Member of Parliament
State Member for Pilbara	Relevant State Member for Parliament
Charter boat operators and Recreational Fishers - Nickol Bay Sport Fishing Club - King Bay Game Fishing Club - Hampton Harbour Boat and Sailing Club - Port Walcott Yacht Club - Port Walcott Volunteer Marine Rescue - West Pilbara Volunteer Sea Search & Rescue Group - Discovery Cruising - Andro Charters - Warrior Princess Charters	Charter boat operators and Recreational Fishers
Other Petroleum Operators - BHP Billiton Petroleum - BP - Shell - Mimi - Chevron	Joint Venture Partners

A consultation Fact Sheet was sent electronically to all identified stakeholders eight months prior to lodgement of the Okha FPSO EP with NOPSEMA for assessment and acceptance. Consultation following distribution of the Fact Sheet included engagement with potentially affected stakeholders, regulators and industry associations. Published data was also reviewed on other user activity in the vicinity of the facility to determine those stakeholders most relevant to the proposed activities. In support of the Okha FPSO EP, Woodside has sought to:

- Ensure that all relevant stakeholders have been identified and communicated to in a timely and effective manner;
- Develop communications material in response to stakeholder needs; and
- Analyse stakeholder feedback to inform decision making and planning.

No objections or claims regarding the activity were raised by relevant persons. Woodside received only minor feedback on the proposed activity from stakeholders and responded appropriately to ensure queries about the continued operation of the Okha FPSO were adequately addressed and resolved. Feedback from stakeholders was considered in the development of management measures specific to the activity and, where relevant, was incorporated in the Okha FPSO EP. Stakeholder feedback and Woodside responses are summarised in **Table 7.2**.

Woodside will continue to accept feedback from stakeholders during the activity via the contact details provided in Section 8.

Table 7-2: Summary of Stakeholder Feedback and Woodside Responses

Stakeholder Feedback	Woodside Response
Stakeholder advised Woodside Corporate to engage with AMSA – AIS Tracking to update vessel tracking information and requested appropriate Auscoast Warning's be considered where relevant.	Woodside responded with Okha specific vessel tracking information which was to the satisfaction of the stakeholder.

Stakeholder Feedback	Woodside Response
<p>The Stakeholder provided the following advice:</p> <ul style="list-style-type: none"> • 5 State fisheries have interest in the area • Ongoing consultation with fisheries and representative bodies should continue • An Operational and Scientific Monitoring Program (OSMP) should be in place • Key fish species (including spawning events) should be included in the Environment Plan • Discharges are managed and recorded as per procedures • Invasive marine species management plan in place • Information provided by the stakeholder is acknowledged in the Environment Plan 	<p>Woodside has acknowledged in the Environment Plan:</p> <ul style="list-style-type: none"> • The active and in-active State fisheries (inactive fisheries have been noted and ongoing consultation with fisheries representative bodies will ensure any activity by those parties is identified) • Woodside has an appropriate OSMP • Spawning grounds and nursery areas for key species are noted • Woodside has appropriate record and notification processes in place for a loss of containment • Woodside has in force an Invasive Marine Species Management Plan

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8. CONTACT DETAILS

Under Regulation 15, the Nominated Liaison Person for this activity is:

Jack Pearse
Asset Manager
Woodside Energy Ltd
Woodside Plaza, 240 St Georges Terrace, Perth WA 6000

For further information about this activity, please contact:

Stephen Munday
Corporate Affairs Adviser
North West Shelf
Woodside Energy Ltd
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E: stephen.munday@woodside.com.au

Please direct email enquiries to our website;
<http://www.woodside.com.au/Pages/Contact-Us.aspx>

Toll free: 1800 442 977

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APPENDIX A: Key environmental risks, impacts and control measures identified for the Okha FPSO

Source of Risk	Key Potential Environmental Impact	Residual Risk	Controls/Mitigation Measures
PLANNED (ROUTINE AND NON-ROUTINE) ACTIVITIES			
Physical presence of the platform and light and noise emissions	<ul style="list-style-type: none"> Exclusion of other users including shipping and fishing; Collision with marine fauna resulting in injury or fatality; Provision of artificial habitat; Seabed disturbance including localised mortality/disturbance of benthos; Disturbance to marine fauna, particularly seabird's marine turtles and fish as a result of light emissions; and Disturbance to marine fauna, particularly whales, marine turtles and fish, potentially as direct physical damage or as a behavioural effect resulting from noise emissions. 	Low	<ul style="list-style-type: none"> Opportunistic light spill inspections will verify that lighting is limited to that required for safe working conditions, with corrective actions implemented. A 500 m safety exclusion zone will be maintained around the Okha FPSO at all times. Interactions between support vessels/helicopters and cetaceans and whale sharks will be consistent with Commonwealth environment Regulations and relevant code of conduct. A stakeholder fact sheet will be distributed during scheduled EP reviews; stakeholder feedback will also be assessed throughout the duration of the approved Okha FPSO EP. Systems and equipment will detect and alert facility personnel of a potential collision with the facility. Anchoring in the facility exclusion zone will be prohibited except in emergency situations or under issuing of a specific permit. Lifting and lifted equipment will be in a safe and serviceable condition and lifting operations will be safely performed to minimise the potential for dropped objects. A simultaneous operations plan will be developed for all support vessels interacting with the facility.
Routine atmospheric emissions from gas flaring and fuel combustion	<ul style="list-style-type: none"> Temporary reduction in air quality beyond localised area; Contribution to global greenhouse gas emissions; Consumption of non-renewable natural resources; and Visual impact from flare flame and possibly dark smoke. 	Low	<ul style="list-style-type: none"> Flared gas will be combusted in an efficient manner and monitored at all times. Flare and fuel gas systems will be operated within design specifications. Flaring must be controlled by each facility in line with annual limits set within the internal operating plan and performance agreements. Fuel gas and diesel consumption will be monitored at all times. Compliance with relevant national emissions reporting legislation and maritime air pollution legislation (where relevant). Routine monitoring of the process plant will be undertaken by operators to identify, isolate and repair leaks. Systems will be leak tested prior to the introduction of hydrocarbons, such that systems are proved for leak tightness prior to commissioning or re-commissioning.

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Source of Risk	Key Potential Environmental Impact	Residual Risk	Controls/Mitigation Measures
Routine discharges to the marine environment, including subsea chemicals, sewage and putrescible wastes	<ul style="list-style-type: none"> Localised water column pollution or eutrophication; and Localised adverse effect to marine biota. 	Low	<ul style="list-style-type: none"> Compliance with Woodside's Environment Procedure for Offshore Chemical and Selection. Production Offshore Process and Subsea Chemical Register Maintained for the Okha FPSO which contains details of chemical assessments and annual reviews. Subsea Inspection, Maintenance and Repair activities adhere to relevant procedures; Subsea control fluid use will be monitored and recorded and any discrepancies will be investigated to identify unplanned use and possible integrity issues. During subsea activities, any operational chemical use and discharge from the support vessel will be recorded. Sewage and putrescible wastes will be macerated prior to discharge to sea. For support vessels, compliance with MARPOL 73/78 Annex IV: Sewage (as implemented in Commonwealth waters by the <i>Protection of the Sea (Prevention of Pollution from Ships) Act 1983</i>); Marine Orders - Part 96: Marine Pollution Prevention – Sewage.
Discharge of Produced Formation Water	<ul style="list-style-type: none"> Acute and chronic toxicity to marine biota; Accumulation of toxicants in sediments affecting biota; Bioaccumulation of organic toxicants. 	Medium	<ul style="list-style-type: none"> The concentration of petroleum in any produced formation water discharged into the sea will not exceed an average of 30 mg/L over any daily (24 hour) period. PFW discharge volume and OIW concentration will be monitored and controlled. Routine assessment of potential PFW discharge impacts, including representative field based monitoring, will be undertaken. Additional verification assessment or monitoring will be initiated should there be potential for a change to discharge characteristics, which may alter existing compliance with the performance standard. PFW discharges will be assessed to meet 'no effect concentration' within an approved mixing zone around the facility. PFW chemical composition and toxicity shall be characterised to support this assessment.
Discharge of cooling, brine and drainage water	<ul style="list-style-type: none"> Alteration of physiological processes; Toxic effect to biota; and Localised water column pollution. 	Low	<ul style="list-style-type: none"> Chemical dosage of the reverse osmosis and cooling water systems is undertaken in a controlled manner to minimise dosage to the minimum required to achieve treatment efficiency. In relation to cooling water discharges, assessments will be undertaken to ensure localised temperature increases remain within an approved mixing zone. Drainage systems will be inspected and in a safe and serviceable condition to manage potential leaks and spills. OIW concentration of discharges will be monitored and controlled.

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Source of Risk	Key Potential Environmental Impact	Residual Risk	Controls/Mitigation Measures
Storage, handling and disposal of waste (including NORMS)	<ul style="list-style-type: none"> Pollution of the marine environment and potentially chronic and acute toxicity impacts on marine flora and fauna; Secondary impacts on marine fauna (e.g. entanglement); and Pollution of the terrestrial environment and potentially chronic and acute toxicity impacts on terrestrial flora and fauna. 	Low	<ul style="list-style-type: none"> Waste will be stored and segregated, and handling equipment kept in good working order, to prevent accidental loss to the environment. Records of waste transport, treatment, recycling or disposal will be maintained. Wastes, including hazardous wastes, will be transported and disposed of in a safe and environmentally responsible manner that prevents accidental loss to the environment and pollution or contamination of soil and water. Training will be provided to relevant operational personnel to educate on the correct waste management requirements i.e. storage, handling, segregation and disposal. Support vessels will comply with relevant marine pollution prevention legislation. Management measure will be in place to identify any Naturally Occurring Radioactive Materials (NORMs), and if so manage the handling, storage and disposal appropriately.
Chemical selection and use	<ul style="list-style-type: none"> Localised water column pollution; and Localised adverse effect to marine life. 	Low	<ul style="list-style-type: none"> Selection of operational process chemicals will include consideration of technical, commercial, health, safety and environment parameters. Compliance with Woodside's Environment Procedure for Offshore Chemical and Selection. Chemicals will be stored safely and handled to prevent the release to the marine environment. Facilities will maintain a hazardous chemicals register.
UNPLANNED ACTIVITIES (ACCIDENTS / INCIDENTS)			
Introduction of invasive marine species	<ul style="list-style-type: none"> Introduction of invasive marine species, possibly resulting in alteration of the natural ecosystem. 	Low	<ul style="list-style-type: none"> Compliance with AQIS Australian Ballast Water Management Requirements. Compliance with Woodside's Invasive Marine Species Management Procedure, where an IMS Risk Assessment is undertaken on support vessels for the Okha FPSO that propose to enter and operate within nearshore waters around Australia. Compliance with the <i>Australian Quarantine Regulations (2000)</i>.
Unplanned venting and release of atmospheric emissions	<ul style="list-style-type: none"> Contribution to global greenhouse gas emissions; and Ozone depletion and contribution to atmosphere of gases with high global warming potential and atmospheric lifetime. 	Low	<ul style="list-style-type: none"> Compliance with Woodside operating procedure to ensure flare system is operated within design specifications. Woodside will hold a valid Refrigerant Trading Authority. Records of refrigerant inventories and equipment maintenance will be documented.
Chemical spills	<ul style="list-style-type: none"> Pollution of the marine environment; and Adverse effects on marine life (sea floor and open water) 	Low	<ul style="list-style-type: none"> Selection of operational process chemicals will include consideration of technical, commercial, health, safety and environment parameters. Compliance with Woodside's Environment Procedure for Offshore Chemical and Selection. Chemicals will be stored safely and handled to prevent the release to the marine environment. Subsea equipment utilising hydrocarbons will be maintained to reduce the risk of loss of hydrocarbon

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Source of Risk	Key Potential Environmental Impact	Residual Risk	Controls/Mitigation Measures
			<p>containment to the marine environment.</p> <ul style="list-style-type: none"> In ocean equipment (subsea equipment and towed equipment) utilising hydrocarbons will be inspected to ensure equipment is not leaking and critical hydraulic hoses are in good working order prior to deployment. Facilities will maintain a hazardous chemicals register. Support vessels will have onboard a current Shipboard Oil Pollution Emergency Plan (SOPEP) to respond to chemical spills.
<p>Hydrocarbon Releases caused by:</p> <ul style="list-style-type: none"> Bunkering Operations 	<ul style="list-style-type: none"> Localised water column pollution; and Localised adverse effect to marine biota. 	Medium	<ul style="list-style-type: none"> Compliance with facility bunkering procedure and operators competent in the activity. Support vessels will have onboard a current Shipboard Oil Pollution Emergency Plan (SOPEP) for responding to small diesel spills.
<p>Major Environmental Events (MEE) - Hydrocarbon Releases caused by:</p> <ul style="list-style-type: none"> Well loss of containment Subsea loss of containment Topside loss of containment Offloading equipment loss of containment Cargo tank loss of containment Loss of structural integrity Loss of marine vessel separation Loss of control of suspended load. 	<ul style="list-style-type: none"> Biological and ecological impacts to megafauna, plankton, deepwater benthic communities, offshore fish species, fisheries, coral reefs, mangroves, subtidal flats and sandy beaches and seagrass communities. 	Medium to High	<p>Many of the critical barriers in place to prevent a hydrocarbon release from occurring are relevant across all MEE's and hydrocarbon release scenarios identified for the Okha FPSO, a summary of which is provided below:</p> <ul style="list-style-type: none"> Critical communication systems will facilitate prevention and response to accidents and emergencies. Emergency Shutdown (ESD) valves and systems will isolate hazardous inventories within pipework and riser systems and shut down plant and equipment. Reservoir isolation valves will isolate the reservoir from the facility. All primary and secondary barriers within the wells will isolate hydrocarbons from the reservoir. Acoustic sand detectors will ensure the integrity of pressure equipment is not compromised by the presence of sand. Subsea isolation valves will isolate the inventory in the pipeline from the riser and topsides affecting the riser. Pipeline and riser system will contain associated liquids and gases. Critical communication systems will facilitate prevention and response to accidents and emergencies. Fire and gas detection systems will facilitate prevention and response to fire or gas hazards. Critical blowdown valves will safely depressurise inventories to avoid, or prevent the escalation of a loss of containment. The position of the facility and offtake tanker, and the ability to disconnect when required, will be maintained. Hull stress will be minimised and positive intact stability will be maintained.

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Source of Risk	Key Potential Environmental Impact	Residual Risk	Controls/Mitigation Measures
			<ul style="list-style-type: none"> • Management of potentially flammable atmospheres either by inert gas blanketing or constant purge. • Maintain systems to ensure the facility's manoeuvrability under self propulsion. • Facility drain systems will contain leaks and spills of hazardous liquids. • Structural integrity of topsides, surface structures and substructures will be maintained to ensure availability of critical systems during a major accident or environment event. • Relief systems will protect pressurised equipment, equipment exposed to high pressures and piping from a loss of containment. • Integrity of pressure vessels, heat exchangers and tanks will be maintained to safely contain liquids and gases as per design requirements. • Nav aids and warning lights will alert marine vessels and aircraft of the position of the facility. • Ship Intrusion Detection Systems and equipment will detect and alert facility personnel of a potential collision with the facility and respond to a potential collision with the facility. • Crane lifting operations will be safely performed to minimise potential for dropped objects. • Lifting and lifted equipment will be in a safe and serviceable condition to prevent dropped objects. • Rotating equipment maintained to safely contain liquids and gasses as per design requirements. • Satellite tracking drifter buoy will monitor the movement of significant hydrocarbon spills to sea.

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