WA-34-L Exploration Wellheads Environment Plan Summary

Exploration Division

April 2018

Revision 0

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1. INTRODUCTION

Woodside Burrup Pty Ltd (Woodside[1]), as nominated Titleholder (on behalf of the Joint Venture comprising Woodside Burrup Pty Ltd, Kansai Electric Power Australia Pty Ltd and Tokyo Gas Pluto Pty Ltd) under the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* (Cth) (referred to as the Environment Regulations), proposes to permanently leave in-situ, the Pluto-3, Pluto-6 and Xeres-1A exploration wellheads in production licence WA-34-L (hereafter referred to as the Petroleum Activities Program).

This Environment Plan (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 WA-34-L Exploration Wellheads EP, accepted by NOPSEMA under Regulation 10A of the Environment Regulations.

1.1 Defining the Activity

The Petroleum Activities Program to be undertaken in production licence WA-34-L, involves no operations and comprises of permanently leaving the existing Pluto-3, Pluto-6 and Xeres-1A wellheads in-situ, which is a petroleum activity as defined in Regulation 4 of the Environment Regulations. As such, an EP is required.

[1] References to Woodside may also be references to Woodside Petroleum Ltd or its applicable subsidiaries.

2. LOCATION OF THE ACTIVITY

The proposed Petroleum Activities Program is in Petroleum Production Licence WA-34-L is located in Commonwealth waters approximately 175 km north-west of Dampier in Western Australia (**Figure 2-1**).

Approximate location details for the Petroleum Activities Program are provided in **Table 2-1.**

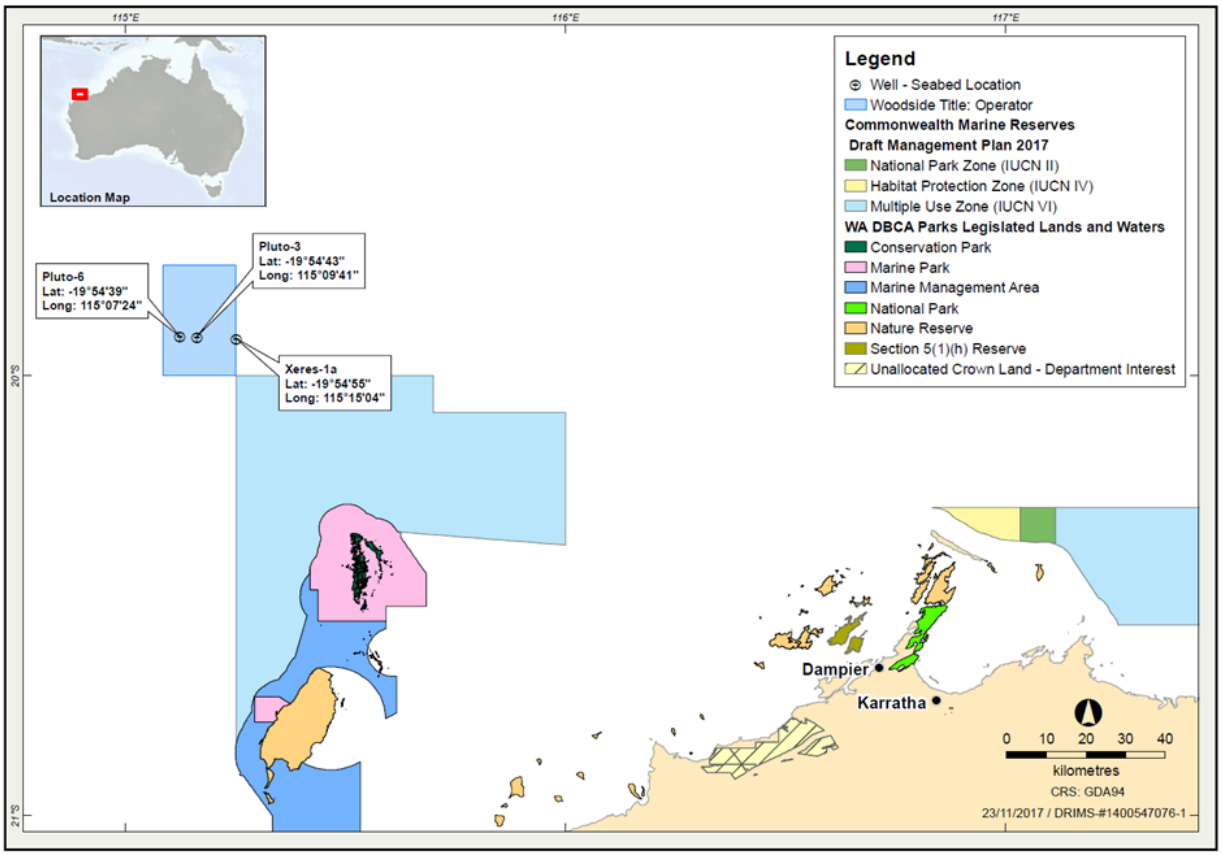

Figure 2-1: Location of the Petroleum Activities Program

The Wellhead Operational Area defines the spatial boundary of the Petroleum Activities Program, as described, risk assessed and managed by the EP. The Wellhead Operational Area encompasses a 500 m radius from each of the three wellheads. The Wellhead Operational Area is the area under which the potential risk associated with the presence of the Pluto-3, Pluto-6 and Xeres-1A wellheads will be assessed.

Table 2-1: Approximate locations details for the Petroleum Activities Program

Activity	Water depth (Approx. m LAT)	Height of well structure (m)	Latitude	Longitude	Title
Pluto-3	585	4.02	-19°54'43"	115°09'41"	WA-34-L
Pluto-6	1,006	4.00	-19°54'39"	115°07'24"	WA-34-L
Xeres-1A	190	3.78	-19°54'55"	115°15'04"	WA-34-L

3. DESCRIPTION OF THE ACTIVITY

3.1 Purpose of the Activity

Woodside conducted a comparative assessment to determine the most suitable long-term management option for the Pluto-3, Pluto-6 and Xeres-1A wellheads.

The comparative assessment has been used to determine the preferred option for abandonment, including a trade-off between safety, environmental, technical and social risks and environmental impacts.

Based on the outcomes of the assessment, Woodside proposes to leave the three wellheads (Pluto-3, Pluto-6 and Xeres-1A) in-situ permanently.

All wells have been permanently plugged and abandoned.

3.2 Well Exploration History

3.2.1 Pluto-3

In December 2005, Woodside drilled the vertical appraisal well, Pluto-3 in the Canning Basin using the Atwood Oceanic's semi-submersible drilling unit Atwood Eagle. The Pluto-3 well was drilled under the *Pluto-3 and Pluto-4 Appraisal Wells, WA-350-P Drilling Environment Plan Bridging Document*. Pluto-3 was spudded on 29 December 2005. Seven cores were cut from 2,950 to 3,227.8 m below the Rotary Table (mRT) and the total drill depth of 3,530 mRT was reached on 4 February 2006. Subsequently, the well was plugged and a sidetrack was drilled to acquire log data across the reservoir section. The Pluto-3ST1 sidetrack kicked off from 2,480 mRT on 14 February 2006. The sidetrack was drilled to a total depth of 3,530 mRT which was completed on 19 February 2006.

Permanent downhole barriers were set in Pluto-3ST1 and the rig was released from contract on 19 March 2006.

3.2.2 Pluto-6

In April 2007, Woodside drilled the deviated appraisal well Pluto-6 in the Canning Basin using the Seadrill dynamically positioned drillship the Chikyu. The Pluto-6 well was drilled under the *Pluto-6 Appraisal Well Drilling Environment Plan Bridging Document*. Pluto-6 was designed as a deviated appraisal well to test the Pluto structure, previously penetrated by the Pluto-1 (2005) discovery well. The well was deviated in order to accommodate an appropriate spud location while meeting the subsurface objectives. Pluto-6 was spudded on 13 April 2007 reaching the total depth of 3,295 mRT on 5 May 2007.

The well was plugged and abandoned and the rig was released from contract on 14 May 2007.

3.2.3 Xeres-1A Well

Xeres-1A was designed as a vertical, exploration well and was drilled by the moored semi-submersible drilling rig, the Maersk Discoverer-I in June 2011. Drilling of the Xeres-1A well was undertaken in accordance with the *Xeres-1 Exploration/Appraisal Well Environment Plan Bridging Document*. Xeres-1A well was drilled riser-less to the depth of 2,440 m measured depth (MD) and the 13 3/8" surface casing was cemented in place at 2,434 m MD. At the time of landing the blow out preventer (BOP), a lateral movement of the wellhead was observed. Different riser pulls and anchor tensions were attempted before the decision was made to suspend drilling due to unsafe conditions and concerns over wellhead fatigue.

Xeres-1A penetrated only the formation in the overburden, with no overpressure and no hydrocarbon bearing sands encountered.

The Xeres-1A well suspension was carried out under the *Xeres-1A Exploration Appraisal Well Environment Plan* Revision 1.

3.3 Well Abandonment

Well abandonment procedures and reservoir isolations performed for Pluto-3 and Xeres-1A wells were submitted to NOPSEMA as a *Pluto Well Abandonment Assessment* in 2017. The assessment demonstrated the adequacy of the downhole barriers such that the wells have been classed as permanently abandoned.

NOSPEMA reviewed the submission and confirmed they are "reasonably satisfied" that the process undertaken setting permanent downhole barriers met the requirement of the WOMP.

The *Pluto-6 Well Suspension Plan* was submitted in accordance with the requirements of the *Petroleum (Submerged Lands) (Management of Well Operations) Regulations 2004* and suspension of Pluto-6 was accepted by the (Department of Industry and Resources (DoIR)). The executed isolation of the reservoir section reflects the approved plan.

3.3.1 Pluto-3

Permanent reservoir isolation for Pluto-3 and Pluto-3ST1 consists of five cement plugs, set within the Pluto-3 well prior to sidetracking. Permanent barriers have also been installed in Pluto-3ST1, which consist of three cement plugs. The wellhead has remained in-situ since these activities were executed in 2006.

3.3.2 Pluto-6

Permanent reservoir isolation for the Pluto-6 well consists of four permanent reservoir isolation cement plugs in place. The wellhead has remained in-situ since plug and abandonment activities were executed in 2007.

3.3.3 Xeres-1A Well

The Xeres-1A well has no reservoir isolation cement plugs, as the well did not penetrate any overpressure or hydrocarbon bearing formations. There is a cement shoe casing present at the bottom of the well.

3.4 Wellhead Description

The wellheads are all made of mild steel (AISI 4130), with small amounts of elastomeric materials such as Teflon and Viton used within the seal components. The top section (between the top cement plug and the well head) of all three wells including the A-annulus (between the conductor and the surface casing) contains seawater and may contain trace amounts bentonite clay and guar gum. These well fluids are considered 'non-toxic' as outlined in **Section 3.4.1**.

The Xeres-1A and Pluto-6 wellheads have 36 inch diameter conductors and large wellheads, whereas the Pluto-3 wellhead has a 30 inch diameter conductor and a smaller wellhead. The wellheads extend up to 4.022 m above the seabed (**Table 2-1**).

The weight of the wellheads varies with their size, the size and presence of a guideless guide base or mudmat, and with the size of the surface casing. The total weight of the infrastructure on the seabed for the heavier 36" wellheads is approximately 7,000 kg per wellhead. There is an environmental cap, made of steel on each wellhead, which is the

same diameter as the wellhead and approximately 0.9 m long and weighs approximately 180 kg.

3.4.1 Selection of Well Fluids

The top section of each well was drilled riserless with water based muds. The drilling fluid was seawater and the additives were a high viscosity pill (guar gum) and pre-hydrated gel (bentonite clay). Following installation of permanent reservoir isolation cement barriers, the wells (between the top plug and the wellhead) and the A-annulus, were filled with seawater. Therefore this section comprises predominantly of seawater. There may be residual amounts of bentonite clay and guar gum at the bottom of the well. The environmental toxicity of these chemicals is presented in **Table 3-1**.

Table 3-1: Pluto-3, Pluto-6 and Xeres-1A drilling fluid formation

Component	Function	OCNS ranking
Guar gum	Viscocifier	E
Bentonite clay	Pre-hydrated gel	E

These well fluids are listed as 'E' category fluids under the Offshore Chemical Notification Scheme (OCNS). These rankings are based on toxicity and other relevant parameters such as biodegradation, and bioaccumulation, in accordance one of two schemes:

Hazard Quotient (HQ) Colour Band: Gold, Silver, White, Blue, Orange and Purple (listed in order of increasing environmental hazard); or

OCNS Grouping: E, D, C, B or A (listed in order of increasing environmental hazard). Used for inorganic substances, hydraulic fluids and pipeline chemicals only.

3.5 Comparative Assessment

Two comparative assessments were undertaken in association with the EP; one for Pluto-3 and Pluto-6 wellheads and one for the Xeres-1A wellhead. This was due to the variation in water depths which present different technical feasibility options and environmental considerations.

The comparative assessments considered removing the wellheads and leaving the wellheads in-situ. Potential wellhead approach options were assessed and compared against relevant decision drivers, including technical feasibility, Health and Safety (H&S), environment factors, social impacts and project costs. The comparative assessments concluded that leaving the wellheads in-situ provided the most preferred option as it resulted in no technical risks, fewer health and safety risks (which were also lower in magnitude as a result of no in-field activity being required) and minimal environmental and societal impacts and risks when compared to complete removal.

The key identified risks for leaving the wellheads in-situ consist of a long-term risk to commercial bottom trawling fishermen over the Xeres-1A wellhead, due to its relatively shallow location (190 m). The Low rating of this risk related to a bottom trawling net snagging on the wellhead causing damage to fishing equipment. It was not deemed credible for a commercial fishing vessel to capsize if a net is snagged on the wellheads as a result of the length of the nets, the larger size of vessels used and the safety mechanisms employed on current bottom trawling commercial fishing vessels.

An environmental benefit to leaving the wellheads in-situ was also identified, as subsea infrastructure is known to provide habitat for and support recreational and commercial fish species (McLean et al., 2017).

In contrast, attempting to remove the wellheads has been assessed as having Moderate technical feasibility risks due to the age and corrosion of the wellheads for safe lifting. The activity would also have High health and safety risks as a result of wellhead removal activities such as lifting a corroded wellhead (which could result in loss of load onto vessel or Mobile Offshore Drilling Unit (MODU) deck, resulting in damage to personnel). Environmental impacts that would also arise from this option include localised disturbance to the seabed and water column from extracting the wellhead from the seabed, and loss of hard substrate which currently provides benthic habitat that supports commercially targeted fish species in water depths down to 190 m at the Xeres-1A wellhead (McLean et al., 2017; pers. comm. Todd Bond, 14 December 2017). Other environmental impacts would be the generation of emissions and waste both from vessel activities and permanent landfill disposal of the wellheads. The use of a vessel or MODU also introduces a loss of containment (LOC) risk. These risks and impacts are avoided if the wellheads are left in-situ.

Societal risks from removing the wellheads include a short-term impact of displacement of other users in the field during the wellhead removal campaign. This would have a limited impact and low magnitude due to the short time duration and low level of fishing and shipping in the area. However, the removal would ensure no long-term risk to commercial fishing vessels from snagging, which would be relevant for the shallower Xeres-1A wellhead. The Xeres-1A wellhead is however located in a permeant fish trawl closure zone. In addition, there would be significant costs associated with recovering the wellheads, even if mobilisation of an intervention vessel or MODU to the location were covered by a larger campaign. This cost is considered disproportionate to the benefit gained, given the additional risks introduced as described above.

Conclusion

The option analysis concluded that leaving the wellheads in-situ is the most preferred option as it provides a better environmental outcome (by provide a potential environmental benefit by providing a hard substrate for benthic habitat which supports marine life) and lower safety risks to personnel when compared to complete removal. There is also minimal societal risks as the shallowest Xeres-1A wellhead is within a permanent fish trawl closure zone and therefore provides little risk of snagging of commercial fishing vessels.

The results of the risk rankings from the comparative assessments undertaken for the shallow water (Xeres-1A) wellhead and the deeper water (Pluto-3 and Pluto-6) wellheads are presented in Appendix A.

4. DESCRIPTION OF THE RECEIVING ENVIRONMENT

4.1 Regional Setting

The Wellhead Operational Area is located in Commonwealth waters, approximately 175 km north-west of Dampier and split between the North West Province (NWP) and the North West Shelf Province (NWSP).

Both provinces form part of the wider North West Marine Region (NWMR) as defined under the Integrated Marine and Coastal Regionalisation of Australia (National Oceans Office and Geoscience Australia, 2005).

The NWP and NWSP are situated on the continental slope and are characterised by troughs, plateaus, terraces and canyons and are a transitional boundary between tropical and temperate climate and biological zones (DSEWPaC, 2012a).

4.2 Physical Environment

The climate of the NWMR is dry tropical, exhibiting a hot summer season from October to April and a milder winter season between May and September (BoM, 2017).

The region experiences a tropical monsoon climate, with distinct wet (January to July) and dry (August to November) seasons. Rainfall in the region typically occurs during the wet season, with highest falls observed during late summer, often associated with the passage of tropical low pressure systems and cyclones (Pearce et al., 2003).

Tropical cyclone activity can occur between November and April and is most frequent during December to March. Based on 47 years of historical weather data from 1970 until 2016, 32 tropical cyclones have occurred within the WA-34-L production license area (BoM, n.d. b).

The large-scale ocean circulation of the NWMR is primarily influenced by the Indonesian Through Flow (ITF) (Meyers et al., 1995; Potemra et al., 2003), and the Leeuwin Current (Batteen et al., 1992; Godfrey and Ridgway, 1985; Holloway and Nye, 1985; James et al., 2004; Potemra et al., 2003). The ITF and Leeuwin Current are strongest during late summer and winter (Holloway and Nye, 1985; James et al., 2004).

In addition to the synoptic-scale current dynamics, tidally driven currents are a significant component of water movement in the NWMR causing rise and fall of the thermocline and enhance mixing in the water column (Holloway, 1983; Holloway and Nye, 1985; Holloway et al., 2001).

Along the NWSP annual variation in salinity is minimal, small increase in salinity during summer is then countered by the arrival of the lower salinity waters of the Leeuwin Current and ITF in autumn and winter (James et al., 2004).

The bathymetry of the NWMR is characterised by four zones: the inner continental shelf, the middle continental shelf, the outer shelf/continental slope and the abyssal plain. These divisions are made on the basis of water depth and geomorphic features in the region.

The Wellhead Operational Area is located from its east-most extent on the continental slope at Pluto-6 (water depth 1,006 m) to its west-most extent at the start of the continental slope on the outer shelf at Xeres-1A (water depth 190 m). The continental slope comprises of soft sediments (sands and silt) which meets the abyssal plain. The NWMR is largely comprised of fine carbonate sands and silts, derived primarily from foraminiferan and diatomaceous remains, with finer sediments increasing towards the Exmouth Plateau and the abyssal plain

(Baker et al., 2008). Marine sediment in the Wellhead Operational Area is expected to consist of fine grained muddy sands and silts, typical of the deep water seabed in the region, with hard substrate potentially occurring at Pluto-6 (Brewer et al., 2007).

4.3 Biological Environment

No Critical Habitats or Threatened Ecological Communities as listed under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) are known to occur within the Wellhead Operational Area

4.3.1 Benthic Communities

Sea floor communities in deeper shelf waters receive insufficient light to sustain ecologically sensitive primary producers. Due to the depth of water at the Wellhead Operational Area (≥190 m), benthic primary producer groups do not occur.

No coral reefs have been identified within the Wellhead Operational Area, though they are an integral part of the wider marine environment to the South. No seagrass beds or macroalgae occur in the Wellhead Operational Area as the seabed receives insufficient light to support such communities. However, seagrass beds and macroalgae habitats are present in the wider region distributed in shallow coastal waters that receive sufficient light to support seagrasses and macroalgae. The nearest suitable seagrass / macroalgae habitat is approximately 55 km southeast of the Wellhead Operational Area at the Montebello Islands. Mangroves are not found within or adjacent to Wellhead Operational Area, but can be found in the wider region in locations such as Ningaloo, Exmouth Gulf, Shark Bay and the Pilbara shoreline.

Benthic communities of filter feeders generally live in areas that have strong currents and hard substratum (CALM, 2005) and are closely associated with substrate type, with areas of hard substrate typically supporting more diverse epibenthic communities (Heyward et al., 2001). The absence of hard substrate in the Wellhead Operational Area is considered a limiting factor for the recruitment of epibenthic organisms. Rock pinnacles observed in the vicinity of the Wellhead Operational Area (within 1 km of Pluto-6 and 3 km of Pluto-3) were reported to provide habitat for fish, shrimp, hydroids and anemones (SKM, 2006). Sedimentary infauna associated with soft unconsolidated sediments of the Wellhead Operational Area is widespread and well represented along the continental shelf and upper slopes in the NWS region (Woodside 2004; SKM, 2007; Brewer et al., 2007; RPS, 2011). Consequently, in the context of the contiguous extent of habitats across the region, benthic habitat within the Wellhead Operational Area, which consists primarily of soft unconsolidated sediments, is considered to be of relatively low environmental sensitivity.

4.3.2 Plankton

Phytoplankton within the Wellhead Operational Area is expected to reflect the conditions of the NWMR. Primary productivity of the NWMR appears to be largely driven by offshore influences (Brewer et al., 2007), with periodic upwelling events and cyclonic influences driving coastal productivity with nutrient recycling and advection. There is a tendency for offshore phytoplankton communities in the NWMR to be characterised by smaller taxa (e.g. bacteria), whereas, shelf waters are dominated by larger taxa such as diatoms (Hanson et al., 2007).

Zooplankton within the Wellhead Operational Area is expected to be similar to offshore waters in the NWMR and may include organisms that complete their lifecycle as plankton (e.g. copepods, euphausiids) as well as larval stages of other taxa such as fishes, corals and molluscs. Peaks in zooplankton such as mass coral spawning events (typically in March and April) (Rosser and Gilmour, 2008; Simpson et al., 1993) and fish larvae abundance (CALM, 2005) can occur throughout the year.

4.3.3 Species

A total of 32 EPBC Act listed species considered to be MNES (i.e. listed as threatened or migratory) were identified as potentially occurring within the Wellhead Operational Area (**Table 4-1**). Of these 15 are considered threatened marine species and 31 migratory species under the EPBC Act.

Table 4-1 Threatened and migratory marine species under the EPBC Act potentially occurring with the Well Abandonment Area

Species Name	Common Name	Threatened Status	Migratory Status
Mammals			
Balaenoptera borealis	Sei Whale	Vulnerable	Migratory
Balaenoptera edeni	Bryde's Whale		Migratory
Balaenoptera musculus	Blue Whale	Endangered	Migratory
Balaenoptera physalus	Fin Whale	Vulnerable	Migratory
Megaptera novaeangliae	Humpback Whale	Vulnerable	Migratory
Orcinus orca	Killer Whale, Orca		Migratory
Physeter macrocephalus	Sperm Whale		Migratory
Tursiops aduncus (Arafura/Timor Sea populations)	Spotted Bottlenose Dolphin (Arafura/Timor Sea populations)		Migratory
Reptiles			
Caretta caretta	Loggerhead Turtle	Endangered	Migratory
Chelonia mydas	Green Turtle	Vulnerable	Migratory
Dermochelys coriacea	Leatherback Turtle, Leathery Turtle, Luth	Endangered	Migratory
Eretmochelys imbricata	Hawksbill Turtle	Vulnerable	Migratory
Natator depressus	Flatback Turtle	Vulnerable	Migratory
Sharks, Fish and Rays			
Anoxypristis cuspidata	Narrow Sawfish, Knifetooth Sawfish		Migratory
Carcharias taurus (west coast population)	Grey Nurse Shark (west coast population)	Vulnerable	
Carcharodon carcharias	White Shark, Great White Shark	Vulnerable	Migratory
Isurus oxyrinchus	Shortfin Mako, Mako Shark		Migratory
Isurus paucus	Longfin Mako		Migratory

Species Name	Common Name	Threatened Status	Migratory Status
Manta alfredi	Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray		Migratory
Manta birostris	Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray		Migratory
Pristis zijsron	Green Sawfish, Dindagubba, Narrowsnout Sawfish	Vulnerable	Migratory
Rhincodon typus	Whale Shark	Vulnerable	Migratory
Birds			
Actitis hypoleucos	Common Sandpiper		Migratory Wetlands
Anous stolidus	Common Noddy		Migratory
Calidris acuminata	Sharp-tailed Sandpiper		Migratory Wetlands
Calidris canutus	Red Knot, Knot	Endangered	Migratory Wetlands
Calidris melanotos	Pectoral Sandpiper		Migratory Wetlands
Calonectris leucomelas	Streaked Shearwater		Migratory
Fregata ariel	Lesser Frigatebird, Least Frigatebird		Migratory
Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew	Critically Endangered	Migratory Wetlands
Pandion haliaetus	Osprey		Migratory Wetlands
*Ardenna pacifica**	Wedge-tailed Shearwater		Migratory

**Not identified within the EPBC Protected Matters Search Report, however the Wellhead Operational Area is located within a BIA for the species*

Seabirds

Ten species of birds (three seabirds and six migratory shorebirds) were identified by the EPBC Act Protected Matters Search as potentially occurring with the Wellhead Operational Area.The breeding/foraging biological important area (BIA) for the wedge-tailed shearwater overlaps the Wellhead Operational Area.

Although these species may be present near the Wellhead Operational Area on occasion, they will not occur at depths of the wellheads within the Wellhead Operational Area (Pluto-3 585 m, Pluto-6 1,006 m and Xeres-1A 190 m).

Marine Mammals

The Wellhead Operational Area lies within the distribution and migration BIAs for the pygmy blue whale, with the nearest foraging BIA approximately 240 km to the southwest. Given research has shown their preference for deeper waters and movements mainly to the west

side of Scott Reef during their migrations, occurrence will be rare. Further, when individuals do occur in the area, it is likely there will be only one or few individuals and their time in the area will be short in duration.

Other cetacean species may infrequently transit the Well Operational Area; however, the Well Operational Area does not represent any critical habitat (feeding, resting or breeding aggregation areas) for cetacean species that may occur in the region. Other listed marine mammals identified that may occur within the Well Abandonment Area include: sei whales, Bryde's whales, fin whales, Humpback whales, and sperm whales. Given the distribution, preferences and migration patterns the presence of Killer whales, Sperm whales and spotted bottlenose dolphins is unlikely.

Marine Reptiles

Of the seven species of marine turtles found globally, five were identified as potentially occurring within the Wellhead Operational Area; the green turtle (*Chelonia mydas*), leatherback turtle (*Dermochelys coriacea*), loggerhead turtle (*Caretta caretta*), hawksbill turtle (*Eretmochelys imbricata*), and the flatback turtle (*Natator depressus*). There is no emergent habitat within the Wellhead Operational Area, and therefore, nesting aggregations of marine turtles are unlikely to occur

Further, tracking data indicate the three main marine turtle species recorded for the NWMR travel and forage in coastal waters that are relatively shallow (hawksbill turtles – less than 10 m deep; green turtles – less than 25 m deep; flatback turtles – less than 70 m deep) (Chevron Australia Pty Ltd, 2015). Diving depth for leatherback turtles is related to food availability, and dives can reach greater than 1000 m in depth, thought typically restricted to less than 300 m (Dodge et al., 2014; Houghton et al., 2008).

One marine turtle BIA overlaps the Wellhead Operational Area, the flatback turtle internesting buffer. The buffer surrounds nesting rookeries present on the eastern beaches of Barrow Island, approximately 90 km south of the Wellhead Operational Area and is therefore unlikely to occur within the Wellhead Operational Area.

Sharks, Rays and Fishes

Nine EPBC listed shark/ray species, including the Narrow Sawfish (*Anoxypristis cuspidata)*, Grey Nurse Shark (*carcharias Taurus)*, Great White Shark (*Carcharadon cacharias)*, Shortfin Mako Shark (*Isurus ocyrinchus*), Longfin Mako (*Isurus paucus*), Coastal and Giant Manta Ray (*Manta alfredi and Manta birostris*), Green Sawfish (*Pristis zijsron*), are unlikely to occur within the Wellhead Operational Area however some may be present for short durations when individuals infrequently transit the area.

The fish fauna in the Pilbara region is considered to be diverse (Sainsbury et al., 1985) and show a trend of decreasing species richness with increasing depth (Last et al., 2005). Fish species richness has been shown to correlate with habitat complexity, with more complex habitat supporting greater species richness and abundance than bare areas (Gratwicke and Speight, 2005).

Further to the south of the Wellhead Operational Area:

- The North West Cape marine region is a transition area for demersal shelf and slope fish communities between the tropical dominated communities to the north and temperate communities to the south (Last et al., 2005). The benthic shelf and slope

communities offshore of the North West Cape comprise both tropical and temperate fish species with a north to south gradient (DSEWPaC., 2012a).

- The fish fauna of the North West Cape area, like the ichthyofauna of many regions including the NWS, exhibits decreasing species richness with depth (Last et al., 2005). Fish species diversity has been shown to be positively correlated with habitat complexity, with more complex habitats (e.g. coral reefs) typically hosting higher species richness than simpler habitats such as bare, unconsolidated muddy sediments (Gratwicke and Speight, 2005). A total of 500 finfish species from 234 genera and 86 families have been recorded within the Ningaloo Marine Park and 393 species at study sites of the Muiron Islands (MPRA, 2005).

4.4 Socio-economic Environment

There are no known sites of Indigenous or European cultural heritage significance within the vicinity of the Wellhead Operational Area. A search of the Australian National Shipwreck Database (DoEE, 2017b) indicated that there are no known historic shipwrecks within the Wellhead Operational Area. However, it is noted that the National Shipwreck Database lists twelve shipwrecks to the South of the Wellhead Operational Area. There are no known National and/or Commonwealth Heritage Listed Places within the Wellhead Operational Area.

A number of Commonwealth fisheries are listed as overlapping or being in close proximity to the Wellhead Operation Area (North West Slope Trawl Fishery, Southern Bluefin Tuna Fishery, Western Skipjack Fishery and Western Tuna and Billfish Fishery). Due to the depth, Low fishing efforts and the type of fishing practices utilised there is not expected to interact with the Wellhead Operational Area.

Interactions with the WA State Managed Fisheries; Mackerel Managed Fishery, West Coast Deep Sea Crustacean Managed Fishery, and Specimen Shell Managed Fishery are unlikely to occur due to low fishing efforts and the type of fishing practices utilised. A number of other WA State Managed Fisheries were identified as existing within the NWMR however due to the depth and current fishing practices interaction with the Wellhead Operational Area will not occur.

There are no traditional, or customary, fisheries within the Wellhead Operational Area, as these are typically restricted to shallow coastal waters and/or areas with structures such as reefs. However, it is recognised that Barrow Island, Montebello Islands and Ningaloo Reef and other areas within the wider region have a known history of fishing from when areas were occupied (as from historical records) (CALM, 2005; DEC, 2007).

No tourism activities take place specifically within the Wellhead Operational Area. Recreational fishing in the NWMR is mainly concentrated around the coastal waters and islands (including Dampier Archipelago, Ningaloo Marine Park, North West Cape area, the Montebello Islands, Rowley Shoals, and other islands and reefs in the region) and has grown considerably with the expanding regional centres, seasonal tourism and residential and fly in/fly out work force, particularly in the Pilbara region (Fletcher and Santoro, 2011). Due to the Wellhead Operational Area's water depths (between 190 and 1,006 m) and distance offshore (approximately 175 km northwest of Dampier), recreational fishing is unlikely to occur in the Wellhead Operational Area.

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 Wellhead Operational Area lies outside of the designated network and is at a significant depth therefore interaction with shipping activity is unlikely.

The NWMR supports a number of industries including petroleum exploration and production, as well as minerals extraction. The nearest petroleum activities occur at the Wheatstone Platform (Chevron) 14 km east of the Wellhead Operational Area and the Pluto Platform (Woodside) approximately 16 km southeast of the Wellhead Operational Area. Floating Production Storage and Offloading (FPSO) units may operate in the wider vicinity of the Wellhead Operational Area.

4.5 Sensitive Marine Environments

The Wellhead Operational Area overlaps with the key ecological feature (KEF) for Continental Slope Demersal Fish Communities. No other sensitive areas including Commonwealth Marine Reserves, State Marine Parks and Reserves, World Heritage Areas and Key Ecological Features occur within the Wellhead Operational Area.

The continental slope demersal fish communities in the region have been identified as a KEF of the NWMR (DSEWPaC, 2012a). The continental slope between North West Cape and the Montebello Trough has been identified as one of the most diverse slope assemblages in Australian waters, with over 508 fish species and the highest number of endemic species (76) of any Australian slope habitat (DEWHA, 2008a).

The fish fauna of the North West Cape region, like the ichthyofauna of many regions, exhibits decreasing species richness with depth (Last et al., 2005). Fish species diversity has been shown to be positively correlated with habitat complexity, with more complex habitats (e.g. coral reefs) typically hosting higher species richness than simpler habitats such as bare, unconsolidated muddy sediments (Gratwicke and Speight, 2005).

The offshore sediment habitats of the Wellhead Operational Area are expected to support lower fish species richness than other shallower, more complex habitats in the coastal areas of the region.

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.

Environmental impacts and risks include those directly and indirectly associated with the Petroleum Activities Program, and includes potential emergency and accidental events. Planned activities have the potential for inherent environmental impacts. An environmental risk is an unplanned event with the potential for impact (termed risk 'consequence').

Herein, potential impact from planned activities are termed 'impacts', and 'risks' are associated with unplanned events with the potential for impact (should the risk be realised), with such impact termed potential 'consequence'.

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.

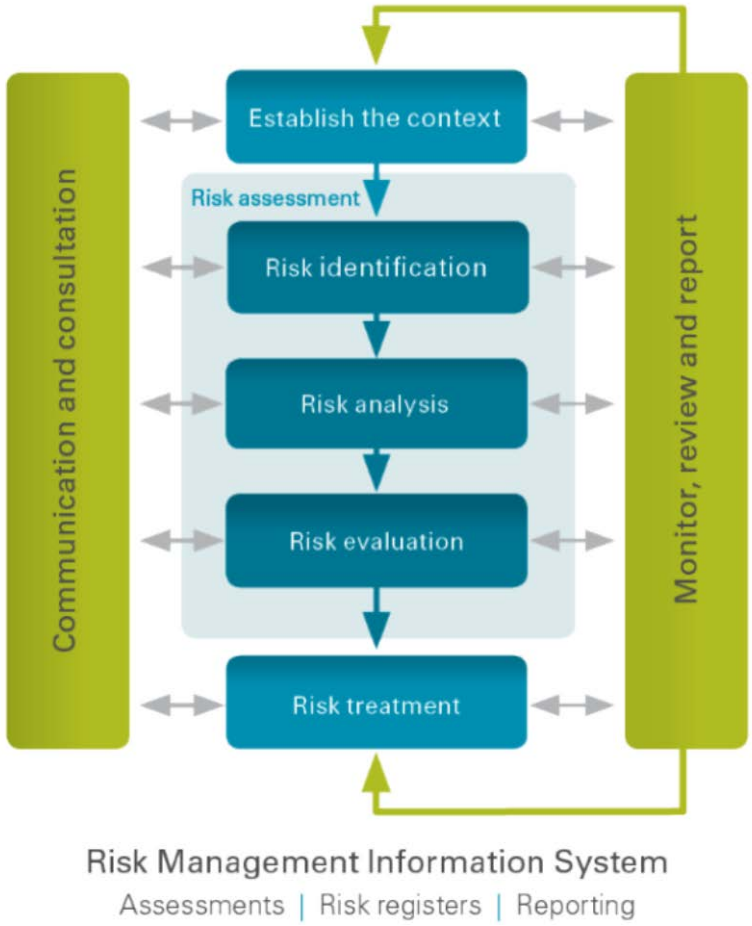

Figure 5-1: Woodside's risk management framework

5.1.1 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.

The 'what' and 'how' are described in the context of 'environmental aspects' to inform the risk and impact assessment for planned (routine and non-routine) and unplanned (accidents / incidents /emergency conditions) activities.

Hazard identification workshops aligned with NOPSEMA's Hazard Identification Guidance Note 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.

5.1.2 Risk Identification

An Environmental Hazard Identification (ENVID) was undertaken by multidisciplinary teams consisting of relevant engineering and environmental personnel with sufficient breadth of

knowledge, training and experience to reasonably assure that risks were identified and their potential environmental impacts assessed.

Impacts and risks were identified during the ENVID for both planned (routine and non-routine) activities and unplanned (accidents/incidents/emergency conditions) events.

5.1.3 Risk Analysis

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

The following key steps were undertaken for each identified risk during the risk assessment:

- identification of decision type in accordance with the decision support framework
- identification of appropriate control measures (preventative and mitigation) aligned with the decision type
- assessment of the risk rating.

Decision Support Framework

To support the risk assessment process, Woodside's HSE risk management procedures include the use of decision support framework based on principles set out in the Guidance on Risk Related Decision Making (Oil and Gas UK 2014). This concept has been applied during the ENVID or equivalent preceding processes during historical design decisions 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 confirm:

- activities do not pose an unacceptable environmental risk
- appropriate focus is placed on activities where the risk is anticipated to be acceptable 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 current 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 current risk (i.e. risk with controls in place) and is therefore determined following the identification of the decision type and appropriate control measures.

The risk rating process considers the environmental impacts and where applicable, the reputational and brand, legal/compliance and social and cultural impacts of the risk. The risk ratings are assigned using the Woodside Risk Matrix (refer to **Figure 5-2**).

The risk rating process is performed using the following steps:

Select the Consequence Level

Determine the most credible impacts associated with the selected event assuming some controls (prevention and mitigation) have failed (refer to **Table 5-1**). Where more than one impact applies (i.e. environmental and legal/compliance), the consequence level for the highest severity impact is selected.

Table 5-1: Woodside Risk Matrix (environment and social and cultural) consequence descriptions

Environment	Social & Cultural	Consequence Level
Catastrophic, long-term impact (> 50 years) on highly valued ecosystems, species, habitat or physical or biological attributes	Catastrophic, long-term impact (>20 years) to a community, social infrastructure or highly valued areas/items of international cultural significance	A
Major, long term impact (10-50 years) on highly valued ecosystems, species, habitat or physical or biological attributes	Major, long-term impact (5-20 years) to a community, social infrastructure or highly valued areas/items of national cultural significance	B
Moderate, medium-term impact (2-10 years) on ecosystems, species, habitat or physical or biological attributes	Moderate, medium term Impact (2-5 years) to a community, social infrastructure or highly valued areas/items of national cultural significance	C
Minor, short-term impact (1-2 years) on species, habitat (but not affecting ecosystems function), physical or biological attributes	Minor, short-term impact (1-2 years) to a community or highly valued areas/items of cultural significance	D
Slight, short-term impact (<1 year) on species, habitat (but not affecting ecosystems function), physical or biological attributes	Slight, short-term impact (<1 year) to a community or areas/items of cultural significance	E
No lasting effect (<1 month). Localised impact not significant to environmental receptors	No lasting effect (<1 month). Localised impact not significant to areas/items of cultural significance	F

Select the Likelihood Level

Select the likelihood level from the description that best fits the chance of the selected consequence actually occurring, assuming reasonable effectiveness of the prevention and mitigation controls (refer to **Table 5-2**).

Table 5-2: Woodside risk matrix likelihood levels

Likelihood Description						
Frequency	1 in 100,000 – 1,000,000 years	1 in 10,000 – 100,000 years	1 in 1,000 – 10,000 years	1 in 100 – 1,000 years	1 in 10-100 years	>1 in 10 years
Experience	**Remote**: Unheard of in the industry	**Highly Unlikely**: Has occurred once or twice in the industry	**Unlikely**: Has occurred many times in the industry but not at Woodside	**Possible**: Has occurred once or twice in Woodside or may possibly occur	**Likely**: Has occurred frequently at Woodside or is likely to occur	**Highly Likely**: Has occurred frequently at the location or is expected to occur
Likelihood Level	**0**	**1**	**2**	**3**	**4**	**5**

Calculate the Risk Rating

A likelihood and risk rating is only applied to environmental risks using the Woodside Risk Matrix. This risk level is used as an input into the risk evaluation process and ultimately for the prioritisation of further risk reduction measures. Once each risk is treated to ALARP, the risk rating articulates the ALARP baseline risk as an output of the ENVID studies.

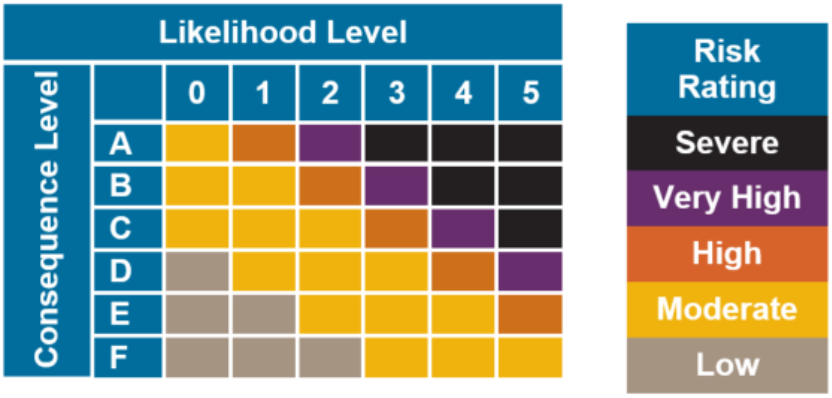

Figure 5-2: Woodside risk matrix: risk level

The ENVID (undertaken in accordance with the methodology described above) identified four sources of environmental risk, comprising three planned, which are all assessed as having a low current risk rating, and one unplanned sources of risk, which is assessed as having a low current risk rating.

The risk analysis and evaluation for the Petroleum Activities Program indicate that all of the current environmental risks and impacts associated with the activity are reduced to ALARP and are of an acceptable level. (refer to **Figure 5-2**).

5.1.4 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 has been adapted to include principles of ecological sustainability (given as an objective in the Environment Regulations and defined in the EPBC Act), the Precautionary Principle and the corresponding environmental risk threshold decision-making principles used to determine acceptability.

Demonstration of ALARP and Acceptability

Below descriptions have been provided to demonstrate how Woodside demonstrates risks are ALARP and acceptable:

- Low and Moderate risks (below C level consequence), and Decision Type A are ALARP and 'Broadly Acceptable', if they meet legislative requirements, industry codes and standards, applicable company requirements and industry guidelines. Further effort towards risk reduction (beyond employing opportunistic measures) is not reasonably practicable without sacrifices grossly disproportionate to the benefit gained.
- C+ consequence risks, Decision Type B and C, and High to Severe risks, are ‘Acceptable if ALARP’ can be demonstrated using good industry practice and risk based analysis, if legislative requirements are met, societal concerns are accounted for, and the alternative control measures are grossly disproportionate to the benefit gained.
- Additionally, Very High and Severe risks require ‘Escalated Investigation’ and mitigation to reduce the risk to a lower and more acceptable level. If after further investigation the risk remains in the Very High or Severe category, the risk requires appropriate business engagement in accordance with Woodside’s Risk Management Procedure to accept the risk. This includes due consideration of regulatory requirements.

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

- Low and Moderate current risks are 'Broadly Acceptable', if they meet legislative requirements, industry codes and standards, regulator expectations, Woodside Standards and industry guidelines.
- High to Severe 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 moderate and high current risks, Woodside evaluates the following criteria:

- principles of Ecologically Sustainable Development (ESD) as defined under the EPBC Act
- internal context - the proposed controls and current risk level are consistent with Woodside policies, procedures and standards
- external context – consideration of the environment consequence and stakeholder acceptability
- other requirements – the proposed controls and current risk level are consistent with national and international standards, laws and policies

Very high and severe current 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 Potential Environment Risks not included within the Scope of the Environment Plan

The ENVID identified a number of sources of environmental risk / impact that were assessed as not being applicable (not credible) within or outside the Wellhead Operational Area as a result of the Petroleum Activities Program. These sources of environmental risk / impact were determined to not form part of the EP and are described in the following sections for information only. These are described in **Table 5-1** below.

Table 5-3 Environmental risks that were assessed as not being credible.

Source of Risk	Justification for not being applicable (not credible)
Vessel based impacts and risks	Vessel based impacts and risks, such as discharges (e.g. sewage, grey water), acoustic emissions, atmospheric emissions and spill risks (e.g. deck and bunkering spills) were assessed as not credible as no vessel operations are proposed for this Petroleum Activities Program.
Helicopter Operations	Impacts and risks associated with helicopter operations such as interference with other aerial operations and acoustic emissions

	were assessed as not credible as no helicopter operations are proposed for this Petroleum Activities Program.
Displacement of Tourism Operations	No specific tourism occurs in the Wellhead Operational Area**.** Occasionally charter boats or private motor vessels may pass through the area. As the wellheads are over 190 m below the sea surface, they will not impact charter boats or private motor vessels passing through the area.
Displacement of Commercial Shipping	NWS shipping density data provided by AMSA confirms that shipping traffic does intersect the Wellhead Operational Area. However, AMSA has advised that the presence of wellheads will not pose a risk to shipping due to their low profile relative to the prevailing water depths. No shipping fairways intersect the Wellhead Operational Area.
Displacement of Defence Activities	The Wellhead Operational Area is narrowly intersected by an area for military flying training. As the wellheads are located in water depths between 190 and 1,006 m, impacts to defence activities as a result of the physical presence of the wellheads was assessed as not credible.
Planned or Unplanned Discharge of Well Fluid	The top sections of all three wells including the A-annulus comprises of seawater. There may be trace amounts of drilling fluid additives (guar gum and bentonite). Guar gum and bentonite are non-toxic and are classified as 'E' category fluids under OCNS. If present, the guar gum and bentonite will have settled to the bottom of the well section (between 664 m and 2,434 m below the seabed)**.** Given the small diameter of each of the well casings and the depths below the seabed at which the cement plugs are installed, the risk of planned or unplanned discharge of residual amounts of non-toxic components to the environment was assessed as not credible.
Invasive Marine Species (IMS)	IMS management (i.e. hull fouling and ballast water was assessed as not being applicable as there are no vessel operations proposed for this Petroleum Activities Program.
Shallow/Near-Shore Activities	Risks associated with shallow / near-shore activities such as anchoring and vessel grounding were assessed as not being applicable as there are no vessel operations proposed for this Petroleum Activities Program.
Loss of Well Integrity	Demonstration of the installation of permanent reservoir isolation barriers performed for Pluto-3 and Xeres-1A wells were submitted to NOPSEMA as a Pluto Well Abandonment Assessment in 2017. The assessment demonstrated the suitability of the permanent downhole barriers, such that the wells have been classed as permanently abandoned. The Pluto-6 Well Suspension Plan details the permanent reservoir isolation barriers installed for the well. The plan was accepted under the *Petroleum (Submerged Lands) (Management of Well Operations) Regulations 2004* by the regulator of the day (Department of Industry and Resources (DoIR)). At the time, legislation only required that the Plan was accepted by the regulator and that evidence able to be provided that permanent isolation barriers were installed in accordance with the accepted

	Plan. The wells have been abandoned with permanent downhole barriers in place and therefore the loss of well integrity is not considered credible. As there is no credible hydrocarbon risk, no Oil Pollution Emergency Plan has been developed to support this EP.

6. ENVIRONMENTAL RISKS AND IMPACTS SUMMARY

Table 6-1 presents a summary of the sources of risk, analysis and evaluation for the Petroleum Activities program, using the methodology described above in **Section 5** 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 unplanned. These sources of risk are all low environmental consequence and either unlikely or highly unlikely to occur.

A detailed description of credible environmental risks and potential impacts together with a summary of control measures have been presented in Appendix B.

Table 6-1: Environmental Risk and Impacts Register Summary

Aspect	EP Section	Source of Impact/Risk	Key Potential Environmental Impacts (Refer to relevant EP section for details)	Current Risk Rating				Acceptability of Impact/Risk
				Consequence	Potential Consequence level of impact[2]	Likelihood	Current Risk Rating	
Planned Activities (Routine and Non-routine)								
Physical presence-disturbance to marine users	6.6.1	Wellheads left in-situ causing interference or displacement to third party activities (e.g. commercial/recreational fishing and oil and gas operators).	Isolated social impact potentially resulting from interference or displacement to third party activities (e.g. commercial/recreational fishing and oil and gas operators). The risk of accidental damage to trawling equipment is assessed as an unplanned activity.	F	Social and Cultural – No lasting effect (< 1 month). Localised impact not significant to areas/items of cultural significance.	-	-	Broadly acceptable
Physical presence-disturbance to seabed and benthic habitats	6.6.2	Disturbance to seabed and benthic habitat from the wellheads remaining in-situ permanently.	Damage to seabed and benthic habitats from scouring/accretion of sediments. Introduction of hard substrate resulting in creation of a new habitat.	F	Environment – No lasting effect (<1 month). Localised impact not significant to environmental receptors.	-	-	Broadly acceptable
Non-routine discharges	6.6.3	Corrosion of wellhead resulting in non-routine discharge of trace amounts of metals.	Localised and not significant effects to sediment and water quality (e.g. toxicity) and marine biota in offshore waters.	F	Environment – No lasting effect (<1 month). Localised impact not significant to environmental receptors.	-	-	Broadly acceptable
Unplanned Activities (Accidents / Incidents)								
Physical presence resulting in accidental damage to trawling equipment	6.7.1	Wellhead left in-situ resulting in accidental damage to trawling equipment.	Isolated social impact potentially resulting in accidental damage to trawling equipment.	F	Social and Cultural – No lasting effect (<1 month). Localised impact not significant to environmental receptors.	1	L	Broadly acceptable

7. ONGOING MONITORING OF ENVIRONMENTAL PERFORMANCE

The Petroleum Activities Program will be managed in compliance with the WA-34-L Exploration Wellheads 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 WA-34-L Exploration Wellheads EP is to identify and mitigate potentially adverse environmental impacts associated with the Petroleum Activities Program, for both planned and unplanned risks, 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 EP) a specific environmental performance outcome, environmental performance standards and measurement criteria have been developed. The performance standards are a statement of performance required of a control 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 WA-34-L Exploration Wellheads EP identifies the roles/responsibilities and training/competency requirements for all personnel in relation to implementing controls, managing non-conformance, and meeting monitoring, auditing, and reporting requirements for the activity.

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 outcomes, standards and measurement criteria outlined in the WA-34-L Exploration Wellheads EP

Woodside employees are required to report internally all environmental incidents and non-conformance with environmental performance outcomes and standards in the WA-34-L Exploration Wellheads 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.

7.1 Environment Plan Revisions and Management of Change

Revision of the WA-34-L Exploration Wellheads EP will be undertaken in accordance with the requirements outlined in Regulations 17, 18 and 19 of the Environment Regulations. Woodside will submit a revision to the 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 WA-34-L Exploration Wellheads 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 WA-34-L Exploration Wellheads EP

- At least 14 days before the end of each period of 5 years commencing on the day on which the original and subsequent revisions of the WA-34-L Exploration Wellheads EP is accepted under Regulation 11 of the Environment Regulations
- As requested by NOPSEMA.

Management of changes relevant to the WA-34-L Exploration Wellheads EP, concerning the scope of the activity description, changes in understanding of the environment, including all current advice on species protected under EPBC Act 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 WA-34-L Exploration Wellheads EP 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 WA-34-L Exploration Wellheads 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 WA-34-L Exploration Wellheads 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 WA-34-L Exploration Wellheads EP using Woodside's document control process. Minor revisions will be tracked and incorporated during scheduled internal reviews.

8. CONSULTATION

In support of the WA-34-L Exploration Wellheads EP, Woodside conducted a stakeholder assessment and engaged with relevant stakeholders to inform decision-making and planning for this petroleum activity in accordance with the requirements of Regulation 11A and 14(9) of the Environment Regulations.

Woodside conducted an assessment to identify relevant stakeholders, based on the location of the WA-34-L exploration wellheads and potential environmental and social impacts. A consultation fact sheet was sent to all stakeholders identified through the stakeholder assessment process prior to lodgement of the WA-34-L Exploration Wellheads EP with NOPSEMA for assessment and acceptance. Woodside provided information about the Petroleum Activities Program to the relevant stakeholders listed in Table 8-1. Woodside considers relevant stakeholders for routine operations as those that undertake normal business or lifestyle activities in the vicinity of the existing Petroleum Activities Program (or their nominated representative) or have a State or Commonwealth regulatory role.

Table 8-1: Relevant stakeholders identified

Organisation	Relevance
Department of Industry, Innovation and Science	Department of relevant Commonwealth Minister
Department of Mines, Industry Regulation and Safety (*formerly Department of Mines and Petroleum*)	Department of relevant State Minister
Australian Maritime Safety Authority	Maritime safety
Australian Hydrographic Service	Maritime safety
Department of Primary Industries and Regional Development (*formerly Department of Fisheries (Western Australia)*)	Fisheries management
Commonwealth Fisheries	Commercial fisheries – Commonwealth - North West Slope Trawl - Western Tuna and Billfish Fishery - Western Deepwater Trawl - Australian Southern Bluefin Tuna Industry Association
Western Australian Fisheries	Commercial fisheries – State - Pilbara Fish Trawl - Pilbara Trap - Marine Aquarium RFish - Mackerel Fishery
Department of Defence	Helicopter movements
Department of Transport	Oil spill preparedness
Department of the Environment and Energy	Responsible for Sea Dumping Act implementation

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 Fisheries Management Authority (AFMA);
- Australian Maritime Safety Authority (marine pollution);
- Australian Conservation Foundation;

- Australian Marine Oil Spill Centre (AMOSC);
- Australian Petroleum Production and Exploration Association (APPEA);
- Pearl Producers Association;
- Recfishwest;
- World Wildlife Foundation;
- Wilderness Society;
- Australian Customs Service - Border Protection Command;
- Department of Biodiversity, Conservation and Attractions (formerly Department of Parks and Wildlife); and
- International Fund for Animal Welfare.

Woodside received feedback on the Petroleum Activities Program from a range of stakeholders, including government agencies and commercial fishing organisations. Woodside has considered feedback from these stakeholders and does not consider any issues as material to the submission of this EP.

A summary of feedback and Woodside‘s response is presented in **Appendix C.**

8.1 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 WA-34-L Exploration Wellheads EP. Stakeholder feedback should be made to the nominated liaison person, identified in **Section 9** of this EP Summary.

8.2 Non-Routine Events

Woodside recognises that the relevance of stakeholders identified in the EP to the activity may change in the occurrence of a non-routine event or emergency. Woodside also acknowledges that other stakeholders not identified in the EP may be affected.

Stakeholder groups include:

- Government Ministers
- Government agencies
- Local governments, including representation local communities
- Emergency response organisations
- Border protection and defence
- Fisheries
- Charter boat operators
- Marine and terrestrial tourism operators

- Other petroleum operators
- Other industry
- Development commissions and industry associations
- Aboriginal claimant groups
- Community representative organisations
- Non-Government Organisations.

9. TITLEHOLDER NOMINATED LIAISON PERSON

For further information on this Petroleum Activities Program, please contact:

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10. ABBREVIATIONS

Term	Description / Definition
AFMA	Australian Fisheries Management Authority
AHS	Australian Hydrographic Service
ALARP	As Low As Reasonably Practicable
AMSA	Australian Maritime Safety Authority
APPEA	Australian Petroleum Production & Exploration Association
BIA	Biologically Important Area
BOP	Blow-out Preventer
CFA	Commonwealth Fisheries Association
CPF	Central Processing Facility
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEWHA	Department of Environment, Water, Heritage and the Arts
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
ENVID	Environmental hazard Identification
EP	Environment Plan
EPBC Act	*Environment Protection and Biodiversity Conservation Act, 1999*.
ESD	Ecologically Sustainable Development
FLNG	Floating liquefied natural gas
FPSO	Floating Production, Storage and Offtake vessel
H&S	Health and Safety
IFAW	International Fund for Animal Welfare
KEF	Key Ecological Feature
LAT	Lowest Astronomical Tide
LOC	Loss of containment
MODU	Mobile Offshore Drilling Unit
MPA	Marine Protected Areas
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NOPTA	National Offshore Petroleum Titles Administrator
NWMR	North-west Marine Region
OCNS	Offshore Chemical Notification Scheme
OPGGS Act	*Offshore Petroleum and Greenhouse Gas Storage Act*
PLONOR	Pose Little or No. Risk to the Environment
SVP	Senior Vice President
VP	Vice President
WA	Western Australia
WA DMP	Department of Mines and Petroleum WA DMP
WAFIC	Western Australian Fishing Industry Council
WBM	Water Based Mud

WOMP	Well Operations Management Plan
Woodside	Woodside Burrup Pty Ltd (note references to Woodside may also be references to Woodside Petroleum Ltd or its applicable subsidiaries.

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APPENDIX B: DETAILED ENVIRONMENTAL IMPACTS AND RISKS

PLANNED ACTIVITIES (ROUTINE AND NON-ROUTINE)

A- 1 Physical Presence: Interference with or Displacement of Third Party Activities

Impacts Evaluation Summary															
Source of Risk / Impact	Environmental Value Potentially Impacted							Evaluation							
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/ Habitat	Species	Socio-Economic	Decision Type	Consequence	Likelihood	Current Risk Rating	ALARP Tools	Acceptability	Outcome
Wellheads left in-situ causing interference with or displacement to third party activities (commercial/ recreational fishing and oil and gas operators).							X	B	F	-	-	GP PJ S	Broadly acceptable	EPO 1

Description of Source of Impact

The physical presence of the wellheads that extend up to approximately 4 m above the seabed has the potential to interfere with, or displace commercial and recreational fishing and oil and gas operations in the Wellhead Operational Area.

The Xeres-1A wellhead located in 190 m water depth is marked on navigational charts, however, Pluto-3 and Pluto-6 wellheads, located in water depths of 585 m and 1,006 m respectively, are not currently marked on navigational charts.

There are no current Petroleum Safety Zones in force around the wellheads for any activity.

Impact Assessment

Displacement of Commercial Fishing Activities

The physical presence of the wellheads on the seabed may result in the displacement of commercial bottom trawl fishers operating in the vicinity, through the need to avoid the area. Four Commonwealth and nine State managed fisheries overlap the Wellhead Operational Area. Of these fisheries, only two operate at the seabed using bottom trawling, at depths within the depth range of the Wellhead Operational Area. These are the State managed Pilbara Trawl Fishery which overlaps with the Xeres-1A well, however, the wellhead is with a permanent fish trawl closure zone for the North Coast Bioregion.

The second is the Commonwealth managed North West Slope Trawl Fishery which overlaps with the Pluto-3 and Pluto-6 wellheads. Currently the fishing effort of the North West Slope Trawl in the area is very low. Therefore the physical presence of the wellheads are not expected to significantly interfere with fishing operations and subsequent catch in the future. The fishery traditionally occurs over soft, muddy sediments or sandy habitats, typically at depths of 350–600 m using demersal trawl gear on the continental slope (Woodhams and Bath, 2017). This includes the depth and sediment profile of the Pluto-3 wellhead. Pluto-6 is approximately 400 m deeper than the depths targeted by this trawl fishery.

Fishing activity is low for this fishery with only one or two vessels operating each year since 2008–09 (down from its peak of 21 vessels in 1986-87) and historical effort, in trawl hours, in the fishery largely follows the trend in the number of active vessels (ABARES, 2016; Woodhams and Bath, 2017).

Within the WA-34-L production license several areas of rock pinnacles have been identified on the continental shelf. Confirmed as being of biogenic origin, the rock pinnacles, located in water depths of 300 m to 500 m, extend from the seabed approximately 2 m to 3 m, and therefore are similar in size to the wellheads which extend to a maximum of approximately 4 m. Given the similar size, fisheries operating in the WA-34-L are expected to be familiar with navigation around seabed features and therefore displacement to potential future trawl fishing as a result of the physical presence of the wellheads is expected to be minimal.

The potential impact to commercial fisheries may include temporary displacement as they avoid the Pluto-3 area. Consultation has been undertaken with relevant commercial fisheries regarding the proposed wellhead management

options and no issues have been raised to date. Therefore, any impacts would be localised and not considered significant.

Displacement of Recreational Fishing Activities

Due to the water depths and distance offshore, recreational fishing is unlikely to occur in the vicinity of the Wellhead Operational Area**.** Therefore the potential impact is not considered significant.

Displacement of Petroleum Activities

The presence of the wellhead on the seabed may result in interactions with future petroleum activities. However due to small footprint it is highly unlikely that it will displace any future oil and gas activities.

Summary of Potential Impacts to environmental values(s)

Given the adopted controls, it is considered that physical presence of the wellheads left in-situ permanently may result in localised impacts to third party users, specifically commercial/ recreational fishing and oil and gas operators.

Summary of Control Measures

- Notify relevant State and Commonwealth fisheries of wellheads left in-situ
- Notify Australian Hydrographic Service (AHS) that the wellheads will remain in-situ to enable update of maritime charts
- Woodside will engage with DotEE on their obligations under the Sea Dumping Act.

A- 2 Physical Presence: Disturbance to Seabed and Benthic Habitat

Impacts Evaluation Summary														
Source of Risk	Environmental Value Potentially Impacted							Evaluation						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/ Habitat	Species	Socio-Economic	Decision Type	Consequence	Likelihood	Current Risk Rating	ALARP Tools	Acceptability	Outcome
Disturbance to seabed and benthic habitat from wellhead remaining in-situ permanently		X			X			A	F	-	-	GP PJ	Broadly acceptable	N/A

Description of Source of Impact

The physical presence of the wellheads remaining in-situ permanently has the potential to result in disturbance to the seabed and benthic habitats in the following ways:

- Altering hydrodynamic conditions around the wellhead resulting scouring and accretion;
- Introduction of hard substrate resulting in the creation of a new habitat

Each wellhead is ~1 m in diameter and ~4.1 m high and made from mild steel (AISI 4130).

Impact Assessment

Scouring and Accretion Around Wellheads

The presence of the wellheads on the seafloor can also interact with the hydrodynamics of the Wellhead Operational Area potentially resulting in disturbance to the seabed (scouring and accretion) and associated benthic habitats.

A number of studies on the effects of sediment movements associated with anthropogenic structures on the seabed, such as shipwrecks and artificial reefs, indicate impacts to be limited to within 10 m of the structure (Smiley 2006; Lewis and Pagano 2016). Sediment around the Xeres-1A and Pluto-3 wellheads is largely comprised fine grained muddy sand and silts therefore localised scouring or accretion is possible.

As Pluto-6 is located in 1,006 m water depth, seabed currents at this depth are unlikely to result in the movement of large amounts of sediments, therefore limiting the extent of scouring/accretion. The area around Pluto 6 is mainly comprised of hard substrate therefore sediment movement is unlikely.

Localised scouring and accretion has the potential to alter associated benthic communities. Given that benthic habitat within the Wellhead Operational Area primarily consists of soft unconsolidated sediments, and is considered to be of relatively low environmental sensitivity, has the ability to recover, no significant impacts to benthic communities are expected.

Habitat Creation

The seabed in the vicinity of these Xeres-1A wellheads is dominated by soft, unconsolidated sediments inhabited by infauna and sparsely distributed epifauna The physical presence of the Xeres-1A wellheads provides an area for the potential settlement of marine organisms requiring hard substrate such as bryozoans (Van der Stap et al., 2016, Pradella et al., 2014).

A study of wellheads at depths down to 150 m on the NWS after sixteen to twenty-two years on the seabed found the structures to be heavily encrusted with marine organisms including sponges, soft corals and barnacles (Skropeta, 2008). Several fish species including commercially important species were also observed associating with the wellhead structures including at Xeres-1A in 190 m of water (Pradella et al., 2014, McLean et al., 2017; pers. comm. Todd Bond, 14 December 2017).

The effects of habitat creation are likely to be limited to the immediate vicinity of the wellhead structures and may ultimately decline as these structures degrade (Fowler and Booth, 2012). Therefore the effects of habitat creation are expected to be localised.

As Pluto-3 and Pluto-6 are located in water depths of 585 m and 1,006 m respectively in the vicinity of hard substrates their presence is unlikely to cause any alteration in marine habitat.

Summary of Potential Impacts to Environmental Values(s)

The wellheads remaining in-situ permanently is expected to have a localised, not significant impact to environmental receptors. No further impacts to benthic habitats and/or sediment quality are likely.
Summary of Control Measures
• No controls adopted – no effective controls were identified. Risk is considered to be acceptable and ALARP in its inherent state.

A- 3 Non-routine Discharges to the Marine Environment

Impacts Evaluation Summary															
Source of Risk	Environmental Value Potentially Impacted							Evaluation							
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/ Habitat	Species	Socio-Economic	Decision Type	Consequence	Likelihood	Current Risk Rating	ALARP Tools	Acceptability	Outcome
Corrosion of wellheads resulting in the non-routine discharge of trace amounts of metals to the marine environment.		X	X		X			A	F	-	-	GP	Broadly Acceptable	N/A

Description of Source of Impact

As the wellheads will remain in-situ permanently there is the potential, over time, for the wellheads to corrode (either internal or external corrosion). This could result in the introduction of contaminants to marine sediments, effecting benthic habitats and water quality in the surrounding water column.

Release of Contaminants

Each wellhead is ~1 m in diameter and ~4.1 m high and made from mild steel (AISI 4130). Mild steel mainly comprised of iron (~98%) and also contains small amounts of carbon, manganese, chromium, silicon, and phosphorus.

Impact Assessment

Release of Contaminants

Corrosion of the wellheads of overtime could result in the release of trace amount of metals (e.g. iron and manganese) to the water column and surrounding sediments. Due to the robustness of the materials involved and the deep water location of the wellheads, corrosion is likely to be a relatively slow process approximately 0.2mm/year (Melchers, 2005).

Iron, the main constituent of wellheads (~98%) is not considered a significant contaminant in the marine environment and is only toxic to marine organisms at extremely high concentrations (Grimwood and Dixon, 1997). As the other constituents represent less than 1% of the wellhead composition impacts to marine sediments, organisms are water quality as a result of their release are highly unlikely.

Given the low toxicity of iron, the slow release rate and rapid dilution in the open ocean environment, it is likely that any impacts to marine sediments, benthic habitats, and water quality will be largely localised and not significant.

Summary of Potential Impacts to environmental values(s)

It is considered that the discharge of trace amounts of metals may result in localised impacts to marine sediments, benthic habitats and water quality and is not considered to be significant.

Summary of Control Measures

- No controls adopted – Woodside considers the potential impacts of trace metals from the corrosion of the wellheads to be ALARP.
- As no reasonable controls were identified that would further reduce the impacts without grossly disproportionate sacrifice, the impacts are considered ALARP.

Unplanned Activities (Accidents / Incidents / Emergency Situations)

A- 4 Physical Presence Resulting in Accidental Damage to Trawling Equipment

Risks Evaluation Summary														
Source of Risk	Environmental Value Potentially Impacted							Evaluation						
	Soil and Groundwater	Marine Sediment	Water Quality	Air Quality (incl Odour)	Ecosystems/ Habitat	Species	Socio-Economic	Decision Type	Consequence	Likelihood	Current Risk Rating	ALARP Tools	Acceptability	Outcome
Wellheads left in-situ resulting in accidental damage to trawling equipment.							X	B	F	1	L	GP PJ SV	Broadly acceptable	EPO 1

Description of Source of Risk

The physical presence of the wellheads that extend up to approximately 4 m above the seabed has the potential to result in accidental damage to trawling equipment within the Wellhead Operational Area.

The Xeres-1A wellhead located in 190 m water depth is marked on navigational charts, however, Pluto-3 and Pluto-6 located in water depths of 585 m and 1,006 m respectively, are not currently marked on navigational charts.

There are no current Petroleum Safety Zones in force around the wellheads for any activity.

Consequence Assessment

Four Commonwealth and nine State managed fisheries overlap the Wellhead Operational Area. As there are no Petroleum Safety Zones around the wellheads there is a possibility that fishing gear in particular trawl nets may snag on the wellheads. The North West Slope Trawl fishery is the only managed fishery which may be impacted at present, as the others are all line and/or trap methods or pelagic (mid-water) fisheries or are a permanent fish trawl closure zone (Pilbara Trawl Fishery). Consultation with the DPIRD (Appendix E) confirms that this area is highly unlikely to be reopened to trawling in the future and that an over-trawlable structure would provide minimal benefit.

There is currently high non-participation among licence holders of the North West Slope Trawl Fishery and fishing activity has steadily declined since establishment of the fishery. Only one vessel operated since the 2012-2013 fishing season up until the 2015-2016 fishing season (ABARES, 2016; Woodhams and Bath, 2017). Fishing effort typically occurs at depths ranging from 350 m to 650 m, should fishing effort increase in future years there is potential for fishing to occur in the Wellhead Operational Area at depths consistent with the Pluto-3 wellhead (585 m). The Pluto-3 and Pluto-6 wellheads are an inherent snag-resistant design being a single pipe structure with no overhanging sections upon which a bottom trawl net could get permanently snagged. If caught, a vessel could lift their net over the obstacle.

As it is unlikely there will be commercial fishery interaction with the Pluto-3 or Pluto-6 wellheads and no stakeholder concern has been raised regarding these wellheads, and the wellheads are not a permanent snagging risk, it is considered there would be little benefit from installing an over-trawl structure.

Within the WA-34-L production license several areas of rock pinnacles have been identified on the continental shelf. Confirmed as being of biogenic origin, the rock pinnacles, located in water depths of 300 m to 500 m, extend from the seabed upwards approximately 2 m to 3 m, and therefore are similar in size to the wellheads which extend to a maximum of approximately 4 m. Given the similar size, fisheries operating in the WA-34-L production license are expected to be familiar with navigation around seabed features and therefore the potential for accidental damage to trawling gear from snagging on seabed features is expected to be minimal and highly unlikely.

The potential impact to commercial fisheries is temporary displacement as they avoid the Pluto-3 area to prevent snagging. Consultation has been undertaken with the North West Slope Trawl fishery regarding the proposed wellhead management options and no issues have been raised to date. Consultation has also been undertaken with the WA Department of Primary Industries and Regional Development, who have requested the consideration of removing the Xeres-1A wellhead at or below the seabed due to the wellhead overlapping with the Pilbara Trawl Fishery area. Woodside provided the factsheet for the proposed wellhead activities to a range of fisheries

stakeholders; including the licence holders of the Pilbara Trap and Trawl fisheries. To date Woodside has received no feedback from the licence holders. Feedback from the Western Australian Fishing Industry Council was received in relation to exclusion zones, of which Woodside advised that there are no exclusion zones currently in place or future plans for exclusion zones. The Australian Fisheries Management Authority raised no concerns with the proposed activity and no comments have been received from the Commonwealth Fisheries Authority. Therefore, any impacts are not considered significant.

Summary of Potential Impacts to environmental values(s)

Given the adopted controls, the risk of the physical presence of the wellheads left in-situ resulting in accidental damage to fishing equipment is considered low.

Summary of Control Measures

- Notify relevant State and Commonwealth fisheries of wellheads left in-situ
- Notify Australian Hydrographic Service (AHS) that the wellheads will remain in-situ to enable update of maritime charts
- Woodside will engage with DotEE on their obligations under the Sea Dumping Act.

APPENDIX C: SUMMARY OF STAKEHOLDER FEEDBACK AND WOODSIDE'S ASSESSMENTS AND REPONSES

Feedback from Relevant Stakeholders on the Petroleum Activities Program

Organisation	Method	Feedback	Woodside assessment	Woodside's response
Department of Industry, Innovation and Science	Email with fact sheet	**Date:** 1 December 2017 **Feedback summary:** No response at the time of submission.	The stakeholder raised no claims or objections.	Woodside to consider stakeholder feedback received during and post EP submission.
Department of Mines, Industry Regulation and Safety (*formerly Department of Mines and Petroleum*)	Email with fact sheet	**Date:** 5 December 2017 **Feedback summary:** The Department acknowledged Woodside's advice about the proposed activities, which will be assessed by NOPSEMA.	The stakeholder raised no claims or objections.	No further action required.
Australian Maritime Safety Authority	Email	**Date:** 15 June 2017 **Feedback summary:** AMSA responded to Woodside advising on its availability for a teleconference to discuss decommissioning options for Echo Yodel.	Stakeholder is interested in engagement to discuss decommissioning options for Echo Yodel.	**Response/Action:** Woodside to organise teleconference.
	Teleconference	**Date:** 22 June 2017 **Feedback summary:** Woodside held a teleconference with AMSA to provide an overview of Woodside's proposed decommissioning approach for Echo Yodel. An overview was provided on the facility background; location; supporting studies and research; options for decommissioning the pipeline, umbilicals and wellheads; and safety, technical, environmental and community considerations for leaving the pipeline, umbilicals and wellheads in-situ. AMSA asked Woodside what stakeholder feedback was provided through WAMSI's stakeholder engagement. Woodside advised that common interest was in relation to habitats provided on subsea	The stakeholder raises no material concerns with proposed approach for in-situ decommissioning.	**Response/Action:** Woodside to assess feedback once received via email.

Organisation	Method	Feedback	Woodside assessment	Woodside's response
		infrastructure, how stable infrastructure is and the impacts for potential containments. AMSA asked what the lateral distance was between the pipeline and umbilical. Woodside confirmed that the distance is approximately 30-40 metres. AMSA advised that this distance does not impact on the scale of infrastructure recorded on marine charts. AMSA asked the height of x-trees and Woodside confirmed 6 metres tall and 3 metres wide. AMSA queried if Woodside chooses to P&A the wells and leave the x-trees in-situ, would an exclusion zone be requested from NOPSEMA. Woodside advised that it wants to hear feedback from stakeholders on their expectations. AMSA advised that the exclusion zone should depend on the type of fishery wanting to mitigate risks. AMSA advised that wrecks are marked on marine charts for line and trap fishers benefit; whereas trawl fishers use charts for planning purposes. Woodside sought advice from AMSA regarding examples of exclusion zones for wellheads. AMSA advised that it had no examples outside of shipping fairways for decommissioning activities. AMSA asked what vessels will be used for partial or full removal of infrastructure. Woodside advised		

Organisation	Method	Feedback	Woodside assessment	Woodside's response
		vessels would likely be primary installation vessels, although depending on what infrastructure is being lifted. The timeframe for removing the pipeline was discussed, with Woodside estimating three-six months. AMSA advised that it would work with Woodside to mitigate risk for marine users, given the pipeline crosses a shipping fairway. AMSA asked when Woodside expects to consult on its final decommissioning plans and Woodside confirms it expects to engage stakeholders from late July. AMSA commented that it had no concerns from a navigational safety perspective. AMSA advised that it would share the presentation pack with its marine environment team, who assess ship source pollution, to gage any additional feedback. Woodside and AMSA discussed wellheads being marked on marine charts with notes about cautionary zones for fishing and anchoring, and gazettal requirements under NOPSEMA. AMSA advised that it will provide formal feedback via email.		
	Email	**Date:** 23 June 2017 **Feedback summary:** AMSA advised via email that it discussed the Echo Yodel decommissioning options with its Environmental Standards team.	Woodside acknowledged AMSA's advised that it considers there to be minimal navigational safety concerns with Woodside's current, proposed approach to leave the	**Response/Action:** Woodside to re-engage AMSA during second phase of consultation and prior to finalising Echo Yodel decommissioning plans.

Organisation	Method	Feedback	Woodside assessment	Woodside's response
		AMSA advised that it assessed minimal navigational concerns for the umbilical and pipeline if left in-situ. AMSA advised if the infrastructure is partially removed, then it would provide comment during the second phase of stakeholder consultation. AMSA advised that its preference for wellheads is to at least remove the tree from above the wellhead if left in-situ to minimise navigational safety aspects of the remaining infrastructure.	umbilical and pipeline in-situ. Woodside advised that it will take into consideration AMSA's preference to have trees removed from the Echo Yodel wellheads, if left in-situ. Woodside will engage AMSA again to finalise final decommissioning plans.	
	Email with fact sheet and shipping fairways map	**Date:** 5 December 2017 **Feedback summary:** The Authority advised it had no navigational concerns with the depths of the wellheads. The Authority advised that PLA-03 is not charted and advised Woodside to liaise with AHS to ensure marine charts are updated.	Woodside notes the Authority's feedback and advice to engage AHS.	Woodside to liaise with AHS to ensure wellheads are marked on marine charts.
Australian Hydrographic Service	Email	**Date:** 14 June 2017 **Feedback summary:** The Service asked to be kept informed to allow any appropriate Notice to Mariners action to take place.	Woodside will ensure it engages with the Service to discuss or provide further background information for the proposed decommissioning activities.	**Response/Action:** Woodside to contact the Service as part of the first phase of consultation for stakeholder engagement.
	Email with fact sheet	**Date:** 4 December 2017 **Feedback summary:** AHS confirmed receipt of Woodside's advice via email.	The stakeholder raised no claims or objections.	No further action required.
Department of Primary Industries and Regional Development (formerly Department of Fisheries *(Western Australia))*	Email	**Date:** 23 June 2017 **Feedback summary:** The Department requested relevant information on the proposed details and how this differs from the	Woodside confirmed that it does not have an accepted decommissioning plan for Echo Yodel and that it is in the process of developing an	**Response/Action:** No further action required.

Organisation	Method	Feedback	Woodside assessment	Woodside's response
		accepted decommissioning plan. The Department asked for a reasonable timeframe to review this information prior to a potential meeting.	environment plan. Woodside advised that it plans to undertake stakeholder consultation in two phases, which is different to regular environment plan consultation when a titleholders consults on the proposed petroleum activities. Woodside confirmed that in the first phase, it plans to discuss its research and a broad range of decommissioning options before landing its final approach for decommissioning Echo Yodel. Woodside advised in the second phase, stakeholders will have an opportunity to provide feedback on Woodside's chosen position for the environment plan before it is submitted to NOPSEMA.	
	Email	**Date:** 23 June 2017 **Feedback summary:** The Department advised that it welcomed Woodside's approach for consultation and suggested Woodside has ideas on how it wished to proceed for decommissioning options. The Department requested additional background information to review prior a meeting.	Woodside confirmed that it does have current ideas to proceed for decommissioning. Woodside advised that it will collate additional background information for the Department.	**Response/Action:** Woodside to provide background information to the Department on proposed decommissioning options for Echo Yodel.
	Email	**Date:** 25 August 2017 **Feedback summary:** The Department requested an update from Woodside since its last	Woodside advised the Department that project timing has been revised that it still plans to undertake a first phase of consultation.	**Response/Action:** Woodside to provide background information to the Department on proposed decommissioning options for

Organisation	Method	Feedback	Woodside assessment	Woodside's response
		correspondence.		Echo Yodel.
	Email	**Date:** 31 January 2018 **Feedback summary:** Woodside provided an agenda for the meeting planned on 1 February. Echo Yodel decommissioning was one of the agenda items.	Woodside to hold meeting with the Department.	**Response/Action:** Meeting to be held.
	Email with fact sheet	**Date:** 1 December 2017 **Feedback summary:** The Department acknowledged Woodside's advice about the proposed activity. The Department raised no concerns with leaving the Pluto-3 and Pluto-6 wellheads in-situ, based on water depth. The Department advised that the Xeres-1A wellhead is in 190 m of water within a WA-managed trawl licence area and encouraged Woodside to remove the unused infrastructure from the seabed; cut the infrastructure at or below the seabed if it cannot be removed to avoid snagging of trawling equipment; and/or remove any safety zones that are in place.	Woodside advised the Department that an environment assessment of the area had been undertaken. Woodside provided an updated location map and referred to a 2017 Departmental fishery report, which shows the Xeres-1A wellhead sits within a closed trawl fishing zone. Woodside requested a meeting be held with the Department in early 2018.	Woodside to hold meeting with the Department in 2018 to discuss feedback on proposed activity.
	Voicemail	**Date:** 21 December 2017 **Feedback summary:** Woodside left a voice message with regards to discussing the proposed activity and organising a meeting in early 2018.	Woodside to follow-up with the Department.	Woodside to hold meeting with the Department in 2018 to discuss feedback on proposed activity.
	Email	**Date:** 31 January 2018 **Feedback summary:** Woodside provided an agenda for the meeting planned on 1 February. Echo Yodel decommissioning was one of the agenda items.	Woodside to hold meeting with the Department.	**Response/Action:** Meeting to be held.

Organisation	Method	Feedback	Woodside assessment	Woodside's response
	Meeting	**Date:** 1 February 2018 **Feedback summary:** Consultation with the Department of Primary Industries and Regional Development (DPIRD) confirms that this area is highly unlikely to be reopened to trawling in the future	Woodside met with the Department too seek further information on trawling and the closure of trawl zones. In additional future decommissioning options for Echo Yodel were discussed.	Woodside have noted the advice that the permanent fish trawl closure zone over the Xeres-1A wellhead (in water depth of 190 m) is highly unlikely to be changed to a trawling zone in the future (**Section 6** of the EP). Based on this, Woodside agree that installing an over trawl structure over this wellhead would provide little benefit given fishermen would be unlikely to be allowed to trawl in this zone again. Feedback provided by DPIRD also fed back into Woodside's Comparative Assessment (**Section 2** of the EP) which assessed the Option to Leave Wellheads in-situ against the Base Case option to remove.
	Email	**Date:** 7 February 2018 **Feedback summary:** Woodside notes the Departments advice in relation to the WA-34-L Exploration Wellheads environment plan. The Department advised that the permanent fish trawl closure zone over the Xeres-1A wellhead (in water depth of 190 m) is highly unlikely to be changed to a trawling zone in the future. Woodside agrees with the Department that installing an over trawl structure over this wellhead would provide little benefit given fishermen would unlikely trawl in this zone again.	Email from Woodside to DPIRD summarising the outcomes of the 1 Feb meeting. Woodside provided additional research links and confirmed discussion on the closed trawl zones at the Xeres-1 wellhead.	No further action required with regard to WA-34-L.

Organisation	Method	Feedback	Woodside assessment	Woodside's response
	Email	**Date:** 1 March 2018 **Feedback summary:** The Department advised that it encourages titleholders to abandon wells and infrastructures sites in conditions that will allow for future fishing operations. The Department provided a list for ways that these options can be facilitated including: removal of all infrastructure that does not provide environmental benefit; cutting infrastructure that cannot be removed at or below seabed to prevent snagging; and removal of any safety zones. The Department advised that it trusts the Regulator to evaluate case-by-case decommissioning proposals when the removal of infrastructure may not result in net environmental benefits. The Department advised that it expects the Regulator to assess a titleholder's rationale and consideration of options to ensure environmental benefits are maximised. The Department acknowledged that there are some environmental benefits for leaving the Echo Yodel pipeline in-situ. The Department included benefits such the structure on the seabed establishing benthic communities; offering refugia in high current areas; and acting as a conduit for fish that move offshore. The Department commented that 'biological stocks' that may be a benefit are likely to be minor scale,	Woodside is advised to initiate and maintain ongoing consultation with the Western Australian Fishing Industry Council (WAFIC), Recfishwest (where relevant), relevant representative bodies and directly with licensees in the potentially affected fisheries. The Department also expects Woodside to re-engage once the decommissioning plan for Echo Yodel is closer to finalisation.	Woodside have noted this advice for Echo Yodel. No further action required with regard to WA-34-L.

Organisation	Method	Feedback	Woodside assessment	Woodside's response
		but could still be considered for evaluating decommissioning options. The Department outlined that augmentation considerations should be a standard element for environmental assessment approval. The Department provided a list of stakeholder it expects Woodside to maintain ongoing consultation with and advised that it expected to be reengaged once Woodside's finalises the Echo Yodel decommissioning plan.		
Commonwealth Fisheries • Australian Southern Bluefin Tuna Industry Association	Email with fact sheet	**Date:** 4 December 2017 **Feedback summary:** The Association advised that it is currently focused on activities along the Great Australian Bight and East Coast of Australia. The Association advised that it has no concerns with the proposed activity providing there is no potential for leakage from the wellheads.	Woodside provided the stakeholder with advice about the environmental risk assessment undertaken for the proposed activity and confirmed that the wells have had permanent downhole barriers installed to prevent any leakage.	No further action required.
Western Australian Fisheries • Pilbara Fish Trawl • Pilbara Trap • Marine Aquarium Fish • Mackerel Fishery	Letter with fact sheet	**Date:** 1 December 2017 **Feedback summary:** No response at the time of submission.	The stakeholder raised no claims or objections.	Woodside to consider stakeholder feedback received during and post EP submission.
Department of Defence	Email with fact sheet and defence zones map	**Date:** 1 December 2017 **Feedback summary:** No response at the time of submission.	The stakeholder raised no claims or objections.	Woodside to consider stakeholder feedback received during and post EP submission.
Department of Transport	Email with fact sheet	**Date:** 20 December 2017 **Feedback summary:** The Department asked Woodside to confirm if there will be no oil spill	Woodside confirmed that an environmental risk assessment was undertaken for the proposed activity and confirmed	No further action required.

Organisation	Method	Feedback	Woodside assessment	Woodside's response
		risk associated with the proposed activity.	that the wells have had permanent downhole barriers installed to prevent any leakage.	
Commonwealth Fisheries Association	Email with fact sheet	**Date:** 1 December 2017 **Feedback summary:** No response at the time of submission.	The stakeholder raised no claims or objections.	No further action required.
Western Australian Fishing Industry Council (WAFIC)	Meeting	**Date:** 18 July 2017 **Feedback summary:** Woodside provided an overview of the decommissioning options being considered for the Echo Yodel pipeline; umbilicals and wellheads. Woodside advised that it was seeking feedback from stakeholders in a phased approach. The first phase introducing stakeholders to the various decommissioning options. Woodside advised that the second phase of consultation would be undertaken once a decommissioning approach for Echo Yodel was finalised.	The Council advised that Woodside will need to present a significant environmental case for leaving infrastructure in-situ. The Council advised that Woodside will need to demonstrate how the site has 'potential for future use'. WAFIC strongly urged that exclusion zones are not put in place and that snagging risks fall to fishery licence holders, not oil and gas operators. Line and anchor snag can occur over natural habitat. WAFIC advised that every fishery that overlaps petroleum titles for Echo Yodel should be consulted.	**Response/Action:** Woodside to engage with fishery licence holders that overlap Echo Yodel permits.
	Email with fact sheet	**Date:** 13 December 2017 **Feedback summary:** WAFIC acknowledged Woodside's advice on the proposed activity. WAFIC asked if exclusion zones will be removed from the wellhead locations. WAFIC recommended exclusion zone information is included in future correspondence.	Woodside confirmed that there are no current exclusion zones in place or future plans for exclusion zones over the wellheads. Woodside acknowledged WAFIC's recommendation to include exclusion zone information in future correspondence.	No further action required.

Organisation	Method	Feedback	Woodside assessment	Woodside's response
Department of the Environment and Energy	Meeting	**Date:** 22 November 2017 **Feedback summary:** Woodside met with the DotEE on 23 June 2017, to discuss wellheads being left in-situ and requirements associated with a Sea Dumping Permit (SDP). DotEE has advised that it will consider whether or not a SDP is required and revert to Woodside.	Woodside is committed to complying with the requirements of the Sea Dumping Act. Email sent from Woodside to DotEE to summarise the meeting.	
	Email	**Date:** 6 December 2017 **Feedback summary:** DotEE acknowledged Woodside's summary of the discussion and advised they would be in a position to advise further in early 2018.	Woodside confirms to DotEE via email response that further discussion via meeting in 2018 would be preferable.	
	Email	**Date:** 1 February 2018 **Feedback summary:** DotEE have progressed a request to clarify the Protocol on the basis of the examples Woodside provided, and also DotEE have discussed with NOPSEMA and Department of Industry. DotEE will contact Woodside once they have received a draft response on those examples.	Woodside request an update via email on the 2nd March to understand if there has been any feedback.	
	Email	**Date:** 2 March 2018 **Feedback summary:** DotEE advise Woodside that they are still awaiting advice.	Woodside acknowledges the response of DotEE	

Feedback from Interested Stakeholders on the Petroleum Activities Program

Organisation	Method	Feedback	Woodside assessment	Woodside's response

Organisation	Method	Feedback	Woodside assessment	Woodside's response
Australian Fisheries Management Authority (AFMA)	Email with fact sheet	**Date:** 5 December 2017 **Feedback summary:** The Authority phoned to enquire if Woodside consults with the Commonwealth Fishing Association.	Woodside confirmed that CFA is engaged for all Woodside EPs. A teleconference was scheduled with the Authority to discuss the proposed wellheads activities.	Woodside to hold teleconference with AFMA.
	Teleconference	**Date:** 18 December 2017 **Feedback summary:** The Authority asked during a teleconference if the x-trees are left on top of the wellheads. The Authority advised that it had no particular concerns with the proposed activity and that it would share the consultation information within its organisation for assessment. The Authority advised that there is unlikely to fishing in the area due to being a low-effort fishery and that data cannot be provided if there are less than five vessels recorded in the area due to commercial in confidence. The Authority referred Woodside to www.data.gov.au for published information on catch efforts.	Woodside advised the Authority that x-trees are not left in place as the three wells were exploration wells. Woodside acknowledged that the Authority may provide feedback after assessment of others within its organisation.	Woodside to consider any additional feedback that may be received from the Authority.
Australian Maritime Safety Authority (marine pollution)	Email with fact sheet	**Date:** 1 December 2017 **Feedback summary:** No response at the time of submission.	The stakeholder raised no claims or objections.	Woodside to consider stakeholder feedback received during and post EP submission.
Australian Conservation Foundation	Email with fact sheet	**Date:** 1 December 2017 **Feedback summary:** No response at the time of submission.	The stakeholder raised no claims or objections.	Woodside to consider stakeholder feedback received during and post EP submission. .
Australian Marine Oil Spill Centre (AMOSC)	Email with fact sheet	**Date:** 1 December 2017 **Feedback summary:** No response at the time of submission.	The stakeholder raised no claims or objections.	Woodside to consider stakeholder feedback received during and post EP submission.

Organisation	Method	Feedback	Woodside assessment	Woodside's response
Australian Petroleum Production and Exploration Association (APPEA)	Email with fact sheet	**Date:** 1 December 2017 **Feedback summary:** No response at the time of submission.	The stakeholder raised no claims or objections.	Woodside to consider stakeholder feedback received during and post EP submission.
Pearl Producers Association	Email with fact sheet	**Date:** 1 December 2017 **Feedback summary:** No response at the time of submission.	The stakeholder raised no claims or objections.	Woodside to consider stakeholder feedback received during and post EP submission.
Recfishwest	Email with fact sheet	**Date:** 1 December 2017 **Feedback summary:** No response at the time of submission.	The stakeholder raised no claims or objections.	Woodside to consider stakeholder feedback received during and post EP submission.
World Wildlife Foundation	Email with fact sheet	**Date:** 1 December 2017 **Feedback summary:** No response at the time of submission.	The stakeholder raised no claims or objections.	Woodside to consider stakeholder feedback received during and post EP submission.
Wilderness Society	Email with fact sheet	**Date:** 1 December 2017 **Feedback summary:** No response at the time of submission.	The stakeholder raised no claims or objections.	Woodside to consider stakeholder feedback received during and post EP submission.
Australian Customs Service - Border Protection Command	Email with fact sheet	**Date:** 1 December 2017 **Feedback summary:** No response at the time of submission.	The stakeholder raised no claims or objections.	Woodside to consider stakeholder feedback received during and post EP submission.
Department of Biodiversity, Conservation and Attractions (formerly Department of Parks and Wildlife)	Email with fact sheet	**Date:** 1 December 2017 **Feedback summary:** No response at the time of submission.	The stakeholder raised no claims or objections.	Woodside to consider stakeholder feedback received during and post EP submission.
International Fund for Animal Welfare	Email with fact sheet	**Date:** 1 December 2017 **Feedback summary:** No response at the time of submission.	The stakeholder raised no claims or objections.	Woodside to consider stakeholder feedback received during and post EP submission.