

1. FACILITY DESCRIPTION

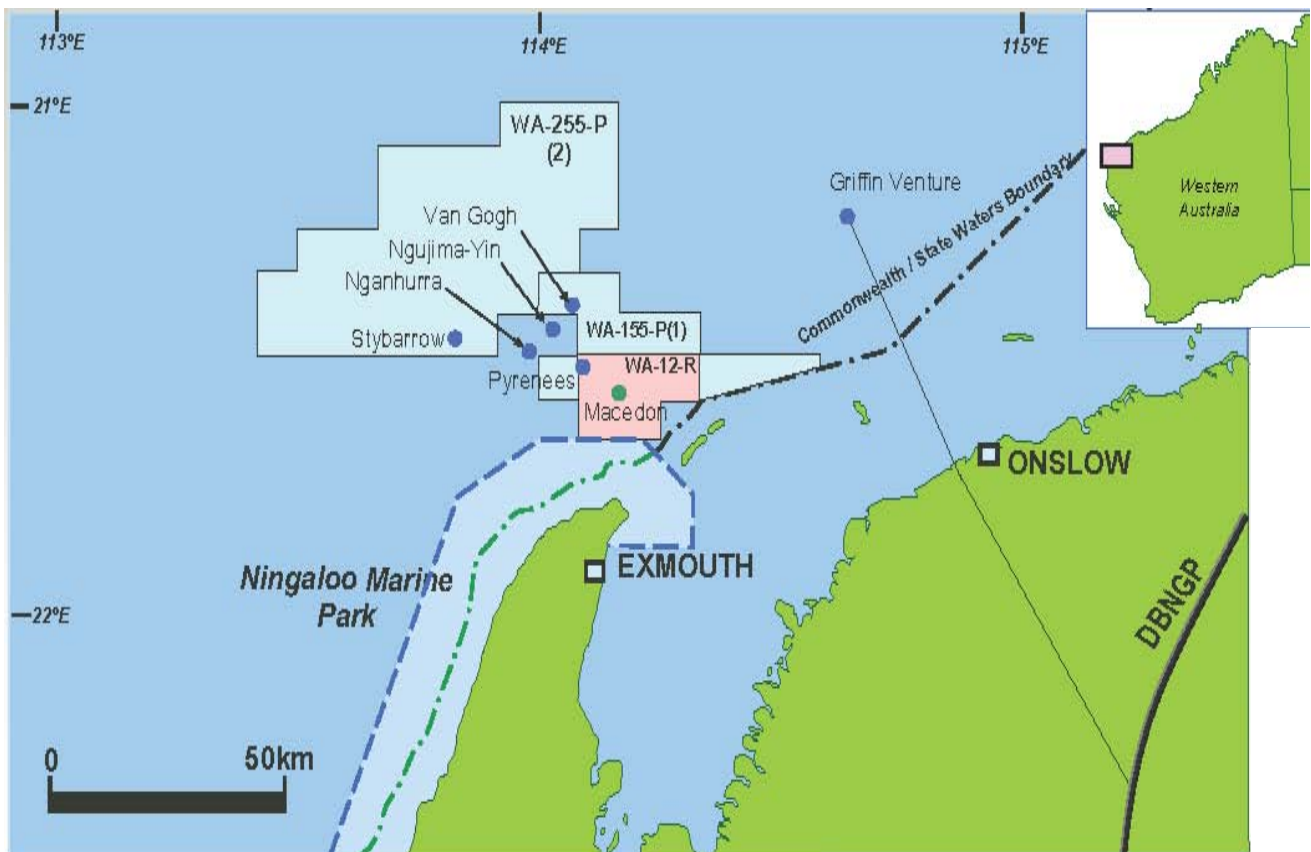
BHP Billiton Petroleum (BHP Billiton) is operator of the 'Pyrenees Facilities', which include the Ravensworth, Crosby and Stickle hydrocarbon reserves for oil production, with Macedon as a gas reinjection reservoir. The Pyrenees Operational Area is located within production permit WA-12-R and WA-155-P, approximately 15 km north-west from the Muiron Islands Marine Management Area, 11 km from the northern boundary of the Ningaloo Marine Park boundary (Commonwealth Waters) and 23 km north-west of North West Cape, Western Australia.

The 'Pyrenees Development' consists of 13 production wells, one gas injection well and three water injection wells. These wells are connected to an offshore Floating Offloading, Production and Offloading (FPSO) facility, which has a design life of 25 years.

The Pyrenees FPSO is a new build double-hulled tanker. It is equipped with a disconnectable mooring and its own propulsion system, which will allow evasion of cyclones. The topside processing facilities consist of oil/water/gas separation systems, water injection, and gas compression equipment.

Once separated from gas and water, crude oil will be exported from the FPSO onto trading tankers. During normal operations, gas and produced water will be reinjected into field reservoirs.

Figure 1: Pyrenees Development Area and Nearby Facilities



The locations of these are outlined in Table 1.

Table 1: Pyrenees Well Names and Types with Provisional Locations

Well name	Short	Well Centre	Well Type		Easting	Northing
Pyrenees FPSO	FPSO	-	-	-	201 300	7 615 200
Lat / Long					21° 32' 28"	114° 6' 59"
Ravensworth - 3H1	RAV- 3H1	R-DC2	Horizontal	Producer	197 962	7 615 393
Ravensworth - 4H2	RAV- 4H2	R-DC2	Horizontal	Producer	197 977	7 615 420
Ravensworth - 5H3	RAV- 5H3	R-DC2	Horizontal	Producer	198 004	7 615 472
Ravensworth - 6H4	RAV- 6H4	R-DC2	Horizontal	Producer	198 004	7 615 494
Ravensworth - 7H5	RAV- 7H5	R-DC1	Horizontal	Producer	198 028	7 616 370
Ravensworth - 8H6	RAV- 8H6	R-DC1	Horizontal	Producer	198 062	7 616 428
Crosby - 3H1	CRO- 3H1	C-DC2	Horizontal	Producer	199 117	7 614 700
Crosby - 4H2	CRO- 4H2	C-DC2	Horizontal	Producer	199 057	7 614 700
Crosby - 5H3	CRO- 5H3	C-DC1	Horizontal	Producer	199 757	7 616 510
Crosby - 6H4	CRO- 6H4	C-DC1	Horizontal	Producer	199 696	7 616 510
Stickle - 4H1	STI- 4H1	S-DC1	Horizontal	Producer	200 590	7 617 171
Stickle - 5H2	STI- 5H2	S-DC1	Horizontal	Producer	200 544	7 617 218
Stickle - 6H3	STI- 6H3	S-DC1	Horizontal	Producer	200 527	7 617 235
Ravensworth - 9WI	RAV- 9WI	R-DC3	Vertical	Water Injector	199 047	7 619 423
Crosby - 7WI	CRO- 7WI	C-DC3	Vertical	Water Injector	202 300	7 619 850
Stickle - 7WI	STI- 7WI	S-DC2	Vertical	Water Injector	204 186	7 619 526
Macedon - 6H1*	MAC- 6H1	M-DC1	Horizontal	Gas Injector	206 600	7 612 350

1 Map datum is Geodetic Datum of Australia 1994 (GDA94).
 Eastings & Northerlies in Universal Transverse Mercator (UTM) Projections, Zone 50, Central meridian 117 °.

2. RECEIVING ENVIRONMENT

The western half of the Pyrenees Operational Area (190 to 260 m depth) is characterised by gravely fine to coarse carbonate sands, while the seabed sediments in the eastern part of the area (190 to 200 m depth) are soft, fine sediments, mainly carbonate silts and clays. A high-resolution acoustic mapping program included the area to the southwest of the Pyrenees Operational Area, which is characterised by more variable sediment types, including occasional rock outcrops and exposed pavements.

A high-resolution acoustic mapping program included the area to the south-west of the Pyrenees Operational Area, which is characterised by more variable sediment types, including occasional rock outcrops and exposed pavements.

Echinoderms were the most common group of species observed during the 2001 and 2002 AIMS (Australian Institute of Marine Science) seabed biodiversity surveys. About 95 different species were recorded, including several that were new to Australia and possibly several new species.

Whales and dolphins are commonly observed in the region, especially in Exmouth Gulf. Humpback whales (*Megaptera novaeangliae*) migrate seasonally through the region in relatively high numbers, while other whale species including pygmy blue whales (*Balaenoptera musculus brevicauda*), minke whales (*Balaenoptera acutorostrata*) and short-finned pilot whales (*Globicephala macrorhynchus*) are thought to be present throughout the year in low numbers, or to transit occasionally through the region.

Based on the proportion of pods observed migrating in each direction, the annual humpback whale migration of the Group IV population was found to consist of three distinct phases, these being:

- **Northern migration** (early June to early August); most pods heading north
- **Transition period** (early August to early September); some pods still heading north, some returning south
- **Southern migration** (early September to late November); most pods returning south.

Whale shark aggregations off Ningaloo Reef generally occur between April and June and encounters mainly take place within a few kilometres of the reef.

The closest population centre to the Pyrenees operational area is the town of Exmouth. Exmouth is a popular tourist centre, based in large part on the natural resources contained in the Cape Range National Park and Ningaloo Marine Park. Other commercial activities in the Exmouth region include prawn fisheries and defence related activities.

An active community consultation programme was first initiated by BHP Billiton during the initial exploration activities in the permit area. This programme remains in operation and is continuously being updated to ensure that issues of concern are identified, discussed and where possible resolved. The consultation programme has included:

- Liaison by a BHP Billiton External Affairs Advisor and Environmental Specialist to manage the programme
- Face-to-face briefings and discussions
- Periodic written newsletter updates posted to stakeholders
- A 1800 toll-free telephone number
- Community Reference Groups (CRG) established in Exmouth and Perth
- Advertising of public comment opportunities in newspapers for activities undergoing EPBC Act processes.

Involvement of a cross-section of interest groups is fundamental to community consultation. BHP Billiton has briefed a range of key stakeholders including local residents, community groups, non-government organisations, government agencies and industry groups. For the Pyrenees Development, consultation with the community in Exmouth and stakeholders in Perth has been essential for planning.

3. ENVIRONMENTAL RISK ASSESSMENT AND MANAGEMENT

The BHP Billiton Charter, Sustainable Development Policy, and Climate Change Position and HSEC Management Standards are mandatory to all BHP Billiton sites and operations. The BHP Billiton HSEC Management Standards form the basis for the development and application of HSEC-MS at all company operations. They are consistent with ISO 14000 series Environmental Management Systems (EMS) and are publicly available from the BHP Billiton website.

BHP Billiton Group Level Documents (GLDs) are a series of documents intended to provide BHP Billiton businesses with guidance on the effective implementation of the HSEC Management Standards at the operational level. The Pyrenees Operations have a HSEC Management System Manual in place, compliant with the ISO 14001 EMS and OHSAS 18001 Safety Management System Standard.

A systematic approach is taken to the management of hazards and risk through the identification and assessment of hazards and risk, the identification of mitigation and control measures, the

establishment of objectives, plans and performance standards, and the development of specific documentation. Table 2 summarises the key environmental aspects and the operations related activities that may lead to these aspects being adversely affected.

Objectives and performance standards for environmental management have been established based on consideration of:

- BHP Billiton’s Sustainable Development Policy requirements;
- BHP Billiton’s HSEC Management Standards;
- Legal requirements;
- Community comments received during consultation; and
- Technology options and feasibility.

Table 2: Environmental Aspects and Operational Activity Interface

Activity	Aspect*										
	Physical Presence	Light	Noise	Sediment impacts	Water quality	Nutrient addition	Solid Waste Disposal	Greenhouse gas emissions	Hydrotest discharges	Hydrocarbon Contamination	Biofouling
Routine Events											
Power generation, turbine & boiler emissions			✓				✓	✓			
FPSO Start-up		✓	✓		✓		✓	✓		✓	
Supply vessel and helicopter operations	✓	✓	✓								
Sewage and greywater						✓					
Discharge of foodscraps						✓					
Deck drainage					✓					✓	
Power generation emissions			✓				✓	✓			
Combustion emissions								✓			
FPSO Flaring		✓						✓			
Helicopter Operations	✓		✓					✓			
Offtakes	✓		✓					✓		✓	✓
Fuel bunkering	✓									✓	
Slops water discharges					✓					✓	
Decommissioning	✓			✓	✓		✓			✓	
Accidental Events											
Hydrocarbon Spill				✓	✓				✓	✓	✓
Chemical Spill				✓	✓				✓	✓	
Introduced species				✓							✓

Table 3 provides a summary of environmental objectives, standards and performance criteria. All staff and contractors taking part in the Pyrenees Operations will be advised of their responsibilities prior to commencement of activities. This will occur through induction and awareness presentations that will be given to all crew.

Further information regarding Pyrenees Operations may be obtained from BHP Billiton’s external affairs department via telephone on toll free 1800 110 258 or by writing to:

External Affairs & Community Manager
 BHP Billiton Petroleum Pty Ltd
 PO Box J668
 PERTH WA, 6842.

Table 3: Summary of Environmental Objectives, Standards and Performance Criteria

Aspect	Environmental Objectives	Standards & Guidelines	Performance Criteria (Avoidance & Mitigation Measures)
Noise	No significant adverse effect on marine biota No significant impact on coastal or island communities	EPBC Act Regulations 2000 Pt 8 P(SL)(MoE) Regulations 1999, r.13 and 14 APPEA Code of Environmental Practice BHP Billiton Sustainable Development Policy BHP Billiton HSEC Management Standards	<p>Helicopter flights are carried out during daylight hours only, except if required during emergencies (and training purposes)</p> <p>Helicopter flights routed to avoid sensitive areas</p> <p>Helicopters to maintain height of at least 1,650 feet or a horizontal radius of 500 metres from any observed whales (except for landing and takeoff from FPSO)</p> <p>Review requirement for underwater noise survey during routine operations in light of recent nearby studies. Survey to be carried out by noise specialist and outcomes reported to DMP and DEWHA</p> <p>Boat-based surveys are conducted to determine cetacean migratory patterns and behaviours</p> <p>Vessel-cetacean interaction procedures to be implemented to avoid interference with whales</p> <p>Cetacean and whale shark sightings are recorded and forwarded to DEWHA</p>
General waste	Minimise incremental increases in waste production Maximise efficient resource utilisation	EPBC Act 1999 Environmental Protection Act 1986 (WA) APPEA Code of Environmental Practice ICCM Framework BHP Billiton Sustainable Development Policy BHP Billiton HSEC Management Standards APPEA Code of Environmental Practice	<p>Waste to be handled and disposed in accordance with Waste Management Plan</p> <p>Hazardous material to be handled and managed in accordance with Hazardous Materials Management Procedures</p> <p>Volumes of wastes shall be monitored and recorded</p> <p>Environmental Audits shall include waste management</p> <p>Induction covers waste management procedures</p> <p>NORM monitoring and handling are carried out in compliance with NORM management procedure</p> <p>NORM disposal is carried out in compliance with government approved disposal option</p>
Sewage, greywater, & food scraps	No significant reduction in ambient water quality No significant adverse effects on marine biota No significant adverse aesthetic effects. Maximise efficient resource utilisation	P(SL)A 1967, Schedule c. 222 (4) P(SL)(MoE) Regulations 1999, r.29 (1) Protection of the Sea (Prevention of Pollution From Ships) Act 1993, Division 2 APPEA Code of Environmental Practice ANZECC Guideline for Fresh and Marine Water Quality BHP Billiton Sustainable Development Policy BHP Billiton HSEC Management Standards	<p>Sewage, greywater and food scraps disposed of in accordance with Marpol 73/78 Annex IV:</p> <ul style="list-style-type: none"> • As a minimum, sewage is capable of passing through minimum mesh size of 25 millimetres and disinfected prior to disposal • Sewage, greywater and food scraps are disposed of in accordance with MARPOL 73/78 Annex IV and Clauses 222 and 616 of the Schedule of the OPGGSA (Offshore Petroleum & Greenhouse Gas Storage Act) • Between 3 – 12 NM offshore, MARPOL Annex IV Regulation 11 (Discharge of Sewage) and MARPOL Annex V Regulation 3 (c) shall apply • Sewage that is discharged between 3 -12 NM from the nearest land shall be treated with a facility that meets MARPOL Annex IV, Regulation 9.1.2 (approved sewage and disinfecting system) • All food scraps are macerated to less than 25 millimetres <p>Sewage treatment facility operating within manufacturer specification</p>

Aspect	Environmental Objectives	Standards & Guidelines	Performance Criteria (Avoidance & Mitigation Measures)
Slops & produced water discharges	No significant reduction in ambient water quality No significant adverse effects on marine biota No significant adverse aesthetic effects	EPBC Act 2000 P(SL)A 1967 Schedule, c.285 and 616 P(SL)(MoE) Regulations 1999, 13, 14 and 29 (1) ANZECC Guidelines for Fresh and Marine Water Quality BHP Billiton Sustainable Development Policy BHP Billiton HSEC Management Standards	<ul style="list-style-type: none"> Slops and produced water discharged in compliance with approved OMS procedures Small deck spills contained and cleaned up Drainage from utility areas where leaks are likely, are collected and processed by oily water separator system such as slops tanks Slops water is monitored for oil-in-water content during ship mode (≤ 15 mg/L limit). Non-compliance of OIW levels reported to AMSA Slops water is monitored for oil-in-water content when PFW is diverted to the tank (≤ 30 mg/L 24hr average). Non-compliance of OIW levels reported to DMP. Note normal OIW discharge is set at <25 ppm The discharge operation should normally be carried out during daylight hours only. Slops discharge should not be carried out whilst cargo offloading, tank washing or while bilge pumping operations are under-way Batch dosage of production chemicals is avoided during periods of production water discharge to sea Chemical selection process has preference for environmental friendly chemicals (e.g. OCNS Gold or Silver; non-CHARMable Group D or E) (OCNS : UK Offshore Chemical Notification Scheme) Checks conducted of the in-line OIW analyser Maintenance and calibration of the in-line OIW analyser in accordance with approved OMS Procedures Records of volumes and OIW content of slops discharges maintained
Chemical use & spills	No significant adverse effect on water quality No significant adverse effects on marine biota	EPBC Act 1999 P(SL)(MoE) Regulations 1999, 13 and 14) P(SL)(MoSoOF) Regulations 24.(1) Environmental Protection Act 1986 (WA) APPEA Code of Environmental Practice ICCM Framework ANZECC Guidelines for Fresh and Marine Water Quality BHP Billiton Sustainable Development Policy BHP Billiton HSEC Management Standards	Internal recording and reporting of all spills in accordance with IHR procedures Chemical selection process has preference for chemicals with least potential for environmental harm Only legally permitted antifouling paints are used No wastes are routinely discharged via deck washdown <ul style="list-style-type: none"> Oil Spill & Chemical Spill Response Plans in place Equipment onboard FPSO and support vessels for responding to, and cleaning up, small spills of oils and other chemicals as per SOPEP requirements Associated periodic response exercises Inspections of spill kits conducted to ensure adequate stocks are maintained Chemical Storage, handling and disposal in accordance with OMS Procedures (esp. Hazardous Material Management) Records of chemical consumption rates maintained No bulk chemical loading / offloading to commence after dark Inspection and integrity maintenance of the chemical injection flow metres and transmitters conducted Chemical dosage rates and effectiveness are assessed and reported regularly, and reviewed by BHP Billiton Australian Production Unit (APU)

Aspect	Environmental Objectives	Standards & Guidelines	Performance Criteria (Avoidance & Mitigation Measures)
Hydrocarbon spills	No significant adverse effect on water quality No significant adverse effects on marine biota	EPBC Act 1999 P(SL)A 1967, Schedule 285 and 616 P(SL)(MoE) Regulations 1999 13 and 14) P(SL)(MoSoOF) Regulations 24 (1) Environmental Protection Act 1986 (WA) APPEA Code of Environmental Practice ICCM Framework ANZECC Guidelines for Fresh and Marine Water Quality BHP Billiton Sustainable Development Policy BHP Billiton HSEC Management Standards	DMP notified and written reports submitted in the event of a spill >80 litres (a Reportable Incident) Internal recording and reporting of all spills in accordance with OMS procedures Oil Spill Response Plan is in place, reviewed and tested through periodic response exercises Deployment capability of oil spill equipment within 12 hours Real-time oil spill fate and trajectory modelling available at all times Stocks of spill response equipment including dispersants on-site and in Exmouth are inspected to ensure adequate stocks are maintained Offtake and bunkering operations conducted in accordance with the 'Offtake Operations Manual', 'Terminal Handbook' and 'Diesel Oil Bunkering Operations' Visual inspections of offtake and bunkering hoses and hose reels shall be conducted Offloading hose integrity management procedures in place Support vessel procedures are maintained Threshold sea-state conditions for re-fuelling are maintained as per tanker offtake and bunkering procedures Ongoing critical equipment integrity checks <ul style="list-style-type: none"> • Integrity testing of riser Emergency Shutdown valve (ESDs) and production well (Surface Controlled Subsea Valves (SCSSV's) leak-off tests and remotely Operated Vehicle (ROV) surveys of flowlines and other sub-sea equipment • Periodic ROV surveys of flowlines and other sub-sea equipment to ensure integrity Trading tanker certification and vetting shall comply with OMS requirements, including Pyrenees Terminal Handbook Follow cyclone monitoring and related procedures and disconnection of offtakes in advance of cyclones or above nominated sea-state conditions Operational procedures to avoid potential for spills Compliance with MARPOL requirements when in marine mode Personnel of FPSO and supply vessels training and competency assessment in emergency and oil spill response measures Scheduled external hull inspections conducted to ensure class requirements are maintained Class inspections of tanks and void spaces conducted

Aspect	Environmental Objectives	Standards & Guidelines	Performance Criteria (Avoidance & Mitigation Measures)
Greenhouse Gas (GHG)	Minimise contribution of greenhouse gases to atmosphere consistent with BHP Billiton's Climate Change Position Efficient use of resources	APPEA Code of Environmental Practice BHP Billiton Sustainable Development Policy BHP Billiton Climate Change Position BHP Billiton HSEC Management Standard	Procedures in place for GHG emitting equipment to ensure efficient operation Monitoring procedures in place to detect fugitive emissions Operational management procedures of cargo tank vapour spaces to reduce emissions to ALARP Flaring Plan, including "Annual Consent to Flare", in place, to define procedures in event of flaring of surplus gas <ul style="list-style-type: none"> • Flared gas intensity limit defined and approved for the facility • Annual greenhouse gas emission and flaring targets agreed with DMP • Non compliance to be reported to DMP Calculation of flare gas flow rate is pressure and temperature compensated and performed by Flare Gas Flow Computer Conduct inspection and integrity maintenance of the HP and LP flare gas flow meters and transmitters Inspection of the HP Flare Tip and LP Flare Tip conducted Inspection and integrity maintenance of the HP and LP Flare Tip sensors conducted Pressure Safety Valve (PSV) recertification conducted Pyrenees GHG Management Plan is periodically reviewed, updated and communicated to the workforce Reporting of volumes of gas flared Emissions from gas flared calculated using E&P Forum Emission Factors Periodic review / assessment of actual flaring volumes against predicted volumes

Aspect	Environmental Objectives	Standards & Guidelines	Performance Criteria (Avoidance & Mitigation Measures)
Marine fauna impacts	No significant adverse effects on marine biota	EPBC Act 1999 EPBC Regulations Part 8 International Convention for the Control and Management of Ships' Ballast Water and Sediments (the Convention) Protection of the Sea (Harmful Anti-fouling Systems) Act 2006 Biofouling Guidance for the Petroleum Production and Exploration Industry (see DAFF-00PY-R950-0001) P(SL)(MoE) Regulations 1999 APPEA Code of Environmental Practice Protection of the Sea (Prevention of Pollution From Ships) Act 1993 Division 2 MARPOL 73/78 Annexe IV ANZECC Guideline for Fresh and Marine Water Quality BHP Billiton Sustainable Development Policy BHP Billiton HSEC Management System	<ul style="list-style-type: none"> Adherence to EPBC Guidelines for interactions with cetaceans. Remain at a distance of >100 metres for a large whale & >50 m for a dolphin or porpoise; only approach a cetacean from the rear, no closer than 30 degrees to its observed direction of travel; or by positioning the vessel ahead of the cetacean at more than 30 degrees from its observed direction of travel) A helicopter must stay at least 1,000 metres away from a cetacean; and must not hover over a cetacean Cetacean injury or death are reported to DEWHA Visual whale sighting records are recorded on standard DEWHA recording sheets and forwarded to DEWHA Boat-based whale surveys are carried out by cetacean specialists based on a Before-After-Control-Impact plan. The need for, and frequency of, whale monitoring is reviewed after the first survey in consultation with DEWHA Reduce propeller power to minimum required for safety manoeuvres Noise and light impacts are limited where possible TBT is not used in antifouling paint on FPSO AQIS requirements are followed for ballast water management A biofouling risk assessment shall be undertaken for vessels that shall enter WA State waters from outside Australia (e.g. as part of FPSO or OSV maintenance activities outside Australia). A response strategy shall be developed on a case by case basis in discussion with Fisheries WA and AQIS Audit of tanker vetting procedures Reporting of non-compliance with AQIS ballast water requirements to DMP
Subsea control fluids	No significant adverse effect on water quality No significant adverse effects on marine biota	EPBC Act 1999 P(SL)(MoE) Regulations 1999 13 and 14 P(SL)(MoSoOF) Regulations 24 (1) Environmental Protection Act 1986 (WA) APPEA Code of Environmental Practice ICCM Framework ANZECC Guidelines for Fresh and Marine Water Quality BHP Billiton Sustainable Development Policy BHP Billiton HSEC Management Standards BHP Billiton HSEC Management Standard: PR 9.1 – Environment	Chemical selection process has preference for environmental friendly chemicals (e.g. OCNS Gold or Silver; non-CHARMable Group D or E). Use of any chemical that is not OCNS Gold or Silver rated (or non-CHARMable Group D or E) and are not mentioned in the Operations EP, shall be approved by DMP prior to use Tank level detection (offshore) Usage of chemicals is recorded

Aspect	Environmental Objectives	Standards & Guidelines	Performance Criteria (Avoidance & Mitigation Measures)
Physical Presence / Multiple Users)P	No significant impacts upon other users of the sea No significant impact on visual amenity for coastal or island communities	EPBC Act 1999 P(SL)(MoE) Regulations 1999, 13 and 14 APPEA Code of Environmental Practice BHP Billiton Sustainable Development Policy BHP Billiton HSEC Management Standard BHP Billiton HSEC Management Standard: PR 9.1 – Environment	Complaints from other users are recorded Application of safety & exclusion zones around FPSO; Establish restricted navigation area and other measures in consultation with AMSA Standard marine radio communications systems with other users of the sea is in place, in addition to RACON & AIS Navigation lights and markers are in place Information on FPSO & subsea well-field locations and operations activities forwarded to AMSA for inclusion into Marine Notices Cetacean interaction procedures are implemented to avoid interference with cetaceans Loading / offloading procedures Use fixed moorings and DP where possible
Dropped Objects	No significant impact to seabed habitat No significant impact to seabed biological communities No significant adverse effects to marine biota	P(SL)A 1967, 124 P(SL)(MoE) Regulations 1999, 13 and 14 APPEA Code of Environmental Practice BHP Billiton Sustainable Development Policy BHP Billiton HSEC Management Standards	Dropped object events are reported in accordance with agreed internal and external recording and reporting procedures
Light	No significant adverse effect on marine biota No significant impact on visual amenity for coastal or island communities	P(SL)(MoE) Regulations 1999, 13 and 14 APPEA Code of Environmental Practice BHP Billiton Sustainable Development Policy BHP Billiton HSEC Management Standards	Flared gas volumes are recorded Re-injection of surplus gas avoids intense flaring during normal operations Light spill to be minimised but kept at sufficient levels for safe operation