GRIFFIN WELL ABANDONMENT ENVIRONMENT PLAN SUMMARY

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1 Introduction

BHP Billiton Petroleum Pty Ltd (BHP Billiton), as nominated Titleholder (on behalf of a Joint Venture comprising BHP Billiton Petroleum (Australia) Pty Ltd, INPEX Corporation Ltd, and Exxon-Mobil Australia Pty Ltd), under the *Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2009)* (referred to as the Environment Regulations), will permanently plug and abandon 13 wells located in Petroleum Production Licence Permits WA-10-L and WA-12-L, hereafter referred to as 'the Griffin Well Abandonment'.

This document summarises the Griffin Well Abandonment Environment Plan (EP) as accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), it has been prepared under Regulation 11(3) and 11(4) of the Environment Regulations.

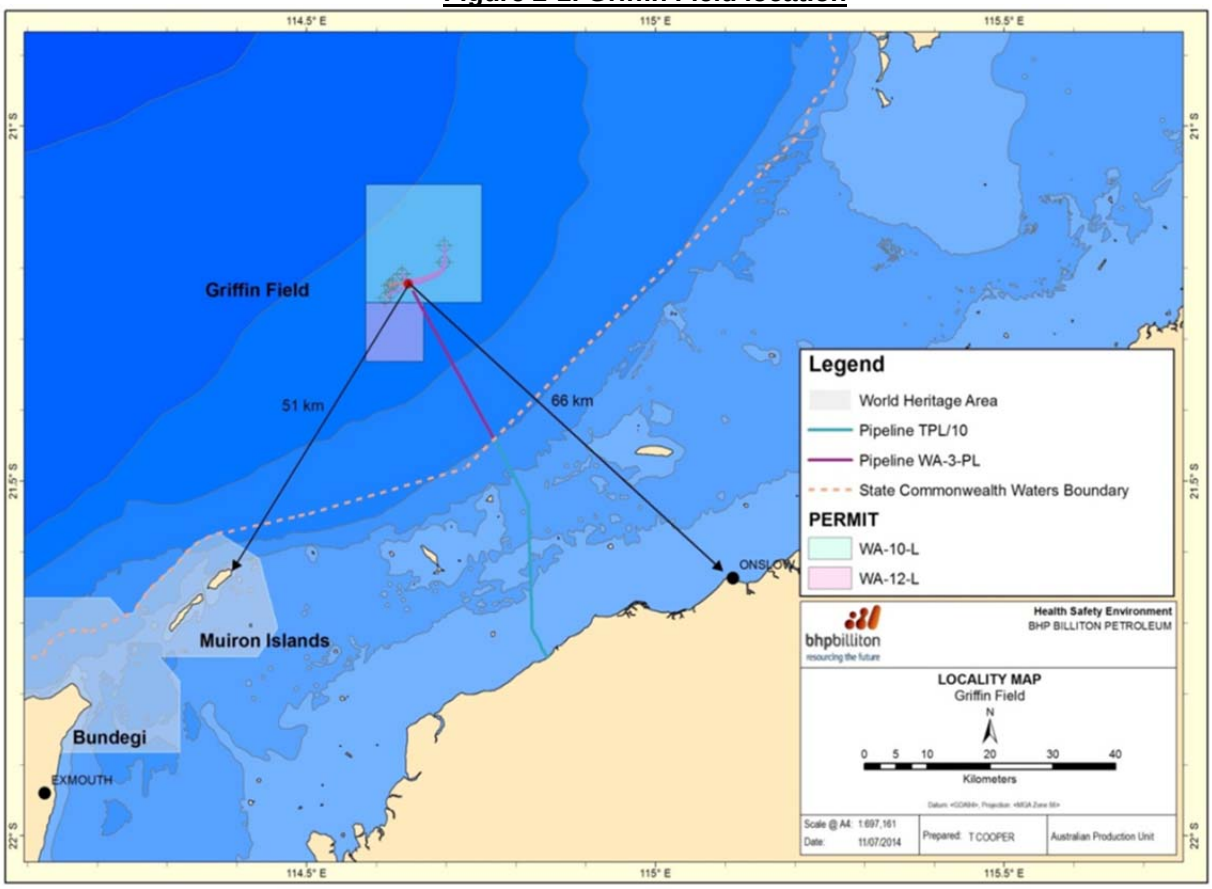
Full field decommissioning of Permit Areas WA10-L and WA-12-L will be undertaken in future and will be subject to a separate NOPSEMA Environment Plan assessment process.

2 Location of the Activity

The Griffin Well Abandonment Activities for 13 wells (8 Griffin wells; 3 Scindian wells, Chinook-1 well and Ramillies-1 well) are located in Permit Areas WA-10-L and WA-12-L in Commonwealth waters, approximately 68 km northwest of Onslow, Western Australia (WA) (Figure 2-1).

The Operations Area defines the geographical boundary of the Activity. The Operations Area covers 269.25 km^2 extending 9.26 km (equivalent to 5 nm) radially from the riser turret mooring (RTM) at the centre (Easting 566888.5m, Northing 7652994.4m).

Figure 2-1: Griffin Field location



3 Description of the Activity

3.1 Timing of the Activity

The Griffin Well Abandonment will commence in FY 2016 (the specific date will be dependent on MODU availability) and will take approximately 6-months. Work will be underway 24 hours a day and each well is expected to take approximate 12 days to permanently abandon (including MODU mooring).

A semi-submersible mobile offshore drilling unit (MODU) will be used. The MODU commissioned for the Activity is currently planned to mobilise to site from within WA waters. The MODU scheduled for the activity can accommodate 130 personnel and will be supported by at least two Anchor Handling Tug Supply (AHTS) vessels, one of which is designated as a standby vessel when at the well sites. Personnel will be transfered to and from the MODU by Helicopters based in Learmonth, Karratha or Onslow.

Anchors will be carried by the AHTS vessels to pre-identified deployment sites and lowered to the seabed. Removal of anchors is the reverse of the deployment procedures described above.

3.2 Well Abandonment

The program consists of abandoning of 12 wells from three fields: Griffin (8 wells), Scindian (3 wells) and Chinook (1 well) (WA-10-L); plus one well from the Ramillies exploration field (WA-12-L). In this EP summary the 13 wells are referred to collectively as ‘the Griffin Field’.

Approximately two to four months prior to the MODU arriving, one construction support vessel (CSV) will be mobilised to the Griffin Field to prepare the well head ready for abandonment work. Work will include the cleaning and maintenance of well heads, Xmas trees and control pods. A remote operated vehicle (ROV) will be deployed from the CSV to clean marine growth and sediment off the infrastructure so the blowout preventer (BOP) can be connected prior to the commencement of work to plug the well.

Once the MODU arrives, work will commence to permanently plug and abandon all 13 wells in accordance with BHP Billiton’s Worldwide Drilling Policies and the NOPSEMA approved Well Operations Management Plan (WOMP). All permeable zones penetrated by a well bore, containing hydrocarbons or over-pressured water, are to be isolated from the surface environment by a minimum of two barriers (cement plugs).

The operational sequence may vary due to the specifics of individual wells; however the general program of works is as follows:

- Position MODU over the well and set the anchors;
- Install and test of the Intervention and Work-Over Control System (IWOCS) to control subsea tree hydraulic functions;
- Remove tree cap;
- Run tree running tool (TRT) / quick disconnection package (QDP) on dual bore Work-Over riser;
- Enter well bore and bullhead (the pumping of kill-weight fluid) brine into production tubing/ reservoir;
- Replace the reservoir cap rock by installing 2 (cement plugs) barriers in the well;
- Remove the Xmas tree and ‘wet store’ on the seabed adjacent to the well head on purpose built mud mat (including cut and disconnect flowlines and umbilicals);
- Tubing will either be cut below the subsurface safety valve (SSSV) and recovered to surface or used as a cement string and dropped back into the well, with top of tubing being >10 m below seabed;
- Well heads may be cut and removed (or delayed for inclusion in the future Griffin Field Decommissioning phase); and
- Pull anchors and move MODU to location of next well / demobilise MODU.

3.3 Anchor Handling Tug and Supply Vessels

Anchor Handling Tug Supply (AHTS) vessels will support the MODU for the duration of the Activity, operating between the MODU and the nearest suitable port (normally Dampier Port, and occasionally Exmouth). Additional or replacement support vessels may be required at times. The AHTS vessels will:

- Tow the MODU to and from location;
- Deployment and retrieval of MODU anchors;
- Supply the MODU with fresh water, food, fuel and bulk materials and equipment between and Dampier Port;
- Transport waste generated from the MODU back to shore (Dampier Port);
- Monitor the 500 m safety exclusion zone around the MODU and intercept errant vessels; and
- Provide support in the event of emergency situations.

At least one support vessel will be present at all times providing (among other tasks) watch for other vessels that may otherwise enter the 500m exclusion zone around the MODU.

ROVs deployed from the AHTS vessels will typically be used during the well abandonment activities for:

- Post abandonment surveys;
- Subsea infrastructure cleaning/ cutting works; and
- Operation, inspection and maintenance of subsurface infrastructure.

4 Description of the Receiving Environment

4.1 Physical Environment

The permit areas are located in the North West Marine Region (North West Province bioregion), as defined in the Marine Bioregional Plan for the North West Marine Region (link).

Water depth and sea floor composition of the region varies greatly: the flat inner shelf component (30-60 m) is characterised by sparse sandy substrata; the mid (60-200 m) and outer (200+ m) shelf sediments are comprised of sands and gravels on cemented hard ground which transition to muds in the deeper areas; and the continental slope (1000-3,000 m) is characterised by muddy sediments.

The province is a transitional zone between tropical and temperate marine species and has a high level of endemism in demersal fish communities on the slope. The Exmouth Plateau is the dominant topographical feature within the province and is an important feature as it modifies the flow of deep waters and contributes to uplifting of deeper, more nutrient-rich waters.

The region experiences an arid sub-tropical climate and a distinct summer monsoonal “wet” season from November to February followed by a typically cooler winter “dry” season. The climate is controlled by two major atmospheric pressure systems: Indian Tropical Maritime air moving in from the west or northwest, and the tropical continental air from the inland.

The region has a sub-tropical climate with a distinct summer monsoonal “wet” season from November to February followed by a typically cooler winter “dry” season. The northwest coast between Broome and Exmouth experiences on average about five tropical cyclones between November to April each year which generally traverse the region from the east-northeast, veering towards the south.

The region’s oceanography is strongly influenced by the warm, low salinity waters of the Indonesian Through Flow (ITF), which affects the upper 1,250 metres of the water column. Surface currents vary seasonally: the Eastern Gyral Current intensifies during July-September; and the Leeuwin Current is strongest between March and May, and weaker between December and February. Tides in the region are semi-diurnal (i.e. there are two high tides and two low tides each day) and run on a north-east and south-west axis. Wind

driven surface currents reflect the prevailing seasonal wind directions, which are predominantly from the south-west during summer and from the east, south-east and south during winter

The average sea surface temperature within the area ranges from 20°C to 24°C during winter and 24°C to 28°C during summer. There is likely to be a distinct thermocline in deep offshore waters, associated with the warming influence of the Leeuwin current, which overlays colder, more saline, deeper ocean waters that vary seasonally. Salinity is relatively uniform at 35 parts per thousand (ppt).

4.2 Ecological Environment and Sensitivities

There are not any World Heritage Properties or National Heritage Places in or adjacent to the Operations Area in permit areas WA-10-L and WA-12-L. No Indigenous or non-Indigenous heritage values have been identified in the Operations Area. There are not any Ramsar Wetlands in or adjacent to the Operations Area. There are not any Commonwealth or State protected areas overlapping or in close proximity to Operations Area. Two Key Ecological Features (KEFs) intersect with the Operations Area (Table 4-1).

Table 4-1: Key Ecological Features the Operations Area

Value / Sensitivity	Description
Ancient coastline at 125 m depth contour	Parts of the ancient coastline, particularly where it exists as a rocky escarpment, are thought to provide biologically important habitats in areas otherwise dominated by soft sediments. The topographic complexity of these escarpments may also facilitate vertical mixing of the water column, providing relatively nutrient-rich local environments.
Continental slope demersal fish communities	The diversity of demersal fish assemblages on the continental slope in the Timor Province, the Northwest Transition and the Northwest Province is high compared to elsewhere along the continental slope.

The Griffin Permit areas contain benthic assemblages predominantly suited to soft sediment habitat including burrowing crustaceans, echinoderms, molluscs, and small fish that associate with sparse communities of sessile sponges, soft corals, sea pens and gorgonians.

Unplanned events may affect the environment outside of the operational area including the Ningaloo Coast and Muiron Islands, and parts of the North-west Commonwealth Marine Reserves Network

The ecological and social values of the Ningaloo Coast and Muiron Islands have been recognised by UNESCO and can be found in the World Heritage listing (external link).

The ecological and social values of the North-west Commonwealth Marine Reserves Network, includes the: Gascoyne Marine Reserve; Montebello Marine Reserve; Ningaloo Marine Reserve; and Shark Bay Marine Reserve. These reserves have a diverse range of values and sensitivities which are described in full in the North-West Commonwealth Marine Reserves Network Management Plan 2014–24 (external link).

There are 26 migratory species, and two non-migratory species listed on Environment Protection and Biodiversity Conservation (EPBC) Act which may occur, or their habitat may occur, within the wider area (table 4-2).

A large number of seabird species migrate across the region. The southern giant petrel and the Amsterdam albatross, which are listed as Threatened and Migratory species, may be sighted in the vicinity of the Griffin Area but it does not contain critical habitats (roosting, nesting or feeding) for any species.

Table 4-2: Species or species habitat that may occur in the Operations Area or wider area

Common Name	Scientific Name	Threatened Status	Migratory	Operations Area
Marine Mammal Species				
Sei whale	*Balaenoptera borealis*	Vulnerable	✓	
Blue whale	*Balaenoptera musculus*	Endangered	✓	✓

Common Name	Scientific Name	Threatened Status	Migratory	Operations Area
Southern right whale	*Eubalaena australis*	Endangered	✓	✓
Humpback whale	*Megaptera novaeangliae*	Vulnerable	✓	✓
Fin whale	*Balaenoptera physalus*	Vulnerable	✓	
Antarctic minke whale	*Balaeniptera bonaerensis*	N/A	✓	✓
Bryde's whale	*Balaenoptera edeni*	N/A	✓	✓
Killer whale, orca	*Orcinus orca*	N/A	✓	✓
Sperm whale	*Physeter macrocephalus*	N/A	✓	✓
Dusky dolphin	*Lagenorhynchus obscurus*	N/A	✓	
Indo-Pacific humpback dolphin	*Sousa chinensis*	N/A	✓	
Spotted bottlenose dolphin (Arafura/Timor Sea populations)	*Tursiops aduncus*	N/A	✓	
Dugong	*Dugong dugon*	N/A	✓	
Fish and Shark Species				
Dwarf sawfish	*Pristis clavata*	Vulnerable	x	
Grey nurse shark	*Carcharias taurus* (west coast population	Vulnerable	✓	✓
Great white shark	*Carcharodon carcharias*	Vulnerable	✓	✓
Shortfin mako	*Isurus oxyrinchus*	N/A	✓	✓
Longfin mako	*Isurus paucus*		✓	✓
Giant manta ray	*Manta birostris*		✓	✓
Blind gudgeon	*Milyeringa veritas*	Vulnerable	x	
Whale shark	*Rhincodon typus*	Vulnerable	✓	✓
Porbeagle, mackerel shark	*Lamna nasus*	N/A	✓	
Marine Reptile Species				
Short-nosed seasnake	*Aipysurus apraefrontalis*	Critically Endangered	x	
Loggerhead turtle	*Caretta caretta*	Endangered	✓	✓
Green turtle	*Chelonia mydas*	Vulnerable	✓	✓
Leatherback turtle	*Dermochelys coriacea*	Endangered	✓	✓
Hawksbill turtle	*Eretmochelys imbracata*	Vulnerable	✓	✓
Flatback turtle	*Natator depressus*	Vulnerable	✓	✓

4.3 Socio-Economic and Cultural Heritage

There are no known sites of Indigenous or European cultural or heritage significance, or historic shipwrecks, within the Operations Area. However numerous Aboriginal registered sites of cultural significance within the wider area that could be impacted by the worst-case unplanned spill event or spill response activities. These include artefacts/ scatter, middens, skeletal material and burial, ceremonial sites and engraving sites

The Griffin Abandonment activity area and the wider region includes State commercial fisheries from the North Coast, Gascoyne, and West Coast bioregions and whole of state fisheries, and five Commonwealth commercial fisheries.

The catch of these fisheries includes a variety of crustacean and mollusc species, as well as pelagic, demersal and reef fish species. Fishing methods utilised include (but are not limited to) nets, longline, gillnet, trawling, and diving.

The region supports significant commercial shipping activity, the majority of which is associated with the oil and gas industry. There are several oil and gas production areas located in proximity to the Griffin Permit Areas, although none lie within or in close proximity to the Operations Area. The Griffin Field within Permit Areas WA-10-L and WA-12-L lies outside of any declared and charted shipping fairways. The nearest shipping route to the Griffin Field is a distance of 26.7 km.

The North West Shelf is Australia's most prolific oil and gas production area that includes operations on several of the offshore islands (Barrow, Thevenard and Varanus Islands). A network of shipping fairways off the north coast of Western Australia direct large vessels such as bulk carriers and LNG ships trading to the major ports into pre-defined routes to keep them clear of existing and planned offshore infrastructure.

There are not any known tourism activities within or adjacent to the Operations Area. The wider area hosts substantial recreational fishing activity which makes up a significant component of the regions tourism, and the Ningaloo Shark Bay World Heritage Areas attracting thousands of tourists annually. The nearest population centres to the BHP Billiton permit areas are the towns of Onslow (~65 km) and Exmouth (~85 km).

5 Environmental Impacts and Risks

5.1 Evaluation of Impacts and Risks

A risk analysis was done to identify the potential environmental impacts and risks associated with the activity and the control measures required to manage these impacts and risks to as low as reasonably practicable (ALARP) and an acceptable level. This risk assessment and evaluation process was consistent with the procedures outlined in the Australian and New Zealand Standards AS/NZS ISO 31000:2009 (Risk Management – Principles and Guidelines) and BHP Billiton's Risk Management Framwork and Drilling Worldwide Management Policies.

An Environmental Hazard Identification (ENVID) process was undertaken to identify the impacts and risks of each environmental aspect and source of hazard for the activity. The objective of the assessment was to develop an understanding of the impacts and risks, to identify appropriate controls and to demonstrate that risks had been reduced to ALARP and that this was acceptable to BHP Billiton. The ENVID process included a detailed impact assessment for the sources of hazard, the controls chosen to reduce or prevent the impact or risk and why some controls were not chosen. This also involved consideration of the sources of risk, their positive and negative consequences and the likelihood that those consequences may occur.

The ENVID process considered both planned and unplanned impacts with variation on how each of these impacts or risks was assessed through to ALARP and acceptability.

The ENVID assessment was conducted as a workshop with a range of personnel from different disciplines including Operations, HSE, and Surface and Subsea Engineering. Decisions made within the ENVID included:

- Confirmation of the sources of hazard identified;
- A Protection Objective developed based on the source of hazard and potential impact (later used for the Performance Outcome);
- Identification of all potential controls and their acceptance through an ALARP process;
- Allocation of likelihood rating for an unplanned source of hazard;

- Severity rating for all sources of hazard; and
- Final acceptability of the impact or risk to BHP Billiton using the acceptability criteria.

The outcome of the assessment process illustrated in Figure 5-1 is summarised in Section 5.2.

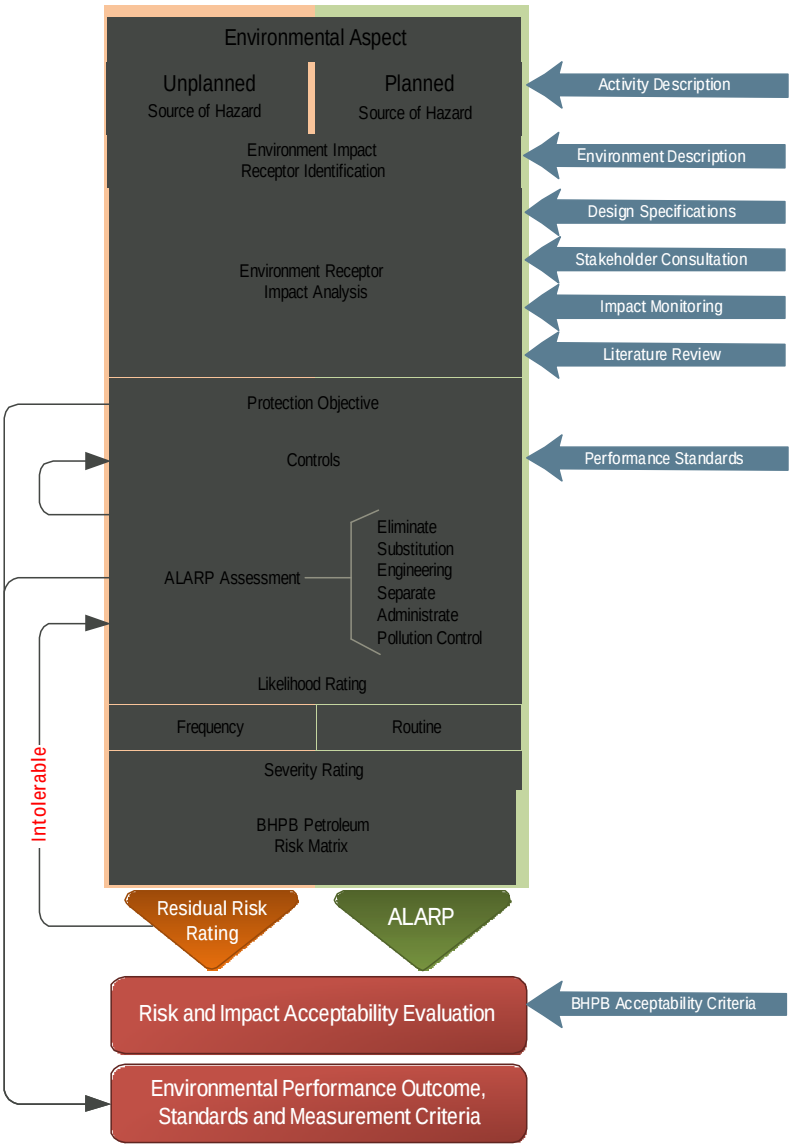


Figure 5-1: Environment plan integrated impact and risk assessment

5.1.1 Environmental Impact Assessment

The environmental impacts were based on the environmental receptors identified in the Operational Area and the broader area that might be affected by a hydrocarbon spill with the impact descriptions developed in an initial screening process that identified the specific receptor that may be impacted. Further quantitative or qualitative definition of the impact was then completed to ensure an understanding of the impact (routine or unplanned) to confirm that the severity of the risk and impact was correctly assigned during the evaluation process.

5.1.2 Demonstration of ALARP

Regulation 10A(b) of the OPGGS (Environment) Regulations 2009 requires demonstration that the environmental impacts and risks of the activity will be reduced to as low as reasonably practicable (ALARP).

Determining whether risks have been reduced to ALARP requires an understanding of the nature and cause of the risk to be avoided and the sacrifice (in terms of safety, time, effort and cost) involved in avoiding that risk. The hierarchy of decision tools (from lowest risk to highest risk) has been adapted from the UKOOA *Framework for Risk Related Decision Support*[1] is:

- Codes and Standards;
- Good Oilfield Practice;
- Professional Judgement;
- Risk-based Analysis;
- BHP Billiton Values; and
- Societal Values.

A summary of the application of these decision tools and protocols in relation to the different categories of risk is presented in Table 5-1.

Table 5-1: Summary of risk ratings, decision-making tools and decision-making protocols

Risk Rating	Decision-Making Tool	Decision-Making Protocol
Tolerable	Comparison to codes and standards, good oilfield practice and professional judgement are used to determine risk acceptability.	If the environmental risk was found to fall within the "Tolerable" zone and the control measures are consistent with applicable standards and 'good oilfield practice' then no further action is required to reduce the risk further. However, if a control measure that would further reduce the impact or risk is readily available, and the cost of implementation is not disproportionate to the benefit gained, then it is considered 'reasonably practicable" and should be implemented.
ALARP Zone	In addition to comparisons with codes and standards, good oilfield practice and professional judgement, risk-based analyses are used to determine risk acceptability.	If the environmental risk of the hazard has been found to fall within the "ALARP Zone" then an iterative process to identify alternative/additional control mechanisms will be conducted to reduce the risk to the "Tolerable" zone. However, if the risk associated with a hazard cannot be reasonably reduced to the "Tolerable" zone without grossly disproportionate sacrifice (e.g. cost, time, resources and safety); then the mitigated environmental risk is considered to be ALARP.
Intolerable	All of the above decision making tools apply combined with consideration of BHP Billiton corporate values and societal values.	If the environmental risk of the hazard has been found to fall within the "Intolerable Zone" then the source of hazard will need additional barriers and is not acceptable to BHP Billiton in the current condition. Work to reduce the level of risk should be assessed against the precautionary principle with the burden of proof requiring demonstration that the risk has been reduced to the ALARP Zone before the activity can commence.

[1] UKOOA. (2014). Guidance on Risk Related Decision Making. Issue 2. Oil & Gas, UK. London. 25 pp.

The ALARP assessment process primarily considers good engineering plus industry practice and legal requirements as key factors affecting the acceptability of a risk. Other factors such as physical constraints, stakeholder perceptions, asset protection and the interaction between environmental and safety risk is also considered as part of the overall decision-making process.

The risk assessment approach described above implies a level of proportionality wherein the principles of decision-making applied to each particular hazard are proportionate to acceptability of environmental risk of that hazard. The decision-making principles for each level risk are based on the precautionary principle (as defined in the EPBC Act) and provide assurance that the environmental impacts and risks are reduced to ALARP and of an acceptable level.

All environmental risks and associated sources of hazard in the EP have been assessed through a tailored ALARP assessment that presents all identified controls in a hierarchal framework. All of the risks associated with the Griffin Well Abandonment Activity correspond to Type A Decisions according to the UKOOA Guidance (UKOOA, 2014), which indicates they do not represent anything new or unusual, the risks are well understood, the adopted control measures represent established good oilfield practice and there are no conflict with BHP Billiton corporate values or major stakeholder implications.

The general preference is to accept controls that are ranked as Tier 1 categories as these controls provide a preventive means of reducing the likelihood of the hazard occurring. Tier 2 categories reduce the potential consequence of the impact or risk. This ranking of controls was considered during the determination of ALARP and the impact and risk acceptance process.

The ALARP process considers all possible controls for planned and unplanned impacts and risks, analyses of risk reduction (prevent or mitigate) proportional to the benefit gained and their final acceptance as a control or rejection and reasoning as to why.

The hierarchy of controls applied in the EP are defined below and are in order of preference:

- Tier 1:
    - Eliminate – Remove the source preventing the impact, i.e. eliminate the hazard;
    - Substitution – Replace the source preventing the impact;
    - Engineering – Introduce engineering controls to prevent or control the source having an impact;
    - Separate – Separate the source from the receptor preventing impact;
- Tier 2:
    - Administrate – Procedures, competency and training implemented to minimise the source causing an impact;
    - Pollution Control – Implement a pollution control system to reduce the impact;
    - Contingency Planning – Mitigate control reducing the impact; and
    - Monitoring – Program or system used to monitor the impact over time.

The controls associated each of the risks for planned and unplanned events of the activity, along with those for the response strategies proposed in the unlikely event of an oil spill, were assessed taking into consideration the potential environmental benefit gained if the control was implemented compared with the practicability of its implementation. If the control had high effectiveness (Availability, Functionality, Reliability, Survivability, Independence/Compatibility) and were practicable to implement, i.e. there was no disproportionate cost/time/safety/effort sacrifice, then the control was adopted. Similarly, if the controls were not practicable, i.e. the cost, time and effort to implement the control was grossly disproportionate to the benefit gained, then the control was rejected.

5.1.3 Demonstration of Acceptability

Regulation 10A(c) of the OPGGS (Environment) Regulations 2009 requires demonstration that the environmental impacts and risks of the activity will be of an acceptable level.

The process used to determine acceptability is as follows:

- Tolerable residual risks are 'Acceptable', if they meet legislative requirements, codes and standards, good industry practice and professional judement;
- ALARP residual risks are ‘Acceptable’ if ALARP can be demonstrated using risk based analysis in addition to legislative requirements, codes and standards, good industry practice and professional judement;

In addition, BHP Billiton evaluates the following criteria for all Tolerable and ALARP residual risks:

- Principles of Ecological Sustainable Development (ESD) as defined under the EPBC Act;
- Internal context - the proposed controls and residual risk level to be consistent with BHP Billiton Policy and HSE Management System
- External context – consideration of the environmental best practice and stakeholder views.

Intolerable residual risks are not acceptable. The source of hazard requires additional barriers and is not acceptable to BHP Billiton in the current condition.

5.2 Risk and Impact Assessment Impact

The environmental aspects and sources of risk identified during an environmental impact identification (ENVID) assessment were divided into planned (i.e. routine operations) and unplanned (i.e. incidents) activities. A total of 14 planned and unplanned activities were identified that had an associated potential source of risk that may have an environmental impact requiring risk assessment and evaluation.

Table 5-2: Summary of the key environmental hazards/ risks and control measures

Environmental Hazard/ Risk	Potential Environmental Impact	Controls – Mitigation Measures	Residual Risk Rating
Planned (Routine) Events			
Physical Presence from Operational and Spill Response Vessels	Interference with shipping, fishing and/or other third party vessels. Damage to fishing gear.	Navigation, bridge and communication equipment compliant with appropriate marine navigation and vessel safety and requirements. Continuously monitored 500 m exclusion zone around the MODU. Vessels seeking to enter the 500 m exclusion zone require the consent of the OIM. Vessel bridge-watch crew on duty 24 hours and qualified in accordance with International Conventions. Activities permitted within the 500 m exclusion zone controlled by the Facility Safety Zone Check Sheet. Notifications to marine safety authorities and other marine users. Regular Community Reference Group (CRG) meetings include commercial and recreational fishing group representatives.	Tolerable
Seabed Disturbance from Operational and Spill Response Vessels	Damage to seabed habitat.	MODU positioning and anchoring procedures reviewed and approved by BHP Billiton prior to their implementation. Support vessel will not anchor within 500 m exclusion zone unless in an emergency (and only if safe to do so) and are to use a mooring buoy when not undertaking key tasks. Recovery of dropped objects where practical to do so and when recovery will provide a net environmental benefit.	Tolerable
Noise Emissions from Operational and Spill Response Vessels	Noise to marine environment causing interference to marine mammals.	MODU and Vessel Masters to operate vessels in accordance with Environment regulations. Support vessels will not knowingly travel greater than 6 knots within 300 m of marine megafauna (caution zone) or approach closer than 100 m for a large whale or whale shark, or 50 m of a dolphin or turtle (with the exception of bow riding). Environmental awareness induction provided to supply vessel crew to advise marine fauna interaction requirements. Sightings of cetaceans and whale sharks to be recorded by crew. Injury or death of any marine fauna species listed as threatened or migratory under the EPBC Act reported to NOPSEMA. Noise emitting machinery/ equipment will be	Tolerable

Environmental Hazard/ Risk	Potential Environmental Impact	Controls – Mitigation Measures	Residual Risk Rating
		appropriately maintained. Stakeholder complaint register and annual review process.	
Atmospheric Emissions from Operational and Spill Response Vessels	Emission of greenhouse gases.	Air emissions recorded and internally reported. Marine-grade, low sulphur diesel will be used (not heavy fuel oil). MODU and support vessel engines to meet international standards. Ozone-depleting substances will be managed in accordance with international standards. No waste incineration onboard the MODU.	Tolerable
Cementing Activities	Localised smothering effects of benthic habitats and fauna from mixed cement and/ or cement residues released overboard. Localised and temporary reduction in water quality from cement residues released overboard.	Cement volume requirements are calculated to determine the required volume of cement plus industry accepted excess volumes to meet the downhole requirements. Bulk (unmixed) cement will not be discharged overboard except in emergency situations. Cement will either be left onboard for subsequent wells, returned to a supply vessel for re-use, or returned to shore for storage and appropriate disposal. Chemical use will be documented and managed in accordance with the Offshore Chemical Notification Scheme and BHP Billiton Drilling and Completions Chemical HSE Evaluation Procedure.	Tolerable
Routine Liquid Waste Discharges from Operational and Spill Response Vessels	Localised and temporary change in water quality – increase in nutrients, increase in salinity. Minor increase in water temperature. Potential for acute toxicity effects to marine biota. Potential water quality impacts leading to bioaccumulation and toxicity to biota immediately adjacent to MODU and/or support vessels.	Current International Sewage Prevention Pollution Certificate onboard vessel and routine liquid waste discharges will comply with Australian and standards and international maritime conventions.	Tolerable
Routine Solid Wastes from Operational and Spill Response Vessels	Generation of hazardous and non-hazardous waste materials.	Routine solid waste discharges will comply with Australian and standards and international maritime conventions.	Tolerable
Residual Hydrocarbon Release - Cutting Flowlines	Temporary reduction in water quality with potential for acute toxic response over localised area.	Pressure check condition of flowline prior to cutting at the Xmas tree to ensure there is no pressure differential prior to cutting. Where possible, flowlines will be cut at a low point reducing the chance for any release of residual hydrocarbons from flowlines. Production flowline samples to be taken after the Xmas	Tolerable

Environmental Hazard/ Risk	Potential Environmental Impact	Controls – Mitigation Measures	Residual Risk Rating
		tree has been removed from the well head assembly and any pressure in the flowlines has been relieved by the drill rig. Caps/plugs will be placed on the exposed ends of both the cut sample and the ends left on the seabed.	
Naturally Occurring Radioactive Material (NORM)	Localised gamma radiation exposure resulting in marine biota absorbing radionuclides.	Ship to shore disposal of NORM-contaminated recovered subsea infrastructure for storage at appropriate facility. All well completion components will remain downhole or recovered to the rig for management and disposal. All potential NORM bearing infrastructure will be capped or sealed to limit exposure to the environment. Specialist 3rd parties to assist in the NORM management and to provide 24 hour coverage as the Radiation Safety Officers on the MODU for the duration of the Griffin Well Abandonment campaign.	Tolerable
Unplanned Activities			
Unplanned Interference to Fauna with Operational and Spill Response Vessels	Interference of MODU or support vessels with migratory or resident populations. Potential lethal impact or harm to protected species from collisions of support vessels with marine fauna.	Vessels to be operated in accordance with Australian law in relation to interactions with marine megafauna. Sightings of cetaceans and whale sharks to be recorded by crew and reported to DoE annually. Environmental awareness induction provided to all marine crew. Injury or death of any marine fauna species listed as threatened or migratory under the *EPBC Act* reported to NOPSEMA. Vessels (AHTS) will not enter Exmouth Gulf during the period 15 September to 31 October in any year except in emergency situations.	Tolerable
Unplanned Marine Spills of Stored Chemicals or Refined Oil from Operational and Spill Response Vessels	Contamination / pollution of water column from localised decrease in water quality potential causing toxicity/ oiling of marine receptors at sea surface.	All MODU machinery space oily water exceeding 15 ppm must be contained and disposed of at a licensed onshore reception facility or to a carrier licensed to receive waste. Liquids from drains may only be discharged if the oil-in-water content does not exceed 15 ppm after treatment in a MARPOL-compliant oily water filter system. Vessels to have a current International Oil Pollution Prevention (IOPP) certificate for oily water filtering equipment. Any loss or discharge to sea of harmful materials to be report to the AMSA Rescue Coordination Centre (RCC). MODU and support vessels will have current MARPOL-compliant Shipboard Oil Pollution Emergency Plan (SOPEP) and Shipboard Marine Pollution Emergency Plan (SMPEP - for noxious liquid) – the latter may be combined with a SOPEP. All shipboard hazardous liquid, chemical and hydrocarbon spills and leaks will be managed in accordance with the SOPEP/ SMPEP. Continuous bunding or drip trays are used around machinery or equipment with the potential to leak chemicals/ fuel. Spill clean-up equipment is located where hydrocarbons	Tolerable

Environmental Hazard/ Risk	Potential Environmental Impact	Controls – Mitigation Measures	Residual Risk Rating
		and hazardous chemicals are frequently handled. Scupper plugs or equivalent deck drainage control measures available where hazardous chemicals and hydrocarbons are stored and frequently handled. Hazardous waste materials are contained onboard for onshore disposal at a licensed reception facility or to a carrier licensed to receive waste. Fuels, oils and hazardous chemicals must be stored with secondary containment at least 110% of largest single waste container. Critical hoses outside bunded areas are identified and regularly inspected/ maintained/replaced as part of the Preventative Maintenance System. Where Offshore Chemical Notification Scheme (OCNS) rating of D or E or a CHARM rating of Silver or Gold rated chemicals are used, no further control required. If other non-rated chemicals are required, chemical selection procedures described in BHP Billiton Drilling and Completions Chemical HSE Evaluation Procedure (DR-PLN-PET-HS-0037) will be followed.	
Diesel Spill during Bunkering Operations from Operational and Spill Response Vessels	Contamination / pollution of water column potentially causing localised acute toxic response.	Diesel bunker checklist will be completed prior to each bunkering activity, detailing load, communications, and alarm criteria. Scupper plugs or equivalent deck drainage control measures available where hazardous chemicals and hydrocarbons are stored and frequently handled. Bunkering area drain points will be plugged prior to commencement of bunkering activities. Bunkering hoses will be drained at cessation of bunkering activities. Direct line of sight between vessels maintained during transfer. Hose register will be maintained that contains details of date of manufacture, date of pressure test and test pressure and preventative maintenance and inspection. No concurrent transfer operations shall take place while undertaking fuel bunkering from the same vessel. Dry break couplings will be used on hoses used for bulk transfer of diesel and a weak link breakaway coupling (e.g. a KLAW coupling) will be in place with the transfer hose string. Diesel bunkering hose will remain buoyant at all times during the bunkering activity. ESD and bunkering valves are in place. Relief valves are included on bunkering pumps. Diesel bunkering activities to commence during day time and only if sea conditions are such that it is safe to do so. Where Offshore Chemical Notification Scheme (OCNS) rating of D or E or a CHARM rating of Silver or Gold rated chemicals are used, no further control required. If other non-rated chemicals are required, chemical selection procedures described in BHP Billiton Drilling and Completions Chemical HSE Evaluation Procedure	Tolerable

Environmental Hazard/ Risk	Potential Environmental Impact	Controls – Mitigation Measures	Residual Risk Rating
		(DR-PLN-PET-HS-0037) will be followed. In line with MARPOL Annex I, all vessels involved in the well abandonment campaign over 400 gross tonnage will have a current Shipboard Oil Pollution Emergency Plan (SOPEP) in place. Implement and maintain MODU/ vessel MARPOL-compliant SOPEP and equipment. Develop and maintain BHP Billiton *Griffin Well Abandonment OPEP (00GA-BHPB-N00-0002)*.	
Unplanned Diesel Spill from Bulk Storage due to Vessel Collision with Operational and Spill Response Vessels	Contamination / pollution of water column potentially causing localised acute toxic response.	Navigation, bridge and communication equipment will be compliant with appropriate navigation and vessel safety requirements. Navigational aids (AIS). Establish and maintain a 500 m exclusion zone around the MODU. Vessels are not permitted to enter the 500 m exclusion zone around the MODU without the consent of the OIM through a defined process. Crew undertaking vessel bridge-watch will be qualified in accordance with International Convention of STCW95, AMSA Marine Order - Part 3: Seagoing Qualifications or certified training equivalent. At least one support vessel monitoring the 500 m exclusion zone around the MODU at all times. Activities permitted within the 500 m exclusion zone around the MODU will be controlled by the Facility Safety Zone Check Sheet. Notification of MODU location, duration of well abandonment activities, etc. to AMSA Rescue Coordination Centre (RCC), which triggers RCC to issue an AusCoast Warning, and to the Australian Hydrographic Service (AHS) who will issue a 'Notice to Mariners'. Establish and maintain a Community Engagement Program by regularly meeting with the Community Reference Group (CRG). Implement and maintain MODU/ support vessel MARPOL-compliant SOPEP. Bridge-watch on all support vessels to be maintained 24-hours per day. Response strategies as per: *Section* 7 - *Oil Pollution Emergency Plan Summary*.	Tolerable
Reservoir Hydrocarbon Spill, dispersant application	Contamination / pollution of water column from uncontrolled flow of reservoir hydrocarbons and dispersed oil. Potential large area of acute and chronic toxic effect, visual pollution, community complaints, displacement of fishing effort due to pollution.	Operations in accordance with BHP Billiton Worldwide Drilling Policies and Worldwide Drilling Management System and by appropriate drilling contractor. Well abandonment in accordance with BHP Billiton Worldwide Drilling Policies and Worldwide Drilling Management System. Response strategies as per: *Section* 7 - *Oil Pollution Emergency Plan Summary*. Continual assessment of dispersant effectiveness through a daily NEBA during oil spill response operations.	ALARP

6 Monitoring and Reporting of Environmental Performance

The Griffin Well Abandonment activities will comply with the EP accepted by NOPSEMA and BHP Billiton's risk management policy. The Implementation Strategy for the EP includes:

- Measures, systems, practices and procedures to ensure environmental performance outcomes and standards are met;
- Chain of command, key roles and responsibilities for key BHP Billiton and contractor personnel in relation to the EP implementation, management and review;
- How training, competencies and on-going environmental awareness will be maintained for the duration of the activity, for all personnel and contractors with responsibilities under the EP;
- Monitoring, auditing and management of non-conformance;
- Record management;
- Routine and incident reporting;
- Oil spill response arrangements;
- Oil Pollution Emergency Plan (OPEP);
- Review and testing arrangements of the OPEP; and
- OPEP consultation.

Environmental performance will be managed through an inspection, monitoring, auditing and review regime to ensure environmental performance (among other matters) is consistent with BHP Billiton Policies and the EP. Records and reports for five years after the activity, including, but not limited to:

- External communications (e.g. stakeholder consultation logs, reporting of incidents);
- Training and competency assessments;
- Emissions and discharges (e.g. ODS Record Book, Garbage Record Book, Envirosys Records; National Pollutant Inventory Report);
- Cetacean and whale shark sighting datasheets;
- Environmental Performance;
- Reportable and recordable incidents and/or near misses, and investigations;
- Audits, inspections, test certificates, non-conformance, and corrective actions;
- EPs, EP revisions and supporting documentation;
- Daily/ Scheduled Report (e.g. End of Well Report, Cement Report; Drilling Reports);
- Records of periodical tests and maintenance of HSE-related (and other) equipment and tools;
- Records of HSE meetings and training/ emergency drills;
- Modification and changes authorised by BHP Billiton and/ or contractor; and
- Risk assessments (e.g. chemicals to be discharged; management of changes).

BHP Billiton will report information on environmental performance to regulators to remain in compliance with key environmental legislation and regulations.

If any changes to the activity are required, BHP Billiton will assess if the proposed changes create any new or increased environmental impacts or risks. If there is a change in the risk profile of the active a revision of the accepted EP may be required pursuant to Regulation 17 of the Environment Regulations. In this case BHP Billiton will prepare a revised EP for submission to NOPSEMA for assessment and acceptance.

7 Oil Pollution Emergency Plan Summary

The *Griffin Well Abandonment Oil Pollution Emergency Plan (OPEP) (00GA-BHPB-N00-0002)* is BHP Billiton's response strategy in the event of an oil spill during the well abandonment campaign. The OPEP has been accepted by NOPSEMA as compliant with the Environment Regulations.

BHP Billiton has utilised a Net Environmental Benefit Analysis (NEBA) methodology to identify the appropriate response strategies for individual credible and worst-case hydrocarbon spill scenarios that could occur during the Griffin Well Abandonment campaign. A strategic NEBA was conducted to determine the benefits and constraints of the spill response strategies along with an assessment of the associated risks and impacts that may occur from their implementation.

In the event of an oil spill, an Operational NEBA will be undertaken to select the most appropriate spill response (or responses). The response strategy can evolve as conditions change.

The potential environmental risks and impacts of these strategies include:

- Physical presence of vessels and equipment causing disturbance to marine fauna including inteference/temporary displacement of marine fauna;
- Seabed disturbance impacting any benthic habitats or species when equipment such as anchors for the relief well, capping stack, is deployed;
- Noise / air emissions causing a temporary increases in ambient noise and reduction in air quality, respectively;
- Increased routine liquid waste discharge and generation of solid waste from response vessels/personnel;
- Physical damage to shoreline habitats from protection and clean-up operations;
- Physical injury and stress to wildlife if captured for treatment;
- Pollution of the marine environment from unplanned chemical/hydrocarbon spills and waste generated during a spill response; and
- Exposure to entrained and/or dispersed oil.

7.1.1 Primary Response Strategies

Primary response strategies which may be applied following a hydrocarbon spill:

- Source Control:
  - Vessel Control – the primary response strategy for single point spills, transfer hose/ pipe failure, spills during diesel bunkering, tank overflows, hull leakage and spills in the event of a vessel collision. Activities will be dependent on the type of incident but may include:
    - Closing valves, isolating pipework and shutting down pumps.
    - Temporary patches or bungs/plugs to seal holes, until permanent measures are made.
    - Spill response equipment, including small booms, absorbent pads, spill absorbent litter, spill recovery containers, permissible cleaning agents and other materials.
    - The transfer of product between tanks on the vessel or between vessels - in the event of a leaking tank or tank rupture from a vessel collision.
  - Relief Well – the initial and highest priority response strategy for a reservoir hydrocarbon spill and required to permanently stop the hydrocarbon flow.
  - Capping Stack – allows a subsea wells to be capped; restricting any hydrocarbon loss into the marine environment, until a relief well can be drilled.
  - Subsea First Response Tool Kit (SFRT) – a subsea dispersant and debris clearance toolkit allowing debris to be cleared around the area of the wellhead, to enable intervention and prepare relief well drilling and safe installation of the well capping or containment device.

- Monitor and Evaluate – to maintain situational awareness and inform the response to any spill event:
  - Surveillance using boats and aircraft;
  - Oil spill trajectory modelling; and
  - Use of satellite imagery, surveillance and subsea plume tracking devices (oil spill tracker buoys and autonomous underwater vehicle) to track hydrocarbon spill trajectory;
- Shoreline Protection – the deployment of vessels, equipment and personnel to use protection and deflection booms by (AMOSC/ OSRL), which assist in minimising the amount of oil contacting shorelines. To be effective, the oil is required to be of a certain thickness.
- Shoreline Clean-up – where shoreline protection and deflection is not possible or unsuccessful, shoreline clean-up activities will be implemented requiring multiple vessels, equipment, clean-up crew and waste management resources.
- Natural Recovery – makes use of the natural degradation and weathering processes to breakdown and remove surface oil and stranded hydrocarbons.
- Operational and Scientific Monitoring –to support the response strategies for large spills and to understand any effects on sensitive receptors.
- Oiled Wildlife Response – pre-oiling activities include: onshore exclusion barriers (e.g. fencing) to stop wildlife accessing shoreline areas affected by hydrocarbons; shepherding wildlife away from oil slicks or oiled shorelines with visual and auditory devices; and pre-emptive capture and removal of wildlife that may come into contact with hydrocarbons. Post-oiling activities include: collection and rehabilitation of oiled fauna at dedicated Oiled Wildlife Response Centres.
- Forward Command Post – enables constant on-location response management for major spills.
- Waste Management – waste generated from sea-based marine recovery and shoreline clean-up response strategies through on-site waste handling and storage, segregation of waste, offsite transport and storage, waste treatment and disposal options, and waste monitoring and reporting.

7.1.2 Secondary Response Strategies

Secondary response strategies may be implemented if needed and practicable:

- Dispersant Application – In the event of a loss of reservoir hydrocarbons, dispersants may be applied if the coastline, State waters or sensitive marine receptors are at risk from significant shoreline loading or a surface oil slick thicker than10 µm. Dispersant may be applied from aircraft, marine vessels or subsea equipment.
- Marine Recovery – the deployment of booming systems and skimmers to gather, contain and retrieve surface oil. This response strategy is highly dependent on favourable weather conditions and sea state, the oil spill characteristics and selection of the correct boom type.
- Mechanical Dispersion – the promotion of the oil weathering process through the physical agitation of oil using vessels. Mechanical dispersion is an optional response strategy, not a primary method for reducing impacts from major spills; it has no significant benefit unless used dispersants.

7.2 BHP Billiton Oil Pollution Emergency Arrangements

BHP Billiton has the following emergency response arrangements in place:

- Standing Agreement and Service Contract with Australian Marine Oil Spill Centre (AMOSC) for the supply of experience personnel and equipment, including a Subsea First Response Toolkit (SFRT) and National dispersant stockpiles;
- Access to Wild Well Control's capping stack, SFRT equipment and relevant experienced personnel;
- Contract agreement with Oil Spill Resources Limited (OSRL) to supply Capping Stack, dispersants, and incident management / specialist personnel;
- Contract agreement with Trendsetter for installation of well capping equipment;

- Mutual Aid Memorandum of Understand (MOU) with other regional oil and gas operators to assist (including to source and mobilise a MODU and offshore support vessels) in an oil spill situation;
- Other support services such as 24/7 oil spill trajectory modelling and satellite monitoring services as well as 'on-call' aerial, marine, logistics and waste management support;
- MOU with AMSA, as managers of the National Plan for Maritime Environmental Emergencies, will support BHP Billiton with response equipment from National stockpiles. Equipment stockpiles are located around Australia in strategic locations such as Exmouth, Dampier, Darwin and Fremantle.

8 Stakeholder Consultation

BHP Billiton has been consulting with residential and business stakeholders of the North West Cape since 1992, when the Griffin Field was first developed. BHP Billiton undertook extensive consultation with 102 stakeholders whose functions, interests or activities may be affected by the Griffin Abandonment and/or potential associated risks of the project. Consultation included 27 Commonwealth and State departments and agencies, and local government as well as fisheries, local residents and business stakeholders.

BHP Billiton's consultation includes: distribution of an activity fact sheet; direct mail; email; face-to-face meetings; and telephone conversations. The information provided includes: the activity's timing and duration; relevant risks and controls; BHP Billiton's policies and experience; and BHP Billiton contact details.

The Exmouth Community Reference Group and the Onslow Community Reference Group (CRG) were established to facilitate consultation in relation to BHP Billiton's multiple assets in the North West Cape region, including the Griffin Field. BHP Billiton has held regular open community reference group (CRG) meetings in Exmouth and Onslow throughout the development of the EP. The CRG meetings provide stakeholders with updates on petroleum activities including all Griffin Field activities. Meeting participants are invited to raise any concerns or issues. Meeting agendas are prepared and circulated in advance of meetings and minutes are recorded. The BHP Billiton Corporate Affairs toll-free 1800 number and email address are made available to stakeholders.

No objections or significant concerns were raised by stakeholders during consultation in the preparation of the EP. Stakeholders who provided feedback to BHP Billiton and those whom provided information or advice were responded to directly (summary in Table 8-1). Information or concerns raised (if not already considered by BHP Billiton) were included in the EP in the same manner as risks identified by BHP Billiton.

BHP Billiton will continue to engage with stakeholders in the lead up to commencement of work and throughout the activity's duration.

Table 8-1: Summary of consultation, and BHP Billiton's assessment of feedback and response

Topic	Summary of Stakeholder Feedback	BHP Billiton Response
Activity Notifications and Consultation	The stakeholder acknowledged the information received and noted the program for the Griffin Well Abandonment Activity, advising that they required no further information about the campaign. The stakeholder requested pre-start and cessation notification.	BHP Billiton acknowledged the Stakeholder's request for pre-start and cessation notification.
Commercial Fisheries	Provided BHPB with: advice from the Department including; a list of fisheries in the region; the Department contact details in the event of an oil spill; information relating to introduced marine pests; and the spawning times of the key fish species in the region.	BHP Billiton acknowledged the letter noting the advice in the letter would inform the EP. BHP Billiton also advised that commercial fisheries operators and the industry associations had been consulted, and WA sourced vessels would be used to minimise introduced marine pest risk.
	Stakeholder requested additional information on potential impacts to pearl oysters and pearling.	BHP Billiton responded noting that modelling indicated no significant risks from planned activities to pearling operations due to pearl

Topic	Summary of Stakeholder Feedback	BHP Billiton Response
		oyster depths and locations in relation to modelled spill trajectory. The stakeholder had no further comments
Maritime Safety	Stakeholder provided BHP Billiton with map of well locations in relation to commercial shipping routes and advised of maritime safety procedures which must be followed such as communication with commercial shipping in the region and advising AMSA's RCC and the AHS prior to and at the cessation of the activity.	BHP Billiton acknowledged the requests and noted that AMA's comments are used to guide the EP's management of the communication of maritime traffic.
Local Business	Stakeholder sought information on how the risk of introduced marine pests would be managed.	BHP Billiton advised the risk would be reduced through using WA sourced vessels. Stakeholder had no further comments.
	Stakeholder sought information on how to tender for work with BHP Billiton.	BHP Billiton responded advising stakeholder on BHP Billiton's tender process and opportunities. Stakeholder had no further comments.
Incident Response	BHP Billiton had face-to-face meetings with several regulatory stakeholders to discuss the Griffin Well Abandonment Campaign and spill response co-ordination.	Spill response arrangements were confirmed with the Department of Transport. Stakeholders had no further comments.

9 Titleholder Nominated Liaison Person

For further information about this activity please contact the BHPB Petroleum Corporate Affairs Team.

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