

## 1 INTRODUCTION

The Griffin Venture and associated infrastructure is owned by a joint venture of BHPB Billiton Petroleum Pty Limited, Exxon Mobil and Impex, and operated by BHP Billiton (BHPB). BHPB discovered the oil and gas field in 1989 and commissioned the Griffin Venture Floating Production and Offtake Facility (FPSO) in 1994.

The Griffin Venture was originally assessed as part of the “Griffin Gas Pipeline Development Consultative Environmental Review”, 2 November 1992. The assessment was undertaken by the Environmental Protection Agency (WA) in conjunction with the former Commonwealth Environmental Protection Agency.

Griffin operations have now been operating for over a decade and expected to continue through to 2016.

## 2 ACTIVITY DESCRIPTION

The Griffin development consists of four main components:

- the infield development
- the gas export pipeline
- the Griffin Export Facility
- other support services and facilities

The EP addresses the operation and maintenance of the infield development.

### The Infield Development

The infield development consists of a purpose built FPSO, the *Griffin Venture*, moored to a disconnectable catenary mooring riser. The *Griffin Venture* is essentially a large, double hulled tanker specifically designed and constructed to enable:

- connection to and disconnection from the mooring riser;
- monitoring of oil and gas production rates from the field;
- separation and stabilisation of the reservoir fluid into oil and gas sales products and produced water for disposal;
- compression of gas for export and gas lift;
- storage of oil product and offloading to shuttle tanker;
- mooring of shuttle tanker;
- accommodation on FPSO for normal manning of 40, with max accommodation available for 63;
- self propelled movement and navigation; and
- assurance of crew safety and environmental integrity.

Crude oil is produced from nine subsea wells (Griffin 1, 2,4,5,6, 8 and 9, Chinook 1, Scindian 2,3 and 4 wells on stream, Griffin 2 and Scindian 1A wells shut-in and Griffin 4 suspended). Oil, gas and water flow through hard piping (for Scindian wells) and high pressure flexible flowlines (for all other wells) along the seabed towards the *Griffin Venture*. From the seabed, flowlines are connected to the riser via high pressure flexible flowlines. Two production and one test manifold route these well products from the riser to the oil stabilisation and storage facilities.

Gas, oil and water are separated in a three stage separation process. Oil from the separators is progressively cooled to 34°C, in a heat exchange system, prior to storage in one of the seven crude oil storage tanks. Seawater is used as a cooling medium in the heat exchange system. It is also used to remove heat from the closed circuit exchangers, which cool the gas in the compression trains.

Stabilised crude is offloaded to a tandem moored shuttle tanker using a floating hose arrangement. A work vessel maintains the shuttle tanker position under static tow during the offload operation.

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The MOE regulations require that produced formation water (PFW) does not exceed 30mg/l during each period of 24hrs. On the GV, produced water from the separators is routed to one of four hydrocyclones and a degassing vessel to reduce the oil in water concentration to less than 30 mg/l. The produced water discharge stream is monitored using an inline SIGRIST oil-in-water analyser prior to discharge overboard. Excursions at or above 30 mg/l result in an alarm and after 60 seconds the discharge is diverted automatically to the slops tanks.

Two slops tanks are provided for the treatment of oil contaminated drainage from the machinery areas and process skid sumps and diverted PFW. The oil-in-water concentration of the slops discharge is managed in the same way as the produced water discharge.

The majority of gas is dried, compressed and piped to the onshore gas treatment plant, Griffin Export Facility. Some gas is used on the *Griffin Venture* for fuel gas, or gas lift and maintaining a flame on the flare (safety requirement). A gas flaring target, agreed to with the DoIR, is in place to minimise the quantity of gas flared and to ensure there are progressive reductions in gas flared over the life of the facility.

### 3 CORDINATES OF ACTIVITY

The *Griffin Venture* is sited in 130m of water in Permit Area WA-10-L, located on the North West Shelf, south-west of Barrow Is, on the Western Australian coast. The Griffin Field is located at latitude 21°13'S and Longitude 114°38.7'E. Location is illustrated in Fig 1.

### 4 DESCRIPTION OF RECEIVING ENVIRONMENT

The *Griffin Venture* is moored on the outer Rowley Shelf, approximately 68km offshore, in a water depth of 130m. Seawater surface temperatures range between 19°C to 24°C in winter and 26°C to 31°C in summer. The average number of days with rainfall is 21-26 days per year with significant rainfall associated with summer thunderstorms and cyclones.

The tropical cyclone season is generally between January and April and the region experiences an average of two cyclones per season. The wave climate includes both a sea and swell component. Generally, offshore areas experience more extreme conditions due to the influence of oceanic swell and long fetch sea waves. Waves in the vicinity of the FPSO are typically 2-3m in winter and 1-2m in summer. However, swells of 8 metres or more may occur during cyclones.

The range of habitats and species at the *Griffin Venture* (the **Outer Rowley Shelf**) is not well defined or documented, but is much less diverse than the inner shelf. Benthic fauna consists of crustaceans, cephalopods and small fish that live within a structural habitat formed by a sparse community of sponges, soft corals, sea pens and gorgonians. The outer shelf has a relatively productive trawl fishing industry that produces substantial quantities of demersal fish. The main nutrient source for the outer shelf fishery is a summer upwelling of nutrient rich deep water.

The Rowley Shelf supports mostly tropical species which are widely distributed throughout the area. 620 species of fish have been identified in trawl surveys within deeper waters offshore. The most notable species are the billfish, which include the Marlin, Sailfish and Swordfish. Pelagic species are seasonably abundant and pass through the area during annual migrations.

The most common whale species found in the area is the Humpback Whale. They are found in the area between June and December, with the greatest numbers being associated with the southerly migration in September and October. Other whales also present in the area, but in lower numbers, include the Brides, Killer, False Killer, Sperm, Pigmy, Melon Headed and Southern Right Whale. Occasional visitors include the Fin, Blue and Minke Whales. Common offshore tropical species of dolphin include the Spinner and Stripped Dolphins

The Rowley Shelf supports mostly tropical species which are widely distributed throughout the area. The coral reefs support the greatest diversity and abundance of fish, with lesser numbers and species occurring in other habitat types.

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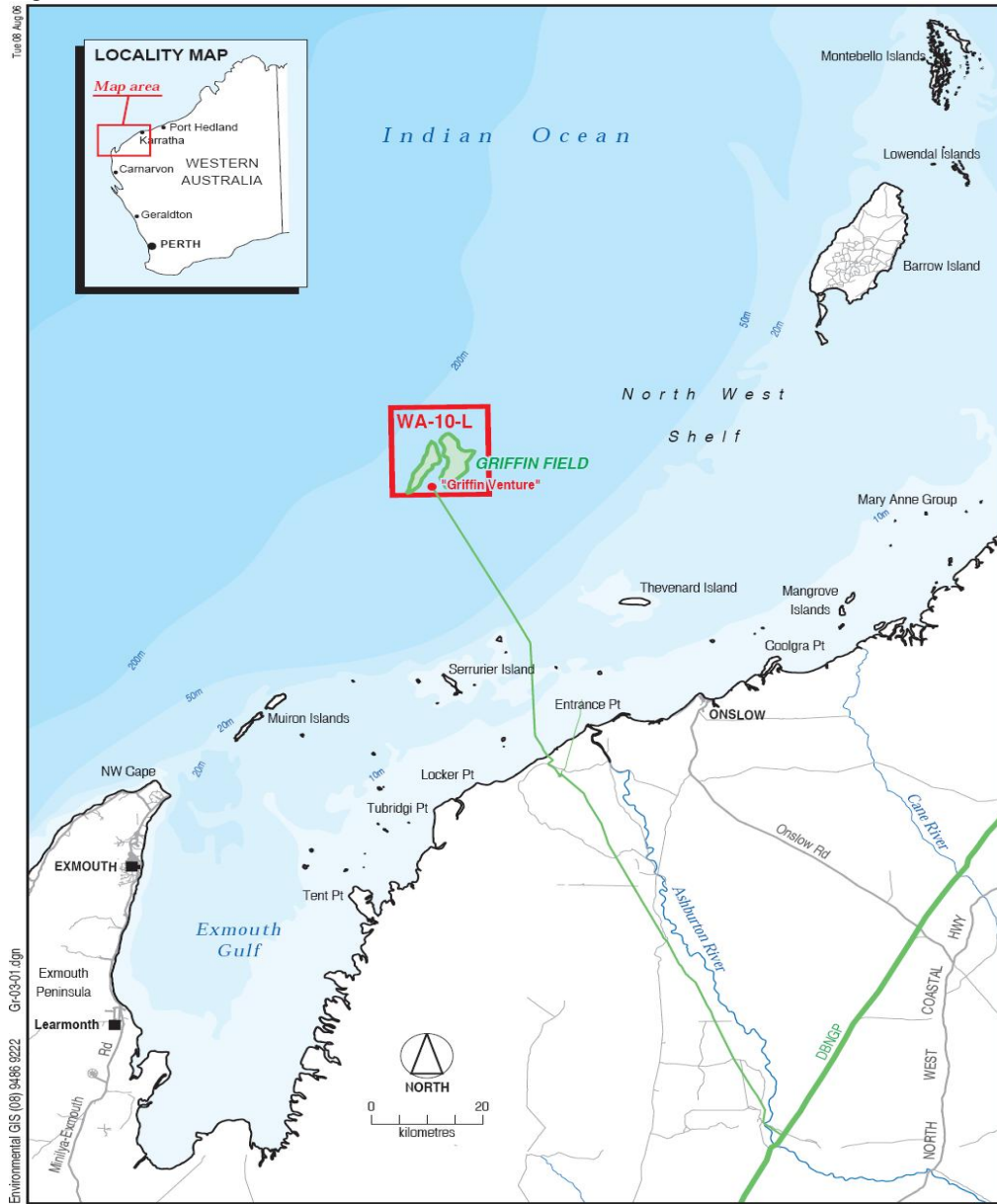
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Figure 1. Griffin Venture Field



### 5 MAJOR ENVIRONMENTAL HAZARD AND CONTROLS

Table 1: Outlines the major environmental hazards identified via risk assessment for the Griffin Venture FPSO.

ASPECT	HARZARD	HAZARD AND MITIGATION CONTROL MEASURES
Loss of containment (700,000bbl) hydrocarbons	Large oil spill potentially affecting marine fauna and flora and the local fishing industry	Maintain and enforce safety and exclusion zone around FPSO, Oil spill contingency plan approved and tested. Vessel integrity maintained by on going maintenance schedule.
Produced formation water (PFW)	Releasing PFW to the marine environment containing elevated hydrocarbons and process chemicals	Continuous online monitoring of PFW to maintain regulatory limits. Any exceedence of OIW, PFW is turned inboard for further storage and treatment.  Daily Manual OIW analysis undertaken by production staff , to cross check online monitoring results  Calibration and maintenance schedules in place and training of staff.
Discharge of Slops water	Releasing PFW to the marine environment containing elevated hydrocarbons and process chemicals	Continuous online monitoring of Slops to maintain regulatory limits. Any exceedence of the OIW criteria, slops discharge is stopped.
Diesel Spills during bunkering	Release of diesel to the marine environment potentially affecting marine fauna and flora	Diesel bunkering procedures that include steady sea state conditions  Bunkering supervised at all times  Spill kits and procedures on both vessels and training of staff in oil spill management

## 6 SUMMARY OF MANAGEMENT APPROACH

The BHP Billiton HSEC Management System is hierarchical, where documents and systems must meet and support the requirements of those of higher levels. Within the Hierarchy, there are mandatory and advisory requirements (listed below).

### MANDATORY

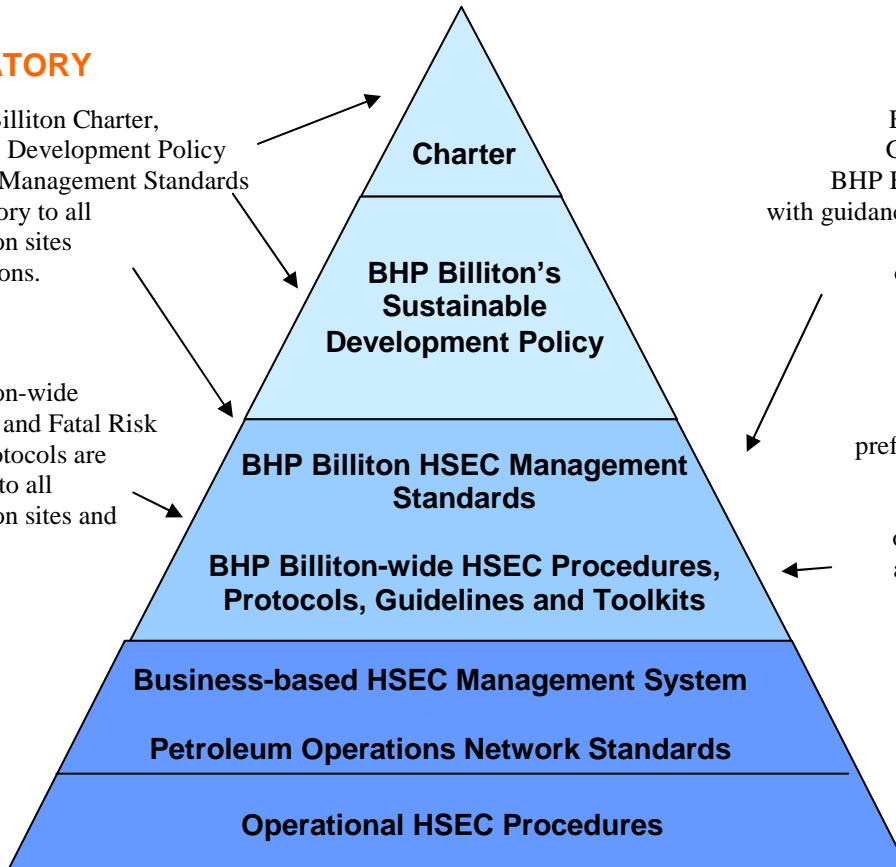
The BHP Billiton Charter, Sustainable Development Policy and HSEC Management Standards are mandatory to all BHP Billiton sites and operations.

BHP Billiton-wide Procedures and Fatal Risk Control Protocols are mandatory to all BHP Billiton sites and operations.

### ADVISORY

BHP Billiton-wide Guidelines provide BHP Billiton businesses with guidance on the effective implementation of these Standards

Toolkits provide preferred methods for meeting the requirements of these Standards and BHP Billiton-wide Procedures, Protocols and Guidelines



The Griffin Venture Operational HSEC Procedures are intended to support the BHP Billiton Charter, HSEC Policy and these Standards. The requirement of the HSEC management system is met by the by the Griffin Venture through the implementation of the following primary documents:

- The Griffin Venture Environment Plan
- The Griffin Venture Safety Case
- The Griffin Operations Emergency Response Plan

Supporting the BHPB management system is the ISO14001 Environmental Management Certification. ISO certification requires an annual audit of the GV management system, ensuring environmental commitments and management is achieved.

## 7 CONSULTATION

Consultation with community and stakeholders for the development of the Griffin Venture was undertaken inline with government and BHPB requirements when first implemented in 1993.

As a remote operating facility in commonwealth waters, the Griffin Venture continues to consult broader communities via the regulation and interaction with the Department of Industry and Resources (DoIR). DoIR ensure the facility operates according to the EP commitments and commonwealth regulations that apply to the operation.

The EP is revised annually within BHPB by the Environmental Advisor who consults broadly with operations and technical staff for document integrity management. This also includes implementation of legislative changes and consultation with relevant government bodies including DoIR.

## 8 CONTACT DETAILS

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