

Greater Western Flank Phase 1 Project: Subsea Installation and Commissioning Environment Plan Summary

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1. INTRODUCTION

Woodside Energy Ltd (Woodside) as operator, proposes to undertake installation of subsea infrastructure and commissioning activities for the Greater Western Flank Phase 1 Project (GWF-1) in offshore Commonwealth waters on the North-West Shelf (NWS) near the Goodwyn Alpha (GWA) facility.

GWF-1 will comprise recovery of gas and condensate from five subsea production wells located in the Tidepole field (three wells) and the Goodwyn GH field (two wells). Co-mingled production from these wells will be transported via a 16-inch corrosion-resistant alloy (CRA) clad subsea pipeline to the GWA facility.

The GWF-1 Subsea Installation and Commissioning Environment Plan (the EP) has been prepared in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Environment Regulations). The EP has been reviewed and accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

The subsea installation activities are scheduled to commence in 2014; however delays may occur to this timing. Subsea installation is planned to occur within a six month window, allowing for delays and cyclone down time, though may extend beyond six months if unanticipated delays occur.

Commissioning activities (including pre-commissioning) are expected to be completed in 2015, further vessel based and associated activity necessary to complete the GWF-1 Subsea Installation and Commissioning activities scope will also occur in 2015 and potentially extended if further delays occur.

The EP summary has been prepared as per the requirements of Regulations 11(7) and (8) of the Environment Regulations.

2. **DESCRIPTION ACTIVTY**

2.1 Overview

The GWF-1 subsea installation program will comprise the following activities:

- · Installation of subsea infrastructure
- Sediment relocation
- Installation of stabilisation, protection and support mattresses
- Testing (pipeline system will be subject to a hydrotest)
- Subsea infrastructure commissioning
- Pipeline dewatering and pre-commissioning

An overview of the vessels to be used in the subsea installation program is provided in Table 2-1.

Table 2-1: Overview of vessels to be used for GWF-1 subsea installation

Vessel Type	Example of Planned Activities		
Primary Installation Vessel	Installation of subsea infrastructure, ROV, diving and survey activities and other as described in this EP.		
Heavy Lift Vessel, transport barge, special purpose vessels	Transport of spools, well jumpers, piles, recovered subsea equipment, umbilicals and other parts.		
Hyperbaric Rescue Vessel	Support PIV whilst in saturation diving mode		
Tugs (e.g. Anchor handling tugs) and platform support vessels	Transport of unmanned barges, supply of materials to PIV and GWA.		
Subsea Support Vessels	Subsea survey, inspection, maintenance and repair, pig launcher deployment and recovery, ROV and diving spreads and other activities as required.		

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2.2 Location of Activity

GWF-1 operational area is located in Production Licence WA-5-L and WA-6-L, in Commonwealth waters on the NWS of Australia.

The Tidepole field is located approximately 15 km south-south-west of the GWA facility in approximately 112 m water depth; while the Goodwyn GH field is approximately 7 km south-south-west of the GWA facility in approximately 120 m water depth and 33 km from the North Rankin Complex (Figure 2-1), Table 2-2 summarises the key operational coordinates in which the subsea installation will be undertaken.

Table 2-2	GWF-1 Ke	y infrastructure	locations in	production	licence a	rea WA-5-L*
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Location	Eastings (m E)	Northings (m N)
TPA Manifold	383 732	7 814 446
TPA-01	383 755	7 814 432
TPA-02	383 719	7 814 423
TPA-03	383 709	7 814 461
GSA Tie-In Skid	382 956	7 817 504
GDA Manifold	382 177	7 820 562
GDA-01	382 154	7 820 577
GDA-02	382 190	7 820 586
SSIV Assembly	387 679	7 826 703

^{*} approximate to within a few metres

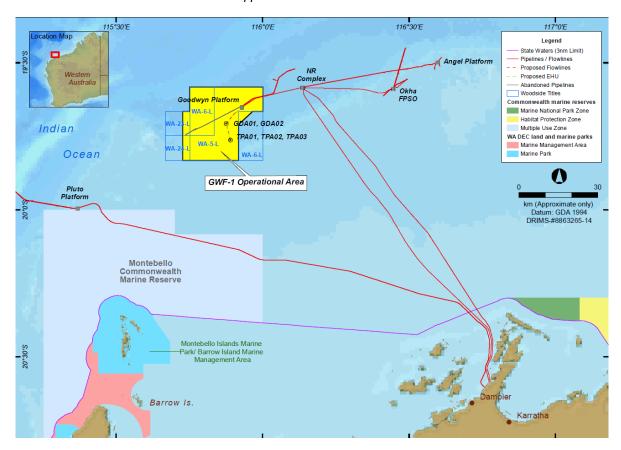


Figure 2-1: Figure showing The GWF-1 subsea installation and commissioning operational area

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3. DESCRIPTION OF THE ENVIRONMENT

3.1 Physical Environment

The GWF-1 operational area is located in the NWS province of the North-West Marine Region (NWMR) within Commonwealth waters.

Broad-scale surveys within the area conducted by Woodside have confirmed that the seabed is flat and featureless. Furthermore, geophysical surveys carried out for a proposed pipeline route from the Tidepole Manifold to the GWA facility in 2011 confirmed this area of seabed as homogenous and featureless, similar to the wider-scale NWS area (as recorded from side scan sonar). Seabed sediment sampling for the GWF-1 Project (RPS 2011) revealed soft sediment composition typical of the NWS comprising coarse sand, gravel and silt, low metal contamination, low nutrient concentrations.

3.2 Biological Environment

Studies have revealed that the infauna associated with soft unconsolidated sediment habitat in the area of the NWS as widespread and homogenous along the continental shelf and upper slopes (Rainer 1991; Bowman Bishaw Gorham, 2000; LeProvost, Dames & Moore, 2000; Woodside, 2004; Sinclair Knight Merz, 2006; Brewer *et al.* 2007; RPS 2011). Sampled infauna, collected along the pipeline route, comprised a suite of typical phyla dominated by burrowing polychate worms (Phylum Annelida) and crustaceans (Phylum Crustacea) (RPS 2011). Epifauna of the offshore, deeper region is typically sparse, patchy and associated with areas of hard substrate.

Offshore seabed surveys across the NWS detected a general reduction in epibenthic coverage with increasing depth with large epifauna (greater than 25 cm) rare beyond the 100 m depth contour (Fulton et al. 2006). With consideration of the depth, lack of hard substrate, reduced light and nutrient loading the soft sediment communities of the GWF-1 operational area are considered of relatively low environmental sensitivity and typical of this area of the NWS.

A search using the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) database (Protected Matters Search Tool) (SEWPaC 2012) was carried out encompassing the GWF-1 subsea installation operational area. The search identified a total of 68 listed marine species that may occur within, or traverse the area, including eight threatened marine species and 15 migratory species. Of the listed species 20 were cetaceans, including two 'threatened' and seven migratory species. The endangered pygmy blue whale and the vulnerable humpback whale are two whale species that seasonally migrate through the NWS between northern breeding grounds and southern feeding grounds. The other five migratory species and 17 other cetacean species are likely to occur at low densities in the region throughout the year.

Whales

The humpback whale (*Megaptera novaeangliae*) is the most commonly sighted whale in north Western Australian waters. The species has been observed to complete their seasonal northern migration in the Camden Sound area of the west Kimberley (Jenner *et al.* 2001), after feeding in Antarctic waters during the summer months (Bannister and Hedley 2001).

3.3 Socio-economic Environment

A number of Commonwealth (beyond 200 m isobath) and State (within 200 m isobath) managed fisheries occur in the region. The GWF-1 operational area is situated within State managed fisheries areas, however, none have significant catches beyond the 50 m isobath, with the exception of the North West Slope Trawl Fishery.

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State-regulated fishing activity within the GWF-1 operational area is most likely to be associated with the North Coast Demersal Scalefish Fishery. The fishery consists of several management units targeting a range of species using several gear types (trawl, trap and line). The Pilbara Trawl Fishery lands the largest component of the catch and operates in waters between 50 and 200 m water depth (DoF, 2011). The Pilbara Trawl Fishery is a high intensity fishery divided into two zones (DoF, 2010) and the GWF-1 subsea installation operational area is located in the trap fishing area situated between zones 1 and 2 (zones that permit trap and trawl fishing).

The GWF-1 operational area is shown to be outside the main shipping routes and the fairways. Whilst the fairways are not mandatory, Australian Maritime Safety Authority (AMSA) strongly recommends commercial vessels remain within the fairway when transiting the region.

3.4 Marine Conservation Reserves

The Western Australian State government is working to establish a comprehensive, adequate and representative network of marine protected areas (MPAs) in the state waters of North Western Australia. The network includes a number of existing State and Commonwealth MPAs and a number of proposed State MPAs that contain environmental assets of high value or sensitivity, from a regional, State or national perspective. These values and sensitivities include habitats or species that are particularly vulnerable or that provide valuable ecological services such as coral reefs, mangroves, seagrass meadows and macroalgae.

There are four State MPAs, four gazetted Commonwealth MPAs and the Ningaloo Coast World Heritage Area (WHA) within the region. The operational area is 40 km from the Montebello Commonwealth Marine Reserve and approximately 75 km from the jointly managed Montebello Islands Marine Park / Barrow Island Marine Management Area (West Australian waters). The GWF-1 subsea installation operational area is also approximately 105 km away from the Dampier Archipelago Marine Park and 125 km away from the Dampier Commonwealth Marine Reserve

4. MAJOR ENVIRONMENTAL HAZARDS AND CONTROLS

Woodside undertook an environmental risk assessment to understand the potential environmental risks associated with GWF-1 subsea installation to ensure they are reduced to As Low As Reasonably Practicable (ALARP) and will be of an acceptable level using a method consistent with Woodside standards.

The key environmental hazards and control measures to be applied to the GWF-1 Subsea Installation Program activities are shown in **Appendix A**. These are consistent with Woodside corporate and project-specific objectives, standards and criteria. All control measures associated with the hazards will be used to reduce environmental risk to ALARP and will be of an acceptable level.

5. MANAGEMENT APPROACH

The GWF-1 subsea installation and commissioning activities will be managed in compliance with the EP accepted by NOPSEMA under the Environment Regulations, other relevant environmental legislation and Woodside's Management System (e.g. Woodside Environment Policy).

The objective of the EP is to ensure that potential adverse impacts on the environment associated with the GWF-1 subsea installation and commissioning activities during both routine and non-routine operations, are identified, reduced to ALARP and will be of an acceptable level.

The EP details specific objectives and standards for each environmental aspect that was identified and assessed in the Environmental Risk Assessment (Section 5 of the EP). For each environmental aspect the range of controls to be implemented (consistent with the standards) to achieve the performance objectives are detailed. The EP then establishes the specific measurement criteria that will be used to demonstrate that the performance objectives and standards have been achieved.

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The implementation strategy detailed in the EP identifies the roles/responsibilities and training/competency requirements for all personnel (Woodside and its contractors) in relation to implementing controls, managing non-compliance, emergency response and meeting monitoring, auditing and reporting requirements during the activities. The EP details the types of monitoring and auditing that will be undertaken and the reporting requirements for environmental incidents and reporting on overall compliance of the activities with the EP.

6. CONSULTATION

Woodside conducted a stakeholder assessment for the proposed activity to identify relevant and interested stakeholders based on the project location, proposed activities and timing.

A consultation fact sheet was sent electronically to all identified stakeholders prior to lodgement of the EP with NOPSEMA for assessment and acceptance. This advice was supported by engagement with potentially affected stakeholders.

Woodside received feedback on the proposed activity from a range of stakeholders, including government agencies, recreational fishing organisations and conservation groups. Where required, Woodside has implemented or adjusted controls and mitigation measures in response to stakeholder feedback.

Woodside will continue to accept feedback from stakeholders during the subsea installation program.

7. CONTACT DETAILS

For further information about this activity, please contact:

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APPENDIX A: GWF-1 Subsea Installation and Commissioning Plan - Performance Objectives, Standards and Measurement Criteria

Source of Risk (Hazard)	Potential Environmental Impact	Control / Mitigation Measures		
Planned (Routine and Non R	Planned (Routine and Non Routine) Activities			
Interference with/ exclusion of commercial fishing and shipping activities	Interference with/ exclusion of fishing/charter boat operations and shipping activities	The Australian maritime Safety Authority and the Australian Hydrographic Office is notified of the GWF-1 subsea installation and commissioning program.		
Generation of noise from PIV and support vessel operation	Short-term localised disturbance to marine fauna such as alteration of behaviours and localised displacement	The interaction of the support vessels with cetaceans will be consistent with Part 8 of the Environment Protection and Biodiversity Conservation Regulations 2000.		
Generation of noise from pile driving activities	Short-term localised disturbance to marine fauna such as alteration of behaviours and localised displacement	Compliance with Woodside procedure to manage disturbance to relevant marine fauna will be implemented as outlined below: • Soft start on initial pile hammering, • Pile driving activities are only conducted during daylight hours.		
Disturbance to seabed and benthic habitat from planed subsea activities	Localised and short term seabed sediment disturbance i	An as-found (prior to installation) and as-left (following installation) ROV survey will be conducted prior to equipment being laid on the seabed.		

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Transport/introduction of invasive marine species from transfer of ballast water	Introduction and establishment of invasive marine species from ballast water	Adherence to the Australian Ballast Water Management Requirements Version 5 (DAFF, 2011): As a minimum all vessels mobilised from outside of Australian waters must undertake ballast water exchange > 50 nm from land and > 200 m water depth. Ballast water exchange records must be maintained. Any alternative methods for ballast water management are approved by DAFF Biosecurity in writing before the event.
Transport of biofouling on vessel hulls, internal niches and in-water equipment	Introduction and establishment of invasive marine species from biofouling	Compliance with to the Woodside Invasive Marine Species Management Plan (IMSMP). The Department of Fisheries is notified within 24 hours of any known or suspected introduced marinespecies detected in Western Australian State waters, as a result of following Woodside IMS procedures.
Atmospheric emissions from fuel and waste combustion on vessels	Contribution to global greenhouse gas emissions and consumption of non-renewable natural resources	Compliance with MARPOL 73/78 Annex VI - as applied in Australia under Commonwealth Protection of the. Sea (Prevention of Pollution from Ships) Act 1983 Regulations for the Prevention of Air Pollution from Ships Marine Orders – Part 97 (Part IIID Marine Pollution Prevention – Air Pollution).
Discharge of bilge water, sewage, grey water, and putrescible wastes	Localised eutrophication of the water column; and localised adverse effect to marine biota.	Sewage, Grey water and Putrescible Waste: Compliance with MARPOL 73/78 - as applied in Australia under Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983); AMSA Marine Orders - Part 96: Marine Pollution Prevention – Sewage, - as required by vessel class. Bilge Water:
		Compliance with MARPOL 73/78 - as applied in Australia under Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983); AMSA Marine Orders - Part 91 Marine Pollution Prevention –Oil, as required by vessel class.

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Discharge of preservation and pre-commissioning fluids to the marine environment.	Localised and short term reduction in water quality, localised and temporary impacts to epifauna, infauna and plankton populations.	Woodside's environmental chemical selection, assessment and approval procedure will be applied.
Disturbance and localised relocation of drill cuttings from beneath the GWA facility	Localised biological and ecological impacts to deepwater benthic communities.	The dredging pump unit and outflow point will be located on or directed towards the existing cuttings pile.
UNPLANNED ACTIVITIES (ACCIDENTS OR INCIDENTS)	
Collision between project vessels and marine fauna	Injury or fatality to protected marine fauna	Project vessels will comply with the EPBC Regulations 2000 Part 8 (Regulation 8.05).
Accidental loss of general or hazardous wastes (excludes sewage, grey water, putrescible waste and bilge water) to the marine environment	Pollution and contamination of the environment and secondary impacts of marine fauna (e.g. Ingestion, entanglement)	Compliance with MARPOL 73/78 Annex V - as applied in Australia under Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983); AMSA Marine Orders - Part 95 Marine Pollution Prevention – Garbage.
Accidental loss of equipment and materials to the marine environment	Localised and short term damage of the benthic subsea habitats in the immediate location.	Lost subsea/ marine equipment and materials lost to the marine environment are recovered where practicable and safe to do so. Personnel will be educated on the dropped object prevention program during safety meetings and/ or the relevant induction.
Minor spills to the environment	Localised and of an extremely short duration	Compliance with MARPOL 73/78 as applied in Australia under the Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983 - Part IIIB: and Marine Orders - Part 91: Marine Pollution Prevention – Oil), where required; • Project vessels hold a valid IOPP Certificate, as required by vessel class; • Current Shipboard Oil Pollution Emergency Plan (SOPEP) in place.

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		Any hydrocarbon or chemical storage on vessel decks must be designed and maintained to have at least one barrier (i.e. form of bunding) to contain and prevent deck spills entering the marine environment. This can include containment lips on deck (primary bunding) and/or secondary containment measures (bunding, containment pallet, transport packs, absorbent pad barriers) in place.
Loss of containment subsea from a dropped object on non-live infrastructure	Localised and short term reduction in water quality, and potential toxicity effects to benthos and plankton	Compliance with Woodside's Environment Procedure: Offshore Chemical Selection and Assessment.
		Project vessels compliant with Marine Orders Part 30: Prevention of Collisions (Issue 8) and Marine Orders Part 21: Safety of navigation and emergency procedures, Issue 8:
	Potential for impacts to openwater environment with a reduction in water quality and marine fauna, fish and sensitive habitats	 Use of standard maritime safety procedures (including radio contact, display of navigational beacons and lights).
Marine diesel spill due to collision with another vessel (project or non-		Compliance with MARPOL 73/78 as applied in Australia under the Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983 - Part IIIB: and Marine Orders - Part 91: Marine Pollution Prevention – Oil), –as applicable to vessel class.
project)		Implementation of the GWF-1 Subsea installation and commissioning activities First Strike Action Plan and SOPEP if a hydrocarbon spill has occurred.
		Vessels operating under limited manoeuvrability do not enter the shipping fairway Implementation of the GWF-1 Subsea installation and commissioning activities First Strike Action Plan and SOPEP if a hydrocarbon spill has occurred.
Marine diesel spill (8 m³) with hydrocarbon release during bunkering operations	Potential for impacts to openwater environment with a reduction in water quality, benthic communities of the submerged shoals (Rankin Bank), hydrocarbon exposure of transiting megafauna),	MARPOL 73/78 as applied in Australia under the Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983 - Part IIIB: and Marine Orders - Part 91: Marine Pollution Prevention – Oil).

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Hydrocarbon release caused by loss of subsea containment

Potential for impacts to the offshore, openwater environment with a reduction in water quality, benthic communities of the submerged shoals (Rankin Bank), hydrocarbon exposure of transiting megafauna

Compliance with procedures are in place and implemented to reduce potential dropped objects over live hydrocarbon infrastructure.

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