



Unicorn-1 Exploration Well Environment Plan: Public Summary November 2006

This summary of the Unicorn-1 EP has been submitted to comply with Regulation 11(7)(8) of the Petroleum (Submerged Lands) (Management of Environment) [P(SL)(MoE)] Regulations 1999.

Introduction

Apache Energy Limited (Apache) proposes to drill a deviated exploration well, Unicorn-1, in Commonwealth waters off the Western Australian coast in Exploration Permit WA-209-P. Unicorn-1 is located 55 km to the northwest of Dampier Archipelago (Figure 1).

Apache submitted a generic Environment Plan (EP) to the Department of Industry and Resources (DoIR) for its drilling program on the North West Shelf (NWS) in state and Commonwealth waters, which was approved in late June 2005. All environmental approvals for drilling are consequently sought by preparing a bridging document that links to the generic EP, providing specific details about the proposed well, in accordance with the Petroleum (Submerged Lands) (Management of Environment) (PSLMOE) Regulations 1999.

Project Description

The proposed Unicorn-1 drill site is located at 20° 01' 37.72" S and 116° 20' 32.31"E (GDA 94, Zone 50) in a water depth of 54 m.

Drilling from the Ensco 106 jack-up drill rig will involve installing surface casing and cementing this in place, install blow-out preventers (BOPs) and test, followed by installing intermediate casing and cementing into place. Only water-based muds (WBMs) will be used during drilling. The well will be drilled to a total depth (TD) of 3,967 m. Production testing may occur depending on intersecting hydrocarbons and vertical seismic profiling may also be undertaken. On the completion of drilling, Unicorn-1 will be plugged and abandoned. The drill rig will then be jacked down and towed away. All well activities will be undertaken in accordance with the Commonwealth *Petroleum (Submerged Lands) Act 1967* and the PSLMOE Regulations 1999.

Receiving Environment

Physical Environment

The NWS lies in the arid tropics region of Australia, which experiences high summer temperatures and periodic cyclones (with associated rainfall). Rainfall is generally low, with evaporation exceeding rainfall. Mean ocean temperatures range from a minimum of 11°C in winter to a maximum of 37°C in summer. Shelf waters are usually thermally stratified at a depth of about 20 m.

Wind patterns are monsoonal with a marked seasonal pattern. From October to March, the prevailing non-storm winds are from the south-west, west and north-west at an average speed of less than 10 knots. From June to August, winds are generally lighter and more variable in direction than in spring and summer. Non-storm winds prevail from north-east through to south-east at average speeds of 5-6 knots.

Transitional wind periods, during which either pattern may predominate, can be experienced in April, May and September each year.

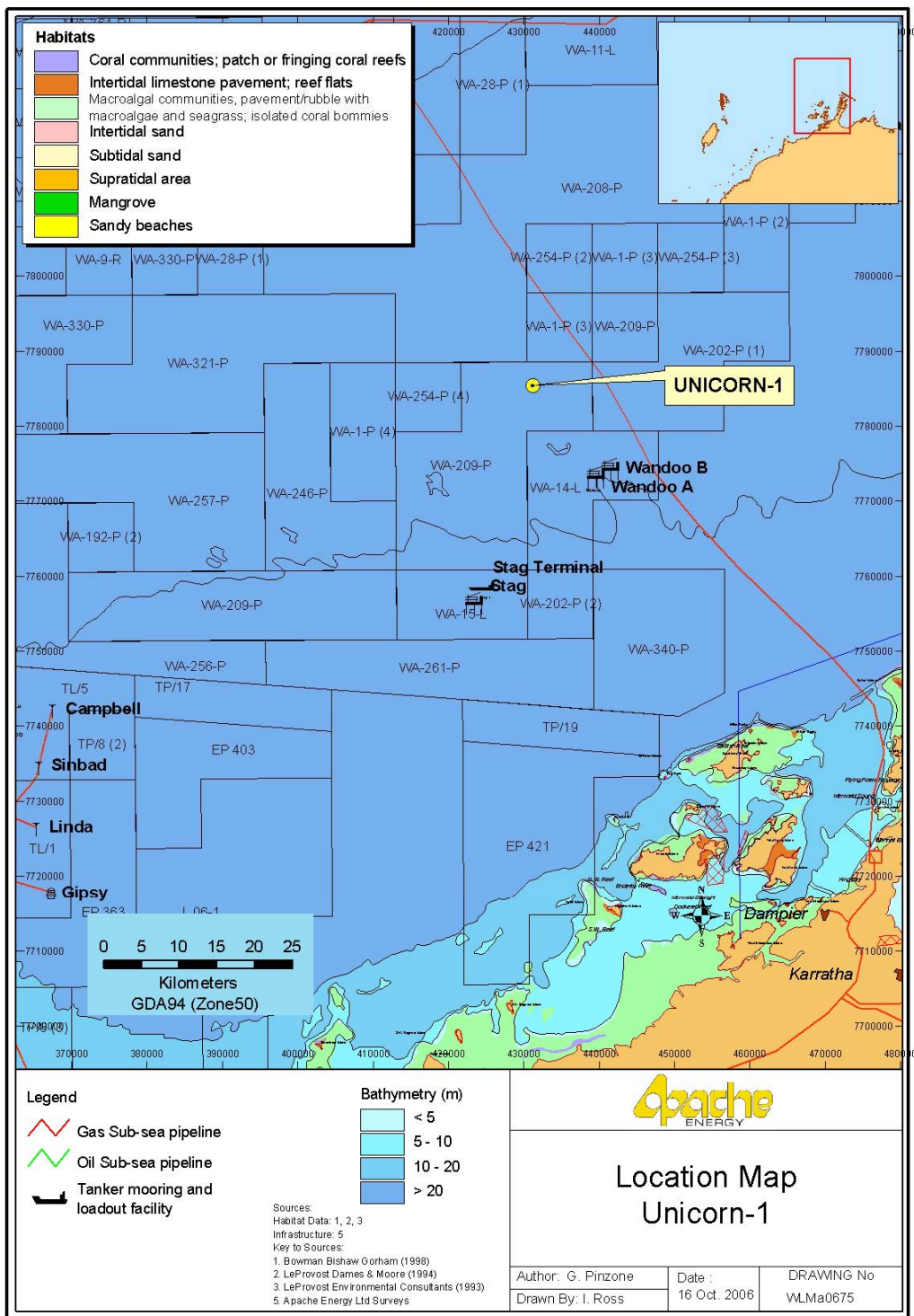


Figure 1 Location of the proposed Unicorn-1 drill site

The dominant component of the NWS is the Rowley Shelf, comprising extensive cemented calcareous limestone sediments, forming a shallow, gently inclining seabed extending from the coast to 40 km offshore to a water depth of 20 m. Unicorn-1, at 54 m water depth, is located on the mid-continental shelf region (30-100 m water depth), which is characterised by a thick sequence of carbonate rock that is overlain by thin layers of unconsolidated fine to medium grained, carbonate sediments.

Biological Environment

Diverse assemblages of benthic fauna are likely to exist at the site, especially if unconsolidated sediments are present. Mobile burrowing species that may be present include crustaceans (crabs and shrimps), worms, sea stars, sea urchins and other small animals. Spatial and seasonal distribution of such species depends on factors such as substrate composition, season, water depth and temperature.

The demersal habitat of the NWS hosts a diverse assemblage of fish, many of which are commercially exploited by trawl and trap fisheries, for example the genera *Lethrinus* (emperor) and *Lutjanus* (snapper). Pelagic fish in this area include tuna, mackerel, herring, pilchard and sardine. The inshore habitats in this region are not considered to be significant nursery grounds for commercially important deeper-water fish species.

Whale sharks (*Rhincodon typus*) are oceanic and cosmopolitan in their distribution; however, they aggregate in and near the waters of the Ningaloo Marine Park during autumn, around the Exmouth region. They are occasionally observed from Apache's offshore oil and gas facilities on the NWS (such as the Stag platform, 30 km southeast of the proposed Unicorn-1 well site).

Four species of marine turtle nest on sandy shore sites of the Dampier Archipelago, Montebello Islands, Lowendal Islands, Barrow Island, and other coastal islands in the Exmouth region. These are the green turtle (*Chelonia mydas*), flatback turtle (*Natator depressus*), hawksbill turtle (*Eretmochelys imbricata*), and the loggerhead turtle (*Caretta caretta*). All four species are on the National List of Threatened Species. The leatherback turtle (*Dermochelys coriacea*) may also visit the open waters of the shelf. The loggerhead, flatback and leatherback turtles are known to feed on mid-water plankton and benthic animals, and can forage in mid-shelf water depths, so may occur around the Unicorn-1 location.

The nationally threatened dugong (*Dugong dugong*) occurs across the tropical coastal waters of Australia from Shark Bay to Queensland. They are herbivorous and are generally associated with seagrass beds, upon which they feed. Dugongs are commonly found in shallow sheltered areas (less than 5 m deep), often near islands or large bays. They are not likely to be present around the proposed Unicorn-1 location.

Dolphins are relatively common in the region. Species known to occur in the region are the bottlenose dolphin (*Tursiops truncatus*), common dolphin (*Delphinus delphis*), Indo-pacific humpback dolphins (*Sousa chinensis*) and the striped dolphin (*Stenella coeruleoalba*). A number of whale species, including the short-finned pilot whale (*Globicephala macrorhynchus*), false killer whale (*Pseudorca crassidens*), tropical byrdes whale (*Balaenoptera edeni*), southern minke whale (*Balaenoptera acutorostrata*) and humpback whale (*Megaptera novaeangliae*), also occur in the region, the most commonly sighted of these being the humpback whale. This species migrates between the Antarctic waters and the Kimberly region of Western Australia. The peak of their northerly migration between the Exmouth Gulf and the Dampier

Archipelago occurs around late July to early August, while the southerly return migration peaks around late August – early September. The Unicorn-1 well is located in the southern migration corridor; however, the drilling is scheduled to occur outside of the migration period.

Eighteen species of seabird have been recorded over the NWS waters. These include petrels, shearwaters, tropicbirds, frigatebirds, boobies and terns, and silver gulls. Of these, eight species occur year round and the remaining 10 are seasonal visitors.

Socio-Economic Environment

The population centres adjacent to the region in which the drilling program is located are the Port of Dampier and Port Hedland and the smaller coastal and fishing towns of Onslow and Point Samson. Dampier, Karratha and Port Hedland are the main service and population centres for the region. Local people seeking aquatic recreation such as boating, diving and fishing use the coast and islands of the Pilbara. The open waters of the Commonwealth permit areas do not support significant recreational or tourism activity.

Commercial fisheries are active along the Pilbara coast; however fishing effort in the open Commonwealth waters is low, with operators favouring the inshore areas. Of the 10 or so commercial fisheries operating in the region, it is likely that only the Pilbara Trap Managed Fishery and Pilbara Trawl Interim Managed Fishery operate around the proposed Unicorn-1 location.

No marine or terrestrial conservation areas are located in the vicinity of the proposed drill site. Table 1 summarises the biological and socio-economic features of the NWS.

Major Environmental Hazards and Controls

The potential environmental impacts resulting from offshore drilling on the NWS are outlined in detail in the Generic Drilling Program EP. Table 2 summarises the potential impacts of the Unicorn-1 drilling program.

Table 1. NWS biological and human activity seasons

SPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Dugong breeding	breeding								breeding			
Hawksbill turtle nesting												
Flatback turtle nesting												
Green turtle nesting												
Loggerhead turtle nesting												
Coral spawning												
Whale migration												
Whalesharks												
Algae	growing				Shedding fronds				growing			
Seabird nesting												
Prawn trawling												
Tourism												
Unicorn-1												

Key

	Peak activity, presence reliable and predictable
	Low level of abundance/activity/presence
	Activity not occurring within the area

Table 2. Summary of potential environmental impacts from offshore drilling on the NWS

Potential hazard (risk)	Potential environmental effect (consequence)	Risk ranking
Drill rig and vessel anchoring	Localised disturbance to seabed, such as shallow furrows, dependent on seabed type. Effects are temporary.	Negligible – seabed depressions rapidly filled by sand and detritus and recolonised.
Artificial lights from drill rig (must be kept on 24 hrs due to safety regulations)	Potential disorientation of fauna by lights at night, especially turtle hatchlings.	Negligible – wave direction and magnetic cues are primary influences on turtle hatchlings once they have left the beach. Unicorn-1 is distant from nesting beaches.
Impacts to marine species from noise generated by the drill rig and support vessels	Potential short-term physiological effects or disruption to behaviour patterns of cetaceans, birds, turtles, fish and other marine life.	Negligible – observations have shown whales resting and swimming in close proximity to operating rigs.
Drill cuttings and fluid discharges	Drilling activities and disposal of drill cuttings and fluids will produce suspended sediments in the water column increasing turbidity, will bury and smother infauna and epifauna and may lead to toxicity and bioaccumulation to marine organisms.	Acceptable – WBMs used rather than synthetic-based muds (SBM). Studies on NWS reveal few long-term impacts on benthic fauna from WBMs.
Sewage, putrescible and solid domestic wastes	Potential localised reduction in water quality - nutrient enrichment. Modification of feeding habits of local fauna.	Negligible – sewage treatment available on rig.
Waste oil, chemicals and oil-contaminated drainage water	Potential localised reduction in water quality.	Negligible – decks kept clean during operations, oily-water separator collects any spilled material.
Cooling water and atmospheric emissions	Potential localised reduction in water quality. Emissions of greenhouse gases. Potential localised reduction in air quality.	Negligible – discharged above water line to allow cooling and oxygenation.
Introduction of foreign marine organisms from drill rig and support vessels	Competition with local marine life and absence of natural predators can alter ecological balance of flora and fauna communities, favouring the introduced species and resulting in loss of flora and fauna diversity and abundance.	Negligible – no ballast required for jack-up drill rig.
Impacts to humpback whales from vertical seismic	VSP is a more benign activity than conventional seismic surveys. Potential short-lived impacts include disruption to navigation and	Negligible – VSP will occur for about 8 hrs. DoIR's <i>Guidelines on Minimising Acoustic Disturbance to</i>

profiling (VSP) noise	communication, with some research indicating no disruption from normal activities when seismic activity is occurring several kilometres away.	<i>Marine Fauna</i> (1997) will be implemented.
Oil or diesel spills	Severe damage of marine habitats (e.g., coral reefs, mangroves, beaches) and death or injury to marine life (e.g., birds, mammals).	Acceptable – oil spill modelling for Unicorn-1, indicates spills would be unlikely to reach land.

Environmental Management

Extensive environmental management guidelines are prepared for each Apache-drilled well. Apache management documents used to guide the implementation of well-specific environmental management procedures are listed below:

- Environmental Management Policy (April 2006).
- Contaminated Waste Management Procedure (VI-SA-ON-EN-000).
- Incident Reporting Procedure (AE-91-IF-002).
- Lighting Management Plan (EA-60-RI-153).
- OSCP Volume 1 – Operations (NWS) (AE-OO-EF-008).
- OSCP Volume 2 – Resource Atlas (NWS) (AE-OO-EF-008/2).
- Quarantine Procedure (AE-91-IQ-189).
- Refuelling Management Plan (DR-91-IG-001).
- Refuelling Operational Procedure Guide.
- Vermin Management Plan (EA-60-RI-131).
- Waste Management Plan (EA-60-RI-167).

Consultation

In preparing the Generic NWS Drilling Program EP, Apache consulted with numerous stakeholder representatives, including:

- DoIR
- Department of Environment (DoE)
- CALM (Marine branch)
- Fisheries WA
- Marine and Coastal Community Network
- Environment Protection Agency (EPA)
- Marine Parks Reserve Authority (MPRA)
- CALM (Environmental protection)
- WA Fishing industry Council

Further Details

For further information about the Unicorn-1 drilling program, please contact:

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