



Theo-1 Petroleum Exploration Well Public Summary

This summary of the Theo-1 Environment Plan has been developed to comply with the recently revised Regulation 11(7)(8) of the Petroleum (Submerged Lands) (Management of Environment) Regulations 1999.

Description and Location of Petroleum Activity

Apache proposes to drill Theo-1 as a vertical appraisal well, in permit area WA-155P(1) in Commonwealth waters, in March 2006 depending on weather conditions and rig availability. BHP Petroleum is normally the operator in WA-155P but has assigned the operatorship to Apache Energy Limited for the purpose of drilling Theo-1. Apache Energy Limited has contracted Tap Pty Ltd to manage day to day operations associated with drilling the well documented in Apache's Generic Environment Plan for North West Shelf.

The location of Theo-1 is 44 km from the mainland as shown in Figure 1. The water depth at the well site is 382m. The well will be drilled with water based mud using the Ocean Bounty semi-submersible drill rig. It is estimated that drilling Theo-1 will produce 96 m³ of cuttings, which will be discharged to the seabed. The rig will be towed from the Browse Basin to the Theo-1 location. Once on location, 8 anchors will be run to secure the rig to the seabed.

Description of the Receiving 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, peak average speeds of 15-25 knots, and maximum speeds of 30 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, peak average speeds of 10-15 knots, and maximum speeds of 20 knots. Transitional wind periods, during which either pattern may predominate, can be experienced in April, May and September each year.

At the water depth at which Theo-1 is located, the habitats common around the islands of the NWS (such as subtidal sediments, intertidal and subtidal reefs, macroalgal and seagrass beds, intertidal shoals and beaches, mangroves and mudflats) will not be encountered. Benthic infauna (animals that live on or in seabed sediments) 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 (ocean bottom) 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 (those living within the water column) in this area include tuna, mackerel, herring, pilchard and sardine, while game fish such as marlin and sailfish also occur. 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 do 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.

Four species of marine turtle (green turtle (*Chelonia mydas*), flatback turtle (*Natator depressus*), hawksbill turtle (*Eretmochelys imbricata*), loggerhead turtle (*Caretta caretta*) nest on sandy shore sites of the Dampier Archipelago, Montebello Islands, Lowendal Islands, Barrow Island, Airlie Island, Thevenard Island, other coastal islands and the Exmouth region. All four species are on the National List of Threatened Species. The leatherback turtle (*Dermochelys coriacia*) 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 NWS waters, so may occur around the Theo-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 the northerly migration occurs around June – July, while the southerly return migration peaks around September – October. Drilling of the Theo-1 well will occur outside of the humpback whale migration.

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.

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.

Environmental Management

Apache management documents used to guide the implementation of well-specific environmental management procedures are listed below:

- Environmental Management Policy (August 2004).
- Refuelling Management Plan (DR-91-IG-001).
- NWS Operations consolidated Cyclone Response Plan (AE-91-IF-010).
- 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 Operational Procedure Guide.
- Incident Reporting Procedure (AE-91-IF-002).

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

Notification letters are routinely sent to these stakeholders to inform them of upcoming drilling programs.

Further Details

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

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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						north			south			
Whalesharks												
Algae	growing				Shedding fronds				growing			
Seabird nesting												
Prawn trawling												
Tourism												
Theo-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.
Noise from the drill rig and support vessels	Potential 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 – WBM's mostly used over SBM's. Studies on NWS reveal few long-term impacts on benthic fauna, especially from WBM's.
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 rigs.

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 drill rig when on tow. Ballast water taken on board prior to drilling is discharged on location at end of drilling.
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 predicts negligible to very low probability of contact with waters of Ningaloo Marine Park.

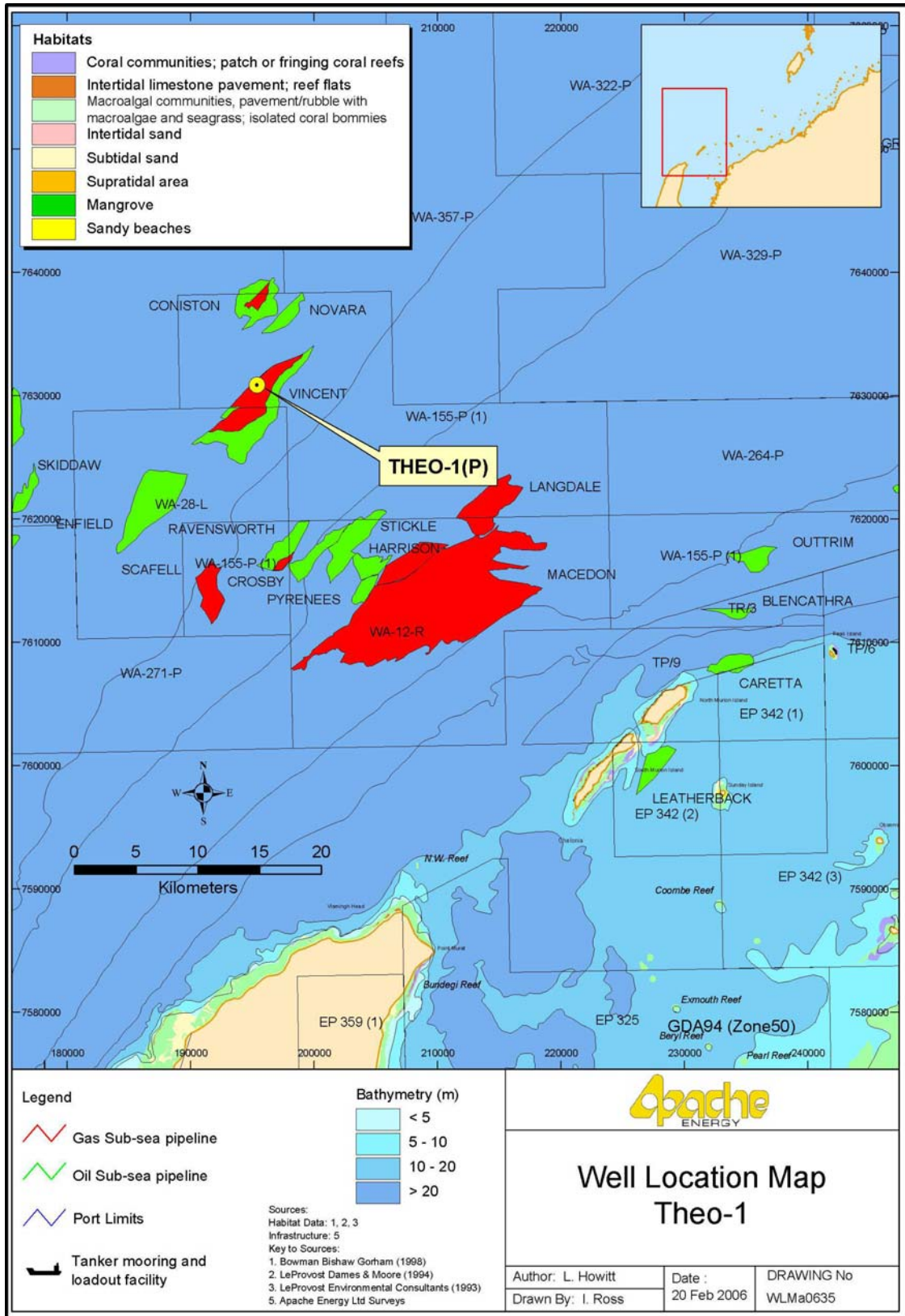


Figure 1 Location of the proposed Theo-1 well site