Australian Drilling Associates Pty Ltd

AUSTRALIAN DRILLING ASSOCIATES

Otway Basin West Triton Drilling Program

ENVIRONMENT PLAN

Prepared by
Coffey Natural Systems

coffey natural systems
SPECIALISTS IN PEOPLE AND PLACE

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1. INTRODUCTION

Australian Drilling Associates Pty Ltd (ADA) has convened a consortium of oil and gas operators for an offshore drilling program using the West Triton jack-up drilling rig. ADA is the designated proponent for the West Triton Drilling Program, which includes the specific drilling program that is the subject of this Environment Plan. This program involves drilling a well at one of two possible locations in Commonwealth waters of the Otway Basin in western Bass Strait. Beach Petroleum is the sole operator in this Otway Basin drilling program (to be referred to in this document as 'the drilling program').

A Schedule has been developed as a mechanism to assist the management of the Environment Plan (EP) approval process, where the operator has signed-off its responsibility for the drilling program. The Schedule sign-off is included in Appendix A.

1.1 Project Outline

1.1.1 Drilling Program

ADA proposes to undertake a drilling program in the Otway Basin of western Bass Strait in Commonwealth waters.

The West Triton jack-up drilling rig (Appendix B), a new rig constructed in Singapore, and having undertaken drilling programs elsewhere in Bass Strait, will be used to drill the well at one of two specified locations (Bernoulli or Fermat, see Figure 1.1). Once positioned on location, the West Triton jack-up drilling rig will establish its foundation by jacking its three independent lattice legs and footings. The West Triton is a Pacific Class 375 jack-up drilling rig with operating parameters for inclement weather. Drilling will occur 24 hours per day.

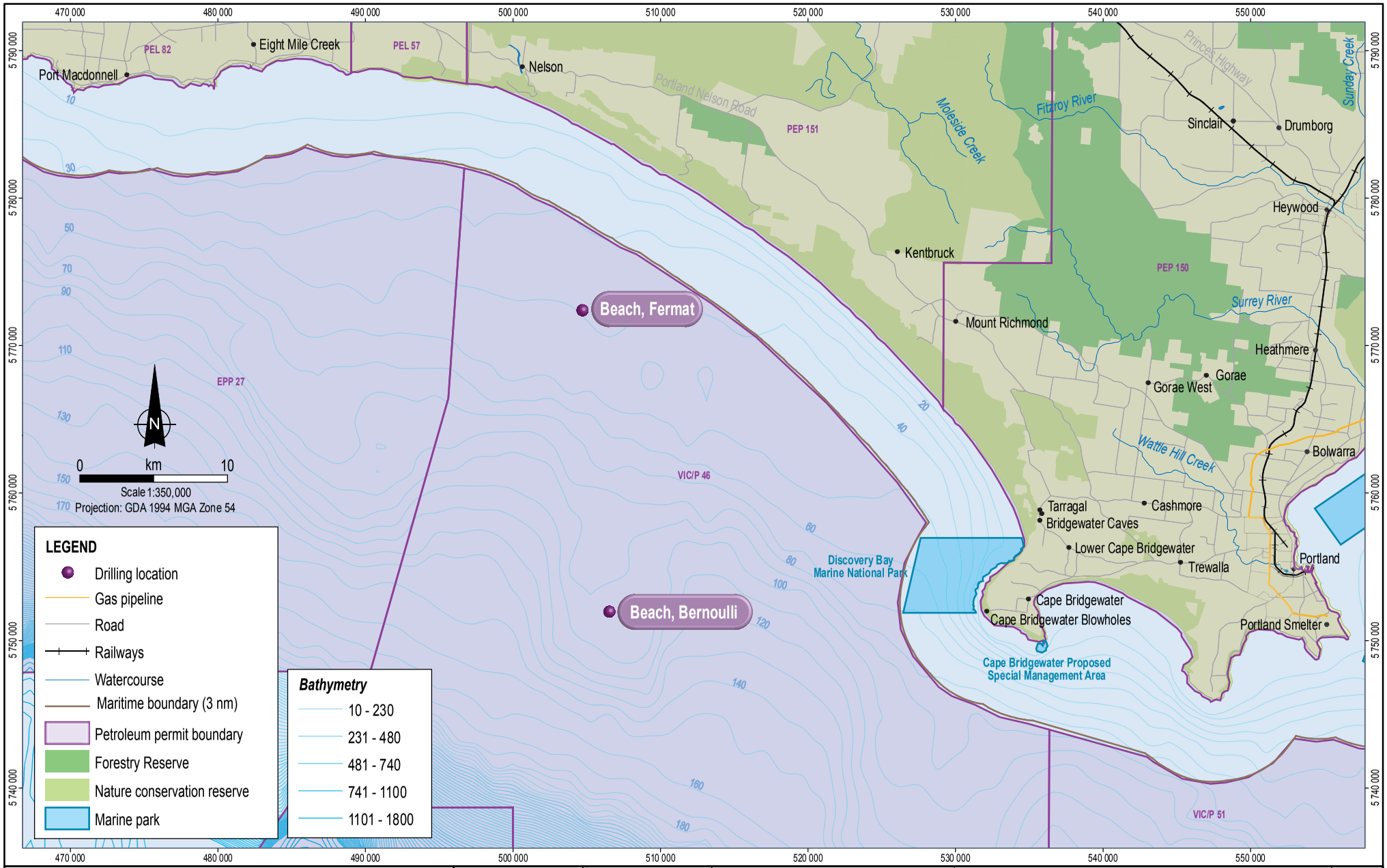
Two support vessels (Appendix C) will service the rig and there will be approximately 15 support vessel trips per month during the drilling program. Both vessels will return to port for refuelling. There will be helicopter support to the drill rig.

The well will be drilled using low toxicity water-based drilling muds (WBM). Cuttings will be separated from the WBM using industry standard equipment. Whole WBM will be predominantly discharged overboard at the completion of the well. The quantity of cuttings discharged will be approximately 485 m^3. The well will be drilled to a depth of approximately 3,800 m.

There may be well testing and flaring on the drilled well.

1.1.2 Project Location

The West Triton Drilling Program is located within permit area Vic/P46 of the Otway Basin in western Bass Strait within Commonwealth waters. Water depths in the project area range from approximately 40 m to 100 m. Coordinates of the potential well locations in the permit area are listed in Table 1.1 and shown in Figure 1.1.



Source:
Bathymetry from GeoScience Australia
Petroleum tenements and pipelines from DPI
Place names, roads, rail, drainage, reserves and parks from GEODATA TOPO 250K (optimum scale 1:250,000)

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Australian Drilling Associates
Environment Plan

West Triton Drilling Program - Otway Basin

Figure No: 1.1

Table 1.1 Well locations and permit areas

Location Name	Permit Area	Latitude	Longitude
Bernoulli	Vic/P46	38° 22' 17.84" E	141° 3' 55.996" S
Fermat	Vic/P46	38° 11' 43. 196" E	141° 3' 12.954" S

Projection: GDA94.

1.1.3 Drilling Program Timeframe

The Otway Basin drilling program is scheduled to commence in the fourth quarter of 2008 and will continue for approximately 1.5 months to drill the single well (only one of the two wells is to be drilled).

1.2 Project Proponent

1.2.1 Australian Drilling Associates Pty Ltd

ADA is an international well engineering and project management company, with offices in Melbourne and Perth.

The registered office for the proponent is:

Australian Drilling Associates Pty Ltd,
Level 5,
Rialto North Towers,
525 Collins St., Melbourne,
Victoria 3000.

Telephone Number: 03 8610 3000
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Contact Person: Paul Barrett.

Additional information regarding ADA can be found at the website:
www.australiandrilling.com.au

1.3 Purpose of the Environment Plan

This document is the Environment Plan (EP) for the proposed drilling program, developed in accordance with Commonwealth regulatory requirements, under the *Petroleum (Submerged Lands) (Management of the Environment) Regulations 1999*. This document will be submitted to the Victorian Department of Primary Industries (DPI) (the designated Authority) for approval.

This EP has been prepared to:

- Ensure that reasonably foreseeable environmental effects associated with the project are identified and that systems are in place to both protect the environment and manage environmental risk.
- Outline the environmental management measures that will apply to the drilling program.

- Examine the environmental hazards and consequences associated with the program, assess environmental risk levels and develop management measures to ensure risks are kept to as low as reasonably practicable.
- Detail the environmental standards that are applicable to the project, set out environmental performance objectives for the project and propose criteria for measuring performance against these objectives.
- Document this information:
  - For implementation by ADA employees and contractors.
  - For use by regulatory authorities in the environmental assessment and approval process.

1.3.1 Environment Plan Content

This EP covers activities associated with the drilling phase of the project. The EP addresses the following issues:

- Description of the proposal, including location of potential drilling program sites, timing and technical details of the vessel and equipment to be used.
- The legislative framework applicable to the proposed drilling program.
- The existing environment of the area, particularly any environmental or social sensitivity associated with the project area.
- The environmental risks associated with normal and abnormal (or emergency) operations.
- The environmental performance objectives, standards and criteria to measure such performance.
- ADA's Health, Safety and Environmental Policy and management objectives.
- The implementation strategy for the project, and specific operational controls to be implemented to achieve the environmental performance objectives.
- Environmental reporting requirements and consultation activities.

2. LEGISLATIVE FRAMEWORK

The proposed offshore drilling program is subject to Commonwealth and State legislation, industry procedures and guidelines and international treaties and obligations. Key environmental legislation and statutory approvals processes are discussed below.

2.1 Commonwealth Legislation

Commonwealth legislation that applies to the project includes:

- *Petroleum (Submerged Lands) Act 1967* ('the PSLA').
- Petroleum (Submerged Lands)(Management of Environment) Regulations 1999.
- *Environment Protection and Biodiversity Conservation Act 1999*.
- *Environmental Protection (Sea Dumping) Act 1981*.
- *Protection of the Sea (Prevention of Pollution from Ships) Act 1983*.
- *Native Title Act 1993*.
- *Historic Shipwrecks Act 1976*.
- *Navigation Act 1912*.
- *Quarantine Act 1908*.

2.1.1 Petroleum (Submerged Lands) (Management of Environment) Regulations 1999

Commonwealth legislation requires the approval of an EP prior to the commencement of the drilling program. Approval of this EP is required from the State agency (Designated Authority) responsible for administering this legislation in the project area on behalf of the Commonwealth Government. The project is located in Commonwealth waters administered by the Victorian Department of Primary Industries (DPI).

2.1.2 *Environment Protection and Biodiversity Conservation Act 1999*

Where a project displays the potential to significantly impact upon matters of national environmental significance, as defined under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Section 2.2.1), an assessment under the EPBC Act may be required. ADA referred the project to the Commonwealth Department of Department of the Environment, Water, Heritage and the Arts (DEWHA) (previously Department of Environment, Water, Heritage and the Arts) under the EPBC Act. On 16 January 2008, DEWHA determined that the project was not a controlled action.

2.2 Victorian Legislation

- *Environment Protection Act 1970*.
- *Pollution of Waters by Oil and Noxious Substances Act 1986*.

2.3 International Agreements and Conventions

International agreements and conventions that apply to the drilling program include:

- Agreement between the Government of Australia and the Government of Japan for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment (JAMBA).
- Agreement between the Government of Australia and the Government of the People's Republic of China for the Protection of Migratory Birds and their Environment (CAMBA).
- Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention).
- International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 (MARPOL 73/78).
- Protocol to International Convention on the Prevention of Marine Pollution by Dumping of Waste and Other Matter 1972 (London Dumping Convention).
- International Convention on Oil Pollution Preparedness, Response and Co-operation 1990.
- United Nations Convention on the Law of the Sea, 1982.
- The International Convention on the Control of Harmful Anti-Fouling Systems on Ships 2001 (AFS Convention) as from September 2008.

2.4 Codes of Practice and Guidelines

Industry codes of practice that apply to the drilling program include:

- Australian Petroleum Production and Exploration Association (APPEA) Code of Environmental Practice, 1996. APPEA have developed general industry guidelines as to those operating practices considered to represent good industry practice in the petroleum industry. These guidelines have no legislative force and are intended to provide industry guidance.

2.5 Environmental Policy Statement

ADA recognises its obligation to take all practicable steps to ensure that its operations and activities are conducted in an efficient and environmentally responsible manner.

In achieving this ADA will adopt responsible environmental practices based on relevant statutory obligations. ADA will ensure that it has appropriate policies, standards and procedures in place in support of environment management reporting.

ADA will encourage open communication with employees and contractors and support participation in all activities related to the improvement and fulfilment of all HSE issues. These commitments are consistent with ADA's HSE Policy (Appendix D). All drilling campaign personnel are responsible for adherence to ADA Health, Safety and Environment Policy.

3. STAKEHOLDER CONSULTATION

ADA's Health, Safety and Environmental (HSE) Policy states that it is committed to open communication regarding its activities.

The principal objectives of stakeholder consultation are to:

- Identify relevant stakeholders.
- Provide appropriate opportunities for involving and communicating with relevant stakeholders.
- Provide a process in which planning of the drilling program can take into account issues raised by stakeholders at the earliest possible stage.
- Provide a means for recording all initiatives in which consultation is undertaken, issues are raised and responses to these issues are provided to stakeholders.

ADA plan to advise stakeholders of the drilling program and respond to any feedback.

3.1 Relevant Stakeholders

A program of consultation has been established and will document the consultation undertaken with relevant stakeholders. Stakeholder consultation details to date are listed in Table 3.1. This commenced with ADA's geotechnical survey and has continued for the proposed drilling program with relevant Otway Basin commercial and recreational fishing stakeholders and government agencies. Ongoing contact with these groups will continue up to and during the drilling program. A schedule, map, well coordinates and ADA contact details will be provided.

The main concern is loss of fishing gear (lobster pots) during transit of the drill rig and service vessels. This has been addressed by ADA with the intended use of a scout boat and employment of a fishing liaison officer to maintain direct contact with those potentially affected.

Table 3.1 Stakeholder consultation

Stakeholder	Contact	Date	Matters Discussed
DPI	Terry McKinley Cynthia Crowe	1/6/07 meeting then ongoing.	EP requirements.
Border Protection Command	bpliaison@customs.gov.au	To be advised 2 weeks prior.	Security advice.
AFMA	Bronwen Jones	31/8/07, 4/9/07	Advice on locations and fisher groups contact.
AMSA	–	To be advised 2 weeks prior.	Contact with Rescue Co-ordination Centre (RCC).
Commonwealth Fisheries Assn	Peter Franklin	17/8/07	Advice on locations.
	Chris Melham	28/5/08	Update advice on drilling locations and timing.
Warrnambool DSE	Mandy Watson	7/8/07	Advice on locations, whale presence in Otway.
		12/6/08	Update advice on drilling locations and timing.

Table 3.1 Stakeholder consultation (cont'd)

Stakeholder	Contact	Date	Matters Discussed
Seafood Industries Vic (including Rock Lobster Committee)	Ross McGowan	17/8/07	Advice on locations.
		26/11/07	Status of consultation update.
		28/05/08	Update advice on drilling locations and timing. Rig and service vessel transit routes through lobster grounds.
Victorian Scallop Industry Asn.	Steve Melissakis	16/8/07	Advice on locations.
		28/11/07	Preliminary geotech coring activity request for safe clearance.
Portland DPI Fisheries	Charlie Cooper	15/8/07	Advice on locations.
Portland Professional Fishermen's Asn.	Steve Nathan	16/8/07	Advice on locations.
		28/05/08	Update advice on drilling locations and timing. Rig and service vessel transit routes through lobster grounds.
SA Rock Lobster Advisory Council	Roger Edwards	16/8/07	Advice on locations.
South East Trawl Fishing Industry Association	Gail Richie	16/8/07	Advice on locations.
South East Fishing Industry Association (SEFA)	Charlie Farqhar	20/8/07	Advice on locations.
VRFish	Christopher Collins	16/8/07	Advice on locations.
Deakin University blue whale group	Peter Gill	21/8/07	Advice on locations.
		12/6/08	Update advice on drilling locations and timing.
Port MacDonnell Fishermen with Victorian access	No specific contact person: 17 individual fishermen notified by mailout	27/11/07	Preliminary geotech coring activity request for safe clearance.
		28/5/08	Update advice on drilling locations and timing.

3.2 Stakeholder Consultation Program

The stakeholder consultation process has utilised a number of mechanisms to communicate with stakeholders, both formal and informal. Consultation and information dissemination will continue to be undertaken through a range of media including:

- Meetings with regulators.
- Correspondence with key stakeholders.
- Provision of detailed project maps.
- Communication of schedule to fishing operators.

Further consultation with the above groups and others, including Australian Fisheries Management Authority (AFMA) and Australian Maritime Safety Authority (AMSA) will occur as necessary up to and during the time of the program.

A fisheries liaison consultant has been engaged to ensure clear communication and information is provided to all fishing operators who may be affected by the drilling program.

When response is received from the mail-out to local fishing groups a formal meting will be held with these groups (coordinated by ADA's fishing liaison coordinator). After the meeting a brochure will be distributed at suitable locations, e.g., ports and ramps, to further advise commercial and recreational fishermen of the drilling program.

4. DESCRIPTION OF THE ENVIRONMENT

4.1 Physical Environment

4.1.1 Climate and Meteorology

Table 4.1 outlines the climate and meteorology of the drilling program area based on recordings from nearby weather stations (Cape Nelson and Portland).

Table 4.1 Climate in the vicinity of the drilling program

Parameter	Cape Nelson (Vic)	Portland (Vic)
Climate classification	No dry season, mild summer	
Average annual rainfall (mm)	784.8	835.8
Mean number of rain days	189	182
Mean daily maximum temperature (°C)	17.0	17.8
Mean daily minimum temperature (°C)	11.1	9.7
Mean relative humidity (9 am) (%)	80	77
Mean relative humidity (3 pm) (%)	76	66
Mean wind speed (9 am) (km/hr)	24.3	-
Mean wind speed (3 pm) (km/hr)	25.5	-

Source: Bureau of Meteorology, 2006.
Bass Strait is located on the northern edge of the westerly wind belt known as the Roaring Forties. Wind speeds in the project region typically range from 10 to 30 km/hr, with maximum gusts reaching 100 km/hr. During winter, wind direction is predominantly westerly and northwesterly, especially when stronger winds occur. During summer, winds from the east become common.

4.1.2 Bathymetry

The seabed is likely to consist of calcarenite, limestone, sandstone, marl and granite, with areas of sand of varying grain size. Benthic substrate can be expected to consist of sand, silt, gravel, calcareous gravel and calcareous ooze. Deep rocky reefs are likely to occur in the shallower waters to the north of the survey area.

The survey area is located in water depths ranging from 40 to 100 m (See Figure 1.1).

4.1.3 Oceanography

Bonney Upwelling

The survey area is located in a region known as the Bonney Coast (Robe to Portland). The 'Bonney upwelling' occurs throughout the summer period (November to March) (Butler et al., 2002) and is a result of southeast winds generating water movements to the surface away from the coast. This water is replaced by colder water drawn from greater depths off the continental shelf that is generally nutrient rich and plays an important role in the generation of blooms of plankton including krill (Woodside, 2003).

Waves

Bass Strait is a high-energy environment exposed to frequent storms and significant wave heights. The highest wave conditions are generally associated with strong west to southwest

winds caused by the eastward passage of low-pressure systems from the Great Australian Bight and across Bass Strait.

4.2 Biological Environment

Bass Strait is an area of high faunal diversity and species endemicity, for several reasons:

- It has been isolated in geological time and by climatic barriers, with a history of variable exposure and immersion during sea-level changes during the last few million years.
- It is influenced by water masses from the west, northeast and south.
- It has sediment complexity and a high biogenic component.

Bass Strait continental shelf benthic fauna shows high species diversity (Poore et al., 1985; Parry et al. 1990). The region also contains a number of species of high commercial and conservation value.

4.2.1 Benthic Invertebrates

Surveys of benthic invertebrates in Bass Strait (Poore et al., 1985; Wilson and Poore, 1987, Parry et al., 1990) have shown:

- Crustaceans and polychaetes dominate the infaunal communities, many of which are unknown species.
- The high diversity of a wide range of invertebrate groups has been a recurrent observation of all surveys in Bass Strait and diversity is high compared with equivalent areas of the northern hemisphere.
- Many species are widely distributed across the Strait, suggesting heterogeneous sediments and many microhabitats.

4.2.2 Fish and Shellfish

It is estimated that there are over 500 species of fish found in the waters of Bass Strait, including a number of species of importance to commercial and recreational fisheries (LCC, 1993).

Pipefishes, seahorses and seadragons are associated with kelp forests in sheltered to moderately exposed reef areas at a range of depths from 0 to 50 m depending on the species (Edgar, 1997), but usually at depths between 5 and 25 m. The well will be drilled in water depths ranging from approximately 40 to 100 m. Weedy seadragons, in particular, are endemic to southern Australian waters (Parks Victoria, undated), but are unlikely to occur where there are no hard substrates to support kelp beds.

Species of shellfish of commercial and recreational importance include abalone, scallops, rock lobsters, prawns and squid, of which rock lobsters, scallops, prawns and squid can be fished commercially in the area of the drilling program. Abalone (*Haliotis rubra*) and rock lobster (*Jasus novaehollandiae*) occur mainly on rocky substrates, which are extensive on the coasts of Victoria, Tasmania and the Bass Strait islands. Scallops (*Pecten fumatus*) occur on sandy substrates in a number of fishing grounds throughout Bass Strait.

A virus is currently affecting the Victorian abalone industry. The coastal waters off Port Fairy were declared a Control Area under the *Victorian Livestock Disease Control Act 1994* in June 2006, restricting fishing and diving activities (DPI, 2007). Discovery Bay Marine National Park is under threat from the virus, with virus reported in abalone found on reefs to the east of the park (VADA, 2007).

4.2.3 Seabirds

The Victorian coast and neighbouring islands provide feeding, breeding and nesting habitats for many important coastal and migratory bird species. Among the frequent visitors to these coastal regions are a number of threatened species, including albatross, skua and petrel species. There are 13 species of albatross listed, of which 12 are migratory species whose status is threatened (three species are endangered and nine are considered vulnerable). There are four threatened species of petrel (one species is endangered and three are vulnerable) and one threatened species of skua listed.

There are no islands or seabird colonies in the immediate vicinity of the project area. However, there is the propensity for coastal migratory species to fly over the area since many of the birds undertake large annual migrations across the south Pacific. Such species are considered highly unlikely to be impacted by the drilling program due to the low impact nature of the program-related activities, relatively small spatial and temporal footprint of the activity and lack of roosting sites.

4.2.4 Marine Mammals

The Department of Environment, Water, Heritage and the Arts (DEWHA) EPBC Online Database (DEWHA, 2007a) lists nine cetacean species under the migratory provisions of the EPBC Act that are likely to occur in the project area. Three of these species are threatened (two endangered and one vulnerable) (Table 4.2).

Table 4.2 Cetaceans listed as migratory and likely to be found in the project area

Common Name	Species Name	Status, Distribution and Habitat
Whales		
Blue whale	*Balaenoptera musculus*	Endangered and migratory. Oceanic but can occur near coast. Warm water breeding, cold water feeding, latitudes 20°S to 60 to 70°S. Migration paths widespread, not obviously following coastlines or oceanographic features. Calving in tropical oceanic waters. Specific breeding and calving areas not identified. Mating: Winter (peak in July). Calving: Winter (peak May to June). Migration period: (November to December).
Southern right whale	*Eubalaena australis*	Endangered and migratory. Migrate annually along the eastern coastline from high latitude feeding grounds to lower latitudes for calving. Migration period: mid-May to September.

Table 4.2 Cetaceans listed as migratory and likely to be found in the project area (cont'd)

Common Name	Species Name	Status, Distribution and Habitat
Whales (cont'd)		
Humpback whale	*Megaptera novaeangliae*	Vulnerable and migratory. Migrates along the eastern coast of Australia heading north to tropical calving grounds from June to August, and south to the Southern Ocean feeding areas from September to November.
Antarctic Minke Whale, Dark-shoulder Minke Whale	*Balaenoptera bonaerensis*	Migratory.
Bryde's whale	*Balaenoptera edeni*	Migratory. Two forms: a large offshore (some seasonal movement) and smaller inshore (largely sedentary). Tropical and temperate waters (from the equator to approximately 40°S). Mating: all year (inshore form) and autumn/winter (offshore form). Exact breeding/calving areas not identified.
Pygmy right whale	*Caperea marginata*	Migratory. Found in temporal subantarctic waters, and oceanic, pelagic and inshore sightings have also been made.
Killer whale	*Orcinus orca*	Migratory. All oceans, warm and cold waters. Single or in groups. Most common in cooler, deeper waters. Mating: all year. Calving: variable. No known calving or breeding areas in Australia.
Sperm Whale	*Physeter macrocephalus*	Migratory. Found in pelagic, offshore, deep waters.
Dolphins		
Dusky dolphin	*Lagenorhynchus obscurus*	Migratory. Predominantly occur in temperate subantarctic zones inshore. Can also be pelagic at times.

There is potential for some interaction between drilling-related activities and whales:

- The drilling program is scheduled to occur during the migratory and feeding period for blue whales.
- The project area is adjacent to the Bonney Coast within the migratory pathways of blue whales.

- The nature of the stationary drilling activity allows migrating whales to avoid the location.
- Support vessels will adhere to guidelines and whale migratory and feeding will be highlighted in pre-spud meetings
- The drilling activity is of short duration (1.5 months per well).
- Sound from drilling activities is less of a concern than seismic operations (for which guidelines have been developed for whale encounters (DEWHA, 2007b)).

Blue whales, *Balaenoptera musculus*, are listed as an endangered, migratory species under the EPBC Act. They have widespread migratory paths and although they can occur relatively close to the coast they are not known to follow coastlines or oceanographic features (Bannister et al., 1996). Sightings of blue whales in western Victoria have generally been between November/December and April/May. Most blue whales are sighted during the March/April period, on the continental shelf in water depths less than 200 m between longitudes 139°18'E and 143°03'E (Gill, 2002; APPEA, 2005; DEWHA, 2006a). Observations suggest that western Victoria and southeast South Australia are used for feeding grounds at least in summer and early autumn (Gill, 2002). Aggregations of the krill species, *Nyctiphanes australis,* which are common along the Bonney Coast upwelling region, attract the blue whales to the area for feeding (Gill, 2002). Off Cape Bridgewater, blue whale sightings are concentrated along the shelf break but are more dispersed over a wider shelf and deepwater area to the northwest and southeast.

Southern right whales, *Eubalaena australis*, are listed as an endangered, migratory species under the EPBC Act, and occur along the southern coast of Australia in winter and spring (Kemper et al., 1997). They migrate annually along the eastern coastline from high latitude feeding grounds to lower latitudes for calving between mid-May and September (Environment Australia, 2001). Winter, in particular, is the peak for southern right whale abundance especially along the southern coast of Australia (Kemper et al., 1997). At this time, calving adult females are spotted frequently inshore, in shallow, northeast-trending bays over sandy bottoms (Bannister et al., 1996). Warrnambool is recognised as a critical area for the recovery of this species (DEWHA, 2006b), as it is an important calving and nursery area. The majority of sightings near Warrnambool occur each year from May to November, peaking on the southwest coast from September to October. Port Fairy and Portland have also been used intermittently as calving areas or by small numbers of mothers with very young calves (DEWHA, 2006b).

The humpback whale, *Megaptera novaeangliae*, is listed as a vulnerable, migratory species under the EPBC Act. Humpback whales annually migrate along the eastern coast of Australia heading north to tropical calving grounds from June to August, and south to the Southern Ocean feeding areas from September to November. Humpbacks observed along the western coast of Victoria are likely to be travelling north to the east coast of Australia via Tasmania's west coast and Bass Strait. Sightings are frequently made along the Victorian coastline from June to November (DEWHA, 2006c) and specifically in the Otway Basin from April to July (pers. comm. Mandy Watson, DSE Warrnambool 7 August 2007). During the autumn period, there have been sightings from shore of humpback whales heading east off Portland and Warrnambool (Woodside, 2003).

Sperm whales, *Physeter macrocephalus*, are not listed as endangered or vulnerable under the EPBC Act. They are found in pelagic, offshore, deep waters and have been recorded offshore of all Australian states (Bannister et al., 1996). The key localities for the sperm whale are between

Cape Leeuwin and Esperance, Western Australia, close to the edge of the continental shelf (averaging 20 to 30 nautical miles offshore); southwest of Kangaroo Island, South Australia; offshore of the west and south coasts of Tasmania; offshore of New South Wales, including Wollongong; and offshore of Stradbroke Island, Queensland (Bannister et al., 1996). The relatively shallow water of the project area minimises the potential for encounters with sperm whales during the drilling program.

Pygmy right whales are generally found in temperate, sub-Antarctic waters. Oceanic, pelagic and inshore sightings have also been made. There have been sightings in Bass Strait.

Killer whales are likely to be found in oceanic, pelagic and neritic (shallow marine environment extending from mean low water down to 200 m depths, generally corresponding to the continental shelf) habitats but are more commonly found in cold, deep waters. Off Australia, they are often seen along the continental slope and on the shelf as well as often being seen near seal colonies (Bannister et al., 1996). Their movements vary seasonally and are related to food supply. There are frequent sightings of killer whales around Tasmania (Bannister et al., 1996), southeast of the project area. Killer whales have been observed in all months but mainly in autumn and spring to early summer.

Dusky dolphins predominantly occur in temperate subantarctic zones inshore, but can also be pelagic at times (Bannister et al., 1996).

In addition to those species listed in Table 4.2, other cetaceans that may traverse the area include those listed in Table 4.3.

Table 4.3 Other cetaceans that may occur within the project area

Category	Species	Common Name
Whales	*Pseudorca crassidens*	False Killer Whale
	Ziphius cavirostris	Cuvier's Beaked Whale, Goose-beaked Whale
	Balaenoptera acutorostrata	Minke whale
	Berardius arnuxii	Arnoux's Beaked Whale
	Globicephala macrorhynchus	Short-finned Pilot Whale
	Globicephala melas	Long-finned Pilot Whale
	Kogia breviceps	Pygmy Sperm Whale
	Kogia simus	Dwarf Sperm Whale
	Mesoplodon bowdoini	Andrew's Beaked Whale
	Mesoplodon densirostris	Blainville's Beaked Whale, Dense-beaked Whale
	Mesoplodon grayi	Gray's Beaked Whale, Scamperdown Whale
	Mesoplodon hectori	Hector's Beaked Whale
	Mesoplodon layardii	Strap-toothed Beaked Whale, Strat-toothed Whale, Layard's Beaked Whale
	Mesoplodon mirus	True's Beaked Whale
Dolphins	*Delphinus delphis*	Common dolphin
	Grampus griseus	Risso's dolphin
	Lissodelphis peronii	Southern Right Whale Dolphin
	Tursiops aduncus	Spotted Bottlenose Dolphin
	Tursiops truncatus s. str.	Bottlenose Dolphin

The bottle-nosed dolphin and the common dolphin are more commonly sighted in near-shore Victorian waters; however, these are not designated as threatened under State and Commonwealth legislation. The common dolphin is also found in pelagic and oceanic habitats in Victorian waters, and has been associated with high topographical relief of the ocean floor, escarpments and areas of upwelling (Bannister et al., 1996). The bottlenose dolphin is generally found in coastal estuarine, pelagic and oceanic habitats. In southern Australia, this species can occur close to shore, as well as in waters beyond the continental slope all year round (Bannister et al., 1996). Risso's dolphin has been recorded in Victoria, and is found inshore as well as offshore. It is considered a pelagic and oceanic species, and is also frequently seen over the continental slope (Bannister et al., 1996).

4.2.5 Sharks

The great white shark, *Carcharodon carcharias*, is listed as vulnerable under the EPBC Act based on evidence of declining populations, due to the species' low fecundity and long reproductive cycles, as well as pressure from fishing activities. They are normally found in inshore waters around areas of rocky reefs and seal colonies. Juveniles are found in coastal waters of Victoria in areas off Portland and Ninety Mile Beach, and pupping grounds are likely to be frequented between the months of December to June.

There have been a few isolated reports of whale sharks, *Rhincodon typus*, from the southeastern coast of Australia. However, they are most likely to be found in oceanic waters where temperatures range from 21 to 25°C. Only immature males have been sighted within southeastern Australian waters (Last and Stevens, 1994).

4.2.6 Seals

The preferred habitat of the Australian fur-seal (*Arctocephalus pusillus*) is on rocky islands in exposed places close to the sea, on open slopes, shore platforms and reefs, pebbled beaches and caves (Strahan, 1995). The Australian fur seal diet consists of fish, cephalopods and seabirds (Shaughnessy, 1999), diving up to 200 m in search of prey (Strahan, 1995). Births occur from late October to late December (Strahan, 1995; Shaughnessy, 1999). The Australian fur-seal has established four breeding areas in Victoria, with the largest breeding colonies found at Lady Julia Percy Island and Seal Rocks (Shaughnessy, 1999), which are over 70 km and 300 km east, respectively, of the drilling program well locations. There are several small non-breeding colonies, one of which is at Little Henty Reef near Apollo Bay (Woodside, 2003) but this is approximately 100 km east of the drilling program wells. Australian fur-seal colonies can also be found on rock shelf sites on the eastern shores of Cape Bridgewater and Cape Nelson (Parks Victoria, 2004a). Australian fur-seals are present in the project area all year round (Woodside, 2003).

The New Zealand fur-seal (*Arctocephalus forsteri*) prefers rocky parts of islands with jumbled terrain and boulders. Primarily, the species breed ashore (generally on remote islands) and feed at sea. There are no major New Zealand fur-seal breeding colonies in Victoria. The closest breeding colonies are located at Kangaroo Island, South Australia (Shaughnessy, 1999). New Zealand fur-seals from populations at Kangaroo Island may forage in western Victoria.

4.3 Heritage, Conservation and Areas of Cultural Significance

4.3.1 Conservation

The drilling program will be undertaken within Commonwealth waters, extending from three to 200 nautical miles from the Australian coast. Natural features in the vicinity of the drilling program include Discovery Bay Marine National Park, Discovery Bay Coastal Park and Cape Bridgewater, which are all described below.

Discovery Bay Marine National Park

The Bernoulli and Fermat wells are approximately 20 km and 25 km from Discovery Bay Marine National Park, respectively (see Figure 1.1), which lies to the west of Cape Bridgewater and to the south of the sand dunes of Discovery Bay (Parks Victoria, 2004b). The marine park covers an area of 2,770 ha and extends approximately 6 km along the coastline north of the blowholes at Cape Duquesne to Blacks Beach and offshore for approximately three nautical miles to the limit of Victorian waters. South of Whites Beach, the park boundary is 500 m seaward of the high water mark (Parks Victoria, 2004b).

The marine park contains various habitats such as intertidal and near-shore reefs formed from basalt, sandy beaches and subtidal, soft sediments, each supporting diverse marine communities. In deep water (30 to 60 m) within the marine park there are low reefs formed from ancient shorelines or dunes when the sea levels were lower than the present day. These reefs (30 to 60 m deep) are known to support sponge ‘gardens’ with a diverse range of sponges, filmy sea-mosses and seafans.

Discovery Bay Coastal Park

The Discovery Bay Coastal Park lies approximately 1 km south of Nelson on the western coast of Victoria covering an area of about 8,350 ha. The sandy coast of Discovery Bay curves gently for approximately 60 km, from the Victorian/South Australian border in the west to Cape Bridgewater in the east.

The Discovery Bay Coastal Park includes several features of geological and geomorphological significance. The original type section of the Bridgewater Formation dune limestone was recorded at Bridgewater Lakes. These lakes are also significant as an unusual example of dune blocked lakes fed by fresh groundwater. Further west, the episodic overflow channel that drains Swan Lake is unusual because it flows over a very wide dune system. Also of importance are the fossil pollen sites that record changes in sea level and vegetation patterns over the last 6,000 years (DEWHA, 2006d).

The diversity of habitats contained within the coastal park support a range of mammals, reptiles and different bird groups, some of which are threatened species. The beaches and nearshore waters are utilised by the little penguin and several albatross species (DEWHA, 2006d).

Cape Bridgewater

Cape Bridgewater covers approximately 1,200 ha, and is located 20 km west-southwest of Portland. It is a basalt peninsula overlain with limestone, dune limestone and calcareous dune sands (DEW, 2006d). Cape Bridgewater is exposed to strong wave action and the jointed basalt has been cut back into steep high cliffs with irregular benches and shore platforms developed.

Marine erosion along the joints and less resistant scoriaceous lava beds has resulted in the formation of blowholes and a number of caves (DEW, 2006d). Cape Bridgewater is mainly farmland and has been considerably modified by clearing and grazing. Little natural vegetation remains. Some fairy penguins and seals breed around the cliff shoreline (DEW, 2006d).

4.3.2 Heritage

Aboriginal Heritage

Land surrounding Portland was once occupied by the Kerryp-Tjmara Aboriginal people for thousands of years. The Discovery Bay area contains some of the most extensive evidence of Aboriginal occupation found along any section of the Victorian coastline. Aboriginal sites consist of large middens, open sites and an excavated rockshelter first occupied over 11,000 years ago. The Aboriginal significance of the area is widely recognised and acknowledged in a public interpretive trail. As yet the Australian Heritage Commission (AHC) has not formally identified, documented or assessed the indigenous national estate values of this location (DEWHA, 2006c).

The drilling program is located offshore and is not an area known to be of high significance in terms of Aboriginal heritage.

Shipwrecks

Shipwrecks are most commonly associated with submerged shallow reefs, which in southern Australia are restricted to shallow coastal waters. There are at least 18 shipwrecks located around the Portland area. The three closest recorded shipwrecks that were identified from a search of the National Shipwrecks Database are listed in Table 4.4 (DEWHA, 2007c). All three have not been found but are assumed to be located within a few hundred metres from the shore and therefore not in the area of the drilling program. Most of the ships were wrecked during the late nineteenth century. The strong waves, rocky reefs and cliffs contributed to the loss of these ships. These wrecks represent significant archaeological, educational and recreational (i.e., diving) opportunities for locals, students, and tourists.

Table 4.4 Shipwrecks in the vicinity of the drilling program

Name (Register ID)	Date Lost	Type of Vessel
Madagascar (6816)	September 1853	–
Marie (7253)	September 1851	Barque
Mary (7260)	September 1840	Barque

Data obtained from a search of the National Shipwreck Database (DEWHA, 2007c).

4.4 Socio-Economic Environment

The South East Regional Marine Plan was developed by the National Oceans Office to provide communities, industries and governments with a common understanding of the South-east Marine Region. This common understanding provides the basis for making management decisions about the region. To build an understanding of this complex region, information on ecosystems and human activities was gathered in a series of assessments covering both State and Commonwealth waters. This report (NOO, 2002) and the detailed analysis of the marine environment and multiple use activities from this report have been used in this section.

The main activities in the project area include:

- Recreational fishing and tourism
- Petroleum exploration and production.
- Commercial shipping.
- Commercial fishing.

4.4.1 Recreational Fishing and Tourism

The coastal communities of Apollo Bay, Princetown, Port Campbell, Peterborough, Warrnambool, Port Fairy and Portland all provide services to the commercial and recreational fishing industries in western Victoria. Portland is Victoria's western most commercial port, and is a deep-water port with breakwaters sheltering a marina and boat ramp.

Portland is a medium sized town with a population of approximately 11,000 (SIV, 2006). It lies approximately 362 km west-southwest of Melbourne, about 99 km west of Warrnambool. The coastal community of Portland provides services to the commercial and recreational fishing industries of western Victoria and South Australia.

4.4.2 Petroleum Exploration and Production

Petroleum exploration (onshore and offshore) has been undertaken within the Otway Basin of Victoria since the early 1960s. Hydrocarbons discovered by these exploration activities have been developed and further exploration continues. Offshore from western Victoria, several gas fields are in the production phase. All include offshore and onshore pipelines and connect to gas plants around the Port Campbell area. These include the:

- Minerva Gas Field (BHP Billiton), 10 km offshore from Port Campbell, in water deeper than 50 m.
- Geographe and Thylacine Gas Fields (Woodside) are located further offshore, directly south of Port Campbell, in waters about 100 m in depth.
- Casino Gas Field (Santos), 30 km offshore from Port Campbell, in a water depth of 70 m.

Petroleum exploration and production has regional benefits for southwest Victoria and southeast South Australia. Not only have the numerous onshore and offshore projects resulted in a boost to the regional economy through the provision of services to project personnel and through the creation of employment in construction and project support, but studies undertaken for these developments led to a greater understanding of the region's terrestrial, coastal and marine environments.

4.4.3 Commercial Shipping

The southeast marine region is one of the busiest areas for shipping in Australia, with freight and passengers carried to and from west and east coast Australian ports, as well as international ports. Shipping channels are located within the vicinity of the drilling program, with over 1,000 vessels travelling through each year.

Shipping within the region comprises cargo shipping, passenger shipping and ship/boat building and repair activities. Portland is one of several commercial ports currently operating within the southeast marine region. Portland is a deep-water port that is important for shipping the region's produce of aluminium, wool, timber, livestock, grain and wood chips (SIV, 2006).

The Bernoulli well will be located adjacent to the major shipping lane between Melbourne and Adelaide. AMSA will manage the shipping lane by Advice to Mariners. The Fermat well will be closer to the coast and, therefore, not within the vicinity of the shipping lane.

4.4.4 Commercial Fishing

Australia's fishing zone is the fifth largest in the world, but has a low productivity due to nutrient-poor ocean currents. About 10% of the known fish, crustacean and mollusc species are commercially fished, with commercial fishing being the fifth most valuable Australian rural industry (Department of Agriculture, Fisheries and Forestry, 2003). Fisheries production relies heavily on the high unit value species such as prawns, tuna, rock lobster and abalone (Department of Agriculture, Fisheries and Forestry, 2003).

Portland supports Victoria's second largest fishing port. Current fishing activities in the area include rock lobster, giant crab and abalone. Fishing methods used include deep-sea trawling, drop-line fishing, mesh netting, hand-line fishing and squid jigging (SIV, 2006). The commercial fishing industry in Portland injects about AU$40 million annually into the local economy (SIV, 2006).

Southern Rock Lobster Fishery

The southern rock lobster (*Jasus edwardsii*) occurs from the southwest of the Western Australian coast to southern New South Wales, including waters around Tasmania and New Zealand. The rock lobster fishery is the second most valuable Victorian fishery – in 2000/2001, it was worth $21.3 million to the Victorian economy (DPI, 2003a). In South Australia, the rock lobster industry was worth $66 million to the South Australian economy in 2004/2005 (Knight et al., 2006).

The Victorian fishery is now managed under the Rock Lobster Fishery Management Plan (DPI, 2003a). There are a set number of access licences allocated between the eastern and western (Apollo Bay) sectors and a total allowable catch divided into individual transferable quota units. Commercial fishers use lobster pots while recreational fishers use SCUBA and hoop netting (DPI, 2003a). Pot numbers and dimensions are restricted (pot and escape gap size) to ensure sustainable harvests. With these management measures, the Rock Lobster Management Plan aims to re-build stocks and catches over time. Stock assessment research shows that the harvestable biomass of lobsters is now 25% of the 1951 levels in the western zone and spawning biomass is 50% of 1952 level (DPI, 2003a).

The drilling program is located within the Victorian Western Zone, which extends from Apollo Bay to the South Australian border. There are 85 Rock Lobster Fishery Access Licences (RLFAL) in the Western zone, out of a total of 139 licences for Victoria (2001/2002) (DPI, 2003a). The 2000/2001 commercial catch from the Western Zone was 507 tonnes, with an average of 0.59 kg/potlift (Hobday & Smith, 2001). Octopus and leatherjacket were the most common by-catch species in 2000/2001 (Hobday & Smith, 2001). The Southern Rock lobster has been the major fishery for Portland for decades and supports a fleet of approximately 30 vessels (SIV, 2006).

The fishing grounds occur on coastal reefs to depths of 200 m on the continental shelf edge. The life cycle of the rock lobster is complex. The fertilised eggs are carried under the tail of the female before being released, typically between September and November. The phyllosoma larvae spend from one to two years drifting in the plankton, during which time they develop through 11

larval stages. The final (puerulus) stage settles on shallow reefs and grow over a period of years into adult lobsters.

Giant Crab Fishery

The giant crab (*Pseudocarcinus gigas*) fishery is a newly developed fishery that grew rapidly during the 1990s. It is found in southern Australian waters from central NSW to southwestern Australia, including Tasmania. The giant crab was initially caught as by-catch of the rock lobster fishery, however now it is a targeted species caught using pots. Giant crabs occur at the continental shelf break and upper slope to depths greater than 400 m, however, they are most abundant at depths between 150 to 350 m (DPI, 2003b), and primarily taken from depths between 140 and 270 m (DPI, 2003b). The giant crab season is the same as that for the southern rock lobster (closed season for female giant crab is from 1 June to 15 November, and closed season for the male giant crab is between September 1 and November 15 (DPI, 2003b)).

Abalone Fishery

The abalone fishery is the most valuable Victorian fishery, currently worth about $60 million (DPI, 2006). In South Australia, the abalone industry is worth approximately $33 million annually (PIRSA, 2006).

Abalone fishing is only possible by hookah diving, (air supplied from compressor on a boat) and in Victoria, this is generally between the shoreline down to a depth of up to 30 m (McShane et al., 1986; Garnham, pers. comm., 2003, DEW, 2003), but often at depths shallower than 15 m (Gorfine & Walker, 1997). Blacklip abalone (*Haliotus rubra*) is harvested all year round, while fishing for greenlip abalone (*Haliotus laevigata*) is banned.

A virus is currently affecting the Victorian abalone industry (see Section 4.2.2).

South East Fishery

The South East Fishery (SEF) fishes more than 100 species, but 17 species or species groups provide the bulk (>80%) of trawl landings. Such species include the orange roughy, gemfish, flathead, blue grenadier, redfish, school whiting, warehou, jackass morwong and others (BRS, 1994; Department of Agriculture, Fisheries and Forestry, 2003). Trawling is concentrated along the edge of the continental shelf.

There are 14 deep-sea trawl boats that operate from Portland, fishing within the South East fishery (SIV, 2006). The Portland trawl fleet lands 6,000 t of fish for the Australian market worth an estimated $20 million each year (SIV, 2006).

Gillnet, Hook and Trap Fishery

The Gillnet, Hook and Trap Fishery (formerly the Southern Shark Fishery and South East non-Trawl Fishery) extend from southeast Queensland to the South Australia/Western Australia border. Among the 21 species subject to quota arrangement include blue eye trevalla, blue grenadier, flathead, gemfish, john dory, orange roughy, royal red prawn and silver trevally (AFMA, 2003). Shark species caught include school and gummy shark, with school shark overfished (BRS, 2003). Methods of fishing include demersal longline, dropline, trotline and handline for scalefish, hook to target sharks, gillnets in waters deeper than 200 m and fish traps (AFMA, 2003).

Southern Squid Jig Fishery

The Southern Squid Jig Fishery, which mainly targets the arrow squid (*Nototodarus gouldi*), is located in Commonwealth waters of southeast Australia in water depths ranging from 50 to 200 m, with peak catches being between January and June (AFMA, 2003). Squid jigging is a seasonal fishery with approximately 45 boats fishing from Portland during the squid season (March to July) (SIV, 2006). Squid have a short life cycle, allowing sustainable catches to be high, and with the increasing popularity of the product, it is a fishery that is expected to grow. The present value of this fishery is worth about $2.5 million a year (SIV, 2006).

Eastern Tuna and Billfish Fishery

The Eastern Tuna and Billfish Fishery extends from the northern coast of Australia south to the Victoria/South Australia border, encompassing Tasmania. Species targeted using longline and minor line includes yellowfin tuna (*Thunnus albacares*), bigeye tuna (*Thunnus abesus*) and broadbill swordfish (*Xiphias gladius*), while purse seine fishing (yielding low quantities) targets the skipjack tuna (*Katsuwonus pelamis*) (AFMA, 2003). The fishery has 311 fishing concessions, and its estimated value in 2001–2002 was $56 million (AFMA, 2003).

5. POTENTIAL ENVIRONMENTAL HAZARDS AND CONSEQUENCES

This section outlines the potential environmental hazards associated with the proposed drilling program and the potential environmental consequences that may result. An environmental risk assessment is presented in Section 6, which also outlines management strategies to reduce environmental risks to as low as reasonably practicable. Operational controls to implement the management strategies are referenced in the Implementation Strategy in Section 8 along with responsibilities for implementation.

5.1 Potential Hazards

The potential hazards and associated consequences pertaining to drilling related activities are listed in Table 5.1:

Table 5.1 Potential hazards and consequences associated with the West Triton Drilling Program

Potential Hazards		Potential Consequences
1	Rig positioning and anchoring	Disturbance to benthic flora and fauna.
2	Artificial lighting	Attraction of marine life and seabirds in the vicinity of the drilling rig.
3	Noise (vessel, drilling rig, helicopter)	Behavioural changes to marine life, including repulsion from source; startle and alarm responses; attraction to source.
4	Interference with other operators	Impact on commercial shipping and fishing activities.
5	Drilling cuttings and mud	Increased turbidity in water column.
		Smothering of benthic fauna.
		Substrate modification.
6	Waste discharges	Changes to water quality.
		Low level contamination/toxicity of marine fauna in sensitive environments.
		Adverse effects on air quality in sensitive environments.
7	Ballast water discharges and biofouling	Introduction of foreign marine organisms (and associated competition, contamination, disease, etc.).
8	Hydrocarbon and/or chemical spills	Contamination of seawater/toxicity impacting on marine fauna. Contamination of sensitive environment.
9	Rig Bilge / Deck drainage discharge	Adverse changes to water quality.
10	Combustion products (equipment; flares)	Air quality; lighting, CO_2.
11	Dropped objects	Risks of damage to fishing gear. Impacts to seabed.
12	Residual structures left after drilling	Obstacles for fishing gear. Disturbance to seafloor.

5.1.1 Rig Positioning and Anchoring

Disturbance to the seabed by the drill rig legs or anchors is the main source of physical impact associated with drilling operations in shallow to moderately deep water, aside from the discharge of cuttings and muds (described in Section 5.1.5).

Once positioned on location the West Triton jack-up drilling rig, will establish its foundation by jacking its three independent lattice legs and footings. The legs will be lowered so that they engage the seafloor simultaneously. Only the leg footings contact the seabed. Support vessels will generally not anchor during routine operations. Supply vessels do not generally anchor. In the event of an emergency they will go into a sheltered harbour, which in this case is Portland. If they have no choice they will anchor.

The extent of disturbance to the seafloor will be limited to that area under each drilling leg or anchor, and be dependent on the substrate type. The footprint area affected by the rig is approximately 50 m x 50 m at each well. Once the drilling rig is moved from site, the leg or anchor depressions will act as traps for marine detritus and sand. These depressions will eventually fill, therefore, the effect is temporary, as re-colonisation by benthic organisms is likely to be rapid.

5.1.2 Artificial Lighting

Due to safety regulations, lights on the drilling rig are illuminated through the night. These lights are a potential attractant to marine life and seabirds and depending on the foraging range of the particular species, may result in a short-term concentration of animals in the immediate vicinity of the rig. Crew are requested to record observations of whales and other megafauna in the vicinity of the rig. These records are passed on to the DEWHA.

With some distance from shoreline (approximately 11 km to the nearest drill site, Fermat), scarce population of the local coastal region, and the short period at the drill site (approximately 1.5 months per well), the effect on visual amenity is expected to be minimal.

5.1.3 Noise Impacts

Noise associated with drilling activities comes from the drilling rig, drilling vessel support vessel movements and helicopter support. Drilling rig presence on the seafloor represents a small, stationary object that is easily avoided by mobile marine fauna. The noise produced from the drilling rig (low-level, low-frequency tones) and accompanying support vessels is in the order of magnitude of noise produced by commercial shipping.

A temporary increase in noise associated with drilling operations (drill rig and support vessel movements) will occur in the vicinity of the drilling operations. The dominant component of exploration drilling noise is associated with the rig support vessels working with main engines and bow thrusters under load. Support vessel noise levels up to 140 dB re 1 µPa have been measured at a distance of 2 km in the Otway basin (APPEA, 2005), but the percentage of time and duration above ambient sea noise (90 to 110 dB re 1 µPa in high energy areas such as Bass Strait (APPEA, 2005)) is unlikely to result in any significant disturbance to cetacean species, if present in the vicinity. For marine fauna that are reliant on auditory sense, 120 dB re 1 µPa is the currently accepted noise threshold above which avoidance and or behavioural changes commence. A behavioural response radius of approximately 5 km is conservatively expected based on reported observations of other species, and underwater noise recordings of drilling in

other similar environments. Therefore, it is unlikely that any cetacean species listed under the EPBC Act will be significantly impacted by the drilling.

Drilling rig noise is generally below the sound levels generated by threatened cetaceans (McCauley, 2003) (Table 5.2). Excessive continuous noise above a tolerable threshold for marine fauna may result in damage to the auditory system, behavioural change, avoidance, temporary shift in hearing thresholds and interference with acoustic signals (McCauley et al., 2003; McCauley, 1994).

Table 5.2 A comparison of underwater noise sources, their frequency and sound levels

Noise Source	Frequency (Hz)	Dominant Frequency (Hz)	Noise Level (dB re 1μPa)
Ambient underwater	N/A	N/A	93 – 97
Shipping traffic	> 100	N/A	125 (depending on distance from recording)
Drilling (drill string rotation)	20 – 1,000	<100	145 maximum (>120 for <1% of time at 5.1 km) (1,2)
Drilling support vessels	1 – 200		140 dB re 1μPA (2) at 2 km
Blue whale (moans)	12 - 390	16 - 25	130 – 188
Sperm whale	100 – 30,000	2,000 – 4,000 10,000 – 16, 000	160 – 180
Southern right whale	3 – 2,200	5 – 500	172 - 192

Adapted from Richardson et al (1995).

1 Woodside (2003).

2 APPEA 2005.

The drilling program is located within known feeding grounds for blue whales, the scheduled timing of the drilling program also coincides with the migration of blue whales in the area. Blue whales have an estimated source level of noise between 130 and 188 dB re 1μPa and in the range of 144 to 192 dB re 1μPa for other baleen whales (SCAR, 2002); it is probable that they can tolerate similar levels of man-made noise without adverse effects or shifts in hearing sensitivity.

If blue whales were in the vicinity of the drilling sites during the drilling program, they would be expected to respond to drilling noise by slightly changing their speed and swimming direction to avoid stationary noise sources. In a study in the early 1980s of bowhead whales in the Beaufort Sea (western Arctic), it was found that they had considerable tolerance to ongoing noise from exploration drilling, reacting strongly only to rapidly changing situations, such as an approaching boat or aircraft (Richardson et al, 1995) and a similar scenario may be expected of other baleen whales such as blue, humpback and southern right whales.

Indirect effects to whales from drilling noise could be caused by the disturbance or dissipation of krill aggregations, which provide the main food supply for blue whales. It is generally considered that crustacea (including their planktonic larvae) are not adversely affected by noise. Whilst there is limited information available on drilling noise effects on crustacea, experiments have been undertaken on the survival and development of Dungeness crab larvae (Pearson et al, 1994) to seismic survey noise (up to a sound pressure of 231 dB re 1μPa).

Stationary sources of offshore noise appear less disruptive to baleen whales than moving sources, such as ships (NMFS, 2001). The greatest level of noise from offshore drilling is often created when support vessels or tenders use their engines (and thrusters) to hold station at the rig for supply or transfer operations.

There will be approximately 15 support vessel trips per month during the program, which will be spread between two support vessels. These vessels have a noise spectra of about 300 Hz, and a broadband source level of 177 dB re 1µPa. Monitoring at the Thylacine exploration drill site in the Otway Basin in 2001 found that most of the noise (i.e., higher levels of high frequency noise) came from support vessels moving around slowly and intermittently from manoeuvring using bow thrusters (McCauley, 2003). McCauley (1998, cited in Woodside 2003) reported that in the Timor Sea, the noise level from the bow thrusters of a support vessel exceeded the noise generated when it was cruising or idling and exceeded the noise of the drill rig itself, which under quiet conditions could be detected at 30 km. However, this would be expected to vary according to vessel type and amount of bowthruster required to maintain station. With rig tenders shut down, drilling rig noise was not audible beyond 11 km.

The reaction of cetaceans to the noise of moving vessels is species-specific and may vary depending on cetacean activity (feeding, breeding, social interactions or resting). Possible reactions may include a change in swim speed and direction, or deeper diving to avoid vessel encounters. Baleen whales engaged in feeding, social or mating activities are less likely to be disturbed than resting whales (Richardson et al., 1995). The incremental (and temporary) increase in vessel-generated noise may not cause significant disturbance to whales in the area. Generally, support vessel noise is expected to be similar to other commercial vessel traffic, which routinely passes through the area.

5.1.4 Interference with Other Operators

For safety reasons, the rig will be well lit at all times and a Notice to Mariners advising of the presence of the drilling unit will be issued through the AMSA. A safety zone of 500 m radius around the rig will be maintained and enforced at all times, as gazetted under Section 119 of the P(SL)A. All vessels, except for the support vessels associated with the drilling activities, will be required to stay outside this safety zone, so as to avoid collisions and prevent fouling anchor chains or other accidents.

Due to the temporary nature of site drilling (approximately 1.5 months for the well) and the small area of the safety zone, drilling is not likely to have any significant impact on fishing activities. The fisheries representative bodies will be informed prior to the commencement of drilling at each well.

The Bernoulli well is located adjacent (approximately 11 km) to the major shipping lane between Melbourne and Adelaide. The Fermat well will be closer to the coast and, therefore, not within the vicinity of the shipping lane.

The impact of the drill rig's safety exclusion zone on commercial shipping will be minimal as the drilling program is of short duration (approximately 1.5 months per well).

5.1.5 Drilling Mud and Cuttings

The impacts from the discharge of cuttings and drilling muds will be very localised (100 to 200 m from the drill site) and short-lived (less than 24 months) (Hindwood et al, 1994). APPEA's (1998) general findings on the effects of drill cuttings on the environment suggest that:

- Major contamination and benthic community effects are limited to 250 m from the well site.
- It is difficult to detect any benthic community effects beyond 250 m from the well site.
- Elevated concentrations of heavy metals or hydrocarbons associated with the drilling mud are generally not detectable beyond 1,000 m of the well site.

The main likely impacts to the seabed include smothering of sediment dwelling (benthic and epibenthic) fauna and substrate modification. Additionally, elevated concentrations of drilling mud in the water column are possible for a short period of time after discharge of any excess water-based drilling mud. Tidal currents and the interaction of surface and oceanic currents facilitate the dispersion and dilution of discharged cuttings, reducing water column turbidity and smothering or significant alteration of benthic communities. According to Hinwood et al (1994), the plume created by a discharge of drill cuttings can be expected to dilute by a factor of at least 10,000 within 100 m of its point of discharge. The use of water-based drilling mud aids in the dispersion of solids in the water column. Environmental monitoring studies undertaken in Bass Strait and the Otway Basin showed localised effects (within 200 to 400 m) were generally short lived, with most benthic organisms recovering within four months (BHP and Santos, 1999). Studies conducted in 70 m depth (similar to that for the proposed project) in eastern Bass Strait, showed no detectable trace element indicators when water-based muds alone were used.

Drilling mud spills will be prevented by containment on the main deck and mud handling area.

5.1.6 Waste

Only deck drains that receive uncontaminated rainwater discharge directly to the marine environment. Drainage from the drilling deck area, the mud handling area and chemical storage areas are contained in bunds to prevent direct discharge to the marine environment. All drains are fitted with open and close valves. Water from the bunded areas and rig bilge water will be directed to the oil/water separators. A Turbulo- MPB separator with a 5 m3/hr capacity is in place to separate oil-in-water to a concentration of < 15 mg/L. The residual water is discharged overboard to MARPOL requirements and continuously monitored by oily water discharge equipment. Specifically, for monitoring the purity of the discharge water a measuring unit type OMD-2005 is mounted. It uses a scattered light sensor to detect oil concentration and has a digital display and 18 month recording device. The OMD-2005 has been tested in accordance with the IMO- Resolution MEPC.107(49).

Disposal of macerated sewage and putrescible wastes overboard from drilling and support vessels during the short period of the drilling program may result in a localised, temporary increase in the nutrient content in the water column. This may in turn act as a food source for some organisms and temporarily altering the species diversity and richness in a localised area for a short time (i.e., a number of hours or days). Sewage will be treated through an on-board effluent treatment plant that meets regulatory requirements prior to being discharged to sea. The sewage treatment plant capacity is 12 m3/day (West Triton has 110 people on board maximum, the Minerals Management Service standard suggests 0.075 m3/day/person). Sewage and putrescible

wastes will be macerated in accordance with regulatory requirements (less than 25 mm, according to P(SL)Act and MARPOL Annex IV) prior to being discharged to sea. Extended aeration sewerage treatment plants are used on service vessels. No sewage discharge will be undertaken within 3 nm of land (under the P(SL)Act). Greywater discharge volumes will be estimated according to potable water usage and recorded and reported monthly and at end of well.

No incineration of waste will occur onboard the drilling and support vessels, and all solid waste items (except food scraps) will be sent to shore. Hazardous wastes will be segregated and stored in sealed storage areas and transferred to onshore licensed hazardous material handlers for disposal to a licensed depot.

5.1.7 Introduction of Foreign Species

The service vessels (Appendix C) will have come from other locations in Bass Strait and previously will have exchanged ballast water in transit in the deep ocean as required by AQIS. Some seawater on-take into pre-loading tanks may be required for weight testing during the jack-up process and will be taken on and discharged at the drill location. Vessels have the potential to transport marine flora and fauna, which may occur due to contact with the hull, deck, anchor chains, drilling rig and other associated equipment, however this risk is small as the rig and vessels are newly commissioned. The port of mobilisation is Portland.

All contracted vessels undergo regular anti-fouling of the hull (to prevent the build up of barnacles and other organisms that increase the drag on the vessel, leading to increased fuel consumption) and certification of anti-fouling will be available for inspection. The main chemical previously used in anti-fouling agent, tributylin (TBT), is being phased out. It persists in the environment by attaching itself to muds (accumulating in sediments), and in high concentrations can have toxic effects on marine organisms through bioaccumulation. The impact of TBT leaching off a single vessel in open waters has been found not to be detrimental to marine life (Fabris et al., 1995) and remains under the ANZECC Guidelines for Fresh and Marine Water Quality (2000) TBT trigger value of 0.0004 μgL^{-1} for the protection of 99% of species in marine waters. The International Convention on the Control of Harmful Anti-Fouling Systems on Ships 2001 (AFS Convention), which prevents the release of TBT from hulls into the ocean, comes into force 17 September 2008. The service vessels were newly commissioned prior to coming to Bass Strait providing greater assurance with compliance to international conventions and are using TBT-free anti-fouling systems. The nature of the jack-up rig means that it does not require the use of anti-fouling coating.

The presence of a disease that causes ganglioneuritis has been confirmed on several Victorian abalone aquaculture farms in 2005 and by 2006, and had also affected wild abalone populations in waters off the coastline in southwest Victoria. As a consequence, in June 2006, coastal waters off Port Fairy were declared a Control Area under the *Victorian Livestock Disease Control Act* (1994), as the disease is listed as 'notifiable'. (DPI www.dpi.vic.gov.au/DPI accessed 03 January 2008). The drilling rig will be operating approximately 80 km from the Port Fairy abalone virus area and approximately 20 km from Discovery Bay where there have been virus reports; the drilling sites are at depths between 40 to 100 m and avoid the shallow (< 20 m) abalone habitats.

5.1.8 Spills

There has been no major oil spill during the history of development and production of oil and gas reserves within Bass Strait. Although the probability of a major spill (associated with drilling activities) occurring in Australian waters is low, the potential environmental consequences if such an event was to occur may be significant.

Sources of hydrocarbon or chemical spills which may enter the environment during the drilling program may result from:

- Blow-out from the drilling operation.
- Spills from transfer of materials (e.g., diesel) from the supply boat to the rig.
- Spill incident due to vessel collision.
- Spill during production testing/flaring.

The possible effects of an oil spill on marine fauna include:

- Smothering and ingestion of oil droplets during grooming.
- Loss of thermal insulation and/or waterproofing.
- Irritation to eyes and exposed mucous membranes.
- Impacts to sandy beaches and coastlines from any landfall.

Secondary impacts may include the loss of prey items or bioaccumulation of hydrocarbon products through the food chain. The effect of oil on cetacean skin was shown by Geraci and St. Aubin (1982) to be minor and temporary. Direct contact with hydrocarbons appears to have little deleterious effect on whales, possibly due to the skin's effectiveness as a barrier to toxicity, although inhalation of any evaporated toxic components may pose a greater risk (Volkman et al., 1994). The potential impact of oil on baleen plates in filter feeding cetaceans is considered to be insignificant. Geraci and St. Aubin (1982) (in Volkman et al., 1994) found that light to medium weight oils reduced the flow of water through baleen plates; however, the flow returned to normal within 40 seconds. Heavy oils reduced the flow for up to 15 minutes. Clearance of the baleen fibres occurred within 15 to 20 hours. Bottlenose dolphins can detect and avoid hydrocarbon on the surface of the water (Geraci and St. Aubin, 1982). The impact of external oiling on seals' thermoregulation capacity is expected to be limited due to the presence of blubber layers (Michel et al., 1992).

In order to prevent the discharge of reservoir hydrocarbon liquids directly overboard, the rig has a blow-out prevention system and the mud system is regularly monitored for well stability. For other high risk activities the following controls are adopted:

- Fuel transfer is undertaken in calm conditions and in accordance with documented transfer procedures with transfer equipment routinely inspected and tested for integrity.

- Vessel collision is prevented by the declaration of a safety zone around drilling facilities, navigational lighting, issuing of marine notices, continual attendant vessel radar and radio monitoring and supply vessel adherence to the OSV Code.

- Production flaring utilises appropriately sized test vessels and burners and shut-down system if flare pilot is extinguished.

Spill trajectory modelling has been undertaken for a number of specific spill scenarios to enable mitigation and management in the unlikely event of large spills. The results are summarised in Table 5.3.

Table 5.3 West Triton spill modelling results for Otway Basin

Location Name	Permit Area	Oil/ Gas Well	Spill Type	Spill Volume (m^3)	Spill Duration (hr)	Simulation Period (day)	Probability of Shoreline Contact (%)	Average Time before Shoreline Contact (hr)	Percentage of Initial Spill on Shoreline (%)
Bernoulli	Vic/P50	Gas	Diesel	80	6	7	15	62	31
			Condensate	448	168	10	42	73	4
Fermat	Vic/P46	Gas	Diesel	80	6	7	26	39	29

The spill modelling results show:

- A large diesel spill from Bernoulli location has an average time for shoreline contact of 62 hours.
- A large condensate spill from Bernoulli location has an average time before shoreline contact of 73 hours.
- A large diesel spill from Fermat location has an average time before shoreline contact of 39 hours.

Note that the modelling does not include capture or dispersion of diesel oil or condensate from spill response actions. The ADA oil spill contingency plan outlines spill response approaches. Fermat requires the shortest spill response time due to its location approximately 11 km from the coastline (Figure 5.1 shows the trajectory of the average Fermat diesel spill volume from stochastic modelling, and the spill weathering and fates curves).

5.1.9 Air Emissions

Diesel will be used to power the drill rig and service vessels and fuel consumption will be routinely monitored. Engines and generators will be serviced to manufacturer's specifications to maintain low emissions.

Well testing will create a flare for a short period of time (approximately 12-15 hr) and a modern burner head will be used to reduce smoke emissions.

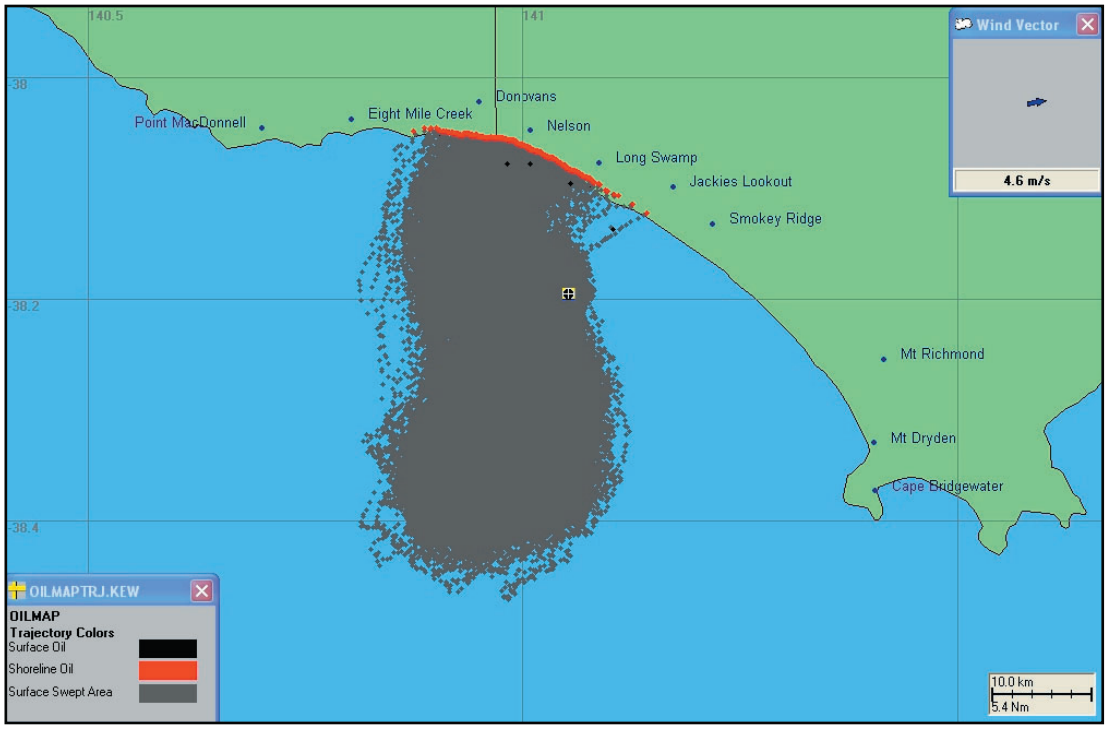
In this low populated environment air emissions are a low risk concern.

The short period of approximately 1.5 months for the drilling program will contribute a small volume of greenhouse gas emissions.

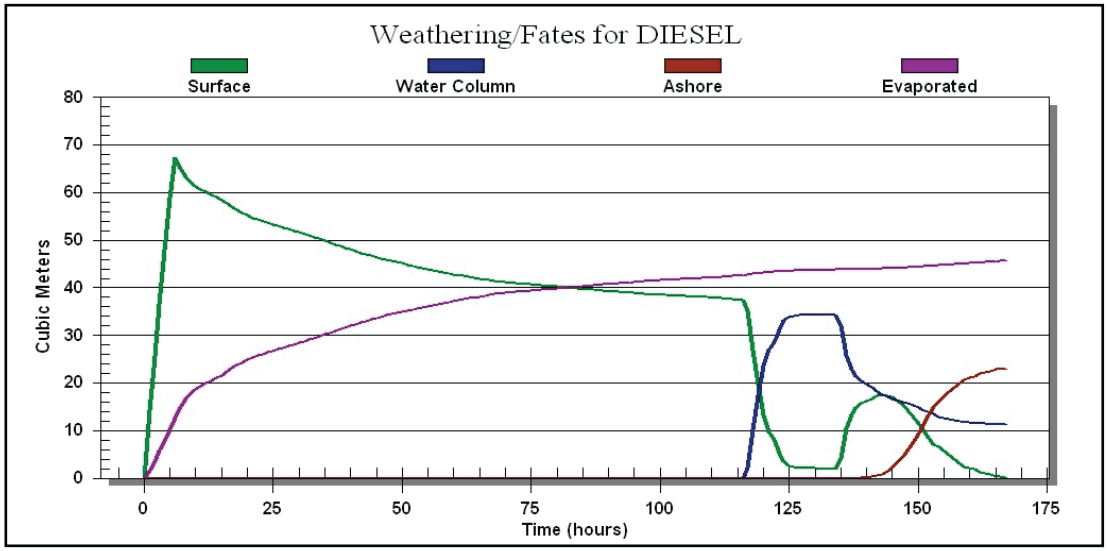
5.1.10 Well Completion and Dropped Objects

To reduce hazards to the commercial fishing industry the following processes are in place for the drilling program:

- At the end of the drilling program the well will be plugged and abandoned below the seabed. There will be no residual structures left after drilling.
- In the unlikely event that equipment is dropped into the ocean during the drilling program it will be retrieved at the end of the program.



Predicted path and shoreline contact for the 80 m3 single trajectory (at 7-day) simulation at Fermat, which had yielded the average volume of diesel oil on shore.



Weathering and fates graph for the 80 m3 single trajectory simulation at Fermat, which had yielded the average volume of diesel oil on shore.

Source: APASA, 2007.

coffey natural systems	Job No: 1323	Australian Drilling Associates	ADA	Fermat stochastic modeling	Figure No:
	File Name: 1323_05_F05.01_HB	Environment Plan			5.1

6. RISK ASSESSMENT

An analysis of environmental hazard and risk has been conducted for the West Triton Drilling program. Its purpose was to:

- Identify and assess hazards to the public and the marine environment during the drilling program.
- Undertake a scenario-based risk assessment, using the risk management method based on the Australian Standards Risk Assessment (AS4360:2004).
- Identify and rank major hazards and determine appropriate risk reduction measures.

The following definitions are critical in the understanding of hazard and risk assessment.

Accident: an event capable of causing critical, major, moderate or minor damage to the environment, or negligible damage with no significant environmental effect.

Hazard: a physical situation with the potential for damage to the environment, human injury, damage to property or a combination of these.

Risk: the likelihood of a specified undesired event occurring within a specified period or in specified circumstances. It may either be a frequency (the number of specified events occurring in a time unit) or a probability (the probability of a specified event following a prior event), depending on circumstances.

6.1 Hazard Identification

The process of hazard identification and risk management are divided in three main sections (reproduced from AS/NZS 4360:2004):

- External and environmental hazards (global hazards):
  - Project-specific hazards (project implementation issues).
  - Personnel health hazards (a global hazard).
- Individual and special operations hazards during operations that are exceptional because of size, complexity or timing.
- General and routine work performed according to standard procedures.

6.2 Risk Scenario

A scenario for realisation of each environmental aspect causing the hazard was developed. Each scenario included:

- A description of the scenario and root cause of the hazard.
- Existing risk mitigation or prevention measures (that is, protection systems and management mechanisms) that are currently in place or are standard safety measures.
- A description of the potential environmental consequence.

- The risk is calculated by the likelihood of that particular consequence of the noted severity actually occurring.

The risk ranking of each hazard scenario was identified and assessed based on AS/NZS 4360:2004 risk assessment tool (Tables 6.1 and 6.2). To assess the consequence of an event the first step is to consider the area of impact.

Table 6.1 Qualitative measures of consequence or impact

Level	Descriptor	Example Detail Description (Safety/Financial/Environmental)
1	Insignificant	No injuries; low financial loss. Alteration/disturbance within the limits of natural variability; effects not transmitted or accumulating; resources not impaired.
2	Minor	First aid treatment; on site release immediately contained or medium financial loss. Temporary alteration/disturbance beyond natural variability effects confined to site and not accumulating resources temporarily affected.
3	Medium	Medical treatment required; on site release contained with outside assistance; high financial loss. Alteration/disturbance of a component of an ecosystem; effects not transmitted or accumulating; potential resource loss, but sustainability unaffected.
4	Major	Single fatality, extensive injuries, and loss of production capability; off site release with no detrimental effects; major financial loss. Alteration to one or more ecosystems or component levels, but which are recoverable; effects can be transmitted/ accumulating.
5	Extreme	Multiple fatalities; toxic release off site with detrimental effect; huge financial loss. Irreversible alteration to one or more ecosystems or several components levels; effects can be transmitted/accumulating; lost sustainability of most resources.

Source: Based on AS/NZS 4360:2004.

Table 6.2 Qualitative measures of likelihood

Level	Descriptor	Description
A	Almost certain	Is expected to occur in most circumstances.
B	Likely	Will probably occur in most circumstances (one per year).
C	Possible	Might occur at some time.
D	Unlikely	May occur in exceptional circumstances.
E	Rare	Not known within industry in this region.

Source: Based on AS/NZS 4360:2004.

6.3 Risk Matrix

Each scenario was then assessed using the risk matrix approach (Table 6.3). A risk estimate was made on the basis of the likelihood of the consequence occurring. Matrix locations were chosen on the basis of operational and environmental judgement.

Table 6.3 Qualitative risk analysis matrix – level of risk

Likelihood	Consequences				
	Insignificant 1	Minor 2	Medium 3	Major 4	Extreme 5
	Level of Risk				
A (almost certain)	M	H	E	E	E
B (likely)	L	M	H	E	E
C (possible)	L	L	M	H	E
D (unlikely)	L	L	L	M	H
E (rare)	L	L	L	L	M

Legend

E	Extreme/intolerable risk; immediate action required.
H	High/undesirable risk; senior management attention needed.
M	Moderate/undesirable risk; management responsibility must be specified.
L	Low/tolerable risk; manage by routine procedures.

6.4 Risk Reduction Measures

Risk reduction measures were applied to risks deemed to be too high, that is, ‘Extreme’ or ‘High’ on the risk matrix.

The residual risk for the hazard scenario was then reassessed. The residual risk associated with all identified hazards was reduced to an acceptable level by this process.

Philosophy of Risk Reduction

AS/NZS 4360:2004 proposes a four-point scale of management action to be taken according to the risk classes of Table 6.4.

Table 6.4 Risk reduction philosophy

Level of Risk	Philosophy
Extreme/ intolerable risk	Unacceptable risk that will not be tolerated by ADA under any conditions and must be engineered down to a lower risk level. The amount by which such risks can be reduced will depend on the control that the survey has over the factors involved in the hazardous event. For example, where a major risk-producing factor is the project’s interface with the general public, fewer options are available to reduce that risk than in cases where the general public are not involved.
High/ undesirable risk	High/undesirable risks require that the engineering design or method should be altered to remove the hazardous event or to reduce the associated frequency or consequence severity so as to place the risk in a lower risk level.

Table 6.4 Risk reduction philosophy (cont'd)

Level of Risk	Philosophy
Moderate/ undesirable risk	Moderate/undesirable risks require that a management plan be determined for the hazardous event to prevent its occurrence and to monitor changes that could place the risk in a higher level. The management responsibility must be specified.
Low/tolerable risk	Low/tolerable risks require no further treatment other than monitoring as the project progresses to ensure that there is no potential for the risk level to increase with time. These risks can be managed by routine procedures.

6.5 Environmental Hazard and Risk Assessment

Table 6.5 presents the environmental hazard and risk assessment for the drilling program in the Otway Basin. The consequence and likelihood rankings are interpreted from Tables 6.1 and 6.2. The risk evaluation draws from the matrix in Table 6.3.

Mitigation measures have been developed from experience in offshore environmental management in Australia and are based on Australian petroleum industry best practice environmental management guidelines, as defined by the Australian Petroleum Production and Exploration Association (APPEA) Code of Environmental Practice (1996).

There are no activities assessed as being of 'high' risk or greater for the drilling program. This reflects the temporary nature of the activity, and the application of appropriate mitigation measures.

Table 6.5 Environmental risk assessment

Risk Identification			Risk Treatment	Risk Analysis		Risk Evaluation
Activity	**Hazard/Risk**	**Potential Environmental Consequence**	**Assessment/Safeguards/Mitigation Measures**	**Likelihood**	**Impact**	**Risk Ranking**
Presence of drilling rig and support vessels	Rig positioning and anchoring	Jack-up rig set-up anchoring disturbs the seafloor and the associated benthic fauna. Temporary and localised disturbance to seabed habitat.	• Pre-mobilisation survey of drill locations. • Adherence to anchoring procedures to minimise chain and anchor drag.	D	1	Low
Presence of drilling rig and support vessels	Interference with other activities	Interference with commercial fishing and shipping. Reduction in fisheries catch, likely to be short term. Risk of collision with other vessels.	• Implementation of measures discussed in consultation with commercial fisheries, including avoidance of conflict and complaints procedures. • Liaison and communication with commercial fishing operators regarding schedules and work plans during the drilling program. • Offshore distance, short duration will reduce the extent of inconvenience. • All support vessel operations will be conducted in compliance with the AMSA OSV Code (e.g., radar monitoring, vessel communications). • 500m safety zone to protect rig infrastructure. • Navigation light present on West Triton. • Continuous support vessel surveillance. • Commercial shipping lanes to Adelaide, adjacent to the Bernoulli site, managed by liaison with AMSA.	D	1	Low

Table 6.5 Environmental risk assessment (cont'd)

Risk Identification			Risk Treatment	Risk Analysis		Risk Evaluation
Activity	**Hazard/Risk**	**Potential Environmental Consequence**	**Assessment/Safeguards/Mitigation Measures**	**Likelihood**	**Impact**	**Risk Ranking**
Presence of drilling rig and support vessels	Artificial lighting	• May attract seabirds and other marine life into areas of potential risk. • Safety need for other vessels of rig's visibility at night.	• Standard maritime safety procedures will be adopted (AMSA). Lighting selected to meet safety requirements. • Minimise unnecessary lights directed downwards toward water. • Crew to record observations of whales and other megafauna. These will be provided to DEWHA.	E	1	Low
Presence of drilling infrastructure and support vessels	Impact to visual amenity	• Visual impact in nearshore areas, particularly for sightseeing and tourist photography.	• Program is of short duration. • Distance from shoreline at least 11 km from nearest drill site.	E	1	Low
Presence of drilling rig and support vessels	Noise from drill rig, drilling vessels and support vessels, helicopters, feeding and migration of blue whales	• Avoidance behaviour by marine mammals and other fauna. • Noise generated at small spatial scale and confined to vicinity of drill site. • Avoidance behaviour at distance of approximately 5 km. • Change in swim speed and direction, or deeper diving to avoid vessel encounters.	• Application of DEWHA guidelines for cetacean observation and recording on rig and support vessels. • Program will be undertaken during migratory periods for whale species that are likely to occur in the area but not at locations where there is breeding, calving. • Program of short duration (approximately 1.5 months per well site). • Noise produced from the drilling rig (low-level, low-frequency tones), and accompanying support vessels in the order of magnitude of noise produced by commercial shipping.	D	1	Low

Table 6.5 Environmental risk assessment (cont'd)

Risk Identification			Risk Treatment	Risk Analysis		Risk Evaluation
Activity	**Hazard/Risk**	**Potential Environmental Consequence**	**Assessment/Safeguards/Mitigation Measures**	**Likelihood**	**Impact**	**Risk Ranking**
Presence of drilling rig and support vessels (cont'd)		• Generally, support vessel noise is expected to be similar to other commercial vessel traffic, which routinely passes through the area. • Mobile vessel encroachment on cetaceans. • collision with a whale	• Adoption of encroachment distances from whales by service vessels (300 m) and helicopters (500 m) (Australian National Guidelines for Whale and Dolphin Watching 2005).			
Drilling discharges	Discharge of water based drilling cuttings and muds to sea	• Smothering of benthic communities in immediate area of discharge (within 100 m). Minor or undetectable impacts from WBM. • Short term and localised increased turbidity in water column from low-toxicity WBM but cuttings/muds sink rapidly. • Assisted dispersion by trawl activity (after drilling, outside 500 m safety zone for permanent seabed structures).	• Drill cuttings are treated on the shale shaker and by centrifuges prior to disposal to maximise recovery and reuse of drill muds. • WBM is low toxicity and rapidly disperses. • Drilling mud spills will be prevented by containment on the main deck and mud handling area.	D	1	Low

Table 6.5 Environmental risk assessment (cont'd)

Risk Identification			Risk Treatment	Risk Analysis		Risk Evaluation
Activity	**Hazard/Risk**	**Potential Environmental Consequence**	**Assessment/Safeguards/Mitigation Measures**	**Likelihood**	**Impact**	**Risk Ranking**
Drilling operations	Lost equipment and well completion	• Disruption to commercial fishing operations, potential effect on seine and trawl fishing gear. • Consequence low given the small relative area affected. • Higher perception of consequences by trawl and scallop operators.	• Drilling activity is short duration at each site (approximately 1.5 months). Equipment retrieval at end of drilling program. • Record to be kept of any lost equipment overboard. • Consultation to explain drilling program to stakeholders and means to avoid/record/retrieve equipment. • Well plugged and abandoned below seabed.	E	1	Low
Discharge of sewage and putrescible wastes, deck drainage, oily wastes	Waste discharge to sea	• Increase of nutrients in the water column. • Increases suspended sediment load in the water column thereby increasing turbidity and decreasing light attenuation locally. • Possible modification in feeding habitats for pelagic fish and seabirds. • Toxicity effects on marine life.	• Solid waste discharges to sea will be limited to food scraps and sewage. • Sewage will be treated through an on-board effluent treatment plant prior to being discharged to sea in accordance with MARPOL regulations (Annex IV). • Macerated to less than 25 mm diameter prior to disposal. • Greywater discharge volumes will be estimated according to potable water usage and recorded and reported monthly and at end of well.	E	1	Low

Table 6.5 Environmental risk assessment (cont'd)

Risk Identification			Risk Treatment	Risk Analysis		Risk Evaluation
Activity	**Hazard/Risk**	**Potential Environmental Consequence**	**Assessment/Safeguards/Mitigation Measures**	**Likelihood**	**Impact**	**Risk Ranking**
Discharge of solid and hazardous materials and waste	Waste discharge to sea	• Pollution of marine environment. • Cause injury to marine life (e.g., plastics injuring marine birds or seals).	• All vessels will comply with State and Commonwealth legislation for the control of pollution and dumping at sea. • Solids will be returned to shore for disposal. • All hazardous materials will be stored in appropriately bunded areas. • Wastes will be segregated as required and stored in storage areas and transferred to onshore licensed materials handlers for disposal to a licensed depot. • Waste register will be maintained to record waste management practices and audited to verify compliance. • Records kept of unplanned emissions and discharges. • Induction training will be provided for waste management. • A maintenance program shall be in place for waste management equipment.	D	1	Low

Table 6.5 Environmental risk assessment (cont'd)

Risk Identification			Risk Treatment	Risk Analysis		Risk Evaluation
Activity	**Hazard/Risk**	**Potential Environmental Consequence**	**Assessment/Safeguards/Mitigation Measures**	**Likelihood**	**Impact**	**Risk Ranking**
Ballast water discharge and hull cleaning	Introduction of marine pests	• Exotic marine species will compete with local endemic species for food and habitat. • Abalone virus control.	• Ballast water will be exchanged as per vessel procedures, if required. • Vessel to comply with the Australian Ballast Water Management Requirements (AQIS). • Vessel masters will be made aware of the AQIS' Maritime Awareness Kit'. • Support vessels and drill rig to avoid abalone virus areas.	E	1	Low
Deck drainage discharge from drill rig and vessels	Waste discharge to sea	• Pollution of marine environment.	• In the event of a chemical or oil spill, absorbent materials will be used to remove spill material prior to any washing activities. • The absorbent material will be containerised and sent to shore as hazardous waste to ensure that no contaminated waste streams are routinely discharged from the deck drainage system. • MSDS forms available for all hazardous chemicals. • Use of oil detection monitoring equipment (OMD-2005 scattered light sensor) for treated oily water, which is maintained under the routine maintenance system in place discharges. • Deck treatment systems (separators) for oily wastes and discharge of separated water.	E	1	Low

Table 6.5 Environmental risk assessment (cont'd)

Risk Identification			Risk Treatment	Risk Analysis		Risk Evaluation
Activity	**Hazard/Risk**	**Potential Environmental Consequence**	**Assessment/Safeguards/Mitigation Measures**	**Likelihood**	**Impact**	**Risk Ranking**
Exhaust and well testing emissions	Emission to atmosphere	• Pollution of atmosphere. • CO_2 emissions. • Particulate emissions and visible black smoke.	• Emissions will be minimised by ensuring that all engines and generators are serviced to manufacturer's specifications. • Fuel consumption routinely monitored. • Well cleanup and testing in accordance with approval conditions. Modern burner header, spare air compressor for smoke prevention, flare gas volume recorded from off-gas meter on test separator.	D	1	Low
Accidental spill	Fuel spill, condensate spill	• Pollution of marine environment. • Mortality of planktonic or benthic organisms due to reduced water quality or hydrocarbon toxicity. Smothering of marine and coastal flora and fauna.	• Ensure that the vessel has an Oil Spill Contingency Plan (OSCP) in place and staff (including subcontractors, service vessels, etc.) appropriately trained in its execution. • Ensure that all necessary fuel spill equipment is functional and accessible on the vessel. A maintenance program will be in place for oil spill equipment. • The West Triton spill kits (located on the drill floor, port main deck, starboard main deck, sack room, pump room, engine room) include boom socks, soak pads, gloves, goggles. Each of the service vessels has spill kits at up to 4 locations (focsle store, SOPEP bin lower focsle deck, portable bin main deck, deck store main deck) which include scupper plugs, bags of absorbent granules, absorbent socks, booms and fittings, absorbent pads, bags of rags, bags of sawdust, drip buckets, brooms/mops/shovels, large wheelie bins, plastic disposable bags, pump, portable radios, PPE, gloves, no-smoking signs, portable fire extinguishers, hoses for ship fire main.	E	3	Low

Table 6.5 Environmental risk assessment (cont'd)

Risk Identification			Risk Treatment	Risk Analysis		Risk Evaluation
Activity	**Hazard/Risk**	**Potential Environmental Consequence**	**Assessment/Safeguards/Mitigation Measures**	**Likelihood**	**Impact**	**Risk Ranking**
Accidental spill (cont'd)	Fuel spill, condensate spill (cont'd)		• Ensure that fuel will not be transferred during inappropriate weather conditions. • Ensure that equipment and procedures used for transferring fuel from vessel to rig (e.g., 'Dry-Break' hose couplings), conform to the AMSA Code for the safe working of support vessels. • Supply vessels will cease operating and seek safe harbour (or deep water) where conditions make it unsafe, in the view of the Vessel Master, to continue drilling operations. • In the unlikely event of a spill during fuel transfer, ensure that the volume spilled is minimised by the automatic operation of shutdown pumps or safety valves and apply vessel Emergency Response and OSCPs. • Ensure that all vessel operations are conducted in compliance with the AMSA OSV Code (e.g., radar monitoring, vessel communications).Communications shall be maintained with other vessels operating in the area to advise of the project area and avoid collision. • Spill modelling undertaken to enable oil spill contingency planning. • Ensure that all personnel are aware of the existence and location of the above-listed documents.			

Table 6.5 Environmental risk assessment (cont'd)

Risk Identification			Risk Treatment	Risk Analysis		Risk Evaluation
Activity	**Hazard/Risk**	**Potential Environmental Consequence**	**Assessment/Safeguards/Mitigation Measures**	**Likelihood**	**Impact**	**Risk Ranking**
Accidental spill	Chemical spill	• Impacts to water quality. • Toxicity impact on marine life.	• Minimisation of chemical usage and generation of waste. • Education in waste handling procedures during transfer and operational usage for relevant personnel.	E	1	Low
Accidental spills	Blow out, uncontrolled release of reservoir fluids	• Adverse impacts to marine fauna. • Safety to rig personnel.	• Prior site survey analysis and understanding of likelihood of intersecting over-pressured strata. • Maintenance of all well control equipment including routine maintenance of flowline, hose and other fittings to the BOP and other equipment. • Installation of blow-out preventers. • Routine monitoring of pressure of drilling fluid system. • Oils spill and emergency response plan.	E	4	Low

7. ENVIRONMENTAL PERFORMANCE OBJECTIVES AND STANDARDS

This section summarises the ADA environmental objectives, standards and criteria for the drilling programs. The overall performance objectives are directly linked with the identified risks and effects discussed in Section 5. The roles and responsibilities of the key drilling program personnel are identified, including training requirements, in order to ensure that environmental performance objectives and all conditions of consent are met.

This section also identifies the standards (i.e., legislation, industry guidelines and codes of practice), and conditions (e.g., the consent conditions required by Commonwealth, Victorian Government) by which operations should be carried out to achieve each stated environmental objective, consistent with industry's best practice. Performance criteria by which ADA will measure its environmental performance are also presented. The performance criteria are measurable and relate directly to the environmental objectives. The criteria provide an overview to the commitments for environmental management detailed in the Implementation Strategy in Section 8. Environmental Objectives, Standards and Criteria.

The environmental objectives, standards and measurement criteria are outlined in Table 7.1. The following definitions are used in this section:

- **Performance objectives** are defined as 'overall goals for environmental performance as they relate to individual aspects'.
- **Standards** are described as 'detailed performance requirements necessary to achieve the performance objectives'.
- **Criteria** are defined as 'factors that provide a measure, either direct or indirect, relating to the performance standards'.

Table 7.1 Summary of environmental management objectives, standards and performance criteria

Aspect	Objectives	Standards	Criteria
Policy	Communicate ADA Health, Safety and Environmental Policy (and operator policy, Appendix D) statement and procedures.	ADA Environment Policy statement (section 2.5).	Environment policy statement in place and personnel awareness of policy requirements undertaken.
Disturbance to seabed	Minimise disturbance to seabed.	Geotechnical survey of rig sites prior to drilling,	Records available for seabed surveys, approach paths and drilling locations. Dropped objects recorded on log. Verification of retrieval at end of drilling. e.g,. by ROV.

Table 7.1 Summary of environmental management objectives, standards and performance criteria (cont'd)

Aspect	Objectives	Standards	Criteria
Fishing	Minimise impact on commercial fishing operations.	Mitigation measures specified in section 6 of this EP.	Records of consultation/ radio contact with commercial fishing operators. Records of implementation of stakeholder consultation program. Records of complaints and how addressed.
Shipping	Minimise impacts to shipping activities.	Mitigation measures specified in sections 6 of this EP.	Records of Marine Notices and radio contact logged. Marine Notices issued. Safety Zone gazetted. Attendant vessels monitoring – radar/radio. Effective consultation with fisheries representative(s) and liaison officer appointed.
Introduced pests	Avoid introduction of pest species.	Mitigation measures specified in section 6 of this EP. Australian ballast water requirements AQIS 2002.	Records of AQIS certificates and inspection. Records of hull cleaning and painting. Ballast exchange records.
Artificial lighting	Minimise use of non-essential lighting whilst maintaining safety standards on rig and support vessels. Rig lighting safety need for other vessels.	Application of shielding where practical.	Report of light shielding methods where applied.
Noise	Minimise noise from drilling rig.	Design specification of rig and survey vessel engine and noisy equipment.	Records of maintenance schedule show engines and noisy equipment are maintained according to design specifications.
Impacts to marine mammals	Minimise impacts from physical presence of rig and noise from rig and attendant vessels.	Application of DEWHA Guidelines for whale and dolphin observation and records. Application of ANRMC guidelines for whale watching.	Cetacean sighting reports to DEWHA.
Atmospheric emissions - diesel	Minimise emissions: efficient use of energy.	MARPOL limits, equipment specs.	Maintain all diesel engines to design specifications. Fuel use records maintained and reviewed.
Waste management	Manage/store wastes to avoid any marine discharge and therefore any environmental impacts.	Mitigation measures specified in section 6 of this EP.	Waste log or register kept up to date.

Table 7.1 Summary of environmental management objectives, standards and performance criteria (cont'd)

Aspect	Objectives	Standards	Criteria
Waste discharges	Minimise marine impacts from e.g., sewerage discharges.	MARPOL equipment specs. Food scraps macerated to <25 mm size.	Maintain sewerage plants and macerator.
Fuel and oil spills	Manage operations to avoid spills and minimise safety and environmental risks.	ADA Environment Policy statement (section 2.5). Vessel contractor operating procedures. ERM/OSCP training.	Check implementation of re-fuelling procedures. Check integrity of physical barriers (e.g., tanks and bunding). Training records.
Training	To ensure personnel are aware of their roles, responsibilities, obligations and management procedures.	ADA Environment Policy statement (section 2.5). Drilling and vessel contractor operating procedures. Environment Plan West Triton Drilling Program-Otway Basin (this EP).	Check training log for coverage of appropriate topics and relevant personnel.

7.1 Training

Drilling rig operators and vessel crews undergo continual training covering general operational procedures including waste management, spill and other emergency response. ADA undertakes HSE training onboard service vessels for all crew. In addition, crews shall undergo project specific inductions designed to ensure each crew member is aware of their responsibilities and have the necessary skills to complete the required tasks and meet project objectives to avoid or minimise impacts to the marine environment.

7.1.1 Induction

Inductions will be conducted at the commencement of the drilling program and will detail the requirements of the Environment Plan with respect to key safety and environmental requirements of the drilling operations, presented (in the induction) as a register of environmental commitments structured to include:

- Importance of conforming to the HSE policy and procedures. The HSE Policy has been and will be implemented to reduce environmental risks, continuous improvement, adequately train personnel on their environmental responsibilities so that objectives are met.
- Location of EP on-board under control of ship's master.
- Detail of significant environmental features (environmental impacts, actual or potential, of their work activities) of the drilling program area and surrounds.
- Details of procedures to minimise introduction of exotic species via discharge of ballast or hull fouling.
- Obligations for observing whales and dolphin and completing records according to DEWHA guidelines.

- Importance of understanding the drilling program coinciding with the blue whale feeding and migratory periods
- Importance of dropped objects procedures and recording for subsequent retrieval.
- Waste storage and management procedures within coastal (State) waters (i.e., zero putrescible waste discharge into State waters).
- Nearshore operating requirements (distances offshore, minimum depths, daylight hours etc.) to minimise risk of collision or grounding.
- Roles and responsibilities for achieving conformance with the HSE policy and procedures (including emergency and spill procedures, location of necessary equipment and OSCP, incident reporting notification, reportable/recordable incidents).
- APPEA DVD training on marine mammal observations and the supply of appropriate recording forms.
- Local emergency contact numbers.

All relevant personnel will undertake an environmental induction and completion will be recorded in the training database.

7.1.2 Meetings

Toolbox Meetings are undertaken on a daily basis and prior to any activity where potential hazards may exist. During toolbox meetings, all crew involved in the activities review, the scope of work, responsibilities, communications, procedures, changes, hazards, risk assessments and safeguards. All toolbox meetings are recorded and used to undertake/review risk assessments and communicate hazards and safeguards to persons involved. Toolbox talks after the activity provide feedback on the adequacy of the safeguards.

7.1.3 Oil Spill Response Training

Relevant personnel are trained using internal (West Triton and ADA) and external (e.g. Australian Marine Oil Spill Centre (AMOSC)) resources. The West Triton Australian emergency response training program (including OSCP training) has completed two exercises to date and will undertake an exercise for each well where there is a change in operator from the previous well.

7.2 Environmental Roles and Responsibilities

Under the P(SL)Management of Environment Regulations 14 (4) the implementation strategy must establish a clear chain of command, setting out the roles and responsibilities of personnel in relation to the implementation, management and review of the Environment Plan. As such, ADA has been ‘contracted’ by the operator Beach Petroleum to take responsibility of personnel in relation to the implementation, management and review of this Environment Plan.

All ADA and contractor personnel are required to comply with the Environment Plan and all relevant conditions of approval. Key environmental roles and responsibilities, and therefore chain-of-command, are identified in the following text, whilst specific duties assigned to key personnel are identified in Section 8, Table 8.1.

7.2.1 ADA Drilling Manager

- Responsible for adherence to ADA Health, Safety and Environment Policy.
- Responsible for ensuring the implementation of the Environment Plan.
- Responsible for notifying (in writing) DPI of names and contact details of all environmental contact persons listed and any changes in nominated persons during the course of the project.
- Responsible for notifying the Designated Authority and other appropriate regulatory authorities of all reportable incidents.

7.2.2 ADA Site Representative

- Client site representative during project.
- Responsible for monitoring the performance of the drilling contractor with regard to requirements of the Environment Plan and all conditions of approval.
- Responsible for notifying the ADA Project Manager of all incidents.

7.2.3 Support Vessel Master

- Responsible for safe operation of the support vessel.
- Overall responsibility for HSE management onboard the vessel, and for ensuring environmental impact mitigation measures relevant to vessel operation are implemented, as specified in the Environment Plan and all conditions of approval.
- Responsible for notifying the ADA Site Representative of any incidents/activities arising from vessel operations that may have a negative impact on the environment.

7.2.4 Offshore Installation Manager (OIM)

- Responsible for ensuring that environmental impact mitigation measures relevant to the drilling program are implemented, as specified in the Environment Plan and all conditions of approval.
- Responsible for ensuring compliance with all aspects of HSE reporting and incident/near miss investigations including a copy of the daily report to DPI.
- Responsible for notifying the ADA Site Representative of any incidents/activities arising from the drilling program that may have a negative impact on the environment.

7.2.5 ADA HSE Manager

- Responsible for liaison with stakeholders on environmental matters as required.
- Responsible for conducting environmental compliance audit.
- Responsible for preparation of End of Well Environmental Performance Report to be submitted to DPI.
- Responsible for conducting environmental compliance audit.

7.2.6 Drilling Rig HSE Adviser

- Responsible for conducting environmental inductions and training of crew on relevant aspects of the Environment Plan, with assistance from specialist environmental advisers as appropriate.
- Responsible for logging whale sightings and sending to ADA. Also responsible for HSE monitoring and reporting on rig to client and DPI.

8. IMPLEMENTATION STRATEGY

This section describes the implementation strategy for the Environment Plan, specifically detailing the measures to ensure that the environmental performance objectives, standards and all conditions of consent are met.

Under the Petroleum (Submerged Lands) (Management of Environment) Regulations 1999, the implementation strategy must include operational systems and procedures that identifies:

- Systems, practices and procedures.
- Specific roles and responsibilities.
- Employee training.
- Monitoring, auditing and recording requirements.
- Maintenance of qualitative records of emissions and discharges to the air, marine, seabed and sub-seabed environment.
- Emergency response planning.
- Consultation with government and stakeholders.
- Compliance with the act, the regulations and any other environmental legislation applying to the activity.

The implementation strategy is summarised in Table 8.1.

Table 8.1 Implementation strategy

ID	Subject	Responsibility	Task	Evidence of Action
1	Approval to commence/continue drilling	ADA	Obtain written approval from DPI.	Approval from DPI.
2	Auditing and reporting	ADA Project Manager	Ensure one compliance audit during the Otway Basin drilling program complies with commitments proposed in this Environment Plan.	Results of a compliance audit.
3		ADA HSE Manager	Ensure that the results of the compliance audit are forwarded to the ADA Project Manager who signs off the closeout report to DPI (within 2 to 3 months of each well completion).	Results of a compliance audit. Closeout report to DPI.
4		ADA Drilling Representative	Report all reportable incidents to DPI within 2 hours, including spills > 80 L.	Sign-off on incident reports sent to regulator.
5		ADA Drilling Representative	Report all spills through the ADA incident reporting system (ADA HSE Reporting Procedure, ADA Accident Reporting and Investigation Procedure).	Record of incident reports.
6		OIM	Record and report all non-compliances to this EP.	All non-compliances will be included in the End of Well Environmental Performance Report.
7		OIM	Records kept of routine discharges and discharges from unplanned incidents.	Records of oily water disposal; waste log; drilling mud discharge records.
8	Provision of standards and procedures	ADA Site Representative	Provide as required to OIM all relevant operating standards and procedures such as this Environment Plan.	Check that documentation is available onboard and that all personnel have been inducted on the EP requirements and that their attendance records are signed-off with date.
9	Communication of standards and procedures	Drilling Rig HSE Rep	Conduct as required, pre-site mobilisation induction for employees and contractors to ensure general environmental expectations and desired outcomes outlined in the Environment Plan are understood. Record date, name.	Sign-off on inclusion of EP requirements within induction program.

Table 8.1 Implementation strategy (cont'd)

ID	Subject	Responsibility	Task	Evidence of Action
10	Oil spill response	OIM	Ensure that relevant personnel are trained in the use of oil spill response equipment and oil spill response requirements, including refuelling.	Sign-off on training records for appropriate spill response training.
11		OIM	Ensure that all personnel are made aware of the existence and location of vessel Emergency Response and Oil Spill Contingency documents (including any bridging document with local contact lists) and equipment/material (including spill kits).	Sign-off on inspection record for appropriate emergency and spill plans available and that key people know where they are and content.
12	Handling of hazardous substances	OIM	All substances shall be handled in accordance with their respective material safety data sheets (MSDS). Material Safety Data Sheets for chemicals required on board must be held on the vessel by the contractor responsible for all chemicals used. Safety Case has PPE handling requirements, OSCP has clean-up requirements for deck spills.	Sign-ff on inspection record for storage, use and handling procedures and MSDSs of hazardous materials.
13	Supply of equipment and supplies	OIM	Ensure that storage on the vessel is in accordance with various legislative requirements including the AMSA OSV Code and AMSA Marine Orders: Dangerous Cargoes, Cargo Stowage and Securing, Marine Pollution Prevention - Noxious Liquid Substances, and Marine Pollution Prevention - Packaged Harmful Substances. Ensure stocks of spill response materials/equipment are regularly checked and replenished to ensure appropriate supply quantities are on hand at all times.	Sign-off on inspection record for storage, use and handling procedures and MSDSs of hazardous materials.
14	Fauna and flora impact mitigation observation	ADA Site Representative	Ensure that the vessel is aware of their responsibility for implementing a program of observation and recording of whales. Record whale sightings and complete observation log. APPEA DVD on-board to aid whale identification if needed.	Sign-off on personnel training records for APPEA DVD training as part of induction metric and the supply of appropriate recording forms. Also sign-off on report of sightings made to DEWHA as required.
15	Fishing interaction	OIM	Establish communication times /frequencies to inform fishing operators / cooperatives of areas of project. Ensure 'lost equipment' procedures followed.	Maintain log of communication record. Record of lost equipment.

Table 8.1 Implementation strategy (cont'd)

ID	Subject	Responsibility	Task	Evidence of Action
16	Recreational vessel interaction	OIM	Establish vessel contact with any recreational vessel and inform the recreational vessel of the vessel movements.	Maintain log of communication record.
17	Disposal of wastes	OIM	All vessels will comply with State, Commonwealth and MARPOL legislation for the control of pollution and dumping at sea. No sewage, putrescible waste will be discharged in State waters (3 nm). Greywater discharge volumes will be estimated according to potable water usage and recorded and reported monthly and at end of well. Solids will be returned to shore for disposal. All hazardous materials will be stored in appropriately bunded areas and MSDS for these materials will be kept on the vessel. A register is in place for all chemicals on board (hazardous and non-hazardous). Hazardous wastes will be segregated and stored in storage areas and transferred to onshore licensed hazardous materials handlers for disposal to a licensed depot. Waste register will be maintained to record waste management practices and audited to verify compliance.	Sign-of on waste transfer or disposal record sheets including date, time, and location.
18	Loss of material	OIM	Any spillage during supply vessel loading, unloading, transportation, storage or from the drill rig operations shall be reported immediately.	Physical inspection prior to refuelling drill operations, in maintenance log when completed and on spill record to be submitted to regulator.
19		OIM	Any loss to the sea of fuel or other hazardous substance that requires an operational response to contain or recover is to be managed in accordance with the vessel Oil Spill Contingency Plan.	Written documentation, reporting of incidents, incident investigation report.

Table 8.1 Implementation strategy (cont'd)

ID	Subject	Responsibility	Task	Evidence of Action
20	Refuelling	OIM	Ensure that refuelling operations for the support vessel will be conducted in accordance with refuelling procedures, including continuous visual monitoring and the use of ADA approved fittings. Refuelling is to be conducted at port only.	Refuelling records.
21	Government and stakeholder management liaison	OIM	Advise DPI of project execution progress.	Documentation of compliance (email, phone records).
22	Maintaining equipment	OIM	All equipment (e.g., generators, engines, macerators) to be calibrated and maintained in accordance of manufacturers specs.	Maintenance records.

9. MONITORING, AUDITING AND REPORTING

9.1 Environmental Monitoring

ADA will develop an appropriate monitoring strategy, which will assess compliance with mitigation measures, provide impact assessment verification feedback and also enable an operational response to any significant environmental threat that may arise during the drilling program. The monitoring program is outlined in Table 9.1 below.

Table 9.1 Monitoring program

Parameter	Frequency	Data Recipient
Whale sightings	As sighted	ADA, DEWHA, Peter Gill, Mandy Watson
WBM cuttings volume discharged	Daily/End of Well	ADA
WBM volume discharged	Daily/Total (end of well)	ADA
Fuel use: rig, service vessels	Weekly	ADA
Waste volume to shore from rig	On transfer event to shore	ADA
Flare volume, hours	Weekly	ADA
Oily water discharge volume, ppm oil	Continuous during discharge	ADA
Greywater discharge volumes discharged	Monthly and at end of well (estimated from potable water usage	ADA, DPI
Hazardous materials use	Weekly	ADA
Spills volume	Per incident basis	ADA, (AMSA, DPI if over volume thresholds)
Vessels entering the Safety Zone	Per incident	ADA

9.2 Auditing

ADA will co-ordinate an independent environmental audit during the Otway Basin drilling program. The audit protocol will include an assessment against the following commitments given in Table 8.1 Environmental Commitment Register.

Any non-compliances will be reported to the DPI in the end of well closeout report.

9.3 Reporting on Routine Operations

ADA will report on drilling operations to demonstrate that the environmental performance objectives and standards outlined in this EP have been met. ADA will undertake internal compliance checks as appropriate to show that the actions detailed in this EP have been undertaken. The monitoring program is shown in Table 9.1.

A daily drilling status report that includes environmental matters will be provided to DPI.

A close-out report will be submitted to DPI within 2 to 3 months of completion of each drilling well. This report will include details of all emissions and discharges, results of audits and compliance checks and any incidents and complaints and how these have been addressed.

9.4 Reporting on Non-routine Incidents

All incidents that are a possible breach of environmental regulatory requirements, do not comply with this Environment Plan and/or have the potential to cause significant impact on the environment must be reported and investigated. ADA, as operator, will provide written reports on any reportable incidents to the DPI (refer below) and maintain a record of each report and details of any corrective action taken.

Reportable Incidents

A reportable incident is defined by the P(SL)A MoE Regulations as 'an incident mentioned in the environment plan for the activity that has caused, or has the potential to result in, moderate to catastrophic environmental consequences as categorised by the risk assessment process undertaken as part of the preparation of the Environment Plan'. Incidents considered reportable are spills > 80 L, and damage to fishing gear. Other incidents, although almost unknown and highly unlikely include whale collision, and a ballast water incident in port.

The DPI will be notified of all reportable incidents as soon as practicable, and not later than 2 hours following the first occurrence of the reportable incident or the time that the operator becomes aware of the reportable incident, in accordance with regulation 26 of the P(SL)A MoE Regulations. A written report will be provided to the DPI within 3 days of the first occurrence of the reportable incident.

Recordable Incidents

A recordable incident is defined by the P(SL)A MoE Regulations as an incident arising from the activity that:

- Breaches a performance objective for the Environment Plan that applies to the activity; and
- Is not a reportable incident.

In accordance with regulation 26B of the P(SL)A MoE Regulations, a monthly written report of all recordable incidents will be submitted to the DPI as soon as practicable after the end of a calendar month (and not later than 15 days after the end of the calendar month), and contain a record of all recordable incidents that occurred during the calendar month.

Escape of Petroleum

Mandatory reporting requirements apply in accordance with P(SL)A Management of Safety Regulations for the escape or ignition of hydrocarbons.

An escape or discharge into the sea of a mixture of petroleum and water in which the petroleum concentration was greater than 50 mg/L, and an escape or discharge into the sea of more than 80 L of petroleum liquids is reportable under the P(SI)A Management of Environment Regulations.

Additional Regulatory Reporting

Additional regulatory reporting requirements for the drilling program include:

- All oil pollution incidents in Commonwealth waters must be reported to AMSA under Marine Notice 1/1996.
- Any spills greater than 10 tonnes in Commonwealth waters must be reported to AMSA within 1 hour.

DEWHA Cetacean Reporting

- DEWHA cetacean observation forms completed daily and submitted to DEWHA at the completion of each drilling well.

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Appendix A

Sign-off Schedule

Schedule

The drilling program described in the West Triton Otway Basin PSLA Environment Plan (EP) will be undertaken in a permit area for which a consortium company has operator responsibility. Within the EP, for which ADA is the proponent, this Schedule has been developed as a mechanism to assist the management of the approval process as per the PSLA Management of Environment Regulations.

Table 1 is a proforma for a company to formally sign-off under the Schedule.

Table 1 Company acceptance of EP content

Permit Area	Location	Company	Name	Signature	Date
Vic/P46	Bernoulli	**Beach Petroleum**			
	Fermat				

Appendix B

West Triton jack-up drilling rig

West Triton

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GENERAL	
Delivery	01-Jan 2008
Hull ID	P2011
Major Upgrades	-
Design	Baker Marine-375 Pacific Class
Previous Names	Seadrill 2
Flag	Singapore
Classification Agency	ABS-CDS ✠ Self Elevating Unit
Dimensions	236' x 224' x 27.9'
Operating Draft	18.8 Ft
Transit draft	19.5 Ft
Target VDL - Operating	7,496 kips
Target VDL - Survival	6,500 kips
Target VDL - Transit	6,000 kips
Outfitted Max WD	375 Ft
Min WD	30 Ft
Leg Length	506' (incl spudcan tip)
- usable below hull	435 (incl spudcan tip)
Leg Spacing	155.2' transverse
	145.3' longitudinal
Usable Deck Space	32,722 Ft 2
Spudcan Diameter	55.446ft
Max Drilling Depth	30,000'
Cantilever Envelope	70' aft 30' transverse
Max Combined Load	2599 kips at 70' aft
Quarters	115
Helideck Size	75.5' diameter
Helideck Capacity	S61N or 20,500 lbs
Helideck Certification	CAP437
DRILLING PACKAGE	
Derrick (SHL)	1,500 kips
Racking Capacity	30,000' x 5.5" dp
Drawworks	NOV-D3000UE- 3450HP AC
Rotary Table	NOV-D 495 –API 7K
Top Drive	Hydralift Power Swivel HPS750
- continuous torque	64,175 ft lbs @ 94 rpm
Pipehandling	Hydra Tong MPT-200
MUD SYSTEM	
Pressure Rating	7.5M
Pumps	3 x NOV 14-P-220 triplex
Solids Control	1 x dual gumbo box
	4 x VSM 300

CAPACITIES	
Diesel	3900bls
Drillwater	4850-bbls
Potable Water	3,556 bbls
Bulk Product	11,654 cu ft
Sack Storage	5,000 sacks
Base Oil	1,274 bbls
Brine	1310
Liquid Mud	4,727 bbls
Mudpits (excl slug/mix)	8
WELL CONTROL	
Diverter	49.5" KFDJ -500psi
Annular Preventer	1 x Hydril GX 18 ¾" 10M
High pressure BOP	2 x Hydril 18 ¾" 15M double
C&K Manifold	3 1/16" I.D.- 15M
CRANES	
Pedestal Cranes	3 ea Baker Marine
	(900 / 1600 / 2250)
API SWL-Short Tons	7.8ST@100' / 25.0ST@20'
	8.7ST@100' / 44.9ST@25'
	17.0ST@120' / 55ST@25'
BOP Crane	2 x 50MT
POWER	
Main Engines	5 x CAT3516HD
Total Power	10,750 hp
Main Generators	5 x Baylor SR4
Emergency Power	1 x CAT3508
OTHER	
Mooring System	4 x Baker/Series 70
Conductor Tensioner	500 kips vertical
TUBULARS	
Drillpipe	15750' x 5.5" x S-135
	XT-57 tooljoints, Arnco 300XT
FEATURES	Helo refuelling system
	Single stage preload
	Coring Caisson

Date of Update: 21 Jun 07

Appendix C

Service vessel specifications

M/V Pacific Battler

Main Engines:
2 x 6,120 BHP = Total 12,240 BHP Wartsila Vasa 12V32D engines

Propulsion:
2 x Ulstein CPP propellers in Kort nozzles
2 x Ulstein High Lift flap rudders
2 x independent Ulstein Tenfjord electric-hydraulic steering gears

Bollard Pull:
152 metric tonnes, continuous

Winch:
Ulstein Brattvaag, 300 tonnes, 3 drums

Age / Built:
Ulstein Verft AS, September 1997

Cargo Deadweight:
2,100 tonnes

Vessel Information

Built	:	Ulstein Verft AS, September 1997
Flag	:	Singapore
Call Sign	:	9V5944
IMO No.	:	9155664
Classification	:	DNV + 1A1 Tug, Supply Vessel, SF, E0, FiFi 1

Dimensions

Length, overall	:	66.0 meters
Length, BP	:	56.4 meters
Breadth, moulded	:	14.6 meters
Depth, main deck	:	7.4 meters
Design draft	:	5.2 meters
Maximum draft midship	:	6.3 meters
GRT	:	1,974 Tonnes
NRT	:	716 Tonnes

Capacities

Deadweight (maximum)	:	2,100 tonnes
Clear Deck Area	:	34 m x 11.8 m = 401.2 square metres
Deck Loading	:	General deck - 5 tonnes / square metre Aft A/H deck - 10 tonnes / square metre
Deck Cargo	:	750 tonnes
Fuel	:	880 cubic metres
Potable Water	:	460 cubic metres
Ballast Water / Drill Water	:	825 cubic metres
Brine / DMA / Glycol / Liquid Mud	:	275 cubic metres
Liquid Mud	:	270 cubic metres, (in 4 tanks with agitators)
Bulk	:	240 cubic metres (8475 cubic feet) (in 5 tanks)
Ship's Stores	:	Freezer: 8.4 cubic metres Cooler: 8.6 cubic metres Dry: 10.5 cubic metres

Machinery

Main Engines	:	2 x 6,120 BHP = Total 12,240 BHP Wartsila Vasa 12V32D engines
Propulsion	:	2 x Ulstein CPP propellers in Kort nozzles 2 x Ulstein High Lift flap rudders 2 x independent Ulstein Tenfjord electric-hydraulic steering gears
Bow Thrusters	:	2 x 885 BHP, each developing 10 tonnes thrust (total 20 tonnes)
Stern Thrusters	:	1 x 885 BHP, developing 10 tonnes thrust
Shaft Generators	:	2 x 2,250 kVA, 450 V, 60 Hz, each
Auxiliary Generators	:	2 x 450 kVA, 450 V / 230 V, 3-phase, 60 Hz 1 x 120 kVA, 450 V / 230 V, 3-phase, 60 Hz

Towing and Anchor Handling

Bollard Pull	:	152 metric tonnes, continuous
Rig Chain Locker	:	2 x chain lockers, each 78 cubic metres, total 156 cubic metres
Winch	:	Ulstein Brattvaag, 300 tonnes, 3 drums (all declutchable)
Load Capacity	:	Brake holding on 1st layer - 400 tonnes
Brake Capacity	:	Brake holding on 1st layer - 430 tonnes
Tow Drum Wire Capacity	:	1 x 1500 m x 76 mm wire capacity, declutchable
Work Drum Capacity	:	2 x 1200 m x 76 mm wire capacity, declutchable
Chain Gypsy Cable Lifter	:	2 x non-declutchable cable lifters, one for 3 1/4" (84 mm) chain port and one for 3 1/4" (84 mm) starboard, fitted outside of the anchor-handling drums, plus 1 spare of 3 3/4"

Spare Reel Capacity	:	2 x pennant wire drums, 15 tonnes, each Capacity - 1500 m x 76 mm diameter wire each 1 x spare tow wire drum, 15 tonnes Capacity - 1400 m x 77 mm diameter wire
Stern Roller	:	5 m x 3 m diameter, 350 tonnes SWL
Tow Pins / Guide Pins	:	2 sets (total 4) Karmoy hydraulic, retractable, 240 tonnes SWL, remotely controlled from wheelhouse and on aft deck
Wire Chain Stopper	:	2 x Karm Fork, retractable, 440 tonnes SWL. Remote control from wheelhouse and on aft deck

Deck Machinery

Tuggers	:	2 x 12 tonnes each, hydraulic
Capstans	:	2 x 10 tonnes each, main deck, aft
Windlass	:	1 x 15 tonnes, hydraulic
Crane	:	1 x 5 tonnes, 7 - 11 m outreach, hinged arm

Electronics

Main Radar	:	Furuno FAR / FR-2805, S-band (10 cm), ARPA, 28 ins display
Auxiliary Radar	:	Furuno FAR / FR-2805, X-band (3 cm), 28 ins display
Auto Pilot	:	Anschutz Digital Pilotstar D
Gyro Compass	:	Anschutz, with repeaters in wheelhouse, bridge wings, chart table, steering gear room
Magnetic Compass	:	Bergen Nautik, BN-35
Echo Sounder	:	Marimatech, E-Sea Sound 206
DGPS	:	Furuno
Anemometer	:	Aanderaa Instruments
Speed Log	:	Skipper Electro-magnetic EML 224
Communications	:	(G.M.D.S.S.) Global Maritime Distress & Safety System 2 x SSB 2 x VHF 2 x Inmarsat C (435136410 / 435136420) 3 x VHF (portable) 2 x SART 1 x EPIRB 1 x Navtex
Weather Fax	:	Furuno, Fax-208 MKII

Discharge Pumps

Potable Water	:	150 cubic metres/hr - 9.0 bar
Drill Water	:	205 cubic metres/hr - 9.0 bar
Fuel Oil	:	150 cubic metres/hr - 9.0 bar
Liquid Mud	:	75 cubic metres/hr - 18.0 bar
Brine / Mud	:	75 cubic metres/hr - 18.0 bar
Dry Bulk	:	80 cubic metres/hr - 5.6 bar, 80 psi, 2 compressors

Performance

Speed / Fuel Consumption	:	15 knots running free / 34.0 tonnes per day 12 knots running free / 15.7 tonnes per day 10 knots running free / 9.6 tonnes per day At 100% MCR (12,240 BHP) / 41.3 tonnes per day

Dynamic Positioning

Type	:	Cegelec Type DPS 901 Simplex DP
Reference Systems	:	Sercel, NR108 DGPS Fan Beam laser Sonadyne HPR System
Joystick	:	Poscon - electronic control system joystick, integrated to main propellers, main engines, rudders, side-thrusters and interfaced to gyro compass

External Fire Fighting

Capacity	:	3,000 cubic metres per hour, with external drenching system, to DNV FiFi ONE requirements
Monitors	:	2 x 1,200 cubic metres / hr = 2,400 cubic metres / hr, controlled from inside wheelhouse
Throw Length	:	120 m
Throw Height	:	50 m

Standby Rescue Equipment

1	:	MOB - boat with inboard diesel engine and water jet propulsion, Norsafe as, Magnum 230 HP waterjet, 25 knots with boat davit for quick launch / recovery
2	:	Rescue Zones on both Port and Starboard side, main deck, with scrambling net

Accommodation

Berths	:	7 x 1 (single) berths 3 x 2 (double) berths 3 x 4 (four) berths 25 berths Total 1 x Ship's office 1 x hospital 1 x mess / day room 1 x galley

Miscellaneous

1	:	Design complies to latest rules and regulations from SOLAS 74, with amendments in force and IMO 469 (XII) "Guidelines for the design and construction of offshore supply vessel"
2	:	Fitted with a passive roll reducing tank below main deck
3	:	All cargo systems are controlled by a tanktender system with discharge printers
4	:	Fitted with 5 remote cameras on deck and in winch-house for anchor-handling / towing operations with 2 TV monitors in wheelhouse
5	:	Pneumatic bulk handling system, capable of discharging 2 types of dry bulk simultaneously through 2 separate discharge lines with emergency stop fitted in wheelhouse

6	:	Hose connections: Fuel - 4 inches (Avery Hardol) Potable Water - 4 inches (Weco) Drill Water - 4 inches (Weco) Liquid Mud - 4 inches (Weco) Dry Bulk - 5 inches (Weco) Adapters 6"-5" (2 sets - Weco), 5"-4" (2 sets - Weco), 4"-4" (Camlock - male-to-male), 3"-3" (Camlock - male-to-male), 4" Weco - 4" Camlock (female-to-female) and 4" Weco - 3" Camlock (female-to-female)
7	:	Fitted with 2 Halogen searchlights, each 2,000 W, on wheelhouse top and operated from inside wheelhouse
8	:	Fitted with 4 x 400 W flood-lights, for cargo deck area
9	:	Wood sheathed main deck except for aft area which is steel plated for anchor-handling
10	:	Welding / cutting machine complete with attachments
11	:	Dispersant system designed to use either neat or diluted dispersant
12	:	14 inch diameter hull penetration fitted for survey equipment
13	:	Statutory life-rafts, life buoys, life jackets, pyrotechnics
14	:	P.A. System
15	:	TV and video

Anti-Pollution

Dispersant Tank	:	8.7 cubic metres
Spray booms	:	2 x 6 m

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M/V Pacific Valkyrie

Main Engines:
2 x 4,405 BHP = 8,810 BHP

Propulsion:
2 x MAN B&W Alpha CPP Propellers in MAN AHT Kort nozzles

Bollard Pull:
120 tonnes (minimum)

Winch:
1 x Hydrakraft 250 tonne variable pressure waterfall winch

Age / Built:
Under construction - Labroy shipyard (Batam), November 2007

Cargo Deadweight:
approximately 2,500 tonnes @ 6.2 m draft

Vessel Information

Built	:	Under construction - Labroy shipyard (Batam), November 2007
Flag	:	Singapore
Call Sign	:	9V6791
IMO No.	:	9361653
Classification	:	ABS 1A1 (E) Offshore Support Vessel & Towing Vessel, +AMS, +ACCU

Dimensions

Length, overall	:	66.0 meters
Length, BP	:	57.0 meters
Breadth, moulded	:	16.0 meters
Depth, main deck	:	7.3 meters
Maximum draft midship	:	6.2 meters
GRT	:	2,277 Tonnes
NRT	:	774 Tonnes

Capacities

Deadweight (maximum)	:	approximately 2,500 tonnes @ 6.2 m draft
Clear Deck Area	:	33 m x 12.8 m = 425 square metres
Deck Cargo	:	870 tonnes
Fuel	:	827 cubic metres (dedicated) 1,615 cubic metres (including the combined use Mud / Brine tanks and the combined use Rig Chain locker)
Potable Water	:	468 cubic metres
Ballast Water / Drill Water	:	911 cubic metres
Brine / DMA / Glycol / Liquid	:	128 cubic metres (in 2 dedicated tanks)
Mud		593 cubic metres (including the combined use Mud tanks - s.g. of 2.5)
Liquid Mud	:	465 cubic metres (in 6 dedicated tanks) 593 cubic metres (including the combined use Brine tanks - s.g. of 2.5)
Bulk	:	185 cubic metres (approximately 6,600 cubic feet) total capacity in 4 tanks
Ship's Stores	:	Freezer (-25 degrees Celsius) - approximately 12 cubic metres Cooler (+4 degrees Celsius) - approximately 12 cubic metres Dry Stores - approximately 26 cubic metres

Machinery

Main Engines	:	2 x 4,405 BHP = 8,810 BHP
Propulsion	:	2 x MAN B&W Alpha CPP Propellers in MAN AHT Kort nozzles
Bow Thrusters	:	2 x 600 kW (805 BHP) Brunvoll Tunnel Thrusters, approximately 9.0 tonnes thrust each
Stern Thrusters	:	1 x 600 kW (805 BHP) Brunvoll Tunnel Thrusters, approximately 9.0 tonnes thrust
Shaft Generators	:	2 x Leroy Somer shaft generators, 1300 kW, 1600 kVA each, 440 V, 60 Hz
Auxiliary Generators	:	1 x Caterpillar 3406 Diesel Generator, 270 kW, 440 V, 60 Hz
Emergency Generators	:	1 x air cooled Caterpillar 3406 Diesel Generator, 270 kW, 440 V, 60 Hz

Towing and Anchor Handling

Bollard Pull	:	120 tonnes (minimum)
Rig Chain Locker	:	195 cubic metres chain capacity
Winch	:	1 x Hydrakraft 250 tonne variable pressure waterfall winch

Load Capacity	:	Tow Drum - Pulling force: 1st layer - 255 tonnes mid layer - 165 tonnes outer layer - 122 tonnes (low speed) Tow Drum - Pulling speed: 1st layer - 11.4 m/min mid layer - 17.6 m/min outer layer - 23.8 m/min (low speed) A/H Drum - Pulling force: 1st layer - 127 tonnes mid layer - 82 tonnes outer layer - 61 tonnes (high speed) A/H Drum - Pulling speed: 1st layer - 22.8 m/min mid layer - 35.2 m/min outer layer - 47.6 m/min (high speed)
Brake Capacity	:	Brake Force: 1st layer - 320 tonnes mid layer - 207 tonnes outer layer - 153 tonnes
Tow Drum Wire Capacity	:	1500 m x 71 mm diameter
Work Drum Capacity	:	1500 m x 71 mm diameter
Chain Gypsy Cable Lifter	:	1 x 76 mm, 1 x 84 mm mounted on each side of anchor handling drum
Spare Reel Capacity	:	1 x Hydrakraft variable pressure, 20 tonnes pull on 1st layer, 1400 m x 71 mm diameter
Stern Roller	:	Rolls Royce, SWL 350 tonnes, 5.5 m x 2.0 m diameter
Tow Pins / Guide Pins	:	1 pair of retractable Karmoy guide pins with horizontal locking tops
Wire Chain Stopper	:	2 x retractable Karm forks, SWL 300 tonnes for wire/chain up to 102 mm
Pennant Storage Reels	:	2 x Hydrakraft variable pressure, 20 tonnes pull on 1st layer, 1000 m x 76 mm diameter

Deck Machinery

Tuggers	:	2 x 10 tonnes Hydrakraft
Capstans	:	2 x 16 tonne (warping head) / 10 tonne (wire drum) Hydrakraft
Windlass	:	1 x 10 tonne Hydrakraft, 2100 kg anchors with 440 m x 36 mm chain each side, plus 1 spare anchor
Bow Mooring	:	2 x mooring drums, capacity of 200 m x 56 mm rope each
Smit Towing Bracket	:	1 x 200 tonnes SWL located on the Forecastle
Crane	:	TTS, 5 tonnes at 13 m radius

Electronics

Main Radar	:	1 x Furuno FAR-2117 X Band ARPA Radar with 21" LCD display
Auxiliary Radar	:	1 x Furuno FAR-2137S S Band ARPA Radar with 21" LCD display
Auto Pilot	:	1 x Tokimec PR 6000 Series
Gyro Compass	:	1 x Tokimec TG8000 with repeaters in wheelhouse and steering gear room
Magnetic Compass	:	1 x Cassen & Plath REFLECTA 1
Echo Sounder	:	1 x Skipper GDS102, Dual Frequency, 1500 m water depth

DGPS	:	1 x Furuno GP-90, IMO approved for navigation 2 x Trimble GSM 132L for DP System
Anemometer	:	1 x Gill ultrasonic unit
Speed Log	:	1 x Furuno DS-80 Doppler Speed log
Communications	:	1 x Furuno G.M.D.S.S. (Global Maritime Distress & Safety System) Area A3 set 1 x Furuno FS-2570 (250 W) MH/HF Radio 1 x Furuno FM-8800S (25 W) VHF DSC 1 x Furuno FM-8800D (25 W) VHF DSC 1 x Furuno FELCOM-15 Inmarsat-C 1 x Furuno FELCOM-15 Inmarsat-C/SSAS 1 x Furuno NX-700B Navtex Receiver 3 x McMurdo Portable GMDSS VHF Radios 1 x McMurdo EPIRB 2 x McMurdo SART
Weather Fax	:	1 x Furuno
AIS	:	1 x Furuno FA-100

Discharge Pumps

Potable Water	:	1 x 150 cubic metres/hr - 7.0 bar
Drill Water	:	1 x 150 cubic metres/hr - 7.0 bar
Fuel Oil	:	1 x 100 cubic metres/hr - 7.0 bar
Liquid Mud	:	1 x 75 cubic metres/hr - 18.0 bar
Brine / Mud	:	1 x 75 cubic metres/hr - 18.0 bar
Dirty Oil	:	1 x 10 cubic metres/hr - 2.0 bar
Cargo Flow Meters	:	Fuel Oil and Potable Water

Performance

Speed / Fuel Consumption	:	At 100% MCR, approximate consumption is 34 tonnes / day Economical speed 10-12 knots, approximate consumption is 12 tonnes / day Idle at sea: approximate consumption 4 tonnes / day Idle in port: approximate consumption 0.8 tonnes / day

Dynamic Positioning

Type	:	Alstom ADP 01 Combined DP/Joystick System
Reference Systems	:	1 x Cyscan laser complete with 3 reflectors, 2 x Trimble DSM 132L DGPS
Control Modes	:	Joystick manual heading, Joystick auto heading, Dynamic Positioning, Model Control (dead reckoning), DP minimum power, Ship follow, Auto track, Auto Pilot, Auto Sail, ROV follow, Simulation (for training purposes)

External Fire Fighting

Capacity	:	2 x 1,500 cubic metres/hr = 3,000 cubic metres/hr
Monitors	:	2 x 1,200 cubic metres/hr, Kvaerner, each fitted on wheelhouse top and remotely controlled from within the wheelhouse
Throw Length	:	120 m
Throw Height	:	50 m

Standby Rescue Equipment

1	:	Rescue Boat - MP Springer 660 self righting with inboard 250 hp Yanmar diesel engine and Hamilton water jet propulsion. Capacity for 10 people. 33 to 35 knots top speed with 2 people on board
2	:	Rescue Zones on both Port and Starboard side of main deck, with scramble nets and personnel transfer swing ropes

Environmental Features

1	:	Mud tank of free flowing design with external stiffening, sloped floors and dedicated recirculation
2	:	Low residue design bulk tanks
3	:	1 x oily water separator with 15 ppm monitor. Compliant with IMO - Resolution MEPC 107(49)
4	:	1 x sewage treatment plant
5	:	Galley macerator
6	:	Cargo load/discharge station with save all to inboard tank

Accommodation

Berths	:	8 x single cabins 4 x 2 man cabins (including hospital) 4 x 4 man cabins 1 x Library 1 x Messroom 1 Lounge

Miscellaneous

1	:	Design complies to latest rules and regulations from SOLAS 74, with amendments in force and IMO 469 (XII) "Guidelines for the design and construction of offshore supply vessel"
2	:	All cargo systems are controlled by a Terasaki cargo control system with remote valve operation and tank soundings
3	:	Hose connections: Fuel - 4 inches (Camlock) Potable Water - 4 inches (Camlock) Drill Water - 4 inches (Camlock) Mud - 5 inches (Camlock) Brine - 5 inches (Camlock) Dry Bulk - 5 inches (Camlock) Adapters 5" to 4" reducer, 4" to 3" reducer
4	:	Fitted with 2 x Halogen searchlights, each 2,000 W, fitted on the wheelhouse top and remotely controlled from inside the wheelhouse
5	:	Fitted with 6 x 1,000 W high pressure sodium lights for the aft deck cargo area and 2 x 1,000 W high pressure sodium lights in the crash rails to illuminate Anchor Handling area
6	:	Removable section of crash rail, 6 m long, on Port and Starboard side forward to allow for fitting of ROV spread, etc
7	:	Wood sheathed main deck except for the aft area, which is steel plated for Anchor Handling

8	:	Welding and cutting equipment and lathe in workshop
9	:	Fresh water ultra violet steriliser
10	:	Flume passive roll damping system
11	:	Fire detection system fitted to the accommodation, all store rooms and machinery spaces throughout the vessel
12	:	CO2 fixed fire extinguishing system for Machinery Space, Emergency Generator Room, Paint Locker and Hydraulic Pump Room
13	:	Local water spray Fire Fighting system according to SOLAS regulations
14	:	Statutory liferafts, life-jackets and pyrotechnics
15	:	Deck power supplies for ROV equipment / Charterer's equipment: 2 x 500 A, 440 V, 3 ph; 1 x 63 A, 440 V, 3 ph; 1 x 32 A, 440 V, 3 ph
16	:	Deck power supplies for Refrigerated containers: 6 x 440 V, 63 A, 3 ph

Anti-Pollution

Dispersant Tank	:	9.4 cubic metres
Spray booms	:	2 x Booms with nozzles for both diluted and neat operation fitted

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M/V Pacific Wrangler

Main Engines:
2 x 5,400 = 10,800 BHP, Bergen BRM-9

Propulsion:
2 x CPP Propellers in Kort nozzles
2 x Ulstein high-lift independent rudders
2 x Electro-hydraulic steering gear

Bollard Pull:
134 tonnes, continuous

Winch:
1 x Brattvaag SL300W/2BSL300W low pressure

Age / Built:
INP Shipyard, Ulsan, South Korea, May 2003

Cargo Deadweight:
2,131 tonnes

Vessel Information

Built	:	INP Shipyard, Ulsan, South Korea, May 2003
Flag	:	Singapore
Call Sign	:	9V6218
IMO No.	:	9270608
Classification	:	DNV +1A1 SF E0 DK(+)

Dimensions

Length, overall	:	68.9 meters
Length, BP	:	60.4 meters

Breadth, moulded	:	15.5 meters
Depth, main deck	:	7.0 meters
Design draft	:	5.0 meters
Maximum draft midship	:	5.9 meters
GRT	:	2,332 Tonnes
NRT	:	749 Tonnes

Capacities

Deadweight (maximum)	:	2,131 tonnes
Deadweight (design)	:	1,320 tonnes
Clear Deck Area	:	36.8 m x 12.8 m = 471 square metres
Deck Loading	:	General deck - 5 tonnes per square metre Aft A/H deck - 10 tonnes per square metre
Deck Cargo	:	800 tonnes
Fuel	:	780 cubic metres
Potable Water	:	400 cubic metres
Ballast Water / Drill Water	:	930 cubic metres
Brine / DMA / Glycol / Liquid Mud	:	312 cubic metres (s.g. 2.5) (3 tanks - separate from mud tanks) (in addition, 146 cubic metres in dual use Liquid Mud tanks)
Liquid Mud	:	440 cubic metres (s.g. 2.5) (6 tanks)
Bulk	:	215 cubic metres (4 tanks)
Ship's Stores	:	Cooler: 8.6 cubic metres Freezer: 8.6 cubic metres Dry Stores: 10.5 cubic metres approximately

Machinery

Main Engines	:	2 x 5,400 BHP = 10,800 BHP, Bergen BRM-9
Propulsion	:	2 x CPP Propellers in Kort nozzles 2 x Ulstein high-lift independent rudders 2 x Electro-hydraulic steering gear
Bow Thrusters	:	2 x 590 kW (791 bhp), 9.25 tonnes thrust each
Stern Thrusters	:	1 x 590 kW (791 bhp), 9.25 tonnes thrust
Shaft Generators	:	2 x shaft generators 1200 kW (1600 kVA), 450 V, 60 Hz
Auxiliary Generators	:	2 x diesel/gen output 320 kW (400 kVA), 450 V, 60 Hz
Emergency Generators	:	1 x diesel/gen output 65 kW (80 kVA), 450 V, 60 Hz

Towing and Anchor Handling

Bollard Pull	:	134 tonnes, continuous
Rig Chain Locker	:	187.7 cubic metres chain capacity
Winch	:	1 x Brattvaag SL300W/2BSL300W low pressure
Load Capacity	:	Towing A/H drum 1st layer 300 tonnes pull at 0 - 7.0 m/min. (based on 1st step) 172 tonnes pull at 0 - 12.0 m/min. 122 tonnes pull at 0 - 17.0 m/min. Lowering at 0 - 38.0 m/min.
Brake Capacity	:	450 tonnes on towing drum 1st layer 450 tonnes on A/H drum 1st layer
Tow Drum Wire Capacity	:	1500 m x 76 mm diameter
Work Drum Capacity	:	2 x 1200 m x 76 mm diameter
Chain Gypsy Cable Lifter	:	1 x 76 mm, 2 x 84 mm chain diameter
Spare Reel Capacity	:	2 x hydraulic Brattvaag 1500 m x 76 mm capacity

Wire Storage Reel	:	1 x hydraulic Brattvaag 1500 m x 76 mm capacity
Stern Roller	:	SWL 450 tonnes Length 5 m x 2.5 m diameter
Tow Pins / Guide Pins	:	2 pairs x retractable Karmoy guide pins with horizontal locking tops
Wire Chain Stopper	:	2 x retractable Karm Fork, SWL 450 tonnes

Deck Machinery

Tuggers	:	2 x 10 tonnes Brattvaag
Capstans	:	2 x 10 tonnes Brattvaag
Windlass	:	9.5 tonne pull Brattvaag, 2000 kg high holding anchors 440 m x 38 mm chain each side, plus 1 spare anchor
Bow Mooring	:	2 x mooring drums capacity 120 m x 40 mm synthetic rope
Smit Towing Bracket	:	1 x 200 tonnes SWL located on fo'csle
Crane	:	Hydralift, 5 tonnes at 13 m radius

Electronics

Main Radar	:	1 x Furuno colour S-band (10 cm), ARPA ins display, complete with remote display at aft console
Auxiliary Radar	:	1 x Furuno colour X-band (3 cm), 28 ins display
Auto Pilot	:	1 x Robertson
Gyro Compass	:	Repeaters in wheelhouse, bridge wings, steering gear room
Magnetic Compass	:	1 only
Echo Sounder	:	Skipper Electronic A/S
DGPS	:	Trimble
Anemometer	:	Nippon Electric
Speed Log	:	Skipper Electronic
Direction Finder	:	Taiyo Musen
Communications	:	G.M.D.S.S. (Global Maritime Distress and Safety System) Area A3 1 x SSB 2 x VHF 2 x Inmarsat C 456306640 / 456306650 3 x VHF (portable) 2 x SART 1 x EPIRB 1 x Navtex
Watch Receiver	:	2187.5 kHz and DSC Sailor
Weather Fax	:	Furuno

Discharge Pumps

Potable Water	:	1 x 150 cubic metres/hr - 9.0 bar
Drill Water	:	1 x 150 cubic metres/hr - 9.0 bar
Fuel Oil	:	1 x 150 cubic metres/hr - 9.0 bar
Liquid Mud	:	1 x 75 cubic metres/hr - 18.0 bar (2 speed)
Brine / Mud	:	1 x 75 cubic metres/hr - 18.0 bar (2 speed)
Dry Bulk	:	80 cubic metres/hr - 5.6 bar, 80 psi, 2 compressors
Dirty Oil	:	1 x 10 cubic metres/hr - 2.0 bar
Cargo Flow Meters	:	Fuel Oil and Fresh Water

Performance

Speed / Fuel Consumption	:	Max. speed 15.5 kts @ 5m draft, approximate consumption 36 cubic metres/day Economical speed 10-12 kts, approximate consumption 14 cubic metres/day Idle at sea: approximate consumption 5 cubic metres/day Idle in port: approximate consumption 0.8 cubic metres/day

Dynamic Positioning

Type	:	Alstom / Cegelec DP 1
Reference Systems	:	USBL HPR with remote hydraulic deployment / DGPS
Control Modes	:	Auto sail / track / ROV follow
Joystick	:	Poscon - Ulstein, integrated to main propellers, main engines, rudders, side-thrusters and interfaced to gyro compass

External Fire Fighting

Capacity	:	2 x 1,500 cubic metres/hr = 3,000 cubic metres/hr
Monitors	:	2 x 1,200 cubic metres/hr monitors on wheelhouse roof, remotely controlled from within wheelhouse
Throw Length	:	120 m
Throw Height	:	70 m
Foam Tank	:	8 cubic metres

Standby Rescue Equipment

1	:	MOB-boat with self-righting diesel inboard engine with water jet propulsion, 25 knots (light load) with boat davit for quick launch and recovery
2	:	Rescue Zones on both Port and Starboard side, main deck, with scrambling net and personnel transfer swing ropes

Environmental Features

1	:	Cylindrical mud tank free flowing design with external stiffening, sloped floors and fixed agitators
2	:	Fixed Butterworth type mud tank cleaning system with hot water wash, fitted to all mud tanks and with slop tank reception. Cargo load/discharge station with save all to inboard tank
3	:	Low residue design bulk tanks
4	:	1 x 15 ppm oily water separator
5	:	1 x sewage plant, extended aeration type
6	:	Remote digital fuel economy computer readout in wheel house, of main engine fuel consumption / vessel speed
7	:	Garbage compactor and mascerator

Accommodation

Berths	:	10 x 1 berths 4 x 2 berths (including hospital) 3 x 4 berths 30 berths Total 1 x ship's office 1 x messroom 1 x galley All living space fully air-conditioned, design 45 deg C outside, 23 deg C inside All living space fully heated, design -5 deg C outside, 22 deg C inside

Miscellaneous

1	:	Design complies to latest rules and regulations from SOLAS 74, with amendments in force and IMO 469 (XII) "Guidelines for the design and construction of offshore supply vessel"
2	:	Fitted with Poscon electronic control system joystick, integrated to main propellers, main engines, rudders, side-thrusters and interfaced to gyro compass
3	:	All cargo systems are controlled by a Tanktender system with discharge printer for FO and FW/DW
4	:	Fitted with 5 remote cameras in winch-house for anchor-handling/towing operations with 2 TV monitors in wheelhouse
5	:	Hose connections: Fuel - 5 inches (Avery - Hardol) Potable Water - 5 inches (Camlock) Drill Water - 5 inches (Camlock) Mud - 5 inches (Camlock) Bulk - 5 inches (Camlock) Adapters 5"-4" and 6"-5"
6	:	Fitted with 2 Halogen searchlights, each 2,000 W, wheelhouse top and electrically operated from inside wheelhouse, 4 x 1,000 W flood-lights, for cargo deck
7	:	Deck Power supplies, 1 x 1000 A x 440 V x 3 ph, 1 x 63 A x 440 V x 3 ph and 1 x 32 A x 220 V x 1ph
8	:	Wood sheathed main deck except for aft area, which is steel plated for anchor-handling
9	:	Welding and cutting equipment and lathe in workshop
10	:	Fresh water ultra violet steriliser
11	:	Ulstein passive roll damping system
12	:	Fire detection system fitted to the accommodation, engine room emergency generator space and all other spaces
13	:	CO2 fire extinguishing system fitted in the engine room / paint locker / hydraulic pump room / emergency generator room
14	:	Statutory liferafts, life-jackets, pyrotechnics

Anti-Pollution

Dispersant Tank	:	5 cubic metres
Spray booms	:	2 x 6 m

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Appendix D

ADA and Operator Health, Safety and Environmental Policy

Health, Safety and Environmental Policy

ADA is committed to the application of proactive management in the elimination of injuries, dangerous occurrences and harm to the environment in its efforts to provide a safe, healthy and progressive work environment for all employees, clients and all who come in contact with our operations.

To achieve this ADA shall:

- Maintain a work environment that is safe, conducive to high levels of work performance, and in conformance with all ADA's policies, standards and procedures
- Endeavour to prevent all injuries and work related ill health, in the work place
- Maintain our Management System in compliance with current legislation and apply where relevant, "best practice" methodology in preventing injury, caring for the environment and ensure contractors operate a similar system and suitable interfacing is applied
- Establish and maintain, safe systems of work, throughout our operations and ensure contractors operate similar systems and appropriate interfacing exists
- Develop commitment, responsibility and accountability to ADA's Health, Safety and Environmental (HSE) objectives and targets
- Monitor and analyse all hazards to ensure appropriate corrective actions are applied and verify their effective application
- Ensure that all facilities and projects are resourced, designed, engineered and maintained to satisfy legislative and ADA's HSE requirements
- Ensure all operations comply with relevant statutory obligations
- Encourage open communication with employees and contractors and support participation in all activities related to the improvement and fulfilment of all HSE Issues
- Continually develop and support appropriate behaviour to reduce human error with respect to the job, the individual and the team

John Bell
Managing Director

August 8th 2006
Date