VERMILION

VERMILION OIL & GAS AUSTRALIA

WA-14-L WELL CONSTRUCTION ENVIRONMENT PLAN SUMMARY

WPA-7000-YH-1000

Revision 2

Revision	Date	Description	Originator	Checker	Approver
0	20/6/12	For DMP consultation	S2V	NM	BL
1	20/12/12	For publication	HH	NJ/TR/PPR	BL/DM
2	10/01/2013	NOPSEMA Acceptance	NJ	PJ/PPR	BL

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1 Introduction

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) periodically conducts well construction activities on the Wandoo Oil Facility located in permit area WA-14-L. The last campaign was conducted in 2010 and a further campaign is planned for Q1 2013, lasting approximately 65 days.

The Wandoo Well Construction Environment Plan has been prepared in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) (OPGGS(E)) Regulations 2009*. This EP summary has been prepared as per the requirements of Regulation 11 (7) and (8).

This document summarises the Environment Plan (EP) that has been prepared for the 2013 campaign. Well construction operations involve drilling with a Mobile Offshore Drilling Unit (MODU) and possibly completing new wells, or the re-entering, side-tracking and recompleting of existing production wells.

Support activities during well construction campaigns are similar to those provided to the Wandoo Production Facilities during routine activities, including helicopter transfer of personnel and supply vessel activities. No unique or unusual equipment or operations are anticipated.

Two or three additional campaigns of similar duration may also be undertaken in the next five years which will require a separate revision to the Environment Plan to be submitted for NOPSEMA acceptance under Regulation 17.

2 Location

The permit area WA-14-L is located in Commonwealth waters in the Carnarvon Basin off the northwest coast of Western Australia (WA), approximately 80 km northwest of Dampier.

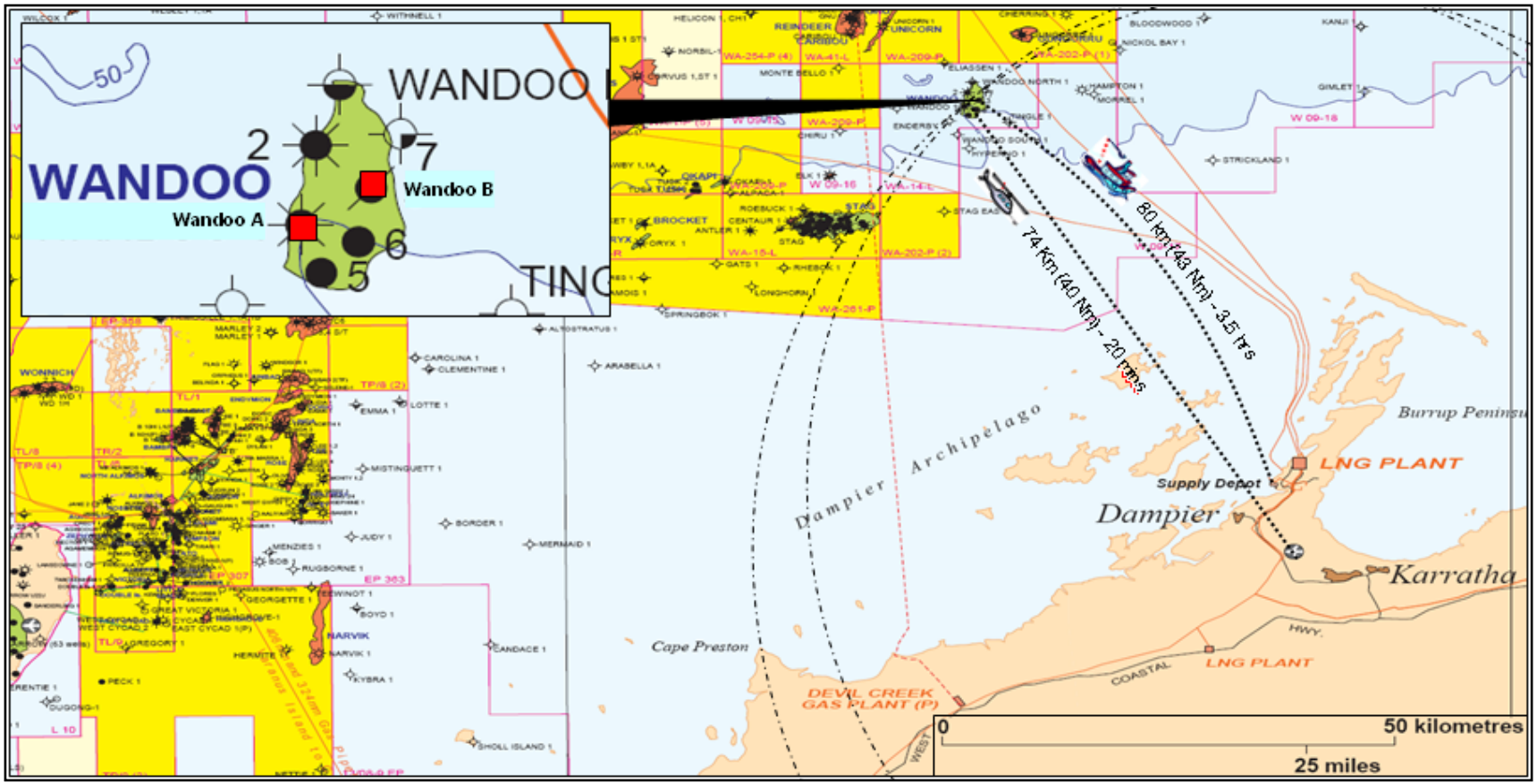

Figure 2.1: Location of the WA-14-L Permit Area

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3 Description of the Environment

3.1 Physical environment

The permit area is situated in the middle/outer shelf waters of the North West Shelf (NWS). Circulation of seawater in the permit area is influenced by the Indonesian Throughflow from the western Pacific and the Leeuwin Current, which continues the transport of warm water further south. Sediments in the permit area are typically comprised of unconsolidated fine to coarse sands dominated by carbonates. Areas closer to shore may have a larger component of terrigeneous sediments, particularly around inputs such as rivers and creeks.

3.2 Biological environment

The infaunal community in the permit area is essentially similar to that found at other locations throughout the region with low numbers of species and low abundance.

Flora and fauna such as coral reefs, seagrasses, mangroves and macroalgae are widespread throughout the coastal areas outside the permit area, including the waters of the Dampier Archipelago, around offshore island groups such as the Montebello Island Group and Barrow and Thevenard Islands. These habitats are recognised as an important resource for a diverse range of species, including breeding, calving, feeding and migratory areas. In total, 61 species of fauna that occur in the coastal waters surrounding the permit area are listed as migratory and/or threatened under the *Environmental Protection and Biodiversity Conservation (EPBC) Act*, including 35 bird, 12 mammal, eight reptile and six shark species.

3.3 Social and economic environment

Both the Dampier Archipelago and Ningaloo Coast, which are located 40km and 250km respectively from the permit area, are included on the National Heritage list. Historic shipwrecks of National and State heritage value are legally protected and there are 23 such shipwrecks in the waters surrounding the permit area.

Fishing activity is unlikely to occur within the permit area due to safety exclusion zones. However, nine state-based fisheries and four federally managed commercial fisheries are potentially active within the coastal and offshore waters surrounding the permit area and considerable commercial aquaculture is undertaken in the broader region.

The region supports significant commercial shipping activity, the majority of which is associated with the Western Australia oil and gas and mining industries. Therefore, there is a high density of vessel traffic in the waters surrounding the permit area. There are no military related uses within the permit area, with the nearest military installation located near Exmouth.

No tourist activities take place within the permit area, although tourist activities are significant within the broader region. Major tourism precincts outside the permit area include the Ningaloo Coast, the Exmouth Gulf and Broome.

3.4 Areas of environmental significance

Table 3-1 lists key environmental values within 300km of the permit area. These areas provide important habitats for nesting turtles, whale sharks, whales, dugongs, migratory birds and coral species.

Five Marine Reserves have recently been declared by the Commonwealth Government and five marine parks and management areas have been proposed by the Western Australia Government, located within the northwest region. Additionally, three marine parks and reserves are also currently gazetted (officially noted in public documents) within the region.

Table 3-1 Key environmental values

Location of value	Distance from permit (km)	Environmental, social and/or economic value identified
Dampier Archipelago	40 SE	Proposed Marine Reserve, Seabird Breeding Area, Turtle Nesting Sites, Mangroves
Barrow Island/ Montebello Islands	72 SW	State Marine Reserve, State Terrestrial Reserve, Seabird Breeding Area, Turtle Nesting Sites
Great Sandy Islands	89 SW	State Terrestrial Reserve
Lowendal Islands	91 SE	State Terrestrial Reserve, Seabird Breeding Area, Turtle Nesting Sites
Mary Anne Islands	140 SW	State Terrestrial Reserve
Ningaloo Coast	252 SW	World Heritage Area, Commonwealth Protected Area, State Protected Area, Seabird Breeding Area, Turtle Nesting Sites, Dugong Habitat, Coral Reef, Protected Shipwrecks
Muiron Islands	253 SW	State Terrestrial Reserve, Turtle Nesting Sites
Gascoyne Marine Reserve	303 SW	Commonwealth Marine Reserve

4 Description of the Action

The primary purpose of the Wandoo Infill Project is to access the stranded and bypassed oil in the A3 and B sands of the M.australis Sandstone Member of the Muderong Shale Formation. A secondary aim of the campaign is to evaluate and confirm the boundaries and extent of the Wandoo reservoir in the areas of the field being accessed.

The jack-up MODU will be manoeuvred into position in permit area WA-14-L using towing vessels and will then be prepared for well construction operations. When operations over the existing Wandoo facilities are undertaken, the same MODU location (relative to the facility) is always used. Positioning activities are carried out in accordance with the MODU Contractor's and Vermilion's safety management systems.

Once the MODU is in position, the vessels are unhitched and perform various supply duties during the course of the well construction campaign. Once well construction activity is complete, the process is reversed and the vessels tow the MODU off location and out of the permit area.

The Wandoo Infill Project will consist of up to three well interventions/side-tracks – two on the Wandoo B platform, one on the Wandoo A platform and one conductor slot repair. The campaign over the WNA and WNB facilities will be carried out over a 70-day period between January and March 2013. Timing is dependent on the activities of the operators that have contracted the MODU ahead of Vermilion.

The planned well construction activities will use standard technical methods and procedures. The activities planned are very similar to those conducted during Vermilion's last Wandoo well construction campaign in 2010 and other well construction campaigns conducted in Australian waters using a MODU.

Vermilion's well construction operations are undertaken in accordance with the Vermilion Well Construction Management System. Further campaign-specific arrangements are documented in the Well Operations Management Plan which is required by the *Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations, 2011 Part 5*.

5 Management of Environmental Hazards and Controls

5.1 Risk assessment

Vermilion undertook an environmental risk assessment workshop to identify and evaluate the potential environmental risks associated with the well construction operations (both routine and non-routine) proposed at the Wandoo Oil Facilities in permit area WA-14-L.

This process facilitated the development of elimination, mitigation and contingency strategies to ensure that, for those risks that could not be eliminated, the residual risk is reduced to as low as reasonably practicable (ALARP). The assessment was undertaken in accordance with Australian/New Zealand Standard AS NZS ISO 31000-2009 Risk Management – Principles and Guidelines and the Wandoo Risk Management Manual.

The Vermilion risk assessment was undertaken on 21 sources of potential environmental impact. Further detail on the environmental impacts and the controls to be applied during well construction operations in the permit is provided in Section 10. The risk assessment also considered any potential cumulative impact of future campaigns to ensure it was also being managed.

The commitments associated with these objectives and standards contribute to ensuring that the residual environmental risk associated with well construction operations in the permit area is reduced to ALARP.

5.2 Vermilion Well Construction Management System and environmental performance

Through continual improvement and development of best practice, Vermilion has used the information available from involvement in various working groups and experience during earlier drilling campaigns to improve its Well Construction Management System. This has resulted in the introduction of the following improvements:

1. The introduction of the Offshore Drilling Superintendent position which, amongst other duties, has over-arching responsibility for ensuring that the Vermilion management processes are actively implemented during operations. The role has accountability for ensuring operations are carried out in a safe and environmentally conscious manner and for ensuring that commitments made under the Vermilion Well Construction Management System, the MODU and Wandoo Safety Case Revisions and the Project Simultaneous Operations (SIMOPS) Plan are met.
2. A robust barrier verification process that provides assurance to all stakeholders that well integrity is being managed in accordance with the Vermilion Well Construction Standards Manual, such that a minimum of two independent and verified barriers are in place at all times in order to prevent the uncontrolled release of well fluids to the environment.

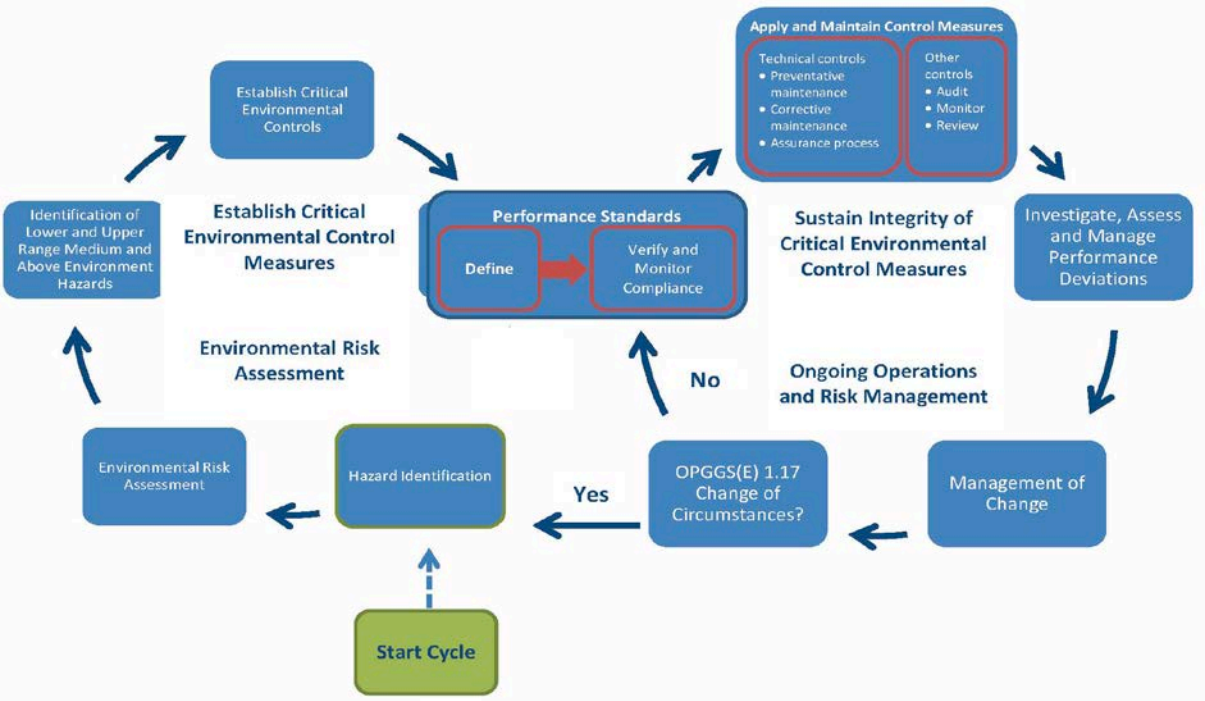
A number of operational initiatives have also been implemented for the campaign to further strengthen the assurance process within the Well Construction Management System.

The review framework was based on the second loop of the Performance Standards cycle, 'Sustain Integrity of Major Accident Event Control Measures,' as part of the Ongoing Operations and Risk Management component of the performance improvement process (refer to Figure 5-1).

The framework includes four key areas:

1. Verify and monitor compliance
2. Apply and maintain control measures
3. Investigate, assess and manage performance deviations
4. Management of change

Figure 5-1: Performance Standards and Continuous Improvement (adapted from NOPSEMA's Control Measures and Performance Standards' Guidance Notes, 2011)



The Performance Standards review process was used to strengthen the Implementation Strategy of the Environment Plan. This process was also developed to support the environmental management for future campaigns.

6 Management Approach

6.1 Overview

The well construction operations proposed by Vermilion in permit area WA-14-L will be managed in compliance with the WA-14-L Well Construction Environment Plan once approved by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), under the OPGGS(E) Regulations.

The objective of the EP is to ensure that any potentially adverse impacts on the environment associated with the proposed well construction activities are identified and managed and that the residual risk associated with any risks not eliminated, is reduced to ALARP.

The EP details the proposed performance objectives, standards and measurement criteria and identifies the preventative and recovery controls (where appropriate) in place for each potential impact. The overall level of residual risk is evaluated based on the assumption that these measures have been implemented.

Vermilion has prepared a series of Environmental Performance Standards (EPS) for risks identified as lower medium, analogous to the Safety Performance Standards prepared within Safety Case documents for managing safety critical equipment and systems. The EPS detail the objectives, requirements, assurance processes and criteria by which environmentally significant equipment and systems are maintained.

The implementation strategy detailed in the EP identifies the management systems in place, communications network, required training and competencies and key roles and responsibilities of all personnel in relation to implementing controls, managing non-conformance, monitoring and auditing of operations and emergency response. The reporting requirements for recordable and reportable incidents and reporting requirements on overall compliance of the activities are described within the EP.

The Vermilion Well Construction Management System includes the generation of a campaign-specific Health Safety Environment and Quality (HSEQ) Plan and MODU Safety Case Revision Document (which must also be approved by NOPSEMA). A key aspect of these documents is the management of interfaces (and potential hazards) between Vermilion and contractors involved in the activity, such as the MODU and support vessel operators.

6.2 Vermilion Health Safety and Environment management system

Vermilion is committed to sustainable development, protection of the environment and the health and safety of our employees, contractors and the public.

Many potential environmental impacts are prevented by measures implemented as a result of safety procedures. For example, a campaign-specific Safety Case revision will be prepared for each campaign to describe interfaces between the MODU contractor's and Vermilion's management systems.

The revisions identify:

1. Responsibilities of senior personnel
2. How potential conflicts in management systems will be managed
3. Changes in Major Accident Event scenarios created by operating in the Permit Area
4. The emergency preparedness and response arrangements that will be in place

Project-specific environmental risk assessment workshops (see Section 5.1) will be conducted prior to each campaign to review the hazards identified in this EP and, where necessary, to reinforce the EP. Significant new hazards identified by the Hazard Identification Study (HAZID), or any other means, will result in review and potential amendment of this EP (and potential notification or resubmission to NOPSEMA in accordance with Regulation 17 of OPGGS(E)R).

6.3 Corporate environmental performance philosophy

Vermilion is committed to reducing adverse environmental impacts of its operations and meeting all environmental regulatory requirements. Vermilion believes that good environmental performance is fundamental to long-term success and, as such, is committed to conducting its operations in a manner that reduces impact to the environment. This philosophy is expressed in the company's Health, Safety and Environment (HSE) policy reflecting the integrated approach taken to managing HSE risk. The Vermilion Managing Director is ultimately accountable for the oversight and implementation of the policy in Australia.

6.4 Contractor management system

All MODU and Anchor Handling Transport Supply (AHTS) based personnel will be required to conform to critical elements relevant to their roles identified in the campaign HSE-related management documents (including this EP). Vermilion will ensure that the critical elements are communicated through induction, training programs, regular communication, HSE meetings, specific campaign-related workshops and by the Vermilion onsite representatives.

Management visits will be used as a further opportunity to reinforce Vermilion's commitment to a safe and environmentally aware work environment and to reinforce a culture of compliance with all campaign HSE-related management requirements.

Vermilion will apply learning and tools developed during this EP process to the contractor selection process for future campaigns.

7 Oil Spill Contingency Plan

The Wandoo Oil Spill Contingency Plan (OSCP) has also been updated as part of the Well Construction EP revision. The OSCP details the arrangements in place for dealing with any potential spills and reducing the potential effects of a spill on the environment. The OSCP details the roles and responsibilities of all involved and includes interfaces with third parties who may be affected by or involved in responding to a spill, e.g. by supplying response equipment, such as the Australian Marine Oil Spill Centre (AMOSC).

The OSCP is being developed in consultation with State and Federal Statutory Agencies including Western Australia's Department of Transport and Australian Maritime Safety Authority (AMSA). The OSCP outlines:

1. Vermilion's incident response structure and function and interfaces with external response agencies.
2. Incident notification requirements for the relevant State and Federal agencies.
3. Potential spill scenarios, trajectory modelling and zones of potential impact.
4. Response options, response constraints and logistics arrangements.
5. Guidance on the use of dispersants including application of net environmental benefit analysis.
6. The strategy for engaging stakeholders impacted by the oil spill and associated response activities.
7. Testing and monitoring arrangements to ensure the performance standards for the plan and equipment are maintained.

8 Consultation

Vermilion is consulting with a range of stakeholders to meet the following objectives:

- Inform them of the rationale for the forthcoming activities and the provisions of the EP
- Explain how, through the EP, Vermilion aims to identify and mitigate against potential risks
- Obtain information and advice regarding oil spill response resources and capability, in particular the approvals process for the potential use of dispersants
- Address any concerns arising from the proposed activity and understand requirements for ongoing consultation
- Establish relationships which will be of mutual benefit

Vermilion remains committed to ongoing two-way consultation with interested parties on the progress of its EP and with respect to the company's broader commitment to thorough stakeholder engagement around its well construction activities in the permit area and, more specifically, its production operations in the Wandoo field.

In addition to external project stakeholders, Vermilion has also engaged a number of consultants and subject experts to provide professional advice during the development of the EP and other relevant project documentation e.g. AMOSC.

Vermilion will review all responses obtained from stakeholders during the ongoing consultation process and consider the implications for proposed well construction activities, making changes and revising the EP as appropriate.

In accordance with Vermilion's stakeholder management program, notifications are made to relevant agencies and state departments prior to each well construction campaign including NOPSEMA, AMSA, the WA Department of Mines and Petroleum and any other relevant agencies or departments.

A dedicated email address and contact number will be made available to interested parties wishing to contact the company. This will provide the opportunity for stakeholders and interested parties to raise any questions they may have with respect to Vermilion's activities in the permit area. All enquiries will be captured in Vermilion's stakeholder management system and Vermilion will endeavour to respond to all incoming inquiries promptly and thoroughly.

9 Contact Details

9.1 Notifications

As part of the EP preparation process, and in accordance with the OPGGS(E) Regulations 2009, Vermilion has identified a number of potentially reportable incidents (those which must be reported to NOPSEMA as the regulator). These are events that have the potential for moderate or greater environmental damage and include:

- Injury of cetaceans (marine mammals) from MODU and vessel movement
- Introduction of non-endemic species from vessels/MODU
- Collision between MODU and platform
- Loss of well control
- Loss of MODU stability and consequent discharge of fuel and/or drilling chemicals
- Support vessel collision resulting in hydrocarbon spill from vessel or MODU
- Spill during vessel to MODU bunkering
- Application of dispersants in response to spill from loss of well control

In addition, the following will be reportable incidents based on other legal requirements not otherwise captured in the risk assessment process:

- All hydrocarbon or hazard chemical spills greater than 80L
- An unplanned gaseous release to the atmosphere greater or equal to $500m^3$
- Death or injury of individual(s) from a Listed Species (as per the EPBC Act)
- unplanned impact caused to a matter of National Environmental Significance (NES) during an activity (as per the EPBC Act)

In accordance with Regulation 26AA of the OPGGS(E) Regulations 2009, should a reportable incident be notified to NOPSEMA, the Department of the responsible state minister will also be notified as soon as practicable.

9.2 Further Information

Further information about the WA-14-L Well Construction Environment Plan and Vermilion's ongoing activities in the WA-14-L permit area can be obtained from:

Health Safety Environment and Security Advisor

Vermilion Oil and Gas Australia

Level 5, The Esplanade, Perth WA 6000

Email: voga.environment[at]vermilionenergy.com.au

10 Environmental Aspects, Impacts and Controls

The following tables provide a breakdown of the ways in which well construction activities in the permit area might impact on the environment. It lists the activities, and aspects of those activities, which may give rise to an environmental impact and the controls and mitigation measures which eliminate the risk or ensure that the residual risk of significant impact on the environment is reduced to ALARP.

Risk No.	Activity and Environmental Aspect (cause of impact)	Potential Environmental Impact	Control/Mitigation Measure
1	Disturbance to marine fauna from MODU and vessel movement	• Disturbance of marine fauna including potential collision and/or changes in migration and breeding patterns. • Injury to cetaceans due to collision with vessels. • Disturbance to cetaceans' normal patterns due to vessel noise.	• Reduce risk of collision by limiting speed to <5 knots within the Permit Area and ½ - 2 knots within 500m of the planned location. • Prequalification of AHTS operators prior to contract award and pre-hire inspections. • Vermilion Third Party Services Management Manual ensures Vermilion's requirements are applied consistently to all contractors. • Assurance monitoring against Well Construction Management System is facilitated by Vermilion's Environmental Performance Standards
2	Physical presence of MODU and vessels in relation to fishing activity	• Disruption to fishing activities and other marine users	• Standard maritime safety procedures shall be adopted. • Compliance with WA Marine (Radiotelephony) Regulations 1981 will enable effective communication with other sea users. • Auscoast/AMSA requirements for provision of Notices to Mariners. • Consultation with all applicable stakeholders (see Section 1). • MODU Contractor is required to notify the WA Fishing Industry Council of the presence of the MODU within the Permit Area. • Communications will be established to avoid conflict. • A record of interaction with stakeholders shall be kept and made available to regulatory authorities upon request.
3	Discharge of ballast water from MODU and AHTS and bio-fouling present on MODU and AHTS.	• Establishment of non-endemic marine species that would out-compete local species leading to mortality and biodiversity	• The hull of the MODU is only in the water for relatively short periods (several hours) during MODU moving operations. The short duration that the hull is in the water and the fact that it is not stationary for any period of time makes it improbable that invasive species could attach and survive. • The hull of the MODU is 'jacked-up' out of the water during MODU well construction operations, reducing likelihood that invasive species could survive.

Risk No.	Activity and Environmental Aspect (cause of impact)	Potential Environmental Impact	Control/Mitigation Measure
		changes to native marine organisms	• MODU and the supporting AHTS have been operating in Australian waters for at least the last 12 months. • Any AHTS from outside Australian waters are contractually required to meet Australian Quarantine Inspection Service (AQIS) guidelines and will be third party inspected to ensure compliance. • Any AHTS coming from outside Australian waters will follow ballast water exchange requirements. • If new/different bio-fouling species are observed growing on the Concrete Gravity Substructure (CGS) during inspections, a sample will be collected and sent to the WA Museum for identification and to develop a strategy, in consultation with marine pest experts, for the control of the species.
4	Placement of the MODU alongside Wandoo platforms including installation of temporary moorings if required	• Damage to seabed and benthic habitat.	• MODU positioning procedures ensure that jack up legs are not dragged on the seabed. • The MODU is positioned using the MODU contractor's own operating/positioning procedures and in accordance with a detailed MODU Move Plan. • Sonar site survey will be undertaken to identify areas of hard substrate and high structural complexity prior to placement of MODU on the location.
5	Light Emissions from MODU and vessels	• Alteration to marine fauna behaviour.	• MODU Safety Case and AHTS management systems specify minimum lighting requirements for safe operation. • Turtle hatchlings will not be attracted to the lights as the Permit Area is at least 40km from the nearest turtle nesting beaches.
6	MODU, support vessel and helicopter noise associated with well construction operations	• Acoustic disturbance of marine fauna.	• Sound emitted during the operations may alarm marine life within a 2km radius and cause minor route alterations during their feeding, migrations and mating. • Level of helicopter and AHTS activity is minimised through efficient operations management. • Helicopter flight paths are planned to ensure most direct route is used and normal flight is maintained which will minimise impact on marine fauna. • Cetacean interaction guidelines for aircraft will be followed during the transit from Karratha airport to the facilities (no flying lower than 1650ft within a 500m radius of whales except when approaching the facilities to land).

Risk No.	Activity and Environmental Aspect (cause of impact)	Potential Environmental Impact	Control/Mitigation Measure
7	Discharge of formation cuttings, steel shavings and cement	• Increase in water turbidity. • Localised mortality of benthic infauna due to burial, smothering or increased water turbidity. • Reduced amount of light and oxygen increasing the localised potential mortality of sessile benthic and infaunal species.	• Drill fluid retained on the cuttings/shavings is from water-based drilling fluids. • Returned drilling fluids and solids are processed within the MODU's fluid management and solids control system to, as much as practicable, recycle the fluids and minimise the total volume of fluid retained on the cuttings when they are discharged overboard. • Drilling in the target sections in the Wandoo Field produces discrete particles of unconsolidated fine to coarse sands and glauconite which will be dispersed by the currents and integrated back into the sandy seabed. • Drilled cuttings will be discharged 2-5m below the surface of the ocean to aid plume dispersion. • Natural oceanic factors (i.e. water depth and strong tidal currents) ensure that turbidity changes are short lived and smothering is minimal due to the dispersion and dilution rates.
8	Discharge of drilling and completion fluids to the marine environment	• Toxicity and bioaccumulation of drilling and completion fluids and associated chemicals in marine organisms. • Increased water turbidity.	• Water-based muds (WBMs) have been selected for the campaigns. • WBMs have low toxicities and degrade rapidly in the marine environment, compared to alternative fluids. • Chemical Hazard and Risk Management (CHARM) and Offshore Chemical Notification Scheme (OCNS) assessment schemes have been used as part of the chemical selection process in order to ensure that those chosen will have the lowest environmental impact while achieving campaign objectives. It is through this process that the WBMs proposed can be classed as 'non-toxic'. • WBMs will be recycled as much as practicable during the drilling process. • Volume of drilling fluid used will be minimised consistent with safety and well-control requirements. • Drilled cuttings from deeper hole sections of the well will be discharged 2-5m below the surface of the ocean to aid plume dispersion. • Natural oceanic factors (i.e. water depth and strong tidal currents) ensure that cuttings are dispersed across the seabed during the operations. • Drilling fluids are processed through the MODU's fluid management and solids control systems and recycled as much as practicable.
9	Discharge of potentially oil	• Toxicity and bioaccumulation of	• Spills of oil, grease and other contaminants are collected and removed from the MODU and vessel decks (for onshore disposal) prior to any wash-down. Wash-down drainage

Risk No.	Activity and Environmental Aspect (cause of impact)	Potential Environmental Impact	Control/Mitigation Measure
	water from MODU and vessel deck washing	hydrocarbons in the marine environment. • Localised mortality of surface dwelling plankton that comes in contact with the hydrocarbon or chemical contaminated water.	is directed to oily water separators prior to discharge. • Biodegradable detergents are used during wash-down activities. • Given the open ocean environment in the permit area and the short term duration of the work, the risk to the environment would be low if an inadvertent overflow of water occurred during wash-down of the MODU or support vessel decks. • Drip trays are provided below the drill floor and it is bunded with fluids draining to a closed drainage system. Work areas where machinery is present, is bunded or the machines have drip trays to ensure deck drainage does not contain contaminants. Wash-down from these areas to the marine environment will not be undertaken. • Preventative maintenance and good housekeeping practices (primary containment) reduce contaminant volumes in drip trays and bunded areas, significantly reducing the risk of contaminated water discharge to marine environments during high rainfall periods. • No oil based mud is being used which might otherwise contribute to deck oiling
10	Discharge of sewage, grey water and putrescible wastes to the marine environment from MODU and support vessels	• Potential localised reduction in water quality - nutrient enrichment. • Temporary modification of feeding habits of local fauna. • Biodegradable matter (i.e. macerated food scraps and sewage) may result in localised increases in nutrient levels, which may stimulate microbial activity and therefore act as a food source for scavenging birds and/or marine fauna.	• International Convention for the Prevention of Pollution from Ships (MARPOL) compliant sewage treatment facilities. • Vermilion, vessel and MODU standard operating procedures and plans, e.g. vessel garbage management plans and sewage treatment plant operating procedures. • MARPOL 73/78 will be observed; sewage and food scrap disposal will conform to the requirement of MARPOL 73/78 Annex IV including maceration and disinfection. • The permit area is in water 55m deep and distant from sensitive habitats (~60 km). • Sewage and putrescible waste disposal from the MODU and support vessels is localised and of short duration with high dispersion and dilution rates due to the natural oceanic factors in the permit area (i.e. water depth, strong tidal currents and sea states). • Waste discharges shall be limited to biodegradable food scraps, grey water and sewage. • All other waste shall be retained on board for appropriate disposal on shore (i.e. all domestic, solid, plastics and maintenance wastes). • The permit area is remote from any sensitive receptors, such as population centres

Risk No.	Activity and Environmental Aspect (cause of impact)	Potential Environmental Impact	Control/Mitigation Measure
			and the overall volumes of sewage and putrescible and grey water discharges are relatively insignificant. • Vermilion well construction environmental/pre-hire audit programs ensure MODU and support vessel sewage treatment and maceration equipment is operational and maintained.
11	Emissions from power generation on MODU, helicopters and vessels including CO_2, CO, NO_x, SO_2 and particulate matter (PM)	• Localised effect on air quality affecting people and fauna. • Contribution to greenhouse gases/climate change	• MODU and vessels use power generation configuration to reduce fuel consumption (and cost), including vessels travelling at 'economic speed' while transiting. • Fuel use is monitored and reported daily (and will be reported to Vermilion). • Diesel will be sourced within Australia, meeting Australian Standards (including limits on sulphur content). • Power generating equipment is maintained in accordance with the contractors' preventative maintenance systems which ensure efficient operation. • Daily logistics planning ensures optimal movement of vessels and helicopters, minimising emissions. • Power generation systems shall meet requirements of MARPOL Annex VI for minimisation of emissions.
12	Collision between the MODU and platform resulting in loss of hydrocarbons from platform	• Increased toxicity of and bioaccumulation in marine organisms from hydrocarbons. • Oiling of seabirds. • Potential impact on cetaceans and turtles, disturbance to movement patterns	• The CGS design of the WNB production facility provides inherent protection of oil-containing pipework and storage tanks. • MODU hull design places diesel tanks in protected areas, away from potential impact zones. • A campaign specific Rig Move Plan provides a controlled process to manage activity. • MODU position and vessel GPS and telemetry monitoring systems are used, with the tow route and all permit infrastructure indicated on the display screens. • Exclusion zones around the MODU and Wandoo production facilities reduce the likelihood of third party interference around the facilities. • Specification/check of tow equipment (including winch lines) and vessels is undertaken in accordance with MODU and vessel standard operating practices (SOPs). • Met-ocean conditions are assessed and must be favourable before any move.

Risk No.	Activity and Environmental Aspect (cause of impact)	Potential Environmental Impact	Control/Mitigation Measure
			• Preventative maintenance systems and operational checks on vessel and MODU systems and equipment are conducted prior to and during operations. • Offshore pre-operation meetings with MODU and vessel crews are held to raise awareness and to ensure all key personnel clearly understand the rig move plan, required operational controls, communications protocols and emergency response plans, including; o In-field pipelines and external well conductors are shut-in and depressurised for moves that will bring the MODU onto the WNB facility. A loss of hydrocarbons is limited to in-line volumes of external well conductors (B13, B14 and B15) and pipelines. o In-field pipelines and the WNA facility are shut-in and depressurised above the subsea safety valve for moves that will bring the MODU onto the WNA facility. o The export line is located on the north-western side of the CGS, behind WNB Shaft 4 which provides impact protection from the tip of a MODU spud can. o A Simultaneous Operations (SIMOPS) Plan will be in place.
13	Diesel spill from hose or coupling failure, or receiving tank overfilling during vessel to MODU fuel transfer (up to $10m^3$)	Localised: • Oiling of seabirds and marine fauna. • Increased toxicity of and bioaccumulation in marine fauna and organisms.	• A constant watch will be maintained during refuelling operations and strict conformance to refuelling procedures will be maintained. • Transfer of diesel from support vessels will be undertaken in accordance with diesel transfer procedures. • Transfer hoses will be fitted with dry break couplings, fit for purpose, within design life limits and regularly checked for leaks during operation. • Preventative maintenance systems of contractors will ensure critical equipment such as cranes, pumps, hoses and dry break couplings, are in suitable condition for safe operations. • A crane will be used to lift the refuelling hose up to gravity drain fuel left in hose after completing transfer. • Secondary containment (e.g. drip trays and bunding) will be provided in higher risk areas. • Refuelling will occur during daylight hours, depending on sea conditions. • The volume in the hose that could be lost in the event of failure is minimal (less than

Risk No.	Activity and Environmental Aspect (cause of impact)	Potential Environmental Impact	Control/Mitigation Measure
			$10m^3$). • The MODU locations are in 55m deep water and away from sensitive habitats (~60 km). • Minor spills will be rapidly dispersed and diluted in the open ocean environment which is well away from any sensitive marine habitats.
14	Unplanned release to the marine environment from MODU and/or vessels from dry and bulk transfers e.g. powders and non-hydrocarbon fluids	• Toxicity of and bioaccumulation of bulk products in marine life and organisms. • Ingestion by seabirds and marine fauna. • Pathological effects to fish larvae and plankton. • Localised reduction in water and air quality.	• MODU Specific Procedure for Substance Spill Response. • MODU Specific Procedures, e.g. bulk product transfer. • The MODU contractor's Planned Maintenance System minimises bulk transfer system leakages. • The permit area is in water 55m deep and distant (~60 km) from the coast and other sensitive environments. • The low number and very short duration of the bulk product transfer processes during well construction operations mean that very small volumes of bulk product are lost to the environment. As a result there is a low likelihood that seabirds and marine fauna will ingest the lost product. • The natural oceanic factors in the permit area (i.e. strong tidal currents and sea states) enhance the dispersion and dilution rates of the lost product reducing the likelihood of its concentration in a small area making significant pathological impact on fish larvae and plankton unlikely.
15	Unplanned release of MODU and vessel ancillary hydrocarbons and chemicals into the marine environment (e.g. lube oils and maintenance chemicals)	• Toxicity of and bioaccumulation of MODU, supply vessel and well construction operations related hydrocarbons and chemicals in marine organisms. • Temporary reduction in water quality. • Ingestion by seabirds and	• MODU Shipboard Oil Pollution Emergency Plan deals with containment of spills on the MODU to prevent them from entering the marine environment. • Oil and chemical spill containment and clean up materials (e.g. absorbent) are available on the MODU and vessels in areas where spills could occur. • MODU and vessels have specific operating procedures which incorporate measures for spill prevention, e.g. oil and chemical handling and storage procedures. • Good housekeeping and equipment maintenance ensures good primary containment of potential contaminants. • Secondary containment (bunding) is in place in higher hazard areas. • The natural oceanic factors in the permit area (i.e. water depth, strong tidal currents and sea states) enhance the dispersion and dilution rates of any unplanned release

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		marine life. • Pathological effects to fish larvae and plankton	reducing the likelihood of its concentration in a small area making ingestion by seabirds and marine life and significant pathological impact on fish larvae and plankton unlikely. • The Wandoo permit area is in water 55m deep and distant (~60 km) from the coast and other sensitive environments. • Bilge and wash-down water is processed through an oily water separator (to MARPOL 73/78 standards (<15ppm)) prior to discharge overboard. • New lube oil will be stored on-board in large tanks. Spent oils and lubricants will be containerised and returned to appropriately licensed disposal facilities onshore. • All waste containers will be closed to prevent loss overboard. • Management systems and environmental audits carried out on a periodic basis.
16	Collision between the MODU and platform resulting in loss of hydrocarbons from platform.	• Acute and chronic toxic effects to sensitive marine biota.	• Design of the CGS of the WNB Facility provides inherent protection of oil-containing pipework and storage tanks. • MODU hull design places diesel tanks in protected areas, away from potential impact zones. • MODU move plan provides controlled process to manage activity. • MODU position and AHTS GPS and telemetry monitoring systems are used with the tow route and all permit infrastructure is indicated on the display screens. • Exclusion zones around the MODU and Wandoo production facilities reduce likelihood of third party interference. • MODU and AHTS standard operating practices include AHTS specification and pre tow checks. • Met-ocean conditions are assessed and must be considered favourable by MODU OIM and AHTS Masters before any move. • Planned Maintenance System (PMS) and operational checks on AHTS and MODU systems and equipment prior to and during operations. • Offshore pre-operation meetings with MODU and AHTS crews to raise awareness and to ensure all key personnel clearly understand the MODU move plan, required operational controls, communications protocols and emergency response plans. • In field pipelines and external well conductors are shut-in and depressurised for moves

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			that will bring the MODU onto the WNB facility. • In-field pipelines and the WNA facility are shut-in and depressurised above SSSV for moves that will bring the MODU onto the WNA facility. • The export line is located on the north western side of the CSG, behind WNB Shaft 4 which provides impact protection from the tip of a MODU spud can. • A Campaign SIMOPS Plan is in use. • AHTS Shipboard Oil Pollution Emergency Plan (SOPEP), MODU Emergency Response Plan (ERP), Vermilion ERP, Wandoo Oil Spill Contingency Plan (OSCP). • Loss of hydrocarbons is limited to in-line volumes of external well conductors (B13 and B14) and pipelines.
17	Damage or destabilisation of the MODU and consequent discharge of hydrocarbons and/or chemicals due to positioning problems.	Acute and chronic effects to sensitive marine biota.	• Geotechnical studies and the MODU Contractor's site approval process to confirm location suitable for loads imparted by placing MODU on site. • Debris survey conducted and approved by MODU Contractor, to confirm site is clear of any obstacles to a safe move process. • Contractor's PMS covers equipment critical to the pre-load and jacking process. • MODU Contractor has specific operating procedures covering preloading and jacking up operations • Positioning checks carried out during the MODU move process confirm MODU is positioned at the approved location prior to the commencement of the pre-load and jacking process.
18	Damage or destabilisation of the MODU and consequent discharge of hydrocarbons and/or due to cyclone and extreme weather events.	Unplanned discharge of hydrocarbons and/or chemicals due to impact of cyclone event on MODU operations.	• The MODU's Cyclone Response Plan will be implemented prior to a cyclone event. This includes securing of the well and all moveable deck equipment to prevent uncontrolled loss of hydrocarbons and destabilisation of the MODU and minimise impacts. • Use of weather forecasting through the Bureau of Meteorology. • MODU is designed to withstand cyclonic conditions without major damage.
19	Loss of well control leading to an uncontrolled discharge of hydrocarbons	• Significant pollution impacts on marine wildlife and marine habitats could	• Vermilion's senior well construction personnel and the Drilling Contractor's MODU based senior drilling personnel will carry current well control certification from the International Well Control Forum (IWCF) or International Association of Drilling

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		be expected in a protracted well control event (in excess of 60 days). • Shoreline impacts could be expected in a protracted well control event (in excess of 60 days)	Contractors (IADC) providing an internationally recognised level of well control competence assurance. • MODU Safety Case and Vermilion operating standards specify requirements for well control drills and testing of well control equipment and well barriers. • Well designs and operational programs for well construction campaigns are based on offset well data, reservoir knowledge obtained from long term production data and previous well construction campaigns. • Peer review and Drill Well on Paper workshops are held to review well designs and operations plans with both internal and external peers (and identify potential improvements prior to operations). • The Vermilion Well Construction Standards Manual specifies the required barrier standards to be applied during well construction campaigns. • Project specific risk registers identify any known risks and their associated management strategies. • Vermilion and Drilling Contractor Management of Change processes ensure a rigorous process is applied to assess and manage any risk associated with changes to designs or plans. • Permit-specific well control awareness training course for all personnel whose activities could impact on well integrity, including drilling contractor and other third party service providers e.g. cementers, mud loggers and drilling fluid providers. • Facilities and procedures that will be in place during well construction operations to prevent spills include: o Oil spill response procedures specific to the MODU and vessels, including consideration of the merits of use of dispersants in light of their potential environmental impact. o MODU response systems such as inspected and tested blowout preventers. o Vermilion's Source Control Contingency Plan. o MODU equipment and Drilling Contractor capability assessed through pre-hire inspections and management system audits. o MODU has a NOPSEMA-accepted Safety Case.

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			o NOPSEMA-accepted campaign-specific MODU Safety Case revision. • Preparation of campaign specific SIMOPS plan, Emergency Response Plan and HSE Plan.
20	Unplanned release of solid and environmentally hazardous wastes to the environment (e.g. through littering or dropped objects)	• Mortality of plankton, benthic or pelagic organisms due to reduced water quality or ingestion of solids e.g. plastic bags. • Solids will have a relatively low impact unless ingested	• Vermilion, vessel and MODU standard operating procedures and plans, e.g. vessel garbage management plans, lifting procedures, lifting equipment maintenance procedures, etc. • MARPOL73/78 – prohibits the discharge of solid wastes, such as plastics, rope, etc. overboard, as implemented by vessel and MODU operating procedures. • All solid waste will be retained on board for appropriate disposal on shore (i.e. all domestic, solid, plastics and maintenance wastes). • Land based disposal will be carried out by a licenced waste disposal contractor and waste will be disposed of in conformance with relevant legislation (Environmental Protection Act 1986). • All waste containers will be closed (i.e. with lid or netting) to prevent loss of contents overboard. • Spent oils and lubricants will be containerised, stored in bunded areas, then containerised and returned to shore for disposal during the campaign. • All hazardous wastes will be segregated from other streams of operational wastes. Hazardous wastes will be transferred to land for disposal and its movement shall be in accordance with Dangerous Goods legislation. • A complete inventory will be kept of all chemicals on the MODU to enable sufficient and appropriate recovery materials to be on hand in the event of a spill (i.e. Material Safety Data Sheets, labelling and handling procedures). • Vermilion contractor audits confirm that the Drilling Contractor waste management procedures meet or exceed the Vermilion Waste Management Procedure • The permit area is in water 55m deep and distant from sensitive habitats (~60 km). • In an unplanned release, the volumes/quantity of waste is likely to be small. Liquid or dissolvable solids will be rapidly dispersed and diluted in the open ocean environment which is well away from any sensitive marine habitats.
21	Oil Spill Response Activities,	• Increased entrained	• Net environmental benefit analysis process is applied when preparing the incident

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	e.g. application of dispersants	fraction of hydrocarbons in the water column after adding dispersants. • Toxicity of dispersant.	action plan for the spill response strategies. • Toxicity assessment of dispersant is conducted and information is available for consideration in the net environmental benefit. • Tests of dispersant on unweathered and weathered oil are conducted to pre-assess effectiveness. • Dispersant applied as close to the source as possible to allow maximum time for dispersal and reduce the likelihood of shoreline impacts. • Monitoring/recording of dispersant use. • Incident action plan process includes assessing the effectiveness of the oil spill response strategy, and information is incorporated into the review and adjusting phases of the process • Ongoing monitoring of the effectiveness of dispersant application will be carried out to ensure that dispersants are used effectively and efficiently. (Oil Spill Trajectory Model, Type 1 monitoring through aerial surveillance) • Response plan includes post spill engagement activities for stakeholders impacted, or potentially impacted, by hydrocarbons.