

Summary of Potential Key Environmental Impact/Risks and Management Measures

The potential key environmental impacts listed below are assumptions based on existing experience in the region and conducting similar activities. Final impacts, risks and management measures will be updated on the activity landing page at petreleni.com.au.

Aspect	Description	Potential Impact / Risk	Proposed Management
Planned Impacts			
Seabed disturbance	Seabed disturbance will be caused by: - Positioning of the mobile offshore drilling unit (MODU), if a moored or jack-up MODU is used. - Anchoring of support vessels, if required. - Drilling. - Wellhead removal.	Seabed disturbance will cause a localised and temporary reduction in water quality, and disturbance to benthic habitat. The maximum seabed disturbance footprint is from MODU positioning, if a moored MODU is used. In this case, up to 12 anchors and mooring lines will be laid, giving a maximum footprint of 0.0725km² per well. There is no sensitive benthic habitat, Marine Parks or Key Ecological Features (KEFs) in the Operational Area.	- MODU move and anchoring procedure (including mooring analysis). - All deployed equipment will be recovered. - Post-activity ROV survey will be conducted. - MODU station-keeping system. - Lifting management procedure. - Exclusion zone around the SEDCO Helen shipwreck.
Physical interaction – Other marine users	The physical presence of the MODU and movement of the vessels within the Operational Area can interfere with other marine users by causing displacement from the area during activities.	The Operational Area is retention leases WA-6-R and NT/RL1. Activities in the Operational Area are of short duration, expected to last up to 150 days per well for the longest campaign. Two active fisheries overlap the Operational Area; however, these commercial fisheries have recorded limited historical catch effort data within the area. There are no tourism or recreational fishing activities expected in the Operational Area due to distance from shore. The Operational Area overlaps with a defence practice area (Darwin AWR West) and training area (Northern Australia Exercise Area).	- Navigation equipment and procedures, in accordance with legislative requirements. - Consultation with relevant persons (including notification requirements) - Maritime notices will be complied with. - All activities will occur within the Operational Area. - Exclusion and cautionary zones will be in place. - Lighting will be used as required for safe work conditions and navigational purposes. - Eni petroleum activities simultaneous operations (SIMOPS) management.
Atmospheric emissions and greenhouse gas (GHG)	Atmospheric and GHG emissions are generated by the MODU, vessels and helicopters as a result of combustion for power generation. The MODU and vessels may also use ozone depleting substances (ODS) in refrigeration systems. Flaring will be limited to the minimum time required for well evaluation. No waste will be incinerated on board the MODU or vessels.	Hydrocarbon combustion may result in a temporary, localised reduction of air quality in the environment immediately surrounding the release point. Non-GHG emissions (such as NO_x and SO_x) and GHG emissions can lead to a reduction in local air quality. Given the short duration of the campaigns (up to 150 days per well) and flaring (up to 48 hours per well over a period of five days), and relatively low fuel usage, the contribution of atmospheric and GHG emissions to the global carbon budget is expected to be insignificant and is not evaluated further.	- Use low sulphur fuel on the MODU and vessels, in accordance with legislative requirements (e.g., Marine Orders). - Bulk solids transferred in accordance with bulk transfer procedures to reduce the risk of an unintentional release to sea and air. - ODS managed in accordance with MARPOL. - Compliance with regulatory requirements for marine air pollution and GHG missions reporting. - MODU and vessel Planned Maintenance System (PMS) in place to maintain DP, engines and machinery. - No waste incineration onboard the MODU and vessels. - Eni Marine assurance standard in place.

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Noise emissions - Continuous	Continuous noise emissions will be generated by the operation of the MODU, support vessels, helicopters, ROV, well drilling and removal of the wellheads.	Underwater noise emissions can cause: • a change in marine fauna behaviour. • mask communication. • temporary or permanent hearing loss. The greatest source of noise emissions is if a MODU on Dynamic Position (DP) is used (from thruster noise), and its support vessels. The Operational Area does not overlap with any biologically important areas (BIAs) for marine mammals, fish or sharks. It does overlap with 4 species of marine turtles. However, any individuals present would be transitory. Potential impacts are likely to be restricted to localised and temporary avoidance behaviour. Given the short duration of the MODU campaign (up to 150 days per well), the potential impacts are considered low.	• Compliance with administrative controls (such as EPBC Regulations Part 8) to reduce interactions with marine fauna. • MODU and vessel PMS in place to maintain DP, engines and machinery. • Eni Marine assurance standard in place.
Noise emissions - Impulsive	Impulsive noise emissions will be generated by MODU positioning and well evaluation. Acoustic transponders (long baseline and/or ultra-short baseline) may be used to support MODU anchor positioning, where a moored MODU is used. Well evaluation is required to collect data on the well and surrounding formation. Wireline logging and vertical seismic profiling (VSP) may be performed as part of formation evaluation.	The Operational Area does not overlap with any BIAs for marine mammals, fish or sharks. It does overlap with 4 species of marine turtles. However, any individuals present would be transitory. The impulsive noise emissions generated by the transponders and well evaluation techniques may result in localised and temporary behavioural changes to marine fauna within tens or hundreds of metres.	• Compliance with administrative controls (such as EPBC Regulations 8 (Part 8) and EPBC Act Policy Statement 2.1 to reduce interactions with marine fauna.

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Light emissions	Lights on the MODU and vessels will be required on a 24-hour basis during the activities for safety and navigational purposes, in accordance with navigational requirements. Flaring will be limited to the minimum time required for well evaluation.	Light emissions have the potential to result in changes to marine fauna behaviour, by acting as an attractant to light-sensitive species, leading to possible increased predation and/or disorientation. There is no potential to impact nesting females or hatchlings. The closest nesting habitat critical for marine turtles is ~78km from the 20km buffer used for light impact assessment – meaning light from the MODU and vessels is not visible from shore; and there is no potential to impact nesting females or hatchlings. The Operational Area does not overlap any BIAs for seabirds, and is >144km from shore, meaning there is no potential to impact fledging behaviour. There is potential a small number of adult seabirds and migratory shorebirds may be attracted to the MODU and vessels, however given the short duration of the campaigns (up to 150 days per well) and flaring (up to 48 hours per well over a period of five days), this is considered minor.	• Lighting will be used as required for safe work conditions and navigational purposes.
Planned discharges - Routine	Operation of MODU and vessels will routinely discharge the following to the marine environment: • sewage • greywater • putrescible waste • treated bilge • cooling water and brine • deck drainage	A temporary and localised impact on water quality may result in a change in water quality and changes to predator-prey dynamics. Given the relatively low volume and intermittent nature of planned MODU and vessel discharges, the short duration of the campaigns (up to 150 days per well), the water depth and open ocean environment of the Operational Area, the potential impact is expected to be localised to the immediate proximity of the release, and of short duration.	• All routine marine discharges will be managed according to legislative requirements (e.g. Marine Orders). • MODU and vessel PMS in place to maintain DP, engines and machinery. • Eni Marine assurance standard in place.

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Planned discharges – drilling and well abandonment	Drilling and well abandonment activities may result in the following discharges to the marine environment: • drilling fluids (mix of seawater, clay (or gel) and additives such as barite, chalk, polymer and polyamine). • drill cuttings. • water based mud (WBM). • cement and cement additives. • inhibited seawater (chemical additives include biocide, oxygen, scavenger, dyes, corrosion inhibitor). • control (hydraulic) fluid. • excess bulk dry products. • chemicals (brines, weak acids, weighting materials, lost circulation materials). No synthetic based mud will be used.	Discharges of muds and other fluids have the potential to impact to: • Water quality. • Sediment quality and benthic habitat. • Local marine fauna. The benthic fauna and seabed at the Operational Area is widely represented on the Joseph Bonaparte Gulf. Given the quantities of the discharges, the low toxicity of WBM and cement and high dispersion in the open, offshore environment, any impact on the marine environment from the discharges are expected to be minor and temporary. Recovery of water quality conditions is expected within hours after the cessation of the discharges. Cement discharge impacts to the marine environment are associated with smothering of benthic and infauna communities in the vicinity of the wells. Due to the localised area of disturbance, impacted benthic communities are expected to rapidly recolonise any disturbed areas upon completion of the activities.	• Quality control for barite to limit contaminant concentrations. • Monitoring use of barite and cement. • Unused bulk product on the MODU will be managed in accordance with a decision framework to restrict the discharge of leftover bulk products to ALARP. • Industry collaboration on management of unused bulk products. • Cuttings management system will be implemented for all drill cuttings returned to the MODU. • Chemical risk assessment process will be implemented to select chemicals to reduce impact to as low as reasonably practicable (ALARP) and acceptable levels.
Unplanned Risks			
Interaction with other marine users – Wellhead presence	If the well is temporarily abandoned following drilling completion, the wellhead may remain in place for up to 3 years. The physical presence of the wellhead may cause an impact to other marine users (e.g. commercial fisheries, petroleum industry, or shipping).	Temporarily abandoned wells may be present on the seabed up to 3 years. The height of the wellheads is ~3m above the seabed. Two active fisheries overlap the Operational Area; however, these commercial fisheries have recorded limited historical catch effort data within the area. There are no tourism or recreational fishing activities expected in the Operational Area due to distance from shore. The Operational Area overlaps with a defence practice area (Darwin AWR West) and training area (Northern Australia Exercise Area). There are no known recognised major shipping routes within the Operational Area. Given the water depth (~84 - 107m) and height of the wellheads (~3m), any disturbance or displacement of shipping traffic is consider unlikely.	• Wellheads are charted on Australia Hydrographic Office (AHO) nautical charts so that marine users are aware of their location. • AHO and any other stakeholders who requested to be informed of wellhead locations (i.e fisheries) are notified. • Decommissioning framework.

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Marine fauna interaction	There is the potential for vessels to collide with marine fauna, including marine mammals, fish, marine reptiles and seabirds. The main collision risk is through vessel collision with large, slow-moving cetaceans, potentially resulting in severe injury or mortality.	Given the short duration of the campaigns (up to 150 days per well), and the slow speeds at which vessels operate, collisions with marine fauna are considered highly unlikely. Eni will apply control measures to ensure the likelihood of the event occurring is reduced to ALARP and acceptable levels.	• Compliance with administrative controls (such as EPBC Regulations Part 8) to reduce interactions with marine fauna. • Any vessel strikes with cetaceans will be reported in the National Ship Strike Database. • Observations of the surroundings will be undertaken from the vessel/s for marine fauna.
Introduction of invasive marine species (IMS)	There is the potential for introduction and establishment of invasive marine pests to the operational area via vessels ballast water or biofouling on vessel hulls.	The risk of introducing IMS is limited by the depth of the Operational Area (>50m), which is not directly adjacent to any shallow shoals or banks. The substrate in the operational area does not have any hard substrate to which IMS can attach. Eni will apply control measures to ensure the likelihood of the event occurring is reduced to ALARP and acceptable levels.	• An IMS risk assessment tool will be implemented for vessels to reduce IMS risk to 'low risk'. • Vessels will comply with biosecurity requirements for ballast water and biofouling and comply with the Maritime Arrivals Reporting System (MARS).
Accidental release – waste and solid objects	There is the potential for the accidental disposal of hazardous wastes (e.g. hydrocarbon contaminated materials, batteries, paint cans) and non-hazardous solid wastes (e.g. paper and cardboard, wooden pallets, scrap steel, rope, glass and plastics).	The accidental release of wastes can cause a temporary and localised reduction in water quality, and the potential for marine fauna to ingest or become entangled with solid waste (garbage). If equipment is dropped, this may cause disturbance or smothering of benthic habitats. This is a small area; and benthic habitats are known to rapidly recover. There are no KEFs or sensitive benthic habitat in the operational area. Eni will apply control measures to ensure the likelihood of the event occurring is reduced to ALARP and acceptable levels.	• Procedures to reduce the potential for loss of nonhazardous and hazardous waste and dropped objects to be followed. • Dropped objects to be retrieved where possible. • Lifting management procedures will be implemented. • For hazardous chemicals, including hydrocarbons, hazardous chemical management procedures will be in place to reduce the risk of an accidental release to sea. • Chemical risk assessment process will be implemented to select chemicals to reduce impact to as low as reasonably practicable (ALARP) and acceptable levels.

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Unplanned Risks			
Accidental release – Minor loss of containment	Minor volumes of hydrocarbon or other chemicals (e.g. hydraulic fluids, deck spills) may be accidentally released to the marine environment due to: • Bulk product spills (e.g. cement, barite). • Loss of primary/secondary containment • Incorrect handling and storage • ROV failure.	Minor accidental releases of hydrocarbons or chemicals can cause a change in water quality. Expected volumes are small (<1m³), and there is no potential for injury or mortality to marine fauna. Eni will apply control measures to ensure the likelihood of the event occurring is reduced to ALARP and acceptable levels.	• Response plans and equipment will be in place and maintained to manage spills to the environment (e.g., NOPSEMA-accepted OPEP, SOPEP). • Chemical assessment procedure will be implemented to select chemicals to reduce impact to as low as reasonably practicable (ALARP) and acceptable levels. • For hazardous chemicals, including hydrocarbons, hazardous chemical management procedures will be in place to reduce the risk of an accidental release to sea. • ROV inspection and maintenance procedures. • Procedures to reduce the potential for loss of non-hazardous and hazardous waste and dropped objects to be followed. • MODU and vessel PMS in place to maintain DP, engines and machinery.
Accidental release – Condensate (Loss of Well Control (LOWC))	A release of up to 204,750bbl of Petrel condensate could occur following a LOWC event due to factors such as: • mechanical failure. • corrosion. • loss of effective well control. • dropped objects onto the well envelope. • human error. • loss of station keeping of the MODU.	An accidental release of condensate can cause a change water quality, a change in fauna behaviour, injury or mortality to marine fauna and an impact to other marine users. Potential impacts include those to plankton, fish, marine turtles, marine mammals, seabirds and migratory shorebirds, commercial fisheries, and cultural heritage. Petrel condensate is a volatile, non-persistent hydrocarbon with rapid evaporation on the sea surface (typically ~98% within the first 24 hours). Hydrocarbon spill modelling does not predict any shoreline contact. Two active fisheries overlap the Operational Area; however, these commercial fisheries have recorded limited historical catch effort data within the area. There are no tourism or recreational fishing activities expected. The Operational Area overlaps with a defence practice area (Darwin AWR West) and training area (Northern Australia Exercise Area). Eni will apply control measures to ensure the likelihood of the event occurring is reduced to ALARP and acceptable levels.	• NOPSEMA-accepted Well Operations Management Plan (WOMP) will be in force and includes control measures for well integrity that reduce the risk of an unplanned release of hydrocarbons. • NOPSEMA-accepted MODU Safety Case will be in place and includes control measures for well control that reduce the risk of an unplanned release of hydrocarbons. • In the event of an oil spill to sea, OPEP requirements will be implemented to mitigate environmental impacts. • Response plans and equipment will be in place and maintained to manage spills to the environment (e.g., NOPSEMA-accepted OPEP). • Where required, operational and scientific monitoring undertaken in accordance with Eni's NOPSEMA-accepted OSMP. • Eni Marine assurance standard in place. • Consultation with relevant persons (including notification requirements).

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Accidental release – MDO (vessel collision)	A release of up to 300m³ of MDO could occur from a collision between the activity vessels and a third-party vessel due to factors such as human error, navigational error, vessel equipment failure or poor weather. A smaller volume of MDO (~50m³) could be released during bunkering (i.e. refuelling of the MODU).	An accidental release of MDO can cause a change in water quality, a change in fauna behaviour, injury or mortality to marine fauna and an impact to other marine users. Potential impacts include those to plankton, fish, marine turtles, marine mammals, seabirds and migratory shorebirds, commercial fisheries, and cultural heritage. MDO is a relatively volatile, non-persistent hydrocarbon with rapid evaporation on the sea-surface (typically ~36% within the first 24 hours). Hydrocarbon spill modelling does not predict any shoreline contact. Two active fisheries overlap the operational area; however, these commercial fisheries have recorded limited historical catch effort data within the area. There are no tourism or recreational fishing activities expected. The Operational Area overlaps with defence practice and training areas (Darwin AWR West) and training area (Northern Australia Exercise Area). Eni will apply control measures to ensure the likelihood of the event occurring is reduced to ALARP and acceptable levels.	• Pre-start notifications will be issued. • Regulatory requirements for the prevention of vessel collisions and safety and emergency arrangements. • Use of MDO rather than HFO on vessels. • Bulk liquid and bulk solid transfer procedures and refuelling procedures implemented to reduce the risk of a release to sea. • In the event of an oil spill to sea, OPEP and SOPEP requirements will be implemented to mitigate environmental impacts. • Response plans and equipment will be in place and maintained to manage spills to the environment (e.g., NOPSEMA-accepted OPEP, SOPEP). • Vessels selected and on-boarded are operated, maintained and manned in accordance with industry standards (Marine Orders) and regulatory requirements. • Where required, operational and scientific monitoring undertaken in accordance with Eni's NOPSEMA-accepted OSMP. • Use low sulphur fuel on the MODU and vessels, in accordance with legislative requirements (e.g., Marine Orders). • Eni Marine assurance standard in place. • Consultation with relevant persons (including notification requirements).



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