

Mutineer Exeter Plug and Abandonment Environment Plan

Information for Relevant Persons



Activity Overview

Santos is preparing to permanently plug and abandon (P&A) 12 subsea wells within the Mutineer-Exeter, Fletcher and Finucane (MEFF) production licences commencing 2024.

The Operational Area for MEFF P&A activities is located in Commonwealth waters approximately 147 km north of Dampier, Western Australia (see Figure 1).

P&A activities are estimated to take 280 days. The estimated duration is subject to change based on further definition of the technical scope to P&A the wells. Actual duration during the activity may be affected by adverse weather conditions or technical/equipment issues that arise during operations.

Consultation & Feedback

All petroleum activities in Commonwealth waters must have an Environment Plan (EP) accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) before any activities can take place.

Under Commonwealth Environmental Regulations, Santos is required to consult with relevant persons about proposed activities when preparing an EP. A relevant person includes authorities, persons or organisations whose functions, interests or activities may be affected by the proposed activity.

You might be a relevant person if, for example, you have spiritual or cultural connections to land and sea country in accordance with Indigenous tradition that might be affected by our activity, if you otherwise carry out recreational

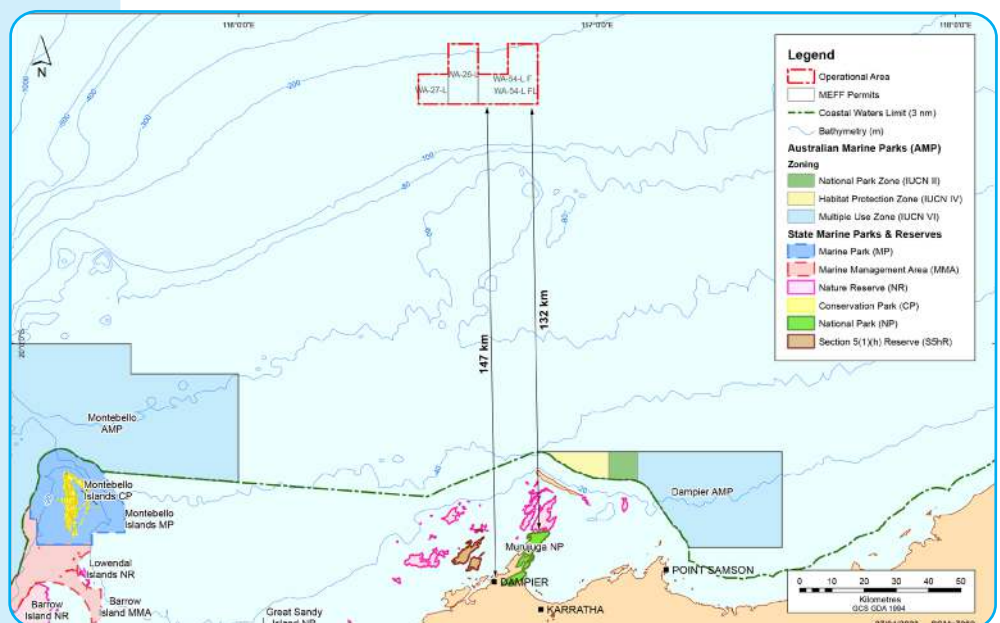
or commercial fishing, tourism or other activities that might be affected by our proposed activity, or if you are part of a local community that might be affected by our proposed activity.

Santos is now consulting with relevant persons for activities proposed to be managed under the Mutineer Exeter Plug and Abandonment Environment Plan. If you consider you may be a relevant person, please contact us as soon as possible if you require any further information or if you think you are not on our consultation list.

We are asking for relevant persons to provide feedback by **26 July 2023**.

Details on how to contact us are included in the **Providing Feedback** section of this information sheet.

Figure 1. MEFF P&A activity location.



Activity Description

ACTIVITY DETAILS

Location	Approximately 147 km north of Dampier.
Timing	Activities are planned to commence in the first half of v2024.
Duration	P&A activities are estimated to take 280 days. The estimated duration is subject to change based on further definition of the technical scope to P&A the wells. Actual duration during the activity may be affected by adverse weather conditions or technical/equipment issues that arise during operations.
Water depth	Approximately 130 m to approximately 160 m
Planned activities	Plug and permanently abandon 12 subsea wells.
Vessels	+ Semi-Submersible Mobile Offshore Drilling Unit (MODU) or a Lightweight Intervention Vessel (LWIV) + Up to three Anchor Handling Tug and Supply vessels.
Aircraft	Helicopters may be used for crew changes, critical equipment supply and emergency response uses.
Description of the natural environment	The seabed in permit areas is generally flat and featureless. There are no protected marine parks over the operational area, but the Ancient Coastline Key Ecological Feature at 125 m depth contour intersects the south eastern portion of the Operational area.
Exclusion zone	A 500 m Petroleum Safety Zone (PSZ) exclusion zone will be in place around the MODU or LWIV for duration of P&A activities.
Operational Area	WA-26-L, WA 27-L and WA-54-L
Petroleum production licences	WA-26-L, WA 27-L and WA-54-L

ACTIVITY COORDINATES

Location	Latitude (GDA 94)	Longitude (GDA 94)
Operational Area		
Point 1	19° 9' 55.21" S	116° 35' 4.72" E
Point 2	19° 9' 55.21" S	116° 40' 4.72" E
Point 3	19° 14' 55.21" S	116° 40' 4.72" E
Point 4	19° 14' 55.21" S	116° 45' 4.72" E
Point 5	19° 9' 55.21" S	116° 45' 4.72" E
Point 6	19° 9' 55.20" S	116° 50' 4.72" E
Point 7	19° 19' 55.21" S	116° 50' 4.72" E
Point 8	19° 19' 55.22" S	116° 35' 4.72" E
Point 9	19° 19' 55.22" S	116° 30' 4.72" E
Point 10	19° 14' 55.22" S	116° 30' 4.72" E
Point 11	19° 14' 55.21" S	116° 35' 4.72" E
Point 12	19° 9' 55.21" S	116° 35' 4.72" E
Mutineer	19° 15' 32.8" S	116° 38' 16.3" E
Exeter	19° 18' 35.4" S	116° 33' 41.1" E
Fletcher	19° 14' 43.8" S	116° 47' 43.9" E
Finucane	19° 18' 17.3" S	116° 45' 32.9" E
Fin-South	19° 18' 16.9" S	116° 45' 31.7" E

About plugging and abandoning activities

The plugging and abandonment of wells is a normal part of industry activities for wells that are not required for oil or gas production and is the first step to offshore decommissioning of assets on title.

Key steps in the plug and abandonment process include:

- + Design of an abandonment program.
- + Cleaning of the well bore.
- + Installation of permanent barriers (e.g. cement) to isolate any oil and gas formations and aquifers.
- + Verification of permanent barriers to ensure that there are no leaks.
- + Recovery of subsea well infrastructure.

Activity Purpose and Approvals

The MEFF Development ceased production in 2018, following which the floating, production, storage and offtake vessel (FPSO) departed the field.

After the removal of a submerged mid-water disconnectable turret mooring (DTM) and two mid water arches (MWA) in Q1 2023, all that remains are 12 subsea wells, and a subsea production system.

The wells have either been placed into long-term suspension in preparation for permanent abandonment, or the wells have been permanently plugged and the wellhead is all that remains to be recovered. The subsea production system has been flushed of hydrocarbons with treated seawater and is in a preservation state.

The MEFF P&A activities will focus on plugging of the remaining wells followed by the severing and recovery of well infrastructure at the seabed.

Santos will use a MODU (see **Figure 2**) or a Lightweight Intervention Vessel located



Figure 2. A photo of a Semi-Submersible MODU.

over the wells to perform the P&A activity, supported by a variety of activity-specific vessels.

Materials may be placed within the wellbores during the activities, including cement, drilling mud, gels and other non-porous materials such as clays (e.g. bentonite) and other sealants (e.g. bismuth, resin) or lost circulation materials (e.g. fibrous materials).

Santos plans to remove the wellheads and conductors from the seabed, unless they cannot be removed by the MODU, in which case they will be removed prior to or during final decommissioning.

Mechanical plugs may be used in some wells to reduce the amount of cement required to plug a well or to provide additional protection from formation pressure in the well. Typically, mechanical plugs installed in a well will also have a cement plug placed on top.

Pre and Post MODU activities may consist of:

- + Inspection and operability tests of the subsea equipment (e.g. Manifold and XT valves).

- + Rig-less well intervention activities
- + Seabed surveys, including a pre-activity debris clearance survey using side scan sonar (SSS) tow fish and a remotely operated vehicle (ROV) if targets of concern are identified.
- + Post-abandonment well monitoring.
- + Post abandonment activities as required.

Activities may not be continuous and the project vessels may depart and then re-enter the operational area on a number of occasions.

An EP for proposed activities is currently under assessment for acceptance by NOPSEMA. The EP has been prepared in accordance with the Commonwealth Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (OPGGGS(E)R). Additional feedback provided by relevant persons will be considered in an update to the [Mutineer-Exeter Plug and Abandonment Environment Plan](#).

Defining the Environment Area for Proposed Activities

Santos has undertaken an initial assessment to identify the environmental, social, economic and cultural values and sensitivities that may be affected by impacts and risks of proposed activities.

To do this we have considered the totality of the areas where activity impacts and risks may occur. These areas are summarised in **Table 1**. The widest extent of these areas is called the Environment that May Be Affected (EMBA), which for this activity is the outer boundary of a worst-

case spill resulting from a loss of well control during P&A activities. The EMBA for proposed activities is illustrated in **Figure 3**.

Oil spill EMBA's are defined by overlaying a great number (usually hundreds) of individual, computer simulated, hypothetical oil spill events into a single map. Each simulation run starts from the same location (release point) but each run will be subject to a different set of wind and weather conditions derived from historical data. The use of advanced and

sophisticated models enables us to present all the areas that could be affected.

While the EMBA represents the largest possible spatial extent that could be contacted by the worst-case spill events modelled, an actual spill event is more accurately represented by a single simulation run, resulting in a smaller spatial extent in the event of an actual spill. Often one or more simulation runs are selected to be representative of the 'worst-case' based on the nature and scale of the activity and the local environment.

Please see the [NOPSEMA Spill Modelling Video](#) for more information on oil spill modelling and why it is required for the preparation of Environment Plans.

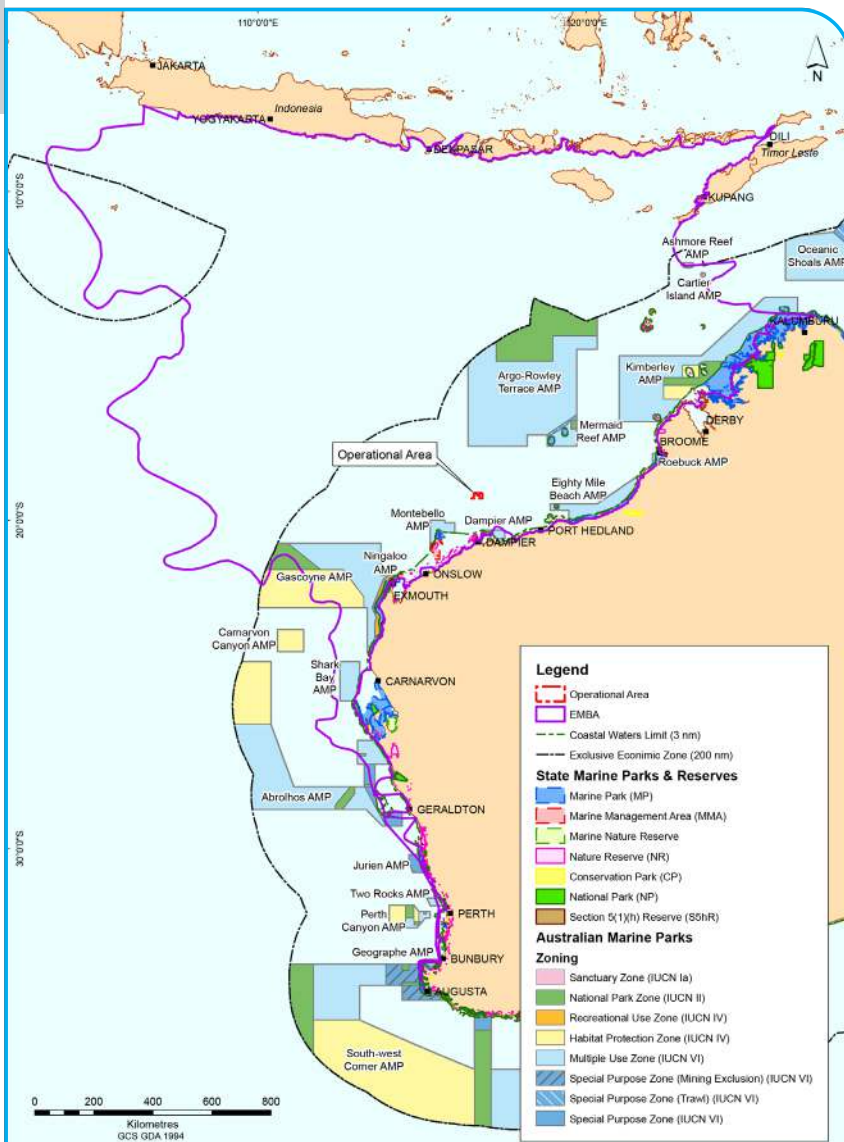


Figure 3. Activity location with EMBA



TABLE 1
ENVIRONMENT AREA FOR PROPOSED ACTIVITIES

ENVIRONMENT AREA

Operational Area

The area in which the MODU and support vessels will operate.

Environment that May Be Affected (EMBA)

The spatial extent of activity impacts (e.g., facility presence, light, noise) and risk (e.g., hydrocarbon spill).

Environmental, Social, Economic and Cultural Features

We have undertaken a review of publicly available information to identify environmental, social, economic and cultural features that may be affected by activity impacts and risks, which are summarised in **Table 2**. These aspects will be risk-assessed within the EP on a case-by-case basis.

TABLE 2
ENVIRONMENTAL, SOCIAL, ECONOMIC AND CULTURAL FEATURES

FEATURES	DESCRIPTION	OPERATIONAL AREA	EMBA	PUBLIC INFORMATION REVIEW
Aboriginal Heritage	Registered Aboriginal heritage sites protected under the: + <i>Aboriginal and Torres Strait Islander Heritage Protection Act 1984</i> + <i>WA Aboriginal Heritage Act 2021</i>	No	Yes	Multiple registered Aboriginal Heritage sites occur within the EMBA. While sea country is a recognised value, the registered site list is land-based sites, therefore could be impacted by unplanned hydrocarbon releases.
Cultural Heritage	Registered cultural sites under the: + <i>Underwater Cultural Heritage Act 2018</i>	No	Yes	Multiple registered cultural heritage sites occur within the EMBA. While sea country is a recognised value, the registered site list is land-based sites, therefore could be impacted by unplanned hydrocarbon releases.
Defence	Designated defence activity areas	No	Yes	Learmonth restricted air space and marine training area overlaps the EMBA.
Fishing	Commercial fishing	Yes	Yes	Three Commonwealth fisheries that overlap the operational area: Western Tuna and Billfish Fishery, Southern Bluefin Tuna Fishery, Western Skipjack Tuna Fishery. Management boundaries of twelve state managed fisheries intersect WA-20-L. Four fisheries actively fished within WA-20-L for the period 2009-2019: Mackerel Managed Fishery, Pilbara Fish Trawl (Interim) Managed Fishery, Pilbara Demersal trap Managed Fishery, Pilbara Line Fishery. Although the fishery management zones overlap the operational area, activity within or near the operational area is not expected. A number of State fisheries are open within the operational area and EMBA; however, they do not have activity in this area.
	Indigenous, subsistence or customary fishing	No	Yes	Traditional Australian Indigenous fishing activities are generally concentrated within 3 nm of the Western Australian coastline.

Fishing	Recreational and charter boat fishing	No	Yes	Given the water depths and distance from the nearest mainland, it is unlikely recreational fishing would occur in the OA. Recreational fishing does occur within the EMBA and therefore could be impacted by a LOWC.
Oil and Gas Operations	Petroleum operations	No	Yes	Oil and gas facilities occur within the EMBA as do permits operated by other titleholders. Thus, oil and gas activities could be impacted by unplanned events.
Protected Areas (nearest Commonwealth and State marine parks)	Australian Marine Park (Cwth)	No	Yes	The Montebello Marine Park is approximately 98km southwest from the operational area.
	Marine Park (State)	No	Yes	The Montebello Marine Park is approximately 98km southwest from the operational area.
Shipping	Shipping fairway	Yes	Yes	The eastern boundary of the operational area abuts the Dampier shipping fairway. The shipping fairways of the region service Dampier and Karratha. Therefore, vessel traffic is expected in the vicinity of the operational area.
Telecommunications	Subsea telecommunications cables	No	Yes	The JASUR AUS cable system and the North West Cable System are located approximately 181 km and 185 km east of the operational area.
Tourism	Tourism operations	No	Yes	The EMBA encompasses a number of marine parks and reserves where shoreline accumulation of oil may also occur. Thus, ecotourism based on specific local values (game fish, nearshore reef snorkelling and diving) could be impacted by unplanned events.
Towns / communities	Dampier	No	Yes	Dampier is approximately 147 km south of the Operational Area.

Activity Impacts and Risk Management

We have summarised in **Table 3** potential environmental risks and impacts and associated management measures for the proposed activity. These aspects will be risk-assessed with the Environment Plan on a case-by-case basis.

TABLE 3
ACTIVITY IMPACT AND RISK MANAGEMENT

POTENTIAL ACTIVITY IMPACTS

Acoustic disturbance to marine fauna

Description of potential impacts

Potential impacts from noise emissions may occur in the operational area from the following sources:

- + MODU activities (e.g., drilling equipment, engines and machinery, LWIV DP systems (if engaged)).
- + Flaring during well bleed-off activities.
- + Positioning equipment installed on the seabed.
- + Support vessel activities (e.g., vessel engines, thrusters and other machinery such as winches, site surveys using echo sounders, side scan sonar (SSS) or similar).
- + ROV activities (e.g., thrusters, debris clearing activities and cutting activities).
- + Helicopter activities relating to crew change requirements (e.g., aircraft engine).

Compliance with the following key management measures

- + MODU/LWIV and Vessel Planned Maintenance System (PMS) to maintain vessel DP, engines and machinery.
- + Santos Marine Assurance Procedure.

Light emissions

Description of potential impacts

Potential impacts from light emissions may occur in the operational area from:

- + Safety, operational and navigational lighting on the MODU/LWIV.
- + Safety, operational and navigational lighting on the support vessels.
- + ROV spot lighting while it is operational underwater on an as-needed basis.
- + Light from flaring during well bleed-off.
 - + Lighting will typically consist of bright white (i.e., metal halide, halogen, fluorescent) lights typical of lighting used in the offshore petroleum industry and not dissimilar to lighting used for other offshore activities in the region, including shipping and fishing.

Compliance with the following key management measures

- + MODU/vessels navigation lighting and equipment is compliant with the Convention on the International Regulations for Preventing Collisions at Sea, 1972 / Marine Orders 30: Prevention of Collisions, and with Marine Orders 21: Safety of Navigation and Emergency Procedures.

Atmospheric emissions

Description of potential impacts

Potential impacts from atmospheric emissions may occur in the operational area from the following sources:

- + Operation of MODU/LWIV and vessel engines, helicopters, generators, mobile and fixed plant and equipment.
- + Flaring from the MODU during well bleed off activities. Flaring is expected to last for approximately 6 - 12 hours per well.
- + Limited venting of hydrocarbons may occur as dead spaces or inaccessible areas of the well infrastructure are recovered and where any hydrocarbons cannot be directed to the bleed-off package.
- + Operation of incinerators on support vessels outside the 500 m exclusion zone around the MODU/LWIV.
- + When transferring dry bulk products used for drilling (e.g., barite, bentonite, cement), tank venting is necessary to prevent tank overpressure.

Compliance with the following key management measures

- + Vessel fuel oil sulphur content is compliant with the International Convention for the Prevention of Pollution from Ships (MARPOL).
- + Pursuant to MARPOL Annex VI, vessels will maintain a current International Air Pollution Prevention (IAPP) Certificate as relevant to vessel class.
- + MODU/LWIV and Vessel Planned Maintenance System (PMS) to maintain vessel DP, engines and machinery.

Seabed and benthic habitat disturbance

Description of potential impacts

Potential seabed disturbance may occur in the operational area from the following source:

- + Positioning and anchoring of the MODU at the well locations with the assistance of support vessels.
- + Cutting of wellheads.
- + Installation and recovery of pre lay equipment in preparation for rig arrival .
- + Installation and recovery of any seabed mounted survey or monitoring equipment.
- + Marine growth removal from critical areas of the subsea infrastructure.
- + Break up of cement patio.
- + Recovery of defunct material between the wellhead and the manifold / UTA / PUDU.
- + Wet storage of equipment on seabed for future recovery during decommissioning.

Compliance with the following key management measures

- + No vessel or LWIV anchoring, unless in an emergency.
- + Objects dropped overboard are recovered (where possible and safe to do so) to mitigate the environmental consequences from objects remaining in the marine environment.

Physical presence and interaction with other marine users

Description of potential impacts

Interaction with other marine users may occur as a result of, but not limited to:

- + MODU/LWIV and ROV presence in the operational area.
- + Support vessels presence in the operational area.
- + Well infrastructure and other equipment on the seabed.

Compliance with the following key management measures

- + If requested, stakeholders will be notified prior to the commencement of, and on cessation of each activity.
- + Relevant maritime notices issued.
- + A 500 m radius PSZ (exclusion zone) will be in place around the MODU/LWIV for the duration of the activity.
- + A visual and radar watch will be maintained on the support vessel bridge.
- + Support vessels (including the MODU) will be prohibited from recreational fishing within the operational area.
- + Santos commits to reducing impacts on commercial fishers through the provision of timely activity information to enable advance planning and avoidance of unexpected interference.

Operational vessel discharges

Description of potential impacts

Potential impacts may occur in the operational area from the following operational discharges:

- + sewage and grey water.
- + putrescible waste.
- + deck drainage.
- + cooling water.
- + bilge water.
- + brine.
- + ballast water.
- + swarf from subsea cutting activities.
- + hydraulic fluid from BOP operation.

Compliance with the following key management measures

- + Routine vessel discharge (sewage, bilge water, food waste) will meet MARPOL requirements.
- + Deck cleaning products that may be discharged to the ocean will meet MARPOL requirements.

Drilling discharges

Description of potential impacts

During P&A activities, drilling fluids and cements used and potentially discharged are similar in nature (but of lesser quantities) to those discharged during the drilling of a conventional well and include:

- + brines, seawater and freshwater.
- + water based drilling / milling fluid (WBM).
- + hi-viscosity (Hi-Vis) pills.
- + other additives such as density increasing additives, viscosity additives, alkalinity and hardness control additives, lost circulation materials (LCM) and tracer dyes.
- + drilling cements and additives such as retarders, accelerators, light-weight additives, water loss additives and gas migration additives.

Compliance with the following key management measures

- + Drilling and cement and chemicals potentially discharged to sea are Gold/Silver/D or E rated through OCNS, or PLONOR substances listed by OSPAR, or have a completed Santos risk assessment so that only environmentally acceptable products are used.
- + Only water-based muds will be used.

Spill response operations

In the event of a hydrocarbon spill, response strategies will be implemented where possible to reduce environmental impacts to ALARP but may include:

- + light, noise and atmospheric emissions.
- + Physical presence and disturbance.
- + Disruption to other users of marine and coastal areas and townships.

Compliance with the following key management measures

- + In the event of a hydrocarbon spill, the Oil Pollution Emergency Plan (OPEP) requirements are implemented to mitigate environmental impacts.

ACTIVITY RISKS

Release of Solid Objects

Description of risks

Solid objects, such as those listed below, can be accidentally released to the marine environment, and potentially impact on sensitive receptors:

- + non-hazardous solid wastes, such as paper and packaging.
- + hazardous solid wastes, such as batteries, fluorescent tubes and aerosol cans.
- + equipment and materials, such as hard hats, tools or infrastructure parts.

Compliance with the following key management measures

- + Dropped object prevention procedures
- + Waste (Garbage) Management Plan.
- + Hazardous chemical management procedures.
- + Dangerous goods managed in accordance with International Maritime Dangerous Goods Code (IMDG Code).

Accidental introduction of invasive marine species (IMS)

Description of risks

Introduction of invasive marine species may occur due to:

- + MODU/LWIV or support vessels and external/internal (e.g., sea chests, seawater systems) niches.
- + biofouling on equipment that is routinely submerged in water (e.g., mooring lines, ROVs).
- + discharge of high-risk ballast water.
- + cross contamination between vessels.

Compliance with the following key management measures

- + MODU/LWIV and vessels are managed to low risk in accordance with the Santos Invasive Marine Species Management Plan prior to movement/transit into or within the invasive marine species management zone, which requires:-
 - + assessment of applicable MODU/vessels using the Department Primary Industry and Regional Development (DPIRD) Vessel Check Tool; and
 - + the management of immersible equipment to low risk.

Unplanned interaction with marine fauna

Description of risks

There is the potential for MODU/LWIV and vessels or equipment from the vessels involved in operational activities to interact with marine fauna, including potential strike or collision, potentially resulting in severe injury or mortality.

- + Fauna strike may also occur from helicopters during take-off and landing.

Compliance with the following key management measures

- + Procedure for interacting with marine fauna.

Unplanned hazardous and non-hazardous discharges

Description of risks

Causes for accident hydrocarbon releases (other than diesel release from a vessel collision or bunkering, and LOWC) include:

- + Bulk Product Spills.
- + Mechanical / Structural Failure / Loss of Secondary Containment.
- + Loss of Primary Containment.
- + Incorrect Handling and Storage.
- + ROV Failure.
- + Hydrocarbon Fall-out during Flaring.
- + Rupture or leak from a flowline, service line, or umbilical.

Compliance with the following key management measures

- + Dropped object prevention procedures.
- + General chemical management procedures.
- + Hazardous chemical management procedures.
- + Santos chemical selection procedure.
- + International Maritime Dangerous Goods Code.
- + Bulk liquids and solids transfer procedure.

Unplanned hydrocarbon release from a loss of well control, vessel collision or refuelling

Description of risks

- + A worst-case credible scenario for the proposed activity is a loss of well control at the seabed or surface.

Compliance with the following key management measures

- + NOPSEMA-accepted MODU or LWIV safety case and Santos Well Operations Management Plan (WOMP) in place.
 - + A relief well plan will be developed prior to the commencement of P&A activities.
 - + Appropriate refuelling procedures and equipment will be used to prevent spills to the marine environment.
 - + NOPSEMA approved Oil Pollution Emergency Plan (OPEP), equipment and materials will be in place and maintained.
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Consultation

Consultation provides Santos with an opportunity to receive feedback from authorities, persons and organisations whose functions, interests or activities may be affected by proposed petroleum activities.

This feedback helps us to refine or change the management measures we are planning to address potential activity impacts and risks. Santos' objective for proposed activities is to reduce environmental impacts and risks to a level that is As Low As Reasonably Practicable (ALARP) and acceptable over the life of the activity.

Consultation also helps us to identify values and sensitivities where information is not publicly available, such as spiritual and cultural connection to land and sea country, as well as first-hand feedback on commercial and recreational fishing, tourism and local community activities and interests.

Providing feedback

If you consider you may be a relevant person, please contact us as soon as possible if you require any further information or if you think you are not on our consultation list.

We are asking for relevant persons to provide feedback by **26 July 2023**.

Feedback provided by relevant persons will be considered in an update to the [Mutineer-Exeter Plug and Abandonment Environment Plan](#) currently under assessment by NOPSEMA and through the life of the activity. Feedback from relevant persons will be included in the updated EP that is submitted to NOPSEMA for assessment.

Please let us know if you would like your personal/organisational details or any part of your feedback to remain private and we will ensure this remains confidential to NOPSEMA.

Santos

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