

WA-20-L Environment Plan

1. Purpose of this report

NOPSEMA has accepted in part and with conditions the WA-20-L Environment Plan (the EP) submitted by Santos WA Northwest Pty Ltd (Santos) for the ongoing management of gas seepage in the form of small bubbles emanating from the seabed into the water column at the Legendre Hub, Legendre South-1 and Legendre South-3 locations, as well as the ongoing presence of the Legendre-1 wellhead, which has been in situ in the field since the well was permanently plugged and abandoned in 1968.

This report explains how NOPSEMA took into account matters that may be of interest to the public and accompanies the accepted EP, submitted by Santos which is available on the NOPSEMA website and should be referred to for further information.

1.1. Information relevant to NOPSEMA's decision:

In making the decision to accept this EP, NOPSEMA took into account:

- the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (OPGGGS Act);
- the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulation 2009 (Environment Regulations);
- NOPSEMA Assessment Policy (PL0050), Environment Plan Assessment Policy (PL1347), Environment Plan Decision Making Guidelines (GL1721) and Consultation in the course of preparing an Environment Plan guideline (N-04750-GL2086);
- the Department of Industry, Science and Resources' Offshore Petroleum Decommissioning Guideline, March 2022;
- NOPSEMA Section 572 regulatory Policy (PL1903) and Section 270 regulatory Policy (PL1959);
- the WA-20-L Environment Plan which includes the titleholder's Oil Pollution Emergency Plan (OPEP);
- the information raised by relevant persons, government departments and agencies that is relevant to making a decision;
- relevant plans of management and threatened species recovery plans developed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and relevant guidance published by the Department of the Environment and Energy;
- the *1996 Protocol to the convention on the prevention of marine pollution by dumping of Waste and Other Matter, 1972*; and
- *IMO Resolution A.672(16), Guidelines and Standards for the removal of offshore installations and structures on the continental shelf and in the exclusive economic zone*, adopted on 19 October 1989.

2. Next steps

Responsibility for the ongoing environmental performance of the activity remains, at all times, with Santos.

NOPSEMA has legislated responsibilities to inspect and investigate offshore petroleum and greenhouse gas storage activities, and to enforce compliance with environmental law. These functions will be applied to this activity in accordance with NOPSEMA's policies.

3. Sensitive Information

Sensitive information received during the public comment period, such as the names and contact details of commenters and specific information identified by the commenter or relevant person as 'sensitive', is not published in this report. Sensitive information is contained in a sensitive information part of the EP which has been considered by NOPSEMA during its assessment process.

4. Further information

If you would like further information about the activity, please contact the titleholder's nominated liaison person specified in the EP and on NOPSEMA's webpage for the WA-20-L Environment Plan.

If you would like to be notified of regulatory information on the activity, such as start and end dates and enforcement actions (if any), please subscribe to updates from the [Approved projects and activities](#) on NOPSEMA's website.

How NOPSEMA has taken into account key matters raised during the assessment and decision-making process for the WA-20-L Environment Plan

#	Matter	Titleholder Submission	NOPSEMA's assessment and decision
1	Monitoring and evaluation of gas seepage from the Legendre field.	<p>The EP describes the ongoing management of gas seepage in the form of small bubbles emanating from the seabed into the water column in the Legendre field in petroleum license WA-20-L, approximately 105 km north of Dampier, Western Australia.</p> <p>Wells drilled within WA-20-L were gradually plugged and abandoned between 1968 and 2011, in accordance with relevant legislation and regulatory approvals at the time. Legendre field production wells were plugged and abandoned in 2011, while removal of the subsea infrastructure and placement of anti-scour mats and concrete caps was completed in two offshore campaigns between 2011 and 2012. The wells are located in water depths ranging from ~50-55 meters.</p> <p>In December 2013, Santos completed a post-decommissioning compliance ROV survey of the area. The survey identified that small gas bubbles were emanating from under the anti-scour mats at the Legendre Hub and notified NOPSEMA in January 2014, within which a commitment was made to perform additional monitoring of the gas seepage.</p> <p>Two targeted field surveys have since been conducted to inspect and analyse any gas seeps, as described in the EP (RPS 2021 and CSIRO 2022)</p> <p>The first survey confirmed that gas seepage at WA-20-L was occurring at three well locations (Legendre Hub, Legendre South-1, Legendre South-3) and that the gas was reservoir gas (85% methane gas).</p>	<p>NOPSEMA recognises that Section 270 of the Act, sets out the criteria required for the Joint Authority to give consent to the surrender of a title. NOPSEMA also notes that Santos is not requesting to relinquish the title (WA-20-L) as part of this EP submission.</p> <p>During the course of the assessment, NOPSEMA required Santos to provide further detail surrounding the status of the seep, composition and sources of the gas, subsurface evaluations, report on studies conducted to date, evaluations on remediation potential and results from subject matter expert (SME) workshops conducted to identify best management options.</p> <p>Given the uncertainties regarding the seepage pathways and the technical challenges associated with subsurface interventions, NOPSEMA agreed that there is a low likelihood that remediation activities would be successful, also noting that the impacts of attempting such operations may not be proportionate when compared to the minor nature of environmental impacts associated with the current seep.</p> <p>Santos provided additional information about the scope of the proposed monitoring program, confirming it will include measurements of:</p> <ul style="list-style-type: none"> • Gas release rates • Gas composition

	<p>The second survey concluded that the estimated flux rates have not significantly changed since the last monitoring study (2021) and remained in the same order of magnitude. The estimated annual average CO₂-e emissions associated with WA-20-L gas seeps is 17.585 tonnes of carbon dioxide equivalence per year, which can be compared to the Australian household average of greenhouse emissions (approximately 15-20 tonnes CO₂-e per annum).</p> <p>Santos reached the conclusion that well remediation and intervention activities were unlikely to resolve the matter and would not be ALARP given the nature of the seeps (stable and limited in volume), the low potential for impact to the local environment or sensitivities, low escalation potential and overall contribution to greenhouse gas emissions (i.e., approximately 0.00004% of the 2020/21 national fugitive emissions).</p> <p>Santos committed to perform an additional gas seepage monitoring campaign (CM-01) and an analysis and comparison against previous campaigns (CM-02) to better compare and evaluate Legendre field seep characteristics over time.</p>	<ul style="list-style-type: none"> • Contaminants in water • Contaminants in sediments • Visual inspection of Legendre-1 wellhead <p>NOPSEMA identified some remaining uncertainty surrounding expectations for the monitoring program and accepted the EP with a condition (Condition 1) to ensure that impacts and risks associated with the ongoing management of the gas seepage will be of an acceptable level.</p> <p>Condition 1 states: <i>Upon completion of the gas seepage monitoring campaign committed to in the EP (Control Measures 01 & 02), if any increase in gas seepage rates from the field are detected:</i></p> <p><i>a) Notify NOSPSEMA as soon as reasonably practicable but no more than 21 days after completion of the monitoring campaign; and</i></p> <p><i>b) Develop a seepage analysis and adaptive management plan, to be submitted to NOPSEMA within 60 days of completion of the monitoring campaign.</i></p> <p>The condition will require Santos to investigate further controls and mitigations should additional monitoring determine that the seepage rates have increased.</p> <p>Taking into consideration the status of the seeps, nature of monitoring activities proposed and the additional condition set, NOPSEMA is satisfied that the environmental impacts and risks associated with the ongoing presence of these seeps within WA-20-L, for the duration of the EP, are being managed to ALARP and will be of an acceptable level.</p>
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<p>2</p>	<p>Vessel-based surveillance, monitoring and inspection activities of the Legendre field and Legendre-1 wellhead</p>	<p>The EP also contains an evaluation of impacts and risks arising from proposed vessel-based inspection and monitoring activities for the additional monitoring campaign.</p> <p>Vessel activities may occur at any time within the period that the EP is in force, may be performed during any season, over days to weeks, within permit WA-20-L and may include 24-hour operations. Vessel-based activities may include the use of ROVs and various sampling and monitoring equipment (e.g., towed or dropped camera, water sampling and profiling, sediment sampling and gas flow rate monitoring).</p> <p>The environmental impact assessment for this activity covers planned and unplanned impacts and risks associated with the campaign, such as presence of vessel and monitoring equipment, acoustic emissions, light emissions, atmospheric emissions, seabed and benthic habitat disturbance, operational discharges, introduction of invasive marine species, marine fauna interactions, accidental release of solid object, hydrocarbon or chemical spill due to a vessel incident, and any associated spill response operations.</p> <p>Santos identified a number of standard control measures to reduce potential risks and impacts associated with the monitoring vessel-based activities.</p>	<p>NOPSEMA recognises that the monitoring activity proposed by Santos will be limited in scope and duration.</p> <p>NOPSEMA evaluated the potential impacts from survey activities to ensure they would be managed in a manner that will not have an unacceptable impact on matters protected under Part 3 of the EPBC Act, including marine turtles, whales, and values of the Commonwealth Marine Area such as commercially important fisheries.</p> <p>NOPSEMA found that with standard marine vessel activity control measures in place, and the Titleholder's capacity to implement its Oil Pollution Emergency Plan (OPEP) if required, impacts and risks will be reduced to ALARP and will be of an acceptable level</p>
<p>3</p>	<p>Leaving the Legendre-1 wellhead in situ may not be acceptable and result in long-term impacts and risks to the environment.</p>	<p>The EP describes the ongoing presence of the Legendre-1 wellhead and permanent guide base structure, located in 53m water depths, in petroleum license WA-20-L, approximately 105 km north of Dampier, Western Australia. The wellhead sits approximately 3.6 m above the seabed and has a permanent guide base estimated to be 3 to 5 m wide.</p> <p>Santos provide a decommissioning options assessment of the technical feasibility of wellhead removal and compared the</p>	<p>NOPSEMA recognises that Section 572 of the Act requires that a titleholder must remove from the title area all structures that are, and all equipment and other property that is, neither used nor to be used in connection with the operations on the title.</p> <p>NOPSEMA recognises the importance of ensuring petroleum titleholders meet their decommissioning obligations as required under section 572 of the OPGGS Act.</p>

	<p>environmental impacts and risks of removal versus those arising from leaving the wellhead in situ as the basis for the petroleum activity described in the EP.</p> <p>Santos conclude that cutting options to remove the Legendre-1 wellhead may be technically feasible, however there are technical risks, and risks of failed removal attempts.</p> <p>In preparing the EP, Santos consulted with relevant persons to inform the evaluation of environmental impacts and risks of the proposal. This included Commonwealth and State government agencies, fishing industry bodies, First Nations relevant persons or organisation, and relevant fishing licence holders. Santos responded to all objection and claims made, presenting this information in the EP.</p> <p>Santos undertook an environmental impact and risk assessment for the wellhead proposed to be left in situ, taking into account the limited environmental sensitivities present. This included evaluating impacts from the degradation of the wellhead materials over time and immediate and future snagging risks to fishers from leaving the wellhead in place.</p> <p>Santos concluded that with controls measures in place (i.e., ongoing AHO navigational chart marking and notification to persons of interest), impacts and risks are reduced to ALARP and will be of an acceptable level. Santos also included an additional commitment to perform an additional visual inspection of the Legendre-1 wellhead as part of the additional monitoring program committed to for the Legendre field.</p> <p>The EP also evaluates and concludes that the risk of gas seepage from the primary reservoir formation through the plugged and abandoned Legendre-1 well is not credible and that future escalation is also assessed as not credible, highly unlikely, or remote.</p>	<p>Santos sought a permanent deviation from the requirement to remove all property (i.e. the Legendre-1 wellhead), which may be considered when the titleholder demonstrates in an EP that the alternative arrangement ensure that environmental impacts and risks will be reduced to ALARP, be of an acceptable level and are carried out in a manner consistent with the principles of ecologically sustainable development.</p> <p>During the course of the assessment, NOPSEMA required Santos provide further evaluation of the risks to fishers, additional specifications about the property and additional analysis of the impacts to the environment from degradation of the wellheads.</p> <p>In response, Santos evaluated snagging risks to current and future potential fishers and performed additional consultation with fishing licence holders.</p> <p>Santos also provided further details on the impacts from the release of contaminants to the environment from the degradation of the wellhead structures.</p> <p>After taking into consideration the title holder's response and information provided in the EP, NOPSEMA was not reasonably satisfied that the proposal to leave the Legendre-1 wellhead in situ permanently was acceptable, and only accepted the EP in part.</p> <p>This is because NOPSEMA found that the permanent abandonment proposal was not consistent with current industry practice and in keeping with principles of ecological sustainable development and international guidance.</p> <p>As an SME report indicated there is some potential for trapped wellbore pressure occurring under the Legendre-1 wellhead,</p>
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