Keraudren Extension 3D Marine Seismic Survey Environment Plan

1. Purpose of this report

NOPSEMA has accepted the Keraudren Extension 3D Marine Seismic Survey Environment Plan (the EP) submitted by Santos WA Northwest Pty Ltd (the titleholder) for a seismic survey activity in the Bedout sub-basin within the period(s) February to July across the years 2020-2022.

As required by the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (the Environment Regulations), the public was provided with an opportunity to comment on the EP. There were no public comments received during the public comment period.

Following the public comment period, the titleholder submitted the EP for assessment by NOPSEMA on 20 January 2020. On 9 April 2020 NOPSEMA completed its assessment of the EP and has determined that it was reasonably satisfied that the EP meets the criteria for acceptance[1].

This report explains how NOPSEMA took into account key matters raised by stakeholders in making its decision. Comments have been grouped into 'key matters' that capture the key issues, concerns or information provided during the consultation process. This report also contains other key matters reflecting important values and sensitivities that may be of interest to the public.

This report accompanies the accepted Keraudren Extension 3D Marine Seismic Survey Environment Plan (Document No. SO-91-BI-20006.01, Revision 3, dated 26 March 2020) submitted by Santos WA Northwest Pty Ltd 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 Environment Regulations;
- NOPSEMA Assessment Policy (PL0050), Environment Plan Assessment Policy (PL1347) and Environment Plan Decision Making Guidelines (GL1721);
- the Santos WA Northwest Pty Ltd Keraudren Extension 3D Marine Seismic Survey Environment Plan;
- the information raised by relevant persons, government departments and agencies that is relevant to making a decision;
- the information raised through public comment that is relevant to making a decision (in this case none were received); and
- 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.

[1] Environment Regulations, Regulation 10A Criteria for acceptance of environment plan

2. Next steps

Responsibility for the ongoing environmental performance of the Keraudren Extension 3D Marine Seismic Survey activity remains, at all times, with Santos WA Northwest Pty Ltd.

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

This report does not provide an exhaustive record of all matters relevant to environmental management and decision making for this EP.

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 Keraudren Extension 3D Marine Seismic Survey.

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 link on NOPSEMA's website: https://info.nopsema.gov.au/environment_plans/13/show_public

How NOPSEMA has taken into account key matters raised during the assessment and decision making process for the Keraudren Extension 3D Marine Seismic Survey

#	Matter	Titleholder response	NOPSEMA's assessment and decision
1	***There would be unacceptable impacts to whales due to the proximity of the seismic acquisition area to the pygmy blue and humpback whale migration biologically important areas (BIAs).***	Santos WA Northwest Pty Ltd (Santos) undertook a comprehensive assessment of the potential impacts to humpback and blue whales. This was informed by underwater acoustic modelling that accounted for physical and behavioural impacts, as well as marine mammal observation data collected during the Keraudren 3D MSS conducted in 2019. Santos will ensure that the activity is conducted such that there is no physical injury to marine mammals (EPO-10), and there is no behavioural disturbance of humpback whales utilising the migratory BIA (EPO-11). The control measures that will be implemented to ensure there is no physical injury to marine fauna are as follows: • Implementation of EPBC Policy Statement 2.1 (Part A) Standard Management including observation zone, increased 2 km power down zone (CM-11), pre start-up visual, soft start procedure, night-time and low visibility procedure. EPBC PS2.1 requirements will be applied to marine turtles and whale sharks as well as cetaceans (CM-11). • Implementation of EPBC Policy Statement 2.1 (Part B.6) Adaptive management	NOPSEMA recognises that there is the potential for the activity, if not appropriately managed, to have an unacceptable impact on humpback and blue whales should they be migrating through the region, during the course of the petroleum activity. In making a decision regarding this matter, NOPSEMA took into account the content of the EP; relevant scientific literature; NOPSEMA's Decision Making Guidelines (GL1721), the Conservation Management Plan for the Blue Whale (DoE, 2015); *Megaptera novaeangliae* (humpback whale) Conservation Advice (DoE 2015); EPBC Act Policy Statement 2.1 (DEWHA, 2008), and the EPBC Act Significant Impact Guidelines 1.1- Matter of National Environmental Significance (DEWHA, 2013). During the course of the assessment NOPSEMA required Santos to consider: • The potential for injury (including TTS) to pygmy blue and humpback whales utilising migratory BIAs from cumulative sound exposure. As well as uncertainty in the distribution of pygmy blue whales during their northern and southern migration. This resulted in the adoption

		measures to cease acquisition for 24 hours if there are three or more humpback whale induced power or shut downs and only recommence if there are no further sightings for 24 hours. If there are three consecutive days of no acquisition as a result of whale sightings, the survey will cease for that year (CM-14). • Temporal exclusion of the humpback whale migration period with the survey proposed to occur anytime between February and July (inclusive) within the 2020-2022 period (CM-16). • An acoustic source exclusion zone has been implemented to prevent operation of the seismic source within 50 km of the pygmy blue whale migratory BIA to ensure that injury from cumulative sound exposure will be not occur either within the migratory BIA or in continental shelf waters (CM-56). • Use of two dedicated, trained MFOs, at least one with greater than 12 months experience in Australian waters (CM-13).	of an acoustic source exclusion zone that ensures that the seismic source will not be operated within 50 km of the pygmy blue whale migration BIA. Given the temporal avoidance of peak humpback whale migratory times, the acoustic source exclusion zone for the blue whale migratory BIA, the use of past MMO data to provide confidence in the performance of controls, and with the adaptive mitigation measures proposed, NOPSEMA is satisfied that there will be no injury to humpback or blue whales utilising their respective BIAs. Additionally, NOPSMA is satisfied that impacts to migrating blue and humpback whales will be limited to short term behavioural responses in isolated individuals, with no injury or displacement from migratory corridors. NOPSEMA has concluded that after taking into consideration the proposed environmental management measures that the activity will not cause unacceptable impacts to humpback whales or pygmy blue whales.
2	***There would be unacceptable impacts to turtles and whale sharks due to the overlap of the acquisition area with Flatback turtle inter-nesting habitat critical and the whale shark migration BIA.***	Santos has analysed the activities and the potential for impacts to marine turtles and whale sharks as a result of seismic noise emissions. Based on acoustic modelling, mortality and potential injury to marine turtles are possible within 20 m of the seismic source,	NOPSEMA recognises that there is the potential for the activity, if not appropriately managed, to have an unacceptable impact on marine turtles should they be present within the deeper waters of the Flatback habitat critical for interesting, and whale sharks migrating or feeding in the area.

		while behavioural disturbances may occur out to 4.3 km from the source. Santos will ensure that the activity is undertaken in a manner that prevents displacement of marine turtles from habitat critical during nesting and interesting periods, and ensures there is no injury to marine turtles or whale sharks (EPO-12 and EPO-14). The control measures that will be implemented to ensure there is no injury to marine turtles or whale sharks, or displacement of turtles from habitats critical are as follows: • Application to EPBC Policy Statement 2.1 Part A Standard Management Procedures to whale sharks and turtles. • No operation of the seismic source within flatback turtle habitat critical during nesting season. • Employ two dedicated MFOs to undertake observations for turtles and whale sharks.	In making a decision regarding this matter, NOPSEMA took into account the content of the EP; relevant scientific literature; NOPSEMA's Decision Making Guidelines (GL1721), the Recovery Plan for Marine Turtles (DoE, 2017); Conservation Advice for *Rhincodon typus* (Whale Shark); and the EPBC Act Significant Impact Guidelines 1.1-Matter of National Environmental Significance (DEWHA, 2013). NOPSEMA concludes that with the proposed environmental management measures in place, the potential for impacts to marine turtles or whale sharks is negligible. It is demonstrated through the evaluation of impacts and risks in the EP that the activity can be conducted in a manner that is not inconsistent with the Marine Turtle Recovery plan and the Conservation Advice for *Rhincodon typus* (whale shark) and will not result in unacceptable impacts to marine turtles or whale sharks within the operational area.
3	***There was concern from relevant persons that the survey may result in unacceptable impacts to the sustainability of commercial fisheries as a result of cumulative impacts to spawning fish stocks.***	Santos conducted an extensive evaluation of the potential impact of seismic on spawning behaviour and recruitment success using the best available science, FishCube data, Fisheries stock assessments and noise modelling predictions. This included a benchmarking activity that involved a review of historical surveys over the Pilbara Demersal	NOPSEMA recognises that there was concern from commercial fishing stakeholders that the survey could impact on their functions, activities and interests, through impacts to the spawning fish stocks. In making a decision regarding this matter, NOPSEMA took into account the content of the EP; NOPSEMA's Decision Making

		Scalefish Fishers and Mackerel Managed Fishery between 2014 and 2018. Based on the benchmarking activity, the greatest level of spatio-temporal overlap of seismic activity with spawning areas and times for commercially important fish stocks occurred in 2015. This included an overlap of 5.79% and 5.03% with ruby and goldband snapper spawning respectively with no observable impact on catch rates or recruitment in subsequent years. Based on the evaluation of cumulative and additive impacts of the Keraudren Extension MSS alongside other proposed and accepted seismic surveys, the maximum (worst case) overlap of seismic surveys within one season with spawning commercial fish species was below that which occurred in 2015. This was used to define acceptable levels of overlap. In addition to demonstrating that the spatio-temporal overlap of seismic activity and spawning fish was below historical highs and consequently would not result in an unacceptable impact to the sustainability of commercial fisheries, Santos committed to further reduce the km^2 of seismic acquisition within one year. Under CM-56 Santos will limit the total acquisition of Keraudren Extension MSS to 4134 km^2 within any one calendar year, which is to be reduced by 1859 km^2 should Archer MSS be acquired in the same year.	Guidelines (GL1721), relevant scientific literature, and the extent of the evaluation into cumulative impacts conducted by Santos. NOPSEMA required that Santos conduct a robust, qualitative and quantitative assessment of the potential for impacts to the sustainability of commercial fish stocks both from the proposed Keraudren Extension 3D MSS, and cumulative impacts in combination with potential concurrent seismic surveys. NOPSEMA required Santos to demonstrate that the potential impacts to spawning fish stocks from their survey in combination with other accepted seismic activities were of an acceptable level, and if necessary to provide control measures to ensure acceptable levels of impact were not exceeded. This resulted in a comprehensive evaluation of potential impacts to the fish spawning behaviours and success, with historical seismic activity levels used to benchmark acceptable levels of overlap between the timing and location of fish spawning and seismic activity. Taking into consideration the nature and scale of the activity, available peer-reviewed literature, and the outputs of extensive evaluation undertaken by Santos, NOPSEMA is satisfied that the potential impacts to spawning fish will be limited to short term, transient behavioural disturbance in a small

		In preparing the EP, Santos engaged with commercial fishing representatives, including the Western Australian Fishing Industry Council (WAFIC). Santos evaluated the objections and claims raised by relevant persons and provided a response to the relevant persons addressing the objections and claims raised.	percentage of spawning fish. Such an impact is small in magnitude when compared with natural levels of variability in larval recruitment, and will not constitute a significant impact to the sustainability of commercial fish stocks. After considering the nature and scale of the activity, NOPSEMA is satisfied that the consultation has met requirement of Division 2.2A in that appropriate authorities and relevant persons have been engaged in consultation, with sufficient time and information provided, and that the response by Santos to objections and claims are appropriate.
4	***There was concern from relevant persons that the survey may result in unacceptable displacement of commercial fisheries as a result of concurrent and subsequent seismic activities in the same area.***	Santos conducted an extensive evaluation of historic seismic survey overlap with the Pilbara Fish Trawl Interim Managed Fishery (being the fishery of most relevance to seismic survey in terms of potential for commercial fisheries displacement) between 2014 and 2018 using FishCube data. Based on this benchmarking activity, the greatest historical levels of overlap was established to be 13% overlap with the fishery and 19% overlap of the fished areas (not including the additional areas overlapped by large scale 2D surveys) in 2015. It was established that since 2014 the total fish catch has increased year on year despite the occurrence of large scale seismic surveys.	NOPSEMA recognises that there was concern from commercial fishing stakeholders that the survey could displace commercial fisheries. In making a decision regarding this matter, NOPSEMA took into account the content of the EP; NOPSEMA's Decision Making Guidelines (GL1721), relevant scientific literature, and the extent of the evaluation into cumulative impacts conducted by Santos. NOPSEMA required that Santos conduct a robust, qualitative and quantitative assessment of the potential for overlap with commercial fisheries from the proposed Keraudren Extension 3D MSS, and

		Furthermore the FishCube data showed that fishing vessels continued to fish in similar areas each year with no variations in fishing vessel distribution attributable to the presence of seismic surveys (although operational inconvenience was acknowledged). Santos established that the 2020-2022 potential overlap was higher than the historical benchmark (in 2015) and committed to reduce the km^2 of the Keraudren extension acquisition during that year in order to maintain fishery overlap and fished areas overlap below the established benchmark. Under CM-56 Santos will limit the total acquisition of Keraudren Extension MSS to 4134 km^2 within any one calendar year, to be reduced by 1859 km^2 should Archer MSS be acquired in the same year. Further measures to ensure is no unacceptable displacement of commercial fisheries as a result of concurrent and subsequent seismic activities in the same area include: • Consultation with other seismic operators and development of vessel communication protocols • Not acquiring Keraudren MSS and Archer MSS concurrently	cumulative impacts in combination with potential concurrent seismic surveys. NOPSEMA required Santos to demonstrate that the potential displacement to commercial fisheries from their survey in combination with other potential seismic activities were of an acceptable level, and if necessary to provide control measures to ensure acceptable levels of impact were not exceeded. This resulted in a comprehensive evaluation of historical seismic survey overlap with the PFTIMP and the determination of a benchmark for overlap. The % overlap between 2020 and 2022 was determined to exceed historical overlap and for this reason Santos implemented a control that ensures that % overlap with the fishery and fished areas does not exceed historical levels. Taking into consideration the nature and scale of the activity, the controls implemented including a 'make good' protocol for commercial fisheries and the outputs of extensive evaluation undertaken by Santos, NOPSEMA is satisfied that the activity will be managed to ensure that there are no unacceptable impacts to fishing licence holders. as a result of the seismic survey.

		• ‘Make good’ payments should a loss of catch be demonstrated as a result of the Keraudren 3D MSS.	

References

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