Archer 3D Marine Seismic Survey

1. Purpose of this report

NOPSEMA has accepted the Archer 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) of February to July in either 2021 or 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 21 December 2020. NOPSEMA has since completed its assessment of the EP and has determined that it is satisfied that the EP meets the criteria for acceptance[1] on 3 March 2021.

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 that may be of interest to the public.

This report accompanies the accepted Archer 3D Marine Seismic Survey Environment Plan (Revision 2, dated 9 February 2021 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 Archer 3D Marine Seismic Survey Environment Plan;
- 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;

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

2. Next steps

Responsibility for the ongoing environmental performance of the 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

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 Archer 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 https://info.nopsema.gov.au/home/approved_projects_and_activities on NOPSEMA's website.

5. References

DEWHA. (2008). EPBC Act Policy Statement 2.1 – Interaction between offshore seismic exploration and whales. Retrieved from https://www.environment.gov.au/system/files/resources/8d928995-0694-414e-a082-0ea1fff62fc8/files/seismic-whales.pdf

DEWHA. (2013). Matters of National Environmental Significance – Significant Impact Guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999. Retrieved from https://www.environment.gov.au/system/files/resources/42f84df4-720b-4dcf-b262-48679a3aba58/files/nes-guidelines_1.pdf

DoE. (2015). Conservation Advice. *Megaptera novaeangliae*- humpback whale. Retrieved from http://www.environment.gov.au/biodiversity/threatened/species/pubs/38-conservation-advice-10102015.pdf

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

#	Matter	Titleholder response	NOPSEMA's assessment and decision
1	***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 recognised the potential impact to the commercial fishing sector from multiple seismic surveys, either occurring in the same calendar year or over consecutive years, as discussed in Section 6.4 (Cumulative and Additive Seismic Impacts). Santos also acknowledged stakeholder's concern regarding the available science, but also noted that there are a significant number of credible, peer-reviewed scientific studies on the effects of seismic surveys to fish. Where there was still uncertainty, Santos acknowledges this and a level of conservatism was applied to ensure the assessment approach was precautionary. Santos advised that the spatial extent of the Archer 3D MSS is also covered by the Rollo Multiclient MSS (PGS, Environment Plan accepted, revision proposed) and the Capreolus-2 3D MSS. To accommodate flexibility in commercial arrangements, Santos is developing the Archer 3D MSS EP as well. Santos intends to either undertake the seismic activity under the Archer 3D MSS EP, or to work with either PGS or TGS to acquire the data under their respective EPs. Importantly only one of	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 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 Archer 3D MSS, additive impacts from the Santos 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 proposed survey, in combination with other accepted seismic activities, including their Keraudren Extension

		these surveys needs to be acquired over the area defined by the Archer 3D MSS. Santos confirmed the proposed control measures for managing cumulative and additive impacts, as presented in Section 6.4.4 of the EP. 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 Scalefish Fishery and Mackerel Managed Fishery between 2014 and 2019. 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 Archer 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.	MSS, were of an acceptable level, and if necessary, 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. In addition, NOPSEMA required that Santos demonstrate that the cumulative impacts of conducting both the proposed Archer 3D MSS and the Keraudren Extension 3D MSS in the same calendar year were reduced to as low as reasonably practicable (ALARP). This resulted in further clarification of the intended acquisition areas for the Keraudren Extension MSS, a revised cumulative and additive impact evaluation, and an overall reduction in the cumulative spatio-temporal overlap of seismic activity with the spawning range and periods for key commercial species. 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 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

		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 has committed to not acquiring the Keraudren Extension and Archer MSS concurrently (CM-22), as well as not acquiring any further surveys within Zone 2 of the PFTIMF until at least 2023 (CM-23) 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.	significant impact to the sustainability of commercial fish stocks.
2	***The survey may result in unacceptable displacement of commercial fisheries as a result of concurrent and subsequent seismic activity in the area.***	Santos conducted relevant person consultation by identifying the relevant persons whose functions, interests and activities may be affected by the activity, then providing them with sufficient bespoke information in order to determine how the activity will affect their functions, interests and activities. The relevant persons were then given sufficient time to respond with any objections or claims and those claims were responded to and/or incorporated into the EP consistent with the requirements of Division 2.2A of the Regulations. Santos took on board feedback from WAFIC, commercial fishers and NOPSEMA and provided:	NOPSEMA acknowledges the importance of appropriate consultation to ensure relevant persons have sufficient information and time and that any objections and claims made are appropriately dealt with by the titleholder. In making a decision regarding this matter, NOPSEMA took into account the content of the EP, NOPSEMA's Decision Making Guidelines (GL1721), the full text correspondence with relevant persons, the extent of the consultation effort by Santos and how Santos addressed the merits of objections and claims made.

		• bespoke information to commercial fishers, targeted to their fishery; • engaging WAFIC to assist in the review and distribution of commercial fisher consultation; • refinements to the stakeholder identification process; and • clearly documenting and tracking notifications. Santos will ensure that displacement/interference impacts to commercial fisheries are ALARP and acceptable by implementing control measures and a commitment to assess evidence-based payment claims from commercial fishing licence holders who claim to be affected by the seismic survey.	Taking into consideration the nature and scale of the activity, NOPSEMA is satisfied that the consultation has met the requirements 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. NOPSEMA is further satisfied, taking into consideration the proposed control measures and the length of the proposed survey, that commercial fishing licence holders will be no worse off as a result of the seismic survey.
3	***There would be unacceptable impacts to whales due to the overlap of the seismic acquisition area with the humpback whale migration biologically important areas (BIAs).***	Santos WA Northwest Pty Ltd (Santos) undertook a comprehensive assessment of the potential impacts to humpback 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 injury to cetaceans due to noise associated with the operation of seismic sources (EPO-9), and there is no disturbance of humpback whales during the peak migratory period (EPO-10).	NOPSEMA recognises that there is the potential for the activity, if not appropriately managed, to have an unacceptable impact on humpback 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), *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).

		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, power down zone, pre start-up visual, soft start procedure, night-time and low visibility procedure. EPBC PS2.1 requirements will be applied to marine turtles (CM-19) and whale sharks as well as cetaceans (CM-20). • Implementation of EPBC Policy Statement 2.1 (Part B.6) Adaptive management 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-16). • Temporal exclusion of the humpback whale peak migration period (CM-18), with adaptive mitigation to detect variability in migratory period and cease the survey if 3 consecutive days of no acquisition due to whale triggered shut downs. • Use of two dedicated, trained MFOs, at least one with greater than 12 months experience in Australian waters (CM-15).	During the course of the assessment NOPSEMA required Santos to consider: • The potential for injury (including TTS) to humpback whales utilising the migratory BIA from cumulative sound exposure. Given the temporal avoidance of peak humpback whale migratory times, the use of past MMO data to provide confidence in the performance of controls and likely occurrence of whales, and with the adaptive mitigation measures proposed, NOPSEMA is satisfied that there will be no injury to humpback whales utilising the migratory BIAs. Additionally, NOPSMA is satisfied that impacts to migrating 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.