3D Oil Dorrigo Marine Seismic Survey

1. Purpose of this report

NOPSEMA has accepted the Dorrigo 3D Marine Seismic Survey (the EP) submitted by 3D Oil T49P Pty Ltd (the titleholder, also referred to below as 3D Oil) for a seismic survey activity in the Otway Basin within the period 01 September to 31 October 2019.

The titleholder submitted the EP for assessment by NOPSEMA on 30 January 2019. 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 13 May 2019.

This report explains how NOPSEMA took into account key matters raised by stakeholders (relevant persons) 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 Dorrigo 3D Marine Seismic Survey Environment Plan, Revision 1 submitted by 3D Oil T49P 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 Dorrigo 3D MSS Environment Plan;
- the information raised by relevant persons, government departments and agencies that is relevant to making a decision;
- relevant published, peer reviewed scientific literature;
- 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.

2. Next steps

Responsibility for the ongoing environmental performance of the Dorrigo 3D marine seismic survey activity remains, at all times, with 3D Oil T49P Pty Ltd.

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

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 consultation, such as the names and contact details of individuals, is not published in this report, although this information 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 Dorrigo 3D MSS.

This report does not provide an exhaustive record of all matters relevant to environment management and decision-making for this EP. Readers should also refer to the relevant sections of the EP particularly where these references are provided.

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 via NOPSEMA's website.

How NOPSEMA has taken into account key matters raised during the assessment and decision making process for Dorrigo 3D MSS

#	Matter :	What 3D Oil are doing:	What NOPSEMA decided:
Displacement of commercial fishers			
1	***There would be unacceptable impacts on fishing operations in particular southern rock lobster and giant crab*** Claims were raised that there would be displacement of commercial fishers as a result of the seismic activity which could reduce catch resulting in loss of income to fishing and related businesses.	3D Oil completed an evaluation of publicly available information, commissioned a report by SETFIA (appendix 4), and undertook consultation with relevant government departments and other relevant persons. The survey area overlaps areas that may be fished by Southern Rock Lobster (SRL) and Giant Crab (GC) fishers operating within the Victorian and Tasmanian managed fisheries. 3D Oil scheduled the survey to occur in September and October 2019 so as to avoid upwelling periods and also at a time of minimal fishing activity (Section 5.7.5 of EP). The survey timing coincides with the lowest take of Southern Rock Lobster for both Tasmanian and Victorian fisheries. The survey overlaps one of the three Victorian fisheries management areas, the Apollo Bay Region, and about 92% of this region is outside the survey area (Table 7-10A of the EP). The survey overlaps areas fished for Giant Crab by Tasmanian Fishers but not by Victorian Fishers. For the Tasmanian fishery the seasonal effort along the West Coast is lowest from August to October and fishing effort during the time of the survey is predicted to be very low. The survey does not overlap with fisheries habitat in the Victorian fishery and overlaps an extremely small	NOPSEMA recognises the matter raised and agrees that there is the potential for the activity to cause displacement of fishers, which if not appropriately managed could have adverse impacts on fishing. In making a decision regarding this matter, NOPSEMA took into account the content of 3D Oil's EP, the modelling report included as part of the EP, view's expressed by relevant persons including fishery representative organisations Seafood Industry Victoria, South East Trawl Fishery Association, Tasmanian Seafood Industry Council, Victorian Rock Lobster Association, and NOPSEMA's decision making guidelines (GL1721). NOPSEMA required 3D Oil to provide a detailed evaluation of their spatial and temporal overlap with the SRL and GC fishery, as well as describe the likely presence of these species within the survey area based on habitats and bathymetry present. A focus of the assessment included the provision of a demonstration that sufficient effort had been given to exploring control measures to address relevant person's claims. This included survey design such as designing the survey location and timing to avoid potential impacts to fishers.

	proportion of the seabed fished by the fishery in Tasmania (0.75%, Table 10B of the EP). 3D Oil must ensure that the survey is undertaken in a manner which prevents injury to invertebrates and fish such that the impacts as result of the survey are localised, temporary and recoverable; and the survey is undertaken in a manner that prevents impacts to fishers' gear. The control measures in place to ensure that this level of performance are met include: Survey is undertaken between 1 September to 31 October 2019 which does not temporally overlap the Victorian SRL or GC fishing season or the Commonwealth squid jig fishing season. Operating an array volume of no greater than 3260 in3 volume operating at 2000psi There will be no discharge of the acoustic source outside the Dorrigo MSS operational area. Soft start procedures will be conducted in accordance with Part A of the EPBC Policy Statement 2.1 requirements to alert sound sensitive species and allow for displacement. During line turns the acoustic source will be shut-down. Notification to fishers of commencement of survey and ongoing weekly updates on survey duration and completion.	NOPSEMA recognises that 3D Oil has limited the survey duration and timing to a narrow window of opportunity which avoids known environmental sensitivities and avoids peak fishing time minimising displacement of fishers. NOPSEMA is reasonably satisfied that 3D Oil have provided a detailed evaluation of potential displacement of commercial fishers and demonstrated that with the adoption of control measures, impacts of the survey will be reduced to as low as reasonably practicable (ALARP) and an acceptable level.

Fisheries Stock		
2 ***There would be unacceptable impacts from seismic sound on fish stock in particular southern rock lobster and giant crab*** Claims were raised that seismic sound would cause mortality, injury and/or displacement of commercially important fish species resulting in reduced catch rates.	In response to these claims 3D Oil assessed the potential for the survey to have an impact on fisheries stock, in particular SRL and GC. This assessment was supported by a comprehensive review of scientific literature and informed with the outputs of underwater acoustic modelling. Acoustic modelling applied the seafloor PK-PK threshold of 202 dB as the level of particle motion from sound that could cause an impact to Crustaceans (Payne et al. 2007). Particle motion is considered to be the most appropriate metric to use as opposed to sound pressure level as it is this element of sound that crustaceans are most sensitive to. The distance from the source to this level was 505 m. 3D Oil's assessment concludes that given the small percentage of survey overlap with fisheries habitat, outputs of the modelling impacts in relation to impact thresholds, any impacts to fish stock are likely to be negligible due to the impacts not being lethal to individuals and not impacting reproduction or larval development. 3D Oil must ensure that the survey is undertaken in a manner which prevents injury to invertebrates and fish such that the impacts as result of the survey are localised, temporary and recoverable. The control measures in place to ensure that this level of performance are met are described above in key matter #1.	NOPSEMA recognises the matter raised and agrees that there is the potential for the activity, if not appropriately managed, to have an unacceptable impact on commercially important fish stock. In making a decision regarding this matter, NOPSEMA took into account the content of 3D Oil's EP, the modelling report, scientific literature, view's expressed by relevant persons including fishery representative organisations Seafood Industry Victoria, South East Trawl Fishery Association, Tasmanian Seafood Industry Council, Victorian Rock Lobster Association, individual fishers and NOPSEMA's decision making guidelines (GL1721). NOPSEMA required that the evaluation of impacts from underwater sound on fish stocks, including at key life stages was well supported and based on contemporary scientific literature (e.g. Day et al, 2016; Payne et al, 2007). NOPSEMA is reasonably satisfied that conservation thresholds have been adopted and given the small spatial overlap with likely GC and SRL habitat, the potential for impact is negligible, localised and recoverable. Studies cited include a wide range of scientific literature (Day et al, 2016; Payne et al., 2007; Christian et al., 2003; Christian et al., 2004) that support the assessment that widespread mortality, physiological or stress-related changes in GC and SRL are not expected to occur under the conditions of the Dorrigo 3D marine seismic survey. Further, based on the evidence presented, the connectivity of the GC and SRL stocks and the low spatial overlap of the seismic survey, NOPSEMA is satisfied that there will not be any population level impacts from the seismic survey.

	NOPSEMA is reasonably satisfied that 3D Oil have provided a detailed evaluation of potential impact on commercial fish stock and demonstrated that with the adoption of control measures, impacts of the survey will be reduced to as low as reasonably practicable (ALARP) and an acceptable level.

Primary Productivity			
3	***There would be unacceptable impacts to primary productivity – zooplankton*** Claims were raised that seismic sound from this activity and others proposed in the Otway region would adversely impact primary productivity.	3D Oil has provided a comprehensive assessment of the potential for their survey to have an impact on the primary productivity of the region, with a specific focus on impacts to zooplankton. 3D Oil acknowledges the potential for seismic sound to negatively impact on zooplankton (McCauley et al., 2017), and the productivity of the region as a value of the Commonwealth marine area (DoE, 2015). Based on calculations the EP states plankton biomass will have recovered at Day 42 – 6 days after the completion of the survey. CSIRO's recommendations for minimising impacts to plankton (Richardson et al., 2017) have been considered as part of the 3D Oil's evaluation. Aside from temporal exclusions, survey lines are designed to run across prevailing currents to allow for maximum recovery of plankton and minimum exposure of individual organisms to seismic survey. 3D Oil concludes that impacts will be of an acceptable level based upon recovery time of plankton. 3D Oil must ensure that its activity results in no significant impact to plankton biomass during the Dorrigo MSS and will achieve this by conducting the survey outside of key upwelling times. Control measures to be implemented are outlined in Table 7-8 (p.219). Further, 3D Oil has modelled the potential cumulative impacts of this survey with the proposed Spectrum Otway Deep survey which will be conducted 35 km away to ensure that there is no potential for cumulative impacts to primary productivity in the region.	NOPSEMA recognises that the oceanographic and bathymetric features of the Otway marine bioregion present optimal conditions for upwelling to occur which in turn supports high productivity in the region. High levels of primary productivity driven by the annual Bonney Upwelling event is considered to be an important value of the Commonwealth Marine Area. NOPSEMA recognises that seismic survey activities have a potential to impact upon zooplankton which may have flow on effects for higher levels in the trophic cascade. In making a decision regarding this matter, NOPSEMA took into account the content of 3D Oil's EP, the modelling report, scientific literature and the South East Marine Bioregional Plan (DoE, 2015). NOPSEMA required that the evaluation of potential impacts to primary productivity took into account relevant scientific literature, modelled exposure levels and the CSIRO's recommendations for mitigating impacts to zooplankton (Richardson et al., 2017). NOPSEMA recognises that the Bonney Upwelling is an oceanographic phenomenon that results in favourable conditions for primary productivity (phytoplankton blooms). Phytoplankton are photosynthetic organisms (plants) and thus are not susceptible to impact from seismic noise. Zooplankton blooms, comprised of larvae, crustaceans and small animals can lag behind the initial upwelling by periods of weeks to months (Gill et al., 2015) and are susceptible to impacts from seismic sound (McCauley et al., 2017). NOPSEMA is aware of other seismic survey proposals in this region and takes both proposed and past surveys into consideration when considering the potential

	for cumulative impacts. Based on the evidence presented, even if other proposed seismic surveys took place, NOPSEMA is reasonably satisfied that there would not be unacceptable impacts to primary productivity in the region. Given that the seismic survey has been scheduled to avoid the Bonney upwelling period and noting the modelled recovery times based on currents and survey design, NOPSEMA is reasonably satisfied that any potential impacts to zooplankton will be localised, temporary and negligible, and managed to a level that is ALARP. NOPSEMA is reasonably satisfied that by incorporating the CSIRO guidelines for seismic surveys (Richardson et al., 2017), and avoiding the Bonney Upwelling period, that there will be no unacceptable impacts to the productivity of the region.

Consultation method			
4	***The consultation in the course of preparing the EP was inappropriate*** Claims were raised that fishing stakeholders including peak fishing industry association were not provided with sufficient information or time.	3D Oil undertook a systematic approach to identify stakeholders (relevant person) and contacted these persons at the commencement of the consultation process. Table 4.1 identifies the stakeholders contacted. These include State and Federal Government Departments, local Government, such as the King Island Shire Council, as well as community interest groups such as the "King Island Press" (Local Paper) and conservation group "Blue Whale Study". The majority of the consultation involved interaction with fisheries representative bodies, Fishery Management Authorities, and with individual fishers. In the course of this consultation general concern was expressed about potential disruption of fishing effort and acoustic impacts to fish stocks. However detailed information about fishing effort in the survey area was difficult to obtain. Consequently more consultation was undertaken to gain additional information about, and consult with, the Victorian and Tasmanian SRL and GC fishers through consultation with Seafood Industry Victoria (SIV) and the Tasmanian Seafood Industry Council (TSIC). All parties to this consultation failed to reach agreement in a timely manner about how consultation would be undertaken. Consequently 3D Oil undertook an alternative consultation strategy (Section 4.6 of the EP). This included contacting 57 Victorian fishers through mail-out from the Victorian Fisheries Authority, obtaining contact details for a number of Tasmanian licence holders and subsequently contacting these license holders by telephone, and finally placing adverts in local Tasmanian newspapers. Where fishers raised issues in response to this consultation they were of similar general nature to	NOPSEMA acknowledges the importance of appropriate consultation to ensure that stakeholders (relevant persons) have sufficient information and time and that any objections and claims from stakeholders are appropriately dealt with by the titleholder. In making a decision regarding this matter, NOPSEMA took into account the content of 3D Oil's EP, which included the full text of the correspondence with stakeholders, including with fishers and Fishery Representatives, the extent of the consultation effort undertaken by 3D Oil, NOPSEMA's Decision Making Guidelines (GL1721), and correspondence received directly by NOPSEMA during the assessment of the EP. During the assessment process NOPSEMA reviewed the consultation process undertaken by 3D Oil and required them to provide a full description and justification to demonstrate that the consultation was appropriate, particularly in relation to SIV, TSIC and the adoption of the alternative consultation strategy. The consultation report and environment description, identifies that because of seasonal fishing patterns, fishery closures and the small overlap of the survey with fishing grounds, few, if any fishers are likely to be in the area at the time of the survey. Although quite extensive consultation has been undertaken few comments specific to the location and time of the survey were received. Most comments were of general concerns in respect to acoustic impacts to SRL and GC and 3D Oil responded to these by providing a science based evaluation (as per the content of the EP).

those raised by the Peak Fisheries Bodies (and discussed above) and have been addressed in the EP.

The consultation process began in March 2018 with initial information provided and this was updated as the details of the survey were finalised, with the most recent consultation in January 2019, and publication of survey details in newspapers (including the King Island Press) on 16 January 2019.

Fishing stakeholder were provided with details of the proposed activity including the location, timing and duration of the proposed survey and the planned method of operation. Comment and request for further information were invited and a contact was provided for this purpose. SIV and TSIC were provided with an assessment of their objections and claims including extracts from the relevant fisheries impact assessment section of the draft EP in September 2018 and again in December 2018.

The EP commits to ongoing consultation prior to, during and on completion of the survey. 3D Oil intends to provide fishers who wish to be kept informed timely notification and daily updates via SMS.

It is noted that the consultation method was not to the satisfaction of SIV and TSIC. NOPSEMA gave consideration to this issue, but also noted that the available information indicates that the level of fisheries activity and the distribution of fisheries stock in the survey area, at the planned time of the survey, is demonstrably quite low. In view of this the consultation was seen to be proportional to the magnitude of fisheries values for the area.

Taking into consideration the nature and scale of the activity, NOPSEMA is satisfied that the consultation has met the requirements of Division 2.2.A in that appropriate authorities and relevant persons have been engaged in consultation, with sufficient time and information provided, and that the response by 3D Oil to objections and claims are appropriate.

EPBC Listed Whale Species			
5	***There would be unacceptable impacts on protected matters, specifically southern right whales (SRW).*** Concerns were raised in relation to managing impacts to whales, in particular southern right whales.	3D Oil has undertaken a comprehensive literature review of the known and established breeding and calving areas and biologically important areas, the closest one of which is the coastal connecting habitat along the western coastline of King Island (p. 103 of the EP). The evaluation of potential impacts to southern right whales was supported by a comprehensive underwater acoustic modelling study (Appendix 5). The acoustic modelling predicted received sound levels at the boundary of the interconnecting habitat to reach a maximum of 147 dB, which is below the behavioural disturbance threshold for low frequency cetaceans of 160 dB (Southall et al, 2007). While the behavioural threshold applied for SRW cows and calves in calving and resting habitat is 140 dB, 3D Oil provided evidence to support the conclusion that the interconnecting habitat biologically important area is a historically low use area (1 of 13 sightings at King Island between 1899 and 2018, p. 99; AMMC, 2018), and animals are more likely to be moving through the area than resting there based on prevailing winds and oceanographic conditions on the exposed western coast of King Island. 3D Oil undertook consultation with an Australian SRW research scientist in an attempt to better understand the distribution of SRWs and potential mitigation measures that would be effective for the species. 3D Oil has also made the commitment to seek future opportunities to invest in SRW research in the region. 3D Oil will ensure that (Table 7-2, p.197): there is no injury to southern right whales, and there is no behavioural disturbance to coastal aggregation or calving activities in coastal biologically important areas.	NOPSEMA recognises the conservation significance of the SRW and the potential for the activity to have impacts on SRW if calving and breeding phases were disturbed, or if whales come within close proximity to the seismic source and were subject to injurious levels of sound. In making a decision regarding this matter, NOPSEMA took into account the content of 3D Oil's EP, views expressed by a reputable SRW scientist, NOPSEMA's Decision Making Guidelines (GL1721), Conservation Management Plan for the Southern Right Whale (SEWPC, 2012), EPBC Act Policy Statement 2.1 (DEWHA, 2008), and EPBC Act Significant Impact Guidelines 1.1 – Matters of National Environmental Significance (DEWHA, 2013). NOPSEMA is reasonably satisfied that the survey avoids the critical period for SRW calving when pregnant females and new calves would be at their most sensitive (AMMC, 2009). There is a low likelihood that cows and calves migrating out of the calving areas, or using the interconnecting habitat on the west coast of King Island in September/October, may demonstrate avoidance behaviours (McCauley et al., 2000). However, based on the information provided and current research, there are no restricted migration corridors (SEWPC, 2012; Bannister et al., 1997) and thus the activity would not impact on the ability of animals to undertake migration. NOPSEMA required that 3D Oil implement larger mitigation zones (low power and shut down) for SRW cows and calves to account for uncertainty in the sensitivity of cows and calves to noise, and to conduct a thorough assessment of the potential use of the interconnecting habitat at King Island by SRW cows and calves.

The control measures in place to ensure this level of performance will be met include:

- Implement EPBC Policy Statement 2.1 (Part A) Standard Management
- Adoption of night time/low visibility procedures
- Trained crew observing for cetaceans on both the seismic and support vessels
- No operation at night where there have been 3 or more whale instigated shut downs
- Increased power down (3 km) and shut down zones for SRW cows and calves (1.5 km).

Where there is a high density of whales (> 3 whale instigated shut downs in 24 hours) additional mitigation measures will be implemented, including using a support vessel to scout ahead for whales, relocating to a different survey line and ceasing night time operations in the area.

A more thorough analysis of the potential for SRW cows and calves to utilise the King Island connective habitat (AMMC, 2018), and potential for disturbance from the Dorrigo survey has been provided to assess the potential for unacceptable behavioural impacts to SRW cows and calves. Based on the additional contextual information provided, and the nature and scale of the activity, the potential for behavioural disturbance to SRW in the (west) King Island interconnecting habitat is considered unlikely, and if realised, impacts are assessed as negligible, and would be limited to a potential transient behavioural disturbance. Given the short temporal window over which sound levels will be raised to 147 dB, the unlikely chance that SRW cows and calves would utilise the western side of King Island for anything other than migration (AMMC, 2018) it is demonstrated that the activity can be conducted in a manner that is not inconsistent with the Conservation Management Plan for Southern Right Whales.

After taking into consideration the environmental management measures in place, NOPSEMA was reasonably satisfied that the activity will not result in unacceptable impact (no injury or disturbance to biologically significant behaviour) to SRW.

Hydrocarbon Spill Risks			
6	***Hydrocarbon Spill risk have been reduced to an acceptable level.*** Concerns were raised in relation to managing hydrocarbon spill risks, in particular from refuelling and/or an incident.	3D Oil analysed the activities that have the potential to result in a fuel spill during the Dorrigo MSS (including planned activities such as refuelling) and incidents (such as vessel collision). 3D Oil has committed to the vessel selected for the MSS will have a maximum fuel tank size of 400m3 of marine diesel or marine gas oil [MDO/MGO]. In order to determine the risk associated with the escape of oil 3D Oil conservatively selected the rupture of a complete fuel tank of 400m3 of MDO/MGO as the worst case scenario to be modelled. The oil spill modelling used October to April oceanographic conditions to simulate a 400m3 surface release of marine diesel oil over 6 hours to represent a vessel collision incident. The oil used in the model was a marine diesel oil which spreads quickly when spilt at sea and has high evaporation rates. Approximately 5% of the oil is considered persistent. The oil spill modelling found that: • the maximum distance from a release site for low surface exposure was 48km • a 2% probability of contact to shoreline with a peak volume of 30 m3 • no marine diesel oil was shown to persist on the water surface beyond five (5) days at visible levels. 3D Oil must ensure that : • there is no spill of MDO to the marine environment from vessels during Dorrigo MSS activity; • vessels to be prepared for an oil spill and implement arrangements should a spill occur;	NOPSEMA recognises that titleholders must demonstrate that all reasonably practicable measures are in place to prevent the escape of oil to the environment from their activities. The titleholder must demonstrate all things reasonably practicable are being done to prepare for their specific oil pollution risks and that the risks posed by oil pollution are of an acceptable level. In making a decision regarding this matter, NOPSEMA took into account 3D Oil EP, views expressed by relevant persons, the Decision Making Guidelines (GL1721), and the Oil Pollution Risk Management Guidance Note (GN1488). NOPSEMA required 3D Oil to provide justification as to whether oil spill modelling conducted for October to April would be representative for September conditions. NOPSEMA recognises the response by 3D Oil that indicates that a potential spill in September oceanographic conditions would result in less shoreline loading than predicted and greater subsurface concentrations of hydrocarbon. 3D Oil acknowledged that the only way to reduce risks to subsurface receptors further was prevention of a spill. NOPSEMA also required 3D Oil to justify restricting refuelling activities to outside the Zeehan Commonwealth Marine Park. As a result 3D Oil has committed 'no refuelling will occur at sea during the Dorrigo survey'. NOPSEMA is reasonably satisfied that, in the unlikely event of the seismic vessel being involved in a collision at

		• they are ready to initiate operational and scientific monitoring to establish any impacts from any potential spill; and • there is no refuelling at sea.	sea, the environment may be temporarily affected by an MDO spill on a localised basis but that this will not result in disturbance to an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity occurs. NOPSEMA was of the view that the level of detail provided in the EP to describe possible consequences and likelihoods were reflective of the nature and scale of the oil pollution risk. NOPSEMA is reasonably satisfied that the risks associated with any spill from the survey vessel are understood and managed to ALARP and acceptable levels.

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