

OTWAY BASIN 2DMC MARINE SEISMIC SURVEY

Public Comment Period: 22 May 2019 - 21 June 2019
Titleholder Report on Public Comment

Prepared for:

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SLR Ref: 640.11793.00000-R01
Version No: -v1.0
July 2019



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BASIS OF REPORT

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DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
640.11793.00000-R01-v1.0	3 July 2019	SLR Consulting Australia Pty Limited	Stephen Calder	Dan Govier

1 Introduction

On 20 May 2019 Schlumberger Australia Pty Limited (**SLB**) lodged an Environment Plan (**EP**) with the National Offshore Petroleum Safety and Environmental Management Authority (**NOPSEMA**) for the Otway Basin 2D Multiclient Marine Seismic Survey (**Otway Basin 2DMC MSS**) within the Otway Basin. This EP was the first EP lodged in accordance with the recent amendments to the Offshore Petroleum and Greenhouse Gas and Storage (Environment) Regulations 2009 (**Environment Regulations**) and Amendment Regulations, which were introduced to increase transparency associated with the submission and evaluation of offshore oil and gas EP's.

The Otway Basin 2DMC MSS EP was accepted as complete in accordance with the Environment Regulations and NOPSEMA's assessment policies on 21 May 2019 and was published on NOPSEMA's website for the 30 day public consultation process on 22 May 2019, with consultation closing on 21 June 2019.

SLB adhered to NOPSEMA's Assessment Policy requirements and placed advertisements in regional, state and national newspapers to let the general public know that the EP was available to download on NOPSEMA's website and that any person could provide comment during the 30 day public consultation period.

The 30 day public consultation process resulted in two submissions being received from the following groups:

- The Blue Whale Study (**BWS**); and
- A combined submission from Tasmanian Seafood Industry Council (**TSIC**) and Seafood Industry Victoria (**SIV**).

This report provides SLB's response to the submissions lodged by BWS, TSIC and SIV. The title holder contact details are provided in the table below.

Environment Regulation Requirements	Description
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2 Blue Whale Study

#	Comments received (in general terms)	Titleholder response
1	<p><i>Matter:</i> Spatial extent of Bonney Upwelling.</p> <p><i>Claim:</i> The EP under-represents the sub-surface extent of the Bonney Upwelling System.</p>	<p>The shapefile used to illustrate the extent of the Bonney Upwelling in the EP was published by the Australian Government in the National Key Ecological Features Register (https://data.gov.au/dataset/ds-aodn-baabcdcf-e620-4d9e-b273-91d1de3ec107/details?q=). This layer was last updated in November 2018 so is considered to be relevant and appropriate to the EP.</p> <p>However, Section 5.3.8.1 of the EP has been amended to clarify that this spatial representation is of the surface plume and that larger subsurface upwellings may also occur in the vicinity of the Operational Area.</p>
2	<p><i>Matter:</i> Pygmy blue whale distribution and seasonality.</p> <p><i>Claim:</i> Unpublished data suggests the pygmy blue whale distribution and seasonality of habitat use in the vicinity of the Operational Area is less predictable and far more extensive than reflected in published literature (as included in the EP).</p>	<p>The Otway Basin 2DMC MSS EP was developed based on the best available information through extensive searches of peer reviewed and published literature. It is not possible to develop an EP based on information that isn't available (i.e. unpublished) at the time of drafting the application. The information that BWS indicated in the submission on blue whale distribution and seasonality of habitat use has not yet been published so could not be utilised when the EP was being developed.</p> <p>BWS has not provided any peer reviewed and scientific evidence to support this new information and subsequent claim and for this reason no changes to the EP have been deemed necessary. In particular, further information on the distribution and seasonality of pygmy blue whales has not been provided to support the claim to allow an analysis to be undertaken on the location of these observations in relation to the Operational Area. The EP has used the best available information from all of the published literature and research to develop the operational procedures and control measures that are proposed for implementation throughout the acquisition of the Otway Basin 2DMC MSS. Should new published research become available prior to the survey that is assessed to provide a more definitive distribution that would increase the potential for impacts to be at an unacceptable level and thus making the existing measures not ALARP, SLB will revise the mitigation measures accordingly.</p> <p>SLB are willing to work with BWS to increase the knowledge of blue whales in the Otway Basin area during the survey from any observational data and would like to commence further discussions with BWS on potential research opportunities in the region. However, this is not considered as a control measure for the purposes of the proposed Otway Basin 2DMC MSS</p> <p>Based on this assessment, it is considered that no revision to the EP is required based on this matter and claim raised by the submitter.</p>

#	Comments received (in general terms)	Titleholder response
3	<p><i>Matter:</i> Pygmy blue whale depth preference.</p> <p><i>Claim:</i> Unpublished data suggests this species utilise deeper waters than previously thought on occasion.</p>	<p>As outlined in response #2, the EP has been developed based on the best available information, including all relevant published scientific papers based on a thorough literature review. It is not possible to draft an EP based on unpublished findings that were not provided in support of the submission.</p> <p>The assessment of the impacts and risks from the Otway Basin 2DMC MSS has been based on the information provided within Dr Gill's published work, where the majority of the blue whale sightings have been in waters less than 200 m deep, and this is still considered relevant for the avoidance of potential impacts on pygmy blue whales.</p> <p>However, to reinforce the conservatism that has been incorporated throughout the EP, when developing the control measures for the survey lines that are proposed for the blue whale Biologically Important Area (BIA), the blue whale Conservation Management Plan was consulted. This plan states that anthropogenic noise in BIAs will be managed so that any blue whale continues to utilise the area without injury and are not displaced from a foraging area (Commonwealth of Australia, 2015). Behavioural disturbance to whales is considered to occur when underwater noise levels reach 160 dB re 1 µPa (NMFS, 2013). The threshold distances for behavioural disturbance to whales, specific to the Otway Basin 2DMC MSS and acoustic source configuration was determined by Sound Transmission Loss Modelling (STLM) across eight different water depths within the Operational Area ranging from 50 m to 4,800 m and this is provided in Table 62 of the EP. As a result, these disturbance thresholds were utilised to determine the mitigation zone within the blue whale BIA to avoid any injuries, displacement or behavioural disturbance in accordance with the blue whale Conservation Management Plan.</p> <p>The offshore extent of the blue whale BIA has a water depth of approximately 1,000 m. The behavioural disturbance thresholds in Table 62 of the EP, utilising 1,600 m water depth equates to a behavioural disturbance threshold distance of 4 km. The shallowest part of the Operational Area is 50 m with a behavioural disturbance threshold of 2.5 km.</p> <p>As a result, SLB proposed a 4 km behavioural disturbance threshold throughout the blue whale BIA and southern right whale BIA. This approach affords even more conservatism in the inshore waters, where 1.5 km of additional contingency is incorporated into the mitigation zone based on STLM calculations and behavioural disturbance thresholds. This approach aligns with SLBs conservative approach which has been applied throughout the development of the EP where SLB has gone to considerable effort to avoid impacts and risks to the marine environment.</p> <p>So even though, as quoted in the submission by BWS, the EP states that majority of the blue whale sightings occur in water depths <200 m based on published literature, the mitigation zones have been based on a water depth of 1,600 m (not 200 m) to ensure that blue whales will not be exposed to underwater noise levels greater than 160 dB re 1 µPa with the intention to avoid behavioural disturbance to these whales based on the disturbance threshold recommendations by the United States National Marine Fisheries Service (NMFS, 2013).</p> <p>SLB has proposed to implement an extensive set of control measures throughout the Operational Area based on the sensitivities and marine mammal species in the area and has taken a highly conservative approach going well beyond the requirements of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) Policy Statement 2.1 requirements in regard to mitigations. In addition, for the survey lines that are to be acquired in shallower water (i.e. inshore of the shelf edge), and nearer the Bonney Upwelling System, the level of mitigation increases again through the implementation of additional control measures.</p> <p>Based on this assessment of what is already implemented for the Otway Basin 2DMC MSS and included within the EP, it is considered that no revision to the EP is required based on this matter and claim raised by the submitter.</p>

#	Comments received (in general terms)	Titleholder response
4	<p><i>Matter:</i> Logistical considerations of operating in a region where blue whale presence is unpredictable.</p> <p><i>Claim:</i> Aerial surveys to confirm the distribution of whales before, after and at intervals during the Otway Basin 2DMC MSS are recommended. At the very least aerial surveys during tie line operations should be undertaken.</p>	<p>SLB considers that the proposed 4 km shut-down distance (that will be implemented during tie line acquisition and during acquisition within the blue whale and southern right whale BIA's) provides sufficient protection to pygmy blue whales to avoid the potential for injuries, displacement or behavioural disturbance. This is detailed within response to matter #3 above.</p> <p>The additional Marine Mammal Observer (MMO) that will be present on the support vessel in these inshore areas, will operate in accordance with the Support Vessel Marine Mammal Observer Plan detailed in Section 10.5 of the EP, in addition to the extensive suite of control measures proposed in Section 3.4.7 and throughout Section 7 of the EP for implementation during the acquisition of the Otway Basin 2DMC MSS.</p> <p>STLM was undertaken specifically for the Operational Area and the specific operational parameters of the Otway Basin 2DMC MSS (i.e. acoustic source configuration) to predict received sound exposure levels and the spread of noise emissions from the acoustic source during acquisition. However, one of the main priorities of the STLM was to determine compliance with the EPBC Act, confirm and determine the mitigation zones that would be implemented and to determine the potential impact zones on all faunal groups based on acoustic sensitivity thresholds and published literature to predict potential effects on receptors.</p> <p>SLB have recent experience with conducting marine seismic surveys around populations of blue whales as detailed within Section 3.4.7.2.1 of the EP where sightings were observed out to 6.2 km. However, the population of blue whales in the South Taranaki Bight did not move away from the large aggregations of krill, even though seismic surveys were being acquired nearby, and this was not only for SLBs survey but for other seismic surveys conducted in the area as well. Seismic surveys have been conducted in the South Taranaki Bight over the last several years, and even though seismic surveys have been active in the basin they remained where the food was, and the seismic vessels just avoided the area until there was a change in weather pattern and oceanographic conditions, resulting in the upwellings residing and the aggregations of krill disappearing as well as the blue whales.</p> <p>As a result, aerial surveys are not considered necessary due to the extensive set of control measures that have been specifically developed for the Otway Basin 2DMC MSS to reduce impacts and risks to As Low As Reasonably Practicable (ALARP) and an Acceptable Level and these are detailed in Section 3.4.7 and throughout Section 7 of the EP. Table 66 of the EP provides an assessment of the control measures for managing the acoustic disturbance to the marine environment and consideration is given to the use of aerial surveys as a control measure. However, there are a number of justifications included within the table as to why spotter aircraft will not be used and it is concluded that the use of spotter aircraft would have a cost that is disproportionate to the benefit or mitigation that may be gained from their inclusion in the survey.</p> <p>Based on the relevant published scientific information, along with the STLM undertaken specifically for the parameters within the Operational Area and the specific operational parameters of the Otway Basin 2DMC MSS (i.e. acoustic source configuration) it is considered that no revision to the EP is required based on this matter and claim raised by the submitter.</p>
5	<p><i>Matter:</i> Sperm whale distribution.</p> <p><i>Claim:</i> The EP under-represents the distribution of sperm whales in the Operational Area by using the spatial extent of the sperm whale BIA to define the distribution of this species.</p>	<p>The shapefile used to illustrate the extent of the sperm whale BIA in the EP was published by the Australian Government in the register of Biologically Important Areas of Regionally Significant Marine Species (https://data.gov.au/dataset/ds-environment-2ed86f5a-4598-4ae9-924f-ac821c701003?q=Biologically%20important%20area).</p> <p>This layer was last updated in January 2016 so is considered to be relevant and appropriate to the EP.</p> <p>However, Section 5.2.6.2.1 of the EP has been amended to include additional information from Gill <i>et al.</i> (2015) to more accurately reflect the current knowledge of sperm whale distribution throughout the Operational Area.</p>

#	Comments received (in general terms)	Titleholder response
6	<p><i>Matter:</i> Marine Mammal Observers and Passive Acoustic Monitoring.</p> <p><i>Claim:</i> The effective range of MMO visual detections of marine mammals during seismic surveys is too small 1) to effectively implement the 4 km shut down distance; and 2) to have real benefit to individual animals. In addition, PAM systems may not be capable of estimating distance or direction to acoustically detected whale vocalisations.</p>	<p>The use of MMO's and PAM is industry standard and is endorsed by the Australian Government in Part B of the EPBC Act Policy Statement 2.1.</p> <p>Behavioural disturbance to whales is considered to occur when underwater noise levels reach 160 dB re 1 µPa (NMFS, 2013). During the Otway Basin 2DMC MSS a 4 km shut-down distance has been proposed to minimise behavioural effects on whales within the section of the Operational Area that overlaps with the blue whale BIA and the southern right whale BIA (including a 4 km offshore buffer). This extended shut-down zone is a highly conservative reflection of STLM results and is further detailed in response to matter #3.</p> <p>The technical feasibility of implementing the 4 km shut-down zone has been thoroughly considered during EP development and full details of how this will be implemented are provided in Section 3.4.7.2.1 of the EP. In particular the additional MMO that is to be placed on the support vessel for all acquisition in the blue whale BIA and tie lines, will operate in accordance with the Support Vessel MMO Management Plan detailed in Section 10.5. The details within the Management Plan will further address the concerns raised about the implementation of the 4 km observation range.</p> <p>During the development of the EP, SLB recognised that the PAM system may have limited capability to estimate distance and direction to acoustically detected whales. On this basis SLB proposed the following Environmental Performance Standards as outlined in Table 67 of the EP:</p> <ul style="list-style-type: none"> • All PAM detections will be validated and cross-referenced against daylight visual observations and ranges to determine the error (if any) in PAM detections; and • If PAM records prove reliable in estimating distances, PAM will be used to trigger shut-down procedures at night and during periods of poor visibility. If PAM records are shown to be inaccurate in estimating distances, the seismic vessel will power-down in the event of a confirmed detection (comprising ≥3 detection records for an individual whales) and not power-up until 30 minutes has passed without another detection. <p>Based on this assessment, it is considered that no revision to the EP is required based on this matter and claim raised by the submitter.</p>
7	<p><i>Matter:</i> Tie-line mitigations.</p> <p><i>Claim:</i> The timeframes proposed for tie-line acquisition do not appropriately reflect the presence of blue whales at the upwelling system based on unpublished data.</p>	<p>As discussed in relation to #2 and #3 above, the control measures (in this case the tie-line timeframes) have been developed based on published scientific information, including that of Dr Gill. It is not possible for SLB to develop control measures on information that is not publicly available, still to be published, or not provided as part of the submission.</p> <p>BWS have indicated that blue whales can be anywhere at any time. Based on this claim the control measures are the biggest mitigation as has been detailed above. If there are repeated shut downs then SLB will move to a different area to avoid any large numbers of blue whales, as SLB do not want to be operating in an area where high number of whales are present.</p> <p>Based on the best available information, it is considered that the control measures, including those proposed for the acquisition of the tie-lines, are appropriate for reducing the potential impacts and risks from the Otway Basin 2DMC MSS on the marine environment, including marine mammals to ALARP and an Acceptable Level.</p> <p>Based on this assessment, it is considered that no revision to the EP is required based on this matter and claim raised by the submitter.</p>
8	<p><i>Matter:</i> Ecological significance of disturbance to blue whales.</p> <p><i>Claim:</i> Any displacement of blue whales from prey aggregations could have significant metabolic consequences for affected individuals.</p>	<p>The marine mammal control measures proposed in the EP are designed to minimise the potential for injuries, displacement or behavioural disturbance. Indeed, many of the control measures proposed (see Section 3.4.7 and throughout Section 7 of the EP for a summary) take a highly conservative approach going well beyond the requirements of the EPBC Act Policy Statement 2.1 requirements.</p> <p>On this basis, the full suite of proposed control measures that are included in the EP in Section 3.4.7 and throughout Section 7 of the EP are considered to fulfil the objective of the Conservation Management Plan for blue whales as follows:</p> <ul style="list-style-type: none"> • Anthropogenic noise in BIAs will be managed such that any blue whale continues to utilise the area without injury and is not displaced from a foraging area. <p>Based on this assessment, it is considered that no revision to the EP is required based on this matter and claim raised by the submitter.</p>

References

Commonwealth of Australia, 2015. '*Conservation Management Plan for the blue whale – a Recovery Plan under the Environment Protection and Biodiversity Conservation Act 1999*'. 57pp.

DOC, 2013. '*2013 Code of Conduct for Minimising Acoustic Disturbance to Marine Mammals from Seismic Survey Operations*'. Department of Conservation. <https://www.doc.govt.nz/globalassets/documents/conservation/native-animals/marine-mammals/seismic-survey-code-of-conduct.pdf>

NMFS, 2013. '*National Marine Fisheries Services. Marine mammals: Interim Sound Threshold Guidance*' (webpage), National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce. http://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/threshold_guidance.html

3 Tasmanian Seafood Industry Council & Seafood Industry Victoria

#	Comments received (in general terms)	Titleholder response
1	<p><i>Matter:</i> Scientific references.</p> <p><i>Claim:</i> Oil and gas industry in general are very selective in the science used, and the interpretation of the science used.</p>	<p>The scientific literature utilised for the Otway Basin 2DMC MSS is considered to be the best available and most recent information at the time of preparing the EP to adequately describe the potential impacts of seismic surveys on the marine environment. The literature used for the Otway Basin 2DMC MSS EP is peer reviewed and mostly included within respected scientific journals, and the use and summary of this literature has been based on the scientific knowledge and experience of the project team in conducting environmental risk assessments on oil and gas exploration activities such as seismic surveys, along with sound professional judgement. It is considered that a wide range of scientific literature has been utilised within the development of the EP, as supported by the extensive list of references in Section 12 of the EP.</p> <p>In addition to the scientific literature used, STLM was undertaken specifically for the Operational Area and the specific operational parameters of the Otway Basin 2DMC MSS (i.e. acoustic source configuration) to predict received sound exposure levels and the spread of noise emissions from the acoustic source during acquisition. However, one of the main priorities of the STLM was to determine compliance with the EPBC Act Policy Statement 2.1 requirements in regards to control measures, and determine potential impact zones on all faunal groups based on acoustic sensitivity thresholds and published literature to predict potential effects. This is clearly detailed within the EP based on referenced thresholds for mortality and potential injury thresholds as well as for cumulative exposure. This specific information has been utilised as part of the Environmental Risk Assessment process in determining potential impacts to all receptors in the Otway Basin and defining control measures proposed to be implemented.</p> <p>Based on this assessment, it is considered that no revision to the EP is required based on this matter and claim raised by the submitter.</p>
2	<p><i>Matter:</i> Scientific references.</p> <p><i>Claim:</i> All stakeholders should accept that seismic can have a greater impact on larvae/zooplankton than previously recorded, and measures should be put in place to mitigate the risk this places on future recruitment of key commercial species (such as the Offset Principle (described below)).</p>	<p>Scientific knowledge and understanding are ever increasing based on new and improved scientific surveys, collaboration, advanced methodologies and increased funding enabling more advanced research to be undertaken. The information utilised for the Otway Basin 2DMC MSS includes the most recent studies and the best available information in order to assess the potential impacts and risks of the seismic survey.</p> <p>This is highlighted within Section 7.2.2.1.1 of the EP, where the study by McCauley <i>et al.</i>, 2017 has been summarised and the key findings are presented on the physiological impacts on zooplankton from acoustic disturbance.</p> <p>It is clearly discussed within this section that, until recently, most scientific studies and the literature have shown that exposure to emitted sound levels from a seismic survey have identified no significant adverse effects on the abundance or mortality of zooplankton, crabs or scallops. However, the recent studies (such as McCauley <i>et al.</i>, 2017 and Richardson <i>et al.</i>, 2017) which have been utilised in the EP have shown differing results to the earlier literature.</p> <p>During the consultation process, SLB has listened to the concerns of stakeholders and has significantly reduced the size of the Operational Area, reducing the area by approximately 100,000 km² to avoid the areas where most of the fishing activities take place and there are higher sensitivities present in these nearshore shallower areas. Although it is known that larvae can be within the water column for a long period of time, it is considered that this significant reduction to the Operational Area is a key mitigation to reducing potential impacts on the nearshore more sensitive environments as well as the most likely habitat in the shallower waters where larvae first settle out of the water column and onto the seabed.</p> <p>The offset principle is considered in response to matter #7.</p> <p>Based on this assessment, it is considered that no revision to the EP is required based on this matter and claim raised by the submitter.</p>

#	Comments received (in general terms)	Titleholder response
3	<p><i>Matter:</i> Cumulative effects of seismic.</p> <p><i>Claim:</i> Does not adequately address cumulative impacts of seismic. The potential for 3 MSS approved for the same region over the same time period not addressed.</p>	<p>The EP contains a detailed assessment of the potential cumulative effects that could arise during the Otway Basin 2DMC MSS in Section 9. The EP identified four different scenarios when cumulative effects could arise, and each of these are assessed within the EP, and include:</p> <ul style="list-style-type: none"> • Multiple MSS's being conducted in the same area, at the same time – acoustic footprints overlap in space and time; • Multiple MSS's undertaken consecutively – two or more MSS undertaken across the same area within a short period of time; • Multiple exposures during a single MSS – including infill of seismic data gaps within the same survey; and • Interaction between different sources of sounds – e.g. vessel noise and seismic energy. <p>An assessment was undertaken of the potential for concurrent seismic surveys within the Otway Basin, based on NOPSEMA's 'Activity Status and Summaries' webpage. Four potential seismic surveys were identified in this process, with their details included within Table 103 of the EP, and an assessment of these surveys being undertaken concurrently can be found within Section 9.1 of the EP. This assessment concluded that, with the maintenance of a 40 km separation distance between the active seismic sources (seen as recent best practice) that multiple active sound sources do not overlap and therefore do not cause higher SEL for marine species. This 40 km buffer has been reinforced within the control measures specified within Table 44 and Table 66 of the EP in regard to the physical presence of the seismic vessels and the acoustic disturbance to the marine environment.</p> <p>Further assessments on consecutive MSS, multiple exposures – infilling, and multiple sources are detailed within Section 9.2, 9.3 and 9.4 of the EP respectively.</p> <p>As part of the cumulative effects assessment, scientific literature and STLM results were incorporated to reach the conclusions and the control measures that will be implemented to reduce cumulative impacts to ALARP and an Acceptable Level.</p> <p>Based on the detailed assessment of cumulative impacts already in the EP, it is considered that no revision to the EP is required based on this matter and claim raised by the submitter.</p>
4	<p><i>Matter:</i> Cumulative effects of seismic.</p> <p><i>Claim:</i> There is very little understanding of cumulative impacts of different seismic surveys on the marine environment, in particular on larvae of key commercial species (southern rock lobster and giant crab). The cumulative area of the three proposed MSS covers an area of significant value to the Tasmanian seafood industry and the impacts from one survey, let alone three, is of considerable concern given the 18-months to 2-year larval cycle of rock lobster.</p>	<p>The potential impacts of seismic surveys on the larvae of key commercial species has been assessed through Sections 7.2.2.1.1, 7.2.2.1.2, 7.2.2.1.4, and 7.2.2.1.5 within the EP, and further outlined in relation to #6 within this table below.</p> <p>As the assessment concludes the impacts and risks are reduced to ALARP and an Acceptable Level. The other aspect of this matter is in relation to the cumulative effects on these species. As outlined above, four different scenarios for potential cumulative effects were assessed within Section 9 of the EP.</p> <p>Based on the discussions within Section 9 of the EP, it is considered that the potential cumulative effects associated with the Otway Basin 2DMC MSS has been assessed in adequate detail to determine the likely impacts the Otway Basin 2DMC MSS may have on the receptors and receiving environment. This assessment has utilised the results of the STLM undertaken specifically for the Otway Basin 2DMC MSS, along with the likely spatial and temporal specifications of other seismic surveys within the region and best available information.</p> <p>SLB have proffered a control measure specifically designed to reduce the potential for cumulative impacts, which is seen as best practice, that being the maintenance of a 40 km separation distance between active seismic sources if more than one seismic survey is operating in the region.</p> <p>Based on this assessment, it is considered that cumulative effects have been appropriately considered within the EP based on best available information and that no revision to the EP is required based on this matter and claim raised by the submitter.</p>

#	Comments received (in general terms)	Titleholder response
5	<p>Matter: ALARP vs Precautionary Principle.</p> <p>Claim: Does not accept that oil and gas industry must only mitigate risk to ALARP, with a view that a more precautionary approach (the Precautionary Principle) be taken due to the uncertainties around the impacts of seismic on broader ecosystem services.</p>	<p>The submitted is correct in that reducing risks to ALARP is not the only matter which must be shown through the EP process to reduce impacts. Regulation 10A of the Environment Regulations details eight matters which must be met in order for NOPSEMA to accept an EP. In addition to regulation 10A(b) which requires the demonstration that all environmental impacts and risks of the activity being reduced to ALARP, regulation 10A(c) requires the impacts and risks being of an Acceptable Level, based on seven criteria identified in Table 42 in the EP. Based on the assessment undertaken throughout Section 7 and 8 of the EP, it is considered that the impacts and risks associated with the Otway Basin 2DMC MSS are reduced to ALARP and to an Acceptable Level.</p> <p>Regulation 13(5) and 13(6) of the Environment Regulations require that a SLB have to include the details of all the potential environmental impacts and risk from the proposed Otway Basin 2DMC MSS, along with an evaluation of those impacts and risks appropriate to the nature and scale of each impact, for all of the planned and unplanned activities. This assessment must detail all the control measures that will be utilised to reduce the impacts and risks of the proposed activity to ALARP and an Acceptable Level. That is what has been undertaken throughout the preparation of the Otway Basin 2DMC MSS EP, in accordance with the Environment Regulations which were developed to provide an objective based regime for the management of environmental performance for Australian offshore petroleum exploration and production and greenhouse gas storage activities in areas of Commonwealth jurisdiction.</p> <p>In accordance with the NOPSEMA Guidance Note on Environment Plan Decision Making (A524696 – June 2018), in order for a precautionary principle to apply, two conditions need to occur. These two conditions are where there is a “<i>threat of serious or irreversible environmental damage</i>” and “<i>scientific uncertainty as to the environmental damage</i>”. The assessment undertaken within Section 7 and 8 of the EP has shown that the proposed Otway Basin 2DMC MSS does not involve a ‘threat of serious or irreversible environmental damage’. This has been based on a thorough review of scientific literature on the effects of seismic operations on the environment being undertaken in the development of the EP, specific and extensive STLM conducted for the Otway Basin 2DMC MSS and Operational Area, along with numerous control measures being implemented to reduce the impacts and risks associated with this proposal.</p> <p>It is considered that neither of the two conditions requiring a precautionary principle apply to the Otway Basin 2DMC MSS, let alone both conditions. As such, it is considered that no revision to the EP is required based on this matter and claim raised by the submitter.</p>
6	<p>Matter: Impacts on rock lobster larvae and other larvae.</p> <p>Claim: Concerns that wide scale seismic activity will have a significant negative impact on rock lobster larvae, exacerbated through the cumulative impacts of multiple seismic surveys. Similar concerns are held for other commercially targeted species, including giant crabs, scallops and many fish species.</p>	<p>An assessment of the effects of seismic on the larvae of scallops and rock lobster (specifically development of eggs on berried females), as well as the effects of seismic on adult benthic invertebrates (including scallops, crabs, and lobsters) and fish was undertaken through Sections 7.2.2.1.1, 7.2.2.1.2, 7.2.2.1.4, and 7.2.2.1.5 respectively. These sections contain a detailed description of the potential effects from seismic activity as described in available published scientific literature. Based on a review of this literature, it is considered that the impacts and risks associated with the Otway Basin 2DMC MSS on these receptors are reduced to ALARP and to an Acceptable Level.</p> <p>In addition to the extensive literature reviews, the potential impacts of the Otway Basin 2DMC MSS have been based on underwater noise threshold levels for mortality in plankton and fish eggs and larvae (based on Popper <i>et al.</i> (2014) for fish eggs and larvae, and McCauley <i>et al.</i> (2017) for plankton), with STLM predicting the zone of impact from single pulses and cumulative exposure based on these thresholds. When assessing the acoustic effects of seismic survey activity on zooplankton and fish eggs and larvae, the naturally high mortality rates (>50% per day in some species) of marine fish eggs and larvae must be considered. In addition, the high energy nature of the offshore marine environment in the Operational Area will help promote rapid recovery of zooplankton populations on account of dispersal and mixing.</p> <p>Cumulative impacts arising from multiple seismic surveys have been assessed throughout Section 9 of the EP. While the effects on environmental receptors from a single seismic survey may be exacerbated through cumulative impacts of multiple surveys, SLB will implement a number of control measures to reduce the impact from any cumulative effects, with a separation distance of 40 km from any concurrent seismic operations particularly important as discussed in response #3 and #4.</p> <p>Overall, the EP has assessed the potential for cumulative noise impacts on environmental receptors as low, with this conclusion supported by published scientific literature (i.e. Richardson <i>et al.</i>, 2017; Przeslawski <i>et al.</i>, 2016; Ellison <i>et al.</i>, 2016).</p> <p>Based on this assessment, it is considered that the potential impacts of larval species have been considered within the EP in detail based on best available information, and no revision to the EP is required based on this matter raised by the submitter.</p>

#	Comments received (in general terms)	Titleholder response
7	<p><i>Matter:</i> Offset principle.</p> <p><i>Claim:</i> The offset principle was suggested during discussions with Schlumberger; however, this concept has not been incorporated within the EP submitted.</p>	<p>As outlined in the above supporting documentation and the EP, SLB will ensure appropriate control measures are established throughout the Otway Basin 2DMC MSS such that the potential for impacts and risks are minimised. Based on the available research and STLM results, the impacts have not been assessed at a level that would significantly displace fishers to the extent that an offset fund would be considered appropriate for this activity.</p> <p>Based on the available research we assess the potential for damage to the marine environment to be ALARP given the proposed control measures and the conclusions from the STLM study. SLB proposes to continue discussions with all stakeholders in good faith to identify and fund projects that will add value to the local industry, although do not consider this is a necessary control measure for the purposes of the proposed Otway Basin 2DMC MSS.</p> <p>SLB are currently in discussions with industry bodies to identify appropriate projects and would like to discuss these projects in more detail to develop these future projects further.</p> <p>Based on this assessment, it is considered that no revision to the EP is required based on this matter and claim raised by the submitters.</p>

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