



26 May 2014

National Offshore Petroleum Safety & Environmental Management Authority  
(NOPSEMA),  
GPO Box 2568,  
Perth, WA, 6001

Dear Sir/Madam,

**Re: Environment Plan Submission: Request for Further Written  
Information - Lightning 3D Marine Seismic Survey (Bight  
Basin) Environment Plan**

In accordance with Regulation 9(A) of the *Offshore Petroleum and Greenhouse Storage (Environment) Regulations 2009 (OPGGSER)*, please find attached further written information, requested by NOPSEMA, to assist in making a decision on the Lightning 3D Marine Seismic Survey (MSS) (Bight Basin) Environment Plan (EPP-41/EPP-42).

Should you require any further information or clarification please do not hesitate to contact Simon Fyfe on 0410 536 544.

Yours Sincerely,

A handwritten signature in black ink, appearing to read "Matthew", with a long horizontal flourish extending to the right.

Matthew Philipchuk  
Chief Executive Officer  
**Bight Petroleum Pty Ltd**

**Environment Plan Response Note**  
 (Request for further written information)

<b>NOPSEMA File No:</b>	A355671	<b>NOPSA Obj ID:</b>	RMS:2664	<b>NOPSEMA Activity ID:</b>	959
<b>Facility Name:</b>	Lightning 3D Marine Seismic Survey	<b>Operator:</b>	Bight Petroleum Pty Ltd		
<b>Submission Title:</b>	Lightning 3D Marine Seismic Survey (Bight Basin) Environment Plan			<b>Rev:</b>	0
<b>Document ID:</b>	N/A			<b>Date:</b>	21 March 2014

<b>Date of request:</b>	5 May 2014
<b>Specified Period:</b>	30 Days
<b>Date information due:</b>	4 June 2014

Pursuant to Regulation 9A of the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009*, further written information about each matter required by the regulations to be included in an environment plan (EP) is requested from the titleholder, as detailed in the table below. Please note that information provided in response to this request becomes a part of the EP and NOPSEMA must have regard to the information as if it had been included in the submitted EP.

Matter Number	Section of Submission	Environment Regulation	Further written information requested	Response from Titleholder	NOPSEMA Status (To be completed by NOPSEMA)
1	Section 3	Regulation 13(2)	<p>Further information is requested on EPBC Act listed species in the operational area, noting the EPBC Act Protected matters search identified approximately 80 species potentially found in the area and not all of these have been identified and described.</p> <p>Other environmental features for which further information is requested include values and sensitivities of Eyre Peninsula; Neptune Islands; and Lincoln National Park; little penguins; benthic fauna in the operational area; and details of the spawning seasons of site attached benthic fauna.</p> <p>In responding to this point, please note that:</p> <ul style="list-style-type: none"> <li>• Details and an evaluation of impacts and risks may need to be undertaken;</li> <li>• Details of the control measures (if any) that will be used to reduce impacts and risks to ALARP and acceptable should be supplied;</li> <li>• Impacts and risks must be demonstrated to be reduced to ALARP and acceptable levels;</li> <li>• The demonstration and selection of controls (if any) must be supported.</li> </ul>	<i>Please refer to information below</i>	

Matter Number	Section of Submission	Environment Regulation	Further written information requested	Response from Titleholder	NOPSEMA Status (To be completed by NOPSEMA)
1	The EPBC Protected Matters Database has been re-interrogated to confirm species within the Lightning MSS operational area listed under the EPBC Act. The table below lists the additional species not currently included in the Lightning MSS EP (Section 3) from this database together with the additional environmental species/sensitivities requested by NOPSEMA.				
	Species/Location	Environmental Characteristics/Values			
	Albatross	<p>Additional species of albatross and their environmental characteristics include:</p> <ul style="list-style-type: none"> <li>• <u>Southern Royal Albatross (<i>Diomedea epomorpha epomorpha</i>)</u>: Classified as vulnerable and migratory, this species is likely to forage and feed within the MSS operational area however breeds in New Zealand (Campbell Island). Birds encountered in the MSS area are expected to be non-breeding birds. The species feeds primarily on squid and fish, supplemented by salps, crustacea and carrion obtained by scavenging dying or moribund prey, from fishing vessels and to a limited extent by active predation<sup>1</sup>.</li> <li>• <u>Northern Royal Albatross (<i>Diomedea epomorpha sanfordi</i>)</u>: Classified as endangered and migratory, this species is likely to forage and feed within the MSS operational area however breeds in New Zealand (Chatham Islands/Otago Peninsula). Tracking data for the species indicates that they forage over shelf waters around New Zealand and southern South America rather than in oceanic waters or south of the Antarctic Polar Front (i.e. Australia). The species feeds primarily on squid and fish, supplemented by salps and crustacean obtained by scavenging of dying or moribund prey, from fishing vessels and to a limited extent by active predation<sup>2</sup>.</li> <li>• <u>Antipodean Albatross (<i>Diomedea exulans antipodensis</i>)</u>: Classified as vulnerable and migratory, this species is likely to forage and feed within the MSS operational area however breeds in New Zealand (Auckland, Campbell &amp; Antipodes Island). Birds encountered in the MSS area are expected to be non-breeding birds. The species feeds via surface seizing of cephalopods and fish with most populations foraging in the Tasman Sea and the Pacific Ocean east of New Zealand. Foraging is concentrated over pelagic waters and deep shelf slope (up to 6000m) with peaks of activity around 1000m in areas of seamounts and shelf-break<sup>3</sup>.</li> <li>• <u>White-capped Albatross (<i>Thalassarche cauta steadh</i>)</u>: Classified as vulnerable and migratory, this species is likely to forage and feed within the MSS operational area however breeds in New Zealand (Auckland islands). Breeding biology largely unknown however eggs are usually laid in mid-November and hatch in February with young thought to fledge in August. Diet consists of fish cephalopods, crustaceans and tunicates utilising surface seizing, diving and following ships to obtain offal<sup>4</sup>.</li> </ul> <p>As listed in EP Section 3.4.7, no biologically significant areas (i.e. nesting and roosting) for these marine bird species lie in proximity to the Lightning MSS area however these birds may overfly and forage within the MSS area although the operational area is not nominated as primary feeding grounds for these species.</p>			
	Petrels	<p><u>Great-winged Petrel (<i>Pterodroma macroptera</i>)</u>: This species is likely to forage and feed within the MSS operational area and is 'listed' under the EPBC Act. The species has a large range and feeds mostly on squid, with some fish and crustaceans, most of which it obtains by surface-seizing. They are often observed near the continental shelf break. Breeding occurs in winter, starting in April, nesting in solitary or in small colonies on oceanic islands on ridges, slopes or flat ground. It nests in burrows or above ground in rock crevices, among tree roots or under scrub<sup>5</sup>. Great-winged petrels breed at the Recherche Archipelago (WA) with an estimated 33,000 breeding pairs the only breeding population of great-winged petrels in Australia<sup>6</sup>.</p> <p>As listed in EP Section 3.4.7, no biologically significant areas for this petrel species lie in proximity to the Lightning MSS area.</p>			

<sup>1</sup> Agreement on the Conservation of Albatrosses and Petrels. 2009. ACAP Species assessment: Southern Royal Albatross *Diomedea epomorphora*. Downloaded from <http://www.acap.aq> on 2 September 2009.

<sup>2</sup> Agreement on the Conservation of Albatrosses and Petrels. 2009. ACAP Species assessments: Northern Royal Albatross *Diomedea sanfordi*. Downloaded from <http://www.acap.aq> on 31 August 2009

<sup>3</sup> Agreement on the Conservation of Albatrosses and Petrels. 2009. ACAP Species assessment: Antipodean Albatross *Diomedea antipodensis*. Downloaded from <http://www.acap.aq> on 18 September 2009

<sup>4</sup> Agreement on the Conservation of Albatrosses and Petrels. 2011. ACAP Species assessment: White-capped Albatross *Thalassarche steadh*. Downloaded from <http://www.acap.aq> on 1 February 2011

<sup>5</sup> BirdLife International (2014) Species factsheet: *Pterodroma macroptera*. Downloaded from <http://www.birdlife.org> on 18/05/2014. Recommended citation for factsheets for more than one species: BirdLife International (2014) IUCN Red List for birds. Downloaded from <http://www.birdlife.org> on 18/05/2014

<sup>6</sup> SEWPC, 2012 – Species Group Report Card – Seabirds – Supporting the Marine Bioregional Plan for the South-west marine Region available at <http://www.environment.gov.au/system/files/pages/a73fb726-8572-4d64-9e33-1d320dd6109c/files/south-west-report-card-seabirds.pdf>

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1	Shearwaters		<u>Flesh-footed Shearwater (<i>Puffinus carneipes</i>)</u> : Classified as migratory, this species is likely to forage and feed within the MSS operational area. From early September to late May, this species may forage up to 100km offshore along the south-coast <sup>7</sup> along the continental shelf and slope. The species breeds at 41 islands in south-west WA, on Smith Island (~150 pairs) off the south-east coast of the Eyre Peninsula (approx. 85km from nearest survey boundary) and Lord Howe Island. The Flesh-footed Shearwater feeds on small fish, cephalopod molluscs (squid, cuttlefish, nautilus and argonauts), crustaceans (barnacles and shrimp), other soft-bodied invertebrates (such as <i>Veleva</i> ) and offal. It obtains most of its food by surface plunging or pursuit plunging. It also regularly forages by settling on the surface of the ocean and snatching prey from the surface ('surface seizing'), momentarily submerging onto prey beneath the surface ('surface diving') or diving and pursuing prey beneath the surface by swimming ('pursuit diving') <sup>8</sup> . <i>Biologically significant areas (i.e. nesting) for this marine bird species lies approximately 85km from the nearest Lightning MSS survey boundary. These birds are likely to be encountered during the survey foraging.</i>		
	Skua		<u>Great Skua (<i>Catharacta skua</i>)</u> : This species is described as possibly having habitat which may occur in the operational area and is listed under the EPBC Act. The species feeds opportunistically and has a hugely varied diet. The species is loosely colonial but territorial and breeds on islands with flat ground and some vegetation cover <sup>9</sup> . <i>No biologically significant areas (i.e. nesting) are located in proximity to the Lightning MSS area but the species may forage over the operational area.</i>		
	Gulls		<u>Pacific Gull (<i>Larus pacificus</i>)</u> : This species is likely to forage and feed across the MSS operational area and is listed under the EPBC Act. This species is the dominant gull across the south-west marine region and breeds in small numbers (usually 1-2 pairs/island) with strongholds at the Recherche Archipelago (~21pairs), Houtman Abrolhos Islands (~51pairs) and The Brothers islands (near Coffin Bay) (~10pairs) (approx.. 100km NE) <sup>10</sup> . The species forages along the coasts between the high-water mark and the shallow water on sandy beaches feeding mainly on molluscs, fish, birds and other marine animals. <i>No biologically significant areas (i.e. nesting) are located in proximity to the Lightning MSS area and it is unlikely that they will be encountered during survey activities.</i>		
	Pipefish/Pipehorse/ Seahorse/Sea Dragons		The EPBC Protected Species lists 27 species of fish – namely pipefish, pipehorse, sea-dragons and pipehorse as possibly occurring within the Lightning MSS area. There is little information available on <i>syngnathidae</i> , the family of fish which included seahorses, pipefish and sea-dragons. Studies <sup>11</sup> identify that these species exist over a broad geographical range, however within this range their distribution is limited to suitable habitat which is determined by the species' camouflage, size, food source, behaviour and reproduction. Species can inhabit seagrass and macro-algal habitats, reef habitats, and broken bottom habitats (described as a mixed mosaic of margins of seagrass meadows, shelly or rubbly bottom and sandy bottom with patchy seagrass or detritus, and disturbed areas). Many pipefish, seahorse and the two sea-dragon species lie in shallow bays and coastal waters, especially seagrass beds, and on reefs covered with macro-algae where they are well camouflaged. Pipehorses usually occur in deeper continental shelf waters. Generally syngnathids are site associated in near-shore habitats <sup>12</sup> . These species utilise a swim bladder to control their depth within the water column. For the two species of pipe-horse listed for the Lightning MSS area <sup>13</sup> : <ul style="list-style-type: none"> <li>Southern Pygmy/Little Pipehorse (<i>Acentronura australe</i>): The species is known in the Southern Gulf of St Vincent but not commonly recorded and is assumed to live in red macro-algal habitats on semi-exposed coastal reefs. Specimens have typically been caught in depths less than 20m; and</li> <li>Robust Pipehorse (<i>Solegnathus robustus</i>): The species is fairly common within its known depth range (42-68m) and occurs in benthic habitats on the continental shelf.</li> </ul> <i>The depth range of the Lightning MSS area is 130-2400m. These species of pipehorse are not expected to be present in the MSS area.</i>		

<sup>7</sup> SEWPC, 2012 – Species Group Report Card – Seabirds – Supporting the Marine Bioregional Plan for the South-west marine Region available at <http://www.environment.gov.au/system/files/pages/a73fb726-8572-4d64-9e33-1d320dd6109c/files/south-west-report-card-seabirds.pdf>

<sup>8</sup> Department of Environment, 2014 – SPRAT Database – Flesh-footed Shearwater (*Ardenna carneipes*) available at [http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon\\_id=82404](http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=82404)

<sup>9</sup> BirdLife International (2014) IUCN Red List for birds. Downloaded from <http://www.birdlife.org> on 18/05/2014

<sup>10</sup> <sup>10</sup> McClatchie, S., Middleton, J., Pattiaratchi, C., Currie, D., Kendrick, G., (2006) – The South-west marine Region: Ecosystems and Key Species Groups, Department of Environment and Water Resources available at <file:///C:/Users/Leonie/Downloads/McClatchie%20et%20al%20The%20South-west%20Marine%20Region%20Department%20of%20Environment%20Report.pdf>

<sup>11</sup> Browne, R.K., Baker, J.L. & Connolly, R.M. (2008) – Chapter 13: Syngnathids: Sea dragons, Seahorses, and Pipefish of Gulf of St Vincent, available at [http://www98.griffith.edu.au/dspace/bitstream/handle/10072/23973/53038\\_1.pdf?sequence=1](http://www98.griffith.edu.au/dspace/bitstream/handle/10072/23973/53038_1.pdf?sequence=1)



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1	Minke Whale		Species is not considered threatened nor does it have a migratory species under the EPBC Act. The species is oceanic but not restricted to deep water with extensive migrations between cold water feeding and warm water breeding grounds, however the location of breeding grounds are unknown. Calving is thought to occur between May and July. The species is relatively common in Australia <sup>14</sup> . This species may be present in the Flanagan MSS area during the survey period		
	Benthic Fauna		<p>The Lightning MSS area lies on the outer continental shelf (~150m to shelf break) and on the continental slope. Studies undertaken to characterise and quantify the benthic biodiversity in the eastern GAB identified that large biomasses/species characterise the inner shelf waters off the western Eyre Peninsula, however by comparison relatively fewer species and individuals are present on the outer shelf.<sup>15</sup> Studies undertaken of benthic fauna in the Eastern GAB identified that sessile suspension feeding organisms (primarily poriferans, ascidians and bryozoans) dominate samples and comprised over 96% of the biomass and 74% of the species collected. All other feeding guilds (scavengers, predators, deposit feeders and grazers) were rare by comparison. Samples taken on shelf waters representative of the Lightning MSS area (i.e. deeper outer shelf area) identified (by %biomass) Porifera (63%), Ascidians (28%) and bryozoans (5.5%) dominated. On a species diversity basis bryozoans represented the majority of species (23/55).<sup>16</sup> Characteristics (including spawning) for these species are as follows:</p> <ul style="list-style-type: none"> <li>• <u>Porifera</u>: Species identified in the area belonged to class Demospongiae (containing siliceous spicules) with smaller representation by class calcarea (containing calcareous spicules). Sponges are sessile, multicellular organisms that have bodies full of pores and channels which allow water to circulate in order to obtain food and oxygen and remove wastes. They flourish in waters where water movement is strong<sup>17</sup>. Sponges do not have nervous, digestive or circulatory systems. Increasing temperature is generally accepted as a major environmental factor regulating the onset of reproduction activity particularly in regions of large seasonal change<sup>18</sup>. As the Lightning MSS timeframe occurs during autumn, spawning is not expected during the MSS period.</li> <li>• <u>Ascidians</u>: All ascidians (commonly known as sea squirts) are sessile, sac-like marine invertebrate filter feeders. The species has a digestive, circulatory and nervous system however lacks any special sensory organs. They are hermaphrodites and fertilisation can be external with development in the water column (solitary species) or internal with embryos brooded in the body (colonial species). Solitary larvae are free-swimming for periods of 1-24hours and prior to hatching have been floating free in the water for up to 3 days. They are therefore subject to current dispersal which contribute to gene flow and remove risks of isolation. The colonial species are seldom free swimming for more than one hour and attach to substrates rapidly.<sup>19</sup> In temperate and cold seas, breeding is usually seasonal and restricted to the warmer season but in tropical waters it may continue throughout the year<sup>20</sup>. On this basis, spawning is unlikely to occur during the cooler months of the Lightning MSS.</li> <li>• <u>Bryozoans</u>: Bryozoans are sessile, aquatic invertebrate filter feeding animals which attach to hard substrates and form lace-like colonies. They have no respiratory organs, heart, or blood vessels. Instead zooids absorb oxygen and eliminate carbon dioxide through the body wall. Bryozoans are hermaphrodites and fertilisation can be external with development in the water column or internal with embryos brooded in the body (as per ascidians). Larvae which are released after they hatch swim but do not feed. They swim towards the light then after a few hours swim down to the sea floor to colonise. For species which do not brood but release eggs, fertilised eggs become part of the plankton stream for approximately 2 months until they are large enough to descend and start a new colony<sup>21</sup>. Temperature controls all aspects of bryozoan life. In spring, rising water temperatures and increased intensity of light stimulate phytoplankton growth which initiates active budding in bryozoans and to some degree sexual reproduction<sup>22</sup>. On this basis, spawning is unlikely to occur during the cooler months of the Lightning MSS.</li> </ul> <p>The sediments of the continental slope are characterised by muddy foraminiferal, spicule and pteropod oozes and contains large quantities of skeletal organic remains derived from the shelf including bryozoan and mollusc fragments. No published studies are available on the composition or distribution of benthic biota beyond the shelf-break in the south-west marine region.</p>		

<sup>12</sup> McClatchie, S., Middleton, J., Pattiaratchi, C., Currie, D., Kendrick, G., (2006) – The South-west marine Region: Ecosystems and Key Species Groups, Department of Environment and Water Resources available at <file:///C:/Users/Leonie/Downloads/McClatchie%20et%20al%20The%20South-west%20Marine%20Region%20Department%20of%20Environment%20Report.pdf>

<sup>13</sup> McClatchie, S., Middleton, J., Pattiaratchi, C., Currie, D., Kendrick, G., (2006) – The South-west marine Region: Ecosystems and Key Species Groups, Department of Environment and Water Resources available at <file:///C:/Users/Leonie/Downloads/McClatchie%20et%20al%20The%20South-west%20Marine%20Region%20Department%20of%20Environment%20Report.pdf>

<sup>14</sup> Bannister, J.L., Kemper, C.M., Warneke, R.M. (1996) – The Action Plan for Australian Cetaceans, Australian Nature Conservation Agency, September 1996

<sup>15</sup> McClatchie, S., Middleton, J., Pattiaratchi, C., Currie, D., Kendrick, G., (2006) – The South-west marine Region: Ecosystems and Key Species Groups, Department of Environment and Water Resources available at <file:///C:/Users/Leonie/Downloads/McClatchie%20et%20al%20The%20South-west%20Marine%20Region%20Department%20of%20Environment%20Report.pdf>

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1	Neptune Islands		<p>The Neptune Islands consist of two island groupings, the Northern and Southern Neptune Islands. Both islands have rocky coastlines. The Neptune Islands Marine Park (includes all islands except part of the southern-most island used by a lighthouse) was initially established to protect a New Zealand Fur Seal colony (on the southern island of the Northern Neptune Islands). The Marine Park includes both island groups and waters 2nm to shore. The Northern Neptune Islands Group is significant for white shark habitats and ecotourism activities including berleying activities which attract Great White Sharks. Anchorages are utilised by tourism operators lie on the eastern side of Northern Neptune Island Group where shark cage diving occurs<sup>23</sup> (ecotourism by permit only). The CSIRO also undertakes research at the Neptune Islands<sup>24</sup> and recreational fishing (coastal) activities are allowed under permit given the Marine Park<sup>25</sup> status.</p> <p>Other features present on the islands include a number of shipwrecks, a small breeding population of Australian Sea Lions and the following bird species:</p> <ul style="list-style-type: none"> <li>• Cape Barron Goose (<i>Cereopsis novaehollandiae</i>) which lives on small, windswept and generally uninhabited offshore islands and can survive on brackish water. The species are grazing birds eating the common island tussock <i>Poa poliformis</i> as well as spear grass. Nesting commences in autumn, hatched goslings develop through the winter and fledge during spring<sup>26</sup>. <i>This species is not expected to interact with Lightning MSS activities.</i></li> <li>• White Bellied Sea-eagle (<i>Haliaeetus leucogaster</i>) which is found throughout south-east Australia and breeds and forages near water. It catches fish by flying low over the water and grasping it with its talons or may dive at a 45° angle and briefly submerge to catch fish near the surface. Fish forms half its diet with the remainder being obtained from carrion and a wide variety of animals (turtles, sea snakes, birds) opportunistically. The species is considered Vulnerable in South Australia and as a Marine Migratory bird under the EPBC Act 1999. The breeding season in Australia is June to August<sup>27</sup>;</li> <li>• Osprey (<i>Pandion haliaetus</i>) is found in temperate and tropical regions of all continents except Antarctica. In Australia the species is mainly sedentary and is found patchily around the coastline. Breeding occurs near cliffs, rocks, rock stacks or islets; on the ground on rocky headlands, coral cays, deserted beaches, sandhills or saltmarshes. The species is a diurnal fish-eating bird of prey with diet consisting almost exclusively of fish<sup>28</sup>.</li> <li>• Peregrine Falcon (<i>Falco peregrinus</i>) is found from the arctic tundra to the tropics. Its diet consists almost exclusively on medium-sized birds but will sometimes hunt small mammals, small reptiles or insects. The species nests in a scrape normally on cliff edges and eggs are laid from July to August in Australia. <i>This species is not expected to interact with Lightning MSS activities.</i></li> </ul>		

<sup>16</sup> Ward, T.M., Sorokin, S.J., Currie, D.R., Rogers, P.J., McLeay, L.J. (2006) – Epifaunal assemblages of the eastern Great Australian Bight: Effectiveness of a benthic protection zone in representing regional biodiversity, Continental Shelf Research 26 (2006) 25-40

<sup>17</sup> Butler, A., Althaus, F., Furlani, D., Ridgway, K., 2002 – Assessment of the Conservation values of the Bass Strait sponge bed area – A component of the Commonwealth Marine Conservation Assessment program 2002-2004, Report to Environment Australia available at <http://www.environment.gov.au/system/files/resources/9dc94eb7-5873-4e88-902d-d26ad39be486/files/conservation-assessment-bass.pdf>

<sup>18</sup> Fromont, J., (1993) – Reproductive development and timing of tropical sponges (Order Haploscleria) from the Great Barrier Reef, Australia, James Cook University.

<sup>19</sup> DOE, 2014 – Australian Biological Resources Study, Australian Faunal Directory – Class Ascidiacea available at <http://www.environment.gov.au/biodiversity/abrs/online-resources/fauna/afd/taxa/ASCIDIACEA>

<sup>20</sup> Shenkar, N (2008) – Ecological aspects of the ascidian community along the Israeli coasts. Thesis submitted for the Degree "Doctor of Philosophy to the Senate of Tel-Aviv University available at <http://primage.tau.ac.il/libraries/theses/lfmed/free/2173881.pdf>

<sup>21</sup> Earthlife, 2014 – The Phylum Ectoprocta (Bryzoa) available at <http://www.earthlife.net/inverts/bryozoa.html>

<sup>22</sup> Smithsonian Marine Station at Fort Pierce (2014) – What is a Bryozoan? available at <http://www.sms.si.edu/irlspec/IntroBryozoa.htm>

<sup>23</sup> Calypso Star Charters, 2014 – Shark Cage diving Locations available at <http://www.sharkcagediving.com.au/shark-tours/dive-locations/>

<sup>24</sup> Calypso Star Charters, 2014 – Research on the Great White Shark available at <http://www.sharkcagediving.com.au/shark-tours/shark-research/>

<sup>25</sup> DEWNR (2012) – Neptune Islands Group Marine Park – Draft Management Plan Summary available at [www.marineparks.sa.gov.au](http://www.marineparks.sa.gov.au) and Neptune Islands Group (Ron & Valerie Taylor) Marine Park – Management Plan 2012

<sup>26</sup> Tasmanian Parks and Wildlife Service (2014) – Cape Barron Goose available at <http://www.parks.tas.gov.au/index.aspX?base=5110>

<sup>27</sup> DOE, 2014 – SPRAT Database – Haliaeetus leucogaster – White Bellied Sea Eagle available at [http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon\\_id=943](http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=943)

<sup>28</sup> DOE, 2014 – SPRAT Database – Pandion cristatus – Eastern Osprey available at [http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon\\_id=82411](http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=82411)

Lincoln National Park	Lincoln National Park is located at the tip of the Eyre Peninsula and has large expanses of granite outcrops, sandy beaches and sand dunes (including the Sleaford Bay coastline). The park protects coastal vegetation and is a refuge for migratory bird species such as stints and sandpipers. Within the park boating, fishing, beachcombing, swimming and bird-watching are all popular activities. <sup>29</sup> Sea Lions and Australian Fur Seals are present along the coastline and Southern Right Whales, Bottlenose Dolphin and Common Dolphin are also seen close to shore.
Eyre Peninsula	The Eyre Peninsula is bounded by the Spencer Gulf and GAB in the west. Coastal waters around the Eyre Peninsula contain marine life including Sea Lions, Bottlenose Dolphins, Southern Right Whales and terrestrial fauna. The peninsula is acknowledged as one of the finest fishing areas in Australia. Fishing options include rock or surfcasting or fishing charters out of major towns. Species such as Bluefin Tuna (Port Lincoln), kingfish (Port Lincoln, Arno Bay), oysters (Franklin Bay, Coffin Bay) and Murray Cod are also farmed or processed in the area; however these are located in in-shore protected areas. Cruise operators operate from Eyre Peninsula ports to view or swim with Sea Lions, Fur Seals (Hopkins Island approximately 95km NE of nearest MSS Boundary); swim with tuna (Port Lincoln) or cage dive with White Sharks (Neptune Island North approximately 70km NE of nearest MSS boundary). <sup>30</sup> On the west coast, tourists can snorkel with Sea Lions and bottle-nosed dolphins from the sheltered waters of Baird Bay (~250km north).
Little Penguins	<p>The Fairy Penguin (<i>Eudyptula minor</i>) inhabits temperate waters and in South Australia the largest colonies are present at Pearson Island and Troubridge Island (Yorke Peninsula)<sup>31</sup> with other colonies present at Kangaroo Island (Kingscote, Penneshaw), Granite island (Victor Harbour)<sup>32</sup>, the Althorpe Islands (Investigator Strait), Goose Island, Greenly Island, Investigator Group Islands, Lipson Island (near Tumby Bay, Eyre Peninsula) and Sir Joseph Banks Group (Spencer Gulf).<sup>33</sup> The closest of these colonies to the Lightning MSS area is Greenly Island located approximately 50km north of the MSS area. The species feeds mainly on pelagic shoaling fish, cephalopods and occasionally crustaceans. Prey is captured by pursuit diving typically to a depth of 10-20m for an average of 24 seconds, but dives as deep as 60m have been recorded. The species tends to forage within a radius of 8-15km (5-10miles) from their burrow during breeding season; and generally within 20km (12.5miles) of shore in non-breeding season, however longer trips of up to 700km may occur in non-breeding season<sup>34</sup>. Nesting colonies occur in burrows on sandy or rock islands often at the base of cliffs or in sand dunes adjacent to marine areas<sup>35</sup>. Mating occurs between August and October with eggs laid in September and October. From this point until chick hatching, parents alternate between incubation duties and feeding at sea with chick feeding occurring from December into January. Moulting occurs in February-April, during which time individual penguins are unable to go to sea for at least 17 days therefore losing a considerable amount of weight. The winter period is important for little penguins as individuals gain the weight lost during the moult, and prepare for the upcoming breeding season<sup>36</sup>.</p> <p>The Lightning MSS activities will be undertaken during the moulting period (March-April) when the species are unable to go to sea and non-breeding season (May) where species are likely to forage within 20km of the coastline. <i>As the closest colony is located 50km from the nearest Lightning MSS boundary, little penguins are not expected to be present within, or in proximity to, the MSS area. Note the closest point of foraging is expected to be 30km away from the nearest MSS boundary.</i></p>

*In responding to this point, please note that an evaluation of impacts and risks may need to be undertaken.*

- **Additional Marine Bird Species:** Additional bird species which have been identified in this evaluation, including the additional albatross and petrel species, shearwater, skua, gulls, White-bellied Sea Eagle and Osprey, are considered have similar characteristics to the existing marine bird species contained within the Lightning MSS EP and therefore be exposed to the same environmental threats for the activity as those species identified in the EP. On this basis, Bight Petroleum considers an evaluation of the potential impacts and risks; control measures to be used to reduce impacts and risk to ALARP and acceptable levels; demonstration of ALARP and acceptability; and the implementation methodology for those controls has been provided in the Lightning MSS EP (Rev 0).
- **Additional Whale Species:** The additional whale species identified in this evaluation are considered similar in characteristic to the existing whale species contained within the Lightning MSS EP and therefore will be exposed to the same environmental threats for the activity as those species identified in the EP. On this basis, Bight Petroleum considers an evaluation of the potential impacts and risks; control measures to be used to reduce impacts and risk to ALARP and acceptable levels; demonstration of ALARP and acceptability; and the implementation methodology for those controls has been provided in the Lightning MSS EP (Rev 0).
- **Little Penguin:** As described above, Little Penguins are not expected to be present within the MSS area given their limited foraging distances from shore. Accordingly Little Penguins would not be expected within 30km of the nearest MSS boundary. Accordingly only those threats which have a footprint which extends outside the MSS operational area (acoustic and oil spill) might be considered to impacts this species. Possible marine oil spill impacts to little penguins are considered to have been addressed in Section 5.7.1 (Fuel tank Failure), Section 5.7.2 (Chemical/Oil Spill through Deck Drain System), Section 5.7.3 (Refuelling) and Section 5.7.6 (Seismic Streamer Liquid Release); and solid/hazardous waste 'overboard' incidents addressed in Section 5.7.2. On this basis, Bight Petroleum considers an evaluation of the potential spill impacts and risks; control measures to be used to reduce impacts and risk to ALARP and acceptable levels; demonstration of ALARP and acceptability; and the implementation methodology for those controls has been provided in the Lightning MSS EP (Rev 0).



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1			<p>With regard to possible acoustic impacts from the MSS activity, Little Penguins are not expected to be in proximity to the MSS operational area (distances of at least 30km to edge of foraging grounds). Based upon EP <b>Figure 5-1</b>, recognising that Little Penguin habitats are inshore of the survey area and SEL levels, due to attenuation of sound over shelf areas, are predicted to be in the order of 120dB re 1µPa<sup>2</sup>.s (or ~160dB re 1µPa). These sound levels are equivalent to sound levels emitted by fishing vessels and less than the sound levels emitted by container ships which pass through the shelf areas to the north of the survey area. Studies have indicated that acoustic disturbance to seabirds could be a potential problem if birds were diving in close proximity to the acoustic source (~5m)<sup>37</sup>. <i>On this basis negligible to no impacts due to acoustic disturbance are expected to the Little Penguin.</i></p> <ul style="list-style-type: none"> <li>• <b>Pipefish:</b> An assessment of syngathids (above) has identified that these species are predominantly inshore of the MSS area however one species of pipe-horse may be present in depth ranges up to 68m on the continental shelf inshore of the MSS area. The Lightning MSS will be undertaken in depths of between 130-2400m hence the species will be located at some distance from the MSS area. Accordingly only those threats which have a footprint extending outside the MSS operational area (acoustic and oil spill) might be considered to impacts this species. <i>Oil Spill Impacts:</i> Possible marine oil spill impacts to fish species are considered to have been addressed in <b>Section 5.7.1</b> (Fuel tank Failure), <b>Section 5.7.2</b> (Chemical/Oil Spill through Deck Drain System), <b>Section 5.7.3</b> (Refuelling) and <b>Section 5.7.6</b> (Seismic Streamer Liquid Release). On this basis, Bight Petroleum considers an evaluation of the potential spill impacts and risks; control measures to be used to reduce impacts and risk to ALARP and acceptable levels; demonstration of ALARP and acceptability; and the implementation methodology for those controls has been provided in the Lightning MSS EP (Rev 0). <i>Acoustic Impacts:</i> Pipefish are classified as a fish species. Acoustic impacts to fish species are described in <b>Section 5.5.1</b> and identify that limited behavioural changes in fish may be experienced at approximate distances between 2-12km based upon sound pressure levels of 160dB re 1µPa. EP <b>Figure 5-2</b> identifies that the maximum predicted SEL at 100m water depth is approximately 130dB re 1µPa<sup>2</sup>.s (or ~170dB re 1µPa). Based on the additional attenuation inshore of 100m, it is expected that at depths of 68m there will be negligible to no behavioural impacts on this species. Again these sound levels are equivalent to sound emitted by fishing vessels and less than the sound levels emitted by container ships which pass through the shelf areas to the north of the survey area.</li> <li>• <b>Tourism (Spatial disruption – Section 5.4.4):</b> Tourism activities as identified for the Eyre Peninsula, Lincoln National Park and Neptune Islands fall broadly within the tourism activities identified in <b>Section 3.5.2</b> of the Lightning EP. It is acknowledged that Shark Cage Diving, not previously identified in the Lightning MSS EP (Rev 0), was not identified at the Northern Neptune Group Islands. However as no additional tourism activity occurs <u>within</u>, or in close proximity to the MSS survey area, the assessment made in <b>Section 5.4.4</b> of the EP with respect to <u>spatial disruption</u> to tourist activities is considered to represent impact from this threat associated with survey vessel presence. On this basis, Bight Petroleum considers an evaluation of the potential impacts and risks; control measures to be used to reduce impacts and risk to ALARP and acceptable levels; demonstration of ALARP and acceptability; and the implementation methodology for those controls for <u>spatial disruption</u> (presence of vessels) has been provided in the Lightning MSS EP (Rev 0). Social (tourism) threats which have a footprint which extend outside the MSS operational area (acoustic and oil spill) are assessed separately in the Request for Further Information Response Item 3 (Acoustic) and Item 7 (Oil Spill).</li> </ul>		

<sup>29</sup> National Parks South Australia (2014) – Lincoln National Park available at [http://www.environment.sa.gov.au/parks/Find\\_a\\_park/Browse\\_by\\_region/Eyre\\_Peninsula/Lincoln\\_National\\_Park](http://www.environment.sa.gov.au/parks/Find_a_park/Browse_by_region/Eyre_Peninsula/Lincoln_National_Park)

<sup>30</sup> South Australia Government (2014) – Eyre Peninsula available at <http://www.southaustralia.com/regions/eyre-peninsula.aspx>

<sup>31</sup> SEWPC, 2012 – Species Group Report Card – Seabirds – Supporting the Marine Bioregional Plan for the South-west marine Region available at <http://www.environment.gov.au/system/files/pages/a73fb726-8572-4d64-9e33-1d320dd6109c/files/south-west-report-card-seabirds.pdf>

<sup>32</sup> Foundation for National Parks and Wildlife, 2014 – Little Penguins available at <http://www.fnpw.org.au/plants-a-wildlife/birds/little-penguin>

<sup>33</sup> Wikipedia, 2014 – List of Little Penguin Colonies available at [http://en.wikipedia.org/wiki/List\\_of\\_Little\\_Penguin\\_colonies](http://en.wikipedia.org/wiki/List_of_Little_Penguin_colonies)

<sup>34</sup> Australian Wildlife, 2014 – Little Penguin available at <http://www.australianwildlife.com.au/penguin.htm>

<sup>35</sup> BirdLife International 2014. *Eudyptula minor*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. <[www.iucnredlist.org](http://www.iucnredlist.org)>. Downloaded on 18 May 2014

<sup>36</sup> Gormley, A M, and Dann, P., (2009) – Examination of Little Penguin Winter Movements from Satellite Tracking Data, Report for the Department of Sustainability and Environment Victoria available at <http://www.oem.vic.gov.au/Assets/668/1/AnalysisofLittlePenguinWinterMovements.pdf>

<sup>37</sup> Macduff-Duncan, C R. & Davies, G. (1995) – Managing Seismic Exploration in a Near-shore Environmentally Sensitive Area, Offshore Europe Conference, Aberdeen, Scotland, 5-8 September 1995



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1			<ul style="list-style-type: none"> <li><b>Benthic Fauna:</b> Very little is known about sound detection and use of sound by aquatic invertebrates. Organisms may detect sound by sensing either the 'particle motion' or pressure component (or both) however no physical structures have been discovered in aquatic invertebrates which would be expected to be stimulated by the pressure component of sound. Marine invertebrates (i.e. porifera, bryozoans and ascidians) are at the same density as water and do not contain air cavities which might function like a fish bladder in responding to pressure (i.e. trauma due to rapid pressure changes). On this basis, no impacts to benthic fauna in the MSS area are expected from the sound "pressure" component of the sound wave.</li> </ul> <p>Invertebrates may be receptive to low frequencies by detecting the "particle motion" component of the sound field<sup>38</sup>. Many aquatic invertebrates have ciliated "hair" cells that may be sensitive to water movements caused by currents or water particle motion which occur close to the sound source. These hair cells may allow for the sensing of near-by prey or predators or help with local navigation. Water particle motion falls off rapidly with distance from an acoustic source<sup>39</sup> so only aquatic invertebrates located in close proximity may be affected or detect nearby sound sources. Given the water depths of the Lightning MSS are &gt;130m, no particle motion effects from acoustic arrays are expected at seabed locations.</p> <p>Some aquatic invertebrates (e.g. cephalopods) have specialised organs called statocysts for determining equilibrium and in some cases linear or angular acceleration which may be affected by marine sound<sup>40</sup>. Benthic species such as porifera, bryozoans and ascidians present in the Lightning MSS area do not contain statocysts.</p> <p>Little research has been undertaken as to sound impacts on ascidians, bryozoans or porifera. Most studies into aquatic invertebrates have focussed on commercial species (crab, lobster, squid, shrimp, etc.). One study, looking at possible acoustic impacts from seismic sources to (glass) sponge (i.e. porifera) feeding characteristics, identified no increased feeding rates within the species when exposed to an air-gun of source level 151dB re 1µPa<sup>2</sup>.s at 160m<sup>41</sup>. This is however, a much lower SEL than a seismic acoustic array.</p> <p>On the basis of the known anatomy of benthic fauna in the region and the distance between acoustic array and the seafloor, no impacts to benthic fauna are expected with acoustic impacts from MSS activities. Acoustic impact and risk to benthic fauna are therefore considered to be acceptable and ALARP.</p> <p>General threats to marine invertebrates are reported to include commercial fishing (demersal trawl), habitat degradation by pollution and coastal development and invasive marine species<sup>42</sup>. With respect to these possible threats from Lightning MSS activities, the following should be observed:</p> <ul style="list-style-type: none"> <li>Lightning MSS EP <b>Section 5.3.1</b> (Invasive Marine Species) provides controls to be adopted during MSS activities to reduce IMS introduction to acceptable and ALARP conditions;</li> <li>Lightning MSS EP <b>Section 5.7</b> (non-routine incidents) deals with incidents which are pelagic in nature and will not impact on benthic fauna (considered acceptable and ALARP);</li> <li>Additionally as the survey does not contact the seabed no physical impacts or disturbances are anticipated (considered acceptable and ALARP).</li> </ul>		

<sup>38</sup> UNEP (2012) – Scientific Synthesis on the Impacts of Underwater Noise on Marine and Coastal Biodiversity and Habitats, Convention of Biological Diversity, Subsidiary Body on Scientific Technical and Technological Advice, Montreal 2012

<sup>39</sup> Tasker, M.L., Amundin, M., Andree, M., Hawkins, A., Lang, W., Merck, T., Scholik-Schlomer, A., Tellman, J., Thomsen, F., Werner, S., Zakharia, M., (2010) – Marine Strategy Framework Directive, Task Group 11 Report – Underwater Noise and Other Forms of Energy, Joint Report prepared under the Administrative Arrangement between JRC and DG ENV (No 31210-2009/2010) the memorandum of Understanding between the European Commission and ICES managed by DG MARE and JRC's own Institutional Funding available at <http://ec.europa.eu/environment/marine/pdf/10-Task-Group-11.pdf>

<sup>40</sup> Normandeau Associates, Inc. 2012. Effects of Noise on Fish, Fisheries, and Invertebrates in the U.S. Atlantic and Arctic from Energy Industry Sound-Generating Activities. A Workshop Report for the U.S. Dept. of the Interior, Bureau of Ocean Energy Management. Contract # M11PC00031. 72 pp. plus Appendices

<sup>41</sup> Tunnicliffe V., Chapman, N.R., Wilmot, M.J., Yalhal, G. & (2008) – Final report – Environmental Impacts of Airguns on Glass Sponges, Ministry of Energy & Mines and University of Victoria, British Columbia available at <http://www.empr.gov.bc.ca/Mining/Geoscience/MapPlace/thematicmaps/OffshoreMapGallery/Documents/SpongefinaDec08.pdf>

<sup>42</sup> Butler, A., Althaus, F., Furlani, D., Ridgway, K., 2002 – Assessment of the Conservation values of the Bass Strait sponge bed area – A component of the Commonwealth Marine Conservation Assessment program 2002-2004, Report to Environment Australia available at <http://www.environment.gov.au/system/files/resources/9dc94eb7-5873-4e88-902d-d26ad39be486/files/conservation-assessment-bass.pdf>

Matter Number	Section of Submission	Environment Regulation	Further written information requested	Response from Titleholder	NOPSEMA Status (To be completed by NOPSEMA)
2	Section 5.5.1	Regulation 13(5)	<p>This activity area overlaps with a biologically significant upwelling which is detailed as occurring 2 to 4 times a year each over 3 to 10 days. What is the likelihood of the upwelling occurring during the activity?</p> <p>Further, are any measures proposed to be utilised to detect the presence of any upwelling; and/or mitigate impacts of the activity on feeding aggregations of fishes, seabirds, seals or other fauna that may be occur in the upwelling area in the event that this occurs?</p> <p>In responding to this point please note that:</p> <ul style="list-style-type: none"> <li>• Details of the control measures (if any) that will be used to reduce impacts and risks to ALARP and acceptable should be supplied;</li> <li>• Impacts and risks must be demonstrated to be reduced to ALARP and acceptable levels;</li> <li>• The demonstration and selection of controls (if any) must be supported.</li> </ul>	<i>Please refer to information below</i>	

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2	<p><b><i>This activity area overlaps with a biologically significant upwelling which is detailed as occurring 2 to 4 times a year each over 3 to 10 days. What is the likelihood of the upwelling occurring during the activity?</i></b></p> <p>Field data and hydrodynamic modelling support that the Kangaroo Island upwelling (pool) starts in the submarine canyons south of Kangaroo Island, where localized sub-surface upwelling brings a pool of cold water onto the continental shelf. This dense-water pool drifts along the shelf bottom to offshore Kangaroo Island (west) and the Eyre Peninsula. Upwelling events occur, normally two to three times a summer, when cold water is upwelled from the pool during “upwelling favourable” south-easterly wind regimes. Middleton &amp; Bye (2007) identify these upwelling favourable events occurring between December and March (note December to April in nominated in the current EP). Studies<sup>43</sup> also indicate that there is inter-annual variability in the upwelling events and that stronger upwelling events are associated with El Nino conditions (2003, 1998). Seasonal wind rose directions (EP Figure 3-4) for the Lightning MSS area identifies, and supports, the south-easterly wind regime as predominating from November through to March. During March, April and May, south-easterly winds prevail approximately 35%, 8% and 2% of the time respectively. Accordingly it is considered very unlikely that upwelling conditions would result during April/May.</p> <p><i>Further, are any measures proposed to be utilised to detect the presence of any upwelling; and/or mitigate impacts of the activity on feeding aggregations of fishes, seabirds, seals or other fauna that may be occur in the upwelling area in the event that this occurs?</i></p> <p>Measures proposed in Section 5.5.1 of the Lightning EP to detect the presence of an upwelling include an initial aerial survey. The key parameter utilised within these surveys for the detection of an upwelling will be the presence of Blue Whales exhibiting feeding characteristics. It is important to note the following:</p> <ul style="list-style-type: none"> <li>• The Lightning MSS survey has been sequenced in a time period which has a reduced likelihood of upwelling;</li> <li>• The MSS survey has been designed with control measures to reduce environmental impacts/risk to acceptable and ALARP conditions based upon the ‘worst case’ of an upwelling being present. Constraints and limitations in MSS operation imposed by these control measures are accepted on this basis; and</li> <li>• The survey window of 90days does not provide for much operational contingency to acquire the MSS data. Full utilisation of the allocated window will be necessary.</li> </ul> <p><b><i>In responding to this point please note that:</i></b></p> <ul style="list-style-type: none"> <li>• <b><i>Details of the control measures (if any) that will be used to reduce impacts and risks to ALARP and acceptable should be supplied;</i></b></li> <li>• <b><i>Impacts and risks must be demonstrated to be reduced to ALARP and acceptable levels;</i></b></li> <li>• <b><i>The demonstration and selection of controls (if any) must be supported.</i></b></li> </ul> <p>Based on the above, control measures detailed in Section 5.5.1 of the Lightning EP are considered the relevant controls to mitigate impacts of the MSS activity on feeding aggregations of fish, seabirds, seals and other fauna that may occur in the upwelling area. The use of soft-start or ramp-up procedures for a 30minute period before full data acquisition activities commence, allows for the displacement of acoustically sensitive fish from the immediate area. Based on available data for fish response (~180dB re 1µPa) it is estimated the displacement distance would be approximately 3-10km (refer Figure 5-1). Additionally, the MSS vessel moves at approximately 5knots (~9km/hr.) so effects in any particular location are temporary and given the distances involved is not considered significant. It is expected that fish initially displaced by acoustic sound will rapidly attract back to areas of high productivity (~hrs.). Further, the displacement of fish as a result of MSS activities will mitigate the presence of prey species such as sea-birds, seals and odontocetes.</p>				

<sup>43</sup> Middleton 2007; cited in Pattiaratchi, 2007 - Understanding areas of high productivity within the South-west Marine Region, Report prepared for the Department of the Environment, Water, Heritage and the Arts, September 2007 downloaded on June 5<sup>th</sup> 2012 at <http://www.environment.gov.au/coasts/mbp/publications/south-west/pubs/sw-high-productivity.pdf>

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2	<p>It is to be noted that high productivity upwelling areas cause fish to aggregate due to high levels of plankton and zooplankton (krill). There is no literature available on the response of either plankton or zooplankton (including krill) to sound, however the following should be noted:</p> <ul style="list-style-type: none"> <li>Plankton which cannot remove itself from the MSS area may be fatally affected in areas immediately adjacent to the acoustic source. If plankton is affected in a similar way to sound as fish eggs/juveniles there would be increased mortality around the immediate area of the acoustic source (~5m). For areas where plankton might be present there may be localized areas of mortality in proximity of the acoustic source however this is not considered to be significant at a population level and is not expected to impact on higher trophic levels;</li> <li>No published literature is available which established the effects of anthropogenic sound on krill, or establishes that krill can detect sound<sup>44</sup>. Additionally, there is almost no data on invertebrate hearing, and the small information available suggests that hearing is associated with low frequencies and only to the particle motion component of the sound field<sup>45</sup>. The particle motion component of the sound field occurs in the 'near-field' close to the sound source. Given the presence of statocyst organs in crustaceans, similar to cephalopods, krill may be responsive to sound, however it is not possible to quantify these impacts. Invertebrate studies associated with sound level impacts on crustaceans have identified no apparent change in catch rates or mortality impacts<sup>46</sup>. Aerial observations associated with the 2003 Santos EPP42 MSS identified areas of krill throughout the MSS program which appeared to be unaffected by the presence of the seismic vessel<sup>47</sup> and aerial observers on a previous Santos MSS in 2002 noted that when the MSS vessel approached a swarm of krill, the krill parted into two swarms without apparent harm. This observed impact indicates there is some responsiveness of krill to the presence of a seismic vessel or acoustic sound (or both) and the displacement of krill may also serve to displace higher trophic species however this is not considered to be significant.</li> </ul> <p>Species identified in this evaluation have been considered in the existing Lighting MSS EP (refer <b>Section 5.5.1</b>) with respect to acoustic impacts. On this basis, Bight Petroleum considers an evaluation of the potential impacts and risks; control measures to be used to reduce impacts and risk to ALARP and acceptable levels; demonstration of ALARP and acceptability; and the implementation methodology for those controls has been provided in the Lighting MSS EP (Rev 0).</p>				
3	Section 5.5.1	Regulation 13(5)	<p>What are the impacts and risks to tourism attributed to acoustic disturbance from the array?</p> <p>In responding to this point please note that:</p> <ul style="list-style-type: none"> <li>Details of the control measures (if any) that will be used to reduce impacts and risks to ALARP and acceptable should be supplied;</li> <li>Impacts and risks must be demonstrated to be reduced to ALARP and acceptable levels;</li> <li>The demonstration and selection of controls (if any) must be supported.</li> </ul>	<i>Refer to Section below.</i>	

<sup>44</sup> CMST, 2001 – Marine Acoustic Effects Study – Blue Whale Feeding Aggregations, Otway Basin, Bass Strait Victoria by R.D. McCauley and A.J. Duncan

<sup>45</sup> Normandeau Associates, Inc. 2012, Effects of Noise on Fish, Fisheries, and Invertebrates in the U.S. Atlantic and Arctic from Energy Industry Sound-Generating Activities, A Literature Synthesis for the U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Contract # M11PC00031. 153 pp.

<sup>46</sup> Bight Petroleum (2012) – EPBC Referral 2012/6583: Lightning 3D MSS – Additional Information: Key Ecological Feature – Kangaroo Island Pool, canyons and adjacent shelf break and Eyre Peninsula Upwellings (Section 4) available at <http://bightpetroleum.com/custom/2122/images/Key%20Ecological%20Feature.pdf>

<sup>47</sup> Morrice, M., Gill, P., Hughes, J., & Levings, A.H. (2004) – Summary of Aerial Surveys Conducted for the Santos Limited EPP32 Seismic Survey 2-13 December 2003.



*What are the impacts and risks to tourism attributed to acoustic disturbance from the array?*

As provided in Section 5.5.1.1 (Acoustic Disturbance – Seismic Acquisition), Figure 5-2 provides the acoustic footprint impacts to adjacent coastlines from Lightning MSS acquisition activities (i.e. closest survey point to both Kangaroo Island and the Eyre Peninsula - considered worst case and highly conservative). In summary this this acoustic footprint shows the following:

- The maximum SEL at the 50m water depth contour just off the Western end of Kangaroo Island from P1 (approx. 104km) is predicted to be less than 115dB re 1  $\mu\text{Pa}^2\text{s}$  (~145dB re 1  $\mu\text{Pa}$ ) for a 3090in<sup>3</sup> source array. Similar SELs are also predicted just off the coast of the Eyre Peninsula (approx. 67km);
- The maximum SEL at the North Neptune Group Islands is approximately 110dB re 1  $\mu\text{Pa}^2\text{s}$  (~140dB re 1  $\mu\text{Pa}$ ) and for the Southern Neptune Groups Islands of 120dB re 1  $\mu\text{Pa}^2\text{s}$  (~150dB re 1  $\mu\text{Pa}$ ). These islands produce a 'sound shadow' inshore into the Spencer Gulf; and
- Sound levels do not impact acoustically within Spencer Gulf as sound is 'blocked' by barrier islands at the mouth of the gulf.

The following is also relevant to this assessment:

- A major shipping route lies between the Lightning MSS area and Neptune Islands which carries large vessels (tankers) with sound emissions between 180-190dB re 1  $\mu\text{Pa}$  (at hull) with medium sized fishing trawlers also emitting low frequency sounds at 165-180dB re 1  $\mu\text{Pa}$ ; and
- Studies (1993, 1995) undertaken on low frequency underwater sounds to humans (divers) by the US Department of Navy<sup>48</sup> identified that sound levels below SPL 160dB re 1  $\mu\text{Pa}$  is not be expected to cause physiological damage to a diver. Further studies (1997, 1998) concluded that SPLs of 157dB re 1  $\mu\text{Pa}$  did not produce physiological damage in humans, further only 2% of divers experienced "very severe" adverse reactions at a level of 148dB re 1  $\mu\text{Pa}$ . On this basis, the threshold was scaled back by 3dB (a 50% reduction in signal strength) to provide a suitable margin of safety for divers. Interim guidance for the operation of low frequency sound sources in the presence of recreational divers is recommended not to exceed a SPL of 145 dB re 1  $\mu\text{Pa}$ .

An assessment of possible impacts and risk to regional tourism-related activities/values identified within Section 3.5.2 and additional tourism items identified in Request for further information Item 1 from acoustic sound follows:

- Recreational Beach Use (sightseeing, swimming, surfing and snorkelling) and diving (coastal areas): Sound levels at coastal beaches are expected to be less than 145dB re 1  $\mu\text{Pa}$  and hence no physiological or aversion impacts to people located within the water are expected. The Northern and Southern Neptune Islands both have rocky shorelines (no beaches) and plenty of white sharks (no snorkelling). *Hence no recreational beach use tourism-related impacts are predicted.*
- Diving (Heritage Trails): Identified heritage diving areas are located outside the MSS acoustic footprint areas and will be less than 115dB re 1  $\mu\text{Pa}^2\text{s}$  (i.e. SPL ~145dB re 1  $\mu\text{Pa}$ ). *Hence no heritage diving-related tourism impacts expected from acoustic activities.*
- Whale Watching Operations: Lightning MSS activities occur outside the time window for whale watching (June-October) which is predominantly association with coastal Southern Right Whale aggregations. *Hence no impacts expected to whale watching operations expected.*
- Charter boating (sightseeing, fishing, diving, marine mammal watching): As identified in Section 3.5.2, charter boats are concentrated around Port Adelaide, Kangaroo Island and the Eyre Peninsula. Charter vessels also utilise the waters surrounding the Northern and Southern Neptune Islands for sight-seeing and/or coastal recreational fishing. SPL levels at the Northern & Southern Neptune Islands Group (considered the 'worst case' for all coastal areas) are predicted to be at levels below those where behavioural responses in fish result (i.e. 160dB re 1  $\mu\text{Pa}$ ). Accordingly, no coastal recreational fishing displacement effects are predicted around these islands or coastal areas<sup>49</sup>.

Deep Sea Charters may experience minor fish displacement (i.e. between 180-200dB re 1  $\mu\text{Pa}$ ) (~3km from the MSS boundary based upon Figure 5-1 for attenuated shelf areas). It is considered with the observed low fishing effort in the area reflected in Figure 3-19, and availability of alternate locations, impacts to Deep Sea Charters will be negligible and the risk low.

Marine mammal watching (pinnipeds) (ecotourism) also occurs in coastal areas and islands where colonies are present (i.e. Neptune Islands and Hopkins Island). As identified in Section 5.5.1.1, avoidance behaviour (i.e. no entry into water) is expected by Sea Lions (& Fur Seals) at received sound levels of 170dB re 1  $\mu\text{Pa}$  *in the species preferred mid-frequency hearing range*. It is noted that higher sound levels are required in the low-frequency range to illicit the same response. Low frequency sound levels of 140-150dB re 1  $\mu\text{Pa}$  are expected at the Northern and Southern Neptune Islands (considered worst case for coastal tourism areas). *No avoidance behaviour by pinnipeds is expected as a result of acoustic sound and no subsequent impact to tourism.*

- Recreational boating (small inshore craft): Recreational vessels (non-charter) will not be affected by Lightning MSS acoustic sound. *No impacts to tourism are expected.*

Matter Number	Section of Submission	Environment Regulation	Further written information requested	Response from Titleholder	NOPSEMA Status (To be completed by NOPSEMA)
3	<ul style="list-style-type: none"> <li><u>Yacht Racing</u>: As yacht races are undertaken during periods outside the Lightning MSS time period, <i>no impacts to yacht racing events are expected from acoustic impacts from the Lightning MSS.</i></li> <li><u>Cruise Ships visiting Kangaroo Island</u>: Cruise vessels transiting to Kangaroo Island will not be affected by Lightning MSS acoustic sound. <i>No impacts to tourism are expected.</i></li> <li><u>Cage Diving with Great White Sharks (Northern Neptune Islands) (ecotourism)</u>: As provided in <b>Request for Further Information Item 1</b>, anchorages for shark diving occur on the eastern coastlines of North Neptune Group Islands in water depths of approximately 12-18m away from the prevailing westerly winds and swell. The western coastline of the islands is only suitable in summer during easterly wind regimes<sup>50 51</sup> and calm seas (i.e. not in the MSS time window). Sound levels predicted on the prevailing <i>western face</i> of the North Neptune Group Islands is ~140dB re 1µPa which is lower than the recommended received SPL of 145 dB re 1µPa. As the anchorage locations are on the lee side of the island it is expected that sound levels will be lower at approximately 130dB re 1µPa (refer <b>Figure 5-2</b>). Additionally, as discussed in EP <b>Section 5.5.1</b>, seismic acoustic pulses from MSS activities are not expected to impact on shark species at this location. <i>No impacts to diving tourism are expected from acoustic sound.</i></li> </ul> <p><b>Details of the control measures (if any) that will be used to reduce impacts and risks to ALARP and acceptable should be supplied.</b></p> <p>Control measures as identified in <b>Section 5.5.1.2</b> will manage acoustic sound impacts and risks to tourist activities such that the impacts/risks are acceptable and ALARP.</p> <p><b>Impacts and risks must be demonstrated to be reduced to ALARP and acceptable levels.</b></p> <p><b>Section 5.5.1.3</b> provides an evaluation of Lightning MSS acoustic sound impacts and risk reduction measures with respect to ALARP and “acceptable levels”. Bight Petroleum considers that the information detailed above and within <b>Section 5.5.1</b> demonstrates that the residual impact and risk from acoustic sound to regional tourism activities are acceptable; and all possible practicable control measures have been adopted to bring the impact and risk to a level which is ALARP. On this basis, Bight Petroleum considers the above evaluation of the potential impacts and risks; and the control measures detailed in <b>Section 5.5.1</b> reduce impacts and risk to ALARP and acceptable levels; demonstrate ALARP and acceptability; and the implementation methodology for those controls has been provided in the Lighting MSS EP (Rev 0).</p>				
4	Section 5.5.1	Regulation 13(5)	<p>What are the details of the aerial survey that will be undertaken by the spotter aircraft, including survey timing, duration, methods, data recording and observation personnel used?</p> <p>What is the definition of whale “feeding” that will be used to inform decisions about commencement locations for the survey? For example, how many whales are required to be present and how often would feeding behaviours need to be observed? Further, given that the consultation records state that [REDACTED], where will the survey commence in the event whales are observed feeding in the southern racetrack in March.</p>	Refer to Section Below.	

<sup>48</sup> US Department of Navy (2014) – SURTASS LFA – Diver Studies available at <http://www.surtass-lfa-eis.com/DiverStudies/>

<sup>49</sup> Explore Australian, 2014–Neptune Islands available at <http://www.exploreaustralia.net.au/South-Australia/Eyre-Peninsula-and-Nullarbor/Lincoln-National-Park/Neptune-Islands/Fishing-spot>

<sup>50</sup> Rodney Fox Shark Expeditions, 2014 available at <https://www.rodneymfox.com.au/index.php/selectedContent/21965891>

<sup>51</sup> Shark Cage Diving – Calypso Star Charters, 2014 available at <http://www.sharkcagediving.com.au/shark-tours/dive-locations/>

***What are the details of the aerial survey that will be undertaken by the spotter aircraft, including survey timing, duration, methods, data recording and observation personnel used?***

As detailed in EP Section 5.5.1, prior to the commencement of the Lightning MSS, Bight will engage a spotter aircraft to undertake an aerial survey (weather permitting) to determine the presence of whale species and Southern Bluefin Tuna pontoon towing, three days prior to the MSS vessel and support vessels arriving in the survey area. s 22 - personal information

s 47G - business affairs

Two trained and experienced observers (currently thought to be associated with Blue Whale Study) located on each side of the aircraft will be engaged to sight and record sighting and effort data.

s 47G - business affairs

***What is the definition of whale "feeding" that will be used to inform decisions about commencement locations for the survey? For example, how many whales are required to be present and how often would feeding behaviours need to be observed?***

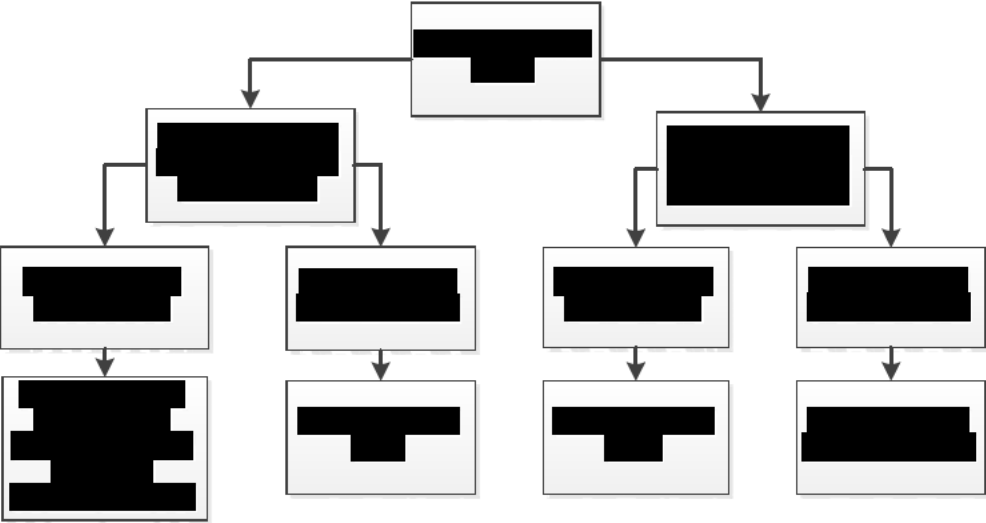
Trained aerial observers (as above) will assess for "feeding" characteristics associated with cetaceans, based upon the following, to determine if this criteria is triggered for the Lightning MSS.

For Blue Whales, behavioural characteristics are distinct between transit activities (constant speed straight line behaviour) and feeding activity (erratic movements). s 22 - personal information

For Sperm Whales, Christal and Whitehead (2001)<sup>53</sup> identified two general behavioural modes; foraging at depth and socialising/resting near the surface. Whilst foraging, which occupies about 75% of the species time, members of a group of females and immatures are usually spread out over 1-2km of ocean, often forming a rank perpendicular to the direction of travel. Additionally, between dives of about 35mins, members of the group breathe at the surface for about 8min in groups usually containing 1-3 animals. These groupings are typically within 100m of each other and show coordinated behaviour. In the event that Sperm Whales show this type of 'clumped'<sup>54</sup> distribution, "feeding" behaviours will be attributed.

Accordingly, the following performance standard is nominated for this control measure (to be included in Section 5.5.1.2):

Control Measure	Performance Standard	Measurement Criteria
Pre-mobilisation Aerial Survey	s 47G - business affairs	Aerial survey report conforms to the documented methodology, survey boundaries and provides the required sighting data.
	Two trained and experienced observers will be engaged to sight and record sighting and effort data	Records (CVs) indicate that the aerial observers are trained and competent to undertake survey activities.

Matter Number	Section of Submission	Environment Regulation	Further written information requested	Response from Titleholder	NOPSEMA Status (To be completed by NOPSEMA)
4	<p>Further, given that the consultation records state [REDACTED] where will the survey commence in the event whales are observed feeding in the southern racetrack in March.</p> <p>s 22 - consultation record excluded by agreement [REDACTED]</p> <div style="text-align: center;">  <pre> graph TD     A[REDACTED] --&gt; B[REDACTED]     A --&gt; C[REDACTED]     B --&gt; D[REDACTED]     B --&gt; E[REDACTED]     C --&gt; F[REDACTED]     C --&gt; G[REDACTED]     D --&gt; H[REDACTED]     E --&gt; I[REDACTED]     F --&gt; J[REDACTED]     G --&gt; K[REDACTED]     H --&gt; L[REDACTED]     I --&gt; M[REDACTED]     J --&gt; N[REDACTED]     K --&gt; O[REDACTED]     L --&gt; P[REDACTED]     M --&gt; Q[REDACTED]     N --&gt; R[REDACTED]     O --&gt; S[REDACTED]     P --&gt; T[REDACTED]     Q --&gt; U[REDACTED]     R --&gt; V[REDACTED]     S --&gt; W[REDACTED]     T --&gt; X[REDACTED]     U --&gt; Y[REDACTED]     V --&gt; Z[REDACTED]     W --&gt; AA[REDACTED]     X --&gt; AB[REDACTED]     Y --&gt; AC[REDACTED]     Z --&gt; AD[REDACTED]     AA --&gt; AE[REDACTED]     AB --&gt; AF[REDACTED]     AC --&gt; AG[REDACTED]     AD --&gt; AH[REDACTED]     AE --&gt; AI[REDACTED]     AF --&gt; AJ[REDACTED]     AG --&gt; AK[REDACTED]     AH --&gt; AL[REDACTED]     AI --&gt; AM[REDACTED]     AJ --&gt; AN[REDACTED]     AK --&gt; AO[REDACTED]     AL --&gt; AP[REDACTED]     AM --&gt; AQ[REDACTED]     AN --&gt; AR[REDACTED]     AO --&gt; AS[REDACTED]     AP --&gt; AT[REDACTED]     AQ --&gt; AU[REDACTED]     AR --&gt; AV[REDACTED]     AS --&gt; AW[REDACTED]     AT --&gt; AX[REDACTED]     AU --&gt; AY[REDACTED]     AV --&gt; AZ[REDACTED]     AW --&gt; BA[REDACTED]     AX --&gt; BB[REDACTED]     AY --&gt; BC[REDACTED]     AZ --&gt; BD[REDACTED]     BA --&gt; BE[REDACTED]     BB --&gt; BF[REDACTED]     BC --&gt; BG[REDACTED]     BD --&gt; BH[REDACTED]     BE --&gt; BI[REDACTED]     BF --&gt; BJ[REDACTED]     BG --&gt; BK[REDACTED]     BH --&gt; BL[REDACTED]     BI --&gt; BM[REDACTED]     BJ --&gt; BN[REDACTED]     BK --&gt; BO[REDACTED]     BL --&gt; BP[REDACTED]     BM --&gt; BQ[REDACTED]     BN --&gt; BR[REDACTED]     BO --&gt; BS[REDACTED]     BP --&gt; BT[REDACTED]     BQ --&gt; BU[REDACTED]     BR --&gt; BV[REDACTED]     BS --&gt; BW[REDACTED]     BT --&gt; BX[REDACTED]     BU --&gt; BY[REDACTED]     BV --&gt; BZ[REDACTED]     BW --&gt; C1[REDACTED]     BX --&gt; C2[REDACTED]     BY --&gt; C3[REDACTED]     BZ --&gt; C4[REDACTED]     C1 --&gt; C5[REDACTED]     C2 --&gt; C6[REDACTED]     C3 --&gt; C7[REDACTED]     C4 --&gt; C8[REDACTED]     C5 --&gt; C9[REDACTED]     C6 --&gt; C10[REDACTED]     C7 --&gt; C11[REDACTED]     C8 --&gt; C12[REDACTED]     C9 --&gt; C13[REDACTED]     C10 --&gt; C14[REDACTED]     C11 --&gt; C15[REDACTED]     C12 --&gt; C16[REDACTED]     C13 --&gt; C17[REDACTED]     C14 --&gt; C18[REDACTED]     C15 --&gt; C19[REDACTED]     C16 --&gt; C20[REDACTED]     C17 --&gt; C21[REDACTED]     C18 --&gt; C22[REDACTED]     C19 --&gt; C23[REDACTED]     C20 --&gt; C24[REDACTED]     C21 --&gt; C25[REDACTED]     C22 --&gt; C26[REDACTED]     C23 --&gt; C27[REDACTED]     C24 --&gt; C28[REDACTED]     C25 --&gt; C29[REDACTED]     C26 --&gt; C30[REDACTED]     C27 --&gt; C31[REDACTED]     C28 --&gt; C32[REDACTED]     C29 --&gt; C33[REDACTED]     C30 --&gt; C34[REDACTED]     C31 --&gt; C35[REDACTED]     C32 --&gt; C36[REDACTED]     C33 --&gt; C37[REDACTED]     C34 --&gt; C38[REDACTED]     C35 --&gt; C39[REDACTED]     C36 --&gt; C40[REDACTED]     C37 --&gt; C41[REDACTED]     C38 --&gt; C42[REDACTED]     C39 --&gt; C43[REDACTED]     C40 --&gt; C44[REDACTED]     C41 --&gt; C45[REDACTED]     C42 --&gt; C46[REDACTED]     C43 --&gt; C47[REDACTED]     C44 --&gt; C48[REDACTED]     C45 --&gt; C49[REDACTED]     C46 --&gt; C50[REDACTED]     C47 --&gt; C51[REDACTED]     C48 --&gt; C52[REDACTED]     C49 --&gt; C53[REDACTED]     C50 --&gt; C54[REDACTED]     C51 --&gt; C55[REDACTED]     C52 --&gt; C56[REDACTED]     C53 --&gt; C57[REDACTED]     C54 --&gt; C58[REDACTED]     C55 --&gt; C59[REDACTED]     C56 --&gt; C60[REDACTED]     C57 --&gt; C61[REDACTED]     C58 --&gt; C62[REDACTED]     C59 --&gt; C63[REDACTED]     C60 --&gt; C64[REDACTED]     C61 --&gt; C65[REDACTED]     C62 --&gt; C66[REDACTED]     C63 --&gt; C67[REDACTED]     C64 --&gt; C68[REDACTED]     C65 --&gt; C69[REDACTED]     C66 --&gt; C70[REDACTED]     C67 --&gt; C71[REDACTED]     C68 --&gt; C72[REDACTED]     C69 --&gt; C73[REDACTED]     C70 --&gt; C74[REDACTED]     C71 --&gt; C75[REDACTED]     C72 --&gt; C76[REDACTED]     C73 --&gt; C77[REDACTED]     C74 --&gt; C78[REDACTED]     C75 --&gt; C79[REDACTED]     C76 --&gt; C80[REDACTED]     C77 --&gt; C81[REDACTED]     C78 --&gt; C82[REDACTED]     C79 --&gt; C83[REDACTED]     C80 --&gt; C84[REDACTED]     C81 --&gt; C85[REDACTED]     C82 --&gt; C86[REDACTED]     C83 --&gt; C87[REDACTED]     C84 --&gt; C88[REDACTED]     C85 --&gt; C89[REDACTED]     C86 --&gt; C90[REDACTED]     C87 --&gt; C91[REDACTED]     C88 --&gt; C92[REDACTED]     C89 --&gt; C93[REDACTED]     C90 --&gt; C94[REDACTED]     C91 --&gt; C95[REDACTED]     C92 --&gt; C96[REDACTED]     C93 --&gt; C97[REDACTED]     C94 --&gt; C98[REDACTED]     C95 --&gt; C99[REDACTED]     C96 --&gt; C100[REDACTED] </pre> </div> <p>* Considered very unlikely as primary encounter is in August and September</p> <p>Note in the unlikely instance that the NRT and SRT options are not clearly defined by the decision tree above, the Project Manager will assess information and determine the least sensitive section of the survey area.</p>				



Matter Number	Section of Submission	Environment Regulation	Further written information requested	Response from Titleholder	NOPSEMA Status (To be completed by NOPSEMA)
5	Section 5.5.1, 5.5.2, 5.7.7 and Section 6.6.1	Regulation 13(5)	<p>What systems, practices and procedures will be implemented to manage impacts and risks from the activity to pinnipeds?</p> <p>Further, when interactions with pinnipeds occur, will these be recorded?</p> <p>In providing a response to the above, consideration should be given to the EPBC Act Recovery Plan for Sea Lions that include recovery actions relating to vessels strike, oil spills and cumulative impacts of human interactions.</p>	<i>Refer to Section Below.</i>	

Matter Number	Section of Submission	Environment Regulation	Further written information requested	Response from Titleholder	NOPSEMA Status (To be completed by NOPSEMA)						
5	<p><b><i>What systems, practices and procedures will be implemented to manage impacts and risks from the activity to pinnipeds?</i></b></p> <p>Lightning EP <b>Section 3.4.5</b> identifies that the northern boundary of the MSS area has minor overlap with foraging areas for male Sea Lions (shelf area) and no overlap with foraging areas for female Sea Lions. Encounter of Sea Lions during the Lightning MSS is therefore considered to be low. Encounter with both male and female New Zealand Fur Seals in the Lightning MSS area is expected.</p> <p>It is also noted that low frequency MSS activities (&lt;200Hz) is not in the normal hearing range for pinnipeds. As identified in <b>Section 5.5.1.1</b>, Phocid Seals have a hearing range between 1kHz-50kHz. Otariid seals (Fur Seals and Sea Lions) have a lower hearing sensitivity than Phocid Seals below 1kHz and similar hearing between 1kHz and 40kHz. Lightning EP <b>Section 5.5.1.1</b> provides a detailed analysis with respect to physiological and behavioural impacts to pinniped species from acoustic impacts. Conservative thresholds adopted in the EP for physiological impact (i.e. Permanent Threshold Shift (PTS) in hearing) to Sea Lions (&amp; Fur Seals) was 186dB re 1µPa<sup>2</sup>.s and for Temporary Thresholds Shift (TTS) onset of 171dB re 1µPa<sup>2</sup>.s. This was based on harbours seals who exhibit much lower physiological damage thresholds compared with Sea Lions. Relativities between Sea Lions and Harbour Seals based upon observed TTS shifts in both species identified Sea Lions had an incremental SEL of 23dB above that of harbour seals. On the basis, TTS onset values for Sea Lions (&amp; Fur Seals) are expected to be approximately 194dB re 1µPa<sup>2</sup>.s which is predicted at a radius less than 100m (refer <b>Figure 5-1</b>) for the acoustic array. It is noted that TTS has been measured at 206dB re 1µPa<sup>2</sup>.s for Californian Sea Lions with full recovery observed in 24hours.</p> <p>Studies undertaken during near-shore seismic programs in the Beaufort Sea with Phocid seals identified that during daylight hours seals were seen at nearly identical rates during periods where there were no airguns firing, one airgun firing and full array operational. Seals tended to be further away during full array seismic. There was partial avoidance of the zone less than 150m during full array seismic but seals did not move away much beyond 250m<sup>55</sup>. Otariid seals, on the basis of literature, are expected to be less sensitive than the Phocid seals to low frequency acoustic sound and displacement levels predicted to be smaller.</p> <p>Given these limited impacts, no shutdown or low power zones as defined in the <i>EPBC Policy Statement 2.1</i> are proposed for pinnipeds (i.e. no requirements for survey interruption based upon pinniped presence within certain buffer distances from the vessel). Measures adopted to mitigate acoustic impacts to pinnipeds as detailed in <i>EPBC Policy Statement 2.1</i> include:</p> <ul style="list-style-type: none"><li>• Use of <b>soft-start/ramp-up procedures</b> to displace sound sensitive species. This will not include pre start-up visual observation for 30minutes for pinnipeds before the commencement of soft-start/ramp-up procedures;</li><li>• During daylight hours the MMOs on the survey vessels will take visual observation of marine fauna (including pinnipeds); and</li><li>• Acoustic source/pinniped interaction will be reported in the Environmental Performance Close-out Report.</li></ul> <p>To clarify the EPO for Acoustic Impact Disturbances in <b>Section 5.5.1</b>, the following should be substituted for the existing EPO:</p> <table><tr><td>Environmental Hazard/ Aspect</td><td><i>Seismic Acquisition Acoustic Disturbance Impacts to Marine <b>Mammals</b></i></td></tr><tr><td>Environmental Performance Outcome</td><td><i>Soft-start procedures are utilised for <b>30minutes</b> during all array start-up activities to provide time for sound-sensitive species to relocate from the area prior to acquisition activities. Source power-down if whales are identified within 2km of the operating array and source shut-down occurs if within 500m of operating array.</i></td></tr><tr><td>Measurement Criteria</td><td><i>MMO Master Sheet records interactions <b>with all marine mammals within the observation zone</b>, and records indicate that <b>power-down and shut-down</b> conditions are met for the duration of the survey.</i></td></tr></table> <p>Lightning MSS <b>Section 5.5.2 (Vessel Operation)</b> and <b>Section 5.7.7 (Cetacean Collision)</b> also reference EPBC Regulations 2000 (Part 8) adopting control measures to prevent disturbance to, and collision with, cetaceans and dolphins. Recognising the threats which are outlined in the Recovery Plan for Sea Lions (<i>Neophoca cinerea</i>) with respect to vessel strikes, pollution, oil spills and cumulative impacts of human interactions to the species, support vessels will adopt constraints on vessel interaction detailed in the <i>EPBC Regulations 2000 (Part 8)</i> listed for dolphins, for pinnipeds. Bight considers the MSS survey vessel, as a slow moving and restricted manoeuvrability vessel with an operating array, does not present a significant collision risk to pinnipeds.</p>					Environmental Hazard/ Aspect	<i>Seismic Acquisition Acoustic Disturbance Impacts to Marine <b>Mammals</b></i>	Environmental Performance Outcome	<i>Soft-start procedures are utilised for <b>30minutes</b> during all array start-up activities to provide time for sound-sensitive species to relocate from the area prior to acquisition activities. Source power-down if whales are identified within 2km of the operating array and source shut-down occurs if within 500m of operating array.</i>	Measurement Criteria	<i>MMO Master Sheet records interactions <b>with all marine mammals within the observation zone</b>, and records indicate that <b>power-down and shut-down</b> conditions are met for the duration of the survey.</i>
Environmental Hazard/ Aspect	<i>Seismic Acquisition Acoustic Disturbance Impacts to Marine <b>Mammals</b></i>										
Environmental Performance Outcome	<i>Soft-start procedures are utilised for <b>30minutes</b> during all array start-up activities to provide time for sound-sensitive species to relocate from the area prior to acquisition activities. Source power-down if whales are identified within 2km of the operating array and source shut-down occurs if within 500m of operating array.</i>										
Measurement Criteria	<i>MMO Master Sheet records interactions <b>with all marine mammals within the observation zone</b>, and records indicate that <b>power-down and shut-down</b> conditions are met for the duration of the survey.</i>										

<sup>55</sup> Harris, R.E., Miller, G.W., Richardson W.J (2001) – Seal Responses to Airgun Sounds during Summer Seismic Surveys in the Alaskan Beaufort Sea, Marine Mammal Science, 17(4): 795-812 (October 2001)

Matter Number	Section of Submission	Environment Regulation	Further written information requested	Response from Titleholder	NOPSEMA Status (To be completed by NOPSEMA)
5	Accordingly, the controls table contained within <b>Section 5.5.2.2</b> (Vessel Operation) is modified as follows (changes are bolded):				
		Environmental Hazard/Aspect	<i>Vessel Operation – Sound Impacts to Marine Fauna</i>		
		Performance Outcome	<i>Vessel(s) propulsion systems meet Manufacturers Specifications with respect to sound emissions.</i>		
		Measurement Criteria	<i>PMS records verify vessel propulsion system operates to specification.</i>		
		Control Measure	Performance Standard	Measurement Criteria	
		Vessel propulsion systems undergo preventative maintenance and inspection	The vessel(s) propulsion systems are routinely maintained in accordance with manufacturer's specifications to maintain equipment performance with respect to lowest emitted sound levels.	Records indicate that the vessel's propulsion system is operating to specification.	
		All vessels to observe cetacean proximity distances/low speeds during transits in the operational area.	Vessel Masters observe speed restrictions and proximity distances as required in the EPBC Regulations 2000 (Chapter 8).	MMO Master Data Sheet verifies interaction between the MSS vessel and cetaceans comply with these requirements	
		Support vessels to observe pinniped proximity distances/ low speeds during transits in the operational area	Vessel Masters observe 'dolphin' speed restrictions and proximity distances as required in the EPBC Regulations 2000 (Chapter 8) for pinniped species.	Support/Chase Vessel Logs verify interactions between the vessel and cetaceans comply with these requirements.	
		Environmental Induction	All crew have completed an environmental induction covering the requirements for cetacean and pinniped/vessel interaction consistent with EPBC Regulations 2000 (Chapter 8) and are familiar with the requirements.	Support/Chase Vessel Logs verify interactions between the vessel and pinnipeds comply with these requirements	
				Induction records verify that all crews have completed an environmental induction.	
Also, the controls table contained within <b>Section 5.7.7.2</b> (Cetacean Collision) is modified as follows, and all references within <b>Section 5.7.7</b> relating to <i>cetacean controls</i> now refers to <i>cetacean and pinniped controls</i> :					
		Environmental Hazard/Aspect	<i>Marine Mammal Collision</i>		
		Performance Outcome	<i>No cetacean or pinniped injuries resulting from vessel collision.</i>		
		Measurement Criteria	<i>Incident records indicate there has been no cetacean or pinniped injuries resulting from vessel collision.</i>		
		Control Measure	Performance Standard	Measurement Criteria	
		Vessel Operations (All)	Vessel operations to conform to proximity distances, speeds and management measures contained in the EPBC Regulations 2000 (Chapter 8) for cetaceans when in the operational survey area.	MMO Master Data Sheet verifies interaction between the MSS vessel and cetaceans comply with these requirements.	
		Support Vessel Operations	Vessel Masters observe 'dolphin' speed restrictions and proximity distances as required in the EPBC Regulations 2000 (Chapter 8) for pinniped species.	Support/Chase Vessel Log verifies interactions between the vessel and cetaceans comply with these requirements.	
		Environmental Induction	All crew have completed an environmental induction covering the requirements for pinniped and cetacean/vessel interaction consistent with EPBC Regulations 2000 (Chapter 8) and are familiar with the requirements.	Support/Chase Vessel Logs verify interactions between the vessel and pinnipeds comply with these requirements	
				Induction records verify that all crews have completed an environmental induction.	

Matter Number	Section of Submission	Environment Regulation	Further written information requested	Response from Titleholder	NOPSEMA Status (To be completed by NOPSEMA)
5	Within <b>Section 6.6.1</b> (Emission/Discharge Monitoring, Quantification and Reporting) – <b>Table 6-2</b> , the following amendments are made:				
	Discharge/Incident		Parameters	Record	Responsibility
	Marine Fauna Interaction				
	Cetacean and Pinniped Sightings	Details required on the Whale and Dolphin Sighting Reports (DOE)		MMO Records	MMO
		Record of soft start commencements, shutdowns and visual checks undertaken before the commencement of arrays and actions taken if whale sightings within 2km of vessel during seismic acquisition		MMO Records	MMO
		Daily log of seismic acquisition by Party Manager		Daily Seismic Report	
	Spill/Release Incidents				
Whale and Pinniped Collision Incidents	Location, time, type of whale, expected injury Any response actions taken		Incident Records	MMOs/ Vessel Master(s)	
6	Section 5.5.2/5.7.7	Regulation 13(5)	Will EPBC Regulations 2000 (Part 8) be applied for managing survey and support vessel interactions with dolphins and porpoises? Will interactions be recorded? In responding to this point please note that: <ul style="list-style-type: none"><li>Details of the control measures (if any) that will be used to reduce impacts and risks to ALARP and acceptable should be supplied;</li><li>Impacts and risks must be demonstrated to be reduced to ALARP and acceptable levels;</li><li>The demonstration and selection of controls (if any) must be supported.</li></ul>	Bight Petroleum confirms for the Lightning MSS the requirements of EPBC Regulations 2000 (Part 8) will be adopted by both the MSS vessel and support vessel for interactions with dolphins and porpoises. Interactions with dolphins and porpoises will be recorded by MMOs present on <u>all survey vessels</u> within the Lightning MSS Operational area.  It is noted that references in <b>Section 5.5.2</b> (Vessel Operation) and <b>Section 5.7.7</b> (Cetacean Collision) to cetaceans are intended to capture both whale, dolphin and porpoise species. In <b>Section 5.7.7.1</b> where there is a reference to 'whales', it is intended that the EPBC Regulation 2000 (Part 8) apply to all cetaceans (whales, dolphins and porpoises).  On this basis, the control measures listed in both <b>Sections 5.5.2.2</b> and <b>5.7.7.2</b> are relevant to all cetaceans (including dolphins and porpoises); and the impact/risk ALARP and acceptability assessments provided in <b>Section 5.5.2.3</b> and <b>Section 5.7.7.3</b> are also directly applicable and relevant to dolphins and porpoises and should be read in this context.  Note that 'cetacean sightings' listed in <b>Table 6-2</b> (Section 6.6.1) applies to whales, dolphins and porpoises.  These control measures are implemented via the implementation strategy provided in <b>Section 6</b> of the Environment Plan.	



Matter Number	Section of Submission	Environment Regulation	Further written information requested	Response from Titleholder	NOPSEMA Status (To be completed by NOPSEMA)
7	Section 5.7.1	Regulation 13(5)	<p>What are the impacts and risks to tourism in the event of a spill?</p> <p>In responding to this point please note that:</p> <ul style="list-style-type: none"> <li>• Details of the control measures (if any) that will be used to reduce impacts and risks to ALARP and acceptable should be supplied;</li> <li>• Impacts and risks must be demonstrated to be reduced to ALARP and acceptable levels;</li> <li>• The demonstration and selection of controls (if any) must be supported.</li> </ul>	<i>Refer to Section Below.</i>	

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7	<p><b><i>What are the impacts and risks to tourism in the event of a spill?</i></b></p> <p>As provided in <b>Section 5.7.1.1 (Oil Spill due to Collision/Grounding/Hull Damage)</b>, <b>Figure 5-8</b> provides details of predicted visible (i.e. 0.5µm) surface oiling for a 300m<sup>3</sup> diesel spill originating from the closest survey point to both Kangaroo Island and the Eyre Peninsula (<i>scenario is considered worst case and highly conservative</i>). Visible oil is defined as the relevant threshold for potential amenity impacts to coastal tourism areas. <b>Figure 5-8</b> identifies that visual sheens are largely confined to Commonwealth marine areas, however there is a very low probability (1%<sup>56</sup>) of a visual sheen entering state waters around the Southern Neptune Islands Marine Park 3-5 days after the spill event, however no direct 'sheen' impact to land areas of the Southern Neptune islands is predicted. Additionally no visual sheens are expected within the state waters of the Northern Neptune Islands Group and no visual sheens are predicted within 15-20km of the western section of Kangaroo Island. As also identified in <b>Section 5.7.1</b>, in the presence of moderate winds (i.e. &gt;12knots) or breaking waves visible surface oil will entrain in the upper water column. <b>Figure 3-4</b> reflects that for the period March-May most wind regimes are in excess of 12knots and it is therefore extremely unlikely that sheens will be observed in proximity to the Southern Neptune coastal waters.</p> <p>An assessment of possible impacts and risk to regional tourism-related activities/values identified within <b>Section 3.5.2</b> and additional items identified in <b>Request for Further Information Item 1</b> follows:</p> <ul style="list-style-type: none"> <li>• <b>Recreational Beach Use (sightseeing, swimming, surfing and snorkelling) and diving (coastal areas):</b> Visual oil sheens are not predicted to impact on regional recreational beaches or diving areas as described in the EP <b>Section 3.5.2</b> or additional items identified in this request for further information. The Northern and Southern Neptune Islands both have rocky shorelines (no beaches). <i>Hence no recreational beach use tourism-related impacts predicted from a Lightning MSS oil spill.</i></li> <li>• <b>Diving (Heritage Trail):</b> Identified heritage diving areas are located outside areas which have a probability of visual oil sheens from a Lightning MSS oil spill. <i>No diving-related tourism impacts predicted from a Lightning MSS oil spill.</i></li> <li>• <b>Whale Watching Operations:</b> Lightning MSS activities occur outside the time window for whale watching (June-October) which is predominantly association with coastal Southern Right Whale aggregation. <i>No impacts expected to whale watching operations from oil spill expected.</i></li> <li>• <b>Charter boating (sightseeing, recreational fishing, diving, marine mammal watching):</b> As identified in <b>Section 3.5.2</b>, charter boats are concentrated around Port Adelaide, Kangaroo Island and the Eyre Peninsula. Charter vessels also utilise the waters surrounding the Northern Neptune Islands for ecotourism (white shark cage diving/pinniped observation) or over both island groups for recreational fishing<sup>57</sup>. As the visible oil sheen does not enter the Northern Neptune Group state waters, <i>no impacts to ecotourism activities are expected</i>. Visible oil sheens which enter the waters of the Southern Neptune Islands Group will be small, localised and temporary. It is expected that Charter fishermen present in the area would seek other fishing locations around the islands (suggest possibly on the leeward side not affected by sheen). <i>Negligible impacts to recreational fishing are anticipated. Given the likelihood of an oil spill occurring is very unlikely, the residual risk is assessed as low.</i> It is possible Deep Sea Charters may encounter oil sheens in open waters closer to the MSS area. It is considered with the availability of alternate charter locations, together with the small, localised and temporary extent of the visual sheen, impacts to Deep Sea Charters will be negligible; and given the likelihood of an oil spill occurring is very unlikely, the residual risk is assessed as low.</li> <li>• <b>Recreational boating (small inshore craft):</b> Recreational vessels (non-charter) are typically small, non-ocean going vessels and are not expected to be present in areas of visible oil sheen. <i>No impacts to recreational vessels are expected.</i></li> <li>• <b>Yacht Racing:</b> As yacht races are undertaken during periods outside the Lightning MSS time period, <i>no impacts to yacht racing events are expected from a Lightning MSS spill.</i></li> <li>• <b>Cruise Ships visiting Kangaroo Island:</b> Cruise vessels transiting to Kangaroo Island may transit through areas of visible sheen however the areal extent of the visible sheen will be small. Given the small temporary nature of the sheen, and as the cruise liner is located in shipping lanes where vessels are permitted to discharge oily bilge at 15ppm, it is expected that an observed sheen would have negligible impact to tourists on the vessel. On this basis the risk is assessed as low. Additionally, as the closest area of predicted sheen is located 15-20km from the western end of Kangaroo Island, and given the heavy vessel traffic (refer EP <b>Figure 3-17</b>) and associated discharges, it is considered that this negligible impact will <u>not be attributed to</u> Kangaroo Island tourism (real or perceived) . <i>The residual risk is assessed as low.</i></li> </ul>				

<sup>56</sup> Pers.Com L. Chapman and APASA 21/05/14

<sup>57</sup> Explore Australian, 2014-Neptune Islands available at <http://www.exploreaustralia.net.au/South-Australia/Eyre-Peninsula-and-Nullarbor/Lincoln-National-Park/Neptune-Islands/Fishing-spot>

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7	<ul style="list-style-type: none"> <li><u>Cage Diving with Great White Sharks (Northern Neptune Islands)</u>: As provided in <b>Request for Further Information Item 1</b>, anchorages for shark diving occur on the eastern coastlines of Northern Neptune Island (eastern area) in water depths of approximately 12-18m away from the prevailing westerly winds and swell. The western coastline is only suitable in summer during easterly wind regimes<sup>58 59</sup> (and calm seas) for these activities (i.e. outside the timeframe of the MSS survey). Given no oil sheens are predicted at the Northern Neptune Islands, <i>no impacts to diving activities are predicted from a Lightning MSS spill</i>. Transit to this location from Port Lincoln may result in sheen encounter by charter vessels. As before, however, given the sheen is small, temporary and located in shipping lanes to Port Lincoln where vessels are permitted to discharge oily bilge at 15ppm, it is expected that an observed sheen would have negligible impact to tourists present on the charter vessel. On this basis the risk to tourism is assessed as low.</li> </ul> <p>It is noted that a significant shipping lane lies to the north of the Lightning MSS area carrying larger vessels compared with the survey vessels in closer proximity to these coastal areas. Additionally it is expected these vessels operate on "less environmentally friendly" fuels (i.e. Heavy Fuel Oil), and are permitted to discharge treated bilge water at 15ppm which carries a higher impacts and risks to tourism values in the area.</p> <p><i>Details of the control measures (if any) that will be used to reduce impacts and risks to ALARP and acceptable should be supplied.</i></p> <p>Control measures as identified in <b>Section 5.7.1.2</b> will reduce impacts and risks to Deep Sea Charters and tourist charter vessels in proximity to the Neptune Islands which lie within the visible oil footprint of a Lightning MSS spill. Additionally Oil Pollution Emergency Plan requirements (refer <b>Section 8</b>) which include notification to AMSA, the South Australian DPTI, and Vessel Master broadcasts on VHF Channel 16, contribute to the notification of local vessels to avoid the spill area.</p> <p><i>Impacts and risks must be demonstrated to be reduced to ALARP and acceptable levels.</i></p> <p><b>Section 5.7.1.3</b> provides an evaluation of Lightning MSS oil spill impacts and risk reduction measures with respect to ALARP and "acceptable levels". Bight Petroleum considers that the information detailed above and within <b>Section 5.7.1</b> demonstrates that the residual impact and risk from oil spill to regional tourism activities are acceptable; and all possible practicable control measures have been adopted to bring the impact and risk to a level which is ALARP. On this basis, Bight Petroleum considers the above evaluation of the potential impacts and risks; and the control measures detailed in <b>Section 5.7.1</b> reduce impacts and risk to ALARP and acceptable levels; demonstrate ALARP and acceptability; and that the implementation methodology for those controls has been provided in the Lightning MSS EP (Rev 0).</p>				
8	Section 8	Regulation 14(8D)	Noting the described emergency response arrangements with AMSA relating to operational monitoring, further information is requested regarding what specific arrangements are proposed for monitoring impacts to the environment in the event that operational monitoring detects oil at levels, and in proximity to environmental features, that may cause an impact.	<i>Please refer to below</i>	

<sup>58</sup> Rodney Fox Shark Expeditions, 2014 available at <https://www.rodneyfox.com.au/index.php/selectedContent/21965891>

<sup>59</sup> Shark Cage Diving – Calypso Star Charters, 2014 available at <http://www.sharkcagediving.com.au/shark-tours/dive-locations/>

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8	<p>Operational monitoring details in <b>Section 8</b> relate to site specific site information (slick size, thickness) for the duration of the spill which is provided to AMSA by unaffected Lightning MSS vessels. The purpose of such information, at the direction of AMSA, is to inform the spill response options and determine when response termination conditions occur. In monitoring 'slick thicknesses' observations relating to air-breathing fauna (sea-birds, mammals, turtles) will also be noted. Each of the available MSS vessels has capability to perform such wildlife monitoring via the MMOs.</p> <p>In the event of a Tier 2 oil spill from Lightning MSS vessels, Bight Petroleum will monitor for oil impacts to environmental sensitivities and if oil is detected at levels which may cause environmental impact to the particular sensitivity (refer EP <b>Table 5-10</b>), undertake any additional scientific monitoring considered necessary (e.g. oiled wildlife (seabird and marine mega-fauna) and water quality). <i>Accordingly, references made within Table 5-10, relating to "no oil spill (scientific) monitoring, are removed from the table.</i> The Project Manager will be responsible for initiating such monitoring studies.</p> <p>Bight will utilise consultants which have a proven capability in performing these scientific studies to determine environmental impacts/remediation activities (e.g. GHD, Sinclair Knight Merz (SKM)). These consultants carry all required marine fauna experts, water sampling equipment and have standing agreements with NATA registered laboratories and courier services to ensure quality control aspects of monitoring are observed. Logistics support will be via existing MSS vessel/aviation contract suppliers.</p> <p>Accordingly the following amendments are made to the Lightning MSS EP:</p> <ul style="list-style-type: none"> <li>Under <b>Section 8.3.1.2 (Response Team Responsibilities)</b> the following statement shall be included under the Bight Emergency Management Team: In the event of a Tier 2 oil spill from Lightning MSS vessels, Bight Petroleum will monitor for oil impacts to environmental sensitivities and if oil is detected at levels which may cause environmental impact to the particular sensitivity (refer EP <b>Table 5-10</b>), undertake any additional scientific monitoring considered necessary (e.g. wildlife, water quality).</li> <li>Under <b>Section 6.3.1 (Bight Petroleum Roles &amp; Responsibilities)</b>, the following responsibility is added to the Bight Project Manager: <ul style="list-style-type: none"> <li>Necessary oil spill monitoring (operational and scientific) is undertaken during a Tier 2 oil spill.</li> </ul> </li> <li>Under <b>Section 6.6.1 (Emission/Discharge Monitoring, Quantification and Reporting)</b> the following statement is made: During an oil spill, operational monitoring at the direction of AMSA will be undertaken to determine the response actions (refer <b>Section 8</b>). In the event of a Tier 2 oil spill from Lightning MSS vessels, if oil is detected at levels which may cause environmental impact to environmental sensitivities, additional scientific monitoring (e.g. water quality, wildlife) as considered necessary will be undertaken.</li> </ul>				
9	Section 5.5.1 & Section 6.4	Regulation 13(5) and 14(5)	How is the passive acoustic monitoring going to be an effective control? Specifically what are the sensitivities of the system, how will the range distance of sounds be determined, at what distances and levels of sound detection will power downs and shut-downs occur, and what arrangements are in place to ensure employees or contractors have the appropriate competencies and training to effectively undertake the monitoring?	Refer to Information Below	



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9	<p><b><i>How is Passive Acoustic Monitoring (PAM) going to be effective?</i></b></p> <p>As described in EP Section 5.5.1.3, Bight Petroleum considers PAM, as a detection system for cetaceans, is less effective than visual observation. As provided in Section 5.5.1.3, Bight considers PAM technology to have limitations - it is reliant upon the cetacean vocalising; that the vocalisation has sufficient intensity for detection; and that bearing and range estimation with the current technology is limited. In response to stakeholder consultation the Lightning MSS will utilise PAM as a complementary control to mitigate impacts to Sperm Whales (and now beaked, killer and pilot whales) that might be present in the survey area. These aspects are discussed in the assessment of options in Section 5.5.1.3 to support ALARP.</p> <p><b><i>What is the sensitivity of the System?</i></b></p> <p>As provided in the Consultation Records, s 22 - consultation record excluded by agreement</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>It is important to note that these are the minimum requirements of the PAM system will be included in the System Specification for procurement.</p> <p>Additionally, sensitivity of distance detection varies based upon the environmental conditions present in the survey area. As an example, for non-seismic operations, Zimmer<sup>60</sup> found detection of Cuvier's beaked whale to be range limited as a result of attenuation of the whale's ultrasonic sounds (9.5dB/km at 40kHz). In good environmental conditions, it was considered possible to detect acoustic behaviour of the whales with near certainty up to 1km, but detection ranges beyond 5km were very unlikely and required extremely low ambient noise or special conditions in sound propagation. Detection distances will therefore vary depending upon environmental conditions. Adjustment of PAM hydrophone cable depths and distances from the MSS vessel will be undertaken in the field to maximise detection.</p> <p><b><i>How will the range distance of sounds be determined?</i></b></p> <p>PAM systems utilise multi-hydrophone arrays to range and triangulate sound sources. In principle this relies on a time-difference of arrival (TDOA) of a call (or call sequence) on pairs of hydrophones. Two call detections will be used to determine the presence and location of the target species. During daylight hours, on the first acoustic detection a visual detection will also be sought from the MMO to both confirm and calibrate the PAM.</p> <p><b><i>At what distances and levels of sound detection will power downs and shut-downs occur?</i></b></p> <p>As indicated in EP (Section 5.5.1.1) and consistent with visual observations, a 500m shut-down zone and 2000m low-power zone will be adopted for this survey activity with respect to PAM detections. These shutdown distances will not apply to confirmed dolphin species.</p> <p>The PAM operator will assess acoustic detections and apply these response distances.</p>				

<sup>60</sup> Zimmer, W.M X (2014) – Range Estimation of Cetaceans with Compact Volumetric Arrays, Reprint, Originally published in the Journal of Acoustical Society of America, Vol. 134, No 3, 2013 pp. 2610-2618

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	<p><b><i>What arrangements are in place to ensure employees or contractors have the appropriate competencies and training to effectively undertake the monitoring?</i></b></p> <p>Two qualified PAM operators, separate to the MMOs, will be present on the vessel to allow for 24hour detection of species. PAM operators will have the appropriate competencies and training as reflected in the New Zealand Department of Conservation “<i>2013 Code of Conduct for Minimising Acoustic Disturbance to Marine Mammals from Seismic Survey Operations</i>” (or equivalent). This includes successfully completing a course and demonstrating competency consistent with the standards in the above Code; and having logged a minimum of 12 weeks relevant sea-time in marine seismic surveys as a PAM Operator.</p> <p>Accordingly, the following performance standard is nominated for this control measure (to be included in <b>Section 5.5.1.2</b>):</p> <table><tr><th>Control Measure</th><th>Performance Standard</th><th>Measurement Criteria</th></tr><tr><td rowspan="3">PAM Observations will be undertaken for Sperm, Killer, Beaked and Pilot Whales on a 24hour basis</td><td rowspan="3">Two competent and experienced PAM Operators will be engaged for the survey to monitor for whales on-board the MSS vessels while acquiring seismic data.</td><td>MSS Vessel POB listing identifies two PAM Operators on-board to undertake PAM observations.</td></tr><tr><td>Records (CV) verify the PAM operators are competent to a standard equivalent to those in <i>2013 Code of Conduct for Minimising Acoustic Disturbance to Marine Mammals from Seismic Survey Operations</i> and have 12 weeks sea-time experience as a PAM operator.</td></tr><tr><td>PAM Master Sheet provides acoustic detection record for the survey.</td></tr><tr><td>PAM System provides for the detection of Sperm, Killer, Beaked and Pilot Whales</td><td>PAM procurement specification will ensure the system is cable of detecting relevant call ‘frequencies’ of species.</td><td>Tender documents verify that a PAM system meeting specification requirements is selected.</td></tr></table>					Control Measure	Performance Standard	Measurement Criteria	PAM Observations will be undertaken for Sperm, Killer, Beaked and Pilot Whales on a 24hour basis	Two competent and experienced PAM Operators will be engaged for the survey to monitor for whales on-board the MSS vessels while acquiring seismic data.	MSS Vessel POB listing identifies two PAM Operators on-board to undertake PAM observations.	Records (CV) verify the PAM operators are competent to a standard equivalent to those in <i>2013 Code of Conduct for Minimising Acoustic Disturbance to Marine Mammals from Seismic Survey Operations</i> and have 12 weeks sea-time experience as a PAM operator.	PAM Master Sheet provides acoustic detection record for the survey.	PAM System provides for the detection of Sperm, Killer, Beaked and Pilot Whales	PAM procurement specification will ensure the system is cable of detecting relevant call ‘frequencies’ of species.	Tender documents verify that a PAM system meeting specification requirements is selected.
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		PAM Master Sheet provides acoustic detection record for the survey.														
PAM System provides for the detection of Sperm, Killer, Beaked and Pilot Whales	PAM procurement specification will ensure the system is cable of detecting relevant call ‘frequencies’ of species.	Tender documents verify that a PAM system meeting specification requirements is selected.														
10	Section 2.1	Regulation 15	What is Bight Petroleum Pty Ltd ACN?	143 444 106												
11	Appendix C	Regulation 16(b)	Further information is requested on consultation undertaken in the course of preparing the environment plan. Specifically, further information to support an assessment of merits of the objections and claims about adverse impacts of the activity made by the following relevant persons. [REDACTED]	Refer to Information below												



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11	<p><b>Possible Impacts to Cephalopods:</b></p> <p><i>Pathological Impacts:</i> Norris and Møhl (1983)<sup>61</sup> identified a short term tolerance of sound levels to 260dB re 1µPa by one species but lethal effects at levels of 246-252dB re 1µPa for another. Further work was recommended to confirm these levels however these results would suggest that squid might be killed within a few meters of individual, large airguns.</p> <p>Andre et al (2010), in experiments conducted over a period of two (2) years on caged adult cephalopod species exposed to low frequency sound<sup>62</sup> (157-175dB re 1µPa), identified lesions on statocysts<sup>63</sup> within the species became more pronounced with increased exposure (12 to 96hrs). Andre (2012)<sup>64</sup> has identified that there were limitations with this study with respect to MSS activity in that:</p> <ul style="list-style-type: none"> <li>• The animals were caged in a small tank and unable to move away; and</li> <li>• The nature of the sound exposure is different compared with seismic impulses.</li> </ul> <p>SCAR (2012) acknowledges the controlled exposure experiments using squid have observed damage to organs responsible for hearing, sense of balance and orientation. While the study demonstrates the possibility of damage to animals, the experimental conditions have no analogy in the Southern Ocean.</p> <p><i>Behavioural Impacts:</i> Studies into squid reaction to airgun sound is limited. McCauley <i>et al.</i>, (2000)<sup>65</sup> assessed the effects of air gun noise on caged squid (<i>Sepioteuthis australis</i>). In the first trial, several squid showed alarm responses at 156-161dB re 1 µPa<sub>rms</sub> and a strong startled response to the start-up of a nearby air-gun by firing their ink sacs and/or jetting away from the source (at received level 174dB re 1µPa<sub>rms</sub>). During this trial the squid showed avoidance to the air-gun by keeping close to the water surface at the end of the cage furthest from the airgun (within the sound shadow at surface). During trials with a ramped start-up approach (rather than near-by sudden start-up), the strong startle response was not seen but there were increased alarm responses once the gun level exceeded 156-161dB re 1µPa<sub>rms</sub>. No avoidance was observed but there was a trend for the squid to increase their swimming speed on air-gun approach but then to slow at the closest approach and remain close to the water surface during the operation. The responses seen in the cages suggest that behavioural changes and avoidance to an operating air-gun would occur at some range. Hence it is probable that seismic operations at distances of 2-5km would impact upon squid (displace) at an expected exposure threshold of approximately 161dB re 1µPa<sub>rms</sub> based upon available literature.</p> <p>Hirst &amp; Rodhouse (2000)<sup>66</sup> found no change in squid catch (trawling) in an area exposed to &lt;149dB re 1µPa (a distance of approximately 1.35km to the source). The observed alarm response suggest that squid would likely move outside the lethal range of a sound source.</p> <p>Cephalopods respond to acoustic sound within the marine environment. Given the control measures adopted for cetaceans (e.g. soft-starts) temporary and localised cephalopod displacement from areas where seismic acquisition is occurring is probable. As the species is wide-spread across the continental shelf this small, temporary displacement is considered negligible (i.e. low residual risk). Higher trophic levels dependent on cephalopods as a food source (Sperm Whales, Dolphins, Fur Seals and Killer Whales), if present in the MSS area, would also be temporarily displaced on a localised basis, however it should be noted that most of these predator species are opportunistic with alternate prey species.</p> <p>Accordingly temporary localized displacement of the species and its predators (i.e. Sperm Whale) during the MSS is possible, however Bight considers that this should not result in permanent habitat modification and, given predator species are opportunistic is expected to have a negligible impact. The residual risk is assessed as low.</p>				

<sup>61</sup> (Cited in )SCAR 2012 Anthropogenic Sound in the Southern Ocean: an update. Antarctic treaty consultative meeting XXXV Hobart 2012

<sup>62</sup> This is attributable to shipping, offshore industry, naval manoeuvres.

<sup>63</sup> These are structures assisting the species to maintain balance and position.

<sup>64</sup> André, M., Solé, M., Lenoir, M., Durfort, M., Quero, C., Mas, A., Lombarte, A., van der Schaar, M., López-Bejar, M., Morell, M., Zaugg, S. and Houégnigan, L., 2011. Low-frequency sounds induce acoustic trauma in cephalopods. *Frontiers in Ecology and Environment*, 9, 489-493.

<sup>65</sup> McCauley, R.D, Fewtrell, J., Duncan, A J., Jenner, C., Jenner, M-N., Penrose, J.D., Prince, R.I.T., Adhitya, A., Murdoch, J., and McCabe, K., 2000, *Marine Seismic Surveys- A Study of Environmental Implications*, APPEA Journal, pp 692-708

<sup>66</sup> Cited in SCAR 2012 Anthropogenic Sound in the Southern Ocean: an update. Antarctic treaty consultative meeting XXXV Hobart 2012

Matter Number	Section of Submission	Environment Regulation	Further written information requested	Response from Titleholder	NOPSEMA Status (To be completed by NOPSEMA)
11	Appendix C	Regulation 16(b)	Further information is requested on consultation undertaken in the course of preparing the environment plan. Specifically, further information to support an assessment of merits of the objections and claims about adverse impacts of the activity made by the following relevant persons. [REDACTED]	Refer to Section Below	
11	<p><b><i>The secretariats of international conventions (e.g. JAMBA, CMS) are 'relevant persons' and should be consulted with:</i></b></p> <p>The OPGSER Section 11A (1) (d) defines a "relevant person" as "a person or organisation whose functions, interests or activities may be affected by the activities to be carried out under the environment plan". Bright is obliged to undertake all petroleum activities in accordance with Commonwealth legislation; and, in accordance with the OPGSER S11A, must provide sufficient information to a relevant person to allow the person to make an informed assessment and provide a reasonable period of time for the consultation. Two EPBC Referral processes involving activity information which has been publically issued is considered to be sufficient information and a reasonable period of time for all relevant parties to provide comment on the proposed activity. Additionally, Commonwealth legislation implements the requirements of international conventions and inter-country agreements to which Australia is a signatory and accordingly all petroleum activities are assessed, and undertaken, in accordance with approvals which meet international obligation requirements. The content of international agreements, between the Australian and other Governments, provide high level principles which are legally implemented through Australian legislation such as the EPBC Act 1999 and, applications made under that legislation, are functionally assessed against agreed criteria by Australian regulators administering the legislation (now NOPSEMA).</p> <p>Bright Petroleum does not consider its role is to consult on behalf of the Australian Government with international Governments or Convention Secretariats [REDACTED] s 22 consultation record excluded by agreement [REDACTED]). Bright believes the constructive point of consultation is with the respective Australian Government authorities responsible for the implementation of these agreements/conventions. It is considered that the relevant Australia Government authority, understanding the context and requirements of the International obligation within Australia, are appropriate to consult and resolve issues within the context of these international conventions and agreements.</p> <p>Bright believes that appropriate consultation with respective Australian and State Governments ("relevant persons" with regard to international conventions) has occurred for the Lightning MSS activity and no escalation to international convention secretariats is warranted.</p>				

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11	<p><i>The actual exposure to (numbers of and duration of) shots is modelled and made available for comments. Further to discussions on 14<sup>th</sup> June 2012 requests are also made for:</i></p> <ul style="list-style-type: none"> <li> <p><b>Actual dB re 1µPa<sup>2</sup>.s and frequencies used across a staggered array cycle;</b></p> <p>The <i>Sound Exposure Modelling for the Bight 3D seismic survey in the eastern Great Australian Bight</i>, South Australia (CMST Report C2012-36) contained in the <i>Bight Petroleum Public Report – Response to Request for Additional Information EPBC Referral 2013-6770</i>, was modelled by the Curtin University Centre for Marine Science and Technology, recognised experts in acoustic modelling in Australia, to address sound propagation and attenuation in the region. Figure 2 within this report provides the spectral density of the pulse according to frequency. The density is approximately 220dB re 1µPa<sup>2</sup>.s/Hz between 8-80Hz and then tapers to just under 200dB re 1µPa<sup>2</sup>.s/Hz at 200Hz and approximately 170dB re 1µPa<sup>2</sup>.s/Hz at 1000Hz. The numeric values for spectral density (i.e. dB re 1µPa<sup>2</sup>.s/Hz) are lower than the SEL value (dB re 1µPa<sup>2</sup>.s) which is the integrated spectral frequency across the whole cycle. The SEL values are therefore dominated by the spectral densities between 8-80Hz.</p> <p><i>This report was provided as part of the EPBC Referral for MWN review.</i></p> </li> <li> <p><b>Number of array cycles/per minute/s;</b></p> <p>Preliminary information, based upon the level of detail available to date, was provided in the EPBC Referral. This references a source array operating at intervals of approximately 11seconds. Hence arrays will undertake approximately 5.5 array cycles per minute. <i>Bight is uncertain what this information is used for.</i></p> </li> <li> <p><b>Operating envelope of sound pressure levels and frequencies at different depths and water temperatures;</b></p> <p>Modelling has been performed using SELs using the appropriate sound speed/water depths profiles for the area (dependent on temperature, salinity and depth (pressure)). Figures 13-19 within the CSMT Report provide the acoustic SEL footprints according to water depth.</p> <p><i>This report was provided as part of the EPBC Referral.</i></p> </li> <li> <p><b>Specifications (including age) of the equipment to be used;</b></p> <p>Broad specifications on the Lightning MSS equipment to be used were provided in both the EPBC Referral and Information to Stakeholder Letter. Further detail cannot be provided until specifications for procurement of the equipment is developed, however the broad information is considered adequate and sufficient for the stage of the project</p> </li> <li> <p><b>Name of the vessel conducting the survey.</b></p> <p>At the time of writing the EPBC Referral and Lightning MSS Environment Plan, vessel selection had not occurred. This activity will not occur until regulatory approvals have been obtained and cannot be provided.</p> <p><i>Bight believes all available accurate information has been provided to MWN within existing documentation released in the public domain. Releasing information which is not yet determined (i.e. vessel name) is not considered constructive.</i></p> <p><b>Suggestions for visual monitoring of species other than cetaceans.</b></p> <p>As identified in <b>Request for Further Information Items 5, 6 and 8</b> visual monitoring will be undertaken for species other than cetaceans (whales). Additional species will include dolphins, porpoises, pinnipeds and during oil spills wildlife which could be affected by surface oil (seabirds, pinnipeds, whales, dolphins, porpoises).</p> <p>The MMOs primary objective on all survey vessels is to protect air-breathing marine fauna from acoustic impacts or vessel collision through agreed control provisions. Increasing visual monitoring to capture marine birds or fish/shark species (for example) would serve to diminish attention on their primary objective and may compromise implementation of these primary control provisions. <i>Bight believes visual monitoring has been adopted within the Lightning MSS on an "as far as practicable" basis.</i></p> </li> </ul>				



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11	Appendix C	Regulation 16(b)	<p>Further information is requested on consultation undertaken in the course of preparing the environment plan. Specifically, further information to support an assessment of merits of the objections and claims about adverse impacts of the activity made by the following relevant persons.</p> <p>[REDACTED]</p> <ul style="list-style-type: none"><li>• <i>The suggested use of ramp-up/soft-start protocols for all EPBC-listed species (not just cetaceans).</i></li></ul>	<i>Refer Section Below</i>	
11	<p>EPBC-listed species within the Lightning MSS include whales, dolphins, pinnipeds, sharks, marine sea-birds, and turtles. In accordance with <i>EPBC Policy Guideline 2.1 (A3.2)</i>, commencing ramp-up/ soft-start protocols relies on visual observation for 30minutes with <u>no whales</u> sighted within the low-power and shut-down zone before ramp-up can commence. Adoption of <u>visual</u> observation for some EPBC-listed species such as sharks/fish is not a practical control; and for bird species is not warranted as their exposure to acoustic impacts at the sea surface is minimal.</p> <p>Notwithstanding this, the actual protocol of ramp-up/soft-start of the acoustic array over 30 minutes is considered <u>extremely important</u> in warning, and allowing displacement of, all sound-sensitive species from the MSS area.. Adopting of ramp-up/soft start procedures are considered critical in preventing impacts to <u>all sound sensitive species</u> (not just EPBC-listed species) and will be adopted for all array start-ups during the Lightning MSS. <i>Bight considers that the use of ramp-up/soft-start protocols has been assessed and adopted, as far as possible for the Lightning MSS.</i></p>				
11	Appendix C	Regulation 16(b)	<p>Further information is requested on consultation undertaken in the course of preparing the environment plan. Specifically, further information to support an assessment of merits of the objections and claims about adverse impacts of the activity made by the following relevant persons.</p> <p>[REDACTED]</p> <ul style="list-style-type: none"><li>• <i>Cumulative seismic survey impacts;</i></li><li>• <i>Other cumulative impacts (e.g. ship noise masking).</i></li></ul>	<i>Please see section below</i>	

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11	<p><b>Cumulative Seismic Impacts</b></p> <p>Exploration in the Bight Basin is increasing and other surveys have recently occurred further west of Bight's permits, and another is scheduled, and will most likely extend into the same 2015 timeframe as the Bight Petroleum Lightning MSS activity. A survey approved under EPBC Referral 2013/7020 is being conducted from 1 October 2014 to 30 June 2015 (in addition to the first phase of the survey being approved for the period 1 January 2014 to 30 June 2014). This period overlaps with Bight Petroleum's proposed period in 2015 from March 1 to May 30. Consideration of cumulative impacts from the proposed simultaneous survey activities in the Bight Basin (which are separated by 120km) are as follows:</p> <ul style="list-style-type: none"> <li>Given the distances involved between the two survey activities, residual sound arriving in the Lightning MSS area from the adjacent survey will be at ambient sound levels and not considered to contribute any additional sound impacts to the sound generated by the Lightning MSS activities. Additionally as the Lightning MSS is limited in timeframe, the area will quickly return to background levels of sound (e.g. routine ship sounds ~190dB re 1µPa);</li> <li>In other areas of the world where seismic exploration activity occurs at greater frequencies and in closer proximity to each other (i.e. Gulf of Mexico, North Sea or North West Shelf), "time-sharing" occurs (generally when the surveys are within 40km of each other depending upon transmission losses in the area) so the seismic signals from one survey area do not impact on data collected from the other survey. This is because the returning signals of interest in a survey (i.e. signals which have travelled through the seabed and reflected from geological horizons) are not significantly greater than ambient sound levels in the ocean. Often, returning signals could be at or below ambient sound levels in some sea conditions and this often triggers weather standby in survey activities. On the basis that sound level interference between two seismic surveys is considered unacceptable (due to quality of the seismic data) at lower sound levels than those established to impact on marine life, it is considered that cumulative sound impacts to marine species from adjacent survey activities is not significant (i.e. negligible).</li> </ul> <p><i>Given these technical constraints with respect to data acquisition objectives and the self-imposed industry "proximity" distances between adjacent seismic surveys, Bight considers any additional environmental impacts from cumulative seismic impacts as a result of adjacent survey activities is negligible and very unlikely. The residual risk is assessed as low.</i></p> <p><b>Other Cumulative Impacts (e.g. ship noise masking)</b> [Consultation Record Context: Other cumulative impacts such as increased noise pollution from seismic, which could potentially increase the risk of ship strikes, also appear to have not even been considered. Given the freight routes through the proposed survey area and the possible masking of other noises such as oncoming freight vessels it is essential that these risks be assessed.]</p> <p>Given the current science available, it is not possible to rigorously assess for biological masking from seismic sources or shipping. It is known that background noise can reduce an animal's ability to detect certain sounds by masking, however this will only occur if the sound is close in frequency and source level to compete with the species call sign (i.e. very similar). Literature indicates that signals which are structured, stereotyped and repeated will be less susceptible to masking<sup>67</sup>. Air guns are considered in this category whereby masking is actually only present for a short period of time and the airgun sounds are pulsed with relatively long quiet periods in the inter-pulse period. In the case of MSSs the airgun sound is received for a short period (&lt;1s) with sound pulses separated by at least several seconds of relative silence<sup>68</sup>.</p> <p>Seismic sound is an impulsive broadband sound present at frequencies below 250Hz (strongest energy in the range 10-120Hz) with an acoustic decay curve which identifies a SEL of 160dB re 1µPa<sup>2</sup>.s (~190dB re 1µPa) at 1700m and 140dB re 1µPa<sup>2</sup>.s (~170dB re 1µPa) between 7km (shelf) and 20km (slope) (refer Figure 5-1). Vessel noise is more tonal (10-50Hz) and is considered to contribute more to masking with continuous sound from shipping in the area at ~180-195dB re 1µPa for larger vessels; 165-180dB re 1µPa for medium vessels<sup>69</sup>. Both sound sources overlap the call frequencies of Baleen whale (e.g. Blue whales call at frequencies of 10-25Hz with source levels of up to 190dB re 1µPa) and these external sound sources may mask (interfere) with sounds of interest to the species. Masking potentially covers up biologically important sounds used for finding prey, identifying predators, courtship or group cohesion, navigational aid and calls between mothers and calves. Mammals have shown some adaption to enable them to minimise the impacts of masking (e.g. increasing call source or alter frequencies).</p> <p>The amount a sound signal must exceed the background noise in order to be audible is termed the Critical Ratio (CR). CRs can be determined by presenting a tone to a test animal while background white noise is present. A CR of a 20dB at a particular frequency means the tone must have a level of at least 100dB re 1µPa to be heard over white noise with a spectrum of 80dB re 1µPa<sup>2</sup>/Hz<sup>70</sup>. CRs tend to increase with increasing frequency other than at quite low frequencies. For example, in bottlenose dolphins a pure tone signal at 6kHz has to exceed spectrum noise by 22dB to be detected and a 70kHz tone had to exceed a spectrum noise level by approximately 40dB; a beluga had CRs of approximately 18dB below 2kHz and increased with frequency (~25dB at 10kHz); a harbour seal at 100Hz measured had a CR of 16dB;<sup>71</sup> and Californian Sea Lion at 500Hz of 20dB<sup>72</sup>. No literature can be found with regard to CRs for Baleen whale species. Adopting the most conservative low frequency CR identified, it is estimated that background noise levels (i.e. including residual acoustic sound levels) would need to be less than approximately 172dB re 1µPa to allow for Baleen whales to communicate and detect prey.</p>				

Matter Number	Section of Submission	Environment Regulation	Further written information requested	Response from Titleholder	NOPSEMA Status (To be completed by NOPSEMA)
11	As identified in <b>Section 5.7.1.1</b> , MSS vessels maintain a distance between the hydrophone receptors and surrounding third party ships to limit sound interference within the data collected. The distances maintained are typically 15-20km (dependent on survey vessel or commercial vessel deviation). Given the impulsive, intermittent sound signature of the airguns; and the buffer distances maintained between the MSS vessel and third party vessels, it is considered that (a) baleen whale calls will not be masked by the air-gun pulses due to their intermittent nature with long silence periods; and (b) for areas surrounding the MSS vessel where some auditory interference might (on a conservative basis) occur (~7-20km from <b>Figure 5-1</b> ) third party vessels are unlikely to be present. <i>On this basis, Bight considers that there is negligible increased risk due to acoustic masking, of third party vessel strikes to cetaceans. Note also survey vessels operating within this 15-20km radius have active MMO surveillance to prevent such incidents.</i>				
11	Appendix C	Regulation 16(b)	<p>Further information is requested on consultation undertaken in the course of preparing the environment plan. Specifically, further information to support an assessment of merits of the objections and claims about adverse impacts of the activity made by the following relevant persons.</p> <p>[REDACTED]</p> <ul style="list-style-type: none"> <li>• <i>Not being consulted regarding new dates, detail and information;</i></li> <li>• <i>Potential deterrence of migrating whales to key habitats.</i></li> </ul>	<i>Refer to Section Detail below</i>	

<sup>67</sup> Gordon, J. Gillespie, D., Potter, J., Frantzis, A., Simmonds, MP, Swift, R., & Thompson, D. (2004) – A Review of the Effects of Seismic Surveys on Marine Mammals, Marine Technology Society Journal, Volume 37, No 4 Winter 2003/2004

<sup>68</sup> National Science Foundation (2010) – Appendix E: Review of the Effects of seismic and Oceanographic Sonar Sounds on Marine Mammals available at [https://www.nsf.gov/geo/oce/envcomp/peis\\_marine\\_seismic\\_research/appendix\\_e-effects\\_of\\_seismic\\_%2B\\_sonar\\_on\\_mammam.pdf](https://www.nsf.gov/geo/oce/envcomp/peis_marine_seismic_research/appendix_e-effects_of_seismic_%2B_sonar_on_mammam.pdf)

<sup>69</sup> UNEP, 2012 – Scientific Synthesis on the Impacts of Underwater Noise on Marine and Coastal Biodiversity Habitats, Convention of Biological Diversity, Subsidiary Body on Scientific, Technical and Technological Advice, 16<sup>th</sup> Meeting, Montreal, 2012

<sup>70</sup> Richardson, W R., Greene, C R. Malme, C.I. & Thomson, D.H (1995) – Marine Mammals and Noise, Academic Press

<sup>71</sup> Richardson, W R., Greene, C R. Malme, C.I. & Thomson, D.H (1995) – Marine Mammals and Noise, Academic Press

<sup>72</sup> Southall, B L., Schusterman, R J. & Kastak, D. (2000) – Masking in three pinnipeds: Underwater low frequency critical ratios, J. Acoust. Soc. Am 108 (3), Pt 1, Sep 2000

Matter Number	Section of Submission	Environment Regulation	Further written information requested	Response from Titleholder	NOPSEMA Status (To be completed by NOPSEMA)
11	<p><b>Consultation on Dates, Detail and Information:</b></p> <p>Bight considers that the information provided to s 22 - consultation record excluded by agreement [REDACTED] (as evidenced in consultation records – Record 9 and Record 30).</p> <p>[REDACTED]</p> <p><b>Deterrence of migrating whales to key habitats:</b></p> <p>Bight Petroleum has identified Sleaford Bay located on the Eyre Peninsula (85km north of the northern edge of the MSS boundary) as a small calving area (biologically significant) for the Southern Right Whale. The proposed timing of the Lightning MSS (March to May) has minor overlap (late May) when the species can be present at the coastline. Migration routes are unknown however it is likely that the majority of individual whales make direct approaches to the coast, as the relative infrequency of sightings outside major calving areas is not consistent with a widely used near-shore migratory pathway. The species are generally thought to be solitary during migration or accompanied by a calf and typically travel between 2.7-4.2km/hr. (65-100km per day)<sup>73</sup>.</p> <p>As reflected in EP Section 5.5.1, behavioural responses in Baleen Whales to acoustic sources range from tolerance (low levels) to shifts in respiratory and diving patterns (higher levels). McCauley observed stand-off behaviour in migrating Humpback whales at received sound levels of 157-164dB re 1µPa (rms) (~143-153dB re 1µPa<sup>2</sup>.s). Based upon the acoustic decay curve in Figure 5-1, predicted avoidance distances around the survey vessel may range from 4km (in shelf area with increased levels of attenuation) to 10km (deeper off-shelf areas). As the Lightning MSS area is located in open ocean waters, while minor deviations in migration pathway might be experienced by the species, there are no areas where sound impacts would restrict migration, impede access or deter species from Sleaford Bay (i.e. acoustic sound footprint does not block available corridors to Sleaford Bay). The possible deviation around the survey vessel is considered negligible given the distances the species travels from southern ocean feeding grounds which are located between 40-65°S (~1000-3500km). As Southern Right Whale encounter is possible in low numbers during late May, the associated residual risk to the species is conservatively assessed as low. Sleaford Bay is recognised as an <u>emerging</u> area of potential importance (breeding) to the south-eastern population<sup>74</sup>. The presence of a shipping channel located to the north of the MSS area and in closer proximity to Sleaford Bay, operating on an annual basis is also expected to create similar localised deviation in migrating species. <i>Bight considers that this aspect has been considered and minimised impacts to as low as practicable through the selected time period nominated for the survey.</i></p>				

<sup>73</sup> SPRAT Database (2014) – *Eubalaena australis* – Southern Right Whale available at [http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon\\_id=40](http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=40)

<sup>74</sup> SEWPC (2012) - Conservation Management Plan for the Southern Right Whale – A Recovery Plan under the Environment Protection and Biodiversity Act 1999 2011-2021 available at <http://www.environment.gov.au/system/files/resources/4b8c7f35-e132-401c-85be-6a34c61471dc/files/e-australis-2011-2021.pdf>

Matter Number	Section of Submission	Environment Regulation	Further written information requested	Response from Titleholder	NOPSEMA Status (To be completed by NOPSEMA)
11	Appendix C	Regulation 16(b)	<p>Further information is requested on consultation undertaken in the course of preparing the environment plan. Specifically, further information to support an assessment of merits of the objections and claims about adverse impacts of the activity made by the following relevant persons.</p> <p>[REDACTED]</p> <ul style="list-style-type: none"> <li>• <i>Timing of Upwelling should be considered.</i></li> </ul>	<p>Bight Petroleum, as identified in <b>Request for Information (Item 2)</b> has assessed all possible survey timeframes to establish a suitable period which minimises environmental impacts. Key to this assessment was the timing of the Kangaroo Island Upwelling, its high productivity and the high encounter rate of species attracted to the area during those upwelling events.</p> <p>The original period (January to May 17) was accordingly modified to April-June however due to sensitivities with the presence of the Southern Right Whale the period of March to May was identified. This window, recognising Southern Right Whale constraints, was determined to be the optimum solution. While there is still a small possibility for upwelling to occur during March to May, upwelling favourable winds are dramatically reduced during this period.</p> <p><i>Bight considers that this advice has been observed and incorporated into the MSS planning.</i></p>	
12	Appendix C	Regulation 16(b)	<p>Further information is requested regarding the consultation undertaken to demonstrate that an appropriate assessment of merits of objections and claims about adverse impacts of the activity has been made by Bight Petroleum Pty Ltd.</p> <p>[REDACTED]</p> <p>[REDACTED]</p>	<p><i>Refer to information provided below.</i></p>	

Matter Number	Section of Submission	Environment Regulation	Further written information requested	Response from Titleholder	NOPSEMA Status (To be completed by NOPSEMA)
12			<p>Bight confirms the following with respect to values/sensitivity statements provided in the Response to Public Comments regarding EPBC Referral 2013/6770:</p> <ul style="list-style-type: none"> <li>The survey activity is not expected to have any impacts to coastal recreational fishing (defined and interpreted as inshore fishing which occur in coastal craft). There is a very low likelihood of a negligible impact associated with charter fishing around the South Neptune Group Islands (as a result of oil spill sheens) ; and</li> <li>The survey activity is not expected to have any impacts on eco-tourism activities on Kangaroo Island. Bight defines and interprets eco-tourism from consultation as activities which relate to <i>visiting undisturbed natural areas of conservation significance or interest to build environmental awareness and includes activities such as whale watching, Sea Lion/Fur Seal watching/swimming, Caged Shark Diving, Swimming with Tuna, etc.</i> Cruise liners en-route to Kangaroo Island may transit through small oil sheens distant from the western coastline of the island. Cruise liners are present in shipping lanes where vessels are permitted to discharge oily bilge at 15ppm. While it is very unlikely that tourists on-board the vessel would notice such a small spill, if it is noticed, it is considered the incident would be attributed to the open sea travel and not Kangaroo Island. Tourism impacts to the 'region' would be negligible.</li> </ul> <p>Within the Lightning MSS EP <b>Section 5.4.4 (Disruption to Tourism Activities)</b>, the section discusses the regional tourism activities within the context of survey vessel presence and displacement of tourism as a result of activities within the permit area. Within this section an assessment is made regarding Deep-sea Charter Vessels, which based conservatively on information provided in the SW Bioregional Plan, identified low levels of "fish catch" in the area (considered to be charter game fishing 'included' under the recreational grouping). Again conservatively, possible displacement of these vessels from the survey area was assessed as having a minor consequence and considered very unlikely with a resultant residual environmental/social risk of low. Bight would like to clarify that within <b>Section 5.4.4</b>, deep-sea Charter Vessels which might be present in the MSS area should not have been termed "recreational fishing" as we believe stakeholders refer to non-commercial fishing activities located much closer to coastlines as recreational fishing. On this basis, terminology within <b>Section 5.4.4.2</b> and <b>Section 5.4.4.3</b> relating to "recreational fishing" or "recreational fishing vessels" should be read as, and substituted by, "Deep Sea Charters".</p> <p>Accordingly, Bight believes Request for Further Information Item 3 (acoustic impacts) and Item 7 (oil spills) provides the representative assessments and supporting information for statements on regional tourism activities. <i>Bight considers the Lightning MSS activity to have a negligible to no impact on tourism.</i></p> <div style="background-color: black; height: 30px; width: 100%;"></div>		



Matter Number	Section of Submission	Environment Regulation	Further written information requested	Response from Titleholder	NOPSEMA Status (To be completed by NOPSEMA)
Stakeholder	Information Provided (Date Method)	Summary of Response	Assessments of Merits of Adverse Claims/Objection	Operators Response to each objection/claim	Record No: Full Text of Communications with Relevant Person
		s 22 - consultation record excluded by amendment	<p>Bight considers:</p> <ul style="list-style-type: none"> <li>The proposed window minimises the potential encounter with species of concern;</li> <li>Extensive review of mitigation measures undertaken with most IFAW controls adopted;</li> <li>Options assessment has identified marine vibrators are not commercially available; have not been tested for environmental impacts; and continuous low-frequency signals could deliver unwanted impacts; and controlled source electromagnetic surveys will not image faults;</li> <li>Concurrent surveys planned within the Bight Basin have sufficient distance between surveys (~120km) such that detrimental cumulative sound impacts should not occur;</li> <li>Bight has undertaken significant consultation with both EPBC Referrals as identified in consultation records.</li> </ul>	Response is provided in the Response to Public Comments regarding EPBC Referral 2013/6770 issued on the Bight Petroleum Website on 17 <sup>th</sup> January 2014	<p>Public Comments regarding EPBC Referral 2013/6770</p>
		s 22 - consultation record excluded by amendment	<p>Bight considers:</p> <ul style="list-style-type: none"> <li>Assessment of survey to recreational fishing activities for MSS activity shows no impact to Kangaroo Island. Commercial fishing industry consulted and adequate mitigation and adaptive measures have been proposed;</li> <li>Assessment of survey to eco-tourism has been undertaken and shows negligible impact to Kangaroo Island expected;</li> <li>EPBC Referral and EP adopts protocols (including survey timing) which will minimise impacts to species to ALARP; and</li> <li>Bight has undertaken significant consultation with both EPBC Referrals as identified in consultation records.</li> </ul>	Response is provided in the Response to Public Comments regarding EPBC Referral 2013/6770 issued on the Bight Petroleum Website on 17 <sup>th</sup> January 2014	

Matter Number	Section of Submission	Environment Regulation	Further written information requested	Response from Titleholder	NOPSEMA Status (To be completed by NOPSEMA)													
12	Appendix C	Regulation 16(b)	Further information is requested regarding the consultation undertaken to demonstrate that an appropriate assessment of merits of objections and claims about adverse impacts of the activity has been made by Bight Petroleum Pty Ltd. [REDACTED] • [REDACTED] [REDACTED]	Refer to information below														
12	<p>Bight Petroleum confirms that the commitment made to [REDACTED] with respect to provision of ongoing status (activity) reports; and final reports submitted to regulators with respect to all monitoring, at-sea activities and observations encountered during the survey; stands and will be made available on the Bight Petroleum website.</p> <p><b>Section 6.5.2 (Marine Stakeholder Consultation):</b> In accordance with the above statement, the following entry is to be included in <b>Table 6-1</b>.</p> <table><tr><th>Stakeholder</th><th>Relevance/Interaction Trigger</th><th>Engagement Methodology</th><th>Timing</th><th>Responsibility</th></tr><tr><td rowspan="2">All Stakeholders</td><td>Status Activity Reports</td><td rowspan="2">Bight Petroleum Website <a href="http://www.bightpetroleum.com">www.bightpetroleum.com</a></td><td>Issued at commencement, 50% complete and 100% complete</td><td>Bight Project Manager</td></tr><tr><td>Final Observation (Monitoring Reports)</td><td>On submission to the Regulators</td><td>Bight Project Manager</td></tr></table> <p><b>Section 6.3.1 (Bight Petroleum):</b> An additional dot point is to be added under the Bight Petroleum Project Manager responsibilities to include:</p> <ul style="list-style-type: none"><li>Activity Status Reports and Final Monitoring/Observations Reports are published on the Bight Petroleum Website in accordance with timeframes listed in <b>Table 6-1</b>.</li></ul>					Stakeholder	Relevance/Interaction Trigger	Engagement Methodology	Timing	Responsibility	All Stakeholders	Status Activity Reports	Bight Petroleum Website <a href="http://www.bightpetroleum.com">www.bightpetroleum.com</a>	Issued at commencement, 50% complete and 100% complete	Bight Project Manager	Final Observation (Monitoring Reports)	On submission to the Regulators	Bight Project Manager
Stakeholder	Relevance/Interaction Trigger	Engagement Methodology	Timing	Responsibility														
All Stakeholders	Status Activity Reports	Bight Petroleum Website <a href="http://www.bightpetroleum.com">www.bightpetroleum.com</a>	Issued at commencement, 50% complete and 100% complete	Bight Project Manager														
	Final Observation (Monitoring Reports)		On submission to the Regulators	Bight Project Manager														

Matter Number	Section of Submission	Environment Regulation	Further written information requested	Response from Titleholder	NOPSEMA Status (To be completed by NOPSEMA)
12	Appendix C	Regulation 16(b)	<p>Further information is requested regarding the consultation undertaken to demonstrate that an appropriate assessment of merits of objections and claims about adverse impacts of the activity has been made by Bight Petroleum Pty Ltd.</p> <p>[REDACTED]</p> <ul style="list-style-type: none"> <li>A claim is raised regarding the risk of loss of reputation through real or perceived impact from the seismic survey or a spill, resulting in a significant impact to the tourism industry. However, the merits of this claim have not been assessed appropriately.</li> </ul>	Refer to information below	
12	<p>Bight Petroleum has conservatively evaluated the following aspects of the Lightning MSS with respect to real or perceived tourism impacts:</p> <ul style="list-style-type: none"> <li><b>EP (Section 5.4.4) (Presence of the survey vessels within the Lightning MSS Operational Area and possible disruption to tourism activities):</b> This assessment determined that due to the distance of the survey area from the coastline (recognising all associated regional coastal tourism activities) no impacts were expected to coastal tourism activities from survey vessel presence in the MSS area. However, while consultation with Charter Vessel and recreational fishing groups yielded no consultation feedback, available documentation (SW Bioregional Plan) identified that the MSS operational area had a low fishing effort. On a conservative basis it was assumed there was a possibility of Charter Vessel activity in the area and possible displacement as a result of survey activities could occur (minor impact). This impact is not considered to have a 'real or perceived' impact to Kangaroo Island tourism.</li> <li><b>Request for Further Information (Item 3) (Tourism Impacts associated with Acoustic Disturbance):</b> Information provided in this assessment utilised acoustic modelling at a point closest to Kangaroo Island and Eyre Peninsula (located on the continental shelf) and hence provided a very conservative assessment. Deep-sea Vessel Charter (fishing) was the only activity which might experience fish displacement within ~3km of the MSS boundary. This impact is considered negligible in the context of the available alternate areas to undertake these activities. All other identified tourism activities within the region will not be impacted by the acoustic footprint of the MSS. The Neptune Islands, Kangaroo Island, Eyre Peninsula and surrounding coastal areas are not detrimentally affected by sound and no impacts 'real or perceived' to tourism are expected. It is to be noted that this area has been surveyed before and no detrimental impacts were identified by the local community which is consistent with the assessment Bight has performed in this EP.</li> <li><b>Request for Further Information (Item 7) (Tourism Impacts from vessel oil spill):</b> This assessment determined that based on a very conservative spill scenario (300m<sup>3</sup> MGO spill originating from the closest MSS boundary to Kangaroo Island and Eyre Peninsula) that visible oil spill impacts may have very limited (negligible) impacts to Charter fishermen located in proximity to the Neptune Islands or in open waters at a reasonable distance from Kangaroo Island. Additionally, Cruise Liners may observe sheens 'en-route' to, but at some distance from, Kangaroo Island. Bight considers that these impacts, given the distance from Kangaroo Island will not be attributed to Kangaroo Island tourism. <i>Based upon oil spill trajectory modelling performed for the survey, there are no oil spill impacts to, or in the vicinity of, Kangaroo Island or its tourist values.</i></li> </ul> <p>While a Tier 2 oil spill in the MSS area may create localised, temporary spill impacts in offshore waters, the spill is short-lived and rapidly disperses. The location and limited fuel release is not conducive to heavy media exposure due to its distance from shore. As no shoreline threats/impacts are anticipated, flow-on 'perceived' tourism impacts to Kangaroo Island are therefore not expected (i.e. no sea lion oiling, etc.).</p> <p>Major shipping channels present in the area lie closer to Kangaroo Island than the MSS area. These vessels are permitted to discharge treated bilge (15ppm oil in water) and additionally can carry significant inventories of fuel (some heavy) which could be released during an incident. Kangaroo Island Council and residents would appear to accept this day-to-day threat by allowing transit of such vessels, without protest, thereby accepting the 'real or perceived' tourism impact to Kangaroo Island should an oil spill occur. As the MSS vessel at the Lightning MSS location does not present the same level of oil spill threat as a container vessel or oil tanker in waters adjacent to Kangaroo Island, Bight believes, if a consistent argument is applied, that a spill during the Lightning MSS activity should carry a lesser 'real or perceived' tourism impact to the Kangaroo Island Community.</p> <p>On the basis of the summary information listed above, no significant 'perceived or real' impacts to the Kangaroo Island tourism industry are expected as a result of seismic survey activities or oil spill with no resultant loss of reputation to Kangaroo Island as a result of the Lightning MSS activity.</p>				

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