

CMS Family Guidelines on Environmental Impact Assessments for Marine Noise-generating Activities

I. Introduction

1. Parties to CMS, ACCOBAMS and ASCOBANS have in several resolutions recognized underwater noise as a major threat to many marine species. These resolutions also call for noise-related considerations to be taken into account as early as the planning stages of activities, especially by making effective use of Environmental Impact Assessments (EIAs). The Convention on Biological Diversity Decision XII/23 also encourages governments to require EIAs for noise-generating offshore activities and to combine acoustic mapping with habitat mapping to identify areas where these species may be exposed to noise impacts.
2. These **CMS Family Guidelines on Environmental Impact Assessment for Marine Noise-generating Activities** are designed to provide regulators with tailored advice to apply in domestic jurisdictions, as appropriate, to create Environmental Impact Assessment (EIA) standards between jurisdictions seeking to manage marine noise-generating activities.
3. The sea is the interconnected system of all the Earth's oceanic waters, including the five named 'oceans' - the Atlantic, Pacific, Indian, Southern and Arctic Oceans - a connected body of salty water that covers over 70 per cent of the planet's surface.
4. This vast environment is home to a broader spectrum of higher animal taxa than exists on land. Many marine species have yet to be discovered and the number known to science is expanding annually. The sea also provides people with substantial supplies of food, mainly fish, shellfish and seaweed, in addition to marine resource extraction. It is a shared resource for us all.
5. Levels of anthropogenic marine noise have doubled in some areas of the world, every decade, for the past 60 years. When considered in addition to the number of other anthropogenic threats in the marine environment, this increase in noise levels can be a life-threatening trend for many marine species.
6. Marine wildlife relies on sound for vital life functions, including communication, prey and predator detection, orientation and for sensing surroundings. While the ocean is certainly a sound-filled environment and many natural (or biological) sounds are very loud, wildlife is not adapted to anthropogenic noise.
7. Animals exposed to elevated or prolonged anthropogenic noise can suffer direct injury and temporary or permanent auditory threshold shifts. Noise can mask important natural sounds, such as the call of a mate, or the sound made by prey or a predator. These impacts are experienced by a wide range of species including fish, crustaceans and cephalopods, pinnipeds (seals, sea lions and walrus), sirenians (dugong and manatee), sea turtles, the polar bear, marine otters and cetaceans (whales, dolphins and porpoises).
8. These CMS Family Guidelines on Environmental Impact Assessment for Marine Noise-generating Activities have been developed to present the Best Available Techniques (BAT) and Best Environmental Practice (BEP), as called for in CMS Resolutions 9.19, 10.24 and 10.15, ACCOBAMS Resolution 5.15 and ASCOBANS Resolutions 6.2 and 8.11. The document is structured to stand as one complete unit or to be used as discrete modules, tailored for national and agreement approaches.
9. In addition to the parent convention, CMS, these guidelines are relevant to:
 - Agreement on the Conservation of Cetaceans of the Black Seas Mediterranean Seas and Contiguous Atlantic Area (ACCOBAMS)

- Agreement on the Conservation of Seals in the Wadden Sea (Wadden Sea Seals)
- Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS)
- MOU Concerning Conservation Measures for the Eastern Atlantic Populations of the Mediterranean Monk Seal (*Monachus monachus*) (Atlantic Monk Seals)
- MOU Concerning Conservation Measures for Marine Turtles of the Atlantic Coast of Africa (Atlantic Marine Turtles)
- MOU Concerning the Conservation of the Manatee and Small Cetaceans of Western Africa and Macaronesia (Western African Aquatic Mammals)
- MOU for the Conservation of Cetaceans and their Habitats in the Pacific Islands Region (Pacific Islands Cetaceans)
- MOU on the Conservation and Management of Dugongs (*Dugong dugon*) and their Habitats throughout their Range (Dugong)
- MOU on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA)
- MOU on the Conservation of Migratory Sharks (Sharks)

II. Technical Support Information to the CMS Family Guidelines on Environmental Impact Assessment for Marine Noise-generating Activities

10. **Technical Support Information** is provided as a full document and as stand-alone modules at: cms.int/guidelines/cms-family-guidelines-EIAs-marine-noise. This technical support information has been specifically designed to provide clarity and certainty for regulators about the implications of their decisions to approve or restrict proposed activities. The **Technical Support Information** document provides detailed information about species' vulnerabilities, habitat considerations, impact of exposure levels and proposed assessment criteria for all of the CMS-listed species groups and their prey.

11. The **Technical Support Information** document is structured to cover specific areas, as follows:

- 'Module A: Sound in Water is Complex' provides an insight into the characteristics of sound propagation and dispersal. This module is designed to provide decision-makers with necessary foundation knowledge to interpret the other modules in these guidelines and any impact assessments that are presented to them for consideration.
- 'Module B: Expert Advice on Specific Species Groups' presents twelve separate detailed sub-modules covering each of the CMS species groups, focusing on species' vulnerabilities, habitat considerations, impact of exposure levels and assessment criteria.
- 'Module C: Decompression Stress' provides important information on bubble formation in marine mammals, source of decompression stress, source frequency, level and duration, and assessment criteria.
- 'Module D: Exposure Levels' presents a summary of the current state of knowledge about general exposure levels.
- 'Module E: Marine Noise-generating Activities' provides a brief summary of military sonar, seismic surveys, civil high powered sonar, coastal and offshore construction works, offshore platforms, playback and sound exposure experiments, shipping and vessel traffic, pingers and other noise-generating activities. Each section presents current knowledge about sound intensity level, frequency range and the activities general characteristics. The information is summarized in a table within the module.

- ‘Module F: Related Intergovernmental or Regional Economic Organization Decisions’ presents the series of intergovernmental decisions that have determined the direction for regulation of anthropogenic marine noise.
- ‘Module G: Principles of EIAs’ establishes basic principles including strategic environmental assessments, transparency, natural justice, independent peer review, consultation and burden of proof.
- ‘Module H: CMS-Listed Species Potentially Impacted by Anthropogenic Marine Noise’

12. The weight of evidence presented in the **Technical Support Information** Modules B, C and D shows that the Parties’ calls for making effective use of EIA for all marine noise-generating activities, in line with CMS Resolutions 9.19, 10.24 and 10.15, ACCOBAMS Resolution 5.15 and ASCOBANS Resolutions 6.2 and 8.11, are fully justified. Full, transparent EIAs are required to assess the impact of proposed activities on marine species and the environment, and should contain details as outlined below. Sound Propagation Modelling and Sound Exposure Level cumulative (SELcum) should also be investigated and understood. All EIAs should also include operational procedures to effectively mitigate impact during activities.

III. Advisory Notes

13. The following advisory notes should be considered in conjunction with the individual EIA Guideline tables presented as Chapters IV through XI.

III.1. Operational Mitigation Procedures

14. All EIAs should include operational procedures to mitigate impact effectively during activities. These are the operational mitigation procedures that are detailed in the national or regional regulations of the jurisdictions where the activity is proposed.

15. Operational mitigation procedures differ around the world, but often include, *inter alia*:
- aerial surveys
 - periods of visual and other observation before a noise-generating activity commences
 - passive acoustic monitoring
 - soft start and shut-down procedures
 - bubble curtains
 - sound dampers
 - cofferdams and
 - marine mammal observers.

III.2. Expert Sound Propagation Modelling

16. The objective of noise modelling for EIAs is to predict how much noise a particular activity will generate and how it will disperse. The aim is to model the received sound levels at given point/s out from the source level. The amount of sound lost at the receiver from the sound source is propagation loss.

17. Many propagation models have been developed such as ray theory, normal modes, multipath expansion, fast field, wavenumber integration or parabolic equation. However, no single model accounts for all frequencies and environments. Other factors to be considered are the sound frequencies of the activity to be modelled, the water depth, seabed topography, temperature and salinity, and whether spatial variation in the environment is significant (known as range dependence (RD) or range independence (RI)). Each of these factors will influence the model/s to be considered.

18. Commonly missing in EIAs is the modelling of particle motion propagation. Most models associated with EIAs only consider the sound intensity component of sound which is the means which mammals hear. However, fish and invertebrates detect sound through particle motion to identify predator and prey. Like sound intensity, particle motion varies significantly close to noise sources and in shallow water. Over-ensonication, particularly low frequencies, to these animal groups may lead to injury (barotrauma).

19. Specific modelling techniques are required to predict the impact on these species.

III.3. Full Frequency Bandwidth Disclosure

20. The intention of EIAs is to assess the impact of proposed activities on marine species and the environment. EIAs should not present only the main output of interest to the activities. The full frequency bandwidth of a proposed anthropogenic noise source, the intensity/pressure/energy output within that full range and the principal or mean/median operating frequency of the source(s) proposed should be fully disclosed within the EIA.

III.4. Sound Exposure Level cumulative (SELcum)

21. Sound Exposure level (SEL) is generally referred to as dB 0 to peak or peak to peak (dB 0 to peak or dB p to p) for plosive or pulsive noise like air guns, military sonar etc. and dB Root Mean Squared (dB rms) for non-plosive or non-pulsive noise such as ship noise, dredging, wind farms, constant drone. These measurements are generally of a one second duration only. The question arises, is this a realistic measurement metric for understanding the effects on all marine species?

22. NOAA's Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (2016) establishes that sound exposure level work well for marine mammals but not well for other marine species (crustaceans, bivalves, cephalopods, finned fish, etc) because non-mammal marine species detect sound through particle motion (the organism resonating in sympathy with the surrounding sound waves) rather than through a tympanic mechanism as with marine mammals.

23. A more informed measurement introduced to modelling is sound exposure level cumulative (SELcum) by which a time component is added to SEL enabling it to encompass all marine species.

24. While SEL has been acceptable in the past, with the use of SELcum modelling, species experts have documented noticeable impacts on species' welfare that would otherwise have gone unnoticed. Contemporary information suggests:

- a. Growth rate of threshold shift is higher for frequencies where hearing is more sensitive
- b. Non-impulsive intermittent exposures require higher SELcum to induce a threshold shift compared to continuous exposures of the same duration
- c. Exposures for longer durations and lower levels induce temporary threshold shifts at a lower level than those exposed to a higher level and a shorter duration with the same duration SELcum
- d. With the same SELcum, longer exposures require longer recovery time
- e. Intermittent exposures recover faster compared to continuous exposures of the same duration
- f. Animals may be exposed to multiple sound sources and stressors beyond acoustics during an activity. This also may have a cumulative effect.

25. NOAA has set a default time of 24 hours for SELcum. An alternate prescribed time can be applied to SELcum if stated. Within the SELcum metric, reference to sound intensity level (0 to peak, peak to peak or rms) is not appropriate due to the extended time parameter. It may be displayed as 190 dB SELcum *re* 1µPa @ 1m pulsive or non-pulsive depending. Module B contains a table which demonstrates differences between sound intensity level (dB peak) and SELcum (SEL cum 24 h).

26. Pulsive/plosive SELcum noise will induce threshold shifts more quickly than a non-pulsive noise with the same SELcum due to the fast rise time characteristics.

IV. EIA Guideline for Military and Civil High-powered Sonar

27. This EIA Guideline should be used in combination with the appropriate modules on species and impact from the **Technical Support Information** (B.1-12, C and D) as required for individual regional and domestic circumstances.

28. The EIA Guideline for Shipping and Vessels Traffic (V) should be used when the vessel is underway/making way with sonar off.

Component	Detail
Description of area	<ul style="list-style-type: none"> • Detail of the spatial extent and nature of the activity – including seabed bathymetry and composition, description of known stratification characteristics and broad ecosystem descriptions – as well as the spatial area that will experience anthropogenic noise, generated by the proposed activity, above natural ambient sound levels • Identification of previous activities, their seasons and duration in the same or adjoining areas, and a review of activity findings and implications
Description of the equipment and activity	<ul style="list-style-type: none"> • Explanation of all activity technologies available and why each proposed technology is chosen • Description of the activity technology including: <ol style="list-style-type: none"> a. name and description of the vessel/s to be used b. total duration of the proposed activity c. sound intensity level (dB peak to peak) in water @ 1 metre, frequency ranges and ping rate • Specification of the activity including anticipated nautical miles to be covered, track-lines, speed of vessels and sonar power setting changes • Identification of other activities having an impact in the region during the planned activity, accompanied by the analysis and review of potential cumulative or synergistic impacts
Modelling of sound dispersal	<ul style="list-style-type: none"> • Detail of computer modelling of sound dispersal in the same season/weather conditions as the proposed activity accounting for local propagation features (depth and type of sea bottom, local propagation paths related to thermal stratification) from point source out to a radius where the noise levels generated are close to natural ambient sound levels • Identification of any SOFAR or natural channel characteristics • Identification and mapping of proposed exclusion zones for species and description of how noise propagation into these zones will be minimized, taking into consideration the local propagation features
Species impact	<ul style="list-style-type: none"> • General: <ol style="list-style-type: none"> a. Identification of species likely to be present that will experience sound transmission generated by the proposed activity above natural ambient sound levels b. Specification of the type of impact predicted (direct and indirect) as well as direct and indirect impacts on prey species • For each species group, also detail of the following (refer to module B species summary): <ol style="list-style-type: none"> a. Species vulnerabilities: <ol style="list-style-type: none"> i. specific vulnerabilities to noise ii. lifecycle components of these vulnerabilities b. Habitat: <ol style="list-style-type: none"> i. specific habitat components considered c. Scientific assessment of impact: <ol style="list-style-type: none"> i. exposure levels ii. total exposure duration

	<ul style="list-style-type: none"> iii. determination of precautionary safe/harmful exposure levels that account for uncertainty and avoids erroneous conclusions
Mitigation and monitoring plans	<ul style="list-style-type: none"> • Detail of: <ul style="list-style-type: none"> a. Scientific monitoring programmes, conducted during and after the activity, to assess impact b. Transparent processes for regular real-time public reporting of activity progress and all impacts encountered c. Impact mitigation proposals: <ul style="list-style-type: none"> i. 24-hour visual or other detection, especially under conditions of poor visibility (including high winds, night conditions, sea spray or fog) ii. establishing exclusion zones to protect specific species, accompanied by scientific and precautionary justification for these zones iii. soft start and shut-down protocols iv. spatio-temporal restrictions
Reporting plans	<ul style="list-style-type: none"> • Detail of post operation reporting plans including verification of the effectiveness of mitigation
Consultation and independent review	<ul style="list-style-type: none"> • Description of consultation, prior to EIA submission: <ul style="list-style-type: none"> a. List of stakeholders consulted b. Detail of information provided to stakeholders, opportunities given for appropriate engagement and the timeframe for feedback c. Explanation of what amendments and changes have been made to the proposed activity in response to the comments, queries, requests and concerns d. Explanation of which comments, queries, requests and concerns have not been accommodated and why • Description of independent review of draft EIA: <ul style="list-style-type: none"> a. Detail of the independent reviewers (species experts) including affiliation and qualifications b. Description of the comments, queries, requests and concerns received from each reviewer c. Explanation of what amendments and changes have been made to the proposed activity in response to the comments, queries, requests and concerns d. Explanation of which comments, queries, requests and concerns have not been accommodated and why

V. EIA Guideline for Shipping and Vessels Traffic

29. This EIA Guideline should be used in combination with the appropriate modules on species and impact from the **Technical Support Information** (B.1-12, C and D) as required for individual regional and domestic circumstances.

30. This EIA Guideline is directed to shipping regulators, including port and harbour authorities. Cumulative impact of shipping, identifying appropriate exclusion zones and shipping lanes should be the focus.

Component	Detail
Description of area	<ul style="list-style-type: none"> Detail of the spatial extent and nature of the activity – including seabed bathymetry and composition, description of known stratification characteristics and broad ecosystem descriptions – as well as the spatial area that will experience anthropogenic noise, generated by the proposed shipping, above natural ambient sound levels
Description of vessels and equipment	<ul style="list-style-type: none"> Description of vessel/s (tonnage and displacement) and equipment activity Detail of all activities including sound intensity levels (dB rms) @ 1 metre and frequency ranges (all frequencies to encompass propeller resonance and harmonics) Identification of other activities having an impact in the region accompanied by the analysis and review of potential cumulative or synergistic impacts
Modelling of sound dispersal	<ul style="list-style-type: none"> Detail of computer modelling of sound dispersal including standing wave and comb filtering in confined areas (harbours and channels) and accounting for local propagation features (depth and type of sea bottom, local propagation paths related to thermal stratification) from point source out to a radius where the noise levels generated are close to natural ambient sound levels Identification of any SOFAR or natural channel characteristics Identification and mapping of proposed species exclusion zones and description of how noise propagation into these zones will be minimised, taking into consideration the local propagation features
Species impact	<ul style="list-style-type: none"> General: <ol style="list-style-type: none"> Identification of species likely to be present that will experience sound transmission generated by the proposed activity above natural ambient sound levels Specification of the type of impact predicted (direct and indirect) as well as direct and indirect impacts on prey species For each species group, also detail of the following (refer to module B species summary): <ol style="list-style-type: none"> Species vulnerabilities: <ol style="list-style-type: none"> specific vulnerabilities to noise lifecycle components of these vulnerabilities Habitat: <ol style="list-style-type: none"> specific habitat components considered Scientific assessment of impact: <ol style="list-style-type: none"> exposure levels total exposure duration determination of precautionary safe/harmful exposure levels that account for uncertainty and avoids erroneous conclusions
Monitoring plans	<ul style="list-style-type: none"> Explanation of access to ongoing scientific monitoring data to assess impacts

<p>Consultation and independent review</p>	<ul style="list-style-type: none"> • Description of consultation, prior to EIA submission: <ul style="list-style-type: none"> a. List of stakeholders consulted b. Detail of information provided to stakeholders, opportunities given for appropriate engagement and the timeframe for feedback c. Explanation of what amendments and changes have been made to the proposed activity in response to the comments, queries, requests and concerns d. Explanation of which comments, queries, requests and concerns have not been accommodated and why • Description of independent review of draft EIA: <ul style="list-style-type: none"> a. Detail of the independent reviewers (species experts) including affiliation and qualifications b. Description of the comments, queries, requests and concerns received from each reviewer c. Explanation of what amendments and changes have been made to the proposed activity in response to the comments, queries, requests and concerns d. Explanation of which comments, queries, requests and concerns have not been accommodated and why
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VI. EIA Guideline for Seismic Surveys (Air Gun and Alternative Technologies)

31. This EIA Guideline should be used in combination with the appropriate modules on species and impact from the **Technical Support Information** (B.1-12, C and D) as required for individual regional and domestic circumstances.

Component	Detail
Description of area	<ul style="list-style-type: none"> • Detail of the spatial extent and nature of the survey – including seabed bathymetry and composition, description of known stratification characteristics and broad ecosystem descriptions – as well as the spatial area that will experience anthropogenic noise, generated by the proposed survey, above natural ambient sound levels • Identification of previous surveys, their seasons and duration in the same or adjoining areas, and a review of survey finding and implications • Identification of previous test wells in the same or adjoining areas including comment about any that have breached or may breach
Description of the equipment and activity	<ul style="list-style-type: none"> • Explanation of all survey technologies available and why each proposed technology is chosen • Description of the survey technology including: <ol style="list-style-type: none"> a. name and description of the vessel/s to be used b. total duration of the proposed survey c. sound intensity level (dB peak to peak) in water @ 1 metre and all frequency ranges and discharge rate d. if an air gun technology is proposed: <ol style="list-style-type: none"> i. number of arrays ii. number of air guns within each array iii. air gun charge pressure to be used (PSI) iv. volume of each air gun in cubic inches v. official calibration figures supplied by the survey vessel to be charted, for sound dispersal modelling vi. depth the air guns to be set vii. number of streamers viii. length of streamers ix. distance set apart x. depth the hydrophones are set • Specification of the survey including anticipated nautical miles to be covered, track-lines, speed of vessels, start-up and shut-down procedures, distance and procedures for vessel turns including any planned air gun power setting changes • Identification of other activities having an impact in the region during the planned survey, accompanied by the analysis and review of potential cumulative or synergistic impacts
Modelling of sound dispersal	<ul style="list-style-type: none"> • Detail of computer modelling of sound dispersal in the same season/weather conditions as the proposed survey accounting for local propagation features (depth and type of sea bottom, local propagation paths related to thermal stratification) from point source out to a radius where the noise levels generated are close to natural ambient sound levels • Identification of any SOFAR or natural channel characteristics • Identification and mapping of proposed species exclusion zones and description of how noise propagation into these zones will be minimized, taking into consideration the local propagation features
Species impact	<ul style="list-style-type: none"> • General:

	<ul style="list-style-type: none"> a. Identification of species likely to be present that will experience sound transmission generated by the proposed survey above natural ambient sound levels b. Specification of the type of impact predicted (direct and indirect) as well as direct and indirect impacts to prey species • For each species group, also detail of the following (refer to module B species summary): <ul style="list-style-type: none"> a. Species vulnerabilities: <ul style="list-style-type: none"> i. specific vulnerabilities to noise ii. lifecycle components of these vulnerabilities b. Habitat: <ul style="list-style-type: none"> i. specific habitat components considered c. Scientific assessment of impact: <ul style="list-style-type: none"> i. exposure levels ii. total exposure duration iii. determination of precautionary safe/harmful exposure levels that account for uncertainty and avoids erroneous conclusions
Mitigation and monitoring plans	<ul style="list-style-type: none"> • Detail of: <ul style="list-style-type: none"> a. Scientific monitoring before the survey to assess baselines, species distribution and behaviour to facilitate the incorporation of monitoring results into the impact assessment b. Scientific monitoring programmes, conducted during and after the survey, to assess impact c. Transparent processes for regular real-time public reporting of survey progress and all impacts encountered d. Impact mitigation proposals: <ul style="list-style-type: none"> i. 24-hour visual or other means of detection, especially under conditions of poor visibility (including high winds, night conditions, sea spray or fog) ii. establishing exclusion zones to protect specific species, including scientific and precautionary justification for these zones iii. soft start and shut-down protocols iv. protocols in place for consistent and detailed data recording (observer/PAM sightings and effort logs, survey tracks and operations) v. detailed, clear, chain of command for implementing shut-down mitigation protocols
Reporting plans	<ul style="list-style-type: none"> • Detail of post operation reporting plans including verification of the effectiveness of mitigation
Consultation and independent review	<ul style="list-style-type: none"> • Description of consultation, prior to EIA submission: <ul style="list-style-type: none"> a. List of stakeholders consulted b. Detail of information provided to stakeholders, opportunities given for appropriate engagement and the timeframe for feedback c. Explanation of what amendments and changes have been made to the proposed survey in response to the comments, queries, requests and concerns d. Explanation of which comments, queries, requests and concerns have not been accommodated and why • Description of independent review of draft EIA: <ul style="list-style-type: none"> a. Detail of the independent reviewers (species experts) including affiliation and qualifications b. Description of the comments, queries, requests and concerns

	<p>received from each reviewer</p> <p>c. Explanation of what amendments and changes have been made to the proposed survey in response to the comments, queries, requests and concerns</p> <p>d. Explanation of which comments, queries, requests and concerns have not been accommodated and why</p>
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VII. EIA Guideline for Construction Works

32. This EIA Guideline should be used in combination with the appropriate modules on species and impact from the **Technical Support Information** (B.1-12, C and D) as required for individual regional and domestic circumstances.

Component	Detail
Description of area	<ul style="list-style-type: none"> • Detail of the spatial extent and nature of the activity – including seabed bathymetry and composition, description of known stratification characteristics and broad ecosystem descriptions – as well as the spatial area that will experience anthropogenic noise, generated by the proposed activity, above natural ambient sound levels • Identification of previous activities, their seasons and duration in the same or adjoining areas, and a review of activity finding and implications
Description of the equipment and activity	<ul style="list-style-type: none"> • Explanation of all activity technologies available and why each proposed technology is chosen • Specification of: <ol style="list-style-type: none"> a. total duration of the proposed activity b. sound intensity level (dB peak to peak) in water @ 1 metre and frequency ranges c. If explosives are proposed: specification of sound intensity level (dB 0 to peak) in water @ 1 metre, frequency range and number of detonations and interval time • Description of noise counter measures e.g.: bubble curtains, noise dampers and cofferdams • Identification of other activities having an impact in the region during the planned activity, accompanied by the analysis and review of potential cumulative or synergistic impacts
Modelling of sound dispersal	<ul style="list-style-type: none"> • Detail of computer modelling of sound dispersal in the same season/weather conditions as the proposed activity accounting for local propagation features (depth and type of sea bottom, local propagation paths related to thermal stratification) from point source out to a radius where the noise levels generated are close to natural ambient sound levels • Identification of any SOFAR or natural channel characteristics • Identification and mapping of proposed exclusion zones for species and description of how noise propagation into these zones will be minimized, taking into consideration the local propagation features
Species impact	<ul style="list-style-type: none"> • General: <ol style="list-style-type: none"> a. Identification of species likely to be present that will experience sound transmission generated by the proposed activity above natural ambient sound levels b. Specification of the type of impact predicted (direct and indirect) as well as direct and indirect impacts to prey species • For each species group, also detail of the following (refer to module B species summary): <ol style="list-style-type: none"> a. Species vulnerabilities: <ol style="list-style-type: none"> i. specific vulnerabilities to noise ii. lifecycle components of these vulnerabilities b. Habitat: <ol style="list-style-type: none"> i. specific habitat components considered c. Scientific assessment of impact: <ol style="list-style-type: none"> i. exposure levels ii. total exposure duration

	<ul style="list-style-type: none"> iii. determination of precautionary safe/harmful exposure levels that account for uncertainty and avoids erroneous conclusions
Mitigation and monitoring plans	<ul style="list-style-type: none"> • Detail of: <ul style="list-style-type: none"> a. Scientific monitoring programmes, conducted before, during and after the activity, to assess impact, including noise monitoring stations placed at specified distances b. Transparent processes for regular real-time public reporting of activity progress and all impacts encountered c. Impact mitigation proposals: <ul style="list-style-type: none"> i. 24-hour visual detection, especially under conditions of poor visibility (including high winds, night conditions, sea spray or fog) ii. establishing exclusion zones to protect specific species, including scientific and precautionary justification for these zones iii. soft start and shut-down protocols
Reporting plans	<ul style="list-style-type: none"> • Detail of post operation reporting plans including verification of the effectiveness of mitigation
Consultation and independent review	<ul style="list-style-type: none"> • Description of consultation, prior to EIA submission: <ul style="list-style-type: none"> a. List of stakeholders consulted b. Detail of information provided to stakeholders, opportunities given for appropriate engagement and the timeframe for feedback c. Explanation of what amendments and changes have been made to the proposed activity in response to the comments, queries, requests and concerns d. Explanation of which comments, queries, requests and concerns have not been accommodated and why • Description of independent review of draft EIA: <ul style="list-style-type: none"> a. Detail of the independent reviewers (species experts) including affiliation and qualifications b. Description of the comments, queries, requests and concerns received from each reviewer c. Explanation of what amendments and changes have been made to the proposed activity in response to the comments, queries, requests and concerns d. Explanation of which comments, queries, requests and concerns have not been accommodated and why

VIII. EIA Guideline for Offshore Platforms

33. This EIA Guideline should be used in combination with the appropriate modules on species and impact from the **Technical Support Information** (B.1-12, C and D) as required for individual regional and domestic circumstances.

Component	Detail
Description of area	<ul style="list-style-type: none"> • Detail of the spatial extent and nature of the activity – including seabed bathymetry and composition, description of known stratification characteristics and broad ecosystem descriptions – as well as the spatial area that will experience anthropogenic noise, generated by the proposed activity, above natural ambient sound levels • Identification of previous activities, their seasons and duration in the same or adjoining areas, and a review of findings and implications
Description of the equipment and activity	<ul style="list-style-type: none"> • Explanation of all activity technologies available and why each proposed technology is chosen • Description of the activity technology including name and description of the vessel/s and sea floor equipment to be used • Specification of: <ol style="list-style-type: none"> a. total duration of the proposed activity b. sound intensity level (dB rms) in water @ 1 metre (from noise source eg: platform caissons or drill ship's hull etc.) and frequency ranges c. sound intensity levels (peak and rms) during planned maintenance schedules • Identification of other activities having an impact in the region during the planned activity, accompanied by the analysis and review of potential cumulative or synergistic impacts
Modelling of sound dispersal	<ul style="list-style-type: none"> • Detail of computer modelling of sound dispersal in the same season/weather conditions as the proposed activity accounting for local propagation features (depth and type of sea bottom, local propagation paths related to thermal stratification) from point source out to a radius where the noise levels generated are close to natural ambient sound levels • Identification of any SOFAR or natural channel characteristics • Identification and mapping of proposed exclusion zones for species and description of how noise propagation into these zones will be minimised, taking into consideration the local propagation features
Species impact	<ul style="list-style-type: none"> • General: <ol style="list-style-type: none"> a. Identification of species likely to be present that will experience sound transmission generated by the proposed activity above natural ambient sound levels b. Specification of the type of impact predicted (direct and indirect) as well as direct and indirect impacts to prey species • For each species group, also detail of the following (refer to module B species summary): <ol style="list-style-type: none"> a. Species vulnerabilities: <ol style="list-style-type: none"> i. specific vulnerabilities to noise ii. lifecycle components of these vulnerabilities b. Habitat: <ol style="list-style-type: none"> i. specific habitat components considered c. Scientific assessment of impact: <ol style="list-style-type: none"> i. exposure levels ii. total exposure duration: iii. determination of precautionary safe/harmful exposure

	levels that account for uncertainty and avoids erroneous conclusions
Mitigation and monitoring plans	<ul style="list-style-type: none"> • Detail of: <ul style="list-style-type: none"> a. Scientific monitoring programmes, conducted before, during and after the activity, to assess impact, including noise monitoring stations placed at specified distances b. Transparent processes for regular real-time public reporting of activity progress and all impacts encountered c. Impact mitigation proposals d. 24-hour visual detection, especially under conditions of poor visibility (including high winds, night conditions, sea spray or fog)
Reporting plans	<ul style="list-style-type: none"> • Detail of post operation reporting plans including verification of the effectiveness of mitigation
Consultation and independent review	<ul style="list-style-type: none"> • Description of consultation, prior to EIA submission: <ul style="list-style-type: none"> a. List of stakeholders consulted b. Detail of information provided to stakeholders, opportunities given for appropriate engagement and the timeframe for feedback c. Explanation of what amendments and changes have been made to the proposed activity in response to the comments, queries, requests and concerns d. Explanation of which comments, queries, requests and concerns have not been accommodated and why • Description of independent review of draft EIA: <ul style="list-style-type: none"> a. Detail of the independent reviewers (species experts) including affiliation and qualifications b. Description of the comments, queries, requests and concerns received from each reviewer c. Explanation of what amendments and changes have been made to the proposed activity in response to the comments, queries, requests and concerns d. Explanation of which comments, queries, requests and concerns have not been accommodated and why

IX. EIA Guideline for Playback and Sound Exposure Experiments

34. This EIA Guideline should be used in combination with the appropriate modules on species and impact from the **Technical Support Information** (B.1-12, C and D) as required for individual regional and domestic circumstances.

Component	Detail
Description of area	<ul style="list-style-type: none"> • Detail of the spatial extent and nature of the activity – including seabed bathymetry and composition, description of known stratification characteristics and broad ecosystem descriptions – as well as the spatial area that will experience anthropogenic noise, generated by the proposed activity, above natural ambient sound levels • Identification of previous activities, their seasons and duration in the same or adjoining areas, and a review of activity finding and implications
Description of the equipment and activity	<ul style="list-style-type: none"> • Explanation of all technologies available for the activity and why each proposed technology is chosen • Description of the chosen technology including name and description of the vessel/s to be used • Specification of: <ol style="list-style-type: none"> a. lowest practicable sound intensity level required b. total duration of the proposed activity c. sound intensity level (dB peak to peak) in water @ 1 metre and all frequency ranges and discharge rate d. if an air gun technology is proposed refer to VI e. if explosives are proposed refer to VII • Specification of the activity including anticipated nautical miles to be covered, track-lines, speed of vessels, start-up and shut-down procedures, distance and procedures for vessel turns including any planned air gun power setting changes • Identification of other activities having an impact in the region during the planned activity, accompanied by the analysis and review of potential cumulative or synergistic impacts
Modelling of sound dispersal	<ul style="list-style-type: none"> • Detail of computer modelling of sound dispersal in the same season/weather conditions as the proposed activity accounting for local propagation features (depth and type of sea bottom, local propagation paths related to thermal stratification) from point source out to a radius where the generated noise levels are close to natural ambient sound levels • Identification of any SOFAR or natural channel characteristics • Identification and mapping of proposed exclusion zones for species and description of how noise propagation into these zones will be minimised, taking into consideration the local propagation features
Species impact	<ul style="list-style-type: none"> • General: <ol style="list-style-type: none"> a. Identification of species likely to be present that will experience sound transmission generated by the proposed activity above natural ambient sound levels b. Specification of the type of impact predicted (direct and indirect) as well as direct and indirect impacts to prey species • For each species group, also detail of the following (refer to module B species summary): <ol style="list-style-type: none"> a. Species vulnerabilities: <ol style="list-style-type: none"> i. specific vulnerabilities to noise ii. lifecycle components of these vulnerabilities b. Habitat:

	<ul style="list-style-type: none"> i. specific habitat components considered c. Scientific assessment of impact: <ul style="list-style-type: none"> i. exposure levels ii. total exposure duration iii. determination of precautionary safe/harmful exposure levels that account for uncertainty and avoids erroneous conclusions iv. how the experiment design will monitor target and non-target species and the steps that will be taken to halt sound emission if adverse response or behavioural changes are observed v. how same target/s exposure can be reduced vi. how exposures that are expected to elicit particular behavioural responses (e.g. responses elicited by predator sounds, conspecific signals) will inform specific mitigation and monitoring protocols. In such cases, impact assessment should also articulate what responses may not be related to the loudness of the exposure but to the behavioural significance of the signal/noise used.
Mitigation and monitoring plans	<ul style="list-style-type: none"> • Detail of: <ul style="list-style-type: none"> a. Scientific monitoring programmes, conducted before, during and after the activity, to assess impact b. Transparent processes for regular real-time public reporting of activity progress and all impacts encountered c. Impact mitigation proposals: <ul style="list-style-type: none"> i. 24-hour visual detection, especially under conditions of poor visibility (including high winds, night conditions, sea spray or fog) ii. establishing exclusion zones to protect specific species, including scientific and precautionary justification for these zones iii. soft start and shut-down protocols
Reporting plans	<ul style="list-style-type: none"> • Detail of post operation reporting plans including verification of the effectiveness of mitigation
Consultation and independent review	<ul style="list-style-type: none"> • Description of consultation, prior to EIA submission: <ul style="list-style-type: none"> a. List of stakeholders consulted b. Detail of information provided to stakeholders, opportunities given for appropriate engagement and the timeframe for feedback c. Explanation of what amendments and changes have been made to the proposed activity in response to the comments, queries, requests and concerns d. Explanation of which comments, queries, requests and concerns have not been accommodated and why • Description of independent review of draft EIA: <ul style="list-style-type: none"> a. Detail of the independent reviewers (species experts) including affiliation and qualifications b. Description of the comments, queries, requests and concerns received from each reviewer c. Explanation of what amendments and changes have been made to the proposed activity in response to the comments, queries, requests and concerns d. Explanation of which comments, queries, requests and concerns have not been accommodated and why

X. EIA Guideline for Pingers (Acoustic Deterrent/Harassment Devices, Navigation)

35. This EIA Guideline should be used in combination with the appropriate modules on species and impact from the **Technical Support Information** (B.1-12, C and D) as required for individual regional and domestic circumstances.

Component	Detail
Description of area	<ul style="list-style-type: none"> Detail of the spatial extent and nature of the activity – including seabed bathymetry and composition, description of known stratification characteristics and broad ecosystem descriptions – as well as the spatial area that will experience anthropogenic noise, generated by the proposed activity, above natural ambient sound levels
Description of the equipment and activity	<ul style="list-style-type: none"> Explanation of all technologies available for the activity and why the proposed technology is chosen Specification of sound intensity level (dB peak to peak) in water @ 1 metre, frequency ranges and ping rate, as well as proposed spacing of pingers Identification of other activities having an impact in the region accompanied by the analysis and review of potential cumulative or synergistic impacts
Modelling of sound dispersal	<ul style="list-style-type: none"> Detail of computer modelling of sound dispersal accounting for local propagation features (depth and type of sea bottom, local propagation paths related to thermal stratification) from point source out to a radius where the noise levels generated are close to natural ambient sound levels Identification and mapping of proposed exclusion zones for species and description of how noise propagation into these zones will be minimized, taking into consideration the local propagation features
Species impact	<ul style="list-style-type: none"> General: <ol style="list-style-type: none"> Identification of species likely to be present that will experience sound transmission generated by the proposed activity above natural ambient sound levels Specification of the type of impact predicted (direct and indirect) as well as direct and indirect impacts to prey species For each species group, also detail of the following (refer to module B species summary): <ol style="list-style-type: none"> Species vulnerabilities: <ol style="list-style-type: none"> specific vulnerabilities to noise lifecycle components of these vulnerabilities Habitat: <ol style="list-style-type: none"> specific habitat components considered Scientific assessment of impact: <ol style="list-style-type: none"> exposure levels total exposure duration determination of precautionary safe/harmful exposure levels that account for uncertainty and avoids erroneous conclusions
Monitoring plans	<ul style="list-style-type: none"> Detail of scientific monitoring programmes, conducted before, during and after the activity, to assess impact
Reporting plans	<ul style="list-style-type: none"> Detail of post operation reporting plans including verification of the effectiveness of mitigation
Consultation and independent review	<ul style="list-style-type: none"> Description of consultation, prior to EIA submission: <ol style="list-style-type: none"> List of stakeholders consulted

	<ul style="list-style-type: none"> b. Detail of information provided to stakeholders, opportunities given for appropriate engagement and the timeframe for feedback c. Explanation of what amendments and changes have been made to the proposed activity in response to the comments, queries, requests and concerns d. Explanation of which comments, queries, requests and concerns have not been accommodated and why <ul style="list-style-type: none"> • Description of independent review of draft EIA: <ul style="list-style-type: none"> a. Detail of the independent reviewers (species experts) including affiliation and qualifications b. Description of the comments, queries, requests and concerns received from each reviewer c. Explanation of what amendments and changes have been made to the proposed activity in response to the comments, queries, requests and concerns d. Explanation of which comments, queries, requests and concerns have not been accommodated and why
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XI. EIA Guideline for Other Noise-generating Activities (Acoustic Data Transmission, Wind, Tidal and Wave Turbines and Future Technologies)

36. This EIA Guideline should be used in combination with the appropriate modules on species and impact from the **Technical Support Information** (B.1-12, C and D) as required for individual regional and domestic circumstances.

Component	Detail
Description of area	<ul style="list-style-type: none"> Detail of the spatial extent and nature of the activity – including seabed bathymetry and composition, description of known stratification characteristics and broad ecosystem descriptions – as well as the spatial area that will experience anthropogenic noise, generated by the proposed activity, above natural ambient sound levels
Description of the equipment and activity	<ul style="list-style-type: none"> Explanation of all technologies available for the activity Specification of sound intensity level (dB) in water @ 1 metre, and frequency ranges. This should include dB peak to peak for acoustic data transmission for example, dB RMS for wind, tidal and wave turbines and future technologies categorized accordingly Identification of other activities having an impact in the region during the planned activity, accompanied by the analysis and review of potential cumulative or synergistic impacts
Modelling of sound dispersal	<ul style="list-style-type: none"> Detail of computer modelling of sound dispersal accounting for local propagation features (depth and type of sea bottom, local propagation paths related to thermal stratification) from point source out to a radius where the noise levels generated are close to natural ambient sound levels Identification and mapping of proposed exclusion zones for species and description of how noise propagation into these zones will be minimized, taking into consideration the local propagation features
Species impact	<ul style="list-style-type: none"> General: <ol style="list-style-type: none"> Identification of species likely to be present that will experience sound transmission generated by the proposed activity above natural ambient sound levels Specification of the type of impact predicted (direct and indirect) as well as direct and indirect impacts to prey species For each species group, also detail of the following (refer to module B species summary): <ol style="list-style-type: none"> Species vulnerabilities: <ol style="list-style-type: none"> specific vulnerabilities to noise lifecycle components of these vulnerabilities Habitat: <ol style="list-style-type: none"> specific habitat components considered Scientific assessment of impact: <ol style="list-style-type: none"> exposure levels total exposure duration determination of precautionary safe/harmful exposure levels that account for uncertainty and avoids erroneous conclusions
Monitoring plans	<ul style="list-style-type: none"> Explanation of ongoing scientific monitoring programmes to assess impact
Consultation and independent review	<ul style="list-style-type: none"> Description of consultation, prior to EIA submission: <ol style="list-style-type: none"> List of stakeholders consulted Detail of information provided to stakeholders, opportunities

	<p>given for appropriate engagement and the timeframe for feedback</p> <p>c. Explanation of what amendments and changes have been made to the proposed activity in response to the comments, queries, requests and concerns</p> <p>d. Explanation of which comments, queries, requests and concerns have not been accommodated and why</p> <ul style="list-style-type: none"> • Description of independent review of draft EIA: <ul style="list-style-type: none"> a. Detail of the independent reviewers (species experts) including affiliation and qualifications b. Description of the comments, queries, requests and concerns received from each reviewer c. Explanation of what amendments and changes have been made to the proposed activity in response to the comments, queries, requests and concerns d. Explanation of which comments, queries, requests and concerns have not been accommodated and why
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