



2013 Code of Conduct

for Minimising Acoustic Disturbance to Marine Mammals from Seismic Survey Operations



Department of
Conservation
Te Papa Atawhai

Cover image: Seismic survey vessel *Polarcus Alima* entering Wellington Harbour 2012. *Photo: Polarcus Ltd.*

© Crown Copyright, November 2013, New Zealand Department of Conservation

Published by Publishing Team, Department of Conservation,
PO Box 10420, Wellington 6143, New Zealand.

In the interest of forest conservation, we support paperless electronic publishing.

CONTENTS

1.	Introduction	1
1.1	Application	1
2.	Definitions	2
3.	Part 1: Marine seismic surveys in New Zealand continental waters	6
3.1	Notification	6
3.2	Pre-survey planning and the MMIA process	7
3.3	Operational area	8
3.4	Training and experience requirements of observers	8
3.5	Recording and reporting	9
3.6	Marine Mammal Sanctuaries	9
3.7	Explosives	9
3.8	Operational requirements	10
4.	Part 2: Specific requirements for each level of marine seismic survey	14
4.1	Level 1 surveys	14
4.2	Level 2 survey	16
4.3	Borehole seismic surveys	19
	Appendix 1: Marine Mammal Impact Assessment	20
	Appendix 2: Observer reporting	22
	Appendix 3: MMO and PAM operator standards	23
	Appendix 4: Operational flowcharts	25
	Appendix 5: Adoption	28
	Schedule 1: Areas of Ecological Importance	29
	Schedule 2: Species of Concern	30

1. Introduction

The *2013 Code of Conduct for Minimising Acoustic Disturbance to Marine Mammals from Seismic Survey Operations* (the Code) has been developed by the Department of Conservation in consultation with a broad range of stakeholders in marine seismic survey operations in New Zealand.

The Code replaces the *2012 Code of Conduct for Minimising Acoustic Disturbance to Marine Mammals from Seismic Survey Operations* and comes into effect on 29 November 2013, and will remain in effect until superseded. It is open for adoption by any organisation engaged in seismic survey activities in New Zealand continental waters.

The Code must be read in conjunction with the *2012 Code of Conduct for Minimising Acoustic Disturbance to Marine Mammals from Seismic Survey Operations: Reference Document* (the Reference Document), which provides background information and guidance to assist with interpretation.

The Department of Conservation administers the Marine Mammals Protection Act 1978 (MMPA), which makes provision for the protection, conservation, and management of marine mammals within New Zealand and within New Zealand fisheries waters. Under section 3A of that Act, the Department is mandated to administer and manage marine mammals and this Code has been developed under that mandate.

1.1 Application

The MMPA's application offshore extends to New Zealand fisheries waters (which includes the territorial sea and exclusive economic zone), the Code applies to New Zealand continental waters (which includes the waters beyond the outer limits of the exclusive economic zone but over the continental shelf).

Regulations created under the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012 allow seismic surveying as a permitted activity, as long as the proponent complies with the conditions of the Code.

In the territorial sea and in waters outside the exclusive economic zone but over the continental shelf, compliance with the Code remains voluntary and is neither legally binding nor enforceable under the MMPA. Persons who intend to adopt the Code while conducting seismic surveys should follow the steps outlined in Appendix 5 to confirm such intention to the Director-General of Conservation.

2. Definitions

Acoustic source means a source of acoustic pressure waves used, or intended to be used, for the purpose of an acoustic seismic survey; and in relation to a source vessel, means an acoustic source on or controlled from the vessel.

Activate means powering up the acoustic source, and includes reactivate.

Adaptive management means a systematic, iterative decision-making process enabling continuous improvement through flexible decision making that can be adjusted in the face of uncertainties and natural variability as outcomes from management actions and other events become better understood.

Areas of Ecological Importance (AEI) means any of the areas defined in Schedule 1.

Borehole seismic surveying means check-shot and all types of vertical seismic profile surveying.

Calf/calves means a smaller animal (less than two-thirds the body size of an adult) travelling in close association with an adult.

Cetacean means an animal that is a whale or dolphin within the meaning of the Marine Mammals Protection Regulations 1992.

Check-shot surveying is a form of seismic surveying used for correlation of well data with conventional surface seismic data. A receiver (hydrophone or clamped geophone) is progressively positioned at a succession of depths in a borehole and records a series of sound waves emanating from an acoustic source at a fixed point at the surface. Check-shot surveying differs from vertical seismic profile surveying in that a check-shot survey involves a small number of hydrophone depth positions of the order of 100 metres apart, whereas a vertical seismic profile survey often involves a larger number of depth positions of the order of 20 metres apart.

Day or daylight hours means between sunrise and sunset at any given location, and includes the twilight hours of dawn and dusk where there is sufficient light to make effective observations, in the opinion of the qualified marine mammal observer.

Director-General means the Director-General of Conservation.

Explosive means a material (usually chemical), either as a pure single substance or mixture of substances, which is capable of producing a sudden release of gas, heat and pressure by its own energy in the form of an explosion.

Generator-Injector (GI) airgun means a seismic source consisting of two chambers: the generator (G) chamber which creates a sound wave and bubble as in a standard air gun, and an injector (I) chamber that is triggered immediately after the generator into the first bubble to control bubble oscillation.

Good sighting conditions means in daylight hours, during visibility of more than 1.5 km, and in a sea state of less than or equal to Beaufort 3.

Level 1 survey means any marine seismic survey using an acoustic source with a total combined operational capacity exceeding 7 litres/427 cubic inches.

Level 2 survey means any marine seismic survey using an acoustic source with a total combined operational capacity of between 2.50–6.99 litres/151–426 cubic inches capacity.

Level 3 survey means any marine seismic survey using low-energy, high-resolution electro-mechanical sources. These may include small seismic sources of less than 2.49 litres/150 cubic inches capacity, sparkers, pingers and boomers. Level 3 surveys are exempt from the provisions of the Code.

Line turn means the interval between active survey lines where the vessel manoeuvres into position for the next survey line and acquisition of seismic data ceases.

Marine mammal means any cetacean or pinniped species.

Marine Mammal Impact Assessment (MMIA) is a process through which the range of impacts on marine mammals associated with seismic survey activities are determined and steps identified to avoid, remedy or mitigate negative effects and coordinate research activities, as outlined in Appendix 1. Alternatively referred to as environmental impact assessment (EIA) in other legislation.

Marine Mammal Sanctuary (MMS) means any Marine Mammal Sanctuary as defined in section 22 of the Marine Mammals Protection Act 1978.

Marine seismic survey is a method of exploration geophysics that uses active acoustic sources to estimate the structure, stratigraphy and properties beneath the sea floor. The method generates a controlled sound wave from an acoustic source, and detects returned sound energy through an array of acoustic receivers that may either be towed behind a vessel or combined with seismographs placed upon the sea floor.

Mitigation zone a circle with a horizontal radius set at varying distances from the centre of the acoustic source array, not the survey vessel, specified relative to the sensitivity of the marine mammal group concerned.

New Zealand continental waters means the territorial sea; the waters of the exclusive economic zone; and, the waters beyond the outer limits of the exclusive economic zone but over the continental shelf, of New Zealand.

Night or night-time hours means between sunset and sunrise at any given location

Offset vertical seismic profiling (Offset VSP) is similar to a standard VSP, but uses a stationary acoustic source positioned at a fixed distance from the borehole.

Operational area means the entire geographical area potentially used for acoustic source activation throughout the proposed marine survey, including seismic data acquisition lines, acoustic source testing and soft start initiation.

Operational capacity (of the acoustic source) means the cumulative internal volume of all operational acoustic devices within an acoustic source array, including the active generator volume of GI airguns, measured in litres or cubic inches and notified in the Marine Mammal Impact Assessment. Operational capacity does not include redundant acoustic devices that are mounted within the acoustic source array for back-up purposes or the injector volume of GI airguns. Notified operational capacity should not be exceeded during the survey, except where unavoidable for source testing and calibration purposes only. All occasions where activated source volume exceeds notified operational capacity must be fully documented in observer reports.

Operator means the party conducting the marine seismic survey operations.

Other Marine Mammals (as applicable to the 200 m mitigation zones for Level 1 and 2 surveys) means a marine mammal not designated as a Species of Concern in Schedule 2. In New Zealand waters this would most frequently mean New Zealand fur seal (*Arctocephalus forsteri*), common dolphin (*Delphinus delphis*) and dusky dolphin (*Lagenorhynchus obscurus*).

Passive Acoustic Monitoring (PAM) means the use of calibrated hydrophone arrays with full system redundancy to estimate bearing and distance of vocalising cetaceans to at least 1.5 km for Level 1 surveys or at least 1 km for Level 2 surveys. The arrays incorporate appropriate hydrophone elements (1 Hz-180 kHz range) and [sound] data acquisition card technology for sampling relevant frequencies (to 360 kHz) used by New Zealand cetacean species, and are coupled with appropriate observations by software-aided monitoring and listening by a qualified PAM operator skilled in bioacoustic analysis, and computer system specifications capable of running appropriate PAM software effectively.

Pinniped means an animal that is a seal or sea lion within the meaning of the Marine Mammals Protection Regulations 1992.

Poor sighting conditions means either at night, or during daylight visibility of 1.5 km or less, or in a sea state of greater than or equal to Beaufort 4.

Proponent means the party responsible for planning the marine seismic survey, usually the prospecting/exploration/mining permit holder.

Qualified marine mammal observer (MMO) means an observer trained and qualified in accordance with DOC standards and experienced in visual whale and dolphin identification and behaviour, and distance/direction of travel estimations.

Qualified observer means either a qualified marine mammal observer or a qualified PAM operator, having successfully completed the relevant training course recognised by the Department of Conservation and logged a minimum of twelve weeks' sea-time observing in that capacity in New Zealand continental waters.

Qualified PAM operator means an observer trained and qualified in accordance with DOC standards and experienced in whale and dolphin detection using Passive Acoustic Monitoring equipment and techniques.

Shutdown means stopping an active marine seismic survey by immediately turning off power to the acoustic source.

Soft start, in relation to an acoustic source, means the gradual increase of the source's power to the operational power requirement over a period of at least 20 minutes and no more than 40 minutes, starting with the lowest capacity/power acoustic source.

Sound exposure level means a measure of the received energy in the sound source pulse and represents the sound pressure level that would be measured if the pulse energy were spread evenly across a 1-s period.

Sound transmission loss modelling means the process carried out during the environmental impact assessment stage, in advance of a marine seismic survey in an Area of Ecological Importance or Marine Mammal Sanctuary, where acoustic propagation is modelled to predict the received sound levels at various distances, based on the specific configuration of the acoustic source and environmental conditions in the operational survey area.

Source (of acoustic pressure waves) includes any device used to create a pulse of acoustic energy in the ocean and includes airgun, boomer, electromechanical, or chemical device.

Source vessel means a vessel from which an acoustic source is being or is to be deployed for the purposes of a marine seismic survey.

Source vessel observer means a qualified marine mammal observer on board the source vessel.

Species of Concern (SOC) means any individual of the species listed in Schedule 2.

Trained observer means either a marine mammal observer or PAM operator who has successfully completed an appropriate training course recognised by the Department of Conservation or demonstrated competence in observational standards to the satisfaction of the Director-General.

Vertical seismic profiling (VSP) is a form of marine seismic surveying used for correlation of well data with conventional surface seismic data, whereby a receiver (hydrophone or clamped geophone) is progressively positioned at a succession of depths in a borehole, and records a series of sound waves emanating from an acoustic source at a fixed point at the surface near the borehole. VSP surveying differs from check-shot surveying in that a VSP survey involves a large number of depth points of the order of 20 metres apart, whereas a check-shot survey involves a smaller number of depth positions of the order of 100 metres apart.

Walkaway vertical seismic profiling (Walkaway VSP) is similar to a standard VSP, but uses a moving acoustic source at the surface.

3. Part 1: Marine seismic surveys in New Zealand continental waters

This section details the common requirements applicable to all marine seismic survey operations recognised in New Zealand continental waters as being subject to the Code.

Level 1 surveys (>427 cubic inches) primarily include large-scale geophysical investigations that would routinely be employed in oil and gas exploration activities with dedicated marine seismic survey vessels, but may also apply to other studies using high-power acoustic sources. This level features the most stringent requirements for marine mammal protection, and is the main focus of the Code.

Level 2 (151–426 cubic inches) provides for lower scale seismic investigations often associated with scientific research. As these survey programmes are normally conducted from smaller, sometimes multi-mode platforms using moderate power seismic sources or smaller seismic source arrays, the risks to marine mammals are decreased. Therefore the mitigation procedures are reduced accordingly.

Level 3 surveys (<150 cubic inches) include all other small scale seismic survey technologies, and are considered to be of such low impact and risk—with nominal noise levels lower than commercial shipping—that they are not subject to the provisions of the Code.

Borehole seismic surveying (also referred to as vertical seismic profiling) is a specific survey activity related to offshore oil and gas well-bore investigations. Such operations are by necessity limited to a small geographic area and may be conducted from static platforms. Borehole seismic surveys may be determined to be within any of the above levels according to the acoustic source power employed.

In addition to the common provisions detailed in this section, further specific measures related to each specific level are outlined in the relevant sections in Part 2.

3.1 Notification

No person may carry out a marine seismic survey from a vessel in New Zealand continental waters, except a Level 3 survey as identified above, unless he or she has, at the earliest opportunity but not less than three months before commencing the survey, notified the Director-General in writing¹ that such a survey is being planned. Notification does not require provision of all required information; it may simply be to indicate potential intent to the Director-General in order to initiate the communication process. The proponents may meet with relevant departmental staff to discuss aspects of survey planning, and are encouraged to seek advice on possible mitigation options at an early stage.

In the event of exceptional circumstances or an opportunistic survey arising within the three-month notification period, the proponent will notify the Director-General at the earliest opportunity but not less than two weeks before commencing the survey. The notification will be supported by:

- Evidence, to the satisfaction of the Director-General, of the exceptional or opportunistic nature of the survey, and
- A written Marine Mammal Impact Assessment (MMIA).

¹ Can include email notification.

3.2 Pre-survey planning and the MMIA process

The fundamental component of the planning process for Level 1 and 2 surveys is the preparation of the MMIA, which must be made available to any personnel involved in observational capacities. Further specific details can be found in Appendix 1 to guide this process.

Particular attention needs to be given to minimising effects where surveys are planned in any of the Areas of Ecological Importance (which includes the marine mammal sanctuaries) as detailed in Schedule 1. Under normal circumstances marine seismic surveys will not be planned in any sensitive, ecologically important areas or during key biological periods where Species of Concern are likely to be breeding, calving, resting, feeding or migrating, or where risks are particularly evident such as in confined waters (for example, embayments or channels). However, where conducting surveys in such areas and seasons is demonstrated to the satisfaction of the Director-General to be necessary and unavoidable, further measures² may be required to minimise potential impacts. In these instances, proponents will seek advice from the Director-General to develop and agree on mitigation strategies for implementation. This should lead to the development of an appropriate marine mammal mitigation plan for use by observers and crew to guide operations.

A core component of the planning process is for the exploration permit holder to determine the lowest practicable power levels for the acoustic source array that will achieve the geophysical objectives of the survey—and to limit operations to this maximum level.

While the Code is primarily concerned with protection of marine mammals, proponents are strongly encouraged to adopt whatever means are available to avoid or mitigate negative effects on other key species (such as turtles, penguins and seabirds) or key habitats identified in the planning stage as being potentially impacted.

Where Passive Acoustic Monitoring (PAM) is incorporated as a mitigation tool in the survey methodology, pre-survey planning should include input from the lead PAM operator, where possible, to ensure appropriate system specifications. Technical details of the PAM system will be provided to the Director-General in conjunction with the MMIA, along with a general description of proposed system deployment. Further information related to PAM operations can be found in the Reference Document.

Proponents will work with the Department to develop and agree any necessary additional mitigation measures based on the risks identified and the advice of the Director-General, and incorporate them into the survey methodology. While there is no formal approval process resulting in a 'consent', in each case the Director-General will determine whether the MMIA is sufficient for the purposes of the Code.

² Further measures may include, for example, additional observers or observation platforms, aerial observation, acoustic source power restrictions, deployment of static PAM equipment in sensitive areas, incorporation of other supplementary detection methods, or designing the survey so as to avoid trapping marine mammals in confined areas such as narrow, constricted seaways.

3.3 Operational area

It is at the discretion of the proponent to specify the geographical extent of the area needed for their operational activities. This will include locations outside the areas targeted for seismic survey data acquisition where acoustic source equipment testing might need to occur, and where soft starts are initiated in the approach to a survey line. All such areas must be included in the MMIA process. Acoustic seismic sources will not be activated outside the specified operational areas at any time, including for any necessary seismic source testing.

3.4 Training and experience requirements of observers

To be a trained observer (either MMO or PAM³), a person will have:

- Successfully completed the respective marine mammal observation course or PAM operator course recognised by the Director-General as being consistent with DOC standards, or
- Demonstrated all required competencies through an assessment process recognised by the Director-General as being consistent with DOC standards.

To be a qualified observer, in addition to the above a person will have:

- Logged a minimum of 12 weeks' relevant sea-time engaged in marine seismic survey operations in New Zealand continental waters, either as an MMO or PAM operator under the supervision of an appropriately qualified observer.

It is important to ensure the independence of qualified observers engaged in Level 1 surveys. Therefore, seismic survey vessel crew cannot be considered as qualified observers irrespective of training or experience. However for Level 2 seismic survey vessels⁴, crew trained and experienced as outlined above may function as qualified observers for the purposes of the Code.

For the entire duration of the Code, PAM operators with 3 years' professional experience⁵ and a minimum of 12 weeks' relevant international sea-time may be engaged if no other suitable qualified observer is available.

Additional information related to the performance, standards and training of qualified observers, as well as the range of interim measures established to ensure a smooth transition into the new regime, can be found in the Reference Document.

³ To clarify, there can be no cross-over between MMO/PAM observer classes unless the relevant training and experience criteria have been met for each activity. A trained or qualified MMO cannot work as a PAM operator without the necessary training or experience, and vice versa.

⁴ Practical onboard limitations may exist on Level 2 surveys as smaller vessels are normally used with limited accommodation capacity for additional personnel.

⁵ Due to the relatively recent emergence of PAM technology, it may prove difficult to locate suitable operators with 3 years' experience. In such circumstances, the proponent should contact the Director-General to discuss potential alternative options.

3.5 Recording and reporting

All sightings of marine mammals during the survey period, including any beyond the maximum mitigation zone boundaries or while in transit, will be recorded in a standardised format (see Appendix 2). A written trip report shall be submitted by the proponent to the Director-General at the earliest opportunity but no longer than 60 days after completion of the survey.

Recording and reporting of observations of other marine species are also encouraged—noting whether opportunistic or systematic (during required observations)—especially where stakeholders have identified particular sensitivities or interests.

In addition to the above summary report, the qualified observers will submit all raw datasheets directly to the Director-General, at the earliest opportunity but no longer than 14 days after completion of each deployment. Proprietary information provided to the Director-General through these reporting processes will be treated in confidence. Only data on marine mammal detections will be made publicly available, primarily in summary form through updates to information resources for Areas of Ecological Importance, but potentially also for detailed analytical research.

The Director-General should be informed immediately if the qualified observers consider that higher numbers of cetaceans and/or Species of Concern than predicted in the MMIA are encountered at any time during the survey. In such instances where the Director-General determines that any additional measures are necessary, these will be implemented without delay. The Director-General should also be informed immediately about any instances of non-compliance with the Code.

The provisions outlined in this section are distinct from any reporting requirements that may apply under the Crown Minerals (Petroleum) Regulations 2007. These must be undertaken separately, and submitted to New Zealand Petroleum and Minerals.

3.6 Marine Mammal Sanctuaries

No person may carry out a marine seismic survey within a Marine Mammal Sanctuary (MMS) unless he or she has, at the earliest opportunity but not less than three months before commencing the survey:

- Notified the Director-General in writing of his or her intention to carry it out
- Submitted a written environmental impact assessment, and subsequently
- Agreed to comply with any additional conditions, such as increasing the mitigation zones or number of qualified observers required, imposed by the Director-General for operating in a MMS.

3.7 Explosives

No person can use explosives as an acoustic source in New Zealand continental waters.⁶

⁶ It should be noted that on occasion the NZ Defence Force is engaged in disposal of munitions, which may be scientifically monitored to derive seismic survey data. Since the primary focus is disposal of wastes, these activities are not covered by the provisions of the Code, but may be subject to other legislation.

3.8 Operational requirements

3.8.1 Observer effort

While two qualified MMO are required on board at all times, as a minimum one must be on watch during daylight hours while the acoustic source is in the water⁷ in the operational area. Of the two qualified PAM operators required on board at all times⁸, as a minimum one must be on watch while the acoustic source is in the water in the operational area.

It is acceptable for there to be one qualified observer and one trained observer in each observation role (MMO/PAM) on board, if an agreement is in place for an appropriately qualified observer to act in a mentoring capacity to a trained observer for the duration of a voyage.

If the acoustic source is in the water but inactive, such as while waiting for bad weather conditions to pass, the qualified observers have the discretion to stand down from active observational duties and resume at an appropriate time prior to recommencing seismic operations. This strictly limited exception must only be used for necessary meal or refreshment breaks or to attend to other duties directly tied to their observer role onboard the vessel, such as adjusting or maintaining PAM or other equipment, or to attend mandatory safety drills.

So long as it does not cause health and safety issues, it is recommended that both qualified MMO are on watch during pre-start observations during daylight hours, or at any other key times where practical and possible.

Furthermore, an MMO with adequate understanding of the PAM system in operation⁹, while not required for visual observation duties, may provide temporary cover in place of a qualified PAM operator to ensure continuation of 24-hour monitoring. This strictly limited exception is in order to allow for any necessary meal or refreshment breaks. A direct line of communication must be maintained between the MMO and the supervising PAM operator at all times. In such instances, the qualified PAM operator remains ultimately responsible for the duration of the duty watch.

The maximum on-duty shift duration for observers must not exceed 12 hours in any 24-hour period. Schedules must provide for completion of reporting requirements.

3.8.2 MMO duties

While acting in their designated role, MMOs will:

- Give effective briefings to crew members, and establish clear lines of communication and procedures for onboard operations
- Continually scan the water surface in all directions around the acoustic source (not the vessel) for presence of marine mammals, using a combination of the naked eye and high-quality binoculars, from optimum vantage points for unimpaired visual observations with minimum distractions
- Use GPS, sextant, reticle binoculars, compass, measuring sticks, angle boards, or any other appropriate tools to accurately determine distances/bearings and plot positions of marine mammals whenever possible throughout the duration of sightings

⁷ Even in periods of poor sighting conditions there can be intervals where improvements in sighting conditions allow valuable observations to be made.

⁸ If PAM is incorporated in the survey methodology.

⁹ As assessed by the relevant qualified PAM operator on duty in each instance.

- Record and report all marine mammal sightings, including species, group size, behaviour/activity, presence of calves, distance and direction of travel (if discernible)
- Record sighting conditions (Beaufort Sea State, swell height, visibility, fog/rain, and glare) at the beginning and end of the observation period, and whenever the weather conditions change significantly
- Record acoustic source power output while in operation, and any mitigation measures taken
- Communicate with the Director-General to clarify any uncertainty or ambiguity in application of the Code, and
- Record and report any instances of non-compliance with the Code.

3.8.3 PAM operator duties

While acting in their designated role, PAM operators will:

- Give effective briefings to crew members, and establish clear lines of communication and procedures for onboard operations
- Deploy, retrieve, test and optimise hydrophone arrays
- On duty watch, concentrate on continually listening to received signals and/or monitoring PAM display screens in order to detect vocalising cetaceans, except for when required to attend to PAM equipment¹⁰
- Use appropriate sample analysis and filtering techniques
- Record and report all cetacean detections, including, if discernible, identification of species or cetacean group, position, distance and bearing from vessel and acoustic source
- Record type and nature of sound, time and duration heard
- Record general environmental conditions
- Record acoustic source power output while in operation, and any mitigation measures taken
- Communicate with the Director-General to clarify any uncertainty or ambiguity in application of the Code, and
- Record and report any instances of non-compliance with the Code.

Further information related to the required performance standards of qualified observers can be found in Appendix 3.

3.8.4 Authority to shut down or delay start

Any qualified observer on duty has the authority to delay the start of operations or shut down an active survey according to the provisions of the Code.

Where MMO are supported by PAM or other alternative technology operators during surveys, marine mammal detections by any means should initiate a process of dialogue between the qualified observers on duty at the time. This is to ensure that decisions potentially affecting survey operations are made in a robust and mutually supportive manner, based on the skills, experience, capability and professional judgement of the observers. However, mitigation action is not dependent on marine mammals being detected by PAM and confirmed by a MMO—either qualified observer has the authority to act independently in each instance, if necessary.

¹⁰ Undertaking work-related tasks, such as completing reporting requirements, while monitoring equipment is allowed during duty watch, but PAM operators must not be distracted by non-work activities such as listening to music or watching TV/DVDs etc.

It should be noted that consistent with a precautionary approach, if operating in an area where calves are expected to be present or have been observed during the survey, that vocalising cetacean detections by PAM should be assumed to be emanating from a cow/calf pair. In this case the more stringent mitigation zone provisions should be applied, unless determined otherwise by the MMO during good sighting conditions.

Due to the limited detection range of current PAM technology for ultra-high frequency cetaceans¹¹ (<300 m), any such bioacoustic detections will require an immediate shutdown of an active survey or will delay the start of operations, regardless of signal strength or whether distance or bearing from the acoustic source has been determined. Shutdown of an activated acoustic source will not be required if visual observations by a qualified MMO confirm that the acoustic detection was of a species falling into the category of 'Other Marine Mammals'.

3.8.5 Observer deployment

The preference for operational deployment of observers is on the acoustic source vessel. However, if there are critical operational constraints in positioning observation teams on the source vessel, they may be redeployed onto chase or receiver vessels providing that their ability to perform in their specific roles is not compromised. The qualified observers affected must be involved in any discussions in this regard and agree to any redeployment arrangements.

Technology is currently emerging that allows remote monitoring of onboard PAM equipment. Where incorporated into survey methodology, remote monitoring can support, but not replace the minimum complement of two qualified PAM operators required onboard.

3.8.6 Crew observations

If a crew member onboard any vessel involved in survey operations (including chase or support vessels) observes what may be a marine mammal, he or she will promptly report the sighting to the qualified MMO, and the MMO will try to identify what was seen and determine their distance from the acoustic source.

In the event that the MMO is not able to view the animal, they will provide a sighting form to the crew member and instruct on how to complete the form. Vessel crew can relay either the form or basic information to the MMO. If the sighting was within the mitigation zones, it is at the discretion of the MMO whether to initiate mitigation action based on the information available.

Sightings made by members of the crew will be differentiated from those made by MMOs.

3.8.7 Acoustic source power output

The operator will ensure that information relating to the activation of an acoustic source and the power output levels employed throughout survey operations is readily available to support the activities of the qualified observers in real time by providing a display screen for acoustic source operations.

It is the responsibility of the operator to immediately notify the qualified observers if operational capacity is exceeded at any stage.

¹¹ For the purposes of the Code, ultra-high frequencies are defined as those between 30 and 180 kHz.

3.8.8 Acoustic source tests

Seismic source tests will be subject to the relevant soft start procedures for each survey level, though the 20-minute minimum duration does not apply. Where possible, power should be built up gradually to the required test level at a rate not exceeding that of a normal soft start. Level 1 and 2 seismic source tests with a maximum combined source capacity of <2.49 litres or 150 cubic inches do not require soft start procedures, and can be undertaken following relevant pre-start observations.

Acoustic source tests cannot be used for mitigation purposes, or to avoid implementation of soft start procedures.

3.8.9 Multiple acoustic sources

In specific instances where two acoustic sources of differing power outputs (that fall in different Levels under the Code) are employed simultaneously in a survey, the relevant provisions of the Code will be applied according to the combined operational capacities of the acoustic sources.

Where two acoustic sources of differing power outputs are employed at different times during a survey, the relevant requirements of the Code shall apply in each case according to the operational capacity of the specific acoustic source in use.

3.8.10 Soft starts

Level 1 or 2 acoustic sources will not be activated at any time except by soft start, unless the source is being reactivated after a single break in firing (not in response to a marine mammal observation within a mitigation zone) of less than 10 minutes immediately following normal operations at full power, and the qualified observers have not detected marine mammals in the relevant mitigation zones as outlined in section 4.1.4 (Level 1 surveys) or 4.2.4 (Level 2 surveys). This means a gradual increase of the source's power, starting with the lowest capacity gun, over a period of at least 20 minutes and no more than 40 minutes.

It is not permissible to repeat the 10-minute break exception from soft start requirements by sporadic activation of acoustic sources at full or reduced power within that time.

Soft starts will be scheduled so as to minimise, as far as possible, the interval between reaching full power operation and commencing a survey line.

3.8.11 Line turns

Operators are strongly encouraged to reduce unnecessary marine noise, if possible and practical, by shutting down at the end of a line and reactivating the acoustic source according to the applicable soft start procedures and pre-start observations.

However the use of acoustic sources for mitigation purposes during line turns immediately following normal full power operations is allowed, providing that the power output of the acoustic source during line turns is reduced to levels that limit effective ensonification to the maximum mitigation zone boundary. Use of acoustic sources for mitigation purposes should only be used in exceptional circumstances where demonstrated by the proponent to be necessary, and must be discussed and agreed with the Director-General as part of the MMIA process.

If mitigation acoustics are employed, they will be subject to the same shutdown provisions as normal seismic survey operations.

4. Part 2: Specific requirements for each level of marine seismic survey

4.1 Level 1 surveys

4.1.1 Pre-survey planning

No person may carry out a Level 1 marine seismic survey in New Zealand continental waters unless he or she has, at the earliest opportunity but not less than one month before commencing the survey, submitted to the Director-General a written MMIA (see Appendix 1).

When planning to operate in areas of identified sensitivity, proponents should develop adaptive management procedures to ensure that survey activities can be modified to respond to unforeseen circumstances and minimise risks of negative impacts by incorporating additional mitigative measures. In all circumstances, the provisions of the Code must be considered as the minimum required.

4.1.2 Observer requirements

For all Level 1 surveys the minimum qualified observer requirements are:

- **At all times there will be at least two qualified MMOs on board, and**
- **At all times there will be at least two qualified PAM operators on board**
- The qualified observers will be dedicated in that their roles on the vessel are strictly for the detection and data collection of marine mammal sightings, and instructing crew on their requirements when a marine mammal is detected within the relevant mitigation zone, and
- At all times while the acoustic source is in the water, at least one qualified MMO (during daylight hours) and at least one qualified PAM operator will maintain watches for marine mammals.

Observations by qualified observers are also encouraged at all other times where practical and possible.

If the PAM system has malfunctioned or become damaged, operations may continue for 20 minutes without PAM while the PAM operator diagnoses the issue. If the diagnosis indicates that the PAM gear must be repaired to solve the problem, operations may continue for an additional **2 hours** without PAM monitoring as long as all of the following conditions are met:

- It is daylight hours and the sea state is less than or equal to Beaufort 4
- No marine mammals were detected solely by PAM in the relevant mitigation zones in the previous 2 hours
- Two MMOs maintain watch at all times during operations when PAM is not operational
- DOC is notified via email as soon as practicable with the time and location in which operations began without an active PAM system
- Operations with an active source, but without an active PAM system, do not exceed a cumulative total of 4 hours in any 24 hour period.

4.1.3 Pre-start observations

Normal requirements

A Level 1 acoustic source can only be activated if it is within the specified operational area, and no marine mammals have been observed or detected in the relevant mitigation zones as outlined in section 4.1.4.

The source cannot be activated during daylight hours unless:

- At least one qualified MMO has continuously made visual observations all around the source for the presence of marine mammals, from the bridge (or preferably an even higher vantage point) using both binoculars and the naked eye, and no marine mammals (other than fur seals) have been observed in the relevant mitigation zone for at least 30 minutes, and no fur seals have been observed in the relevant mitigation zones for at least 10 minutes, and
- Passive Acoustic Monitoring for the presence of marine mammals has been carried out by a qualified PAM operator for at least 30 minutes before activation and no vocalising cetaceans have been detected in the relevant mitigation zones.

The source cannot be activated during night-time hours or poor sighting conditions unless:

- Passive Acoustic Monitoring for the presence of marine mammals has been carried out by a qualified PAM operator for at least 30 minutes before activation, and
- The qualified observer has not detected vocalising cetaceans in the relevant mitigation zones.

Additional requirements for start up in a new location in poor sighting conditions

In addition to the normal pre-start observation requirements outlined above, when arriving at a new location in the survey programme for the first time, the initial acoustic source activation must not be undertaken at night or during poor sighting conditions unless either:

- MMOs have undertaken observations within 20 nautical miles of the planned start up position for at least the last 2 hours of good sighting conditions preceding proposed operations, and no marine mammals have been detected; or
- Where there have been less than 2 hours of good sighting conditions preceding proposed operations (within 20 nautical miles of the planned start up position), the source may be activated if:
 - PAM monitoring has been conducted for 2 hours immediately preceding proposed operations, and
 - Two MMOs have conducted visual monitoring in the 2 hours immediately preceding proposed operations, and
 - No Species of Concern have been sighted during visual monitoring or detected during acoustic monitoring in the relevant mitigation zones in the 2 hours immediately preceding proposed operations, and
 - No fur seals have been sighted during visual monitoring in the relevant mitigation zone in the 10 minutes immediately preceding proposed operations, and
 - No other marine mammals have been sighted during visual monitoring or detected during acoustic monitoring in the relevant mitigation zones in the 30 minutes immediately preceding proposed operations.

4.1.4 Delayed starts and shutdowns

Species of Concern with calves within a mitigation zone of 1.5 km

If, during pre-start observations or while a Level 1 acoustic source is activated (which includes soft starts), a qualified observer detects at least one cetacean with a calf within 1.5 km of the source, start up will be delayed or the source will be shut down and not be reactivated until:

- A qualified observer confirms the group has moved to a point that is more than 1.5 km from the source, or
- Despite continuous observation, 30 minutes has elapsed since the last detection of the group within 1.5 km of the source, and the mitigation zone remains clear.

Species of Concern within a mitigation zone of 1 km

If, during pre-start observations or while a Level 1 acoustic source is activated (which includes soft starts), a qualified observer detects a Species of Concern within 1 km of the source, start up will be delayed or the source will be shut down and not reactivated until:

- A qualified observer confirms the Species of Concern has moved to a point that is more than 1 km from the source, or
- Despite continuous observation, 30 minutes has elapsed since the last detection of the Species of Concern within 1 km of the source, and the mitigation zone remains clear.

Other Marine Mammals within a mitigation zone of 200 m

If, during pre-start observations prior to initiation of a Level 1 acoustic source soft start, a qualified observer detects a marine mammal within 200 m of the source, start up will be delayed until:

- A qualified observer confirms the marine mammal has moved to a point that is more than 200 m from the source, or
- Despite continuous observation, 10 minutes has passed since the last detection of a New Zealand fur seal within 200 m of the source and 30 minutes has elapsed since the last detection of any other marine mammal within 200 m of the source, and the mitigation zone remains clear.

If all mammals detected within the relevant mitigation zones are observed moving beyond the respective areas, there will be no further delays to initiation of soft start.

4.2 Level 2 survey

4.2.1 Pre-survey planning

No person may carry out a Level 2 marine seismic survey in New Zealand continental waters unless he or she has, at the earliest opportunity but not less than one month before commencing the survey, submitted to the Director-General a written MMIA (see Appendix 1).

In the event of exceptional circumstances or an opportunistic survey arising that does not provide sufficient time to complete an MMIA, the proponent will provide evidence to that effect to the satisfaction of the Director-General at the earliest opportunity but not less than two weeks before commencing the survey. Though a full MMIA may not be required in such circumstances, high-level information on any potential marine mammal sensitivities in the operational area based on available data must be determined as a minimum.

4.2.2 Observer requirements

For all Level 2 surveys the minimum qualified observer requirements are:

- **At all times there will be at least two qualified MMO on board**
- The qualified observers will be dedicated in that their roles during the period of seismic surveying on the vessel are strictly for the detection and data collection of marine mammal sightings and instructing crew on their requirements when a marine mammal is detected within the relevant mitigation zone; and,
- At all times while the acoustic source is in the water (during daylight hours), at least one qualified MMO will maintain a watch for marine mammals.

PAM is likely to be a requirement for Level 2 surveys in the future when mandatory regulations are being considered. However, at this stage under the Code it remains an optional consideration for Level 2 surveys. Where PAM is incorporated, the additional minimum qualified observer requirements are:

- At all times there will be at least **two qualified PAM operators** on board the source vessel, and
- At all times while the acoustic source is in the water, at least one qualified PAM operator will maintain a watch for marine mammals.
- If the PAM system has malfunctioned or become damaged, operations may continue in the absence of PAM while repairs are conducted.

4.2.3 Pre-start observations

A Level 2 acoustic source can only be activated if it is within the specified operational area, and no marine mammals have been observed or detected in the respective mitigation zones.

The source cannot be activated during daylight hours unless:

- At least one qualified MMO has continuously made visual observations all around the source for the presence of marine mammals, from the bridge (or preferably an even higher vantage point) using both binoculars and the naked eye, and no marine mammals have been observed in the respective mitigation zones for at least 30 minutes, and
- If incorporated, Passive Acoustic Monitoring¹² for the presence of marine mammals has been carried out by a qualified PAM operator for at least 30 minutes before activation and no vocalising cetaceans have been detected in the respective mitigation zones.

The source cannot be activated during night-time hours or poor sighting conditions unless:

- Passive Acoustic Monitoring for the presence of marine mammals has been carried out by a qualified PAM operator for at least 30 minutes before activation and no vocalising cetaceans have been detected in the relevant mitigation zones.

Operations at night or during poor sighting conditions

If PAM or other alternative technologies acceptable to the Director-General are incorporated to support marine mammal observations and are fully operational, Level 2 acoustic sources may be activated and active surveys may proceed at night or during poor sighting conditions, according to the provisions of the Code, following pre-start observations detailed above.

¹² If PAM is in operation, all non-essential sources of marine noise (such as multi-beam sonar) should be switched off during pre-start observations to reduce interference.

However, when observations are limited to MMOs for Level 2 survey operations, start up can be initiated and active surveys may proceed at night or during poor sighting conditions only if:

- There have not been more than 3 marine mammal instigated shutdowns or delayed starts in the previous 24 hours of active survey operations in good sighting conditions, or
- If active survey operations were not conducted in the previous 24 hours, MMOs have undertaken observations within a radius of 20 nm of the proposed start-up position for at least the last 2 hours of good sighting conditions during the daylight hours preceding proposed operations and no marine mammals have been detected.

4.2.4 Delayed starts and shutdowns

Species of Concern with calves within a mitigation zone of 1 km

If, during pre-start observations or while a Level 2 acoustic source is activated (which includes soft starts), a qualified observer detects at least one cetacean with a calf within 1 km of the source, start up will be delayed or the source will be shut down and not be reactivated until:

- A qualified observer confirms the group has moved to a point that is more than 1 km from the source, or
- Despite continuous observation, 30 minutes has elapsed since the last detection of the group within 1 km of the source, and the mitigation zone remains clear.

Species of Concern within a mitigation zone of 600 m

If, during pre-start observations or while a Level 2 acoustic source is activated (which includes soft starts), a qualified observer detects a Species of Concern within 600 m of the source, start up will be delayed or the source will be shut down and not reactivated until:

- A qualified observer confirms the Species of Concern has moved to a point that is more than 600 m from the source, or
- Despite continuous observation, 30 minutes has elapsed since the last detection of a Species of Concern within 600 m of the source, and the mitigation zone remains clear.

Other Marine Mammals within a mitigation zone of 200 m

If, during pre-start observations prior to initiation of a Level 2 acoustic source soft start, a qualified observer detects a marine mammal within 200 m of the source, start up will be delayed until:

- A qualified observer confirms the marine mammal has moved to a point that is more than 200 m from the source, or
- Despite continuous observation, 10 minutes has passed since the last detection of a New Zealand fur seal within 200 m of the source and 30 minutes has elapsed since the last detection of any other marine mammal within 200 m of the source, and the mitigation zone remains clear.

If all mammals detected within the relevant mitigation zones are observed moving beyond the respective areas, there will be no further delays to initiation of soft start.

4.3 Borehole seismic surveys

4.3.1 Pre-survey planning

No person may carry out a borehole seismic survey in New Zealand continental waters unless he or she has, at the earliest opportunity but not less than one month before commencing the survey, submitted to the Director-General a written MMIA (see Appendix 1).

When planning to operate in areas of identified sensitivity, proponents should develop adaptive management procedures to ensure that borehole seismic survey activities can be modified to respond to unforeseen circumstances and minimise risks of negative impacts by incorporating additional mitigation measures. In all circumstances, the provisions of the Code must be considered as the minimum required.

4.3.2 Observer requirements

Observer requirements shall depend on the capacity of the acoustic source being used for the borehole seismic survey, and shall comply with the requirements for the applicable Level 1 or 2 survey.

4.3.3 Crew observations

If a crew member onboard any vessel or drilling rig involved in borehole seismic survey operations observes what may be a marine mammal, he or she will promptly report the sighting to the qualified MMO, and the MMO will try to identify what was seen and determine their distance from the acoustic source.

In the event that the MMO is not able to view the animal, they will provide a sighting form to the crew member and instruct on how to complete the form. Vessel or drilling rig crew can relay either the form or basic information to the MMO. If the sighting was within the mitigation zones, it is at the discretion of the MMO whether to initiate mitigation action based on the information available.

Sightings made by members of the crew will be differentiated from those made by qualified observers.

4.3.4 Pre-start observations

Pre-start observation requirements shall depend on the capacity of the acoustic source being used for the borehole seismic survey, and shall comply with the requirements for the applicable Level 1 or 2 survey.

4.3.5 Soft starts

It is recognised that alternative acoustic source technologies may be used for borehole seismic surveys, and that soft start may not be possible in the same manner as a conventional marine seismic source array. Where possible, initial activation of the acoustic source must involve the gradual increase of the source's power over a period of at least 20 minutes and no more than 40 minutes, unless the source is being reactivated after a break in firing less than 10 minutes before that time. In the case of borehole seismic surveying, activation of the acoustic source at least once within sequential 10 minute periods shall be regarded as continuous operation.

4.3.6 Delayed starts and shut downs

Delayed start and shutdown requirements shall depend on the capacity of the acoustic source being used for the borehole seismic survey, and shall comply with the requirements for the applicable Level 1 or 2 survey.

Appendix 1: Marine Mammal Impact Assessment

The purpose of the MMIA process is to ensure that the proponent has:

- Identified all potential effects of their activities on marine species and habitats in the receiving environment
- Provided an opportunity for appropriate expert technical advice to be considered
- Avoided, wherever possible, operating in sensitive, ecologically important areas or during key biological periods where Species of Concern are likely to be breeding, calving, resting, feeding or migrating, or where marine mammals are present in confined waters, and
- Implemented whatever measures may be necessary to minimise the identified impacts to acceptable levels.

An MMIA will contain sufficient information to enable the Director-General to understand the nature of the proposed marine seismic survey activities and their effects on the environment, in such detail as corresponds to the scale and significance of the effects that the activities may have. Information will be provided on risks of negative impacts on the particular environmental sensitivities of the proposed area of operations, and consideration will be given to the timing, duration and intensity of the survey. An MMIA will:

- Describe the activities related to the proposed marine seismic survey
- Describe the state of the local environment in relation to marine species and habitats, with particular focus on marine mammals, prior to the activities being undertaken
- Identify the actual and potential effects of the activities on the environment and existing interests, including any conflicts with existing interests
- Identify the significance (in terms of risk and consequence) of any potential negative impacts and define the criteria used in making each determination
- Identify persons, organisations or tangata whenua with specific interests or expertise relevant to the potential impacts on the environment
- Describe any consultation undertaken with persons described above and specify those who have provided written submissions on the proposed activities
- Include copies of any written submissions from the consultation process
- Specify any possible alternative methods for undertaking the activities to avoid, remedy, or mitigate any adverse effects
- Specify the measures that the operator intends to take to avoid, remedy, or mitigate the potential adverse effects identified
- Specify a monitoring and reporting plan, and
- Specify means of coordinating research opportunities, plans, and activities relating to reducing and evaluating environment effects.

For the purposes of the Code, the meaning of the word ‘effect’ includes:

- Any positive or adverse effect
- Any temporary or permanent effect
- Any past, present, or future effect
- Any cumulative effect that arises over time or in combination with other effects
- Any potential effect of high probability, and
- Any potential effect of low probability that has a high potential impact.

Where activities are planned in Areas of Ecological Importance or Marine Mammal Sanctuaries, sound transmission loss modelling will be incorporated into the MMIA methodology and ground-truthed during the course of the survey by appropriate means. Such modelling will indicate predicted sound levels within the various mitigation zones and potential impacts on species present. If sound levels are predicted to exceed either 171 dB re 1 $\mu\text{Pa}^2\text{-s}$ at distances corresponding to the relevant mitigation zones for Species of Concern or 186 dB re 1 $\mu\text{Pa}^2\text{-s}$ at 200 m, consideration will be given to either extending the radius of the mitigation zone or limiting acoustic source power accordingly.

While the focus of the MMIA will be on marine mammals, proponents should also identify broader effects on other significant species or habitats, and include consideration of options for mitigation of any negative impacts—such as incorporation of turtle exclusion devices to prevent entrapment within their distribution range.

An MMIA for the purposes of the Code could be one component of a larger Health Safety and Environment (HSE) plan governing operations, which are commonly employed in the oil and gas sector. In such instances submission of the HSE plan or its relevant parts will be acceptable, providing the details outlined above are included as a minimum. Similarly, where industry practice is to prepare a generic project environmental impact assessment (EIA) at the permit award stage, additional studies will be required to complete the MMIA submitted under the Code if information gaps are identified when specific details of the marine seismic survey are confirmed.

There is no formal approval issued by the Director-General. However, the MMIA review process provides for the Department of Conservation’s marine mammal specialist technical advisors to give appropriate guidance according to the relative impacts and risks of the proposed survey. The MMIA review will be coordinated by the National Office and will involve all relevant technical specialists from across the organisation, depending on the specific circumstances of the survey programme. The Director-General will endeavour to provide an initial response within 10 working days, and within 5 working days for any subsequent matters.

In each case, the Director-General will seek assurance that the measures provided for in the Code, or any additional measures proposed by the proponent, are appropriate to the risks identified. Where such assurance is not provided, the Director-General will advise on any further actions that are deemed necessary to minimise impacts. Proponents will work with the Department to develop and agree any necessary additional mitigation measures based on the advice of the Director-General, and incorporate them into the survey methodology.

The final MMIA must be made available to any personnel engaged in observational duties. Furthermore, where additional mitigation measures have been agreed, a specific marine mammal mitigation plan for the survey should be developed and circulated amongst observers and crew to guide offshore operations.

Appendix 2: Observer reporting

MMO and PAM operators are jointly responsible for recording observational data generated while on duty, and compiling a summary report. This report will detail:

- The identity, qualifications and experience of those involved in observations
- Observer effort, including totals for watch effort (hours and minutes)
- Observational methods employed
- Name of the operator and any vessels/aircraft used
- Specifications of the seismic source array, and PAM array (if included)
- Position, date, start/end of survey, GPS track logs of vessel movements
- Totals for seismic source operations (hours and minutes) indicating respective durations of full-power operation, soft starts and acoustic source testing, and power levels employed, plus at least one random soft start sample per swing
- Sighting/acoustic detection records indicating:
 1. method of detection
 2. position of vessel/acoustic source
 3. distance and bearing of marine mammals related to the acoustic source
 4. direction of travel of both vessel and marine mammals
 5. number, composition, behaviour/activity and response of the marine mammal group (plotted in relation to vessel throughout detection)
 6. confirmed identification keys for species or lowest taxonomic level
 7. confidence level of identification
 8. descriptions of distinguishing features of individuals where possible
 9. acoustic source activity and power at time of sighting
 10. environmental conditions
 11. water depth, and
 12. for PAM detections, time and duration heard, type and nature of sound
- General location, time, duration and reasons where observations were affected by poor sighting conditions
- Position, time and number of delays and shutdowns initiated in response to the presence of marine mammals
- Position, duration and maximum power attained where operational capacity is exceeded
- Any instances of non-compliance with the Code.

Differentiation should be made between data derived from:

- MMO and PAM operators
- qualified observers and others
- watches during survey operations (ON Survey) or at other times (OFF Survey).

Data must be recorded in a standardised format, which can be downloaded from the Department of Conservation website¹³ at <http://www.doc.govt.nz/notifications>.

¹³ It is critical for observers to ensure that the report form functions correctly on their computer system before going to sea. Ensuring access to spare computer capacity onboard is also highly recommended.

Appendix 3: MMO and PAM operator standards

MMO standards

The standards for being considered a trained marine mammal observer include demonstrating proficiency in the following areas as minimum requirements:

- Understanding mitigation and reporting requirements under the Code
- Measuring distance, true speed and direction of travel of marine mammals and vessel movement
- Navigation (e.g. true vs magnetic north, course vs heading)
- Plotting positions of marine mammals in relation to vessel and acoustic source
- Detection and identification of New Zealand marine mammal species, and behaviour/activity assessment
- Understanding relevant aspects of seismic survey operations.

While engaged in observation duties onboard seismic survey vessels, qualified marine mammal observers are expected to be able to use the following tools effectively:

- Reticle binoculars and/or sextant¹⁴ for medium- to long-range (>500 m) distance determinations
- Measuring sticks (in addition to reticle binoculars or sextant) for short-range distance determinations
- Angle boards and compass for bearing determinations from vessel
- GPS to record vessel coordinates accurately and download track logs.

‘Eye-estimations’ of distance are strongly discouraged, and may only be used when the horizon is not visible as a reference for distance calculations or where insufficient time is available to employ more accurate methods of measurement.

Alternative technologies for visual observations and distance determination, such as thermal imaging or high-definition photography systems, are being trialled and may prove to be more effective under certain conditions. Where demonstrated to be at least as good as, if not better than sextant or reticle binoculars, these may be used to supplement visual observations.

¹⁴ The sextant remains the most reliable and accurate instrument for determining distances at sea where the horizon is visible. However, despite its technological simplicity and long history of maritime use, its use by observers has been limited to date. Relatively inexpensive, lightweight plastic versions are widely available, and while it remains at the discretion of the MMO whether to use one in each specific circumstance, it is strongly encouraged that all MMO have a sextant available as a professional tool.

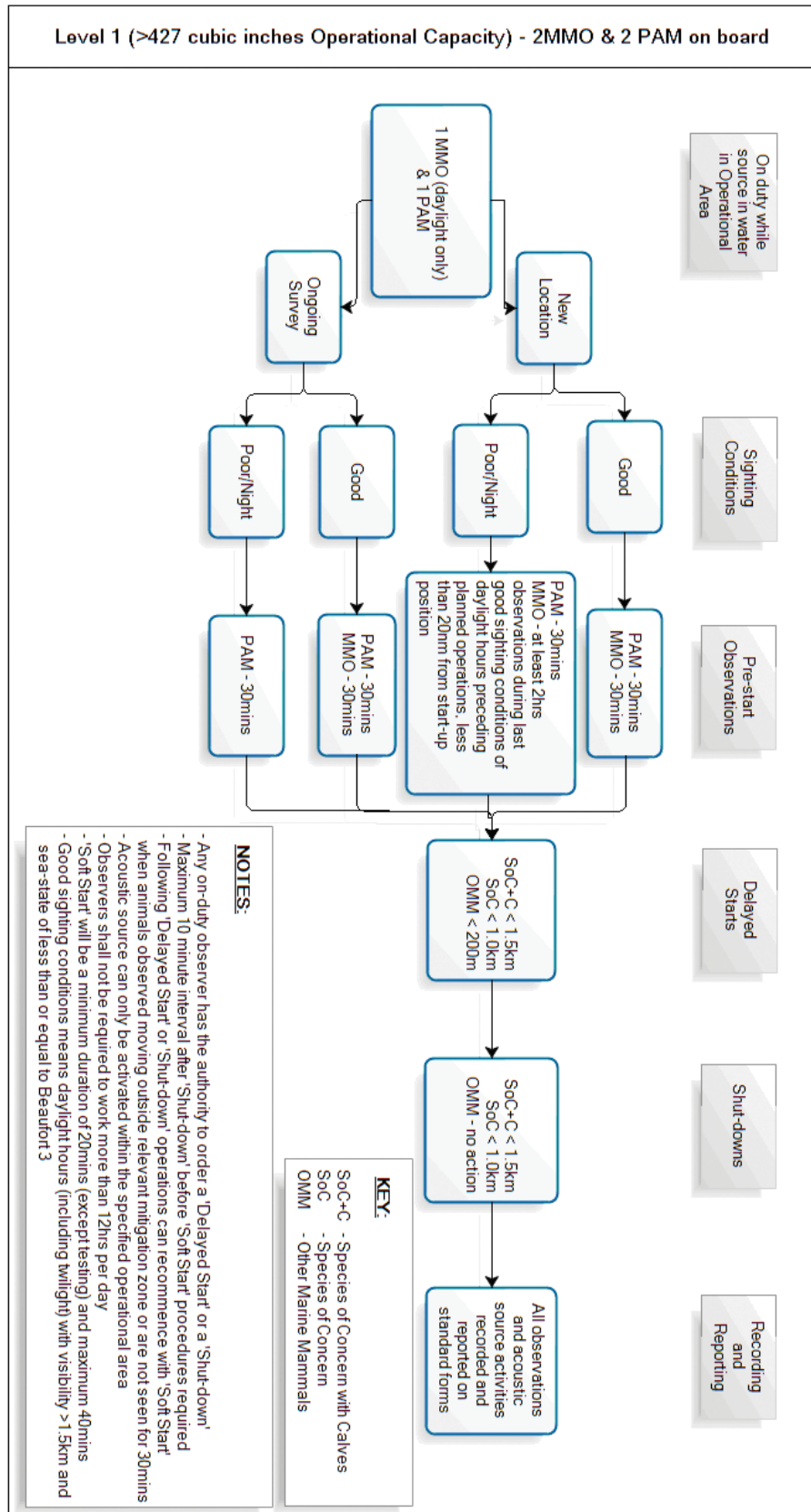
PAM operator standards

The standards for being considered a trained PAM operator include demonstrating proficiency in the following areas as minimum requirements:

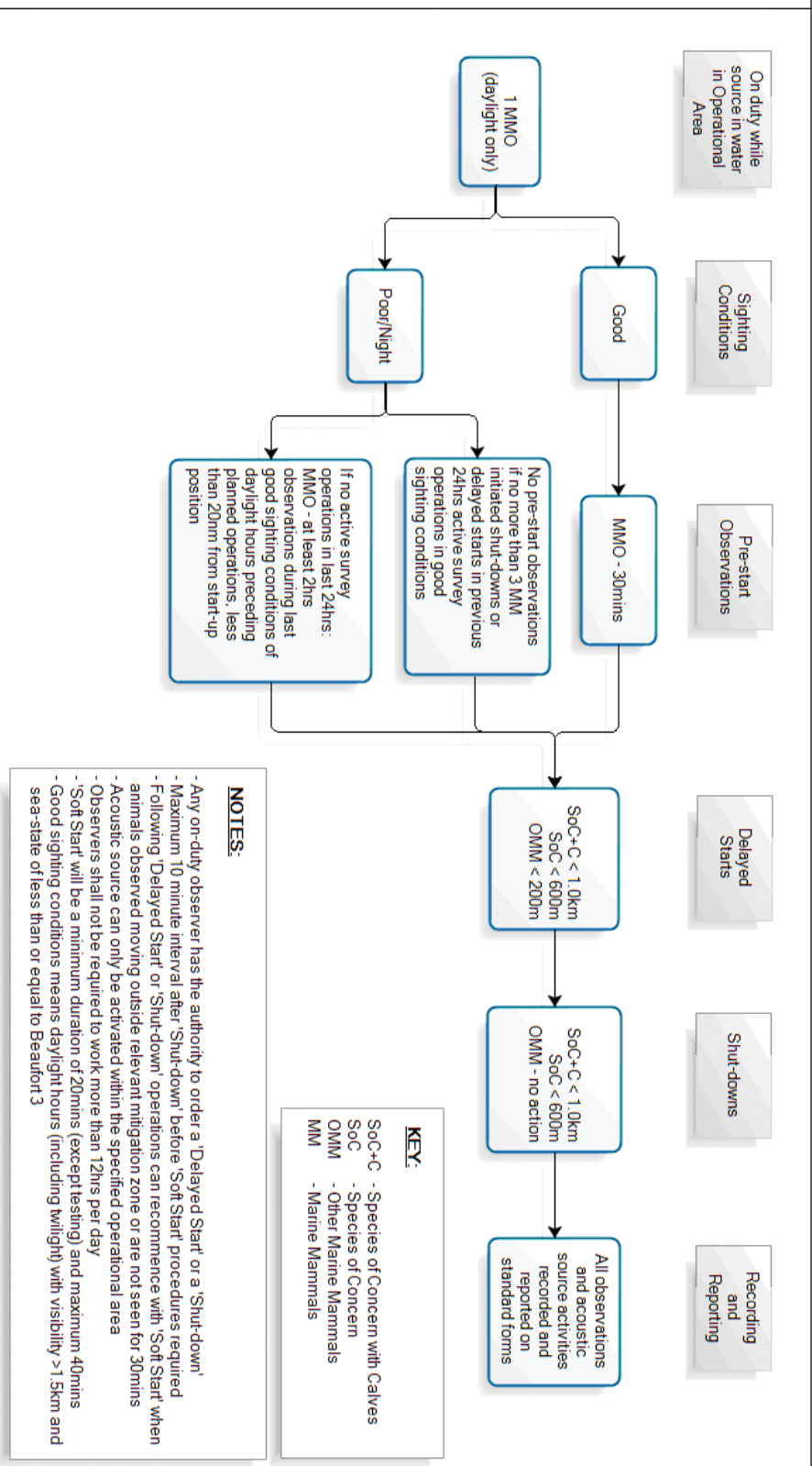
- Understanding mitigation and reporting requirements under the Code
- Optimised deployment and configuration of PAM equipment to ensure effective detections of cetaceans for mitigation purposes
- Detection and identification of vocalising species or cetacean groups
- Measuring distance and bearing of vocalising cetaceans while accounting for vessel movement
- Navigation (e.g. true vs magnetic north, course vs heading)
- Plotting positions of cetaceans in relation to vessel and acoustic source
- Understanding relevant aspects of seismic survey operations.

PAM operators should regularly refresh their detection skills through practice with simulation-modelling software, particularly with species relevant to the region of proposed operations (if available), in preparation for the start of the survey programme. Operators should keep up to date with training on the latest software/hardware advances.

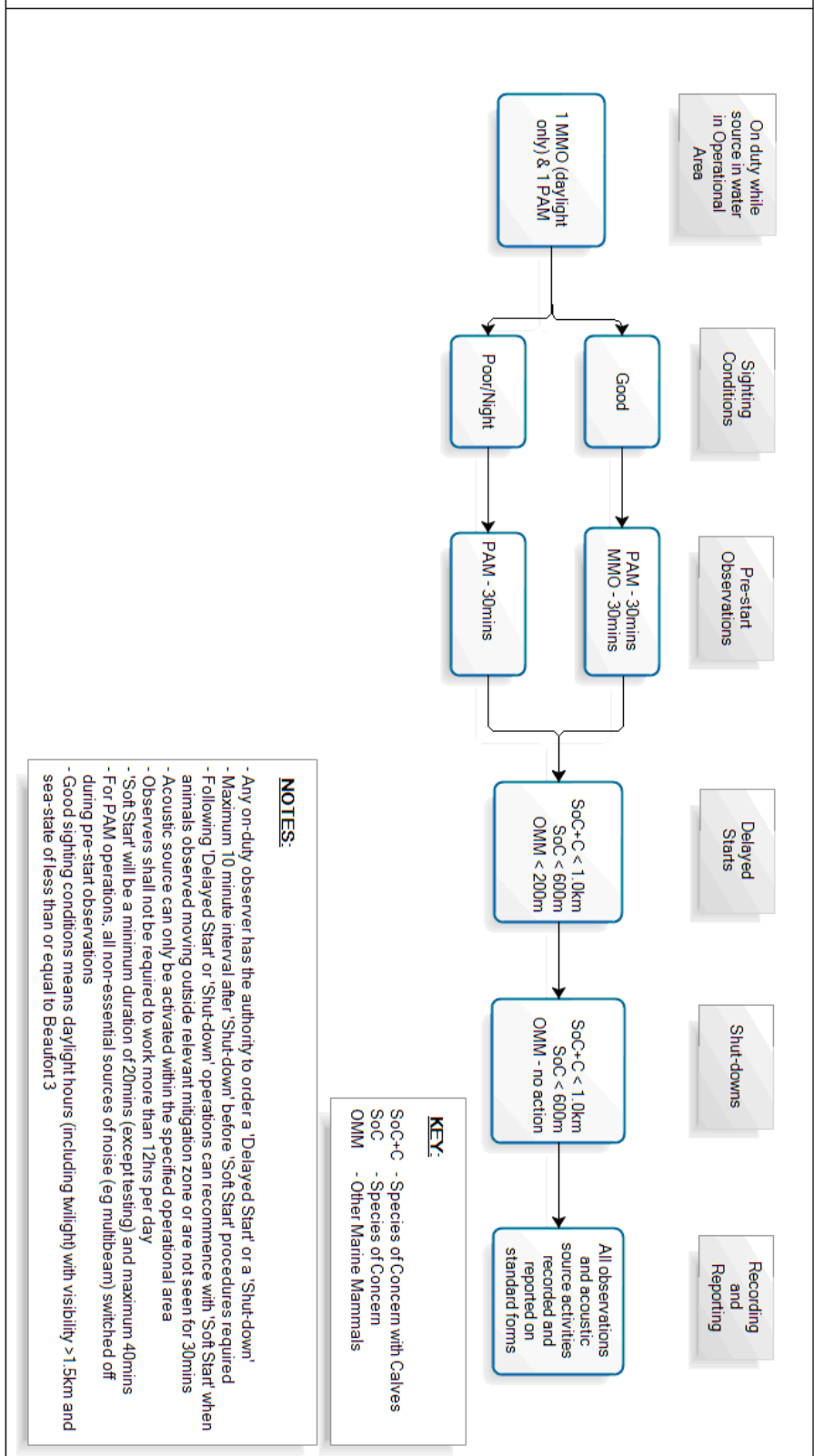
Appendix 4: Operational flowcharts



Level 2 (151-426 cubic inches Operational Capacity) - 2MMO only



Level 2 (151-426 cubic inches Operational Capacity) - 2MMO & 2 PAM on board



Appendix 5: Adoption

Acceptance of the 2013 Code of Conduct for Minimising Acoustic Disturbance to Marine Mammals from Seismic Survey Operations (the Code) and Agreement to Follow its Provisions

Persons who intend to follow the Code while conducting seismic surveys in New Zealand continental waters should take the following steps to confirm such intention—

- a. Download and print a copy of the code from www.doc.govt.nz
- b. Complete the following form with necessary details as indicated
- c. Send the signed copy of this page to the Director-General of Conservation at the address/email below.

Taking the above steps will ensure that the Director-General of Conservation is aware of the extent of uptake of the Code in industry practice. Acceptance of the Code and fulfilling its recommendations will also mean that the Director-General will be furnished with relevant reports from time to time. Such reports would assist in developing further knowledge about the relevant marine mammals, and in turn improve conservation work with respect to them.

I, *(name)* _____

of *(address)* _____,

being authorised by and on behalf of

(name of the company/body corporate) _____

accept the 2012 Code of Conduct for Minimising Acoustic Disturbance to Marine Mammals from Seismic Survey Operations and its supporting Reference Document and agree that its provisions will be followed in respect of seismic survey operations, conducted under the authority of

(name of the company/body corporate) _____

in New Zealand continental waters during the term of the Code.

I understand that following acceptance of the Code,

(name of the company/body corporate) _____

will provide all relevant notifications and reports to the Director-General as expected under the Code. I also understand that the Code is voluntary, and its acceptance and agreement to follow its provisions does not bind

(name of the company/body corporate) _____

in any way under the Marine Mammals Protection Act 1978.

Signature: _____

Date: _____

Send a copy of this form to:

Director-General,
Department of Conservation
PO Box 10420, Wellington 6143

OR marinemammals@doc.govt.nz

Schedule 1: Areas of Ecological Importance

As detailed in Part 1, seismic survey operations within any AEI (which includes the Marine Mammal Sanctuaries) have more comprehensive planning requirements and considerations, including specific additional measures in the MMIA process (see Appendix 1).

The locations and extent of AEI in New Zealand continental waters have been determined from the Department's database records for marine mammal sightings and strandings, as well as from fisheries-related data maintained by the Ministry for Primary Industries through the National Aquatic Biodiversity Information System (NABIS). In addition, technical input from marine mammal experts has been used to refine the AEI maps where data may be absent or incomplete.

The databases are continually evolving, so the AEI will be updated and refined as new information comes to light. To assist planning, online resources have been developed on the Department of Conservation website which will be subject to ongoing review.

Information on AEI can be found at the following URL:

<http://www.doc.govt.nz/aei>

It must be remembered that since understanding about marine mammal distribution and life history is incomplete, the information related to an AEI should not be considered conclusive. There may be other areas beyond the identified AEI where particular sensitivities could exist. Where such areas are identified in the MMIA process, the proponent should discuss potential impacts and mitigation measures with the Director-General.

Schedule 2: Species of Concern

LATIN NAME	COMMON NAME
<i>Megaptera novaengliae</i>	Humpback Whale
<i>Balaenoptera borealis</i>	Sei Whale
<i>Balaenoptera edeni</i>	Bryde's Whale
<i>Balaenoptera bonaerensis</i>	Antarctic Minke Whale
<i>Balaenoptera acutorostrata subsp.</i>	Dwarf Minke Whale
<i>Balaenoptera musculus</i>	Blue Whale
<i>Balaenoptera physalus</i>	Fin Whale
<i>Balaenoptera musculus brevicauda</i>	Pygmy Blue Whale
<i>Eubalaena australis</i>	Southern Right Whale
<i>Caperea marginata</i>	Pygmy Right Whale
<i>Lissodelphis peronii</i>	Southern Right-whale Dolphin
<i>Globicephala melas</i>	Long-finned Pilot Whale
<i>Globicephala macrorhynchus</i>	Short-finned Pilot Whale
<i>Peponcephala electra</i>	Melon-headed Whale
<i>Physeter macrocephalus</i>	Sperm Whale
<i>Kogia sima</i>	Dwarf Sperm Whale
<i>Kogia breviceps</i>	Pygmy Sperm Whale
<i>Mesoplodon grayi</i>	Gray's Beaked Whale
<i>Berardius arnuxii</i>	Arnoux's Beaked Whale
<i>Ziphius cavirostris</i>	Cuvier's Beaked Whale
<i>Mesoplodon layardii</i>	Strap-toothed Whale
<i>Hyperoodon planifrons</i>	Southern Bottlenose Whale
<i>Mesoplodon bowdoini</i>	Andrew's Beaked Whale
<i>Mesoplodon mirus</i>	True's Beaked Whale
<i>Mesoplodon densirostris</i>	Blainville's Beaked Whale
<i>Mesoplodon ginkgodens</i>	Ginkgo-toothed Whale
<i>Mesoplodon hectori</i>	Hector's Beaked Whale
<i>Mesoplodon peruvianus</i>	Pygmy/Peruvian Beaked Whale
<i>Tasmacetus shepherdi</i>	Shepherd's Beaked Whale
<i>Orcinus orca</i>	Killer Whale
<i>Pseudorca crassidens</i>	False Killer Whale
<i>Feresa attenuata</i>	Pygmy Killer Whale
<i>Cephalorhynchus hectori</i>	Hector's Dolphin
<i>Cephalorhynchus hectori maui</i>	Maui's Dolphin
<i>Phocartos hookeri</i>	New Zealand Sea Lion
<i>Tursops truncatus</i>	Bottlenose Dolphin

