BEFORE THE ENVIRONMENTAL PROTECTION AGENCY
COASTAL RESOURCES LIMITED MARINE CONSENT APPLICATION

IN THE MATTER	of the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012
AND	
IN THE MATTER	of a decision-making committee appointed to consider a marine consent application made by Coastal Resources Limited to Dispose of Dredged Material at the Northern Disposal Site.

STATEMENT OF EVIDENCE OF ANDREW JEFFS
ON BEHALF OF THE AUCKLAND CONSERVATION BOARD

Dated: 27 October 2018

MAY IT PLEASE THE COMMITTEE

1. Introduction

My name is Andrew Greig Jeffs.

I am a board member of the Auckland Conservation Board. I was appointed by the Minister of Conservation to the Board for the term of 1 July 2016 to 20 June 2019.

I am also a Professor of Marine Science at the University of Auckland.

I have the following qualifications: BSc, MSc(Hons), Phd in Marine Science, PG.Dip.Com.

I have more than 20 years of experience in marine science and its application in coastal management and development. I am familiar with the Hauraki Gulf as a great deal of my research activity has occurred in this area of the country, including undertaking an extensive underwater survey off the eastern coast of Aotea (Great Barrier Island) for a proposed marine reserve. One of the major areas of my research interest is the ecological role of underwater sound in the marine environment. I have published more than 40 scientific papers in this field in international peer reviewed journals, including *Science*.

I have read the Code of Conduct for expert witnesses contained in the Environment Court of New Zealand Practice Note 2014 and that I have complied with it when preparing my evidence. I acknowledge, however, as a Board Member, that I am not independent. I am not providing independent expert evidence in that sense, but the Conservation Board has drawn on my expertise and experience (and those of other Board Members) in preparing its submission.

My evidence records, to assist the Committee, "who" the Board is and what its key concerns are.

In preparing this evidence I have read the relevant briefs of evidence prepared on behalf of the applicant, Coastal Resources Ltd.

The Conservation Board as a whole has considered the evidence and I am authorised to give this evidence on its behalf.

2. Statutory role of the Auckland Conservation Board

The Conservation Board is an independent statutory body, constituted under section 6L of the Conservation Act 1987 (Conservation Act). Conservation Boards are separate to and distinct from the Department of Conservation (Department), although the Conservation Boards are supported in their functions by the Department. The Department recognises that each Conservation Board represents the public interest in the work of the Department, and conservation in general, within the area of jurisdiction of that Board.

The Conservation Board's functions under section 6M of the Conservation Act include conservation management. Section 6N(2)(a) provides that each Board may advocate its interests at any public forum or in any statutory planning process. Subsection 6N(3) further provides that this includes the right to appear before courts and tribunals and be heard on matters affecting or relating to the Board's functions. It is in this capacity that the Auckland Conservation Board submits with regard to the application by Coastal Resources Ltd.

The Auckland Conservation Board's area of responsibility extends from the entrance to the Kaipara Harbour in the north western part of the Auckland region to the Mangawhai Heads at the north eastern point. In the south west the boundary follows the north bank of the Waikato River and the south eastern boundary is on the Firth of Thames at Pūkorokoro / Miranda. The marine environment is an important part of the Boards' district and area of interest. The Board's jurisdiction includes the Hauraki Gulf and its islands and marine reserves: Cape Rodney to Okakiri Point Marine Reserve, Motu Manawa/ Pollen Island Marine Reserve in the Waitemata Harbour, Long Bay-Okura Marine Reserve and Te Matuku Marine Reserve on Waiheke Island.

3. Concerns of the Auckland Conservation Board in relation to CRL application

The biodiversity of the Hauraki Gulf Marine Park in northern New Zealand is regarded as outstanding and consequently has been protected through its own legislation, the Hauraki Gulf Marine Park Act 2000. The park is well known internationally for its extremely high marine mammal diversity with 25 species of marine mammals (nearly a third of the world's marine mammal species) that visit annually and at least six species of cetaceans are resident (Hauraki Gulf Forum, 2011, Hauraki Gulf Forum, 2014).

In its consultation on the CRL application, the Auckland Conservation Board has been made aware of the acute concerns of tangata whenua and the local community of Aotea. We are supportive of many of the concerns they have raised through their submissions and representations to the EPA on the application.

The Auckland Conservation Board initial submission (dated 7 September 2018) on Coastal Resources Ltd's application for marine dumping on the continental shelf beyond Aotea focused largely on the inadequacy of the application in identifying and addressing possible impacts of the proposed activity on marine mammals and seabirds which use the area in the vicinity of the transit route to the dump

site, and surrounding the dump site itself. I, and the Board, have reviewed the additional expert evidence provided by the applicant from Simon Childerhouse in relation to marine mammals.

4. Commentary on additional expert evidence

The expert evidence provided by Simon Childerhouse confirms many of the concerns raised by the Auckland Conservation Board in relation to the lack of existing data on marine mammals in the vicinity of the dumping site, and the inadequacy of the monitoring provisions for the existing dumping consent held by CRL.

The expert evidence claims that the lack of marine mammal observations from the existing disposal programme is evidence of a low abundance of these animals in the area, despite a wide diversity of species commonly being reported within a 100 km range of the site. However, there are many good reasons why relying on marine mammal observations provided by CRL may be unreliable (beside possible commercial motivations), some of which were raised in the Board's original submission. For example:

1) The vast majority of dump site visits are undertaken at night in darkness (91% of the 277 dumping events in the past 3 years – OIAR EPA 24 October 2018) when it is virtually impossible to observe marine mammals at sea (as confirmed by Childerhouse statement of evidence 5.7.1). Furthermore, Childerhouse confirms that the consented night thermal imaging equipment used by CRL is ineffective as per the contention of our initial submission. The Board has consulted with independent marine mammal scientist (Professor Steve Dawson, Otago University) who has also confirmed this contention. Hence, it is unlikely that any marine mammals would be observed in darkness when most of the CRL visits to the dump site occur.

2) The company is a toll operator of the dumping approval, on selling access to the dump site to other marine dredging operators. These operators use untrained personnel in undertaking their marine mammal observations. It is widely recognised that training and experience in marine mammal observation greatly improves rates of sightings (as confirmed by Simon Childerhouse section 7.6), and for this reason adequate training is a mandated requirement for many offshore marine mammal observer programmes. For example, to qualify as a marine mammal observer for the purposes of the 2013 Code of Conduct for Minimising Acoustic Disturbance to Marine Mammals from Seismic Survey Operations in New Zealand, as cited by Simon Childerhouse, requires an individual to have completed a recognised training course, passed an assessment process, and logged a minimum of 12 weeks of seatime usually in a deputising observer role. Hence, it is much less likely staff only trained in manning sea vessels would observe marine mammals whilst on a trip to the CRL dump site.

3) Under the conditions for the current dumping consent CRL is also required to use hydrophone detection of marine mammals from an operating vessel for which any marine mammal vocalisations would likely be masked (drowned out) by the high background noise emitted by the vessel (confirmed by Simon Childerhouse section 7.5). Furthermore, the recordings are monitored by untrained personnel, and they would not have the capability to detect marine mammal vocalisations outside the frequency range of human hearing. The Board has obtained and had experts (Professor Andrew Jeffs & Dr Craig Radford, University of Auckland) review a sample of monitoring recordings from CRL and can confirm they

contain extensive background noise, including vessel noise and wave noise, that would be likely to obscure the detection of any marine mammal vocalisations. Hence, it is unlikely that this monitoring would detect marine mammals if they were present and happened to be vocalising.

4) It is well-recognised among marine mammal researchers that it becomes increasingly difficult to visually detect cetaceans at the surface with increasing sea state conditions. Above Beaufort Sea State 3 it is almost impossible to detect marine mammals (confirmed by Simon Childerhouse section 7.4). Given the dumping site is in exposed open waters it would be safe to assume that during many dumping events the Sea State would be at Beaufort 3 or above. Hence, it is less likely that marine mammals would be observed during those periods when winds are 7 knots or over.

5) The visual range over which marine mammals can be sighted at sea decreases rapidly with distance from the observer, such that area covered by an observer is somewhat limited. For example, it has been estimated that the probability of detection of one species of dolphin during the day by highly motivated well-trained observers under near-ideal conditions (calm harbour waters) in New Zealand at 100 m distance from the observer is 64% and at 200 m this probability drops to 33% and 14% at 400 m (Dawson 2017). It is worth noting that the dump vessel is some 200 m away from the observer (confirmed by Simon Childerhouse section 7.7). Hence, marine mammals would need to be in the immediate vicinity of the observer vessel in order to have a high likelihood of being seen by observers.

6) Sound generated from vessels and industrial activities at sea travels significant distances underwater and can affect marine mammals at some considerable distances. This commonly includes vertical and horizontal avoidance behaviour and cessation of vocalisation in cetaceans (Watkins 1986, Lemon et al. 2006, Williams et al. 2002) which would further reduce the likelihood of detection from vessels engaged in dumping operations. While the applicant has provided no information on the underwater sound output of their vessel, we know from studies of other vessels operating in the Hauraki Gulf, that the vessels that are used are likely to be emitting broad band sound in lower frequency range at a third octave source level of at least 135 dB re 1 µPa @ 1 metre, and likely higher. Such loud sound has the capacity to be audible to cetaceans for an estimated distance of between 1.7 and 4.22 kilometres from the vessel when operating in the outer Gulf (Pine et al. 2016). Furthermore, the range for which acoustic masking (where introduced noise drowns out natural sound signals, like calls from conspecifics) is likely to occur in the outer Gulf in a 2.12 km diameter circle around the vessel for fish and crustaceans, and up to 2.27 km around the vessel for dolphins (Pine et al. 2016). Hence, it is quite possible that some cetaceans are actively avoiding the vessels engaged in dumping activities and would not be seen by observers within the vicinity of the vessel.

The potential effect of underwater sound pollution, particularly on marine mammals, from the CRL consented activity is not well addressed by CRL in their application or in the expert evidence provided by Simon Childerhouse, as it is assumed to be insignificant based on the assumption of an absence of mammals in the vicinity of the dumpsite and along the transit routes. As outlined above, this assumption has been made in the absence of any independent credible data either for the site, or for the vessel route to the site.

In operating under its existing dumping approval CRL has allowed various vessel operators to undertake a total of 545 trips to the dump site as at 1 October 2018 with a round trip taking between 15 – 25 hours, contributing an estimated accumulation of over 10,000 hours of underwater sound pollution injected into the Hauraki Gulf Marine Park and beyond as a result of this activity. The approval of the current EPA application will see the quantity of underwater sound emissions into the marine environment escalate significantly as a result of an even greater number of vessel movements.

Cetaceans, fish and some marine invertebrates have evolved to detect and respond to natural underwater sounds for navigation, communication, reproduction, orientation and/or larval settlement cues (Montgomery et al., 2006, Popper et al., 2001, Radford et al., 2007, Richardson and Thomson, 1995, Slabbekoorn et al., 2010, Stanley et al., 2010). The hearing mechanisms and hearing thresholds vary between cetaceans, fish and crustacean species. Many fish are sensitive to low frequency sounds (i.e., less than 5 kHz) while some are also sensitive to high frequencies (Ladich and Fay, 2013, Mann et al., 1998). Far less is understood about the hearing capabilities of marine invertebrates, including crustaceans. However, sensitivity to underwater sound in prawns has been found to be similar to that of fish (Enger and Andersen, 1967). In contrast, cetaceans are often highly sensitive to underwater sounds, but of varying frequency ranges which tend to be much broader than those identified in fish (Senigaglia et al. 2016).

Vessel sound commonly overlaps with the audible frequency ranges and hearing thresholds of cetaceans, fishes and crustaceans and therefore masking (drowning out useful sounds) is one of the most common impacts. For example, in crabs it has been shown that boat sound has the potential to make them more vulnerable to predators by masking the sounds made by approaching predators (Chan et al., 2010) and elevating respiratory rates and disrupting normal feeding behaviour (Wale et al., 2013a, 2013b). Boat sound has also been found to mask communication signals between a variety of vocal fishes (Codarin et al., 2009; Vasconcelos et al., 2007) as well as disrupting the schooling behaviour of tuna (Sarà et al., 2007) and generating an increase in levels of stress hormones in fish (Wysocki et al., 2006). Masking of natural sounds emanating from nearshore habitats, such as reefs and estuaries is also of concern, as larval fish and crustaceans may be unable to detect important orientation or settlement cues that enable them to locate and establish in these coastal habitats (Montgomery et al., 2006). Vessel sound may cause either physical behavioural shifts (such as foraging or avoidance behaviours), vocalisation changes or both in cetaceans, including dolphins. For example, killer whales and common dolphins reduce their foraging times in response to vessel sound (Meissner et al., 2015, Williams et al., 2006), beluga whales increase their call rate, source amplitude and frequency of their vocalisations (Lesage et al., 1999), right and humpback whales reduce or cease vocalisations (Watkins, 1986) and minke whales show behavioural responses similar to when encountering natural predators (Christiansen et al., 2013). Vessel sound has also been found to mask dolphin communication signals (Jensen et al., 2009) and may be a contributing factor leading to increasing ship strike rates in large whales (Dolman et al., 2006, Gannier and Marty, 2015). Some studies also report long-term consequences on individual reproductive success and population size in cetaceans can arise due to repeated behavioural disruptions (Constantine et al. 2004, Bej der et al. 2006a, 2006b).

5. Recommendations of the Auckland Conservation Board

The Board's initial submission to the EPA recommended that the applicant provide additional information to support its application in regard to seabird and marine mammal impacts that adequately identify the species of concern in the area, and provides a more rigorous assessment of the likelihood and nature of impacts of the vessel movements and dumping activities on marine mammals. This included the potential effects of the underwater sound generated by the activity on

marine mammals and marine life. While the applicant has provided some further information, the Board remains concerned that CRL's assertion of a lack of any impacts on marine mammals based on an assumption of their low number in the vicinity of the vessel is flawed. There is clear evidence from studies in New Zealand and internationally that vessel movements and the associated underwater noise they generate can have significant impacts on marine mammals, and the marine environment generally. The applicant is proposing a significant increase in their current activity which is likely to exacerbate any existing effect. The Auckland Conservation Board would contend that given the ecological significance of the wider Hauraki Gulf area, there is a strong case to proceed with considerable caution in the absence of evidence.

On this basis, we continue to recommend to the EPA that the application should not proceed without stronger evidence for an absence of impact of the underwater sound generated by the activity on marine mammals. The provision of such information would provide the DMC and submitters greater confidence in assessing the potential impacts on these important species in our marine environment that may arise as a result of this proposed activity.

In respect of this information, Board notes that the EPA is required (among other things) to:

(a) make full use of its powers to request information from the applicant, obtain advice, and commission a review or a report; and

(b) base decisions on the best available information; and

(c) take into account any uncertainty or inadequacy in the information available

If, in relation to making a decision under this Act, the information available is uncertain or inadequate, the marine consent authority also must favour caution and environmental protection.

Andrew Jeffs
25 October 2018

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