BEFORE THE FAST-TRACK APPROVALS PANEL

In the matter of the Fast-Track Approvals Act 2024

And

In the Matter of applications by Oceana Gold (New Zealand) Limited for various resource consents and other authorities relating to the Waihi North Project (including the Wharekirauponga Underground Mine)

Informing comment from Coromandel Watchdog of Hauraki

Brief of evidence of Luke Easton

Dated: 18 August 2025

- My name is Luke Easton.
- I hold an MSc, PGDip, and PhD in Zoology
- I am a specialist in native frogs, having studied them for over a decade.

- I confirm I have read the code of conduct for expert witnesses as contained in the Environment Court's Practice Note 2023.
- I have complied with the code of conduct when preparing this statement of evidence and will do so if required to give oral evidence before the Expert Panel considering the application by Oceana Gold (New Zealand) Limited (**Applicant**) under the Fast-track Approvals Act 2024 (**Act**) for gold and silver mining activities at sites in the Waihi and Wharekirauponga area, being Fast-track Application No. FTAA-2504-1046 (the **Waihi North Project Application**).
- The data, information, facts and assumptions I have considered in forming my opinions are set out in my evidence to follow. The reasons for my opinions expressed are also set out in this evidence.
- Unless I state otherwise, this evidence is within my sphere of expertise and I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.
- My qualifications, relevant experience and basis for my expertise are as set out above.

In preparing this evidence, I have focused my review on my counterpart expert. I have specifically reviewed the following:

B41 and 42, and B 58.

I have also generally reviewed the first iteration of consent conditions. I have not reviewed, but seek an opportunity to review, the latest iteration of consent

conditions, and related documents. Unfortunately these arrived too late in preparation of my evidence.

Below are my comments for Coromandel Watchdog of Hauraki on frog impacts as in the Oceana Gold Waihi North Fast-track Approvals Application documents.

1. Dylan van Winkel's assessment report highlighted the scarcity of literature investigating vibration impacts on amphibians, and specifically the lack of relevance of such studies to leiopelmatid frogs, which lack middle ear structures such as tympanic membranes.
2. Nonetheless, these studies (examples of abstracts below) demonstrate that vibrations do have an impact on a repertoire of amphibian responses, from behavioural through to physiological. Therefore, to suggest that there would be no impact on leiopelmatid frogs is nonsensical.
3. Absence of evidence is not evidence of absence.
4. Caorsi, V., Guerra, V., Furtado, R. *et al.* Anthropogenic substrate-borne vibrations impact anuran calling. *Sci Rep* **9**, 19456 (2019). https://doi.org/10.1038/s41598-019-55639-0 : Anthropogenic disturbance is a major cause of the biodiversity crisis. Nevertheless, the role of anthropogenic substrate vibrations in disrupting animal behavior is poorly understood. Amphibians comprise the terrestrial vertebrates most sensitive to vibrations, and since communication is crucial to their survival and reproduction, they are a suitable model for investigating this timely subject. Playback tests were used to assess the effects of substrate

vibrations produced by two sources of anthropogenic activity– road traffic and wind turbines– on the calling activity of a naïve population of terrestrial toads. In their natural habitat, a buried tactile sound transducer was used to emit simulated traffic and wind turbine vibrations, and changes in the toads' acoustic responses were analyzed by measuring parameters important for reproductive success: call rate, call duration and dominant frequency. Our results showed a significant call rate reduction by males of *Alytes obstetricans* in response to both seismic sources, whereas other parameters remained stable. Since females of several species prefer males with higher call rates, our results suggest that anthropogenically derived substrate-borne vibrations could reduce individual reproductive success. Our study demonstrates a clear negative effect of anthropogenic vibrations on anuran communication, and the urgent need for further investigation in this area.

5. Zaffaroni-Caorsi, V., Both, C., Márquez, R., Llusia, D., Narins, P., Debon, M., & Borges-Martins, M. (2022). Effects of anthropogenic noise on anuran amphibians. *Bioacoustics*, *32*(1), 90–120. https://doi.org/10.1080/09524622.2022.2070543 : Anthropogenic noise is widespread in nature and has been shown to produce a plethora of impacts on wildlife. Sounds play a fundamental role in the lives of amphibians, with species relying on acoustic communication for social and reproductive behaviour, and thus noise can potentially interfere with these activities. Here, we provide a literature review on the effects of anthropogenic noise on anuran amphibians, based on 32 studies (63 species from 14 families) that document noise-driven changes in species behaviour, physiology and ecology caused by urbanisation, transportation and energy production. Experimental and observational studies found evidence that both airborne and seismic anthropogenic noise influence

anuran calling activity, with consequences in mate selection, and induce physiological changes including increased stress, suppressed immune function and colouration changes. Negative noise effects in species abundance and attendance over the reproductive season were reported. Even though adaptations and behavioural adjustments enable species to respond to these noises, it is yet to be understood whether these changes alleviate the negative impacts. Furthermore, collaborative efforts between scientists, stakeholders and private/public institutions are imperative to create conservation guidelines and legal instruments to be implemented during urban expansion projects and mitigate the effects of noise pollution on amphibian anurans.

The Golden Cross vibration modelling suggests that leiopelmatids can tolerate between 2–10 mm/s given that they have persisted around the gold mine since operations began (also mentioned in the Waihi North Project Blasting and Vibration [WNPBV] assessment, Pp. 39). Previous monitoring of Hochstetter's frogs reported by Whitaker & Alspach (1999) attest to no evidence of the mine having a discernible impact on the frog population and that the population structure appeared healthy. However, sampling bias – particularly with rainfall – influenced frog numbers they recorded. Hochstetter's frogs move away from streams during heavy rainfall to avoid being washed downstream due to potential floods.

6. Whitaker, A.H.; Alspach, P.A. 1999. Monitoring of Hochstetter's frog (Leiopelma hochstetteri) populations near Golden Cross Mine, Waitekauri Valley, Coromandel. Science for conservation 130. Further, as Dylan van Winkel pointed out, the vibration modelling does not provide evidence of a vibration threshold (in this case their proposed condition of up to 15 mm/s – Pp. 31 of the WNPBV assessment) that, if exceeded, would initiate a response in the frog population that is deemed ecologically meaningful.

In other words, this perceived 'tolerance range' of 2 -10 mm/s may already be causing a negative response – we just currently don't have the means to detect it.

7. Statements in the WNPBV assessment report, such as: *"Based however on the observed habitat of the frog that shows the area covered with leaf matter and other organic material that would attenuate very heavily the level of vibration that would be experienced for frogs living in the area, the level of vibration that would be experienced by any frogs would be significantly less than the modelled values.* [Section 6.3, Pp. 21]" have no integrity as these have not specifically been measured, and again, to what degree of vibrations are required to elicit responses in frogs, whether it be behavioural, physiological or how they communicate, remains unclear.
8. Which leads me to Brian Lloyd's frog population assessment reports. He clearly identifies the flaws in the study design and analyses, which is great to have transparency. Brian is an incredible statistician, but as he so clearly highlights, monitoring frogs (especially Hochstetter's frogs) is difficult and therefore gaining robust data is difficult to achieve for these purposes. However, I strongly oppose his suggested monitoring method of replicating surveys of streams at least 6 times, 1 day apart, as this will be destructive to sensitive frog habitat. Having people regularly walk through and search refuges disturbs the area, even when you are trying your best not to. I do wonder whether transmitting some frogs and mapping their movements, as well as taking urine samples for stress hormone analysis would be useful, but these are just ideas. These techniques have been successfully used on leiopelmatid frogs in the past.
9. Overall, and in short, we have no knowledge of what impacts vibrations have on leiopelmatid frogs. Yes, they are still present, but as long-lived species (18 years for Hochstetter's frog & 39 years for Archey's frog), they

may survive in an environment that is sub-optimal for decades but are still negatively impacted in some way. What we do know is that the destruction of habitat will directly kill frogs that are not physically transferred elsewhere. Furthermore, population estimates from Brian's reports are erroneous to say the least (see his summaries where he highlights the limitations of the study designs).

10. Avoiding further destruction of conservation areas, regardless of what rare species inhabit them, is what we should be aiming for. Those conservation areas were established for the protection of natural and cultural values.