

UNDER the Fast-track Approvals Act 2024 (**Act**)

IN THE MATTER an application for approvals for the Waihi North
Project (**WNP**) – a listed project described in
Schedule 2 of the Act

BY **OCEANA GOLD (NEW ZEALAND) LIMITED**
Applicant

**SUPPLEMENTARY STATEMENT OF EVIDENCE BY
IAN KENNETH GRANT BOOTHROYD
ON BEHALF OF OCEANA GOLD (NEW ZEALAND) LIMITED**

Freshwater ecology

Dated 10 September 2025

Counsel acting:
Stephen Christensen
Project Barrister

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Introduction

1. My full name is Ian Kenneth Grant Boothroyd. My qualifications and experience, and my role in the Waihi North Project (**WNP**), are set out in my statement of evidence dated 10 February 2025 included in Part G of the substantive application document for the WNP.
2. I provided a statement of evidence on 1 September 2025 in which I responded to comments made by the Department of Conservation, Coromandel Watchdog, Forest and Bird, Waikato Regional Council and iwi on matters within my expertise.
3. I have been asked by OceanaGold (New Zealand) Limited (**OceanaGold**) to provide a response to the statement of evidence of Dr Russell Death on behalf of Coromandel Watchdog which discusses potential ecological impacts on stream and river systems from the WNP.

Code of conduct

4. I confirm that I have read the code of conduct for expert witnesses contained in section 9 of the Environment Court Practice Note 2023 and have complied with it in preparing this evidence. I confirm that the issues addressed in this evidence are within my area of expertise, and I have not omitted material facts known to me that might alter or detract from my evidence.

Threatened and At-Risk Invertebrates

5. Dr Death questions why the presence of at-risk or threatened invertebrate species were not investigated.¹ The reference to surrounding conservation land suggests that Dr Death's concern applies specifically to the Wharekirauponga Stream catchment. I note that Dr Death indicates he has

¹ Statement of evidence of Dr Death dated 22 August 2025 on behalf of Coromandel Watchdog, paras 24-26.

only considered the two main subject reports² and it appears Dr Death has not also considered the report on the effects of potential flow changes on the aquatic ecology of the Wharekirauponga Stream.³

6. That report states that none of the macroinvertebrate taxa identified are listed as threatened,⁴ a statement that relied on the field sampling data. However, the results of environmental DNA (eDNA) sampling carried out in February 2024 confirmed the presence of two threatened⁵ aquatic insect species in samples obtained from the Wharekirauponga Stream mainstem and selected tributaries:⁶

- *Helicopsyche torino* (Nationally vulnerable) in Trib R.
- *Olinga fumosa* (Nationally endangered) in Adams Stream.

7. Dr Death goes on to comment on the use of macroinvertebrate metrics Macroinvertebrate Community Index (**MCI**) and Quantitative Macroinvertebrate Community Index (**QMCI**) in the assessment of ecological values, a topic also referred to further in his evidence, and one which I also return to below in this statement. MCI and QMCI, and along with other macroinvertebrate metric and freshwater attributes (e.g., fish communities, instream habitat, water quality), are commonly used in the assessment and monitoring of ecological values. The MCI and QMCI are helpful in ascertaining biodiversity values, but I acknowledge these metrics are not definitive; hence the use of other metrics (and particularly eDNA) as a more confirmatory tool for detecting threatened species.

² Statement of evidence of Dr Death dated 22 August 2025 on behalf of Coromandel Watchdog, para 13.

³ B.44. *Wharekirauponga Stream Natural State: Effects of potential flow changes on natural state and aquatic ecology*.

⁴ Ibid, at section 5.5.3.1.

⁵ Threatened = Nationally Vulnerable, Endangered or Critical (<https://www.doc.govt.nz/nature/conservation-status/>)

⁶ Species of interest recorded included *Siphlaenigma janae* (mayfly, declining although improving) and *Spaniocercoides watti* (stonefly – data deficient).

Use of MCI and QMCI for the assessment of potential mining effects

8. Dr Death comments on the use of MCI and QMCI for the assessment of potential effects of mining.⁷ Dr Death refers to his preference to apply the Acid Mine Drainage Index (**AMD**) rather than MCI or QMCI for such an assessment. It is not clear whether Dr Death is referring to the effects of the proposed activities within the Wharekirauponga Stream catchment, the effects of the activities proposed at Waihi, or the effects of the treated water discharge to the Ohinemuri River or indeed all of them.
9. Regardless of the purpose, in all cases I have not applied the AMDI for the following reasons:
 - (a) The authors of the development of the AMDI are clear that the index was developed for the detection and assessment of acid mine drainage (**AMD**), as evident from the metric name.⁸ OGL staff have informed me that the rock type and geology of the existing OceanaGold mining operation and the proposed WNP is such that treated water discharges do not reflect the typical AMD water chemistry, and monitoring of in stream water quality associated with OGL's existing operations do not indicate any acid mine drainage influence. Accordingly, I consider that the AMDI is an inappropriate metric to use for assessment purposes at WNP.
 - (b) The authors of the development of the AMDI are also clear in that the index was applied to the detection and assessment of coal mining impacts⁹, and thus its sensitivity to other mining activities is untested. Thus, I consider that the AMDI is an inappropriate and undetermined metric to use for assessment purposes for the WNP.

⁷ Statement of evidence of Dr Death dated 22 August 2025 on behalf of Coromandel Watchdog, paras 27-28.

⁸ Gray & Harding 2012: *Acid Mine Drainage (AMD): a benthic invertebrate biotic index for assessing coal mining impacts in New Zealand streams*. New Zealand journal of Marine and Freshwater Research Vol. 46: 335-352.

⁹ I note that Gray & Harding state their aim is to develop an index specifically sensitive to mine drainage chemical pollution of New Zealand streams.

- (c) The use of the MCI and QMCI (amongst other metrics) enable a comparison with the ecological condition of other monitoring locations that use the same metrics within the respective Wharekairauponga Stream and Ohinemuri River catchments.
- (d) The MCI and QMCI (amongst other metrics) have been used for some 30 years of monitoring within the Ohinemuri River, and the continuity of use of these metrics provides the opportunity to consider long term trends. Indeed, assessment of such trends of macroinvertebrate communities reveal no long-term effects of the treated water discharge on the Ohinemuri River.¹⁰

Characteristics of the warm spring

- 10. Dr Death also makes comment on the assessment and the loss of the warm spring.¹¹ At paragraphs 25 to 29 of my statement of evidence dated 1 September 2025, I provided comment on the loss of the warm spring located in the Wharekairauponga Stream catchment and I emphasise that in section 7.1.17 to section 7.1.24 of the Freshwater Ecological Assessment Report (B.43), there is extensive assessment of the ecological values of the warm spring. That discussion concludes that the warm spring has no particular or strongly distinguishing geothermal ecological values and is recorded as having a low ecological value.¹²
- 11. I have surveyed several warm springs and geothermal ecosystems,¹³ and note that these features are characterised by their stable and consistent ecological and biodiversity features. Confirming the ecological value from a

¹⁰ B.43. *Freshwater Ecological Assessment* part 1, at section 13.1.17.

¹¹ Statement of evidence of Dr Death dated 22 August 2025 on behalf of Coromandel Watchdog, paras 33-37.

¹² B.43. *Freshwater Ecological Assessment* part 1, at section 7.1.23.

¹³ Examples include: Boothroyd, I. K. G. 2009: *Ecological characteristics and management of geothermal systems of the Taupo Volcanic Zone, New Zealand*. Geothermics 38: 200-209; Duggan, I. C.; Boothroyd, I. K. G.; Speirs, D. 2007: *Factors affecting the distribution of stream macroinvertebrates in geothermal areas: Taupo Volcanic Zone, New Zealand*. Hydrobiologia 592: 235-147; Boothroyd, I.K.G., Hay, S., Turner, S. 2006: *Uniqueness and diversity of geothermally influenced aquatic ecosystems*. Proceedings of the 28th Geothermal Workshop, Auckland.

single survey event, as is carried out in many ecological assessments, is consistent with current practice and provides sufficient evidence to form a characterisation of the feature, especially associated with my experience of multiple observations and research on similar thermal ecosystems.

12. As emphasised in my statement of evidence dated 1 September 2025, my conclusion is further highlighted by DOC as part of their Access Arrangement report, where DOC stated that “the impact on freshwater biodiversity is likely to be low due to the composition of the spring and the lack of representative freshwater invertebrate species present”.¹⁴
13. Dr Death makes reference to the potential misidentification and the possible presence of other species of the mud snail *Potamopyrgus* within the warm spring and its outflow. I confirm that eDNA sample taken from the main stem of the Wharekirauponga Stream (which the warm spring flows into) did not detect the presence (i.e., the DNA) of any species of Hydrobiid snails other than *Potamopyrgus antipodarum*.

Resource consent impacts

14. Dr Death makes several comments on the resource consent monitoring and questions the lack of ecotoxicology and/or literature in the assessment.¹⁵ It is worth emphasising that the treated water discharge has been in effect for some 30 years with receiving water quality criteria agreed and accepted by Waikato Regional Council and implemented and complied with by OceanaGold. The water quality criteria have been derived using a credible and accepted method (US Environmental Protection Agency criteria¹⁶) and from information and literature on ecotoxicological tests available.
15. Regular annual monitoring and reporting of the condition of the Ohinemuri River is carried out using a standard practice of sampling various water

¹⁴ Depart of Conservation, Appendix F: Access arrangement report, at paragraph [100].

¹⁵ Statement of evidence of Dr Death dated 22 August 2025 on behalf of Coromandel Watchdog, paras 39 - 44.

¹⁶ USEPA 1985 Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses (USEPA 1985). USEPA = U.S. Environmental Protection Agency.

quality and ecological parameters above and below the (two) discharge points. The emphasis of the water quality criteria and monitoring was established at the commencement of the discharge to confirm that no adverse effects on the aquatic ecosystem of the Ohinemuri River occur because of the treated water discharge. In my opinion and experience, that is a normal and appropriate approach. It was not established or required to monitor the effects of each individual component (e.g., heavy metals) of the treated water discharge on the aquatic biota.

16. Dr Death also places emphasis on the lack of testing of invertebrates for selenium.¹⁷ The selenium testing regime is carried out in response to resource consent condition requirements¹⁸ that make no reference or requirement to test invertebrates for selenium. Given the results reported on whole body testing of selenium for fish,¹⁹ I see no cause to extend the same testing to invertebrates, especially as the ability to collect sufficient body weight of invertebrate material would make the testing prohibitive and potentially destructive of the environment in itself.
17. Dr Death refers to the potential bioaccumulation of PFAS (per- and poly-fluoroalkyl substances) in aquatic biota.²⁰ Monitoring for detection or bioaccumulation of PFAS is not a requirement of the existing resource consent.
18. Nevertheless, OceanaGold staff have confirmed that:
 - (a) On the advice of Fire and Emergency New Zealand (**FENZ**), OceanaGold retired the PFAS / perfluorooctane sulfonate (**PFOS**) Aqueous Film-Forming Foams (**AFFF**) foams from their site in 2018. Once they were decommissioned, the products were stored on site until they were sent for high incineration destruction in Australia using

¹⁷ Statement of evidence of Dr Death dated 22 August 2025 on behalf of Coromandel Watchdog, para 42.

¹⁸ Treated water discharge permit 971318, condition 10.14a.

¹⁹ B.43. *Freshwater Ecological Assessment* part 1, at section 13.1.21.

²⁰ Statement of evidence of Dr Death dated 22 August 2025 on behalf of Coromandel Watchdog, para 43.

FENZ's destruction service. The products were never used in a fire response on site prior to their retirement.

- (b) There is no flotation circuit at Waihi in the gold processing facilities at Waihi, and thus surfactants and flotation chemicals that could contain PFAS/PFOS are not used on site.
 - (c) The water treatment plant at Waihi is not designed to treat hydrocarbons and the current treated water discharge consent does not provide for the discharge of hydrocarbons to surface water. The surface facilities area is designed to capture any hydrocarbons in separators and sumps before they reach the WTP. Hydrocarbon waste from separators and sumps is disposed of offsite by certified waste management contractors. Similarly, I understand that hydrocarbon spills are cleaned up, stored, and disposed of offsite by waste management contractors. This practice would capture any hydraulic fluids or fuel additives that may contain PFAS chemicals.
 - (d) As most of the additional water being treated associated with the WNP is Wharekirauponga Underground Mine (**WUG**) water, and from a source catchment that has no activity where PFAS would be present, I would not expect it to have any PFAS associated with it.
19. Given the measures listed above, I consider that exposure to PFAS has been minimised to the extent that whole body testing of organisms for PFAS bioaccumulation resulting from the treated water discharge is unnecessary.
20. It is worth emphasising that the WNP will not result in any different types of water requiring treatment and water being conveyed to the water treatment plant will continue to come from across the Waihi Epithermal District.²¹ No changes to the receiving water quality limits from the discharge from the water treatment plant are required to accommodate the WNP.

²¹

B.43. *Freshwater Ecological Assessment* part 1, at section 13.1.1.

21. The Freshwater Ecology Assessment comments on the effectiveness of the existing receiving water quality criteria provided for in the resource consent for protecting the ecological values of the Ohinemuri River²² and further considers the appropriateness of retaining the existing instream water quality criteria for the protection of instream ecological values.²³
22. The important conclusion from some 30 (plus)²⁴ years of monitoring of the Ohinemuri River (including fish populations) is that there is no evidence that the treated water discharged (in meeting the requirements of the resource consent) from the operations is causing adverse effects on the biological communities (or ecosystem) of the Ohinemuri River.²⁵

Stream diversions

23. Dr Death makes comment on the feasibility of successfully relocating and re-establishing a stream ecosystem.²⁶ In my statement of evidence dated 1 September 2025, I comment that I have set out the principles for the design of the stream diversions in Appendix 4, examples of cross-sections of the indicative diversion channels in Appendix 11, and a Draft Stream Diversion and Development Plan in Appendix 14.²⁷ These principles and design are typically applied to re-creations of streams, and a well-planned and implemented plan can result in a well-functioning aquatic ecosystem.
24. I emphasise that I am familiar with several examples where diversions have been successfully achieved with appropriate design and principles applied

²² B.43. *Freshwater Ecological Assessment* part 1, at section 13.1.12.

²³ B.43. *Freshwater Ecological Assessment* part 1, at section 20.

²⁴ Monitoring of the Ohinemuri River at the location of the treated water discharge commenced in 1987, at least two years before the water treatment plant was commissioned.

²⁵ B.43. *Freshwater Ecological Assessment* part 1, at section 20.1.8.

²⁶ Statement of evidence of Dr Death dated 22 August 2025 on behalf of Coromandel Watchdog, paras 46-47.

²⁷ Noting that Appendix 4 is contained in part 1, and Appendices 11 and 14 are contained in part 2 of B.43. *Freshwater ecological assessment*.

(e.g., Duck Creek in Wellington and other watercourses of the Transmission Gully construction, Bennydale Mine site, Gibbs Farm).

25. Dr Death comments on the failures of attempts to create waterways, because of limited colonisation sources in urban river systems.²⁸ The diversions planned for WNP are not in an urban environment, but in a more natural/rural setting. More importantly, the planned diversions remain connected with their headwaters and with riparian vegetation planting proposed along their lengths. This means that the diversions remain connected upstream and downstream for the benefit, movement and re-colonisation of both aquatic and terrestrial organisms. In my opinion, the planned diversions have been properly thought through and the approaches proposed apply sound ecological principles that are consistent with good ecological planning.
26. In my statement of evidence dated 1 September 2025, I commented that acceptable outcomes for diversions come with the establishment of good principles, appropriate design, and skilled implementation, and that the proposed Draft Stream Diversion and Development Plan establish the foundation for this to be achieved. Set alongside the upstream-downstream connectivity and source for organisms to reach and settle within the created diversion I consider that the ability to create a functioning aquatic ecosystem within the diversions has a high probability of success.

Dated: 10 September 2025

Ian Boothroyd