

**Before the Expert Panel appointed  
under the Fast-track Approvals Act 2024**

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

**And**

**In the Matter of** an application for approvals by  
Matakanui Gold Limited to establish,  
operate, rehabilitate and ultimately  
close an open pit and underground  
gold mining operation known as the  
Bendigo-Ophir Gold Project

**Statement of Evidence of  
Dr Trevor Matuschka on behalf of  
Matakanui Gold Limited in response to  
Section 53 Feedback  
Tailings Storage**

Dated: 17 April 2026

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## INTRODUCTION

1. My name is Dr Trevor Matuschka.
2. I hold a BE(Hons) in Civil Engineering and a PhD in Civil Engineering. I am a Chartered Professional Engineer and International Professional Engineer. I am also a Recognised Engineer for both Potential Impact Classification and Dam Safety Assurance Programmes. I am currently employed as Director of Engineering Geology Ltd and have held that position since 1989.
3. My previous work experience includes:
  - (a) Project Engineer for Martha Gold Mine, Waihi (1985 to present) - responsible for geotechnical investigation, feasibility studies, consenting, including evidence at hearings, design, specifications, assistance with construction supervision, monitoring and surveillance and annual safety audits of tailings storage facilities (**TSF**).
  - (b) Design Engineer and Technical Reviewer for Macraes Gold Mine, Otago (1988 to present) - responsible for geotechnical investigation, feasibility studies, consenting, including evidence at hearings, design, specifications, supervision during construction, monitoring and surveillance and annual safety audits of TSFs.
  - (c) Design Engineer and Technical Reviewer for Stawell Gold Mine, Victoria, Australia (1993 to present) - responsible for design, documentations to obtain regulatory approvals, preparation of contract documents, assistance with contract supervision of TSFs, monitoring and surveillance and annual safety and performance reviews.
  - (d) Design Engineer and Technical Reviewer for Reefion Gold Mine, West Coast, New Zealand (1994 to present) - responsible for geotechnical investigation, feasibility studies, consenting, including evidence at hearings, design, specifications, assistance with contract supervision of TSF.
  - (e) Design Engineer and Technical Reviewer for Golden Cross Mine, Waitekauri Valley - Coeur Gold (1986-1989) - including seismic hazard study and preliminary design of tailings retention embankment, waste stock and silt detention ponds. Statement of evidence at Planning Tribunal.

4. Design Engineer, Technical Reviewer and Subject Matter Expert for TSF at multiple international mine sites across Australia, New Caledonia, Bulgaria, Romania, Indonesia, Papua New Guinea, Philippines, UK, Peru, Mali, Côte d'Ivoire, and Democratic Republic of Congo. This has included developing design concepts, undertaking scoping studies, peer review work, feasibility designs, and being a member of Independent Tailings Review Boards (**ITRB**). ITRBs are recommended by the Global Industry Standard on Tailings Management (**GISTM**) for large very or extreme consequence TSF.
- (f) I am a past chair of New Zealand Society on Large Dams (**NZSOLD**). I am the current vice-chair of the International Committee on Large Dams (**ICOLD**) Technical Committee on Seismic Design Aspects of Dams. I was General Reporter for the topic of Earthquake Performance and Safety of Dams at the 2025 ICOLD Congress held in Chengdu, China, where I was responsible for reviewing papers submitted on this topic and presenting on the state of practice of seismic aspects of dams. I am a member of 5 Independent Tailings Review Boards (**ITRBs**) for tailings dams associated with major mining projects in Australia and New Caledonia and was previously a member of an ITRB for a project in Peru. I am currently a member of Technical Review Panels for different water storage dams in Australia and New Zealand. I was an author of the latest version of the NZ Dam Safety Guidelines. The topic of my PhD was assessment of seismic hazard in New Zealand.
5. This statement is given as part of Matakani Gold Limited's (**MGL**) response to comments on the Bendigo-Ophir Gold Project (**BOGP**) made under Section 53 of the FTA. This statement responds to specific comments raised on the topic of Tailings Storage by:
- (a) Ross Hanan
  - (b) Otago Conservation Trust
  - (c) Sustainable Tarras
  - (d) Otago Regional Council
  - (e) Business South Incorporated
  - (f) Parliamentary Commissioner for the Environment
  - (g) New Zealand Fish and Game
  - (h) Forest and Bird Protection Society of New Zealand

- (i) Environmental Defence Society Incorporated
  - (j) Central Otago Winegrowers
  - (k) Landowners Occupiers
  - (l) Adjacent Land Owners
  - (m) Crown Ministers
6. My original findings cover Tailings Storage and are provided in full in the report:
- (a) B.21 Engineering Geology Limited – Shepherds Tailings Storage Facility Technical Report (EGL 2025b).
7. Other relevant reports that my findings rely on include:
- (a) B.20 Engineering Geology Limited - Site Specific Seismic Hazard Study Report (EGL 2025a).
  - (b) B.22 Engineering Geology Limited - Site Geotechnical Factual Report Part 1 and 2 (EGL 2025c) (3 Parts).
  - (c) B.03 Kōmanawa Solutions Limited - Groundwater Existing Environment & Effects Assessment (Kōmanawa 2025b).
  - (d) B.04 Kōmanawa Solutions Limited - Surface Water and Catchment Existing Environment and Effects Assessment (Kōmanawa 2025c).
  - (e) B.06 Mine Waste Management Limited - Mine Impacted Water Overview Report (MWM 2025).
  - (f) B.33 Pattle Delamore Partners - Assessment of Environmental Effects from the Discharge of Contaminants into Air (PDP 2025).
8. I have prepared this statement in the limited time available for MGL to respond to comments under the Act. If the Panel requires elaboration on any of the matters raised in this statement, I am available to provide further information on request.
9. Although this is not an Environment Court proceeding my confirmation of compliance with the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2023 is included in Substantive Application Document A0.2B.

## GENERAL COMMENTS

10. Many commenters are understandably concerned about the potential for a breach and release of tailings which would involve risk to life, property and the environment. I have been involved in the design, construction, and operation of many TSFs in New Zealand, Australia, Asia-Pacific, South America, and Africa. They include valley and paddock styles, different types of tailings dams (downstream, centreline, and upstream constructed from natural soils, waste rock, and tailings (including filtered tailings), and different geological, seismological and meteorological conditions. The proposed tailings dam at Bendigo would be close to having the lowest likelihood of breach of all those that I have been involved with. This is because it is of downstream construction and is buttressed by the Shepherds Engineered Landform (ELF) from very early on its operation. The final ELF extends approximately 1.1 km downstream of the crest of the tailings dam and is higher than the TSF (up to 70 m higher). With a buttress this large there are no credible modes of failure, including extreme seismic events, that could lead to a mass release of tailings.
11. Many commenters have concerns regarding the containment of seepage from the TSF. I consider there are several factors that provide confidence that seepage from the TSF can be managed. They include a combination of natural features of the site and design features that limit the direction and quantity of seepage from the TSF. Seepage from the TSF is hydraulically contained by the groundwater levels in the hill slopes to the north, south and east of the TSF. This is because the groundwater levels are above the level of the tailings. The only direction seepage from the TSF can flow is to the west down the valley. Any seepage not collected could flow downstream to the west but the artesian conditions in the valley floor will result in some seepage discharging into the surface water beneath the Shepherds ELF where it will be collected and directed to the Seepage Collection Sump. The narrow width of the valley means it will be relatively easy to monitor seepage in the bedrock and implement a seepage control system. This will include wells to monitor any changes in groundwater quality and if necessary, the construction of barriers to seepage (e.g., grout curtain, seepage cutoff wall) or seepage interception and recovery (e.g., seepage interception drains, or seepage recovery wells).
12. I note that seepage from the TSF will reduce significantly post-closure. This occurs for different reasons. Firstly, following cessation of tailings deposition there is a significant reduction in the quantity of water being deposited and the area of ponded water will reduce. This has a direct influence on the seepage from the tailings. Secondly, closure works will involve reshaping and capping the surface and formation of a wetland. The area of ponded water will be much smaller than the pond during operation of the TSF. The closure works will reduce the amount of rainfall

infiltration into the tailings and result in a reduction in seepage from the tailings. Thirdly, the tailings will continue to consolidate for a period of many years post-closure. Consolidation is a process that involves pore water being squeezed out from the voids in a soil under a sustained loading. The tailings will become denser with lower permeability which results in a reduction in seepage, and a gain in strength of the tailings. Also, over time I would expect there to be a reduction in the degree of saturation due to drain down of the upper parts of the tailings and desiccation (drying) of the tailings at shallow depth which will result in further increase in strength of the tailings.

## **SPECIFIC RESPONSE TO COMMENTS**

13. Many commenters have comments on similar topics. I have responded to comments under key topics related to the TSF.

### **Dam Safety and Statutory Requirements in New Zealand**

14. It is important to understand the statutory requirements and process for ensuring the safety of large dams in New Zealand. The lifecycle (design, construction, operation, and post-closure) of dams in New Zealand, including tailings dams, is subject to rigorous technical and governance requirements that are covered by statutes (Resource Management Act 1991 and Building Act 2004).
15. The structural integrity and durability are assessed as part of the Building Consent process (Building Code requirement which is contained in Regulations of Building Act). For dams, including tailings dams, the New Zealand Dam Safety Guidelines are generally used to support compliance with the Building Code. The New Zealand Dam Safety Guidelines have been prepared by NZSOLD. NZSOLD is a technical interest group under Engineering New Zealand. It promotes best practices, safety and sustainable management of dams. It represents New Zealand on the ICOLD.
16. The latest update to the New Zealand Dam Safety Guidelines was in December 2024. The Guidelines were subject to peer review by internationally recognised dam experts prior to publication. The requirements for safety of TSFs during construction, operation and post closure is often covered by conditions associated with Building or Resource Consent conditions. The conditions generally refer to recommendations provided in the New Zealand Dam Safety Guidelines. On 12 May 2022 the Building (Dam Safety) Regulations were enacted, and they commenced on 13 May 2024. These regulations operate under the Building Act. They cover the safety of dams following construction (i.e., during operation and post closure). They include requirements modelled on the recommendations in the New Zealand Dam Safety Guidelines, but they are now statutory requirements and there are penalties for non-compliance.

The Dam Safety Regulations include the requirement for intermediate (annual) dam safety reviews and independent comprehensive dam safety reviews (5 yearly for High consequence dams like the proposed TSF). I have worked on tailings dams in many parts of the world (Australia, Asia-Pacific, Africa, Europe, South America).

17. I consider the statutes, regulations and guidelines for tailings dam in New Zealand are world class.

### **Long-term Safe Tailings Storage in Operation and Closure**

18. The proposed TSF will provide a very safe and robust tailings storage solution for both operation and post closure of the site. This is because the TSF embankment is constructed principally from rockfill and is buttressed by the Shepherds ELF which is comprised of a very large volume of rockfill. The Shepherds ELF will be constructed up to the crest of the tailings starter dam prior to the commencement of deposition of tailings and will be extended throughout the life of the TSF. There are no credible failure modes that could lead to a mass release of tailings associated with earthquake and flood hazards. The design will be independently peer reviewed. This is a requirement of the process for obtaining a Building Consent for the tailings dam.
19. During construction formal Quality Assurance and Quality Control procedures apply with full time presence of the Designer, fulltime supervision, and with independent Quality Control testing covering earthworks (compaction standards, permeability) and quality testing of materials.
20. Requirements for operation, maintenance and surveillance of the TSF during its operation phase will be detailed in an Operations, Maintenance and Surveillance (**OMS**) Manual in accordance with the Tailings Management Plan and Pond and Reservoir Management Plan. Surveillance includes performance monitoring (based on measurements of piezometers that measure water pressures, measurements of seepage collection drain flows, deformation surveys and visual inspections). The OMS will include Trigger Action Response Plans (**TARP**). They prescribe actions to be followed if measured parameters or observations exceed pre-set limits.
21. During operation and post closure the tailings dam will be subject to regular dam safety reviews. These include intermediate (annual) dam safety reviews and independent comprehensive dam safety reviews every five years. They are standard industry practice; recommended by the New Zealand Dam Safety Guidelines and required by the Building (Dam Safety) Regulations 2022. The Dam Safety Regulations also require annual compliance certificates to be provided by a Recognised Engineer.

## Tailings Storage Facility Design Basis for Flood Management Within Impoundment

22. Some commenters have questioned the reference to fully contained, no release facilities. The term fully contained relates to surface water management, not seepage. To be clear the Water Management Plan says “During operations, the TSF will be a fully contained, no release facility with no dedicated spillway, with all supernatant (decant) water managed onsite and contained within the mine circuit water.” This refers to the management of water on the surface of the tailings which will not be released from the facility. Sufficient storage volume is allowed on the TSF to manage all operational situations plus a Probable Maximum Flood, plus 1 m freeboard for wave action.

## Climate Vulnerability in the Detailed Design of the Tailings Storage Facility

23. I am responsible for the design of the TSF and this includes the surface water management. The primary control for surface water on the TSF is allowing for an inflow design flood.
24. For the Fast Track Application, a technical report has been prepared outlining a proposed design of the facility for the assessment of effects. Final details for the dam are subject to detailed design and application for a Building Consent as required by the Building Act 2004. This also requires independent peer review. This is currently underway, and this includes the assessment of the inflow design flood.
25. The allowance for climate change effect in the detailed design inflow design flood is based on the increases in high intensity rainfall estimates published by NIWA in their High Intensity Rainfall Database Version 4 for Climate Change Scenario Representative Concentration Pathway 8.5. For a 1 in 250-year event the modelling indicates for a 72-hour storm duration a:
- (a) 6% increase in rainfall over historical rainfall records, for the period 2031 to 2050 (assume to be representative of the operational phase)
  - (b) 18% increase in rainfall over historical rainfall records, for the period 2081 to 2100 (assume to be representative of the closure phase)
26. The design condition for the inflow design flood selected is a 72-hour Probable Maximum Precipitation (**PMP**) event. Literature indicates that PMP estimates are at least a 1 in 100,000 event i.e. extremely rare.

27. Modelling for climate change events rarer than a 1 in 250-year event are under development in New Zealand but have not yet been adopted by the dam industry in New Zealand. For this project the 1 in 250-year increases will be applied to the PMP estimates. I consider this to be a conservative assumption for this specific project based on current knowledge. We will consider the method that is under development for assessing PMP allowing for climate change at the detailed design stage.
28. The PMP estimates for long duration storms are very large rainfall depths. Without climate change effects the PMP depth is 703 mm for the site. With climate change effects the depths increase to 743 mm for the operational phase and 830 mm for the closure phase. For comparison the average annual rainfall depth is estimated at 550 mm at the TSF site. In summary the design rainfall depth for detailed design includes climate change and is for a very extreme scenario.
29. I consider that tailings seepage, primarily collected in the underdrains at the TSF, in operation is unlikely to be affected by climate change effects. Tailings seepage is controlled by the permeability characteristics of the tailings, discharge rate of the tailings, thickness of the tailings, and operational pond level.
30. In closure the TSF will be dry capped with a small wetland area in the centre of the capping. Seepage will be controlled by rainfall infiltration rates and are dependent on the characteristics of the capping and underlying tailings, the average rainfall and evapotranspiration depths, and on the permeability of the foundation rock if the underdrains become blocked. The infiltration rates used to assess seepage are a general order of magnitude and we do not expect any notable changes that would affect the closure outcomes for the TSF.
31. In summary I don't believe that climate change effects will have a significant effect on seepage rates from the TSF. They need to be considered in the design of surface water conveyance structures (e.g., open channels, drains, spillways, and assessing freeboard for the TSF). This will be done as part of the detailed design.

### **Design of the Tailings Storage Facility for Seismic Hazards**

32. Seismic hazards include ground shaking, displacement of the ground due to fault rupture, and landslides. The principal hazard for most dams is ground shaking unless there are active faults underlying the dam. There is no evidence of active faults at the site. Landslides are a potential hazard if they are large enough to displace the contents stored by a dam. The site would have experienced multiple large magnitude earthquakes over the millions of years that the site has existed in its current form. There is no evidence that this has resulted in landslides on the sides of the valley that could displace tailings from the TSF and so this hazard is considered very low risk.

33. The tailings dam will be designed to meet the New Zealand Dam Safety Guidelines. These guidelines are based on international best practices. For earthquakes the TSF will be designed to withstand a 1 in 10,000 year earthquake. The seismic hazard study to determine the seismic hazard loading is based on the latest National Seismic Hazard Model released in 2022 and includes rupture of the Alpine Fault and large magnitude faults near to the site.
34. The proposed design has the tailings contained behind a rockfill embankment that will also be buttressed by a large volume of rockfill placed in the Shepherds ELF. The proposed TSF will provide a very safe and robust tailings storage solution for both operation and post closure of the site. The detailed design will be independently peer reviewed as part of the Building Consent approval process for the tailings dam. I consider that the tailings dam will safely contain tailings when subjected to potential future extreme earthquakes.
35. One commenter, Mr Hanan, refers to the Cadia mine in Orange, NSW, Australia as an example of a relatively minor seismic event that compromised a tailings facility. I note the situation associated with that site is completely different to that at Bendigo. The geology was different and the embankment that failed was of upstream construction (this type of dam relies on the strength of the tailings for stability, unlike downstream construction where there is no reliance on tailings strength). The foundations included a weak layer that deformed under increasing loads and resulted in liquefaction of the retained tailings and slumping of the tailings into a downstream TSF. No tailings were released off site.
36. An independent review panel comprised of international experts concluded that the root cause of the failure was foundation deformation over a period of time which triggered liquefaction of the saturated tailings. They concluded that small earthquakes occurring the day before the failure did not trigger the failure.

### **Collection of Seepage from the Tailings Storage Facility**

37. A repeated concern raised in comments is the ability to collect seepage from the TSF. The TSF includes different design features and operational controls to reduce and intercept seepage from the TSF. Design features include:
- (a) a cutoff to bedrock;
  - (b) grouting of defects exposed in the foundations;
  - (c) low permeability zone on the upstream face of the dam;
  - (d) a chimney drain in the dam to intercept seepage through the low permeability zone;

- (e) underdrains beneath the tailings to collect seepage and to accelerate consolidation of the tailings (this reduces the permeability and seepage from the tailings); and
  - (f) seepage collection pipes to convey seepage to a seepage collection sump located downstream of the Shepherds ELF.
38. Operational features include discharge of tailings from the dam so that pond water is not in direct contact with the dam and abutments and minimising the size of the pond so that there is less opportunity for seepage.
39. The proposed TSF is quite different to many TSFs in that seepage is constrained to move down the valley over a relatively narrow width. Groundwater levels in the valley sides and upstream of the TSF are much higher than the stored tailings and this provides hydraulic containment. Seepage in the valley floor naturally has an upward flow (i.e., artesian conditions) and I would expect that any seepage from the TSF that is not collected by the underdrains or chimney drain generally moving upwards towards the ground surface downstream of the tailings dam.
40. Some will reach the surface beneath the Shepherds ELF while some may travel within the bedrock. Groundwater monitoring wells will be installed to detect changes in ground water chemistry. If necessary, seepage control systems can be installed to restrict and collect seepage downstream of Shepherds ELF.

This includes grout curtains, seepage cutoff wall, seepage interception drains, or seepage recovery wells. They would be relatively easy to implement because seepage is confined to a narrow pathway and the valley is narrow.

41. As clarified above, seepage will be collected and treated. Performance monitoring will be undertaken to monitor surface and ground water quality downstream of the TSF and ELF. If monitoring indicates a change in water quality, there are contingency measures that can be implemented. This includes grout curtains, seepage recovery wells, and seepage interception drains. The residual risk to the Ardgour and Lindis Aquifer is low because seepage is constrained in a narrow valley so that the implementation of seepage recovery measures is relatively straight forward.

### **Need for a Liner**

42. Some commenters have recommended that the TSF should have a liner. Liners can be constructed from low permeability compacted earthfill or be a geomembrane (often HDPE). Geomembrane liners are the most popular but there is uncertainty about their long-term durability and if they will provide containment in perpetuity. Liners are necessary where the impact of seepage can have adverse environmental

impacts. Their greatest benefit is during operation when seepage is highest. Liners are not necessary where the seepage is contained by natural or design features and it is feasible to monitor and implement a seepage control system. As explained in paragraphs 10 and 36 to 40 the natural features of the site (containment by groundwater), design features, and performance monitoring and ability to implement a seepage control system means that a liner has no significant benefit for this project.

### **Blockage of Drains Associated With the Tailings Storage Facility**

43. Some commenters have raised concerns in relation to the drains proposed within the TSF and beneath the Shepherds ELF block. Some refer to blockage of drains at the Macraes Mine project.
44. I have been involved in the Macraes project since 1989. I'm aware that precipitation of gypsum can occur in the tailings and precipitates can occur in pipes. However, this has not been a significant issue and has not resulted in blockage of tailing underdrain outlets. Where it has been noticed cleaning of the pipes by high water pressure or by hammering where the pipes are exposed has been undertaken. All drains that would be expected to flow (located below the phreatic surface) continue to flow after 30 years of operation. Some drains have ferric oxide/hydroxides present at their outlets which is removed as a regular maintenance task. Most drains have goosenecks on their outlets to restrict oxygen entry and oxidation processes that result in iron precipitates.
45. BOGP TSF underdrains are designed with measures to reduce the risk of blockage. They include filter zones to protect against blockage by direct ingress of tailings and fine-grained natural soils. There is redundancy within the drainage system. There are two parts to each drain (drainage material and pipe). If either part blocks, seepage can still flow. There is also system redundancy. If one drain blocks other drains can still function to provide underdrainage.

Over time the amount of seepage and contaminant level will reduce because of the cessation of the discharge of tailings to the TSF, consolidation of the tailings which results in a reduction in permeability of the tailings, the reduction in rainfall infiltration due to the closure cover, and due to dilution by groundwater from the valley sides.

46. For design of the TSF it is industry practice to consider the scenario that drains could block when analysing seepage for operating and post closure phases. The results of analyses assuming the underdrains are blocked are included in Appendix B of the EGL Shepherds Tailings Storage Facility Technical Report (August 2025). Based on my experience it is highly unlikely they would block during operation. Blockage of the chimney drain has a smaller impact on the total volume of collected

seepage. As I have noted above seepage flows from the TSF reduce with time for various reasons and the benefits of the underdrains and chimney drains reduces, so even if they block it doesn't have much have impact on seepage from the TSF.

### **Need for Final Design Before Granting Resource Consent**

47. Some commenters contend that many matters of detailed design be addressed prior to issue of a Resource Consent. I don't agree. I consider that the development of design concepts with sufficient detail to demonstrate that adverse effects can be avoided, remedied or mitigated is sufficient at the Resource Consent stage. Detailed design of the dam (e.g., stability, management of floods, durability, specifications), operational, maintenance and surveillance requirements (including performance monitoring), and emergency action plan are normally covered at the Building Consent stage. At the Building Consent stage all this work is subject to independent peer review.

### **Availability of Mine Waste to Construct the Tailings Dam and the Shepherds Engineered Landform**

48. A commenter has questioned if there is enough waste rock from the Rise and Shine (**RAS**) Pit to buttress the initial tailings dam (starter dam). This has arisen from a quoted statement "The early stages of the RAS open pit have been designed to minimise initial waste movement prior to first ore." I confirm that the timeframe for construction of the tailings dam has considered the mining schedule and also the availability of materials for the different zones of the embankment. The initial stage of construction of the tailings dam will use local borrow while the pit is stripped (removal of trees and topsoil) and haul roads are developed. Although the quantity of mine waste from the RAS Pit is designed to minimise waste movement the expected minimum quantities easily exceed that required for construction of the initial tailings dam and to provide a substantial buttress. Scheduling indicates there will be sufficient waste rock from the RAS Pit to provide a buttress up to the crest of the starter dam prior to deposition of any tailings.

There is sufficient waste rock to construct the buttress with a 50m wide crest and with a downstream slope of 7H:1V which is a very flat slope for rockfill. I consider the buttress to be very substantial. As mining progresses the buttress will expand significantly. It will rise substantially above the crest of the tailings dam (up to 70 m) and extend downstream of it by a distance of about 1 km.

## Type of Tailings Dam

49. Professor Lottermoser (Sustainable Tarras) questions the choice of the tailing disposal option (i.e., conventional wet slurry) and suggests that dry stacking of filtered tailings is considered the best option.
50. Filtered tailings are being used more but they are not common nor do they always represent the best option. They offer some advantages in some situations (e.g. where the source of ore is from underground mining and there are limited materials available for constructing a conventional tailings dam or where there are higher environmental risks due to the toxicity of the tailings or the natural ground has high permeability). Filtered tailings are often referred to as dry tailings. This is misleading because they are more often moist and under increasing weight and in wet environments can become saturated, soften and become unstable. This needs to be considered in post closure long-term stability. The technology is not 100% reliable and it is normally necessary to have a small conventional tailings dam to take wet slurry when the filtered tailing plant is not working or when in periods of wet weather, the filtered tailings cannot be transported and placed. The technology has extremely high capital and operating expenses compared to conventional tailing disposal.
51. EGL did undertake a high-level review of possible tailings disposal options with MGL before adopting conventional wet slurry disposal. Filtered tailings were discounted because they provide no significant benefit for the long-term security of the tailings and containment of seepage at the BOGP.
52. Long-term security is provided by the tailing dam and the buttress provided by the Shepherds ELF. Seepage from the TSF is constrained by a combination of natural features of the site and design features. Any seepage from the TSF is confined to a relatively narrow pathway that can be monitored, and a seepage collection system can be implemented if necessary.

## Management of Dust

53. A number of comments have raised concerns associated with dust from the TSF. Management of dust associated with TSFs is part of the normal operation. Dust can potentially occur if the tailings beach is exposed for long periods where there is little rain and high winds occur. The common method for managing dust on TSFs is to prevent the tailings drying out by maintaining the beach in a near saturated condition. This occurs naturally where tailings are being deposited into a TSF, but where the beach is rested for periods of time the tailings can dry out and be susceptible to dust generation under high winds.
54. The proposed TSF is formed by a cross-valley dam and the impoundment is elongated. Tailings will be deposited from the dam and the adjacent abutments. This will result in a beach on the northwest side of the TSF with water ponding to the southwest. The tailings will be discharged over a total length of about 1km. At any one time I would expect tailings to be actively discharged over a length of about 200 m. They might be discharged for about 5 days before moving to the next section. The cycle time over the full length of the tailings could be about 20 days. This cycle time is relatively short so the tailings beach will not be exposed for long periods before discharge of fresh tailings.
55. The risks for dust generation for the TSF are much lower than for large paddock style TSFs where beaches can be left exposed for much longer periods of time with resulting higher risks of dust generation. Where beaches dry and there is a potential for dust generation it is common to use sprinklers to dampen the surface. On some projects I have been involved with chemical dust suppressants have also been used. These are sites where the tailings beach surface is left for prolonged periods due to the long cycle time for deposition, where tailings are being deposited in another TSF, where the TSF is awaiting closure capping. I would expect that sprinklers will be able to provide effective management of dust for the proposed TSF using water from the decant pond (i.e., water ponded on the tailings). Dust suppressants could be used as an alternative. I would expect the OMS Manual to include requirements for managing dust issues. This would include review of weather forecasts for high wind events so that sprinklers can be setup ahead of when required.

## New Zealand Regulatory Framework For Tailings Storage Facility Design

56. Sustainable Tarras has alleged that our lagging regulatory framework for gold mines is particularly concerning as it pertains to TSF design. I consider this statement to be untrue. New Zealand has statutory requirements that cover the design, construction, and post-construction safety of dams (Resource Management Act and Building Act which includes Building Code regulations and Dam Safety Regulations). I consider them to be world class.

They cover the technical and governance aspects for the complete lifecycle of a tailings dam (design, construction, operation and post closure). This is explained in more detail in paragraph 14-17 of my evidence. The New Zealand Dam Safety Guidelines (updated in 2024), which are generally used to support compliance with the Building Code cover tailings dams and reference relevant other international guideline documents published by the ICOLD, Australian National Committee on Large Dams (**ANCOLD**), Canadian Dam Association (**CDA**), and the GISTM. The GISTM was published in 2020 and was jointly authored by the International Council on Mining & Metals (**ICMM**), United Nations Environment Programme, and Principles for Responsible Investment (**PRI**). The Building (Dam Safety) Regulations 2022 apply to all existing dams and there is no time limit on their application.

### **Hypothetical Dam Breach Standard Practice to Set Design Criteria**

57. The purposes of dam breach assessments are to assess consequences of a hypothetical breach to determine the Potential Impact Classification (**PIC**) and to develop evacuation maps for the Emergency Action Plan (**EAP**). The PIC sets the standards for design, construction, and operation of the dam. Dams with higher potential impacts are designed to be resilient to extreme load conditions associated with natural hazards or unlikely scenarios which may occur in operation. The tailings dam will be designed to the recommendations in the New Zealand Dam Safety Guidelines. The TSF is assessed to be a High PIC dam and will be designed for a 1 in 10,000 year earthquake and Probable Maximum Precipitation 72 hour storm event. These criteria are similar to other international design guidelines for dams (ICOLD, ANCOLD, CDA) including the GISTM. Dams that are designed, constructed, operated, and governed to these standards have an acceptably low likelihood of failure (i.e., a breach would not be expected to occur).

### **Rock Shear Strength Parameters**

58. One commenter was concerned that confirmation of rock shear strength parameters was being deferred to the Building Consent stage, and it was inappropriate in their view for a fast track process to approve the land use for a tailings dam that does not have all critical design aspects (based on critical design parameters) finalised. I don't consider that there are any concerns with the stability of the tailings dam because of weak foundations. The site comprises surficial soils and completely weathered schist that forms a veneer up to about 3m deep over schist bedrock. Weak surficial soils shall be completely removed from beneath the footprint of critical parts of the tailings dam. The rock shear strength assumptions that have been adopted are based on experience from another site with similar geology.
59. They will be confirmed following ongoing investigations. I do not expect the shear strength of the rock foundations to control the stability of the tailings dam. There is

no credible failure mode associated with stability of the tailings dam because it is buttressed on the downstream side by the Shepherds ELF.



**Dr Trevor Matuschka**

**17 April 2026**