Technical report

Critical review of the proposed Shepherds Tailings Storage Facility, Bendigo-Ophir Gold Project, Matakanui Gold Ltd, New Zealand

Prof. Dr. Bernd Lottermoser
Annastrasse 4-6, 52062 Aachen, Germany
[redacted]

Date: 18.03.2026

Declaration

This report is written as an independent technical report. My responses are necessarily brief, and I have referenced the report to an extent required for the purpose of the report.

I have read the Environment Court's code of conduct for expert witnesses in Part 9 of the Environment Court Practice Note, and I have complied with it.

Bernd Lottermoser

Signed: Date: 18.03.2026

The information contained in this document was prepared by Prof. Lottermoser and is intended exclusively for use in the Fast-Track Approvals Act process to determine the Bendigo-Ophir Gold Project Substantive Application. This report has been written in a private capacity independent of Prof. Lottermoser's employment with RWTH Aachen University.

Summary of expertise

Professor Lottermoser holds a PhD from the University of Newcastle (Australia) and has worked for >30 years on numerous mining projects throughout Europe, Australia, Asia, Africa and the Americas. In his varied career, he has worked in the mining industry and also for Australian, German and British universities. His work has been recognised by a German Humboldt Research Fellowship, an Erasmus Mundus Fellowship of the European Union, the Michael Daly Award for Excellence in Science Communication by the Australian Government, and an Endeavour Executive Award awarded by the Australian Prime Minister. He currently holds a Chair in Sustainable Resource Extraction, supervises mining engineers, geologists, mineralogists and geochemists, and leads as Director the Institute of Mineral Resources Engineering at RWTH Aachen University, Germany.

Professor Lottermoser's professional expertise covers sustainability and environmental challenges in mining. He has written more than 300 publications and reports as well as acclaimed textbooks on mine wastes and environmental indicators in mining published by Springer. He is also an editor of a textbook on ethics in mining. The textbook on mine waste has been used widely around the world, including for legal cases presented in the Supreme Court of the United States. He has a Google Scholar h-index of 41 with >9,200 citations and is included in the list of the top 1 % most influential scientists in his scientific area. Professor Lottermoser acts as grant peer reviewer for funding agencies from Germany, Switzerland, Finland, Sweden, Norway, Estonia, Ireland, Belgium, Qatar, USA, Canada, New Zealand, Australia and the European Science Foundation, and he is member of the Scientific Advisory Board, Advanced Mining Technology Center, Universidad de Chile.

In the context of this report, Professor Lottermoser has conducted numerous research projects on the environmental impacts of mine sites around the world, especially on mine wastes and tailings storage facilities. He specializes in consulting on sustainable mineral resource development, assessments of mine waste repositories, and evaluations of the environmental impacts of mineral resource extraction for mining companies and intergovernmental organisations, including the International Atomic Energy Agency (IAEA) and the United Nations Environment Programme (UNEP).

Content

Executive summary

The aim of this independent technical report is to critically review application documents for the proposed Shepherds tailings storage facility (TSF) at the Bendigo-Ophir gold project site, New Zealand. These tasks were completed by benchmarking the TSF application against (1) industry best practices and best available techniques, (2) proposed governance, and (3) international standards.

Such benchmarking demonstrates that Matakanui Gold Ltd:

(1) considers only one major disposal option for its tailings.

(2) does not consider other tailings disposal options and disposal sites and has not presented a ranking of such disposal choices.

(3) pursues a wet slurry tailings disposal, which is the riskiest option for tailings disposal in terms of dam failure, uncontrolled liquefaction and long-term water contamination.

(4) does not consider dry stacking of filtered tailings as best available technique (BAT) for waste placement, which is globally recognized as the safest, modern alternative that mitigates the risks of, or entirely eliminates, the potential for catastrophic TSF failure and long-term water contamination.

(5) incorrectly states that their chosen design criteria of the Shepherds TSF for possible flood events equal or exceed the Global Industry Standard for Tailings Management (GISTM).

(6) does not provide any information on the chemical and mineralogical properties of the wastes to be stored in the TSF and the chemical stability of tailings in the long-term.

(7) does not provide any information on mineralogical, textural and grain-size characteristics, liberation size, hardness/competency, and distribution of deleterious elements in the tailings.

(8) does not provide any information on how leaching of metalliferous drainage will be reduced from the TSF at the operating stage.

(9) proposes conventional water spraying as suppression method for dust originating from the TSF, which is not industry best practice and has failed in similar settings in New Zealand.

(10) does not follow industry best practices by not operating under the Cyanide Code and articulating a Cyanide Management Plan.

(11) does not provide any details on arsenic removal and disposal arising from the treatment of mineral processing residues.

(12) intends to align its TSF management with principles of the Global Industry Standard on Tailings Management (GISTM) with its “Zero Harm” and “No Loss of Life” prerogative, but presents its chosen wet slurry tailings disposal option with a breach and potential impact classification assessment that may lead to the Potential Loss of Life, damage to houses, infrastructure, environment, and community recovery time. Such a preferred disposal option is diametrically opposed to the “Zero Harm” and “No Loss of Life” objective of the Global Industry Standard on Tailings Management.

(13) insufficiently adopts into its tailings management only 3 Principles of the Global Industry Standard for Tailings Management (GISTM).

(14) ignores a further 12 Principles and at least 35 Requirements of the Global Industry Standard for Tailings Management (GISTM).
(15) does not present technical analyses and information relevant to tailings disposal and management as required by the Commonwealth Model Mining Feasibility Study Guidelines.

Thus, the application does not present a complete documentation of tailings-relevant information, risks and risk management, using best available techniques (BAT) and international guidelines. Also, the application does not meet industry's best practices for feasibility studies and Commonwealth Mining Guidelines. It appears that the proposed tailings disposal and management are only at the pre-feasibility stage, because there is the failure to present:
(1) an option analysis listing alternatives for tailings disposal,
(2) information on the wastes and their properties to be placed into the TSF,
(3) an assessment of the chemical stability of tailings in the long-term,
(4) the use of best available techniques (BAT) for tailings disposal, dust suppression and prevention of leaching, and
(5) a complete alignment with international standards and Commonwealth guidelines.

Due to these inadequacies, the application of Matakanui Gold for the proposed Shepherds TSF does not meet modern expectations and requirements for tailings disposal and management. Failure to meet those expectations carries heightened risks for people and the environment.

1. Aim of the report

The background to this independent technical report is the need to understand the management and disposal of tailings into the Shepherds Tailings Storage Facility (TSF) as proposed by Matakanui Gold Ltd, Bendigo-Ophir gold project site, New Zealand. The author has been asked to critically review and assess publicly available documents and provide an independent technical report, expressing his expert opinion primarily on two application documents:

(1) The Tailings Facility Technical Report, which purely covers technical aspects of the TSF (Matakanui Gold 2025a; B.21 Engineering Geology Limited Shepherds Tailings Storage Facility Technical Report, PDF, 29 MB).

(2) the Tailings Management Plan, which has a primary focus on the corporate and operational management of all phases over the TSF lifecycle (Matakanui 2025b; G.16 Tailings Management Plan, PDF, 265 KB).

Therefore, the following tasks arose:

Task 1. Benchmarking the TSF application documents against industry best practices and best available techniques

- Consider the above-mentioned application documents and provide an opinion on the extent to which the design, construction, operation, maintenance, surveillance and management of the proposed Shepherds TSF contain factual errors, uncertainties or gaps of evidence, and alignment with industry best practices and best available techniques.

Task 2. Benchmarking the governance of the Shepherds TSF

- Consider and advise on the appropriateness of TSF governance with regards to laws, regulations, industry standards and guidelines.

Task 3. Benchmarking the TSF application documents against international standards

- Consider the above-mentioned application documents and compare the proposed management and disposal of tailings with international standards and guidelines.

2. Benchmarking against industry best practices and best available techniques

2.1. Choice of tailings disposal option

Tailings are the fine-grained, water-mixed waste by-product of mineral processing, often containing residual chemicals and trace metals and metalloids. Traditionally and since the late 1800s, tailings are managed through wet slurry disposal. Since the 1960s, these wet tailings slurries are discharged into engineered Tailings Storage Facilities (TSF) using dam construction. In addition, other disposal techniques such as the paste backfill technique have been used in mining since the 1970s (Lottermoser 2010).

Matakanui Gold will pursue tailings disposal primarily by (a) constructing and using a conventional wet tailings storage facility (i.e. the engineered Shepherds TSF as a wet slurry impoundment), and to a lesser degree by (b) employing paste backfill in their underground workings (i.e. by mixing tailings with binder to fill underground voids).

The choice of using a wet slurry impoundment and the Shepherds TSF for tailings disposal comes with the risk of possible failure. TSF failures can occur owing to earthquakes, overtopping, weak foundations and liquefaction, among other mechanisms (Lottermoser 2010). Since 1915, 257 TSF failures have occurred globally, releasing a total of ~250 million m^3 of tailings, destroying areas up to ~5,000 km^2, killing an estimated 2,650 people and impacting ~317,000 people through displacement, property damage, and risks to livelihoods and health (Hudson-Edwards et al. 2024). Thus, failure of wet slurry impoundments is common, with the number of catastrophic mine tailings dam failures increasing globally (Owen et al. 2020). The frequency of these failures is on an upward trend, with some studies estimating a rate of five to six significant tailings dam failures of slurry impoundments annually after 2000. Tailings dam failures occur with a significantly higher frequency compared to traditional water retention dams (0.01% rate for conventional water dams), with an estimated failure rate of approximately 1.2% of active TSFs over the past century (Zare et al. 2024).

Consequently, around the world, novel and innovative methods are increasingly applied including thickened, paste and filtered tailings disposal (NewFields 2026). Dry stacking of filtered tailings is considered the disposal method with the least catastrophic failure risk, smallest environmental footprint, and most enhanced water recovery (Furnell et al. 2022; NewFields 2026). Dry stacking involves dewatering and filtering tailings, transporting them, and compacting them into solid, stable and unsaturated piles. This method also eliminates the need for water-retaining dams and allows for progressive rehabilitation. Such a safe disposal technique is critical to prevent, for example, dam failures.

Dry stacking of filtered tailings has developed into a high-stability and water-efficient waste management technique that gained commercial traction starting in the 1980s, but it has accelerated significantly into standard industry practice over the last two decades (since 2000). Dry stacking is being adopted by more operators around the world as a safer and more environmentally responsible tailings management method compared to traditional wet slurry TSF use (like the Shepherds TSF). As of 2023-2024, there are approximately 350 to over 1,100 dry-stack tailings facilities in operation globally (Market Report World 2026).

Dry stacking comes, however, with higher upfront capital and operational costs compared to conventional wet slurry TSF construction and use. The process requires significant investment in filtration equipment and higher operational costs for transportation and compaction. It also requires labor-intensive management of conveyors, trucks and stacking.

Regardless, operators are increasingly expected to use the best available technique (BAT), such as dry stacking of filtered tailings, which reduces water content and increases physical stability, rather than traditional wet slurry impoundments. Dry stacking of filtered tailings is also progressively applied in the gold mining sector (e.g. Greens Creek, Nixon Fork and Pogo gold mines, Alaska; Cobb 2017; Twin Metals Minnesota 2026). The technique was until recently considered only appropriate for small- to medium-scale mining operations (1,000 to 20,000 metric tonnes of ore per day), but recent projects are demonstrating that they are also well suited for large-scale mining projects (100,000 metric tonnes of ore per day) (Cacciuttolo and Atencio 2023). For the Bendigo-Ophir Project, ore production is anticipated to peak at 767,000 metric tonnes of ore per year (Matakanui Gold 2025c, p. 148; i.e. 2,100 metric tonnes per day). Hence, from a production point the project would be suited to dry stacking of filtered tailings.

Mining companies evaluate tailings disposal options and disposal site options during the pre-feasibility stage and the latest at the feasibility stage. Particularly at the feasibility stage, disposal options for tailings are considered in some detail (CSIRO 2022). In particular, the Society of Mining, Metallurgy & Exploration (SME) Mining Engineering Handbook states that a feasibility study requires an alternatives analysis and documented selection process for the safe storage of tailings prior to mine development (Kerr and Ulrich 2011). The SME Mining Engineering Handbook is widely regarded as the "bible" of the mining industry. Published by the Society for Mining, Metallurgy & Exploration (SME), it is the most comprehensive reference work for practicing engineers. An alternatives analysis approach is well-established industry practice. Furthermore, in many regulatory environments, it is now mandatory to demonstrate that a program of options identification, analysis, and appropriate ranking was adopted to support the selection of the site and selected tailings disposal choice (e.g. Government of Canada, Guidelines for the assessment of alternatives for mine waste disposal 2025).

Matakanui Gold does not present a multiple-accounts choice matrix or a thorough, transparent, and defensible documentation establishing why the wet slurry impoundment disposal method has been chosen as the method for tailings placement. There is no evidence that other tailings disposal sites or disposal options like dry stacking have been considered, which is essential as these are safer industry best practices and best available techniques. As a result, the presented waste management and disposal option appears to be of conceptual nature rather than at the feasibility stage of mine development.

2.2. Modelling flood events

Flood design aspects and design requirements of the Shepherds TSF have been presented as follows (Matakanui Gold 2025a, section 12.0, page 21):

> *"The design of the proposed Shepherds TSF also aims to achieve general alignment with guidance recommendations contained within the Global Industry Standard for Tailings Management (GISTM) published by the International Council on Mining and Metals (ICMM), United Nations Environment Programme and Principles for Responsible Investments in August 2020 (Ref. 21). Under GISTM there is a different consequence classification system, with the possible classifications being Low, Significant, High, Very High, and Extreme. The Shepherds TSF has a High consequence classification according to the GISTM criteria."*

The Global Industry Standard for Tailings Management (GISTM) mandates for tailings repositories classified as "High" (like the Shepherds TSF) numeric flood design criteria with an annual exceedance probability (AEP) during operations and closure (active care) as 1/2,475 and during passive closure (passive care) as 1/10,000. However, the applicant (Matakanui Gold 2025a, section 12.0, appendix D2.0, D4.0, D5.0, D6.0, Tables D1, D2, D3, D4, D5, Tables 6, 11, 12) uses flood design criteria for individual TSF entities with AEP values ranging from 1/10, 1/50, 1/100, 1/1,000 to 1/10,000, which are in cases much less than the relevant GISTM flood design criteria (i.e. 1/2,475, 1/10,000). Regardless, **Matakanui Gold incorrectly states** that (Matakanui Gold 2025a, section 12.0, page 21):

> "*The design criteria for flood and earthquake load conditions required by the NZDSG for a High PIC dam equal or exceed the design requirements for a High consequence TSF in the GISTM*".

There are further gaps in the modelling of flood events, because the documentation states that final inflow flood designs are still to be performed (Matakanui Gold 2025a, section 12.1.2):

> "*The selection on the final inflow design flood is a detailed design consideration and it is recommended that this includes a review of potential failure modes and risk*".

2.3. Choice of dust suppression technique

The Society of Mining, Metallurgy & Exploration (SME) Handbook on Tailings Management states that windblown dust is characteristic of most TSF facilities (Morrison 2022). Tailings dust likely contains process chemicals and may contain silica, metals, other compounds as well as acid-forming minerals that can have deleterious health and environmental effects (Morrison 2022). Implementation of environmental protection measures is therefore needed to address such risks. Particularly during dry, windy conditions, dust arising from tailings repositories requires effective suppression methods to prevent the inhalation of fine particles (particulate matter PM10 and PM2.5) (e.g. Leading Practice Sustainable Development Program for the Mining Industry 2016; Ren et al. 2025).

At the Bendigo-Ophir Gold Project, dust generation arising from the Shepherds TSF will be controlled as follows (Matakanui Gold 2025a, section 20.0, page 39):

> "*Dust will be controlled by spraying dry surfaces with water. Water will also be required to condition the earthfill and this will assist in reducing the potential for dust".*

Such simple dust control measures are questionable, because experience from the Macraes mine tailings repositories of Oceana Gold demonstrate that:

> *"Tailings in the impoundments are periodically exposed to strong dry north-west winds, and dust plumes up to 1 km long can occasionally emanate from the tailings. Some temporary stabilization of dried tailings surfaces can be achieved by sprayed water, but this treatment needs constant repetition and depletes water resources*" (University of Otago 2026).

At the Bendigo-Ophir Gold Project, the use of bore water and possibly mine water (obtained from the Western ELF (WELF) Silt Pond or open pits in the form of pit sump water) for dust control may be simple and convenient. However, it is well known that rapid evaporation necessitates repeated spraying for long-term effectiveness, leading to water resources wastage and inadequate dust suppression (e.g. Leading Practice Sustainable Development Program for the Mining Industry, 2016; Ren et al. 2025). Moreover at metal mine sites, the long-term use of mine waters with elevated sulfate and trace metal values for dust suppression may lead to the contamination of surface soils/substrates and unconfined aquifers with sulfate and trace metals.

By contrast, industry best practice for dust management at TSFs involves an integrated, multi-layered approach combining active suppression using chemicals additives, surface stabilization, and long-term, progressive rehabilitation to minimize environmental and health risks. The primary goal is to prevent the airborne spread of particles, particularly on dry, exposed tailings surfaces (Leading Practice Sustainable Development Program for the Mining Industry 2016; Noble et al. 2017; Lottermoser 2017; Okane Consultants 2023; International Council on Mining and Metals Tailings Management Good Practice Guide 2025).

Despite the well-known dust dispersion issues with TSFs in general (Leading Practice Sustainable Development Program for the Mining Industry 2016; Morrison 2022) and Oceana Gold's TSF in the South Island of New Zealand in particular (University of Otago 2026), **Matakanui Gold intends to pursue failed dust suppression approaches and has not considered industry best practices and alternative dust management and suppression approaches for the Shepherds TSF.**

2.4. Ensuring tailings chemical stability and minimising leaching

Understanding tailings stability involves understanding their physical and chemical stability and evaluating the risks to prevent environmental impacts. At the Bendigo-Ophir gold project site, tailings will be contained by a downstream engineered land form (ELF) and within the Shepherds TSF. The report of Matakanui Gold (2025a) contains detailed assessments of the physical stability of the Shepherds TSF, including assessments of potential failure due to extreme rainfall and seismic events. However, the report also states (section 8.3.1.1, p. 11) that for the tailings themselves "*site-specific laboratory testing data is not available*".

In fact, Matakanui Gold does not present any information on the density, mineralogy, geochemistry, texture, hardness and grain size of future tailings that are to be placed into the Shepherds TSF. Such a lack of information is surprising, because metallurgical laboratory-tests are usually conducted at the feasibility stage of mine development, and wastes of these tests are commonly used as tailings proxies to understand the mineralogical and geochemical properties of future tailings and predict their likelihood to cause metalliferous drainage.

It is now standard industry best practice to conduct risk assessments and predict metalliferous drainage from tailings (and waste rocks), especially using static and kinetic tests (e.g. Parbhakar-Fox and Lottermoser 20215; Global Acid Rock Drainage Guide 2026). Currently available prediction tools and analytical facilities combined with a comprehensive, well-informed approach and cautious interpretation of the results allow operators to meet environmental objectives, predict long-term metalliferous drainage issues and minimise liabilities and risks, arising from tailings disposal. Matakanui Gold has not conducted such a chemical stability analysis and risk assessment on its tailings.

A metalliferous drainage risk assessment of tailings is in fact part of every feasibility study, because inappropriate management of tailings may lead to the mobilisation of pollutants (i.e. sulfate, metals, metalloids, processing chemicals) in a dissolved form within the tailings repository, with the dissolved pollutants potentially being mobilised beyond the repository over time.

Chemical mobilisation of pollutants is inherently influended by the changing chemical stability of mineral phases within the tailings mass. To help ensure the long-term chemical stability of extractive mining and mineral processing waste, a reference document has been produced by the European Union. It lists the best available techniques (BAT) to use as one or a combination of techniques to ensure chemical stability of an operating mining waste mass, which are: compaction, consolidation and deposition of the waste; progressive rehabilitation; temporary covers; desulphurisation (i.e. extraction of sulfide minerals by froth flotation); blending with buffering materials; and covers (Best Available Techniques (BAT) Reference Document for the Management of Waste from Extractive Industries, 2018).

Matakanui Gold will apparently pursue a conventional approach using covers to ensure chemical stability of the tailings mass at the operating and closure stage (Matakanui

Gold 2025a, section 17.0, p.31). However, it remains unclear whether any other best available techniques (BAT) will be pursued to minimise pollutant leaching during the operation of the Shepherds TSF. In particular, the extraction of sulfide minerals (i.e. desulfurisation) during mineral processing and the safe, separate disposal of a sulfide/arsenopyrite concentrate (or the sale of an arsenopyrite concentrate as an additional revenue stream) would reduce the risk of localised acid generation as well as metal and metalloid leaching.

Despite the well-known presence of sulfide minerals within the ore (i.e. pyrite, arsenical pyrite, arsenopyrite, galena, chalcopyrite, sphalerite; MacKenzie et al. 2006) and its strong enrichment in arsenic, **Matakanui Gold has not performed a chemical stability/metalliferous drainage analysis of its tailings and does not consider industry best practices and alternative approaches to minimize leaching of contaminants from the Shepherds TSF.**

3. Benchmarking governance

3.1. Governance of mineral processing and tailings management

In general, the governance model of mineral processing and tailings is based on laws and guidelines. Laws including regulations require mandatory compliance, whereas benchmarking against national (e.g. Mining Association of Canada) and international guidelines is mandatory for signatories and voluntary for non-signatories (e.g. Global Industry Standard on Tailings Management 2020; International Cyanide Management Code for the Manufacture, Transport, and Use of Cyanide in the Production of Gold: Cyanide Code 2021; United Nations Economic Commission for Europe Safety Guidelines and Good Practices for Tailings Management Facilities 2014; International Council on Mining and Metals Tailings Management Good Practice Guide 2025).

International standards often exceed mandatory regulations, thereby serving as a benchmark for professional skill, diligence and foresight. Moreover, international guidelines in mining represent globally accepted methods, techniques and standards designed to ensure safety, quality, and efficiency across the mining sector. For example, the International Cyanide Management Code (Cyanide Code) is an industry-driven certification program for the gold and silver mining industry, promoting safe, environmentally responsible management of cyanide (International Cyanide Management Institute 2021).

Few jurisdictions pursue the enforceable compliance route in gold mining, mineral processing and tailings disposal. Kenya is one example that does, mainly to manage cyanide and mercury issues. Here, Kenya's Environmental Management and Coordination (Amendment) Act (2022) mandates Environmental and Social Impact Assessments for mineral processing projects, particularly for gold mining. It follows licensing frameworks of cyanide handling, cyanide wastewater treatment, and tailings management. Furthermore, Kenya's Environmental and Social Impact Assessment (ESIA) Guidelines for the Mining Sector (2024) require operators to include (a) an analysis of alternatives in terms of technology and leaching chemicals, (b) appropriate safe use protocols, (c) effective training of staff, and (d) effective monitoring programmes.

3.2. Governance of the Shepherds TSF

Matakanui Gold states that national NZ laws apply:

> "*Shepherd TSF shall be designed, constructed, operated, maintained, monitored, and reviewed to meet the requirements of the Resource Management Act 1991, Building Act 2004, and the Building (Dam Safety) Regulations 2022 and amendments (2023, 2024)*" (Matakanui Gold 2025b, section 2.1, p. 8).

Matakanui Gold also refers to national (i.e. New Zealand Dam Safety Guidelines, NZDSG) and international guidelines (i.e. Global Industry Standard on Tailings Management, GISTM) for tailings management and TSF construction design. In their Bendigo-Ophir Gold Project Tailings Management Plan, Matakanui Gold states that:

> "*the Shepherds TSF shall be designed, constructed, operated, maintained, monitored, and reviewed in general accordance with the latest version of the New Zealand Dam Safety Guidelines, unless otherwise defined in this management plan*" (Matakanui Gold 2025b, section 2.5, p. 9).

Matakanui Gold further refers to the Global Industry Standard on Tailings Management:

> "*The Global Industry Standard on Tailings Management (GISTM) sets a global benchmark for achieving social, environmental and technical outcomes for tailings management. Underpinned by an integrated approach, the GISTM aims to enhance the safety of tailings storage facilities (TSFs) and prevent catastrophic failure of TSFs.* ***MGL intends to generally align the management of Shepherds TSF with the principles set out in GISTM***" (Matakanui Gold 2025b, section 2.5, p. 9).

There is no further evidence that Matakanui Gold has considered learnings from other jurisdictions or other international guidelines, which reflect best available techniques and industry best practices (e.g. United Nations Economic Commission for Europe Safety Guidelines and Good Practices for Tailings Management Facilities 2014; Best Available Techniques (BAT) Reference Document for the Management of Waste from Extractive Industries, 2018; The International Cyanide Management Code for the Manufacture, Transport, and Use of Cyanide in the Production of Gold = Cyanide Code, 2021, The International Council on Mining and Metals Tailings Management Good Practice Guide, 2025; Commonwealth Model Mining Feasibility Study Guidelines, Commonwealth Secretariat 2026).

4. Benchmarking against international guidelines

4.1. Benchmarking cyanide management

At gold mines, the nearly universal chemical of choice and industry standard for gold recovery is sodium cyanide (NaCN). It is the most commonly used and effective leaching agent globally due to its high efficiency, relatively low cost, and stability. Several cyanide alternatives for industrial gold extraction have been put into practice at a laboratory or pilot-plant scale, but none has yet replaced cyanide as the dominant, cost-effective method for large-scale operations.

Since cyanide is highly toxic and can cause serious environmental pollution, particularly in anoxic groundwater, many countries around the world have begun to formulate relevant permissible maximum concentrations to control the cyanide content in tailings. In addition, cyanide for gold recovery is banned in several countries (e.g. Hungary, the Czech Republic, Costa Rica) and in certain regional jurisdictions within nations (e.g. the USA states Montana and Wisconsin, provinces in Argentina) (CNLITE 2018).

Cyanide management at mine sites is either regulated through national laws or aligned with international guidelines. Such an approach is pursued because cyanide mismanagement and spills can have devastating impacts due to the high toxicity of cyanide to humans, aquatic life and wildlife, though often not long-term due to natural degradation processes in surface water. However, cyanide in groundwater or specific anoxic environments can persist for long periods, posing ongoing risks. In addition, inadvertent elevated cyanide levels in tailings repositories can be toxic to wildlife.

The Bendigo-Ophir Gold Project will extract gold from ores using Carbon-In-Leach technology, which uses cyanidation techniques. However, the reports on tailings management (Matakanui Gold 2025b) and the environmental management plan of hazardous substances (Matakanui Gold 2025d) do not refer to cyanide at all. Overall, Matakanui Gold does not state in their application:

- whether the company will be signatory of the Cyanide Code;
- whether it will work voluntarily according to the Code;
- whether alternative lixiviants to cyanide have been explored;
- any information on key cyanide safety and management measures (e.g. cyanide storage, handling, containment, use protocols, emergency response, training of staff, effective monitoring programmes).

Regardless, Matakanui Gold recognizes the need for cyanide destruction and arsenic removal from Shepherds tailings prior to discharge to the TSF. It states that (Matakanui Gold 2025c, section 3.9.1.2, p. 159):

> "*CIL tailings will pass through cyanide destruction and soluble arsenic removal before being pumped as slurry to the TSF*".

In general, cyanide destruction is primarily achieved through oxidation methods that convert toxic free and Weak Acid Dissociable (WAD) cyanide into less harmful cyanate, commonly using Sulfur Dioxide/Air (INCO process). At the Shepherd site, the latter process is to reduce cyanide levels to safe, disposable concentrations (30 ppm or lower WAD cyanide; Matakanui Gold 2025c, Figure 3-11, p. 159). However, it remains unclear (a) whether the cyanide detoxification system will be under automated, real-time control, and (b) whether the proposed Sulfur Dioxide/Air process is actually applicable to the site waters, because the process is known to have serious limitations at high cyanide concentrations.

While "*cyanide destruction tanks*" are shown on the general map of the Shepherds site (Matakanui Gold 2025c, Figure 3-12, p. 161), the plan does not show the arsenic removal plant. Moreover, the applicant (Matakanui Gold 2025c) does not state how soluble arsenic removal will be achieved. In this context, it should be noted that arsenic removal uses completely different approaches to cyanide removal. It is primarily achieved through chemical precipitation, co-precipitation with iron, and adsorption techniques. It remains unclear (a) which arsenic removal technology will be used, (b) whether and how any treatment chemicals will be housed, and (c) how and where the solid arsenic-rich wastes generated from the water treatment will be disposed of.

Thus, the application of Matakanui Gold Ltd is incomplete, because a cyanide management plan has not been presented and information on arsenic removal has not been given. Such a lack of documentation misaligns with other gold operations across the globe including New Zealand. These companies have signed or voluntarily use the Cyanide Code, and they have site-specific Cyanide Management Plans, which are standard industry best practice (e.g. Artemis Gold Inc 2022, Oceana Gold 2026).

4.2. Benchmarking against the Global Industry Standard on Tailings Management

The Global Industry Standard on Tailings Management (GISTM 2020) is the primary voluntary global framework for the safe management of tailings facilities. While it is voluntary global standard, it has been adopted as mandatory for all mining industry members (e.g. Anglo American, Barrick, BHP, Boliden, Codelco, Glencore, GoldFields, Newmont, RioTinto, Teck, Vale) of the International Council on Mining and Metals (ICMM). Consequently, many mining operations in South Africa, Brazil, Chile, Peru, Canada and Australia are implementing the GISTM for their assets to align with ICMM commitments (Dladla and Ramsay 2022).

While the GISTM has not been written into the national law of any country, it has become the international standard designed to achieve the goal of zero harm to people and the environment from mining tailings facilities. Thus, the GISTM sets a high-level, auditable framework (15 Principles, 77 Requirements) that many leading mining companies as well as investors and regulators have been adopting around the world to enhance safety, transparency, and accountability. It has also become the standard as a prerequisite for mining companies to obtain the social license to operate.

Matakanui Gold is aware of the GISTM and "*intends to align the management of Shepherds TSF with the principles set out in the GISTM*" (Matakanui Gold 2025b, section 2.5, p. 9). A comparison of the reports with the GISTM Principles and Requirements demonstrates that certain GISTM principles for the management and disposal of tailings will be followed (Matakanui Gold 2025a, b), in particular:

- *GISTM Principle 4 (Develop plans and design criteria for the tailings facility to minimize risk for all phases of its lifecycle, including closure and post-closure),*
- *GISTM Principle 9 (Appoint and empower an Engineer of Record), and*
- *GISTM Principle 13 (Prepare for emergency response to tailings facility failures*).

However, while following some GISTM Principles, many other GISTM Principles and Requirements have not been addressed. In particular, the documentation (Matakanui Gold 2025a, b) has the following gaps, but it is not limited to these omissions and errors:

GISTM Principle 1: Respect the rights of project-affected people and meaningful engage them at all phases of the tailings facility including closure

Matakanui Gold <u>has not</u>

- clarified how it will engage with project-affected people throughout the tailings facility lifecycle on knowledge and decisions that have a bearing on public safety and the integrity of the tailings facility and share information to support this process (GISTM Requirement 1.3), and
- established an effective grievance mechanism (GISTM Requirement 1.4).

GISTM Principle 2: Develop and maintain an interdisciplinary knowledge base to support safe tailings management throughout the tailings facility lifecycle, including closure

Matakanui Gold <u>has not</u>

- developed and documented knowledge about the social, environmental and local economic context of the TSF (GISTM Requirement 2.1),
- prepared and updated a detailed site characterization of the tailings facility site and the physical and chemical properties of the tailings (GISTM Requirement 2.2). Especially, the likely chemical properties of tailings remain unknown to date, which should have been available from laboratory testing of gold recovery and pilot metallurgical testwork.
- developed and documented a valid flood breach analysis (GISTM Requirement 2.3) (see section 2.2. above).

GISTM Principle 3: Use all elements of the knowledge base – social, environmental, local economic and technical – to inform decisions throughout the tailings facility lifecycle, including closure

Matakanui Gold <u>has not</u>

- evaluated and used climate change knowledge throughout the tailings facility lifecycle (GISTM Requirement 3.1),
- conducted a multi-criteria alternative analysis of all feasible sites, techniques and strategies for tailings management (GISTM Requirement 3.2),
- assessed the social, environmental and local economic impacts of the

tailings facility and its potential failure throughout the lifecycle (GISTM Requirement 3.3), and
- indicated that updated assessments will be produced to reflect material changes (GISTM Requirement 3.4).

GISTM Principle 5: Develop a robust design that integrates the knowledge base and minimizes the risk of failure to people and the environment for all phases of the tailings facility lifecycle, including closure and postclosure
Matakanui Gold has not incorporated
- the outcome of a multi-criteria alternative analysis (GISTM Requirement 5.1), and
- a statement through the Accountable Executive that the design satisfies ALARP principles (As Low As Reasonably Practicable principles) (GISTM Requirement 5.7).

GISTM Principle 6: Plan, build and operate the tailings facility to manage risk at all phases of the tailings facility lifecycle, including closure and post-closure
Matakanui Gold has not included
- new and emerging technologies and approaches to tailings disposal and tailings facility management (GISTM Requirement 6.6). In fact, the use of a dry stacking option of filtered tailings rather than the proposed conventional wet slurry tailings impoundment would offer significant benefits in terms of safety against dam failures and environmental consequences. Dry stacking of tailings is ideal for mine sites in seismic and environmentally sensitive areas.

GISTM Principle 7: Design, implement and operate monitoring systems to manage risk at all phases of the faculty lifecycle, including closure
Matakanui Gold has not demonstrated that it
- will establish specific and measurable performance objectives, indicators, criteria and performance parameters in the design of the monitoring programmes (GISTM Requirement 7.3).

GISTM Principle 8: Establish policies, systems and accountabilities to support the safety and integrity of the tailings facility
Matakanui Gold has not demonstrated that it
- will adopt and publish a policy and commitment by the Board of Directors to the safe management of the TSF (GISTM Requirement 8.1),
- will develop mechanisms such that incentive employee payments are based on public safety and integrity of the TSF (GISTM Requirement 8.2).

GISTM Principle 10: Establish and implement levels of review as part of a strong quality and risk management system for all phases of the tailings facility lifecycle, including closure

Matakanui Gold has not demonstrated that it

- will conduct and update risk assessments with a qualified multi-disciplinary team using best practice methodologies at a minimum every three years at least (GISTM Requirement 10.1),
- will conduct regular reviews of the Tailings Management System and the Environmental and Social Management System that refer to the TSF (GISTM Requirement 10.2),
- will periodically review the estimated costs for planned closure, early closure, reclamation and post-closure of the TSF (GISTM Requirement 10.7).

GISTM Principle 11: Develop an organizational culture that promotes learning, communication and early problem recognition

Matakanui Gold has not demonstrated that it will follow this Principle and its Requirements.

GISTM Principle 12: Establish a process for reporting and addressing concerns and implement whistleblower protections

Matakanui Gold has not demonstrated that it will follow this Principle and its Requirements.

GISTM Principle 14: Prepare for long-term recovery in the event of catastrophic failure

Matakanui Gold has not demonstrated that it will follow this Principle and its Requirements.

GISTM Principle 15: Publicly disclose and provide access to information about the tailings facility to support public accountability

Matakanui Gold has not demonstrated that it will follow this Principle and its Requirements.

In conclusion, **Matakanui Gold aligns its tailings management only to some selected GISTM Principles and Requirements.** This is in stark contrast to other Tailings Management Frameworks and Plans, presented by companies with mining assets across Europe, Asia, Africa, North and South America. These tailings management frameworks and plans have already adopted or aim to fully implement all GISTM Principles and Requirements, whether they are members of the International Council on Mining and Metals (ICMM) or not (Table 1).

Table 1. Examples of mining companies that have already adopted or aim to fully implement all GISTM Principles and Requirements.

AngloAmerican	https://www.angloamerican.com/sustainability-strategy/reporting-data-and-policies/our-approach-to-gistm
ArcelorMittal	https://corporate.arcelormittal.com/media/cases-studies/tailings-management
BHP	https://www.bhp.com/sustainability/tailings-storage-facilities
Glencore	https://www.glencore.com/sustainability/esg-a-z/Tailings
Orano Mining	https://www.orano.group/fr/l-expertise-nucleaire/de-l-exploration-au-recyclage/producteur-d-uranium-de-reference/les-ouvrages-de-ceinture-de-stockages-de-residus-de-traitement
RioTinto	https://www.riotinto.com/en/news/releases/2025/rio-tinto-releases-new-tailings-facilities-disclosure-aligned-with-gistm-requirements
Vale	https://vale.com/de/esg/gistm

4.3. Benchmarking against "Zero Harm" and "No Loss of Life”

The Global Industry Standard on Tailings Management (2020) strives to achieve the ultimate goal of zero harm to people and the environment with zero tolerance for human fatality throughout the entire lifecycle of a tailings facility. Thus, "Zero Harm" and "No Loss of Life" are the core objectives of the standard. To meet these aims, mine operators are to follow best practices and several high-level principles, including the inclusion of new and emerging technologies like the dry stacking of filtered tailings. This latter method is considered a safer alternative to traditional slurry impoundments, because it fundamentally eliminates the mechanism for catastrophic dam failures. The core concepts for "Zero Harm" through dry stacking are (e.g. Furnell et al. 2022; Cacciuttolo and Atencio 2023):

- *Elimination of Dam Failures:* By dewatering tailings, the material becomes a stable, moist soil-like mass. It is stacked and compacted into a self-supporting structure, removing the need for massive retention dams that can fail catastrophically.
- *Protection of Life:* Traditional slurry dam failures (such as Brumadinho 2019 or Fundão 2015 in Brazil) have resulted in hundreds of deaths due to "flowslides" of liquefied tailings. Dry stacked tailings cannot flow in this manner, drastically reducing the risk to downstream communities and workers.
- *Seismic and Geotechnical Stability:* Compacted dry stacks are highly resistant to static or dynamic liquefaction, which is often triggered by earthquakes. This makes them a preferred strategy in high-risk seismic regions.
- *Water Conservation:* The process allows for the recovery of up to 90% of process water for reuse in mineral processing circuits. For the Bendigo-Ophir Project, this would reduce bore water extraction and prevent the formation of large ponds that could lead to seepage or environmental contamination.

- *Progressive Reclamation:* Stable dry stacks allow for "concurrent reclamation," where sections of the facility are covered with soil and vegetation while the mine is still operating. This improves long-term stability and minimizes dust health risks.

By contrast, **Matakanui Gold plans the Shepherds TSF with the "*Potential Loss of Life, damage to houses, infrastructure, environment, and community recovery time*"** (Matakanui Gold 2025a, section 12.0, A2, A7, A8). Matakanui Gold proposes a TSF with a tolerance for human fatalities and harm to people and the environment. Consequently, the basic approach of Matakanui Gold to tailings management is diametrically opposed to the objective of "Zero Harm" and "No Loss of Life" of the Global Industry Standard on Tailings Management (2020). Hence, it does not align with GISTM principles.

4.4. Benchmarking against Commonwealth mining guidelines

Mining feasibility studies are comprehensive technical and economic assessments designed to prove a project's viability, justify investment, and secure financing. They generally evolve over time with more knowledge from scoping study to pre-feasibility study to feasibility study.

To support Commonwealth governments in their decision-making on mineral resource development, the Commonwealth Secretariat (2026) has provided the Commonwealth Model Mining Feasibility Study Guidelines that:

> "*respond directly to the expressed priorities of Governments for practical, credible instruments that strengthen decision-making around mining investments and ensure that projects are developed on sound, transparent, and sustainable foundations*".

These Commonwealth guidelines further state that:

> "*A feasibility study is not simply a technical or financial document. It is the first and most important step in deciding whether a mining project should go ahead. It tests whether a proposed project is realistic, responsible and aligned with national development priorities. Without rigorous feasibility studies, governments risk granting approvals to projects that may be unsustainable, fail to deliver expected benefits, or create disproportionate social and environmental costs*".

The Commonwealth guidelines list the information that companies should provide to allow informed decision-making by governments (Commonwealth Secretariat 2026). Several technical analyses and information required by governments are directly relevant to the tailings disposal and management at the Bendigo-Ophir Project, including:

Section 6. Metallurgical and processing methods

- Describe mineralogical, textural and grain-size characteristics, liberation size, hardness/competency, and distribution of deleterious elements (for example, arsenic).

- Provide details on the processing methods (for example, flotation, leaching, milling, etc.) for extracting valuable minerals from the ore.
- Present the metallurgical test work programme, summarising test objectives, laboratories used (with accreditation status), methods and dates.
- Describe the process selection, justifying the selected processing route versus credible alternatives (technical, economic, environmental and social trade-offs).
- Present the flow sheet of the processing plant (from run-of-mine to final product(s)) and associated infrastructure of flow sheets and recovery assumptions),
- Identify all reagents and consumables, expected consumption rates per tonne of ore and per tonne of product, storage and handling, hazards, and supply chain arrangements.
- Identify potential by-products and recovery circuits (for example, precious metals, rare earth elements, sulfuric acid, gypsum).
- Identify air emissions, wastewater streams, noise/vibration and waste inventories arising from processing; describe mitigation and monitoring. The study should confirm compatibility with permitting requirements.

9. Environment impacts / b. Climate risk and resilience assessment

- Show how climate risk may alter design criteria.
- Summarise tailings/water facility performance under extreme events (overtop risk, storm routing, beach and freeboard assumptions, power loss scenarios).
- Evaluate grid reliability under climate stress.
- Carry out climate risk assessments such as impacts of drought, floods, extreme weather events.
- Present resilience measures, including a prioritised, costed set of adaptations (engineering, operational and nature-based) with in-service dates, dependencies and owners. Measures could include spillway upgrades, berms, fire breaks, cooling/ventilation upgrades, backup power, additional storage, road raising.

Matakanui Gold does not provide most of the above-listed required technical analyses and information. Therefore, Matakanui Gold has not aligned its tailings disposal and management to the Commonwealth Model Mining Feasibility Study Guidelines (Commonwealth Secretariat 2026). Again, the presented technical information appears to be of conceptual nature rather than at the feasibility stage of mine development.

5. Concluding remarks

Modern tailings disposal is transitioning from simple, high-volume storage in wet slurry impoundments (like the proposed Shepherds TSF) to highly engineered, low-risk, and sustainable containment systems. In the modern mining industry, the goal of "Zero Harm" and the prevention of human fatalities is increasingly achieved through dry stacking of filtered tailings. The primary driver for these changes is the need to eliminate catastrophic failures, minimize environmental footprints, consider climate change scenarios, and manage water scarcity, often guided by international industry standards like the Cyanide Code (2021) and the Global Industry Standard on Tailings Management (2020). Consequently, there are now key expectations and requirements, such as:

Zero Harm Goal: The overarching objective is to achieve zero harm to people and the environment, with zero tolerance for human fatalities.

Best Available Techniques (BAT): Operators are expected to use the best available techniques, such as dry stacking of filtered tailings or at least paste thickening, which reduces water content and increases physical stability, rather than traditional wet slurry impoundments.

International Industry Standards & Guides: Utilisation of appropriate standards has become the norm in the mining sector, in particular the use of the Cyanide Code (2021), the Global Industry Standard on Tailings Management (2020), the International Council on Mining and Metals Tailings Management Good Practice Guide (ICMM 2025), and the Commonwealth Model Mining Feasibility Study Guidelines (Commonwealth Secretariat 2026).

The application of Matakanui Gold for the proposed Shepherds TSF does not meet these modern expectations and requirements for tailings disposal and management, because it:

- (1) does not consider other tailings disposal options and disposal sites,
- (2) does not adopt best available techniques (BAT) for tailings disposal, dust suppression and prevention of leaching,
- (3) proposes failed techniques for human health and environmental protection (i.e. tailings dust suppression),
- (4) does not provide any information of the chemical and physical properties of the waste to be stored in the Shepherds TSF,
- (5) does not consider the long-term chemical stability of tailings,
- (6) does not design the TSF with "Zero Harm" and "No Loss of Life",
- (7) designs the TSF with the Potential Loss of Life, damage to houses, infrastructure, environment, and community recovery time in mind,
- (8) does not follow industry best practices by working according to the Cyanide Code and articulating a Cyanide Management Plan,
- (9) does not fully consider all 15 Principles and 77 Requirements of the Global Industry Standard on Tailings Management,
- (10) does not provide technical analyses and information as required by the Commonwealth Model Mining Feasibility Study Guidelines.

6. Conditions

If conditions are imposed on the project, I recommend that those conditions should address all deficiencies outlined in this report. However, many of the identified deficiencies relate to project design and provision of information and may not be possible to address through conditions.

References

Artemis Gold Inc (2022) Blackwater Gold Project – Cyanide Management Plan, 48pp. https://www.blackwatergoldmine.com/eac-plans/

Best Available Techniques (BAT) Reference Document for the Management of Waste from Extractive Industries (2018) in accordance with Directive 2006/21/EC; EUR 28963 EN, Publications Office of the European Union, Luxembourg

Cacciuttolo C, Atencio E (2023) Dry stacking of filtered tailings for large-scale production rates over 100,000 metric tons per day: envisioning the sustainable future of mine tailings storage facilities. Minerals 2023, 13, 1445.

Cobb CF (2017) Update on mine tailings dam regulation in Alaska and North America. Alaska Business Monthly, January 2017, 34-35

CNLITE (2018) Cyanide bans worldwide, https://www.cnlitereagent.com/news/cyanide-bans-worldwide/

Commonwealth Secretariat (2026) Commonwealth Model Mining Feasibility Study Guidelines. https://thecommonwealth.org/publications/model-mining-feasibility-study-guidelines

CSIRO (2022) Being proactive on tailings when deciding how to leach and process. https://research.csiro.au/tailings/proactive/

Dadla SD, Ramsamy S (2022) Practical steps to Global Industry Standard on Tailings Management (GISTM) compliance for operational tailings storage facilities in South Africa. Journal of the Southern African Institute of Mining and Metallurgy, vol. 122, no. 6, pp. 283-290

Environmental Management and Co-ordination Act (2022) Government of Kenya, 73pp.

Environmental and Social Impact Assessment (ESIA) Guidelines for the Mining Sector (2024) National Environment Management Authority, Government of Kenya, 64pp.

European Union (2006) Directive 2006/21/EC, Management of waste from extractive industries, 19pp.

Furnell E, Bilaniuk K, Goldbaum M, Shoaib M, Wani O, Tian X, Chen Z, Boucher D, Bobicki ER (2022) Dewatered and stacked mine tailings: a review. American Chemical Society Environmental Science & Technology, Engineering 2022, 2: 728–745

GARD (Global Acid Rock Drainage) Guide (2026) The International Network for Acid Prevention (INAP), http://www.gardguide.com/

GISTM (Global Industry Standard on Tailings Management) (2020) https://globaltailingsreview.org/ 40pp.

Government of Canada (2025) Guidelines for the assessment of alternatives for mine waste disposal. https://www.canada.ca/en/environment-climate-change/services/managing-pollution/sources-industry/mining-effluent/metal-diamond-mining-effluent/tailings-impoundment-areas/guidelines-alternatives-mine-waste-disposal.html

Hudson-Edwards KA, Kemp D, Torres-Cruz LA, Macklin MG, Brewer PA, Owen JR, Franks DM, Marquis E, Thomas CJ (2024) Tailings storage facilities, failures and disaster risk. Nature Reviews Earth & Environment 5, 612-630

International Council on Mining and Metals Tailings Management Good Practice Guide (ICMM 2025) 148pp.

International Cyanide Management Institute (2021) The international cyanide management code. https://cyanidecode.org/, 14pp.
Kerr T, Ulrich B (2011) Tailings impoundments and dams. In: Darling P (ed.), SME Mining Engineering Handbook, 3rd edition. Society for Mining, Metallurgy & Exploration, Chapter 8.10, pp. 645-665
MacKenzie DJ, Corner NG, Craw D (2006) Rise and Shine shear zone, central Otago. In: Christie AB, Brathwaite RL (eds) Geology and Exploration of New Zealand Mineral Deposits. AusIMM Monograph 25, Carlton, pp.319-323
Leading Practice Sustainable Development Program for the Mining Industry (2016) Tailings management. Commonwealth of Australia, 118pp.
Lottermoser BG (2010) Mine Wastes: Characterization, Treatment and Environmental Impacts. 3rd edition. Springer-Verlag, Berlin Heidelberg, 400 pp.
Lottermoser BG (2017) Environmental Indicators in Metal Mining. Springer Nature, Springer International Publishing Switzerland, 413 pp.
Market Reports World (2026) Mining tailings management market overview https://www.marketreportsworld.com/market-reports/mining-tailings-management-market-14718975
Matakanui Gold Ltd (2025a) B.21 Engineering Geology Limited Shepherds Tailings Storage Facility Technical Report, PDF, 29 MB, 322pp.
Matakanui Gold Ltd (2025b) G.16 Tailings Management Plan, PDF, 265 KB, 32pp.
Matakanui Gold Ltd (2025c) A.10 Section 3 Project Description, 105pp.
Matakanui Gold Ltd (2025d) G.21 Hazardous Substances Environmental Management Plan, PDF, 1 MB, 30pp.
Morrison KF (2022) Tailings Management Handbook: A LifeCycle Approach. Society for Mining, Metallurgy & Exploration, 1024pp.
NewFields (2026) Tailings: a fundamental design choice. https://newfieldscanada.ca/tailings-a-fundamental-design-choice/
New Zealand Dam Safety Guidelines (2024) https://nzsold.org.nz/dam-safety-guidelines-2024/
Noble TL, Parbhakar-Fox A, Berry RF, Lottermoser BG (2017) Mineral dust emissions at metalliferous mine sites. In: Lottermoser BG (editor), Environmental Indicators in Metal Mining. Springer Nature, Springer International Publishing Switzerland, pp. 281-306
OceanaGold (2026) Hazardous substances & cyanide management. https://oceanagold.com/sustainability/environmental-stewardship/hazardous-substances-and-waste-management
Okane Consultants (2023) Dust management strategies for tailings storage facilities. https://okaneconsultants.com/ideas/dust-management-strategies/
Owen JR, Kemp D, Lebre E, Svobodova K, Perez Murillo G (2020) Catastrophic tailings dam failures and disaster risk disclosure. International Journal of Disaster Risk Reduction 42, 101381
Parbhakar-Fox A, Lottermoser BG (2015) A critical review of acid rock drainage prediction methods and practices. Minerals Engineering 82, 107-124
Ren J, Huang Z, Meng K, Abdullahi AY, Zeng M, Li W, Li J, Yu R, Wang P, Farooq A (2025) Study on the development and dust suppression performance of a novel composite dust suppressant for metal mines. Atmospheric Pollution Research 16, 102336
Twin Metals Minnesota (2026) Dry stacking: right for the environment. Right for us.

https://www.twin-metals.com/learning-center/dry-stack-tailings-storage/
United Nations Economic Commission for Europe Safety Guidelines and Good Practices for Tailings Management Facilities (2014) 42pp.
University of Otago (2026) Revegetation of gold mine tailings (active mine – Macraes gold mine). https://www.otago.ac.nz/geology/research/environmental-geology/mine-rehabilitation/macraes-restoration
Zare M, Nasategay F, Gomez JA, Moayedi Far AM, Sattarvand J (2024) A review of tailings dam safety monitoring guidelines and systems. Minerals 14, 551