IRMA

Initiative for Responsible Mining Assurance

EXCERPT FROM THE

IRMA Standard

for

Responsible Exploration, Extraction, and Processing of Minerals

2nd DRAFT

for public consultation

CHAPTER 4.2 – **Tailings and Mine Waste Storage Management**

IRMA Standard v2.0 DRAFT 2

July 2025

English Version

Disclaimer and Context on this Draft

The 2nd DRAFT Version of the IRMA Standard for Responsible Exploration, Extraction, and Processing of Minerals V2.0 (hereafter referred to as the "2nd DRAFT") is being released for public consultation, inviting the world to join once again in a conversation around expectations that drive value for greater environmental and social responsibility in mining and mineral processing.

The 2nd DRAFT does not represent content that has yet been formally endorsed by IRMA's equally-governed multi-stakeholder Board of Directors. IRMA's Board leaders seek the wisdom and guidance of all readers to inform this through an inclusive revision process one more time, to improve the Standard.

This draft document builds on the 1st DRAFT Version published in October 2023, and invites a global conversation to improve and update the 2018 IRMA Standard for Responsible Mining V1.0. This 2nd DRAFT is intended to provide as final of a look-and-feel as possible, although input from this consultation will result in final edits, and consolidation to reduce overall number of requirements (more on this on page 6), for a version that will be presented to IRMA's equally-governed multi-stakeholder Board of Directors for adoption and implementation.

This 2nd DRAFT has been prepared and updated by the IRMA Secretariat based on:

- learnings from the implementation of the current IRMA Standard (V1.0)
- experience from the first mines independently audited (as of July 2025, 24 sites have completed audits or are in the process of being audited)
- evolving expectations for best practices in mining to reduce harm
- comments and recommendations received from stakeholders and Indigenous rights-holders
- the input of subject-specific Expert Working Groups convened by IRMA between 2022 and 2024
- all comments and contributions received during the public-comment period of the 1st DRAFT version (October 2023-March 2024)

Please note that Expert Working Groups were created to catalyze suggestions for solutions on issues we knew most needed attention in this update process. They were not tasked to come to consensus nor make formal recommendations. Their expertise has made this consultation document wiser and more focused, but work still lies ahead to resolve challenging issues. We encourage all readers to share perspectives to improve how the IRMA system can serve as a tool to promote greater environmental and social responsibility, and create value for improved practices, where exploration, extraction, and processing of minerals happens.

IRMA is dedicated to a participatory process including public consultation with a wide range of affected people globally and seeks feedback, comments, questions, and recommendations for improvement of this Standard. IRMA believes that diverse participation and input is a crucial and determining factor in the effectiveness of a Standard that is used to improve environmental and social performance in a sector. To this end, every submission received will be reviewed and considered.

This current 2nd DRAFT is based on content already in practice in the IRMA Standard for Responsible Mining V1.0 (2018) for mines in production, and its accompanying normative Guidance document and Supplementary Guidance, combined with the content drafted in the IRMA Standard for Responsible Mineral Development and Exploration ('IRMA-Ready' Standard – Draft v1.0 December 2021) and in the IRMA Standard for Responsible Minerals Processing (Draft v1.0 June 2021), and offers an updated version of the 1st DRAFT Version of the IRMA Standard V2.0 that received over 2,500 unique points of comments between 2023 and 2024.

Please note: The IRMA Standard V2.0 is new in its approach in that it now covers more phases of the mining and mineral supply chain, from exploration and development, through mining, closure, and mineral processing. IRMA also, separately, oversees a Chain of Custody Standard for tracking materials through the supply chain from mine-to-market end use products.

Disclaimer on Language and Corrections

For this public consultation, only an English version is available. A Glossary of Terms used in this Standard is provided at the end of the full version of the document (see below). IRMA reserves the right to publish corrigenda on its web page, and readers of this document should consult the corresponding web page for corrections or clarifications.

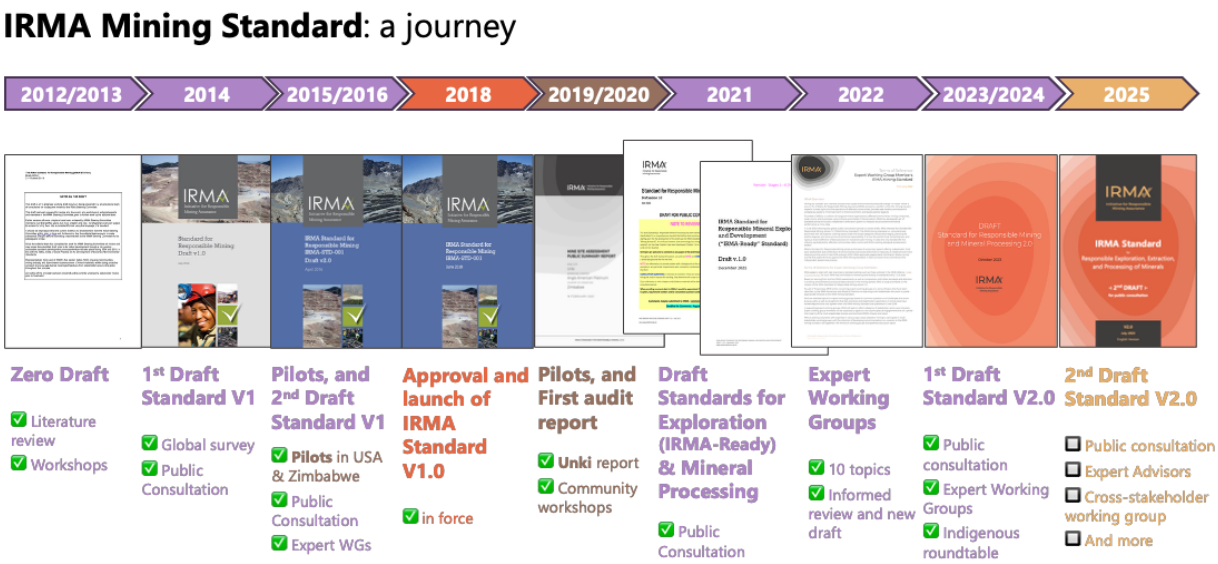
This document provides only one chapter excerpt from the IRMA Standard v2.0 DRAFT 2.

The full version contains 27 Chapters, click here to view it.

Objectives of this 2nd public consultation

Following the release of a 1st DRAFT of the IRMA Standard V2.0 in October 2023 for a 90-day public consultation, the IRMA Secretariat received more than 2,500 points of comments from 82 organizations, then organized additional engagement with stakeholders and Indigenous rights-holders, and solicited complementary guidance from multiple topic-specific Expert Working Groups.

We anticipated release of this 2nd DRAFT for a second round of public consultation as early as Q3 2024, then subsequently announced that more time was needed to support engagement of diverse stakeholders; the revised release date was July 2025. We provided more detailed explanation for the extended process here and here.



The release of this 2nd DRAFT marks a significant milestone on the road to the revision of the IRMA Standard: this public consultation will be the last of this revision cycle on V2.0.

Informed by the outcomes of this public consultation, along with guidance from Expert Advisors and IRMA Working Groups (see more below), and additional engagement with Indigenous rights-holders and stakeholders as requested, the IRMA Secretariat will prepare a final version. This final version will be discussed by the IRMA Board and refined to reach consensus for adoption by all six governing houses of IRMA: Affected Communities including Indigenous Rightsholders; Environmental and Social NGOs; Organized Labor; Finance and Investment Professionals; Mining Companies; Purchasers of Mined Materials.

In IRMA's strategic decision-making, Board members work to achieve consensus. IRMA believes a majority vote is not a model of equal governance. Instead, any motion that results in both of the two representatives from the same governing house voting "no" must go back to the full group for further discussion. In other words, a proposed course of action cannot proceed if both representatives from one of our six governing houses are opposed. Board members will keep talking until a resolution that works for all groups is found. It is a model that has worked for IRMA for nearly two decades and is fundamental to IRMA's credibility, accountability and service to all six houses of governance.

What is IRMA seeking guidance on?

Comments, feedback, and suggestions are welcome on any aspect of this 2nd DRAFT version (including intent and text of the requirements, endnotes, annexes, format and structure, design, readability, etc.).

IRMA is particularly interested in hearing the views of rights-holders and stakeholders on **the provisions in the Standard that are substantially new compared to the IRMA Standard for Responsible Mining V1.0.** These provisions (requirements or at a sub-requirement level) are highlighted in yellow throughout this Draft, to ensure they are easily identifiable.

We ask readers to assist us in weighing these potential new provisions, and also hold awareness that, prior to adoption of the final version, many of these will be consolidated and reduced in overall number.

Although these new requirements have each been drafted in response to lessons learned, the current state of best practices, emerging expectations, and/or in response to requests and suggestions made during the previous public consultation, collectively they represent substantive increased expectations for both implementing entities and audit firms. The IRMA Board of Directors seeks to ensure that the IRMA Standard, while recognized the world's most rigorous and comprehensive mining standard, continue to welcome and support uptake of newcomer companies engaging from the mineral supply chain around the world.

Thus, in this consultation, we seek guidance from all on **the new provisions that seem most urgent** to be integrated in the final version of the Standard V2.0, so that the revised Standard's expectations are paced at a realistic level to support engagement of mineral operations of a range of sizes, materials and global contexts.

It is important to note that all new requirements and sub-requirements, including those not retained in the final V2.0, will serve as the basis for the ongoing review process once the V2.0 is approved and released by our Board, and will provide fodder for future revisions, when it is decided that a V2.1 or V3.0 is needed.

Chapter 4.2
Tailings and Mine Waste Storage Management

SECOND DRAFT (JULY 2025): SUMMARY OF CHANGES

- Updated name of Chapter to clarify the new focus on the management of Tailings Storage Facilities (TSF) and Mine Waste Storage facilities/structures.
- Major changes made to align sequence of Sections, language, and minimum expectations with GISTM Standard.
- Introduced a series of requirements that are fully aligned with the GISTM standard, and that rely on external third-party conformance audits (see introduction to this Chapter and "Issues Under Close Watch" section).
- Made optional (IRMA+) all requirements related to the Physical Stability Management of Non-Waste Facilities (therefore not made explicit in the Chapter title).
- Substantial structural changes to increase clarity and auditability, and to ensure consistency throughout the Standard.

RESPONSE TO CONSULTATION QUESTIONS OUTLINED IN FIRST DRAFT

Question #	Question	Feedback and Proposed Decision
4.X-01	**(ANNEX 4.X-A: Best Practices for the Management of Physical Stability)** **Question**: Do you agree with the proposal to create guidance to better inform auditor's assessments? If not, how do you suggest auditors determine whether or not the measures at a site are sufficient to prevent or mitigate physical instability?	**Feedback received**: 9 respondents: 5 mining, 2 NGO, 2 Consultancy. 6 respondents agree with the inclusion of guidance, but 1 NGO suggests to add more about Factor of Safety and Annual Probability of Failure, 2 Mining suggest it to be more risk-based, and 1 Mining finds it too prescriptive. 1 Mining and 1 Consultancy shared concerns about clarity and the difficulty in maintaining such guidance as technology can evolve rapidly. **Proposed decision**: The draft Annex attempted to cover the most stability-risk-prone facilities at mines and mineral processing operations. IRMA now proposes to focus this Chapter on Tailings Storage Facilities (TSFs) and Mine Waste Facilities, and to mark all the requirements related to the management of other facilities as optional (IRMA+) given the substantial scope expansion this represents for implementing sites. Also acknowledging the lack of clarity in the draft Annex that largely referred to "best practice" without necessarily offering more details, IRMA proposes to remove this Annex.
4.X-02 Part 1	**(4.X.3.4: Initial facility designs and the refinement of the designs of critical facilities)** **Question**: Do you agree that IRMA's best practice design criteria follow the well-established Canada Dam Association criteria? If not, why not? Or are there other design criteria that have emerged as best practice criteria?	**Feedback received**: 10 respondents: 5 mining, 2 NGO, 1 Finance, 2 Consultancy. -Supportive ('yes'): ▪ The 2 NGOs answered yes, but one flagged the need to align design criteria to the highest/safest levels where there is a potential loss of life (in case of failure). ▪ 1 Mining respondent answered yes. ▪ The 2 consultancy firms answered yes. -Not supportive ('no'): ▪ 4 Mining respondents are not supportive, for various reasons (1 flagging that dams and waste dumps are completely different, 1 flagging that all types of facilities are different and require different criteria, 1 suggests to not have criteria altogether, and 1 suggests to strictly align with GISTM) -Others ▪ The finance respondent is undecided, but flags that designs must take climate change into account, and adopt more conservative design criteria accordingly **Proposed decision**: It is proposed to align design-related requirements with GISTM, but to require that the most protective criteria are used for all facilities (i.e., this approach is only one of two options proposed in GISTM (Option B1 of GISTM Requirement 4.2). Instead, in this DRAFT it is

		proposed to be the only option to obtain full conformance with this Chapter). See requirement 4.2.10.2.
4.X-02 Part 2	**(4.X.3.4: Initial facility designs and the refinement of the designs of critical facilities)** **Question**: Do you agree with the inclusion of slope stability criteria? If not, why not?	**Feedback received**: 8 respondents: 4 mining, 2 NGO, 2 Consultancy. -Supportive ('yes'): ▪ The 2 NGOs answered yes, but one flagged the need to align design criteria to the highest/safest levels where there is a potential loss of life (in case of failure). ▪ 1 Mining respondent answered yes. ▪ The 2 consultancy firms answered yes. -Not supportive ('no'): ▪ 3 Mining respondents are not supportive, 1 suggests to not have criteria altogether, and 2 suggest to strictly align with GISTM. **Proposed decision**: It is proposed to align design-related requirements with GISTM, but to require that the most protective criteria are used for all facilities (i.e., this approach is only one of two options proposed in GISTM (Option B1 of GISTM Requirement 4.2). Instead, in this DRAFT it is proposed to be the only option to obtain full conformance with this Chapter). See requirement 4.2.10.2.
4.X-03	**(4.X.3.4: Initial facility designs and the refinement of the designs of critical facilities)** **Question**: As with GISTM, should IRMA make additional allowances for existing facilities if they can demonstrate that upgrade to the best practice design criteria is not viable or cannot be retroactively applied? If so, then like GISTM, should IRMA require demonstration that upgrades still take place to minimize risk to as low as reasonably practicable (ALARP) at those sites? Perhaps if sites do not meet all of the design criteria but can demonstrate that risks have been reduced to ALARP, IRMA could cap a site's rating for this requirement at substantially meets (i.e., they would never be able to fully meet the requirement), so that the sites that have implemented best design practices are able to distinguish themselves. Is that an approach that you would support?	**Feedback received**: 9 respondents: 5 mining, 2 NGO, 2 Consultancy. This question saw a clear divide between the Mining companies and the consultants answering 'Yes' to aligning with GISTM on the one hand, and on the other hand the NGOs answering 'No' (i.e. if a site cannot fully meet, it cannot fully meet). One consultancy and one of the mining respondents did not provide a clear answer. **Proposed decision**: No consensus was found on this issue. In this 2nd DRAFT, it is proposed to -at least- align with the approach taken in GISTM, see requirement 4.2.10.4. However, IRMA proposes to discuss and explore potential approaches within an **IRMA Expert Working Group** dedicated to Tailings Storage and Mine Waste Facility Management. See more below.

BACKGROUND

Mining and mineral processing require facilities to store waste that, if mismanaged, can create risks to human rights, health and safety, biodiversity, and the environment.

Most mined material will remain on site as waste in two general forms: 1) soil and rock removed during mining that will not be processed (e.g., overburden, waste rock, sub-economic ore), and 2) waste from mineral, metallurgical and chemical processing (e.g., tailings, slag, spent heap leach piles, process residue storage ponds).

Tailings storage facilities (TSFs) can present a variety of risks and impacts. Throughout the history of modern mining, a number of unstable TSFs have failed, releasing large quantities of waste, often toxic, into the environment; resulting in some of the worst catastrophes in the minerals sector. Inappropriate management of TSFs can adversely affect rivers, the environment, homes, lives and livelihoods, and economies. As evidenced by the chronology of tailings dam failures and associated statistics, curated by the World Mine Tailings Failures[i] and the World Information Service on Energy[ii], the trend shows an increasing frequency and severity of TSF failures.

Besides TSFs, areas and facilities used to store or dispose of waste from underground and surface mines (other than tailings and waste from mineral processing) may also pose risks to local communities and the surrounding environment, as the storage of any large volumes of any material in piles or constructed impoundments holds the potential for stability-related risks under certain circumstances, that need to be identified and understood.

By implementing best practices, the potential for adverse impacts related to failure of mine waste storage facilities can be prevented or greatly reduced.

Appropriate design criteria and engineering controls, inspection and maintenance programs must also be informed by the characterization of the tailings and mine waste stored, to determine whether they have the potential to generate acid and/or leach metals and other contaminants; this is covered in Chapter 4.1 dedicated to Waste and Materials Management.

Increasingly, mining companies implement stronger governance and accountability mechanisms for mine waste management such as ensuring facility-related decision-making and oversight are assigned at Board and executive management levels; more rigorous risk assessment processes; and independent expert review of waste facility siting, design, construction, operation and closure plans.

This Chapter integrates best practices and recommendations from the Global Industry Standard for Tailings Management (2020, discussed in more detail below), the Safety First Guidelines V2.0 (2022), the ICOLD Committee on Tailings Dams and Waste Lagoons (since 1989) and the UNECE Joint Expert Working Group on Water and Industrial Accidents (since 2006).

KEY REFERENCES

This chapter strongly builds on, or aligns with, the following international or multilateral frameworks, conventions, and guidance:

- UNECE Safety Guidelines and Good Practices for Tailings Management Facilities, 2014
- ICMM, UNEP, UN PRI, Global Industry Standard on Tailings Management (GISTM), 2020
- ICOLD Bulletin 194 Tailings Dam Safety, 2025
- ICOLD Bulletin 181 Tailings Dam Design - Technology Update, 2021
- Earthworks, MiningWatch Canada, London Mining Network, Safety First Guidelines for Responsible Mine Tailings Management V2.0, 2022

[i] https://worldminetailingsfailures.org/

[ii] WISE Uranium Project, https://www.wise-uranium.org/mdaf.html

GLOBAL INDUSTRY STANDARD FOR TAILINGS MANAGEMENT (GISTM) AND THE GLOBAL TAILINGS MANAGEMENT INSTITUTE (GTMI)

In 2020, the Global Industry Standard for Tailings Management (GISTM) was released as a result of the Global Tailings Review, a two-year-long multi-stakeholder effort led by the International Council on Mining and Metals (ICMM), the United Nations Principles for Responsible Investment (UN PRI), and the United Nations Environment Programme (UNEP), which included discussions with IRMA. GISTM "strives to achieve the ultimate goal of zero harm to people and the environment with zero tolerance for human fatality"[i], which aligns with the objectives of this Chapter, and the IRMA Standard more generally.

In January 2025, an independent institute, the Global Tailings Management Institute (GTMI), was announced to "oversee the implementation of and conformance with GISTM".[ii] The Board, CEO, and Technical Committee nominees of the GTMI are expected to be communicated soon, as well as a subsequent work program. Amongst other remits, the GTMI will be responsible for developing "conformance protocols to guide consistent auditing and certification, or assurance as applicable" of GISTM.[iii]

SYNERGIES BETWEEN GISTM, GTMI, AND IRMA

Most industry and finance organizations that have been taking part in the review and revision of the IRMA Standard between 2022 and 2024 have strongly suggested that IRMA should solely rely on GISTM conformance for this Chapter. Conversely, many NGOs and CSOs have flagged that GISTM currently lacks an official, independent and impartial accreditation process for third-party audit firms to undertake conformance verifications. They have also shared concerns about the current lack of auditability of certain elements of GISTM.

TSFs are complex, and the review, assessment and verification of the technical, engineering, and structural measures to ensure the safe management of TSFs require dedicated time and expertise that IRMA-accredited audit teams are not designed to offer.

The 2018 IRMA Standard V1.0 instead requires sites to regularly undertake Independent Reviews of Mine Waste Management Facilities (Section 4.1.6 in the Standard V1.0), and to demonstrate that any gap or risk identified is being addressed and corrected.

Assuming GISTM will be further developed and effectively overseen by the GTMI now that its set-up is underway, it can robustly address and assure the technical aspects of tailings management.

In this 2nd DRAFT, IRMA aims to support and amplify GISTM by requiring operators to undertake robust and independent third-party audits against the GISTM. The auditors conducting an IRMA audit would then rely on the outcomes of these audits to score the relevant IRMA requirements accordingly, without needing to re-audit. This is articulated through a series of requirements in this Chapter

To supplement the existing GISTM requirements, this Chapter contains a few additional technical requirements that cover additional guidance regarding facility characterization, design criteria, the content of risk management plans, additional safeguards for TSFs where at least one life could be lost in case of failure, that are not explicitly covered in GISTM but that are in line with the Key References that this Chapter builds on (see above). For those, no direct reference to GISTM is provided, although additional comparative guidance and detailed cross reference between the two standards will be developed.

As for the non-technical aspects of tailings management, the IRMA Standard offers a comprehensive framework of best practice on business integrity, long-term planning, social, and environmental

[i] ICMM, UNEP, UN PRI, Global Industry Standard on Tailings Management, 2020, https://globaltailingsreview.org/wp-content/uploads/2020/08/global-industry-standard-on-tailings-management.pdf

[ii] Website of the GTMI, https://thegtmi.org/

[iii] Ibid

management for the minerals sector. Most of these topics are transversal and apply to all features and facilities needed to operate an exploration, mining, or processing site. As such, aspects of the IRMA Chapters on human rights due diligence, stakeholder engagement and information sharing, Indigenous Peoples and the right to FPIC, grievance mechanisms, resettlement, financial assurance, closure and post-closure management, emergency preparedness, health and safety, water management, or climate action, apply to the management of TSFs, which is reflected in this Chapter and throughout the IRMA Standard.

IRMA has been in regular contact with members of the Global Tailings Review, and is committed to engage with the GTMI as soon as possible to maximize synergies and cross-recognition between our standards where possible, including the conformance protocols and associated assurance approach. IRMA will also strive to facilitate cross-participation of experts and interested parties between the IRMA Expert Working Group dedicated to Tailings Storage and Mine Waste Facility Management and relevant GTMI advisory or working groups.

PARTICIPATE IN AN EXPERT WORKING GROUP ON THIS CHAPTER

IRMA proposes to discuss the remaining challenging issues and concerns that were raised during the development of this 2nd DRAFT within an **IRMA Expert Working Group** dedicated to Tailings Storage and Mine Waste Facility Management. The topics to be covered include:

- Synergies and relationship with the GTMI;
- Requirements for TSFs that are not classified as 'Very High' or 'Extreme' but with at least one potential loss of life;
- Robustness and appropriateness of ALARP processes, Dam Breach Analyses (including estimations of the potential volumes of tailings and water that could be released), and Dam Safety Reviews;
- Risk management regarding upstream TSFs;
- Potential safety 'buffer' zones and application of ALARP;
- The range of technical information and reports that could be made publicly accessible –by default– by companies, if any; and
- Emergency preparedness planning based on Dam Breach Analysis and risk assessments.

The Terms of Reference applicable to this Expert Working Group, including instructions on how to apply, are available at (click on this link): **ToR for Expert Working Group 2025.**

OBJECTIVES OF THIS CHAPTER

To manage the storage of tailings and waste from mining and mineral processing operations, including tailings storage facilities (TSFs) in a manner that minimizes their short- and long-term physical risks, and prevents harm to workers as well as to the human rights, health and safety of communities, and future land and water uses.

SCOPE OF APPLICATION

This chapter is applicable to all exploration, mining and mineral processing projects and operations. However, if the scoping process required in 4.2.1.1 and 4.2.1.2 demonstrates the total absence of any proposed or existing storage, transport or disposal facilities/infrastructures for tailings and wastes from mineral processing, **and** the total absence of any proposed and existing facilities or structures used to store, transport or dispose of wastes and materials from underground and surface mines (other than tailings and wastes from mineral processing) that may have physical stability risks, the rest of this Chapter will not be applicable.

Also, in the context of this Chapter, and as per the GISTM Standard, **existing** tailings facilities are defined as those facilities that were already accepting new mine tailings on the date that the GISTM Standard took effect (i.e., August 2020) or are not currently accepting new mine tailings but are not in a state of safe closure; while all other tailings facilities are treated as **new** facilities.

For each requirement, the following colors are displayed in the margin to indicate the phases for which it is required:

E1	Exploration – Stage 1
E2	Exploration – Stage 2
E3	Exploration – Stage 3
D	Project Development and Permitting
M	Operating Mine
P	Operating Mineral Processor

CRITICAL REQUIREMENTS IN THIS CHAPTER

Throughout the Standard, critical requirements are identified using a red frame.
There is one (1) **critical requirement** in this Chapter.

The critical requirement to not use riverine, lake, or marine disposal or storage of tailings is found in Chapter 4.1 on Waste and Materials Management.

OPTIONAL IRMA+ REQUIREMENTS IN THIS CHAPTER

Throughout the Standard, optional IRMA+ requirements are identified using a dotted blue frame. There are five (5) **optional IRMA+ requirements** in this Chapter (all related to non-mine waste facilities[i]).

In this second draft, IRMA introduces a new category of requirements: IRMA+. These requirements are aspirational and forward-looking. They reflect emerging expectations and recommendations from stakeholders, but currently go above and beyond existing and established best practice. IRMA+ requirements are entirely optional, and they will not affect the scores and achievement levels obtained by the entities choosing to be assessed against them.

[i] **Management of Non-Waste Facilities:** Mines may also have other facilities and structures that could pose stability risks to nearby communities. For example, a mine may require water storage facilities for fresh and process water, which could also hold the potential for failure. These risks and impacts should be understood and managed. Requiring the same level of characterization, classification, and management for those non-waste facilities as for mine waste facilities aligns with emerging expectations and recommendations from stakeholders. However, we note that several of these requirements go above and beyond existing and established best practice. Therefore, the IRMA Standard reflects this and offers recognition of this opportunity for improved performance through IRMA+ requirements related to non-waste facilities, that are optional for auditing (see greater context in the Introduction to the IRMA Standard for how mining companies may choose to be measured against IRMA+ requirements).

ISSUES UNDER CLOSE WATCH (EYE ICON)

References to GISTM Standard and anticipated GTMI Conformance Protocols:

As explained above, in this Chapter IRMA introduces a different approach to audit and assessment, that relies on external third-party conformance audits against another voluntary standard not supervised by IRMA: GISTM. The auditors conducting an IRMA audit would rely on the outcomes of these audits to score the relevant IRMA requirements accordingly, without needing to re-audit. This new approach is articulated through a series of requirements in this Chapter that follow the sequence of the GISTM Standard, whose scoring levels will rely on the level of conformity determined by GTMI-accredited third-party audit against the GISTM. These requirements (4.2.2.2, 4.2.3.1, 4.2.4.1, 4.2.8.1, 4.2.9.1, 4.2.10.1, 4.2.10.4, 4.2.11.1, 4.2.12.1, 4.2.13.1, 4.2.14.1, 4.2.15.3, 4.2.15.7, 4.2.16.1, and 4.2.17.1) are signaled with an 'eye icon' to ensure that IRMA closely monitor their relevance, and their implementation as the Standard V2.0 is applied. This is also intended to ensure IRMA will review associated challenges and needed decision more quickly if necessary. Note that these requirements are not 'optional' (unlike IRMA+).

IRMA Requirements

4.2.1 Scoping

E3 D M P

4.2.1.1 A scoping process (or equivalent) is undertaken by competent professionals to identify all proposed and existing storage, transport or disposal facilities/infrastructures for **tailings and wastes from mineral processing** that are associated with the site and its associated facilities[1].

E3 D M

4.2.1.2 A scoping process (or equivalent) is undertaken by competent professionals to identify all proposed and existing facilities or structures used to store, transport or dispose of **wastes and materials from underground and surface mines (other than tailings and wastes from mineral processing)**[2], associated with the site and its associated facilities, **that may have physical stability risks that could impact** the health, safety or human rights of workers and communities, or the environment.

E3 D M P

4.2.1.3 **IRMA+**

A scoping process (or equivalent) is undertaken by competent professionals to identify all **other** proposed and existing relevant facilities (other than tailings and waste facilities)[3] that may have physical stability risks that could impact the health, safety or human rights of workers and communities, or the environment.

4.2.2 Formalized Policies and Accountabilities

D M P

4.2.2.1 The ENTITY has a formal policy in place that:

a. Commits to the safe management of mine waste facilities, to emergency preparedness and response to tailings-related incidents, and to recovery after failure of mine waste facilities;

b. Is approved at the top management level of the ENTITY;

c. Is publicly accessible;

d. Has been proactively shared with all relevant employees and contractors to a degree appropriate to their level of responsibility and function; and

e. The ENTITY has allocated financial and staffing resources with the necessary competence to implement this policy at the level of the project/operation.

D M P

4.2.2.2 For **all** the proposed and existing tailings facilities identified as per 4.2.1.1, the ENTITY has undertaken a third-party conformance audit against the GISTM Conformance Protocols and demonstrated full conformance[4] with the following requirements:

a. **GISTM Requirement 8.2**[i]**,** and **GISTM Requirement 8.3**[ii];

b. **GISTM Requirement 8.4**[iii], **GISTM Requirement 8.5**[iv], and **GISTM Requirement 8.6**[v]; and

c. **GISTM Requirement 8.7**[vi].

[i] GISTM Requirement 8.2: Establish a tailings governance framework and a performance-based Tailings Management System (TMS) and ensure that the Environmental and Social Management System (ESMS) and other critical systems encompass relevant aspects of the tailings facility management.

[ii] GISTM Requirement 8.3: For roles with responsibility for tailings facilities, develop mechanisms such that incentive payments or performance reviews are based, at least in part, on public safety and the integrity of the tailings facility. These incentive payments shall reflect the degree to which public safety and the integrity of the tailings facility are part of the role. Long-term incentives for relevant executive managers should take tailings management into account.

[iii] GISTM Requirement 8.4: Appoint one or more Accountable Executives who is/are directly answerable to the CEO on matters related to this Standard. The Accountable Executive(s) shall be accountable for the safety of tailings facilities and for avoiding or minimising the social and environmental consequences of a tailings facility failure. The Accountable Executive(s) shall also be accountable for a programme of tailings management training, and for emergency preparedness and response. The Accountable Executive(s) must have scheduled communication with the EOR and regular communication with the Board of Directors, which can be initiated either by the Accountable Executive(s), or the Board. The Board of Directors shall document how it holds the Accountable Executive(s) accountable.

[iv] GISTM Requirement 8.5: Appoint a site-specific Responsible Tailings Facility Engineer (RTFE) who is accountable for the integrity of the tailings facility, who liaises with the EOR and internal teams such as operations, planning, regulatory affairs, social performance, and environment, and who has regular two-way communication with the Accountable Executive. The RTFE must be familiar with the DBR, the design report and the construction and performance of the tailings facility

[v] GISTM Requirement 8.6: Identify appropriate qualifications and experience requirements for all personnel who play safety-critical roles in the operation of a tailings facility, including, but not limited to the RTFE, the EOR and the Accountable Executive. Ensure that incumbents of these roles have the identified qualifications and experience, and develop succession plans for these personnel.

[vi] GISTM Requirement 8.7: For tailings facilities with Consequence Classification of 'Very High' or 'Extreme', appoint an Independent Tailings Review Board (ITRB). For all other facilities, the Operator may appoint a senior independent technical reviewer. The ITRB or the reviewer shall be appointed early in the project development process, report to the Accountable Executive and certify in writing that they follow best practices for engineers in avoiding conflicts of interest.

D M P

4.2.2.3 The Entity has a system in place to ensure that, for any tailings facility not classified as 'Very High' or 'Extreme' but with at least one potential loss of life:

a. The Accountable Executive reviews the facility's risk environment, and the past and current performance of the facility management;

b. As a result of this review, the Accountable Executive decides whether to appoint an Independent Tailings Review Board (ITRB) (see 4.2.2.2.c);

c. The decision is documented.

GUIDANCE SOUGHT ON REQUIREMENT 4.2.2.3:

Further discussion is needed on whether specific conditions or risks should automatically trigger a decision from the Accountable Executive to appoint an Independent Tailings Review Board (ITRB) for those tailings facility that are not classified as 'Very High' or 'Extreme' but with at least one potential loss of life. IRMA proposes to discuss and explore potential approaches within an **IRMA Expert Working Group** dedicated to Tailings Storage and Mine Waste Facility Management.

PARTICIPATE IN AN EXPERT WORKING GROUP ON THIS CHAPTER

The Terms of Reference applicable to this Expert Working Group, including instructions on how to apply, are available at (click on this link): **ToR for Expert Working Group 2025.**

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D M P

4.2.2.4 The ENTITY's ultimate decision-making authority (e.g. its Board of Directors, or its corporate owner/s' Board of Directors) includes at least one member with general knowledge about mine waste facilities and their associated risks.

D M P

4.2.2.5 For sites with any proposed or existing mine waste facilities where one or more credible failure modes have been identified (see 4.2.5.1), the ENTITY has a system in place to ensure that the risk profiles[5] associated with those facilities are regularly discussed at the level of its ultimate decision-making authority (e.g. its Board of Directors, or its corporate owner/s' Board of Directors, or sub-committees of those bodies)

4.2.3 Interdisciplinary Knowledge Base

E3 D M P

4.2.3.1 For **all** the proposed and existing tailings facilities identified as per 4.2.1.1, the ENTITY has undertaken a third-party conformance audit against the GISTM Conformance Protocols and demonstrated full conformance[6] with the **GISTM Requirement 2.1**[i].

4.2.4 Characterization

E3 D M P

4.2.4.1 For **all** the proposed and existing tailings facilities identified as per 4.2.1.1, the ENTITY has undertaken a third-party conformance audit against the GISTM Conformance Protocols and demonstrated full conformance[7] with the **GISTM Requirements 2.2**[ii].

E3 D M P

4.2.4.2 For **all** the proposed and existing mine waste facilities identified as per 4.2.1.1 and 4.2.1.2, the Entity has a system in place to ensure that a site characterization:

a. Is carried out and documented by competent professionals, using credible methodologies;

b. Includes: 1) the proposed dimensions; 2) proposed location; 3) preliminary design; 4) operational lifespan; and 5) closure objectives; and

c. Includes: 6) the storage or disposal capacity; and 7) existing and planned future contents and their chemical characteristics.

E3 D M P

4.2.4.3 For **all** the proposed and existing mine waste facilities identified as per 4.2.1.1 and 4.2.1.2, the Entity has a system in place to ensure that the site characterization also includes and documents the following factors, and how they may influence physical stability:

a. Soil characteristics as follows: 1) soil type; 2) particle sizes; 3) pore water pressure; and 4) hydraulic conductivity of soils at the site;

b. Geology as follows: 1) seismicity; and 2) geologic and lithic subsurface conditions beneath the site and within 2 km of the site, including the thickness of each geologic unit and identification of which geologic units are water bearing;

c. Hydrology as follows: 1) subsurface conditions for all water-bearing zones beneath the site including maximum and minimum depths to ground water, direction of groundwater flow, hydrologic gradients, transmissivity and storativity; and 2) conditions of surface waters including average and seasonal levels and flow rates, gradients, and storage features within 2 km of the site; and

d. Climate-related factors, as follows: 1) mean annual temperature; 2) precipitation; 3) evaporation; 4) maximum precipitation events; 5) predicted probable maximum precipitation events[8]; 6) Trends in past weather and climate events, and predicted trends in future weather and climate events; and 7) Any uncertainties due to climate change for all the factors listed in a. to c.

[i] GISTM Requirement 2.1: Develop and document knowledge about the social, environmental and local economic context of the tailings facility, using approaches aligned with international best practices. Update this knowledge at least every five years, and whenever there is a material change either to the tailings facility or to the social, environmental and local economic context. This knowledge should capture uncertainties due to climate change.

[ii] GISTM Requirement 2.2: Prepare, document and update a detailed site characterisation of the tailings facility site(s) that includes data on climate, geomorphology, geology, geochemistry, hydrology and hydrogeology (surface and groundwater flow and quality), geotechnical, and seismicity. The physical and chemical properties of the tailings shall be characterised and updated regularly to account for variability in ore properties and processing.

E3 D M P

4.2.4.4 For **all** the proposed and existing mine waste facilities identified as per 4.2.1.1 and 4.2.1.2, competent professionals assess the relevance of the following factors to physical stability and, where relevant, include them in the site characterization:

a. Physical properties of the facility foundation materials, and of borrow or other materials used in construction of embankments or other features intended to provide physical stability of internally stored wastes and materials;

b. Physical properties and chemical properties of stored wastes and materials[9]; and

c. Actual volumes and updated estimates of future volumes of solid and liquid wastes, and the placement and/or fill plans and schedules (short and long-term) for the facility life cycle;

E3 D M P

4.2.4.5 For **all** the proposed and existing mine waste facilities identified as per 4.2.1.1 and 4.2.1.2, competent professionals assess the need for conducting the following additional, and more detailed, geotechnical investigations and, where relevant, carry them out, document them, and include them in the site characterization: geohazard assessment, seepage analysis, stability assessment, seismic assessment, sensitivity analysis, water balance assessment, and flooding assessment.

4.2.5 Identification of Credible Failure Modes

E3 D M P

4.2.5.1 For **all** the proposed and existing mine waste facilities identified as per 4.2.1.1 and 4.2.1.2:

a. A multi-disciplinary team of competent professionals identifies and documents all credible failure modes[10];

b. This identification is informed by the facility characterization required in Section 4.2.4, and by the waste/material characterization required in Chapter 4.1 (Section 4.1.2); and

c. The methodology used and all identified failure modes are documented.

4.2.6 Facility Breach Analysis

E3 D M P

4.2.6.1 For **all** the proposed and existing mine waste facilities where one or more credible failure modes have been identified (see 4.2.5.1), the following analyses are carried out and documented:

a. A facility breach analysis, informed by all the credible failure mode/s identified (as per 4.2.5.1), the facility characterization required in Section 4.2.4, and by the waste/material characterization required in Chapter 4.1 (Section 4.1.2);

b. Runout or inundation analyses for the loss of all wastes and materials (water and liquefiable solids); and

c. These analyses are carried out by competent professionals, using credible methodologies.

E3 D M P

4.2.6.2 For **all** the proposed and existing mine waste facilities where one or more credible failure modes have been identified (see 4.2.5.1), the facility breach analysis required in 4.2.6.1 determines:

a. The estimated physical area that may be impacted;

b. Flow arrival times, velocities, and depth of material deposition; and

c. Estimated potential and likely consequences in terms of loss of human life, impacts to public and private infrastructure and vital services, environmental impacts, and economic cost.

E3 D M P

4.2.6.3 For **all** the proposed and existing mine waste facilities where one or more credible failure modes have been identified (see 4.2.5.1), the location of the facility is mapped in relation to:

a. Topographical contours and geological data;

b. Watercourses and other surface water features, and the most recent 100-year and 500-year flood zones; and

c. The residential populations, individual households, and public and private infrastructure[11] that may be affected by those credible failure modes.

GUIDANCE SOUGHT ON SECTION 4.2.6–Facility Breach Analysis

The possibility of systematically including worst-case/full release scenarios in breach analyses was discussed during the preparation of this 2nd DRAFT. However, no consensus was found, and the diverging views could not be resolved prior to the release of this 2nd DRAFT.

Further discussion is needed on ways for auditors to determine whether the credible failure modes, ALARP processes, Dam Breach Analyses (including estimations of the potential volumes of tailings and water that could be released), and Dam Safety Reviews are aligned and robust, and are used appropriately to inform emergency preparedness and response measures. IRMA proposes to discuss and explore potential approaches within an **IRMA Expert Working Group** dedicated to Tailings Storage and Mine Waste Facility Management.

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4.2.7 Meaningful Engagement with Stakeholders

E3 D M P

4.2.7.1 For **all** the proposed and existing mine waste facilities where one or more credible failure modes have been identified (see 4.2.5.1), the ENTITY:

a. Proactively shares with affected rights-holders and stakeholders information on the factors that may affect the physical stability of proposed and existing facilities, including information on the most recently updated identification of credible failure modes and, if relevant, the most recently updated facility breach analysis;

b. Building on the socio-environmental baseline and ongoing impact assessment required in Chapter 2.1, collaborates with affected rights-holders and stakeholders to identify, document, and regularly update, the potential negative impacts that physical stability failure at any of the identified mine waste facility could have on their social[12], cultural heritage, and environmental resources; and

c. To facilitate effective and meaningful engagement, and in accordance with Section 1.2.5, the ENTITY offers to provide financial assistance to affected rights-holders and stakeholders to select, hire and finance independent experts of their own choosing to advise them on risks related to the management of mine waste facilities.

4.2.8 Consequence Classification

E3 D M P

4.2.8.1 For **all** the proposed and existing tailings facilities identified as per 4.2.1.1, the ENTITY has undertaken a third-party conformance audit against the GISTM Conformance Protocols and demonstrated full conformance[13] with the following requirements:

a. **GISTM Requirement 3.3**[i];

b. **GISTM Requirement 3.4**[ii]; and

c. **GISTM Requirement 4.1**[iii].

E3 D M P

4.2.8.2 Full conformance with GISTM Requirements 3.3 and 3.4 (i.e. assessment, and regular update, of the social, environmental, and local economic impacts of the tailings facilities and their potential failure throughout their lifecycle, required in 4.2.8.1) is demonstrated also for all **existing** tailings facilities[14].

E3 D M P

4.2.8.3 For **all** the proposed and existing mine waste facilities where one or more credible failure modes have been identified (see 4.2.5.1), competent professionals:

a. Determine and document the consequence of failure classification of the facility by assessing the downstream conditions documented in the knowledge base, building on the potential negative impacts identified in collaboration with affected communities (as per 4.2.7.1.b), and selecting the classification corresponding to the highest Consequence Classification for each category in Annex 4.2-A;

b. Review each facility's failure consequence classification at least every five years, but without undue delay after a significant change; and

c. Review each facility's failure consequence classification whenever new or more accurate data relating to risks to the stability of the facility[15] become available.

[i] GISTM Requirement 3.3: For new tailings facilities, use the knowledge base, including uncertainties due to climate change, to assess the social, environmental and local economic impacts of the tailings facility and its potential failure throughout its lifecycle. Where impact assessments predict material acute or chronic impacts, the Operator shall develop, document and implement impact mitigation and management plans using the mitigation hierarchy.

[ii] GISTM Requirement 3.4: Update the assessment of the social, environmental and local economic impacts to reflect a material change either to the tailings facility or to the social, environmental and local economic context. If new data indicates that the impacts from the tailings facility have changed materially, including as a result of climate change knowledge or long-term impacts, the Operator shall update tailings facility management to reflect the new data using Adaptive Management best practice).

[iii] GISTM Requirement 4.1: Determine the consequence of failure classification of the tailings facility by assessing the downstream conditions documented in the knowledge base and selecting the classification corresponding to the highest Consequence Classification for each category in Annex 4.2-A. The assessment and selection of the classification shall be based on credible failure modes, and shall be defensible and documented.

4.2.9 Multi-Criteria Alternatives Analysis (MCAA)

E3 D M P

4.2.9.1 For **all** the proposed and existing tailings facilities identified as per 4.2.1.1, the ENTITY has undertaken a third-party conformance audit against the GISTM Conformance Protocols and demonstrated full conformance[16] with the **GISTM Requirement 3.2**[i].

E3 D M P

4.2.9.2 For **all** the proposed and existing mine waste facilities identified as per 4.2.1.1 and 4.2.1.2:

a. A multi-criteria alternatives analysis (MCAA) is carried out and documented by a multidisciplinary team of competent professionals;

b. Each MCAA has the objective of selecting an alternative that: 1) minimizes risks to people and the environment throughout the facility life cycle, and 2) minimizes the volume of fluids and/or wastes placed in those facilities;

c. Each MCAA identifies minimum specifications and performance objectives for each facility throughout the facility life cycle (including closure objectives and post-closure land and water uses);

d. Each MCAA identifies possible alternatives for initial siting, design and management of those facilities to prevent, and if that is not possible, minimize risks from all credible failure modes and for all phases of the lifecycle of the facility;

e. Each MCAA includes a screening or "fatal flaw" analysis to eliminate alternatives that fail to meet minimum specifications;

f. Each MCAA assesses remaining alternatives using a rigorous, transparent decision-making tool, such as Multiple Accounts Analysis or its equivalent, that takes into account environmental, technical, socio-economic and project economics considerations, inclusive of risk levels and hazard evaluations, associated with each alternative; and

g. Each MCAA includes a sensitivity analysis to reduce potential that biases will influence the selection of final site locations, design specifications and facility management practices.

[i] GISTM Requirement 3.2: For new tailings facilities, the Entity shall use the knowledge base and undertake a multi-criteria alternatives analysis (MCAA) of all feasible sites, technologies and strategies for tailings management. The goal of this analysis shall be to: (i) select an alternative that minimises risks to people and the environment throughout the tailings facility lifecycle; and (ii) minimises the volume of tailings and water placed in external tailings facilities. This analysis shall be an objective constraint analysis reviewed by the Independent Tailings Review Board (ITRB) or a senior independent technical reviewer. For existing tailings facilities, the Entity shall periodically review and refine the tailings technologies and design, and management strategies to minimise risk and improve environmental outcomes. An exception applies to facilities that are demonstrated to be in a state of safe closure.

4.2.10 Design Criteria

D M P **4.2.10.1** For **all** the proposed and existing tailings facilities identified as per 4.2.1.1, the ENTITY has undertaken a third-party conformance audit against the GISTM Conformance Protocols and demonstrated full conformance[17] with the and the **GISTM Requirement 4.2**[i].

D M P **4.2.10.2** The ENTITY systematically adopts a more conservative approach by adopting the 'Extreme' Consequence Classification external loading criteria (see the matrix provided in Annex 4.2-B-1. in Chapter Annexes), and applies this in conformance with all the relevant GISTM Requirements, for all proposed and existing tailings facilities identified as per 4.2.1.1[18].

D M P **4.2.10.3** For **all** the proposed and existing mine waste facilities where one or more credible failure modes have been identified (see 4.2.5.1), if the design for the 'Extreme' Consequence Classification external loading criteria has not been implemented, the reviews of the consequence classification are conducted as follows:

a. Reviews draw attention to any deficiencies or non-conformities in information[19], in facility construction, operation, maintenance, surveillance, emergency preparedness and response plans, responses to incidents, and governance[20];

b. Every review of a particular facility is carried out by a different independent contractor; and

c. Commentary, advice, and recommendations from the Dam Safety Review (DSR) are shared with the Accountable Executive.

[i] GISTM Requirement 4.2: With the objective of maintaining flexibility in the development of a new tailings facility and optimising costs while prioritising safety throughout the tailings facility lifecycle:

A. Develop preliminary designs for the tailings facility with external loading design criteria consistent with both the consequence of failure classification selected based on current conditions and higher Consequence Classifications (including 'Extreme').

B. Informed by the range of requirements defined by the preliminary designs, either:

B.1) Implement the design for the 'Extreme' Consequence Classification external loading criteria; or

B.2) Implement the design for the current Consequence Classification criteria, or a higher one, and demonstrate that the feasibility, at a proof of concept level, to upgrade to the design for the 'Extreme' classification criteria is maintained throughout the tailings facility lifecycle.

C. If option B.2 is implemented, review the consequence of failure classification at the time of the Dam Safety Review (DSR) and at least every five years, or sooner if there is a material change in the social, environmental and local economic context, and complete the upgrade of the tailings facility to the new Consequence Classification as determined by the DSR within three years. This review shall proceed until the tailings facility has been safely closed according to this Standard.

D. The process described above shall be reviewed by the Independent Tailings Review Board (ITRB) or the senior independent technical reviewer, as appropriate for the tailings facility Consequence Classification. Subject to Requirement 4.7, Requirements 4.2.C and 4.2.D shall also apply to existing tailings facilities.

D M P

4.2.10.4 For **all** the proposed and existing tailings facilities identified as per 4.2.1.1, the ENTITY has undertaken a third-party conformance audit against the GISTM Conformance Protocols and demonstrated full conformance[21] with the following requirements:

a. **GISTM Requirement 4.3**[i], and **GISTM Requirement 4.4**[ii];

b. **GISTM Requirement 4.5**[iii], and **GISTM Requirement 4.6**[iv]; and

c. **GISTM Requirement 4.7**[v], and **GISTM Requirement 4.8**[vi].

GUIDANCE SOUGHT ON SECTION 4.2.10–Design Criteria

The possibility of requiring a site to avoid the upstream construction method of tailings dams for new facilities, and to work towards the gradual decommissioning of such existing upstream tailings facilities at the site (as legally required in certain jurisdictions with wet climates and high seismic activity, such as Brazil, Chile, Ecuador, and Peru) was discussed during the preparation of this 2nd DRAFT.

Additionally, the possibility of requiring a minimum distance between tailings facilities and inhabited areas (as legally required in certain jurisdictions such as like Brazil, China, or Ecuador) versus implementing an ALARP approach was discussed during the preparation of this 2nd DRAFT.

However, no consensus was found on these matters, and the diverging views could not be resolved by prior to the release of this 2nd DRAFT. IRMA proposes to discuss and explore potential approaches within an **IRMA Expert Working Group** dedicated to Tailings Storage and Mine Waste Facility Management.

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[i] GISTM Requirement 4.3: The Accountable Executive shall take the decision to adopt a design for the current Consequence Classification criteria and to maintain flexibility to upgrade the design for the highest classification criteria later in the tailings facility lifecycle. This decision shall be documented.

[ii] GISTM Requirement 4.4: Select, explicitly identify and document all design criteria that are appropriate to minimise risk for all credible failure modes for all phases of the tailings facility lifecycle.

[iii] GISTM Requirement 4.5: Apply design criteria, such as factors of safety for slope stability and seepage management that consider estimated operational properties of materials and expected performance of design elements, and quality of the implementation of risk management systems. These issues should also be appropriately accounted for in designs based on deformation analyses.

[iv] GISTM Requirement 4.6: Identify and address brittle failure modes with conservative design criteria, independent of trigger mechanisms, to minimise their impact on the performance of the tailings facility.

[v] GISTM Requirement 4.7: Existing tailings facilities shall conform with the Requirements under Principle 4, except for those aspects where the Engineer of Record (EOR), with review by the ITRB or a senior independent technical reviewer, determines that the upgrade of an existing tailings facility is not viable or cannot be retroactively applied. In this case, the Accountable Executive shall approve and document the implementation of measures to reduce both the probability and the consequences of a tailings facility failure in order to reduce the risk to a level as low as reasonably practicable (ALARP). The basis and timing for addressing the upgrade of existing tailings facilities shall be risk-informed and carried out as soon as reasonably practicable).

[vi] GISTM Requirement 4.8: The EOR shall prepare a Design Basis Report (DBR) that details the design assumptions and criteria, including operating constraints, and that provides the basis for the design of all phases of the tailings facility lifecycle. The DBR shall be reviewed by the ITRB or senior independent technical reviewer. The EOR shall update the DBR every time there is a material change in the design assumptions, design criteria, design or the knowledge base and confirm internal consistency among these element).

4.2.11 Robust Design Development

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4.2.11.1 **Critical Requirement**

For **all** the proposed and existing tailings facilities identified as per 4.2.1.1, the ENTITY has undertaken a third-party conformance audit against the GISTM Conformance Protocols and demonstrated full conformance[22] with the following requirements:

a. **GISTM Requirement 5.1**[i], **GISTM Requirement 5.2**[ii], and **GISTM Requirement 5.3**[iii];

b. **GISTM Requirement 5.4**[iv], **GISTM Requirement 5.5**[v], and **GISTM Requirement 5.6**[vi]; and

c. **GISTM Requirement 5.7**[vii].

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4.2.11.2 For any of the proposed and existing tailings facilities identified as per 4.2.1.1 where other measures to reduce the consequences of its credible failure mode as per the breach analysis have been exhausted, and pre-emptive resettlement cannot be avoided, the ENTITY fully meets all the applicable requirements of Chapter 2.5 (Land Acquisition, Displacement, and Resettlement) of the IRMA Standard for the given proposed or existing tailings facility[23].

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[i] GISTM Requirements 5.1: For new tailings facilities, incorporate the outcome of the multi-criteria alternatives analysis including the use of tailings technologies in the design of the tailings facility. For expansions to existing tailings facilities, investigate the potential to refine the tailings technologies and design approaches with the goal of minimising risks to people and the environment throughout the tailings facility lifecycle.

[ii] GISTM Requirements 5.2: Develop a robust design that considers the technical, social, environmental and local economic context, the tailings facility Consequence Classification, site conditions, water management, mine plant operations, tailings operational and construction issues, and that demonstrates the feasibility of safe closure of the tailings facility. The design should be reviewed and updated as performance and site data become available and in response to material changes to the tailings facility or its performance.

[iii] GISTM Requirements 5.3: Develop, implement and maintain a water balance model and associated water management plans for the tailings facility, taking into account the knowledge base including climate change, upstream and downstream hydrological and hydrogeological basins, the mine site, mine planning and overall operations and the integrity of the tailings facility throughout its lifecycle. The water management programme must be designed to protect against unintentional releases.

[iv] GISTM Requirements 5.4: Address all potential failure modes of the structure, its foundation, abutments, reservoir (tailings deposit and pond), reservoir rim and appurtenant structures to minimise risk to ALARP. Risk assessments must be used to inform the design.

[v] GISTM Requirements 5.5: Develop a design for each stage of construction of the tailings facility, including but not limited to start-up, partial raises and interim configurations, final raise, and all closure stages).

[vi] GISTM Requirements 5.6: Design the closure phase in a manner that meets all the Requirements of the GISTM Standard with sufficient detail to demonstrate the feasibility of the closure scenario and to allow implementation of elements of the design during construction and operation as appropriate. The design should include progressive closure and reclamation during operations.

[vii] GISTM Requirements 5.7: For a proposed new tailings facility classified as 'High', 'Very High' or 'Extreme', the Accountable Executive shall confirm that the design satisfies ALARP and shall approve additional reasonable steps that may be taken downstream, to further reduce potential consequences to people and the environment. The Accountable Executive shall explain and document the decisions with respect to ALARP and additional consequence reduction measures. For an existing tailings facility classified as 'High', 'Very High' or 'Extreme', the Accountable Executive, at the time of every DSR or at least every five years, shall confirm that the design satisfies ALARP and shall seek to identify and implement additional reasonable steps that may be taken to further reduce potential consequences to people and the environment. The Accountable Executive shall explain and document the decisions with respect to ALARP and additional consequence reduction measures, in consultation with external parties as appropriate. (Note: GISTM Requirement 5.7 applies to facilities with consequence classification of 'High', 'Very High', or 'Extreme' or higher, which ensures inclusion of any proposed or existing facilities with at least one potential loss of life).

4.2.12 Planning, Building, and Operating Tailings Facilities

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4.2.12.1 For **all** the proposed and existing tailings facilities identified as per 4.2.1.1, the ENTITY has undertaken a third-party conformance audit against the GISTM Conformance Protocols and demonstrated full conformance[24] with the following requirements:

a. **GISTM Requirement 6.1**[i] and **GISTM Requirement 6.2**[ii];

b. **GISTM Requirement 6.3**[iii], and **GISTM Requirement 6.4**[iv]; and

c. **GISTM Requirement 6.5**[v], and **GISTM Requirement 6.6**[vi].

[i] GISTM Requirements 6.1: Build, operate, monitor, and close the tailings facility according to the design intent at all phases of the tailings facility lifecycle, using qualified personnel and appropriate methodology, equipment and procedures, data acquisition methods, the Tailings Management System (TMS) and the overall Environmental and Social Management System (ESMS) for the mine and associated infrastructure.

[ii] GISTM Requirements 6.2: Manage the quality and adequacy of the construction and operation process by implementing Quality Control, Quality Assurance and Construction vs Design Intent Verification (CDIV). The Operator shall use the CDIV to ensure that the design intent is implemented and is still being met if the site conditions vary from the design assumptions.

[iii] GISTM Requirements 6.3: Prepare a detailed Construction Records Report ('as-built' report) whenever there is a material change to the tailings facility, its infrastructure or its monitoring system. The EOR and the Responsible Tailings Facility Engineer (RTFE) shall sign this report.

[iv] GISTM Requirements 6.4: Develop, implement, review annually and update as required an Operations, Maintenance and Surveillance (OMS) Manual that supports effective risk management as part of the TMS. The OMS Manual should follow best practices, clearly provide the context and critical controls for safe operations and be reviewed for effectiveness. The RTFE shall provide access to the OMS Manual and training to all levels of personnel involved in the TMS with support from the EOR.

[v] GISTM Requirements 6.5: Implement a formal change management system that triggers the evaluation, review, approval and documentation of changes to design, construction, operation or monitoring during the tailings facility lifecycle. The change management system shall also include the requirement for the EOR to prepare a periodic Deviance Accountability Report (DAR) that provides an assessment of the cumulative impact of the changes on the risk level of the as-constructed facility. The DAR shall provide recommendations for managing risk, if necessary, and any resulting updates to the design, DBR, OMS and the monitoring programme. The DAR shall be approved by the Accountable Executive.

[vi] GISTM Requirements 6.6: Include new and emerging technologies and approaches and use the evolving knowledge in the refinement of the design, construction and operation of the tailings facility.

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4.2.12.2 For **all** the proposed and existing tailings facilities identified as per 4.2.1.1, the Operations, Maintenance, and Surveillance (OMS) Manual/s (or equivalent) include a risk management plan (or equivalent) that:

a. Outlines critical controls to minimize the probability and potential consequences of a facility failure to as low as reasonably practicable (ALARP)

b. Includes other risk controls and actions necessary for the safe operation of the facility;

c. Documents specific and measurable performance objectives, indicators, and performance parameters for critical controls and risk controls;

d. Includes a trigger action response plan (TARP), or equivalent, that describes pre-defined trigger levels for performance criteria, and actions to be taken if trigger levels are reached or exceeded[25];

e. Assigns implementation of controls and measures to responsible staff with adequate skills and expertise, and assigns responsibility to its top management level to oversee plan implementation, monitoring, and recordkeeping[26];

f. Includes clearly-defined timelines and an implementation schedule in place that specifies the expected outcomes;

g. Includes estimates of human resources and budget required; and

h. Includes a financing plan in place to ensure that funding is available for the effective implementation of the plan.

4.2.13 Monitoring and Evaluation

M P **4.2.13.1** For **all** the proposed and existing tailings facilities identified as per 4.2.1.1, the ENTITY has undertaken a third-party conformance audit against the GISTM Conformance Protocols and demonstrated full conformance[27] with the following requirements:

a. **GISTM Requirement 7.1[i],** and **GISTM Requirement 7.2[ii]**;

b. **GISTM Requirement 7.3[iii]**, and **GISTM Requirement 7.4[iv]**; and

c. **GISTM Requirement 7.5[v]**.

M P **4.2.13.2** At least annually, but without undue delay after a significant change, competent professionals evaluate the performance of all existing mine waste facilities identified as per 4.2.1.1 and 4.2.1.2 by assessing whether the performance objectives defined for each facility are being met (see 4.2.9.2.c).

[i] GISTM Requirements 7.1: Design, implement and operate a comprehensive and integrated performance monitoring programme for the tailings facility and its appurtenant structures as part of the TMS and for those aspects of the ESMS related to the tailings facility in accordance with the principles of Adaptive Management).

[ii] GISTM Requirements 7.2: Design, implement and operate a comprehensive and integrated engineering monitoring system that is appropriate for verifying design assumptions and for monitoring potential failure modes. Full implementation of the Observational Method shall be adopted for non-brittle failure modes. Brittle failure modes are addressed by conservative design criteria.

[iii] GISTM Requirements 7.3: Establish specific and measurable performance objectives, indicators, criteria, and performance parameters and include them in the design of the monitoring programmes that measure performance throughout the tailings facility lifecycle. Record and evaluate the data at appropriate frequencies. Based on the data obtained, update the monitoring programmes throughout the tailings facility lifecycle to confirm that they remain effective to manage risk.

[iv] GISTM Requirements 7.4: Analyse technical monitoring data at the frequency recommended by the EOR, and assess the performance of the tailings facility, clearly identifying and presenting evidence on any deviations from the expected performance and any deterioration of the performance over time. Promptly submit evidence to the EOR for review and update the risk assessment and design, if required. Performance outside the expected ranges shall be addressed promptly through Trigger Action Response Plans (TARPs) or critical controls.

[v] GISTM Requirements 7.5: Report the results of each of the monitoring programmes at the frequency required to meet company and regulatory requirements and, at a minimum, on an annual basis. The RTFE and the EOR shall review and approve the technical monitoring reports.

4.2.14 Engineer of Record

D M P

4.2.14.1 For **all** the proposed and existing tailings facilities identified as per 4.2.1.1, the ENTITY has undertaken a third-party conformance audit against the GISTM Conformance Protocols and demonstrated full conformance[28] with the following requirements:

a. **GISTM Requirement 9.1**[i];

b. **GISTM Requirement 9.2**[ii]**,** and **GISTM Requirement 9.3**[iii]; and

c. **GISTM Requirement 9.4**[iv]**,** and **GISTM Requirement 9.5**[v].

[i] GISTM Requirement 9.1: Engage an engineering firm with expertise and experience in the design and construction of tailings facilities of comparable complexity to provide EOR services for operating the tailings facility and for closed facilities with 'High', 'Very High' and 'Extreme' Consequence Classification, that are in the active closure phase. Require that the firm nominate a senior engineer, approved by the Operator, to represent the firm as the EOR, and verify that the individual has the necessary experience, skills and time to fulfil this role. Alternatively, the Operator may appoint an in-house engineer with expertise and experience in comparable facilities as the EOR. In this instance, the EOR may delegate the design to a firm ('Designer of Record') but shall remain thoroughly familiar with the design in discharging their responsibilities as EOR. Whether the EOR or the DOR is in-house or external, they must be competent and have experience appropriate to the Consequence Classification and complexity of the tailings facility. (Note: GISTM Requirement 9.1 applies to facilities with consequence classification of 'High', 'Very High', or 'Extreme' or higher, which ensures inclusion of any proposed or existing facilities with at least one potential loss of life.)

[ii] GISTM Requirement 9.2: Empower the EOR through a written agreement that clearly describes their authority, role and responsibilities throughout the tailings facility lifecycle, and during change of ownership of mining properties. The written agreement must clearly describe the obligations of the Operator to the EOR, to support the effective performance of the EOR.

[iii] GISTM Requirement 9.3: Establish and implement a programme to manage the quality of all engineering work, the interactions between the EOR, the RTFE and the Accountable Executive, and their involvement in the tailings facility lifecycle as necessary to confirm that both the implementation of the design and the design intent are met.

[iv] GISTM Requirement 9.4: Given its potential impact on the risks associated with a tailings facility, the selection of the EOR shall be decided by the Accountable Executive and informed, but not decided, by procurement personnel.

[v] GISTM Requirement 9.5: Where it becomes necessary to change the EOR (whether a firm or an in house employee), develop a detailed plan for the comprehensive transfer of data, information, knowledge and experience with the construction procedures and materials

4.2.15 Ongoing Risk Assessment and Continuous Improvement

M P **4.2.15.1** For each existing mine waste facility where one or more credible failure modes have been identified (see 4.2.5.1):

a. A risk assessment is carried out to evaluate the risks to human rights and the health and safety of communities and the environment from all credible failure modes identified;

b. It is carried out and documented by a multi-disciplinary team using a credible methodology;

c. It Identifies credible failure modes for which design elements and critical controls must be prioritized, and a rationale is documented;

d. It is updated at least every three years, but without undue delay after a significant change; and

e. It is informed by the collaborative identification of potential negative impacts with affected rights-holders and stakeholders required in 4.2.7.1.

GUIDANCE SOUGHT ON REQUIREMENT 4.2.15.1

The possibility of requiring a summary of the risk assessment findings to be made and maintained publicly accessible was discussed during the preparation of this 2nd DRAFT.

However, no consensus was found, and the diverging views could not be resolved prior to the release of this 2nd DRAFT. IRMA proposes to discuss and explore potential approaches within an **IRMA Expert Working Group** dedicated to Tailings Storage and Mine Waste Facility Management.

PARTICIPATE IN AN EXPERT WORKING GROUP ON THIS CHAPTER

The Terms of Reference applicable to this Expert Working Group, including instructions on how to apply, are available at (click on this link): **ToR for Expert Working Group 2025.**

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M P **4.2.15.2** For each existing mine waste facility where one or more credible failure modes have been identified (see 4.2.5.1), the ENTITY can demonstrate that:

a. The refinements of the design are informed by the outcome of the multi-criteria alternatives analysis and the risk assessment;

b. The design criteria used are appropriate to minimize risk to as low as reasonably practicable for: 1) all credible failure modes; and 2) all phases of construction over the facility life cycle[29] and

c. The facility uses the flood, seismic and slope stability design criteria that are consistent with the facility's failure consequence classification. If not originally applied at existing facilities the ENTITY can demonstrate that a plan to meet the applicable criteria has been developed, has undergone independent review and is being implemented.

M P **4.2.15.3** For **all** the existing tailings facilities identified as per 4.2.1.1, the ENTITY has undertaken a third-party conformance audit against the GISTM Conformance Protocols and demonstrated full conformance[30] with the following requirements:

a. **GISTM Requirement 10.2**[i], **GISTM Requirement 10.3**[ii]**,** and **GISTM Requirement 10.4**[iii];

b. **GISTM Requirement 10.5**[iv]; and

c. **GISTM Requirement 10.6**[v].

M P **4.2.15.4** For all the existing tailings facilities identified as per 4.2.1.1, the Dam Safety Review (DSR) draws attention to any deficiencies or non-conformities in information[31], in facility construction, operation, maintenance, surveillance, emergency preparedness and response plans, responses to incidents, and governance[32].

M P **4.2.15.5** For all the existing tailings facilities identified as per 4.2.1.1:

a. Every DSR of a particular facility is carried out by a different independent contractor; and

b. All ITRB members, senior independent technical reviewers, and DSR contractors are objective, third-party, and competent, professionals with at least 15 years of experience in the specific area of review[33].

[i] GISTM Requirement 10.2: Conduct regular reviews of the TMS and of the components of the ESMS that refer to the tailings facility to assure the effectiveness of the management systems. Document and report the outcomes to the Accountable Executive, Board of Directors and project-affected people. The review shall be undertaken by senior technical reviewers with the appropriate qualifications, expertise and resources. For tailings facilities with 'High', 'Very High' or 'Extreme' Consequence Classification, conduct the review at least every three years. (Note: GISTM Requirement 10.2 applies to facilities with consequence classification of 'High', 'Very High', or 'Extreme' or higher, which ensures inclusion of any proposed or existing facilities with at least one potential loss of life).

[ii] GISTM Requirement 10.3: Conduct internal audits to verify consistent implementation of company procedures, guidelines and corporate governance requirements consistent with the TMS and aspects of the ESMS developed to manage tailings facility risks.

[iii] GISTM Requirement 10.4: The EOR or senior independent technical reviewer shall conduct tailings facility construction and performance reviews annually or more frequently, if required.

[iv] GISTM Requirement 10.5: Conduct an independent DSR at least every five years for tailings facilities with 'Very High' or 'Extreme' Consequence Classifications and at least every 10 years for all other facilities. For tailings facilities with complex conditions or performance, the ITRB may recommend more frequent DSRs. The DSR shall include technical, operational and governance aspects of the tailings facility and shall be completed according to best practices. The DSR contractor cannot conduct consecutive DSRs on the same tailings facility and shall certify in writing that they follow best practices for engineers in avoiding conflicts of interest.

[v] GISTM Requirement 10.6: For tailings facilities with 'Very High' or 'Extreme' Consequence Classifications, the ITRB, reporting to the Accountable Executive shall provide ongoing senior independent review of the planning, siting, design, construction, operation, water and mass balance, maintenance, monitoring, performance and risk management at appropriate intervals across all phases of the tailings facility lifecycle. For tailings facilities with other Consequence Classifications, this review can be done by a senior independent technical reviewer.

M P **4.2.15.6** The Entity has a system in place to ensure that, for any tailings facility not classified as 'Very High' or 'Extreme' but with at least one potential loss of life:

a. Building on the review of the facility's risk environment, and of the past and current performance of the facility management required in 4.2.2.3, the Accountable Executive and/or the ITRB (if appointed) decides whether independent Dam Safety Reviews (DSR) should also be conducted at least every five years[34]; and

b. The decision is documented.

M P **4.2.15.7** For **all** the existing tailings facilities identified as per 4.2.1.1, the ENTITY has undertaken a third-party conformance audit against the GISTM Conformance Protocols and demonstrated full conformance[35] with the **GISTM Requirement 10.7**[i].

M P **4.2.15.8** At least every three years, the ENTITY:

a. Reviews its performance in demonstrating full conformance with all the GISTM Requirements, as evidenced by the results of a third-party conformance audit against the GISTM Conformance Protocols;

b. It develops and implements a time-bound action plan in response to all relevant commentary, advice or recommendations from this third-party audit;

c. It documents a rationale for any advice or recommendations that will not be implemented; and

d. Tracks its progress on implementing its previous time-bound action plan.

M P **4.2.15.9** For any tailings facility not classified as 'Very High' or 'Extreme' but with at least one potential loss of life, if the decision was made to appoint an Independent Tailings Review Board (ITRB), as per 4.2.2.3, the ITRB, reporting to the Accountable Executive, also provides ongoing senior independent review of the planning, siting, design, construction, operation, water and mass balance, maintenance, monitoring, performance and risk management at appropriate intervals across all phases of the tailings facilities' lifecycle (in accordance with GISTM Requirement 10.6).

[i] GISTM Requirement 10.7: The amount of estimated costs for planned closure, early closure, reclamation, and post-closure of the tailings facility and its appurtenant structures shall be reviewed periodically to confirm that adequate financial capacity (including insurance, to the extent commercially reasonable) is available for such purposes throughout the tailings facility lifecycle, and the conclusions of the review shall be publicly disclosed annually. Disclosure may be made in audited financial statements or in public regulatory filings. Subject to the provisions of local or national regulations on this matter, Operators shall use best efforts to assess and take into account the capability of an acquirer of any of its assets involving a tailings facility (through merger, acquisition, or other change in ownership) to maintain this Standard for the tailings facility lifecycle. (Note: see also Chapter 2.7 of the IRMA Standard on Concurrent Reclamation, Closure, and Post-Closure).

4.2.16 Organizational Culture

D M P

4.2.16.1 For **all** the proposed and existing tailings facilities identified as per 4.2.1.1, the ENTITY has undertaken a third-party conformance audit against the GISTM Conformance Protocols and demonstrated full conformance[36] with the following requirements:

a. **GISTM Requirement 11.1**[i];

b. **GISTM Requirement 11.2**[ii], and **GISTM Requirement 11.3**[iii]; and

c. **GISTM Requirement 11.4**[iv] and **GISTM Requirement 11.5**[v].

4.2.17 Information-Sharing and Public Reporting

E3 D M P

4.2.17.1 For **all** the proposed and existing tailings facilities identified as per 4.2.1.1, the ENTITY has undertaken a third-party conformance audit against the GISTM Conformance Protocols and demonstrated full conformance[37] with the following requirements:

a. **GISTM Requirement 15.1**[vi];

b. **GISTM Requirement 15.2**[vii]; and

c. **GISTM Requirement 15.3**[viii].

[i] GISTM Requirement 11.1: Educate personnel who have a role in any phase of the tailings facility lifecycle about how their job procedures and responsibilities relate to the prevention of a failure.

[ii] GISTM Requirement 11.2: Establish mechanisms that incorporate workers' experience-based knowledge into planning, design and operations for all phases of the tailings facility lifecycle.

[iii] GISTM Requirement 11.3: Establish mechanisms that promote cross-functional collaboration to ensure effective data and knowledge sharing, communication and implementation of management measures to support public safety and the integrity of the tailings facility.

[iv] GISTM Requirement 11.4: Identify and implement lessons from internal incident investigations and relevant external incident reports, paying particular attention to human and organisational factors.

[v] GISTM Requirement 11.5: Establish mechanisms that recognise, reward and protect from retaliation, employees and contractors who report problems or identify opportunities for improving tailings facility management. Respond in a timely manner and communicate actions taken and their outcomes.

[vi] GISTM Requirement 15.1: Publish and regularly update information on the Operator's commitment to safe tailings facility management, implementation of its tailings governance framework, its organisation-wide policies, standards or approaches to the design, construction, monitoring and closure of tailings facilities. Details on the required pieces of information can be found in the GISTM Standard.

[vii] GISTM Requirement 15.2: Respond in a systematic and timely manner to requests from interested and affected stakeholders for additional information material to the public safety and integrity of a tailings facility. When the request for information is denied, provide an explanation to the requesting stakeholder.

[viii] GISTM Requirement 15.3: Commit to cooperate in credible global transparency initiatives to create standardised, independent, industry-wide and publicly accessible databases, inventories or other information repositories about the safety and integrity of tailings facilities.

E3 D M P **4.2.17.2** The ENTITY:

a. Regularly reviews its stakeholder engagement plan (see 1.2.2) to identify and/or develop engagement activities related to mine waste facility management and monitoring, that are commensurate with the level of risks associated with its mine waste facilities;

b. At least annually, meets with affected rights-holders and stakeholders that are significantly at risk[38] from one or more credible failure modes to report on the management, and surveillance and monitoring of mine waste facilities, as well as on the findings from independent reviews (where applicable)[39];

c. Provide them an opportunity to give feedback on the ENTITY's management of mine waste facilities;

d. Proactively shares with them information about how their feedback was taken into account to inform continuous improvement in the management of mine waste facilities; and

e. Meets with other affected rights-holders and stakeholders (that are not significantly at risk) to share information about the management, and surveillance and monitoring of mine waste facilities, at a frequency that is commensurate with the level of risks associated as well as upon request from those rights-holders or stakeholders (see 1.2.3 - Processes for Sharing Information).

E3 D M P **4.2.17.3** For **all** the proposed and existing tailings facilities identified as per 4.2.1.1, the ENTITY makes publicly accessible an updated version, and maintains publicly accessible all previous versions of:

a. The findings and recommendations of the third-party conformance audit it undertook against the GISTM Conformance Protocols;

b. Its rationale for any advice or recommendations that will not be implemented; and

c. At least annually, a report on its progress on implementing the time-bound action plan required in 4.2.15.8.

E3 D M P **4.2.17.4** In accordance with 1.2.3, the ENTITY ensures that any request from affected rights-holders and stakeholders to obtain additional information or reports related to mine waste facilities will be met in a timely and effective manner.

GUIDANCE SOUGHT ON SECTION 4.2.17–Information-Sharing and Public Reporting

The range of technical information and reports that could be made publicly accessible –by default– by companies, if any, such as Construction Records Reports, Dam Safety Review Reports, Internal reviews, EOR review, Independent Tailings Review Board reports, etc. was discussed during the preparation of this 2nd DRAFT. IRMA proposes to discuss and explore potential approaches within an **IRMA Expert Working Group** dedicated to Tailings Storage and Mine Waste Facility Management.

PARTICIPATE IN AN EXPERT WORKING GROUP ON THIS CHAPTER

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4.2.18 Physical Stability Management of Other Facilities

E3 D M P

4.2.18.1 **IRMA+**

For all the proposed and existing facilities that may have physical stability risks, other than tailings and waste facilities[40], identified as per 4.2.1.3, competent professionals characterized them, to inform a detailed analysis of physical stability risks, as follows:

a. The proposed or actual: 1) dimensions, 2) location, 3) design, 4) operational lifespan, and 4) closure objectives are documented for each facility, and if relevant, the proposed or actual: 5) storage or disposal capacity, 6) contents and their chemical characteristics[41];

b. Key environmental factors that may influence the physical stability of proposed and existing facilities are documented by competent professionals, including documentation of any uncertainties due to climate change[42]; and

c. The location of all facilities with physical stability risks are mapped in relation to: 1) Topographical contours; 2) Geological data; 3) Watercourses and other surface water features; and 4) The most recent 100-yr and 500-yr flood zones;

E3 D M P

4.2.18.2 **IRMA+**

Building on 4.2.1.3 and 4.2.18.1, a multi-disciplinary team of competent professionals identifies all credible failure modes for each proposed and existing facilities other than tailings and waste facilities identified.[43]

E3 D M P

4.2.18.3 **IRMA+**

Building on 4.2.18.1 and 4.2.18.2, a multi-disciplinary team of competent professionals determines the failure consequence classification (or equivalent) for each proposed and existing facilities other than tailings and waste facilities where one or more credible failure modes have been identified, based on the matrix provided in Annex 4.2-A (see Chapter Annexes).

E3 D M P

4.2.18.4 **IRMA+**

Building on 4.2.18.1, 4.2.18.2 and 4.2.18.3, the ENTITY has systems in place to manage all proposed and existing facilities other than tailings and waste facilities where one or more credible failure modes have been identified, in accordance with Sections 4.2.3 to 4.2.17 (but adapted to these non-waste facilities).

CROSS REFERENCES TO OTHER CHAPTERS

This table will be added when the new content for all chapters is finalized and approved.

CHAPTER ENDNOTES

[1] Including, but not limited to storage or disposal facilities for: tailings, sludges and residues, spent heap leach piles, process residue storage ponds; as well as any associated transport/delivery infrastructures such as pipes/pipelines, conveyors, launder channels, ploughs, radial stackers, etc..

[2] Including, but not limited to storage or disposal facilities for: waste rock, overburden, rejects material, topsoil, and other stockpiles; as well as any associated transport/delivery infrastructures.

[3] Including, but not limited to: surface mines features such as pit highwalls and other associated features, underground mines shafts, tunnels and features, fluid extraction areas or facilities (e.g., for brine or groundwater pumping/dewatering), water reservoirs and other water storage facilities, access roads, non-mining and non-processing hazardous and remediated waste storage facilities.

[4] Compliance was obtained or maintained during the last thirty-six months.

[5] Risk profiles should include both risks to business and risks to people, animals, biodiversity, and the environment, using a double-materiality approach.

[6] Compliance was obtained or maintained during the last thirty-six months.

[7] Compliance was obtained or maintained during the last thirty-six months.

[8] E.g., 24-hour, annual, 10-year, 100-year, 500- year.

[9] See Chapter 4.1, Section 4.1.2 for the characterization of potentially hazardous wastes and materials.

[10] Depending on the facility, credible failure modes may include, but are not limited to:

a. Shallow and deep failures within the facility;

b. Foundation failures;

c. Internal erosion failure (e.g., piping);

d. Ground-subsidence-related failures;

e. Slope failures;

f. Pit highwall or slope failures;

g. Failures due to storm events;

h. Construction- and operations-related failures;

i. Upstream/upgradient off-site failures that may affect a facility (e.g., upstream dam or landslide); and

j. Cascading failures (e.g., if there are upstream and/or downstream facilities or structures).

[11] Including, where relevant, bridges, irrigation systems, and water supply infrastructures.

[12] E.g., human rights, ecosystem services, commercial and residential property, businesses.

[13] Compliance was obtained or maintained during the last thirty-six months.

[14] GISTM Conformance Protocols only require these requirements for **new** tailings facilities.

[15] E.g., geological, hydrological, climate change, newly-identified credible failure modes.

[16] Compliance was obtained or maintained during the last thirty-six months.

[17] Compliance was obtained or maintained during the last thirty-six months.

[18] This approach is only one of two options proposed in GISTM (Option B1 of Requirement 4.2). Instead, in the IRMA Standard, it is the only option to obtain full conformance with this Chapter.

[19] E.g., identification of hazards, failure modes, geotechnical and hydrotechnical assessments, or the inputs or outcomes of failure consequence classifications.

[20] E.g., roles, responsibilities, authorities and activities are clearly assigned, personnel are competent and trained.

[21] Compliance was obtained or maintained during the last thirty-six months.

[22] Compliance was obtained or maintained during the last thirty-six months.

[23] Chapters 2.5 addresses Land Acquisition, Displacement, and Resettlement in a more detailed and comprehensive manner than GISTM Requirement 5.8.

[24] Compliance was obtained or maintained during the last thirty-six months.

[25] I.e., if performance is outside of expected range.

[26] If work is carried out by third party contractors, then there needs to be a staff employee responsible for overseeing the quality of work, timelines, etc.

[27] Compliance was obtained or maintained during the last thirty-six months.

[28] Compliance was obtained or maintained during the last thirty-six months.

[29] E.g., start-up, partial raises, interim configurations, final raise, and all closures stages.

[30] Compliance was obtained or maintained during the last thirty-six months.

[31] E.g., identification of hazards, failure modes, geotechnical and hydrotechnical assessments, or the inputs or outcomes of failure consequence classifications.

[32] E.g., roles, responsibilities, authorities and activities are clearly assigned, personnel are competent and trained.

[33] E.g., facility design, operations, closure, environmental or social aspects or other specific topic of concern.

[34] The way GISTM Requirement 10.5 requires it for every facilities with 'Very High' or 'Extreme' Consequence Classifications.

[35] Compliance was obtained or maintained during the last thirty-six months.

[36] Compliance was obtained or maintained during the last thirty-six months.

[37] Compliance was obtained or maintained during the last thirty-six months.

[38] And their advisors, if relevant (see 4.2.7.1.c).

[39] E.g., reviews carried out by ITRB and/or independent senior technical reviewers, as well as independent dam safety reviews.

[40] Including, but not limited to: surface mines features such as pit highwalls and other associated features, underground mines shafts, tunnels and features, fluid extraction areas or facilities (e.g., for brine or groundwater pumping/dewatering), water reservoirs and other water storage facilities, access roads, non-mining and non-processing hazardous and remediated waste storage facilities.

[41] Information on storage or disposal capacity and contents would only be relevant for those facilities storing or disposing of fluid- and/or solid materials or wastes. The chemical characteristics of the fluids and wastes are required to be determined in Chapter 4.1, Section 4.1.1. These characteristics, such as the presence of contaminants of potential concern, will feed into the failure consequence classification evaluation (or equivalent) in 4.2.18.3.

[42] Including a. Soil characteristics: soil type, particle sizes, pore water pressure, hydraulic conductivity soils at the site; b. Geology: seismicity, geologic and lithic subsurface conditions beneath the site and within 2 km of the site, including the thickness of each geologic unit and identification of which geologic units are water bearing; c. Hydrology: subsurface conditions for all water bearing zones beneath the site including maximum and minimum depths to groundwater, direction of groundwater flow, hydrologic gradients, transmissivity and storativity; and surface waters including average and seasonal levels and flow rates, gradients, and storage features within 2 km of the site; and d. Climate: mean annual temperature, precipitation, evaporation, maximum precipitation events, predicted probable maximum precipitation events (e.g., 24-hour, annual, 10-year, 100-year, 500-year), trends in past events and predicted trends in future events.

[43] Credible failure modes may include, but are not limited to: 1) Shallow and deep failures within the facility; 2) Foundation failures; 3) Internal erosion failure (e.g., piping); 4) Ground-subsidence-related failures; 5) Slope failures; 6) Pit highwall or slope failures; 7) Failures due to storm events; 8) Construction- and operations-related failures; 9) Upstream/upgradient off-site failures that may affect a facility (e.g., upstream dam or landslide); and 10) Cascading failures (e.g., if there are upstream and/or downstream facilities or structures).

CHAPTER ANNEXES

ANNEX 4.2-A: Failure Consequence Classification Matrix

Consequence Classification	Incremental Losses				
	Potential Population at Risk	Potential Loss of Life	Environment	Health, Social and Cultural	Infrastructure and Economics
Low	None	None expected	Minimal short-term loss or deterioration of habitat or rare and threatened or endangered species.	Minimal effects and disruption of business and livelihoods. No measurable effect on human health. No disruption of heritage, recreation, community or cultural assets.	Low economic losses (<US$1M). Area contains limited infrastructure or services.
Significant	1 – 10	Unspecified	No significant loss or deterioration of habitat. Potential contamination of livestock/fauna water supply with no health effects. Process water low potential toxicity. Tailings not potentially acid generating and have low neutral leaching potential. Restoration possible within 1 to 5 years.	Significant disruption of business, service or social dislocation. Low likelihood of loss of regional heritage, recreation, community, or cultural assets. Low likelihood of health effects.	Losses to recreational facilities, seasonal workplaces, and infrequently used transportation routes <US$10M.
High	10 – 100	1 – 10	Significant loss or deterioration of critical habitat or rare and threatened or endangered species. Potential contamination of livestock/ fauna water supply with no health effects. Process water moderately toxic. Low potential for acid rock drainage or metal leaching effects of released tailings. Potential area of impact 10 km2 – 20 km2. Restoration possible but difficult and could take > 5 years	500-1,000 people affected by disruption of business, services or social dislocation. Disruption of regional heritage, recreation, community or cultural assets. Potential for short term human health effects.	High economic losses (<US$100M) affecting infrastructure, public transportation, and commercial facilities, or employment. Moderate relocation/compensation to communities.
Very High	100 – 1000	10 – 100	Major loss or deterioration of critical habitat or rare and threatened or endangered species. Process water highly toxic. High potential for acid rock drainage or metal leaching effects from released tailings. Potential area of impact > 20 km2. Restoration or compensation possible but very difficult and requires a long time (5 years to 20 years).	1,000 people affected by disruption of business, services or social dislocation for more than one year. Significant loss of national heritage, community or cultural assets. Potential for significant long-term human health effects.	Very high economic losses (< US$1B) affecting important infrastructure or services (e.g., highway, industrial facility, storage facilities, for dangerous substances), or employment. High relocation/compensation to communities.
Extreme	> 1000	> 100	Catastrophic loss of critical habitat or rare and threatened or endangered species. Process water highly toxic. Very high potential for acid rock drainage or metal leaching effects from released tailings. Potential area of impact > 20 km2. Restoration or compensation in kind impossible or requires a very long time (> 20 years).	5,000 people affected for years by disruption of business, services or social dislocation. Significant national heritage or cultural assets destroyed. Potential for severe and/or long- term human health effects.	Extreme economic losses (>US$1B) affecting critical infrastructure or services, (e.g., hospital, major industrial complex) or employment. Very high relocation/compensation to communities and very high social readjustment costs.

Source: Adapted from GISTM, 2020

ANNEX 4.2-B: External Loading Criteria

1. As required in the IRMA Standard:

Potential Loss of Life	*Consequence Classification*	**Flood Design Criteria** – Annual Exceedance Probability		**Seismic Design Criteria** – Annual Exceedance Probability	
		Operations and Closure	Operations and Closure	Operations and Closure	Operations and Closure
None	*Low*	1/200	1/10,000	1/200	1/10,000
	Significant	1/1,000	1/10,000	1/1,000	1/10,000
	High	1/2,475	1/10,000	1/2,475	1/10,000
	Very High	1/5,000	1/10,000	1/15000	1/10,000
	Extreme	1/10,000	1/10,000	1/10,000	1/10,000
At least one	***Any***	**1/10,000**	**1/10,000**	**1/10,000**	**1/10,000**

Sources: Adapted from GISTM, 2020; and Safety First Guidelines V2.0, 2022.

2. As required in the GISTM Standard (for information only)

Consequence Classification	Potential Population at Risk	Potential Loss of Life	**Flood Design Criteria** – Annual Exceedance Probability		**Seismic Design Criteria** – Annual Exceedance Probability	
			Operations and Closure	Operations and Closure	Operations and Closure	Operations and Closure
Low	None	None expected	1/200	1/10,000	1/200	1/10,000
Significant	1 – 10	Un-specified	1/1,000	1/10,000	1/1,000	1/10,000
High	10 – 100	Possible (1 – 10)	1/2,475	1/10,000	1/2,475	1/10,000
Very High	100 – 1000	Likely (10 – 100)	1/5,000	1/10,000	1/5,000	1/10,000
Extreme	> 1000	Many (>100)	1/10,000	1/10,000	1/10,000	1/10,000

Source: Adapted from GISTM, 2020.

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