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The challenge of GISTM adherence for smaller mining operations in remote parts of the world and the case for a GISTM-Light process

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GISTM Global Industry Standard on Tailings Management

6 Topic Areas

- Communities
- Integrated Knowledge Base
- Design, Construction and Operation
- Management and Governance
- Emergency Response
- Disclosure

15 Principles

77 Requirements

219 Criteria

ALL confirmation was required by 5 August 2025

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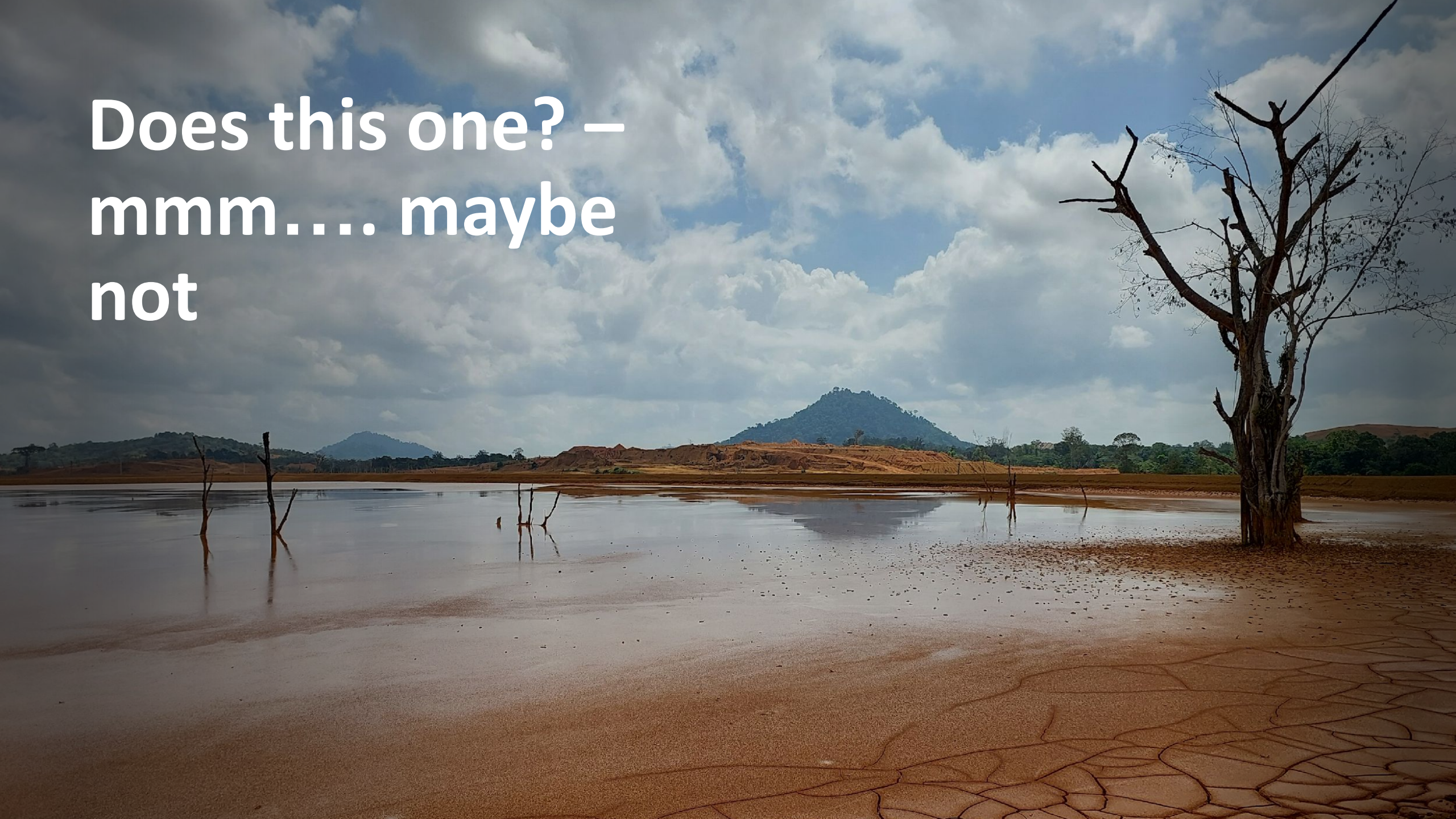
Does this TSF require full GISTM – Most Definitely


Does this one? –
mmm…. maybe
not

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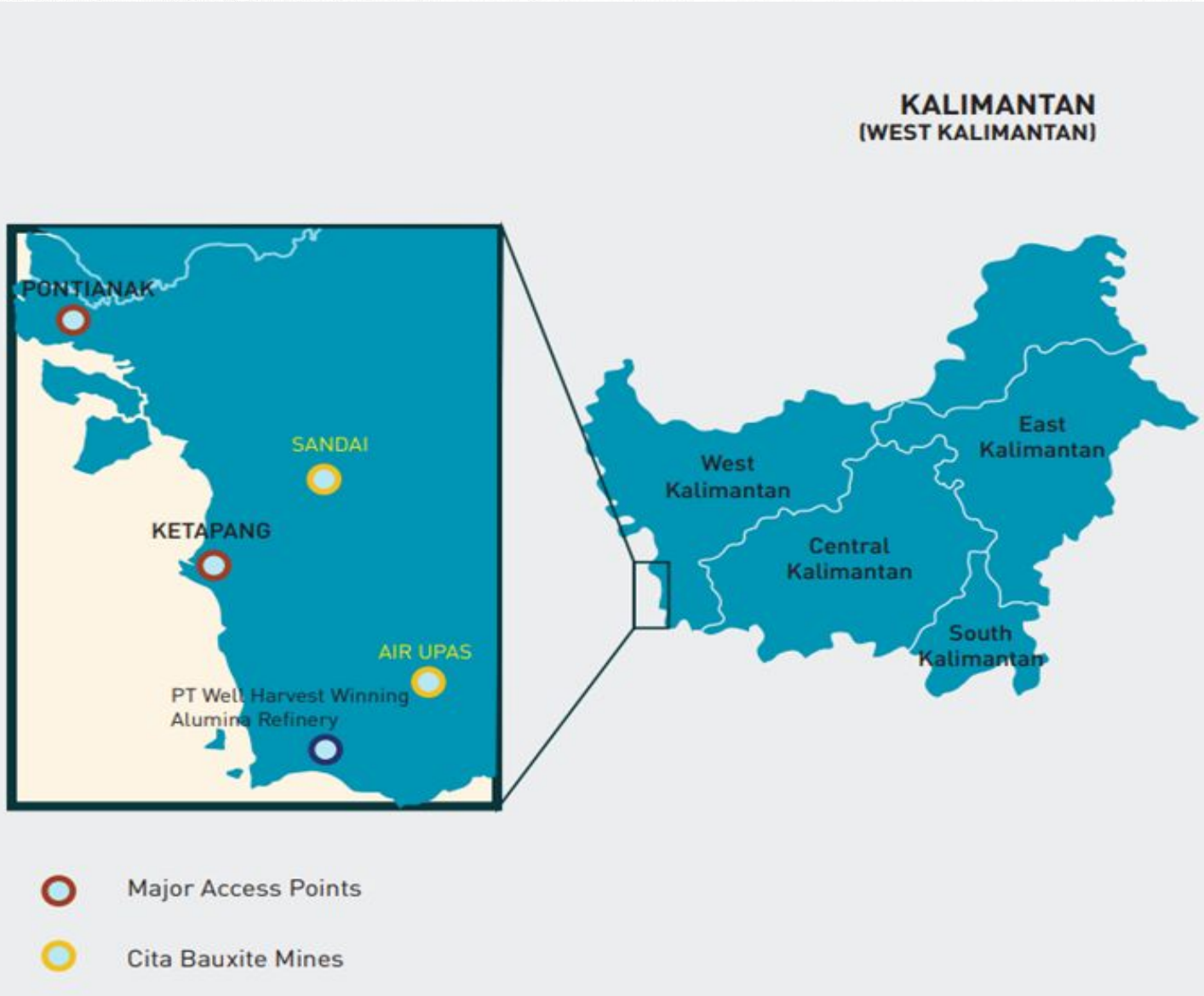
INDONESIA – WEST KALIMANTAN



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Let's have a look at this Kalimantan operation

- Surface mining of unconsolidated bauxitic materials
- Transported to washing stations with rotating drum screens to separate the bauxite-rich ore
- Flushed residue is thickened and excavated and dumped into a primary trench – then secondary, tertiary, quaternary and even quinary trenches
- Trucked and dumped in a designed mine-dump area
- Remaining tailings is clarified through progressive overflow via a series of shallow dams with clear water pumped back for re-use
- Metallurgical grade bauxite (MGB) is trucked to a refinery to produce smelter grade alumina (SGA)

Tailings thickened & removed

Dams are small, with freeboard & seldom >8m

Monitoring is good

Innovation using cantilevered pile wall with natural resources

Rehabilitation is underway

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But they didn't achieve a 100% Pass: WHY NOT?

Design Construction Operation Topic

- No appointed Accountable Executive (AE)
- No standalone Design Basis Report (DBR)
- No detailed Tailings Management System (TMS) register or report

But they didn't achieve a 100% Pass: WHY NOT?

Management & Governance Topic

- No appointed Accountable Executive (AE)
- No appointed Engineer of Record (EoR)
- No designated Responsible Tailings Facility Engineer (RTFE)
- No documented evidence of internal audits
- No Closure Report

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Topic Area	Principle	Compliant	Substantially Compliant	Partially Compliant	Not Compliant	Not Applicable
Design, Construction and Operation	Principle 4 - Develop plans and design to minimise all risk in all phases of the lifecycle, including closure		3	1	3	1
	Principle 5 – Provide robust design that integrates knowledge base and minimises risk through all lifecycle phases	3	2	1		2
	Principle 6 – Plan, build and operate the TSF to manage risk through all life cycle phases		3	1	1	1
	Principle 7 – Design, implement and operate monitoring systems to manage TSF facilities throughout a lifecycle	1	1	3		
Management and Governance	Principle 8 – Establish policies, systems and accountabilities to support TSF lifecycle safety and integrity		1	2	2	2
	Principle 9 – Appointment and empowerment of an Engineer of Record			1	4	
	Principle 10 – Establishment and implementation of review levels to provide strong quality and manage risk for all phases		2	2	2	1
	Principle 11 – Develop an organisational structure that promotes learning, communication & early problem recognition	2	2	1		
	Principle 12 – Establish a process for reporting, addressing concerns and protecting whistleblowers	2				

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Identifier	Conformance Level	Description of Outcome & Corrective actions
	Compliant 90% - 100%	Systems and/or practices related to the Requirement have been implemented and there is sufficient evidence to demonstrate that the Requirement is being met. No action required or only minor refinements.
	Substantially Compliant 75% - 90%	Systems and requirement implementation generally satisfy the Requirement but there is a minor finding, or findings, that need/s to be corrected. Actions required for full compliance.
	Partially Compliant 50% - 75%	The asset has systems and/or practices that relate to the Requirement but do not directly address the Requirement or the asset. There is evidence of existing action plans to comply with the requirement. Corrective actions required.
	Not Compliant 0% - 50%	Systems and/or practices required to support implementation of the Requirement are not in place, or are not being implemented, or cannot be evidenced. There are major findings requiring correction. Major corrective actions required.
	Not Applicable	The specific Requirement is not applicable to the context of the system or asset.

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COMBINE ALL THESE AND WHAT DO YOU GET?

- NO ACCOUNTABLE EXECUTIVES AND ENGINEERS
- INABILITY TO CONFORM DUE TO INADEQUATE SITE MONITORING SYSTEMS

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CAN A GISTM-LIGHT ITEM FIX THIS?

I BELIEVE IT CAN -
WHAT DO YOU THINK?

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THE OMNIBUS GISTM VERSION DOES NOT MEET SMALL REMOTE MINING OPERATION REQUIREMENTS BECAUSE:

- Access poor - difficult & time-consuming – and at times dangerous
- Sophisticated Seismic CPTu, VWPs with telemetry, drilling with inclinometer installation, dilatometer – all beyond the pocket of a small operation. Difficult to establish large machines on these sites. Distant
- Senior skills required - difficult to find and finance
- Electricity, Wi-Fi, cellphone comms – often non-existent
- AE and EoR appointments are costly. Senior personnel unlikely to associate with small operations
- Unattractive opportunities for skilled engineers and mining executives in an already constrained resource sector

EVEN SO – GISTM COMPLIANCE IS SOUGHT & MUST BE ENCOURAGED

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A GISTM-LIGHT SYSTEM CAN SOLVE THIS CONUNDRUM BY

- Mandatory for an on-site Responsible Tailings Facility Engineer (RTFE)
- RTFE attends to all geotechnical execution, management & monitoring
- Substitution of sophisticated monitoring eg Casagrande standpipe piezo, survey of prism targets, satellite monitoring, daily check for geo problems
- Annual internal audit by RTFE reviewed by mine-appointed geotechnical consultant
- Encourage local self-governance and innovation eg timber cantilever pile walls
- Support of active rehabilitation concomitantly with mining
- All accountability resides with the mine RTFE

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INTERNATIONAL GISTM BODY TO CONSIDER CREATION OF A GISTM-LIGHT CATEGORY

LET'S MAKE SURE WE KEEP EVEN THE SMALLEST PLAYERS IN THE GISTM FAMILY

FOLLOWING MAY BE ONE WAY

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QUALIFICATION FOR GISTM-LIGHT

PHYSICAL

- Small, distant, isolated & remote
- <18m height *1
- <180 000 m^3 impoundment
- Nil, or isolated, or diluted deleterious chemicals

1 Heights and volumes for discussion purposes only

QUALIFICATION FOR GISTM-LIGHT

CLASSIFICATION

- Dam failure classification – Low
- Population at risk – None
- Loss of life - None expected
- Environment – Minimal disruption
- Economic loss - <1M US$

MINIMUM ENGINEERING REQUIREMENT FOR GISTM-LIGHT

ENGINEERING

- Robust TSF design required by RTFE & site team
- Peer review and proof of design acceptance
- Proof of containment design
- Independent review by outside geotechnical firm
- Compliance with GISTM safety protocols

GISTM-LIGHT TOPIC AREA COMPLIANCE REQUIREMENTS

DESIGN CONSTRUCTION & OPERATIONS TOPIC

- Permanent RTFE presence on mine site
- RTFE stands in for AE
- RTFE required to derive DBR & TMS
- Allow less sophisticated monitoring methods
- Accept innovation (e.g., tree stump cantilever piles)
- Concurrent closure and operation of all site TSFs

GISTM-LIGHT TOPIC AREA COMPLIANCE REQUIREMENTS

MANAGEMENT & GOVERNANCE TOPIC

- RTFE stands in for EoR
- Ensure mine produced internal audits & closure report
- Annual TSF audit report required from RTFE
- Arrange gap review by external geotechnical firm
- Mandatory annual GISTM-Light audit by independent geotechnical firm
- Ensure clear RTFE authority and accountability

INTERNATIONAL GISTM BODY TO CONSIDER

- A GISTM-Light template & set of rules for small remote mining operations
- Recognise this is not criticism of the current highly effective GISTM audit system but a refinement to keep even the smallest mining operations in the GISTM fold
- A GISTM-Light audit process will require precise details of all geotechnical requirements as determined by the international GISTM group, including clear description to differentiate between GISTM-Light and standard GISTM
- The jump from GISTM-Light to full GISTM compliance in mine growth could have GISTM-Light audits included in the new omnibus GISTM as Annexures as proof of earlier fulfilment of GISTM requirements
- GISTM-Light with clear descriptions to demonstrate precise delineation of responsibility and accountability plus measurable assurance that the system can stand up to external audit scrutiny.

CONCLUSIONS

- A full GISTM TSF audit set of requirements is difficult, time-consuming & costly to implement, making its use in remote small mining operations at times untenable.
- Geotechnical site investigation campaign requirements are costly and difficult to undertake.
- Senior AEs and EoRs are difficult to come by, costly and hard to entice to smaller remote operations.
- **BUT** the enthusiasm and attempts at compliance by staff in these remote mining operations needs to be lauded and encouraged.
- It is recommended therefore, in efforts to encourage this, that a GISTM-Light system be compiled for small mining TSF operations in remote areas.
- GISTM-Light can be included in the GISTM manual as an Annexure, with protocols and direction as determined by the international GISTM body.