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Mine closure liability as an environmental, social, and governance concept: using a multi-dimensional approach to mine closure liability reduction

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Abstract

Environmental, social, and governance (ESG) practices and expectations have become central to discussions surrounding project development and operations, both large and small. Miners are increasingly recognising the importance of addressing these aspects to safeguard their reputations, uphold corporate values, manage risks effectively, and nurture relationships with both internal and external stakeholders. Consequently, ESG considerations now play a significant role in mine closure and transition planning. While discussions about liability during mine closure have traditionally focused on financial tools and cost projections, this paper argues that understanding mine closure liability as a multi-dimensional concept is crucial for strategic planning and more accurate closure liability estimates. Drawing on our experience in integrated closure and reclamation planning, we illustrate that accurately accounting for and mitigating closure-related liabilities – a primary objective in all projects and regions – necessitates the explicit integration of ESG factors in cost estimation, as well as design and other technical aspects. We propose a conceptual framework for reducing liability, emphasising that proactive management of ESG issues is essential for achieving sustainable closure and transition planning.

Keywords: *liability reduction, risk management, closure planning, ESG*

1 Introduction

While robust environmental, social, and governance (ESG) due diligence assessments are often meant to support sustainable finance or long-term investment decisions with respect to life of mine planning[†], ESG discussions largely remain separate from liability cost estimates for mine closure planning. In this paper, we draw on our experience with closure and reclamation planning to illustrate that mitigating closure-related liabilities necessitates consideration of ESG factors. We propose the use of the 'Five Capitals' framework (Scoones 1998; Goodwin 2003; Porritt 2005), as adapted to sustainable livelihoods planning (Vanclay et al. 2015), as a useful conceptual model for closure planning and liability reduction; underlining that financial capital is only one form of capital for consideration in risk management – or due diligence – for mine closure planning.

2 Environmental, social, and governance due diligence

The acronym ESG is a product of sustainability and sustainable development principles that emerged in the 1980s and continue to drive international standards, goal-setting (e.g. Sustainable Development Goals [SDGs]), and assessment frameworks (Bhandari et al. 2022). ESG practices provide a framework that enables stakeholders – and shareholders, specifically – to understand how an organisation or corporation is managing risk and opportunity. ESG due diligence is, broadly, the process of identifying and assessing the potential risks

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[†] Life of mine planning is a kind of strategic planning that accounts for everything from initial feasibility studies to closure and post-closure land use, outlining a roadmap for long-term success.

associated with a particular transaction. Details provided in an ESG due diligence assessment then inform investment decisions, including the identification of 'red flag' issues that have the potential to either significantly impact project valuation or pose unacceptable risk (Leahy & Farrer 2023). ESG risks may be noted in reference to regulatory compliance (e.g. provincial and federal legislation in Canada), international lenders' standards (e.g. International Finance Corporation Performance Standards), as well as organisations' internal standards and guidelines, and broader themes (e.g. reputational risks) (Sympact Advisory 2023). Based on the authors' experience conducting due diligence assessments, ESG risks relating to mining transactions most often relate to: potential community impacts, including, primarily, relationships with Indigenous peoples; tailings and waste management; and water management and stewardship – all also common drivers of high mine closure-related costs.

3 Closure assurances, liabilities, and costs

Responsible planning for mine closure, and rehabilitation of mine sites, remain ongoing issues for the mining industry around the world. Although best practices integrate mine closure into life of mine planning there is a lack of alignment on closure criteria and objectives, as well as uncertainties around closure alternatives. Historically, abrupt termination of mining operations has left orphan mines and processing sites scattered around the globe, with limited or no financial provisions for closure and reclamation activities (Ashby & van-Etten 2021). Many of these sites accumulated significant environmental liabilities during their operating life. Chile's *Ley 20,551* – one of few examples of mine closure legislation in South America – was developed specifically to prevent environmental liabilities, or *pasivos ambientales mineros*, formalising the need for strong financial instruments to prevent miners from abandoning their assets, as well as incentivise miners to conduct (progressive) rehabilitation or remediation work (Gregory 2021).

External frameworks, including those outlined by the International Council on Mining and Metals (ICMM), enable miners to consider mine closure and associated closure cost estimates across all mining phases, including ICMM's Integrated Mine Closure (ICMM 2019a). Similarly, internal processes within mining companies allow miners to better understand their potential closure liabilities‡ and obligations. Financial liability cost estimates are generally developed for long-term life of mine planning, including budgeting, accounting, and/or financial reporting. On the other hand, financial assurances – a regulatory requirement – refers to any financial instrument required by any governmental entity primarily to fund closure and/or rehabilitation, and are typically based on estimated costs to abandon, remediate, and reclaim a site, or to fully implement a closure and reclamation plan (ICMM 2019b).

Regulatory requirements for financial assurances relating to closure are outlined, assessed, and enforced distinctly around the globe (Table 1) (Hattingh et al. 2021). A recent survey conducted through the Intergovernmental Forum on Mining, Minerals, and Metals and Sustainable Development indicated that 76% of jurisdictions have a formal legal requirement for industry to submit a mine closure plan as part of mine development, and while 86% of jurisdictions require some level of financial assurance for operating mines, only 45% of jurisdictions require companies to provide adequate financial assurance for rehabilitation and other closure costs (Stevens 2021). The so-called 'rush to relinquishment' (Pearce 2021) that miners have historically used as a closure strategy to see rapid return of financial assurance is rarely successful (Churr et al. 2014; Gregory et al. 2023). Moreover, analyses of closure programs suggests that an underestimation of both financial assurances and financial liability closure costs is common, with most mine closures over-running initial cost estimates by 20 to 100 percent (Dunnow & Kalisch 2022), totalling up to billions of dollars (Murphy 2022).

‡ IAS 37 is an international financial reporting standard that sets out the definition of liability as a 'present obligation as a result of past events. Settlement is expected to result in an outflow of resources (payment)' (IAS Plus 2024).

Table 1 Examples of jurisdictional requirements in North and South America for mine closure financial assurances

Place	Key policy or legislation	Requirement	Acceptable financial instruments
British Columbia (Canada)	Mines Act Major Mines Reclamation Security Policy (interim)	Financial assurances must be submitted as part of Reclamation and Closure Plan and are a condition of obtaining a Mines Act permit. Partial release of financial securities possible with progressive reclamation	Cash, cash equivalents, surety bonds, qualified environmental trusts, irrevocable standby letters of credit
Ontario (Canada)	Mining Act Building More Mines Act Ontario Regulation 35/24 Rehabilitation of Mining Lands Financial Assurance Policy Index	Financial assurances are required as part of Closure Plan, including new allowance for phased financial assurance. Partial release of financial securities possible with progressive reclamation	Cash, letter of credit from named bank, bond of a licensed insurer, mining reclamation trust, compliance with corporate financial test, any other form of security that meets prescribed requirements
Northwest Territories (Canada)	NWT Waters Act Mine Site Reclamation Policy for the Northwest Territories and Nunavut NWT Environmental Protection Act Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories Guidelines for Closure and Reclamation Cost Estimates for Mines	Financial assurances required as part of Reclamation and Closure Plan, and are part of water license and/or a condition of a land use permit. Boards will consider reducing the security for progressive reclamation work completed	Cash and equivalents, letter of credit, bank guarantee
California (USA)	Surface Mining and Reclamation Act	Financial assurances are required as part of Reclamation Plans and are required to cover the cost of final reclamation	Surety bond, irrevocable letter of credit, or trust fund

Place	Key policy or legislation	Requirement	Acceptable financial instruments
Colorado (USA)	Colorado Mined Land Reclamation Act Colorado Land Reclamation Act for the Extraction of Construction Materials Colorado Surface Coal Mining Reclamation Act	Financial assurances are required as part of Reclamation Plan, reflects actual current cost of fulfilling the requirements of the Reclamation Plan	Surety bond, letter of credit from a bank authorised to do business in the US, certificate of deposit, deed of trust or security agreement (real or personal property)
New Mexico (USA)	Mining Act	Financial assurances required as part of Reclamation Plan (a condition of the Mining Act permit)	Cash, trusts, surety bonds, letters of credit, collateral bonds, third-party guarantees, insurance, or a combination of all
Chile	Ley 20,551 (Regulating the Closure of Mining Operations and Facilities) Ley 21,169 (modification to Ley 20,551)	Financial assurances are required as part of Closure Plan (must be approved by National Geology and Mines Commission), and must include Closure Plan implementation costs, as well as post-closure monitoring and control activities	Bank bonds, deposit certificates, bank guarantee receipts, and standby letters of credit from a bank with a risk classification of at least A, and insurance policies
Peru	Ley 28,090 (Regulating the Closure of Mines)	Financial assurances are required as part of Closure Plan, equal to the total cost to implement the Closure Plan minus any progressive closure measures completed	Letters of credit or equivalent financial instruments, an insurance policy (bond), a trust in cash, property other than mining concessions, and securities excluding those issued by the mining company

As with risks identified in ESG due diligence assessments, financial liability closure costs tend to be associated with five main categories, including tailings and waste management, water quality and water stewardship, and community engagement (Leahy & Farrer 2023). While closure liabilities and associated cost reduction are key priorities for miners, parallels between common, 'invisible' closure costs and typical ESG risks underlines a need to include non-financial considerations in financial liability cost estimates.

4 Five capitals framework

The Five Capitals framework is a useful lens for understanding sustainable (economic) development that is applicable to mining projects broadly (Owen & Kemp 2012), and to mine closure and mine closure liabilities specifically. The five 'capital' types (or assets) that give the Five Capitals framework its name include:

- physical (or manufactured) capital: infrastructure, tools, equipment
- social capital: social networks and organisations
- natural capital: waste, agriculture, forests, ore, and other natural resources
- human capital: skills, education, health, and human capacity
- economic or financial capital: savings, cash, income.

Although referred to as a singular framework, it may be better referred to as a shared approach with overlapping but distinct origins in microeconomics thinking and sustainable livelihoods and development planning. Focused on concerns with productive capital and a revised framework for doing business, Goodwin (2003) and Porritt (2005) suggest that sustainable development can only occur if all types of capital – including natural capital – are maintained or increased, and that the maintenance of human and social capital are equally important. The Sustainable Livelihoods Approach (SLA) (Scoones 1998; Bebbington 1999) similarly considers the capabilities and livelihoods resources – including assets, or different kinds of 'capital' – that people undertake to make a living. The SLA is now often used as an assessment of social impact and human wellbeing because it is based on the idea that strengthening different kinds of capitals supports an increase in overall wellbeing (and, by contrast, diminishing one or more types of capitals decreases wellbeing) (Vanclay et al. 2015). The Five Capitals framework put forward more recently by the Forum for the Future (2020) also argues that there are five overarching types of capital from which we derive the goods and services we need to improve the quality of our lives. The Forum for the Future framework deploys these types of capitals to suggest a systems change-inspired model for decision-making around sustainability.

Unlike financial liabilities for mine closure, framed as an obligation owing to past events (as with IAS 37), the Five Capitals framework (or approach) is based on the premise that the accumulation of capital or assets will provide a kind of insurance against a future liability. In addition to future-oriented versus retrospective thinking, a key distinction between financial liabilities and the Five Capitals framework is that the latter also explicitly requires a multi-dimensional understanding of capital.

5 Five capitals conceptual liability framework

Mine closure liabilities are closely associated with closure costs. The liability that miners take on has a specific dollar value attached; the work of closure, then, has classically been to have that liability settled. If mining is understood as a temporary land use (Keenan& Holcombe 2021), closure can represent an opportunity for shared value creation that helps offset liability but does not entirely remove the liability. While even the most successfully closed sites, with limited examples to draw on, have residual risk and liability; liabilities remain one of the core components (and incentives) of mine closure planning and execution.

Conceptually and in practice, financial liability cost estimates can then be explicit in incorporating and calculating the costs of including social, human, physical, economic, and natural capital. Although most liability cost estimates already incorporate physical, economic, and natural capital (albeit in distinct ways), human and social (or sociopolitical or sociocultural) capital considerations are excluded. Nonetheless, this can be done

through development of indices to assess and quantify existing conditions (including risks or constraints) at individual mines. Assessment of socio-economic, cultural, and governance conditions may include explicit consideration of external governance stability, regulatory structure and requirements, local capacity and workforce dependency on the mine, sociocultural dynamics and cultural heritage impacts. Ranking of these conditions can be translated to cost approximations as a proportion of total closure costs, with closure costs then accounting for social investment needs, or social, political, and reputational risk costs. Such an approach would enable more fulsome accounting of closure costs and, ideally, mine closure liability cost reduction – a 'forward-liability investment approach' (James 2015). Given ESG risks relating to mining transactions are all also common drivers of high mine closure costs, this Five Capitals Conceptual Liability framework also outlines one means of addressing and assessing ESG risks through financial liability cost estimates.

6 Conclusion

Although there has been significant work to identify and implement best practices in reducing mine closure-related liabilities, financial liabilities are still primarily based on cost estimates that rely on narrow understandings of capital. We emphasise here that a critical component of realising on-the-ground opportunities for shared value creation at closure – a key means of offsetting closure financial liabilities – all necessitate a wider lens on elements of closure-related liabilities themselves. There are strong parallels between common ESG due diligence risks identified for mining-related transactions and closure liabilities and associated costs, and clear connections between mine closure and discrete forms of capital (including human and social capital). With ongoing work across jurisdictions and geographies to refine and improve mine closure planning, guidance, and execution, this work demonstrates that liabilities are seldom associated with social or human obligations, and that translating these capital considerations (also framed as ESG issues) into financial liability cost estimates is an essential component of achieving sustainable development and sustainable mine closure.

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