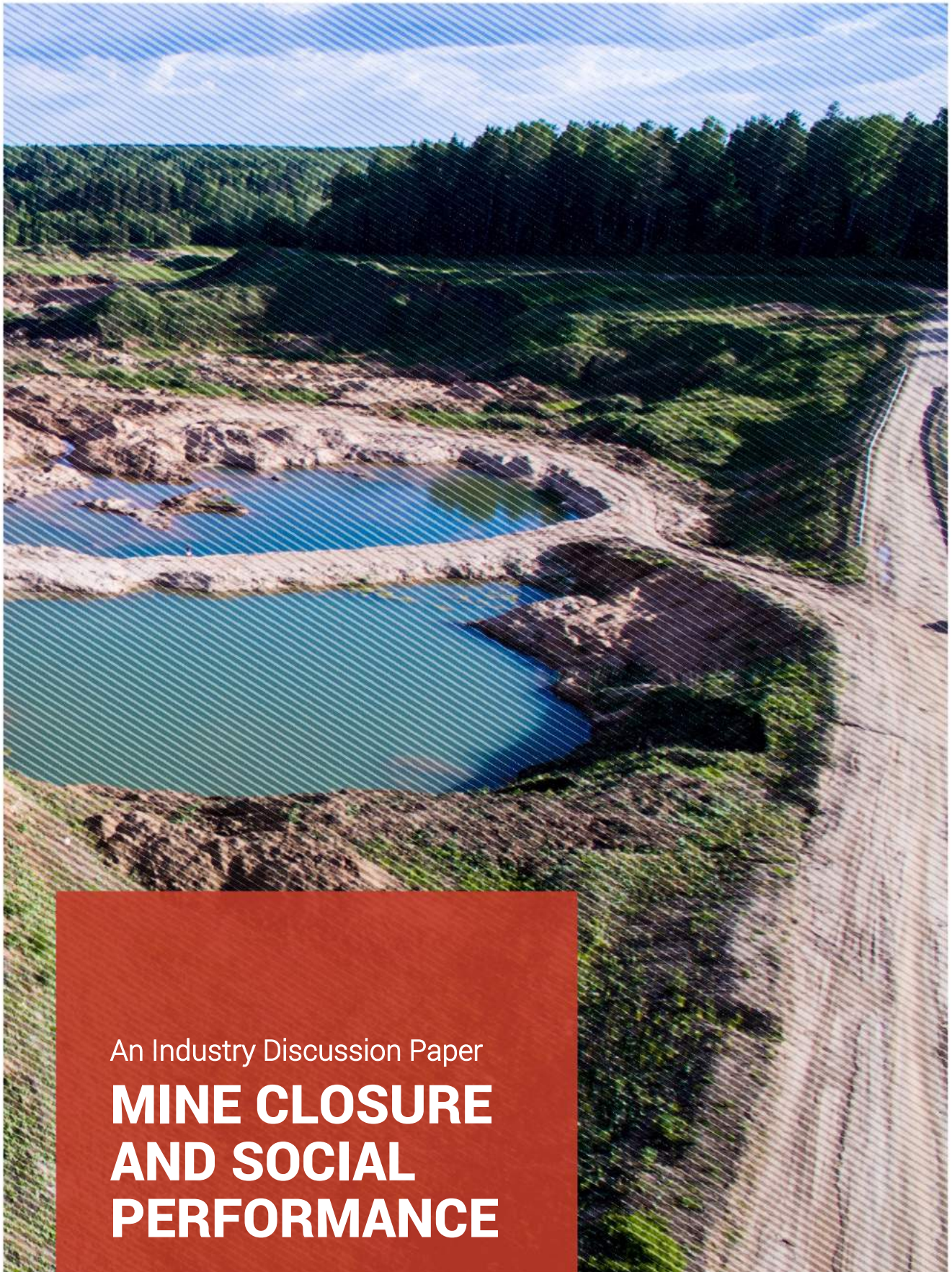




THE UNIVERSITY
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An Industry Discussion Paper

MINE CLOSURE AND SOCIAL PERFORMANCE

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SMI CSRM
Centre for Social
Responsibility in Mining

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SECTION 1

INTRODUCTION

This discussion paper is about the social aspects of mine closure. Mine closure can be understood as a form of 'industrial transformation'. The ideas and debates surrounding industrial transformation, are by no means new. Industrial regions, centres or hubs are generative; they are full of promise, and promises, and have for the last two hundred years, been a cornerstone of worldwide economic growth. However, these same localities can also experience severe disruption, sometimes resulting in long term decline, when technologies, markets and/or business models change.

Economists, historians and geographers have documented the ups and downs of industrial transformations going back to the early periods of manufacturing in the 17th and 18th centuries. Twentieth century industrial history alone has witnessed the emergence, and disappearance, not only of individual companies, but of entire sectors. To remain at the forefront of economic competitiveness, industrialists must innovate through new products and technologies, or risk the prospect of becoming obsolete. As modes of operating become outdated, the ability to transform business practices becomes a key determinant in an industry's success or failure. Industrial complexes, particularly those founded on natural resources, inevitably come to an end. The mining industry, in extracting and processing mineral resources on a site-by-site basis, has assets that ultimately reach a point where the resource has been depleted to a point where it is no longer economically viable to continue mining that resource. The narrative told in the global

mining industry is of economic uplift and prosperity through the construction and operational phases of mine life, contractions at project closure and relinquishment.

In this discussion paper we focus on a set of questions relating to transformations at the end of mine life, namely:

- What happens when major mining projects come to the end of their economic life?
- How are responsibilities for end of life planned and distributed among stakeholders?
- What does industrial transformation mean, for different stakeholders, at closure?

MINING PROJECTS AND CLOSURE

Mining projects can be differentiated from other industrial installations due to a combination of operational features. These features have direct implications for post-closure futures:

- Mining projects centre on geological resources. Other resources, or capitals (physical, human, financial) can be mobilised from other locales into the operation environment. In manufacturing, for example, proximity to a combination of capitals: labour, infrastructure, materials, technology, are considered essential to the overall viability of the operation.
- The scale of physical disruption accompanying these mining footprints is a distinguishing feature of the industry. The “mega” open-cut mines that have proliferated over the past three decades, with vast quantities of associated waste, represent a notable quantum of disruption.
- Mining projects tend to be located in remote or regional settings. Distance and remoteness are key features. To overcome the limitations of distance, mining projects often need to invest in the building of primary infrastructure, and develop sophisticated logistics systems to move resources, people and products. Often, mining projects are established in areas that are not considered attractive for investors from other industries, such as tourism, or from manufacturing sectors: textile, automotive, chemical, information technology.
- Market volatility influences the industrial footprint. This factor is not present to the same extent in other industrial sectors. Volatility in commodity pricing can cause mining projects to delay construction, rapidly deploy capital to expand operations, or lead companies to choose

care and maintenance or divestment over continuing operations.

- Mining projects often commence operations without the full extent of the geological resource being known to the developer, or the government. While some mines close earlier than planned, there are many others where the closure date continues to be extended as more resources are discovered, or new methods of extracting them economically are developed. The practical problem this presents is that, without an agreed closure time frame, it is difficult to engage key actors in a closure planning process.
- At the end of mine life, select equipment and infrastructure can be sold to other mining projects, but unlike other sectors, there are fewer opportunities for repurposing assets on-site for use by other industries. For other industries, except in cases where a project site has been contaminated, either the plant, or the plant site itself can be re-purposed for future industrial, commercial or even residential use.

OBJECTIVES AND CONTEXT

The mining industry is on the cusp of an upturn. Previously marginal projects are being re-examined, projects that were placed in care and maintenance are being revisited, and in some cases dormant projects are being reactivated. Capital investments that were on hold during the market downturn are once again being brought before investment committees and boards of directors. Commodity prices have not peaked, but are once again trending upwards. Notwithstanding these increased levels of activity, the industry's approach to mine closure remains largely unchanged.

This, while several nation-building mega projects steadily move toward closure; not because of a lull in commodity prices, or community opposition,

but because the resource is reaching the end of its economic life. Some of these assets will be sold to other operators, or will continue processing or re-processing at a much reduced rate. While this creates a long project tail, closure of some sort is inevitable in the longer term. The extent to which these large industrial projects, in the course of their inevitable closure, leave a liability, or a positive legacy is the topic that we engage here.

Against this backdrop, there are a range of uncertainties. Commodity prices may not determine the ultimate end point of an industrial scale mine, but market projections will most certainly shape the development trajectory. Whether a company “high grades” while prices are up, holds or sells its low grade assets, or reprocesses tailings and/or ‘waste’ rock until all remaining value is extracted will be largely determined by market conditions. Likewise, political instability, through the re-drafting of regulation or significant changes in government, can influence how quickly a mine will reach the end of its productive life. At the same time, there are patterned certainties that the industry is aware of, and which it should be able to plan towards. For example, it is certain that even multi-generational mines will exhaust their reserves at a future point. Some sort of economic uplift will be achieved during the construction and production phases of the project. It is also certain that without safeguards, the enduring value of this economic uplift cannot be guaranteed.

By subscribing to a broad range of international standards and policy norms, the global mining industry has introduced protections to more evenly distribute the risks and benefits of mining. In doing so, the industry has created a demand for new social performance capabilities. The social aspects of mining have always presented a challenge for the industry. Recent commitments by industry associations and companies suggests that the industry is becoming more attuned to the social dimensions of its activities – social impact, human rights, and human development. Yet, the industry has major capability gaps in the area of social performance– gaps that inhibit its ability to

identify issues and trends, conduct analysis, and manage projects through complex problems and scenarios. This capability deficit, while carried throughout the life of asset, is acute in closure processes. A compounding factor is the dearth of case studies on the social dimensions of mine closure planning, and the fact that even fewer documented examples exist of mines actually closing in ways which achieved good social performance outcomes.

This paper aims to generate constructive discussion about the social dimensions of mine closure. We do not offer direction, a series of checklists, or a “how-to” guide. Our intent is to prompt deeper thinking about the social dimensions of mine closure. We encourage the industry to use this document to initiate and facilitate conversations about its own future, and the future of the communities in which it operates.

STRUCTURE OF THE PAPER

This discussion paper comprises five sections. Section 1 establishes the general context for exploring the social aspects of closure in the mining industry. Section 2 engages the question: **How should mining companies optimize their closure efforts from a social performance perspective?** This section articulates nine foundation strategies for effective mine closure. These strategies are expressed in terms of the industry progressively optimising its approach to closure. This discussion relies on a distinction between “optimised” and “idealised” processes. The former is about improvement with a view to achieving the best of what is possible, whereas the latter does not necessarily take the question of what is possible into consideration.

The question posed in Section 3 is: **What prevents mining companies from optimizing their closure efforts?** In responding to this question we identify nine barriers to improved social performance in mine closure. Companies confront a wide range of factors that reduce their ability to effectively decommission and handover mining assets. We describe issues that are external, and not within

the control of the company, issues at the “interface” of company and community (or company and other stakeholders) and issues that are internal to the company.

Section 4 asks: **What are the key specialist domains associated with mine closure?** We have established that the closure of industrial assets is commonplace across a range of sectors, and that the mining sector is not alone in having to manage the social aspects of its activities. At the same time, however, it is clear that mining projects have characteristics that often differentiate them from other industrial projects. The social aspects of mining, and mine closure, warrant particular consideration. In this section we explore major policy and practice domains that require specialist social input.

In Section 5 we summarise the most commonly discussed mine closure scenarios. The emphasis in this section is on establishing closure objectives that are practical and which align with current industry discourse about sustainable development, and the base principle of “do-no harm”. Section 6 concludes and offers a set of questions to prompt discussion and reflection about the social aspects of mine closure.





SECTION 2

FOUNDATION STRATEGIES FOR THE SOCIAL OPTIMIZATION OF MINE CLOSURE

This section briefly outlines nine strategies for optimising mine closure from a social performance perspective. The discussion actively considers the roles and responsibilities of mining companies, governments and local communities.

UNDERSTANDING IMPACTS AT CLOSURE

A sound working knowledge of impacts, and how impacts will affect future social, economic and environmental systems is essential to effective closure planning. Designing, developing and acting upon knowledge about impacts, mitigations, consequences and costs is the responsibility of all stakeholders. This includes impacts as they relate to all stages of the mining lifecycle and the extent to which they will be present during efforts to decommission the project. Planning, monitoring, and mitigation efforts around social concerns for closure are built around, and feed into, management systems that are grounded in longitudinal and real-time data sets.

CLOSURE AS A LIFE OF MINE ACTIVITY

Closure, while presenting challenges, is a predictable stage in the life of a mining asset. Publicly available guidelines will ensure that

governments, communities and developers are aware of closure requirements, from both an environmental and social perspective. Project owners, governments, financiers, and local stakeholders are fully apprised of a project's development timeline, together with the activities and resources allocated to support closure. Costs and resourcing relating to social impact mitigation and programming at closure will be reviewed by companies, governments and community stakeholders throughout the life of mine to ensure that allocations are adequate and accurately reflect project conditions.

EARLY PLANNING AND PERMITTING

From the earliest phases of a project's development trajectory assumptions are made about future land acquisition, and at what point the mine will come to the end of its economic life. These assumptions inform business decisions relating to the overall financial viability of projects for developers and investors; and influence how

government and community stakeholders approach the project. Governments, in their evaluation of projects, need to consider the resources they have available, and when demands for these resources will be most acute.

Identification of issues at permitting stage provides stakeholders with greater scope for “designing in” possible benefits and “designing out” possible issues, and for collaborative planning and action in order to avoid future harms and liabilities.

SOCIAL MANAGEMENT CAPABILITY

Optimising mine closure across the life of asset requires sustained investment in social management capability within the company. This capability will support pre-planning efforts and remain central to decision making through the mine lifecycle. Social management capabilities will exist as a specialist business function that builds and applies social data systems to improve operational performance. This capability will be promoted among managers and leaders from other parts of the business who recognise the value of social science in planning for closure. Equally, strengthening this capability set in government agencies which oversee the closure process will be critically important.

ADAPTIVE REHABILITATION

Land use needs and expectations can change over the life course of the operation, both from the perspective of the developer, the regulator and the host community. Companies have the opportunity to engage with internal and external stakeholders throughout life of mine to identify land use options reflecting legislative requirements, operational priorities, and the resource needs of communities. As stakeholders confront new possibilities and challenges, company efforts in leading programs of environmental rehabilitation will adapt in order to achieve agreed future land use outcomes.

ENGAGING FOR CLOSURE

Planning for mine closure involves extensive engagement with a range of stakeholders using a

variety of engagement mechanisms. Companies will be prepared to work at the interface between mining, government and local communities – including those located in the direct impact zone and along downstream and infrastructure corridors. Engagement inputs will include qualitative and quantitative data from across the disciplinary spectrum, and will account for traditional knowledge in contexts where indigenous peoples claim rights and entitlements to land and territories. Inclusive and collaborative engagement that aims to identify an agreed closure scenario will be the primary aim.

AVOIDING ECONOMIC DEPENDENCY

Constructing and commissioning a mining project pulls local people, businesses, and government agencies into an economic process. Each of these parties will, to different degrees, become dependent on the mine. Some of these dependencies are mutual, whereas others are at the convenience of one or other party. All parties will understand the implications of these dependencies and interdependencies as the mine moves through its lifecycle. Transitioning from a mining economy, to a mixed, or non-mining, economy will be calibrated in a manner that provides opportunities for dependent parties to plan ahead. For some groups, this may not be possible. Closure planning will safeguard at risk groups that are more vulnerable, or less resilient, than others.

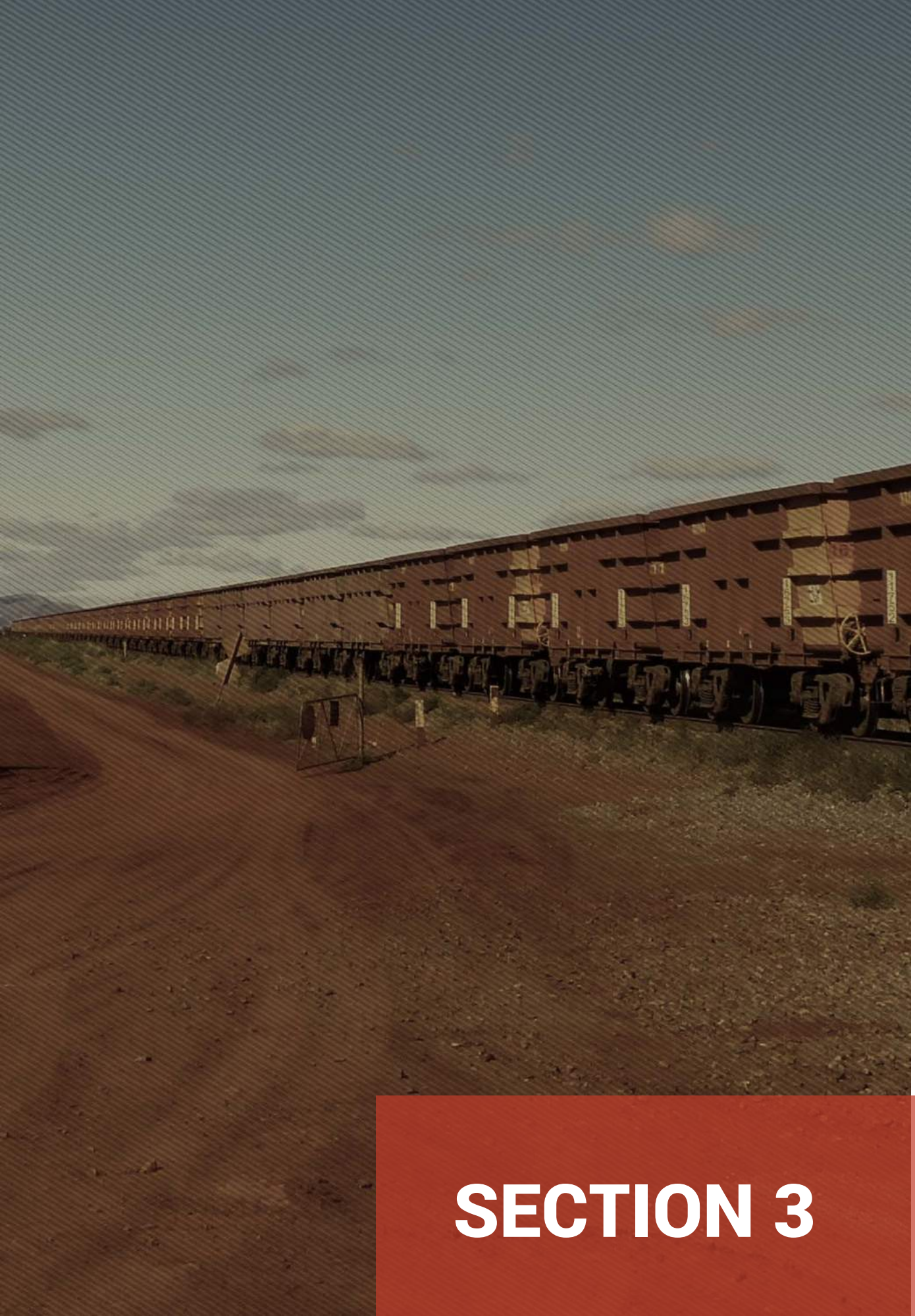
ZERO UNFUNDED LIABILITY

At the end of the asset's economic life, management of residual or ongoing risks are fully funded. Over the life of the mine, companies will endeavour to minimise future social and environmental risks to the greatest extent possible. Where such risks cannot be reduced to zero, resources and controls will be put in place to ensure that future liabilities associated with the active or passive phases of mine closure are not an environmental or financial impost for host governments and communities.

MINE CLOSURE AS SOCIAL PERFORMANCE

Conventional wisdom suggests that to optimise mine closure “social aspects” should be included in “closure planning”. A more progressive approach is to invert this logic, and to ensure that “closure considerations” form part of “social performance” from the outset of a mining project. This arrangement avoids social aspects being a “bolt on” to standard closure planning processes. Mining companies will consider ownership and use of land, resources and infrastructure throughout the life cycle, and consider stakeholder concerns and aspirations relating to post-mining transitions. This allows closure considerations to be integrated into land use agreements, social investment programs, and other safeguarding mechanisms.





SECTION 3

BARRIERS TO OPTIMIZING THE SOCIAL DIMENSIONS OF MINE CLOSURE

This section presents key barriers to optimizing the social dimensions of mine closure. Multiple barriers are identified and, for the purposes for discussion, have been categorised based on whether they are:

1

External to the company

2

A product of the interface between external parties and the business

3

An internal feature of the business

EXTERNAL

Regulating mine closure

Closure and the decommissioning of industrial assets presents future possible risks and opportunities for governments and host communities. Sovereign nation states determine the legal and regulatory architecture identifying performance and management standards in relation to risk mitigation and the conditions surrounding the transfer for assets and liabilities. While mining companies are able to access practical guidance based on industry experience and performance elsewhere, these otherwise useful tools are no substitute for government-lead

policy and legislation. The absence of clear regulatory instruments to guide to closure of multi-million (often multi-billion), multi-decade, large scale industrial projects presents major challenges for developers and stakeholders in the closing-out of social and environmental impacts. As a result, companies, governments and mine-affected communities will often enter into ad-hoc processes of negotiation as a means of forming agreement over complex social, environmental and economic liabilities. In other instances, parties can find themselves locked into an inflexible set of prescribed land use conditions that are impractical, and do not reflect stakeholder interests.

Market volatility

International commodity markets are prone to fluctuations. Factors that drive market demand sit squarely outside the realm of a single company's jurisdiction. Global mega trends with the advancement of new technologies, and steady emergence of industrial and consumer markets in the developing economies of many of the world's most populated nations, have altered the conventional demand cycles for minerals and metals. Company responses to changing market conditions inevitably have implications for operational footprints, the pace and scale of activities, and eventually on the timelines for closure. Where heightened demand can hasten the rate at which companies deplete available reserves, and truncate closure timeframes, a slump in commodity prices can promptly make a once economic mining operation unviable from a cost perspective. Volatilities in the international markets can translate into uncertainty at the project level, and impose conditions on how stakeholders approach life of asset issues.

AT THE INTERFACE

Contributing to unwanted conditions

Plans, strategies and decisions made by external stakeholders are an ever present factor. Given the overarching size and reach of mining complexes, corridors and supply chains, it is inevitable that projects will influence both the policy and implementation functions of other stakeholders. Similarly, decisions that will eventually have implications for closure will be negotiated between parties over the life of asset. Governments, companies and local communities may have distinct and potentially opposing views on a range of matters, such as whether to operate a mine on a long distance commuting model, or whether to establish townships.

In some cases companies will not be in a position to determine the conditions that they are operating within, but will nonetheless, over the course of their interactions with stakeholders, continue to invest in that environment. For example, while a company may not want a

township in close proximity to the mine, or want to invest in social services or infrastructure considered to be the responsibility of the state, companies will contribute to these developments through their procurement processes, either directly as a matter of convenience, or indirectly through the activities of its labour force. Under these circumstances, companies can unwillingly, over the life course of the asset, co-create conditions that broaden the range of social issues that have to be addressed as part of the closure process. .

Results of negotiated outcomes

Companies, in responding to a wide range of seemingly competing priorities and interests, frequently face the prospect of having to choose between imperfect alternatives. Aside from pressures generated by global markets, boards and shareholders, companies are also heavily influenced by the expectations, and demands, expressed by government and local community stakeholders. Having invested the capital to construct and operate a mining project, companies are conscious of securing their assets and ensuring continued access to land and infrastructure. Negotiating operational access in situations where stakeholders have high expectations, or where the operation is under pressure to secure short-term approval, can result in sub-optimal planning and decision making. Sub-optimal decisions early in the life of an asset can create long-term liabilities. While no stakeholder group would be expected to negotiate against its own interests, short-term ad-hoc negotiations can undermine the integrity of longer term plans and impose complexities and liabilities into the future.

Stakeholder readiness

Companies do not move assets through these stages on their own. Governments and communities are participants in the project development journey. The capacity of these stakeholders to maximise opportunities, carry responsibilities, or absorb externalised costs, often exist independently of the company's own maturity cycle. Different stakeholders require different lead times in order to interact with the

project development process. Preparing host communities for industrial employment, particularly in developing country contexts, is an investment that may not materialise for decades. Likewise, working with host communities with a view to establishing local business partners requires an investment in time, as well, as human and financial capital. Following investment in civil and social infrastructure, mine closure raises questions about who will continue to administer, fund and deliver benefits. Ensuring that stakeholder capabilities are aligned is a difficult exercise at any stage of project life. In the lead up to closure, this becomes a critical challenge.

INTERNAL

Mine planning

While many of the factors that contribute to the overall complexity of a mining project are seemingly external to the business, the approach to identifying, analysing, optimising and planning against these factors is largely an internal endeavour. Mine planning is a central business function incorporating a vast quantity of data from across the operation. Mine planning as an activity has the objective of extracting the available mineral resource to achieve the maximum possible value. The range of variables associated with mine planning, particularly in inherently complex environments make it difficult to find an optimum solution. Social considerations, both during the operational and post-mining phases, are generally not well understood, or prominent in mainstream mine planning. The assumptions made in the formation of mine plans that keep operational costs down and promote value for the business in the short term, may not be beneficial to operators in the latter stages of project life when closure typically becomes a more important consideration. Life of asset planning is needed to ensure that post-mining opportunities are not ruled out due to decisions made in earlier project phases.

Divestment

As mines enter the latter phases of their life, there is an increasing tendency for companies to divest.

Selling non-commercial assets, or assets with declining rates of return, typically relieves a company of their closure liabilities in relation to these assets. These liabilities are passed to the buyer. Companies that acquire assets in the latter stages of mine life usually purchase the business as an ongoing concern, and secure a viable (although often less profitable) asset, with permits, plans, licences, and agreements in place. Companies buying end-of-life-assets may also inherit a closure plan – which is often enough to meet minimum regulatory requirements. However, these buyers are often smaller, less experienced companies looking to minimise major capital expenditure. This creates a situation where the new operator reduces its investment in closure planning while it seeks to explore and operate in a cost effective manner. In these situations, while communities may support the extension of mine life with some remaining employment and business opportunities, planning for closure can stall.

Accountability

Assigning accountability for closure planning is notionally a simple affair. As closure approaches, a “point person” is assigned to oversee the development of a closure plan. The appointee is not always located on site. Some closure managers hold a corporate position, and can carry responsibility for closure planning across a number of operations. While companies may prefer to have a central point of coordination for mine closure planning, the lines of accountability are not always clear. For example, the closure manager may have responsibility for building closure scenarios, whereas operations personnel may have responsibility for the remediation of disturbed land at the site. The development of high level plans are often outsourced to specialists, although external consultants may not know the operations they are working with in any great detail. Once closure and decommissioning starts to occur, it is also the case that as the operation demobilises, closure responsibilities will be assigned to remaining personnel who may not have expertise. When problems arise, and as personnel turn over, it is common to find that, the

“accountable person” is not necessarily a “knowledgeable person”.

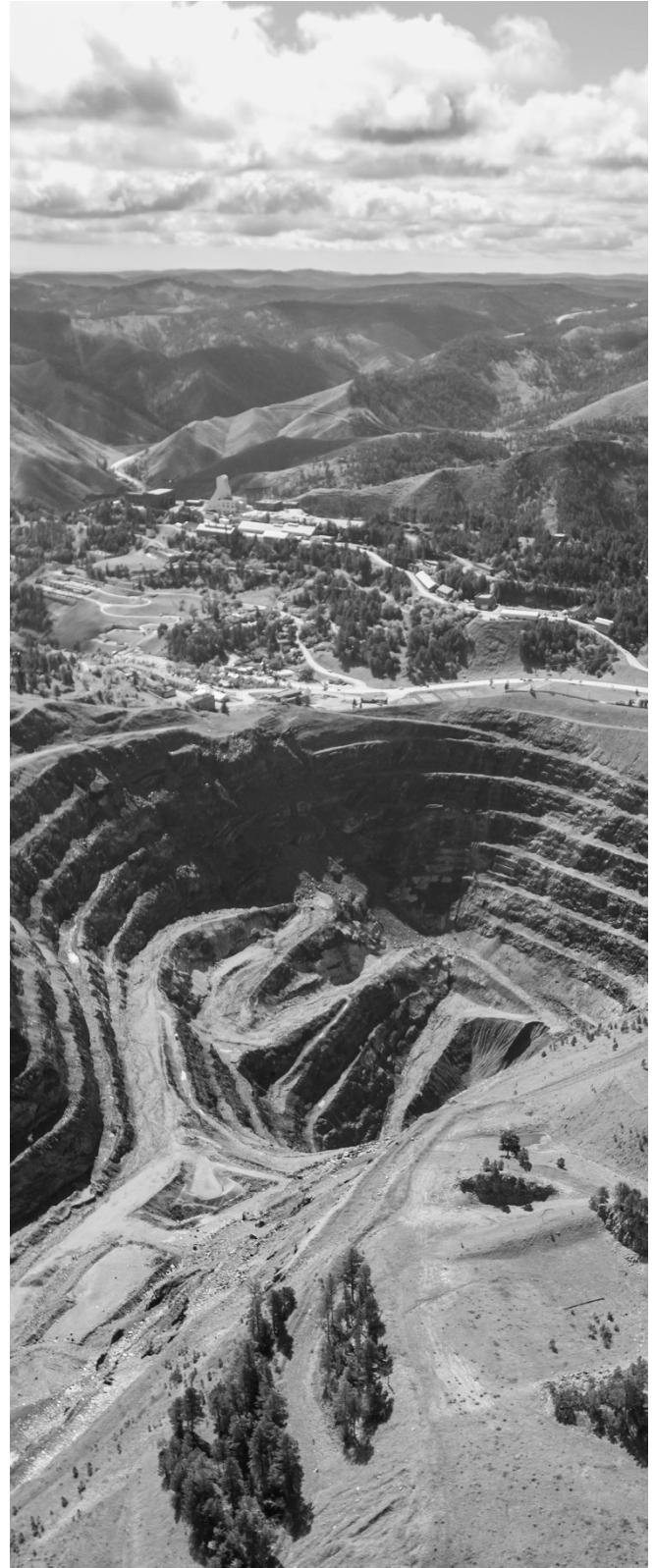
Discipline

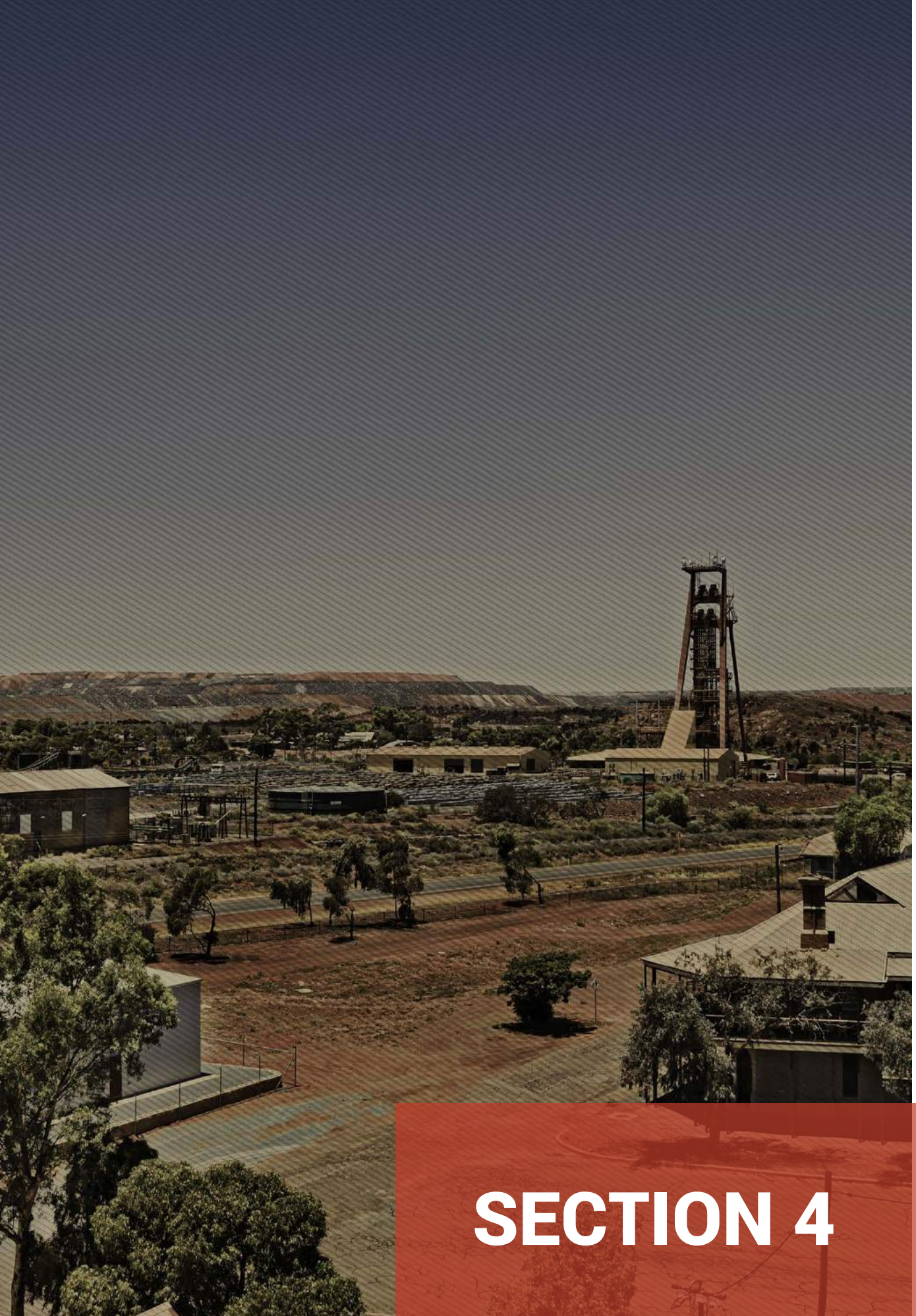
Planning for closure is typically led by specialists from human resources, environmental and/or engineering disciplines. These domains are where regulatory frameworks are most specific in defining minimum requirements. There are complex issues to address in these disciplinary domains, including retrenchment or redeployment of the workforce, what to do with the pit void, matters relating to land rehabilitation, water management, and safety and health concerns regarding chemical and other potentially hazardous wastes. Environmental and engineering sciences are where mining companies have deep and longstanding disciplinary expertise. The issue here is that the regulatory framework, and the industry’s disciplinary strengths tend to overlook, or exclude, social specialists. This leads to a situation where other disciplines dominate the closure planning process, and by the time social specialists are brought in to the mix, their timeframes for studies, consultations and negotiations are compressed, and certain issues may have been neglected. Often this is a reflection of how the mine has been operated in the past. Again, this reduces the likelihood of a successful transition to a post-mining future.

Social performance capability

The mining industry has a social performance capability issue. In recent times, there has been a significant diminution in the scale and quality of company capabilities in this area of practice. This poses a particular problem for understanding and managing the social aspects of mine closure. In situations where the social performance function is weak, companies are limited in their ability to commission and oversee closure studies and to plan engagement processes. Likewise, where social management systems are not built on strong disciplinary foundations, conceptualising closure options and scenarios becomes difficult, if not impossible. A lack of capability leads to a propensity to underestimate the work associated with the social aspects of closure. Poorly handled

mine closure can exacerbate local-level issues. Capacity issues also exist amongst other stakeholder groups, including governments and regulatory agencies, and community representative bodies, as discussed in the following section.





SECTION 4

SPECIALIST DOMAINS

In this section a set of six specialist policy and practice domains are explored. These domains are considered to be of general relevance across jurisdictions. The discussion below highlights the importance of incorporating social specialists into life of asset planning.

LAND USE AND LAND OWNERSHIP

Large scale mining impacts on land in fundamental ways. The transformation of landscapes from their original form for industrial purposes changes "use" patterns and invokes questions about "tenure" over the mine's area of interest. Establishing industrial infrastructure, and the disturbance of ground to develop pit areas, waste and spoils heaps, and tailings facilities each alter the form and function of land. Similarly, the granting of mining leases, concessions and special purpose easements add layers of complexity to previous systems of land tenure.

Rehabilitation of disturbed land has the dual objective of first, seeking to remediate or contain mining related impacts in a manner that is sustainable, and second, to restore or create a land form from which current and future generations of land users can derive meaningful value. The handing over, or handing back of land previously used or leased by the mine, assumes not only that the landscape is sufficiently safe to return, but that the land will be transferred to the appropriate parties, taking into consideration original ownership, as well as future obligations in

terms of land and risk management. Progressing these steps in preparation for mine closure requires governments and developers to understand a range of complex and inter-related issues. For example, pre-existing systems of land tenure must be clearly defined, in addition to how, following a potentially extended period of industrial use, future tenure over the landscape will be organised and brought into effect. In some jurisdictions, where customary systems of land tenure are active, the formal status of those systems is poorly understood. Numerous examples exist where, due to an absence of state guidelines and low levels of internal capacity within the mining company, developers have entered into ad-hoc arrangements in order to acquire land for the project. Few case studies exist to explain how under such circumstances, governments and companies engage with customary authorities to ascertain the most appropriate means through which to relinquish land to the community. Moreover, concerns can arise in these situations when lands are not returned to customary tenure, but are simply transferred directly from the developer to the state. The central issue being that mining concessions are generally granted by the state to

developers on a “lease” basis, and not by way of permanent alienation.

Future ownership of rehabilitated land is a critical consideration given the potential risk posed by residual or ongoing impacts caused by prior mining activities. If leased land is to be returned to communities as the original or legal owners of land, the rehabilitation activities will need to be scoped based on intended land use, in addition to the capability of the state, developer and community to effectively manage continuing risks in a fashion that does not undermine the value or enjoyment of that land. Understanding the dynamics of land ownership and what is needed in terms of future land rehabilitation requires dedicated management of longitudinal social and community datasets and land records, spanning the life of mine, with constant monitoring of operational activities and impacts. Failure to incorporate these kinds of considerations can result in governments refusing to sign off on relinquishment of the asset.

SOCIAL SERVICES AND INFRASTRUCTURE

Services and infrastructure are often a major focus of mine closure processes. Infrastructure includes schools, clinics, hospitals, roads, rail, shipping and airports, power, and water and sanitation infrastructure. Services can include education, medical and allied health services, waste management, and a range of social welfare services. Companies tend to claim that services and infrastructure are primarily a government’s responsibility. However, they will build and maintain some, or all, of these, particularly if the project is remote, the workforce is large, and services and infrastructure are essential to operations. Under these circumstances, governments tend to include responsibility for services and infrastructure in mine permits, contracts, or development agreements. Communities themselves may negotiate for these inclusions in native title, impact and benefit or community agreements.



The introduction of services and infrastructure into remote or regional areas are largely perceived as “positive”. It is at the point of mine closure, when services and infrastructure are disrupted through withdrawal, sale or handover, that the disruption becomes perceived as “negative”. The following questions then become pressing: What infrastructure will remain in situ, and under what conditions? How will it be maintained? Who will own and operate the asset, once the company withdraws? There is also the question of viability, especially in cases where closure leads to significant out migration, and where demand by other users falls below threshold levels. Transitioning, to a post-mining future may involve losing the very thing that was celebrated at the outset of operations as a corporate contribution to sustainable development. Communities that were connected by company-supported infrastructure can once again become isolated.

Determining whether infrastructure is either integral or non-essential to a post mining future requires a process of study, analysis and engagement. While it may not be possible to predict outcomes with certainty, it is usually possible to develop scenarios or options that provide stakeholders with parameters for planning and engagement. This requires an understanding of social, political and government systems, including administration, budgeting and fiscal regimes. It also requires data on demographic patterns, access to and utilisation of services and infrastructure, projected costs to administer and manage into the future, and potential alternative uses. If companies have not collected or compiled this data, understood the social and political context and systems, or determined the level of resourcing and capacity required, they will be creating a liability. If, on the other hand, companies maintain a social knowledge base, and provide time to engage, model, and plan, they increase the likelihood of positive post-mining development outcomes.

WATER QUALITY, ACCESS AND USE

Water is one of the world’s most valuable resources. Mining interacts with water in a range of complex and contingent ways. Company activities can alter water systems, through river diversions, utilising water courses as a major transport route, building of major industrial facilities, such as processing plants, tailings and hydro dams, and through mine dewatering. On site, water can be used for mineral separation, washing, dust suppression, production processes and worker consumption, and discharged into rivers, streams and lakes and other water bodies, including through deep sea tailings placement. These discharges can be both controlled and uncontrolled. Depending on the geological, climatic and geographic conditions, mining’s various interactions with water can be disruptive, even damaging, to the environment, and to other water users and rights holders.

Other users, including local and downstream communities, interact with many of the same water resources as mines, for human consumption and domestic use, and for farming, agriculture, fishing, business and other livelihood and recreational activities. These water bodies may hold cultural and spiritual significance for indigenous and tribal peoples. These interactions can bring companies and communities into direct competition, even violent conflict, over water. Water contamination, and effects on water bodies is a major concern of many stakeholders – in both water scarce and water abundant environments. The prevention of water contamination is a critically important activity for mining companies, including in mine closure. In some instances, water monitoring and treatment can be required into perpetuity, creating an ongoing liability for other stakeholders, long after mining activities have ceased.

Mining’s interactions with water may be complex, but they are not always negative. In building the water infrastructure needed for operations, mines can enhance access to potable water and sanitation for local and downstream populations, which can contribute to the achievement of



human development goals. Mines can introduce new knowledge about how to use water more efficiently, and likewise, how to capture and store water in contexts where major water infrastructure is not in place. Through social investment and community development programs, mining companies often provide significant support for water, sanitation and health programs, particularly in remote areas. A key consideration at closure is what will happen to groups that become reliant on water infrastructure supported by the mine?

The degree to which water, and the social aspects of water, are accounted for in mine closure varies across jurisdictions. Mine closure legislation should require mines to understand and manage their hydrogeological impacts, including where companies have enhanced access to water through development projects. However, legislation generally does not describe the degree to which companies are required to engage with water users and rights holders about their interaction with water – at project approval stage, during operations or during closure planning. There are many matters to consider, and that may be of concern to stakeholders, including:

- Pollution legacies: Some mines will manage water contaminated through seepage and affected groundwater springs. Sometimes this contamination can be historical, and not caused by the current mine owner. Will there be management post-closure?
- Pit lakes: Where these exist post-mining, they are generally designed to be a sink of water (i.e. a pit lake level below surrounding groundwater level) to prevent flow of the pit water into aquifers or overflows to surface water. Will pit lakes be returned to positive use, or will they be fenced off to prevent misuse and accidents?
- Tailings and spoil piles: Mine closure usually involves isolating tailings and spoil

piles from the surrounding water environment through the use of covers, or by directing runoff to the pit, or other means. There is also the issue of dam stability, and water management associated with floods. Are communities satisfied with level of risks?

Companies should understand the hydro-social context from the outset of project development. They should also understand water users in the catchment area, the function water plays, the values attached to water, and historical interactions, and conflicts. This knowledge should be updated as the mine moves through its lifecycle, and inform closure planning. Understanding closure conditions in the final years of operation, when a longer period of monitoring data is available, is the best scenario.

THE LOCAL ECONOMY

The local and regional economic effects of industrial scale mining are transformational. These transformations occur over the life course of the project through staged investments. Once established, mining interacts with every form of local economically valuable capital: physical, natural, human, financial and social. The form, function and interplay between these capitals changes in fundamental way in order to adapt to, and make use of new opportunities presented by the mining project. Markets, and their constituent parts, become qualitatively different as they move from operating along subsistence, or more localised sets of activities, towards engaging with a faster paced, globally orientated and embedded system.

These processes, while having a major effect on the economic character of mining regions, are often not tracked in a consistent or comprehensive fashion. The long term positive and negative impacts associated with changed economic inputs and outputs within and between regions, or within and between lifecycle events, are rarely acknowledged, or analysed so as to maximise opportunities to their greatest effect.

Economic flows between mining companies and governments are measured to understand contributions to state revenue, and the economy more broadly, but the direct and indirect effects of company expenditure at the sub-regional and immediate vicinity levels is generally poorly understood. By and large, companies understand that there is an expectation that host communities will be incorporated into the supply chain of the operation, and that activities which directly compromise local livelihood systems (such as displacement), will be appropriately compensated.

What a post-mining economy should look like, both qualitatively and quantitatively, are questions that need to be posed early in the mining life cycle, and not at the final stages of the asset's productive life. As projects move towards closure, expectations around what the economic environment will transition to can be hotly contested by companies, governments and host communities. Without clear state guidelines, front-end agreements, or longitudinal economic impact data, deliberations about how the post-mining economic future will be structured, or how it will be financed, and to what end, are difficult questions to answer. Where companies may be looking to consolidate their activities to ensure a low cost, low liability exit from the project area, sub-national government authorities and local communities will quite naturally be seeking to understand the possible "replacement options" to avoid a scenario where mine closure results in economic decline and collapse.

Project de-mobilisation is an inevitable part of an operation's transition to closure, however, given that mining developments also support a range of other non-mining activities, such as the maintenance of major civil and social infrastructure, which the mine itself has derived an advantage, it is important to consider how and when, in the process of de-mobilisation, local markets or institutions can play a role in absorbing and carrying forward priority assets and services. In some instances, where the life of mine has been relatively short, and the economic impact has been minor, it may be reasonable to assume that,

for the most part, the local economy will revert to its pre-mining state. However, in cases where mining has occurred over several generations, or where impacts have fundamentally transformed the landscape in a way that compromises the viability of pre-mining activities or industries, this may not be possible. For these deliberations to be constructive, there must be a common understanding of what economic activities occur where, and at what local benefit and cost.

GOVERNANCE AND TRANSITIONS

Governance and oversight of project activities is undertaken within the formal constraints of state regulation, and through self-regulation by companies as a means of internal assurance. In the majority of jurisdictions, there are national level requirements for companies to engage with local communities at various stages of the project lifecycle. The most intensive period of engagement typically occurs at project start up, where consultation and the identification of major social risks and impacts are presented to the state ahead of the granting of permits. With the exception of critical incidents, or significant changes in the footprint, for instance, where additional land acquisition is required to support an expansion, regulatory activities relating to the social dimensions of mining operations are relatively minor.

Multi-stakeholder processes for securing, planning and implementing mine-sponsored investments in civil and social infrastructure, however is common. Not only is it common for stakeholders to seek to participate in governance structures relating to social investment funds and programmes, there is often competition within and between stakeholder groups over the control and distribution of these resources throughout the construction and operational phases of mine life. At closure, with the prospect of company supplied funds ceasing to support civil and social projects, questions ultimately surface about what long-term funding can be secured to maintain infrastructure and services, and how in the context of national and sub-national administration, responsibility for



time required to prepare national and sub-national government for a complete transfer for responsibility, often exceeds the timeframes allocated for planning and engagement for these activities.

More broadly, however, is the problem of governing in the absence of clear objectives and guidelines, in an area of industry practice where technical capability is at its lowest. The setting of objectives, or a vision for future, post-mining social and environmental conditions is a complex exercise. Governing, and holding the various parties to commitments with these long term objectives in mind, is equally challenging given the inherent volatility that surrounds mining investments, if for no other reason than that governments will themselves want to extract maximum possible value from the mining asset. Invoking strict conditions pre-maturely in the interests of responsible closure planning may result in government, investors and local communities not realising the full economic potential of the project. The risk of hesitation, however, is that developers do not disclose their intention to close, and subsequently commence effective planning, until external market conditions force the decision. Under these circumstances, companies will often seek to divest the asset, given the low levels of economic incentive associated with the detailed, and costly planning, involved in investing in maintaining a long term presence to oversee active closure and handover of the asset.

IDENTITY AND CONNECTION

In many communities, land is the basis of identity and connection to place. For indigenous and tribal people connection to, and ownership of, land, waters and territories is directly tied to identity, which signals certain rights, entitlements and obligations. When mining disrupts and transforms landscapes, it alters the way people interact with each other, and with land, which in turn has implications for identity and connection. This can occur, for example through land dispossession and alienation, a common occurrence when a

mine resettles groups of people. Similarly, landscape transformation can be a creative and positive process, where new identities and connections are forged. While there are debates about whether mining reinforces the oppression of vulnerable groups, mining has also disrupted entrenched forms of domination, and provided historically marginalised peoples with new opportunities for asserting their rights.

When a mine attracts people, inward movements can trigger other types of change, including new markets, economic activities and social interactions. Transformation can occur at the mine site, and also in surrounding areas where villages, towns and regional centres can also be transformed. In some places, a town's heritage as a mining town becomes important to its post-closure future. The point is that when people begin to live differently, in different places, and connect in different ways, some of this will affect the way they construct their identity. Some parts of a person's identity will be fixed, such as being a mine worker, a land owner, or self-identifying as an indigenous person, whereas other dimensions will change as they engage different people, places and social systems.

Large-scale and heavy footprint industries pose a threat to people with a strong connection to people and place. However, people and social systems can adapt, and become attached in new and different ways. When a mine winds down, questions that come to the fore include:

- What happens to these forms of connection?
- How do people identify with themselves, and with others?
- Can people maintain their connections to place without mining?
- How do people disconnect in ways that are not harmful?



- How do the original inhabitants reconnect following industrial disruption?
- What is possible, and moreover, what is acceptable?

Some people who move into a mining area find that their attachment is deeper than the original driver to move; that is, they moved to take advantage of an economic opportunity, but over time, connected through land, marriage, or by establishing other social ties. As closure approaches, all this can be put under threat. For decisions to be made about whether to manage or enable in or out migration, the mine, and other stakeholders such as governments and traditional leaders, need access to data and information, and must be willing to pursue conversations about alternative development trajectories. This will require monitoring and ongoing analysis of population trends, pressures, and carrying capacity. For land connected peoples, there are additional questions of stewardship relating to the need to safeguard the rights, resources and entitlements for future generations. In some locations, younger generations blame older generations for having sold their inheritance, and given away their heritage. These issues become very real at closure, when land use and royalty payments pay cease. Companies may claim that identity and place connection is not their responsibility – but decisions made by the company affect these matters in profound ways. Companies must be active participants in seeking to understand the consequences of decisions, and working to formulate an agreeable closure scenario that takes account of identity and place connection.



SECTION 5

CLOSURE SCENARIOS AND STAKEHOLDER CAPABILITY

This final section describes three closure scenarios. These scenarios represent three general approaches, each with their own set of costs, and consequences. The purpose of this section is to describe the basic differences between these approaches in terms of their implications for company, government and local community stakeholders. Government and company capability requirements – particularly for those aiming to continue “economic uplift” or to achieve “zero externalised liability” – are briefly discussed in order to highlight the importance of investing in life of asset social performance capability if the most attractive scenarios are to be carried into the future.

SCENARIO 1: EXTERNALISED COSTS

The least attractive closure scenario – from the perspective of host governments, local communities, and for corporate reputation – is for companies to “walk away” with social and environmental impacts unmitigated. This scenario pushes or “externalises” liabilities onto current and future generations of stakeholders. Governments can, and often do, hedge against companies defaulting on closure costs by insisting on environmental bonds. These are imperfect solutions, given that small bonds can easily be forfeited if the cost of meeting closure costs is higher than the financial guarantee. In cases where the bond value is high, companies may choose to move the project into care and maintenance rather than commence active

closure. As a divestment strategy, companies may also elect not to fully exhaust the project’s reserves, making the transfer of closure liabilities attractive to a new buyer. This is not a scenario in which companies voluntarily adopt principles that exceed, or even comply, with performance minimums. Rather, it allows companies to use commercial and legal avenues in order to transact their way out of mine closure responsibility.

SCENARIO 2: CONTINUING ECONOMIC UPLIFT

The most attractive scenario, from the perspective of host governments, local communities and for corporate reputation, is for companies to avoid the rapid economic decline associated with mine

closure, and to financially underwrite the process of achieving “continuing economic and social uplift” at the end of asset life. This scenario internalises the cost for achieving that uplift, and involves companies on-boarding other partners in transitioning to a viable post-mining economy. While this is by far the most difficult scenario to achieve, it is the narrative that is most readily used by companies at the front end of the project development lifecycle, often, it seems, to create “safe passage” through the approvals process.

SCENARIO 3: ZERO EXTERNALISED LIABILITY

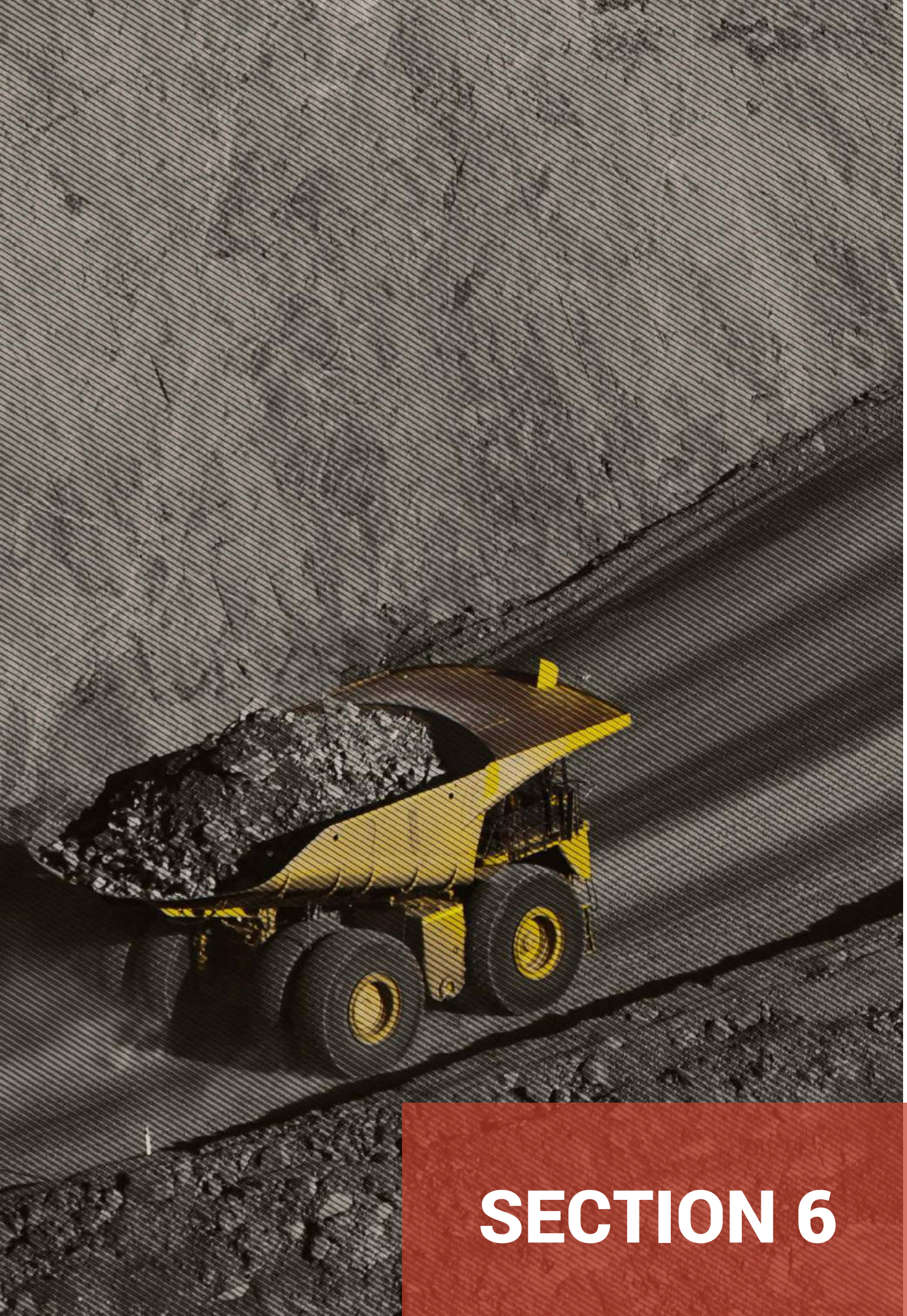
One scenario that is rarely discussed is managing project closure to “zero externalised liability”. Mines may, as a general principle, generate economic uplift during the construction and productive phases of mine life that may not extend into post-mine life. In other words, stakeholders acknowledge the decline in economic activity toward the end of mine life, and manage to a reality whereby public and community-level actors carry little by way of ongoing economic benefit, but neither do they carry ongoing risk or liability. What may at first appear to be a minimal closure proposition, is in fact a considerable improvement when considered against Scenario 1. A neutral economic footprint does not equate to a neutral physical footprint, or a return to pre-mining conditions. This scenario requires a commitment to the principle of “do no harm” and significant capital investment to neutralize any deleterious effects of mining on the social landscape. Too often mining communities are burdened with assets that become a cost, rather than a service to them, and with infrastructure that becomes hazardous, rather than beneficial. This scenario underlines the importance of planning mine closure with integrity, where liability is addressed before closure.

Governments often leave the corporate promise of economic uplift unchecked in order to facilitate the right investment conditions during project development. The promise of re-purposing major

infrastructure (such as port, rail, road or airport infrastructure) for the benefit of the state, at some later point, can hold appeal – even if the pathway towards achieving that purpose is undefined and potentially unachievable. While the economic uplift narrative suggests a corporate “vision” for development, it lacks integrity unless there is a parallel uplift in capacity to service the corporate promise. Where companies are not prepared to create the conditions for ongoing economic uplift, promising anything beyond zero externalised liability can only be read as disingenuous.

Each of the latter two scenarios can be regarded as denoting an improvement on existing closure practice. The first scenario, while clearly depicted in a negative light, reflects an approach to closure in the mining industry that is becoming more common, and yet, widely accepted as falling short of modern standards. Many of the strategic foundations outlined in Section 2 are absent in this first scenario.

The second and third scenarios are more ambitious. Individual companies, along with industry organisations, have sought to align their position on responsible resource development with global frameworks, such as the United Nations Sustainable Development Goals (UNSDGs). While the “continuing economic uplift” and “zero external liability” scenarios suggest divergent outcomes, they nonetheless reflect a growing consensus in which sustainability objectives and human rights responsibilities are viewed as mutually reinforcing. Whether developers cast their vision toward a post-mining future that aims to extend the enjoyment of human rights, supported by economic growth, or set their sights on reducing residual social and environmental harm to zero, life of asset capability will be essential. Scenarios two and three assume that the strategic foundations for closure are in place.



SECTION 6

CONCLUSION

Mining developments bring great, and even unprecedented change. This change can be transformational. The predominant language used by industry is “economic uplift”. Economic uplift describes a situation in which the combined effect of massive injections of capital and wholesale improvements in civil infrastructure rapidly widen the scope of opportunity for communities living in near proximity to the project. For remote regions, in both developed and less developed countries, this growth, however difficult to harness or sustain, often represents an once-in-a-lifetime opportunity to secure improvements in living standards. The decision to proceed with a mining development is a major milestone for companies, governments and for local communities.

Mine closure is an equally significant development. The distant and recent history of mine closure predominantly paints a picture of economic decline, legacies of enduring environmental pollution, lost opportunities and seemingly irrecoverable social hardship. An alternative – and ultimately more optimistic – version of mine closure was presented in Section 2 of this paper. In that section, the strategic foundations of acceptable mine closure are outlined from a distinctly social perspective. Optimal in this context reflects heightened levels of social performance capability across stakeholder groups. This marks a step change from existing levels of capability and performance.

In Section 3, the barriers to improving social performance in mining closure were identified. These barriers were organised by source, noting

whether the barrier was an internal feature of mining companies, a consequence of forces external to the mine, or a function of different stakeholders attempting to navigate these factors. This describes the internal barriers to achieving better social outcomes from mine closure. While mining companies cannot control many of the underlying conditions of mine closure, there are a range of barriers that sit within their control or influence, including those at the stakeholder interface.

The discussion in Section 4, focusing on specific domains of social performance practice, highlights the inherently complex nature of mine closure. Our objective in presenting these complexities is to demonstrate the overall importance of investing in social performance capabilities as a life of asset resource. Social

performance capability is by no means a 'magic bullet' for securing an orderly and sustainable transition at closure, but it is essential for progressing the industry beyond the current impasse.

The final section emphasizes the importance of working with other stakeholders to set a realistic closure vision. Expectations of mining companies to deliver ongoing economic development are increasing. The industry is responding by increasing the promises it makes to achieve economic uplift. The risk here is that companies make promises they cannot keep. This strategy does not stand the industry in good stead, particularly as it moves into a phase of growth.

Stakeholders are looking for realistic commitments and a clear lines of responsibility. Most stakeholders accept that the conditions for large-scale industrial development are difficult, and are becoming increasingly so. What stakeholders will not accept is that the underlying conditions were not taken into account, and that there was no investment in building capacity to overcome barriers and maximise the opportunities that mining brings. Companies must invest in life of asset social performance capability if the most attractive closure scenarios are to be carried into the future.

The following ten questions are provided as discussion and reflection prompts based on the issues and themes presented in this paper. We strongly encourage corporate and government readers to engage stakeholders inside and outside of their organisations in order to promote further discussion about the social aspects of mine closure.

QUESTIONS FOR FURTHER DISCUSSION

1. What does a 'positive legacy' mean in the context of mine closure?
2. What are the key contextual factors that are likely to enable, or constrain, different types of post-mining futures for impacted communities?
3. What would best practice in mine closure look like from a social performance perspective?
4. What kinds of knowledge are needed to be able to plan more effectively for mine closure?
5. What should be the role of governments in the closure planning process?
6. How can communities be more effectively engaged in closure planning and management processes?
7. What governance mechanisms (e.g. multi-stakeholder forums, taskforces, statutory bodies) would support more effective closure planning from a social perspective?
8. What controls should there be on companies placing mines on indefinite care and maintenance, or transferring ownership of the mine to smaller, less well-resourced, companies?
9. Where companies do transfer ownership, what steps should they take to ensure that pre-existing commitments to communities are honoured, particularly as these relate to closure?
10. How should mining companies be configured internally to ensure that appropriate attention is paid to the social aspects of mine closure?

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