

Realising rehabilitation of legacy mine areas as an opportunity under an environmental, social and governance framework

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Abstract

The most elementary goal of mine closure is to minimise the environmental impact of the operations and reduce future financial impact to the company's shareholders. Many modern mines have detailed mine closure plans for current approved mine operations, gaining the support from the shareholders and, in turn, increasing the value of the company. In recent years, we have seen mines being decommissioned and rehabilitated to land uses from pre-mine natural states through to future energy hubs.

An emerging issue pertaining to closure planning is the identification and management of legacy areas where mining or exploration activities have ceased but rehabilitation has not occurred. Given the age of these some of these unclosed sites, many openings have not been sealed, forgotten, or lost. These sites pose a risk to the public safety and reduce the value of the land for future sales.

The current Sustainability Accounting Standards Board (SASB) standards require the disclosure of environmental and social impacts to the decommissioning and rehabilitation of mines. These environmental, social and governance (ESG) standards focus on the financial materiality of issues pertaining to mine closure. Banks and investors look to these standards to guide their investment decisions.

Using four Australian case studies, we explore how an ESG report using the SASB Standards can be improved when a legacy area is rehabilitated or closed. This can lead to favourable results for the company when it comes to refinancing or divesting an asset due to more investor interest as the materiality of the legacy area is better defined.

In addition, shifting legacy areas from areas of risk on a company's portfolio to potential opportunities to drive better ESG performance has the potential to realise increased corporate financial performance and increased valuation by investors.

Keywords: *legacy areas, NSW, ESG, SASB Standards, rehabilitation, decommissioning, sustainability, closure*

1 Introduction

New South Wales (NSW) has been mined for resources such as copper, gold, and coal since the early 1800s. In the 220 years since, regulations, public perception, and the geo-political landscape have shifted substantially. As a result, many historical mine sites were closed and have not achieved rehabilitation to a safe, stable, and non-polluting condition (Laurence 2006). A legacy mine is defined as 'a site in which no person or company with direct responsibility for the rehabilitation of the mine can be located'. These sites fall under the Legacy Mines Program (LMP) (NSW Government 2022), an initiative of the state government of NSW to fund the rehabilitation of these sites. It is estimated that within NSW, over 573 legacy mine sites exist that have not been rehabilitated (Mining Legacies 2022). This paper, however, focuses on legacy areas within operational mine sites where mining activities have ceased, and rehabilitation has not been undertaken. These legacy areas occur on a site, and a company has direct responsibility for the rehabilitation of the site. These areas do not qualify for funding under the LMP and are considered burdens on a company's bottom line. They are often put aside to rehabilitate at a later date (normally at the closure of the mine).

Investors, insurers, large customers, and the community are becoming increasingly aware of the environmental and social risks of these legacy mine areas. Investors are asking questions ahead of any investment or refinancing of a mine or a company in regard to these areas and how they are managed. Environmental, social and governance (ESG) aspects of a mine are analysed for risks and opportunities; one such risk is the poor management of their legacy areas.

Due to the rise in interest of ESG risks and responsibilities, a number of independent rating agencies and reporting standards have been developed to compare a company's individual performance to another in a similar industry, to allow investors to evaluate their holdings in a standardised way.

One of these standards has been established by the Sustainability Accounting Standards Board (SASB). The SASB Standards were developed in 2011 and are designed for communication by companies to investors about how sustainability issues impact long-term enterprise value (Value Reporting Foundation 2022a). SASB has developed 77 industry standards to identify the minimal set of financial material, sustainability topics, and their associated metrics for the typical company in an industry (Value Reporting Foundation 2022b).

The Metals and Mining Standard details 12 sustainability disclosure topics and accounting metrics. Three of these (water management, biodiversity impacts and workforce health and safety) are likely to be negatively impacted by the poor management of legacy mining areas. It follows that if these mining areas are rehabilitated, a company's SASB report will be improved. This could lead to favourable results for the company when it comes to refinancing or divesting the mine, increasing investor interest as the materiality of the legacy areas is better defined.

In addition, shifting legacy areas from areas of risk on a company's portfolio to potential opportunities to drive better ESG performance has the potential to realise increased corporate financial performance (CFP) (Friede et al. 2015) and increased valuation by investors (McKinsey Sustainability 2020). We hope that this paper can be used by management on current mine sites to communicate the benefits of legacy area rehabilitation to gain support from their board of directors.

2 Background

2.1 Mining in NSW

The earliest record of mining in NSW is coal mining at Nobbys Head in the 1790s (Mining Legacies 2022). This set the area of Newcastle up as a coal mining hub, and led to the discoveries of gold, lead, zinc, and copper deposits (Mining Legacies 2022) along the Illawarra, Lower and Upper Hunter, New England and the Central West. Early mining operations employed underground and open cut mining methods.

Many of these older mine sites have ceased and have not been rehabilitated to their pre-mine state. A focus on operational activities, and a historically unregulated industry, has meant that mining activities in an area moved on and mine openings (such as vent shafts, adits, and exploratory bore holes) were left unsealed or only temporarily sealed.

Current mining operations are still undertaken on leases where underground mining has occurred as far back as the 1850s. These present-day active mining operations have often mined through the older underground workings or are in previously unmined areas of the mining lease. These areas are within a current mining lease that has a clear person or company with direct responsibility for the rehabilitation of the site. They are not a legacy mine where there is no person or company with direct responsibility for the rehabilitation of the mine. These legacy mines fall under the LMP (NSW Government 2022), an initiative of the state government of NSW to fund the closure of these sites.

For the purpose of this paper, the term 'legacy area' refers to areas that have not been rehabilitated or a site within an operational mining lease where the company has the responsibility under existing regulations to rehabilitate the whole mine site and mining lease, including the legacy area.

2.2 Mine closure

The most elementary goal of mine closure is to minimise the future environmental impact of the operation, relinquish the mining lease and its obligations and reduce future financial impact to the company's shareholders. Many modern mines have detailed mine closure plans for current approved mine operations, gaining the support from the shareholders and, in turn, increasing the value of the company. Mine closure and final land uses are set at the project outset by an agreed final landform and land use as part of the EIS approval process. The Department of Planning and Environment's Major Projects website shows that final land uses are largely grazing and biodiversity land uses (Department of Planning and Environment 2022).

Modern rehabilitation obligations require a mining area to be rehabilitated at closure. In NSW, the rehabilitation is required to be undertaken in accordance with the conditions of the *Mining Act 1992* (NSW Government 1992), which state that any disturbance resulting from the activities conducted under this mining lease must be rehabilitated to the satisfaction of the minister. This generally means that rehabilitation of the mining area achieves the final land use, as stated in the approved rehabilitation objectives and rehabilitation completion criteria. Recently revised changes to the legislation also require rehabilitation of the land and water within the mining area as soon as reasonably practicable after disturbance occurs. As such, mine rehabilitation and closure plans focus on the active mining area and legacy areas are left out.

An active mining area generally corresponds with approved current mining operations granted through the relevant state government approval process. As a result, the focus of rehabilitation planning, progressive rehabilitation and operational budget allocations, is also focused on areas where active mining is being undertaken. However, the requirements for relinquishment of the mining lease require any areas disturbed as a result of activities conducted under the mining lease to be rehabilitated to the satisfaction of the minister.

2.3 Complications of rehabilitating legacy areas

Legacy areas pose a risk to the public safety and reduce the value of the land for future sales. Based on our experience working across mine sites in NSW over the last five years, this is further complicated by the fact that:

- Where legacy areas are present within the boundary of a current operational mine, the costs for the rehabilitation of the legacy areas are generally not included, underestimated, or identified too late in the closure process to realise beneficial re-use options.
- Where these legacy areas have become revegetated naturally, additional project approval may be required to allow for mine sealing and rehabilitation works to be undertaken, increasing costs and time frames for legacy area rehabilitations.
- Any delay in rehabilitation of legacy areas could result in the required standards imposed by the regulator becoming harder to achieve as industry standards improve.

2.4 Current ESG reporting standards

ESG describes a set of factors used to measure the non-financial aspects of assets and companies. ESG grew out of socially responsible investing, and early efforts were focused on 'screening out' companies from portfolios due to ESG concerns. Recently, there has been a shift from ESG informing a select few stakeholders to divest in a company, to favourably distinguishing companies who are making positive contributions to the elements of ESG (Bergman et al. 2020). It is increasingly recognised that ESG issues impact the financial condition, operating performance, and enterprise value of a company. Stakeholders, including investors, insurance companies, lenders, large customers, and consumers, are increasingly looking for ESG data to inform their investing, purchasing, or lending decisions.

Estimates indicate that over 30% of all global capital is now invested through an ESG framework (Bloomberg Professional Services 2021), as investors increasingly link financial performance to ESG factors. Larry Fink, the Chairman and CEO of BlackRock, stated:

“ESG factors relevant to a company’s business can provide essential insights into management effectiveness and thus a company’s long-term prospects.” (BlackRock 2022)

In order to assess an asset or company’s ESG issues, an investor can look to either a ratings agency or perform a due diligence exercise. Both require a company to disclose information on their material ESG issues. Disclosure can be complicated and hard to evaluate when reports are not standardised. This has led to a range of standardised reporting frameworks being released in the market. Unfortunately, the range of these standards has led to confusion and disagreement between companies, investors and customers as to the preferred standard to use. Fortunately, the International Sustainability Standards Board (ISSB), formed in November 2021 during the COP26 summit, promises to offer ‘a single source of truth of ESG reporting’ (Eccles & Mirchandani 2022). These standards are currently in development; however, the ISSB has communicated plans for building upon the SASB Standards (IFRS 2022). The industry-based approach used by SASB is valued by investors for producing decision-useful information and by companies for providing cost-effective standards.

The SASB Standards were developed in 2011 and are designed for communication by companies to investors about how sustainability issues impact long-term enterprise value (Value Reporting Foundation 2022a). SASB has developed 77 industry standards to identify the minimal set of financially material sustainability topics and their associated metrics for the typical company in an industry (Value Reporting Foundation 2022b). The Metals and Mining Standard details 12 sustainability disclosure topics and accounting metrics, which are as follows:

1. Greenhouse gas emissions.
2. Air quality.
3. Energy management.
4. Water management.
5. Waste and hazardous materials management.
6. Biodiversity impacts.
7. Security, human rights and rights of Indigenous peoples.
8. Community relations.
9. Labour relations.
10. Workforce health and safety.
11. Business ethics and transparency.
12. Tailings storage and facilities management.

These disclosure topics are reported against using both quantities and discussion and analysis.

It should be noted that the Minerals Council of Australia has recently adopted the Towards Sustainable Mining (TSM) framework (Minerals Council of Australia 2022). This framework has been successfully used in Canada, and allows mining companies to evaluate, manage and communicate their sustainability performance. TSM does not compare sites on disclosure performance and allows any appropriate disclosure standard to be used (McCombe et al. 2022), such as SASB or ISSB.

Many companies also report against both the Global Reporting Initiative (GRI) and the SASB Standards. The GRI standards have been designed to capture the impacts a company may have on people and the planet. The SASB, on the other hand, specifically focuses on the impacts material to the company’s financial performance and long-term enterprise value (GRI & SASB 2021).

For the purposes of this paper, SASB is the only framework discussed, since it is most likely to heavily influence the future ISSB standard for the mining industry. As communicated by IFRS in March 2022,

“the ISSB will embed the industry-based approach used by the SASB into its standard-setting process. The industry-based approach used by SASB is valued by investors for producing decision-useful information and by preparers for producing cost-effective standards.” (IFRS 2022)

Further, IFRS are including the SASB Standards in the General Requirements for Sustainability-Related Disclosures Exposure Draft (General Requirements ED). The General Requirements ED proposes that

“entities provide material information on all significant sustainability-related risks and opportunities necessary to assess enterprise value. In the absence of specific IFRS Sustainability Disclosure requirements, this ED requires companies to consider SASB Standards to identify sustainability-related risks and opportunities and to develop appropriate disclosures. This enables IFRS Sustainability Disclosure Standards to make use of the range of sustainability-related risks and opportunities covered by the SASB Standards from inception with the status of implementation guidance.” (IFRS 2022)

2.5 ESG and shareholder returns

The purpose of this paper is not to argue that improving a SASB-guided sustainability/ESG report will result in increased company profits and shareholder value; however, there is much discussion in both academia and industry as to the correlation between these two factors. Two examples are provided below.

The purpose of this report is to highlight the potential opportunity there is to realise these benefits through improved ESG performance by the successful rehabilitation of a site.

2.5.1 Correlation between ESG and CFP

A study published in the *Journal of Sustainable Finance and Investment* in 2015 summarises the findings of 2,200 individual studies analysing the correlation between ESG and CFP. This study is by far the most exhaustive overview of academic research on this topic. The results showed that the business case for ESG investing is empirically very well founded. Roughly 90% of studies find a nonnegative ESG–CFP relation (Friede et al. 2015).

2.5.2 Valuation of a company with positive ESG records

McKinsey Sustainability conducted a recent survey (2020) of executives and investment professionals within financial institutions in relation to their views on companies’ ESG records and valuation. Some key insights were:

- Given a hypothetical opportunity to acquire a new business, respondents across the spectrum say they would be willing to pay about a 10% premium for a company with an overall positive record on ESG issues over a company with an overall negative record. That’s true for those respondents who say ESG programs have no effect on shareholder value.
- One quarter of respondents said they would be willing to pay a premium of 20 to 50%, and 7% say they would pay a premium of more than 50% or a company with an overall positive record on ESG issues over a company with an overall negative record.
- Maintaining a good corporate reputation and attracting and retaining talent continue to be cited most often as ways that ESG programs improve financial performance.
- Of respondents who say ESG programs increase shareholder value, more than half say the existence of high-performing ESG programs is a proxy for good management (McKinsey Sustainability 2020).

A way for companies to communicate their ESG issues to investment professionals and financial institutions is through the SASB guidelines, as these guidelines focus on the topics that are financially material to the particular industry the company is in, streamlining the reporting process (Value Reporting Foundation 2022a).

A potential opportunity is in either increased CFP or favourable investor appetite (and valuation) if a company reports improved ESG performance (measured through the SASB Standards) by the successful rehabilitation of a site.

3 Improving an SASB report through legacy area rehabilitation and closure

3.1 Water management

3.1.1 *Non-compliances to water quality permits*

Mining can impact the availability and quality of water resources. Recognising this, water resources are regulated using a variety of tools by local, state, and national governments. Non-compliances to permits can financially impact a company through higher costs, liabilities, and lost revenues due to curtailment or suspension of operations (SASB Standards Board 2021). As such, the number of incidents of non-compliances associated with water quality permits, standards, and regulations each year is required to be reported against under EM-MM-140a.2 in the SASB Standards. The scope of disclosure encompasses the following:

1. The entity shall disclose the number of instances of non-compliance, including violations of a technology-based standards and exceedances of quality-based standards.
2. The scope of disclosure includes incidents governed by national, state and local statutory permits and regulations, including, but not limited to, the discharge of a hazardous substance, violation of pre-treatment requirement, or total maximum daily load exceedances.
 - a. Typical parameters of concern include arsenic, copper, lead, nickel, zinc, cyanide, radium-226, total suspended solids, pH and toxicity.
3. The scope of disclosure shall only include incidents of non-compliance that resulted in a formal enforcement action/s.
 - a. Formal enforcement actions are defined as governmental actions that address a violation or threatened violation of water quantity and/or quality laws, regulations, policies, or orders, and can result in administrative penalty orders, administrative orders, and judicial actions, among others
4. Violations shall be disclosed, regardless of their measurement methodology or frequency. These include violations for:
 - a. Continuous discharges, limitations, standards, and prohibitions that are generally expressed as maximum daily, weekly average, and monthly averages.
 - b. Non-continuous discharges and limitations that are generally expressed in terms of frequency, total mass, maximum rate of discharge, and mass or concentration of specified pollutants (SASB Standards Board 2021).

It is common that mine sites with legacy areas have a higher risk of unlicensed discharges and/or be actively managing a known water quality issue associated with the legacy area. For example, pit lakes often form in open cut mines once mining ceases. These lakes are typically contaminated with low pH, elevated concentrations of metals, metalloids and major ions and low concentrations of dissolved oxygen (Kumar & McCullough 2009). Fluctuations of the groundwater height due to old underground mining operations have been observed at a number of sites to result in changes to the pH of the water, resulting in acid mine

drainage. Tailings dams that remain uncapped or have an unsuitable cap can contribute to continued seepage (International Commission on Large Dams 2011), and this uncontrolled discharge offsite has the potential to have water quality parameters outside a mine's Environment Protection Licence limits.

Case Study 1

Location: Confidential area, NSW

Company: Confidential

Issue: An area of historic underground mining within a mining lease (where mining operations had moved to another area of the lease) was discharging seepage. The NSW Environmental Protection Authority (EPA) required the company to address this issue. Monitoring established that the seepage water was of low pH and was entering a nearby watercourse. Downstream of this watercourse is an ecologically sensitive wetland and known Green and Golden Bell Frog habitat. It was determined that fluctuations in the groundwater level in the underground workings and the associated geochemistry were resulting in the generation of acidic water. A passive treatment was designed and installed to address the pH of the seepage water that was discharging offsite.

The result of this passive treatment installation satisfied the NSW EPA. If the company were reporting against the SASB Standards, this project would have improved their report under EM-MM-140a.2.

SASB input to EM-MM-140a.2 before remediation: 1

SASB input to EM-MM-140a.2 after remediation: 0

By reporting this metric under a SASB-guided sustainability report, the ESG performance has been improved with the remedial activities. Improving an ESG performance can lead to increases in CFP and investor valuation, as discussed in Section 2.5.

3.2 Biodiversity impacts

The operation of a mine, including its closure and rehabilitation, can have a range of impacts on biodiversity. Biodiversity impacts of mining operations can affect the valuation of the land and create operational risks. Where potential impacts to vegetation communities that are listed as endangered under state legislation or critically endangered by federal legislation the requirement for biodiversity offsetting becomes a potential constraint when applying to mine in new areas due to the need to adhere to biodiversity offsetting requirements and increased interest in the protection of ecosystems. The rehabilitation of the land post-mining can pose regulatory risks to the company via obligations under their approved rehabilitation plans to state government approval bodies. Material costs may arise from the removal of covering of refuse piles, meeting water treatment obligations, protection of endangered species and dismantling infrastructure. Companies that have an effective environmental management plan (EMP) for the various stages of a mine's lifecycle may minimise these material risks, face less resistance to development of new mines and decrease the time taken to be granted approvals for mining operations. As such, both a description of environmental management policies and practices and biodiversity metrics such as acid rock drainage (ARD) are covered in the SASB Standards.

3.2.1 *Environmental management policies and practices*

Under the SASB Standards, a company is expected to describe its EMP/s implemented at active sites, including:

- Lifecycle stages to which the plan/s applies, such as exploration, site development, production, during closure, decommissioning, and restoration.

- The topics addressed by the plan/s, such as ecological and biodiversity impacts, waste generation, noise impacts, emissions to air, discharges to water, natural resource consumption, and hazardous chemical storage.
- The underlying references for its plan/s, including whether they are codes, guidelines, standards, or regulations. The company must also disclose whether the plan was developed by the company in house or prepared by a third-party organisation (such as a consultant, governmental agency, industry organisation or a combination of these groups).

If the plan/s does not apply to all the company's sites or operations, it must indicate the percentage of sites to which they apply.

Other items to report on include:

- Any areas of conservation status and/or areas of critical habitat within the mines area (which are defined by the International Finance Corporation [IFC] Performance Standard 6).
- Where management policies or practices differ significantly by mineral resource.
- The degree to which its policies and practices are aligned with the IFC's Performance Standards on Environmental and Social Sustainability, specifically Standards 1, 3, 4 and 6.

Mining areas with a mining lease under the *Mining Act 1992* (NSW Government 1992) are required to have progressive rehabilitation management plans in NSW (NSW Government 2016). These plans require both the method and the associated activities for five phases of rehabilitation to be detailed. The aim of these plans is to demonstrate the set of completion criteria for each of the five stages. This level of rehabilitation planning provides a basic level of investigation and planning required for progressive rehabilitation and closure of active mining areas. It is common for large mining companies to implement their own mine closure procedures, which require more detail to be investigated and provided as a mine nears its end of life consistent with guidelines such as the ICMM's *Integrated Mine Closure: Good Practice Guide* (International Council on Mining & Metals [ICMM] 2020). This internal planning procedure – for example, Glencore's internal mine closure process as reported in the *Coal Mine Rehabilitation 2021 Update* (Glencore 2021) – ensures that the whole of the mining lease is considered, planning to address all closure requirements is undertaken and budget is allocated.

Larger multinational mining companies throughout Australia have developed and implemented their own mine closure procedures that satisfy state government requirements for progressive rehabilitation plans. These procedures are typically aligned with international standards such as:

- The International Council on Mining and Metals.
- Mining (ICMM) with Principles.
- Integrated Mine Closure.
- Good Practice Guide, 2nd Edition (ICMM 2020).

These standards look to create the opportunity for companies to be proactive in identifying and addressing risks early. The planning process typically begins with a conceptual plan that is regularly updated, with more detail added five years prior to closure. This process generally means that the whole of the mine site is included in the planning process. Environmental and rehabilitation management of the mine site with this approach is integrated with closure in mind well before actual closure. Issues such as biodiversity within the mining lease and of biodiversity offset areas by project approval conditions of active mining areas are provided a mechanism to include legacy areas.

Where mines have legacy areas with no progressive rehabilitation plans, only the active area EMP can be reported under EMM-MM-160a.1. However, the SASB report can be significantly improved by detailing the progressive rehabilitation plans in place on a site, what percentage of the site they apply to, and how they have been updated to reflect the mine's lifecycle.

Case Study 2

Location: NSW, confidential

Company: Confidential

Issue: A company with a mining operation in NSW recently instigated the preparation of a detailed internal closure plan when planned closure of the mine site was brought forward. The mining company had not undertaken any progressive internal feasibility, design or planning in preparation of mine closure. The detailed planning process incorporated a risk-based approach to identify the key site risks to successful rehabilitation and closure of the site. A range of specialist investigations and designs were then undertaken to ensure that appropriate measures, processes and budget allocation are understood and identified in preparation of closure. The closure plan built on the information in the mine operation plan that had been approved by the NSW Resources Regulator for the active mining areas and incorporated the active mining areas and areas where mining had ceased operations and rehabilitation had not been completed.

The closure plan follows the principles and process outlined in the ICM (2020) *Good Practice Guide*, and the mine now has a comprehensive set of procedures, measures and designs to ensure that each of the key risks on the site is addressed. This plan was the first time that rehabilitation and closure activities for the whole of the mining lease were developed. The mine has brought forward its planned closure by three years to 2023.

SASB input to EM-MM-160a.1 before adoption of a closure plan: If this company were to report against SASB prior to having a closure plan, they would have only been able to detail their EMP. This EMP did not cover legacy areas, and as such, this section would not have covered the whole mine area.

SASB input to EM-MM-160a.1 after remediation: With a closure plan in place, section EM-MM-160a.1 is much more robust, covering the whole of mine area.

By reporting this metric under a SASB guided sustainability report, the ESG performance has been improved with the remedial activities. Improving an ESG performance can lead to increases in CFP and investor valuation, as discussed in Section 2.5.

3.2.2 Acid rock drainage

ARD is a generic term for mine drainage that can include acid, metalliferous, saline and/or neutral drainage (International Network for Acid Prevention 2022). It is formed when certain sulfide-bearing minerals are brought to the surface by mining where they are exposed to atmospheric and/or aqueous oxygen, generating various environmentally deleterious elements and compounds. ARD can negatively impact the health of humans, animals, and plants. Under the SASB Standards, ARD is expected to be reported against under EM-MM-160a.2 (SASB Standards Board 2021). This quantitative result is to be reported by percentage of mine sites (by annual production output from mines in metric tons) where ARD into surrounding surface water and/or groundwater is:

1. Predicted to occur based on computer simulations, chemical evaluations, and/or acid-base accounting, it is biochemically likely that ARD could form at the mine site.
2. Actively mitigated. ARD is considered to be actively mitigated if the entity is preventing the formation of ARD through methods that include, but are not limited to, storing or covering sulfide-bearing minerals to prevent oxidation, flood prevention and mine sealing, mixing of acid-buffering materials with acid-producing materials, and/or chemical treatment of sulfide wastes (e.g. organic chemicals designed to kill sulfide-oxidising bacteria).
3. Under treatment or remediation. ARD is considered to be under treatment or remediation if the acidic water discharged from the mine area is captured and undergoes a waste water treatment process (active or passive).

Legacy areas that have poor mineral waste management strategies implemented may provide a source and pathway for ARD to enter the environment, negatively affecting aquatic and terrestrial biodiversity.

Case Study 3

Location: Lachlan Fold Belt, NSW

Company: Confidential

Issue: A historic gold mining site in the Lachlan Fold Belt was rehabilitated approximately 20 years ago to the standards of the day. While the rehabilitation was well received by the government of the time, a mining lease remains for the site. One of the issues onsite is neutral metalliferous drainage from historic mine tailings that is affecting downstream water quality in the river that drains the site. As the site is now a liability to the mining company rather than an asset, limited funding was made available by the mining company to fully assess the extent of the problem to provide information to develop a remedial strategy for execution to allow the lease relinquishment process to be undertaken. Further complicating the issue is the presence of legacy workings on the site, which clearly pre-date the mining activities of the current titleholders, although they have not been excised from rehabilitation liability for the leaseholder. Technical studies including water and heritage assessments are now underway to attempt to legally delineate rehabilitation liability in addition to developing appropriate neutral drainage technical solutions.

SASB input to EM-MM-160a.2 before remediation: Area impacted under 'Predicted to occur' is likely to be of the order of 10–20% of the whole mine area.

SASB input to EM-MM-160a.2 during and after remediation: Once the area has been delineated, a better estimate can be provided, and will move into the 'actively mitigated' category, improving the SASB report from the previous reporting period.

By reporting this metric under a SASB-guided sustainability report, the ESG performance has been improved with the remedial activities. Improving an ESG performance can lead to increases in CFP and investor valuation, as discussed in Section 2.5.

3.3 Health and safety

Safety is critical to mining operations due to often hazardous working conditions. The metals and mining industry has high fatality rates compared to other industries (SASB Standards Board 2021). Poor health and safety records can result in fines, penalties, increased regulatory compliance costs from more stringent oversight and increased insurance premiums.

A company's health and safety culture, policies and practices can help to prevent accidents, mitigate costs and operational downtime, and avoid reputational fall-out. As such, the SASB Standards request that incidents and near misses are reported through EM-MM-320a.1 for the whole mine or company. The following metrics are requested:

1. Incidence rate.
2. Fatality rate.
3. Near miss frequency rate.
4. Average hours of health, safety, and emergency response training.

The *Work Health and Safety Act 2011* (NSW) (WHS Act) (NSW Government 2011) provides a framework to protect the health, safety and welfare of all workers and others in relation to NSW workplaces and work activities. The *Work Health and Safety (Mines and Petroleum Sites) Act 2013* (NSW Government 2013) and *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014* (NSW Government 2014) apply to all mines and petroleum sites in NSW. These laws support the WHS Act and WHS Regulation and provide additional provisions for work health and safety issues unique to mines and petroleum sites. This legislation

requires a mine operator to eliminate risks to health and safety as far as is reasonably practicable. This extends to legacy mine areas.

Legacy areas pose a risk to the health and safety of workers and the public. Hazards associated with old mine openings that have not been sealed or occurrences of subsidence present a risk to people entering the area affected. Public access is often unrestricted and unmonitored in remote legacy areas due to their proximity to the active areas. Many mine sites report regular access to these areas by the general public for mountain biking and other recreational activities.

Looking at the period from 1849 to 2022, a study found a total of 55 records of incidents and/or fatalities involving the general public attributed to mine shafts, sinkholes and trough subsidence throughout Australia, South Africa and Pennsylvania (Mackenzie 2022, p. 353). In Australian coal mining, an average of one incident every 12.7 years has occurred from 1908 to the present day (Mackenzie 2022, p. 353). It is important to note that these are the reported incidents that have resulted in injury or a fatality, and that an unknown number of unreported incidents may have occurred.

Case Study 4

Location: South Australia, Antakirinja country, Coober Pedy

Company: Unknown

Issue: An incident occurred in 2014 in Coober Pedy where a person was searching through piles of dirt taken from mine shafts for opals and died as a result of falling down a disused mine shaft (The Advertiser 2014). While the fatality occurred in an area where mining activities had not occurred for some time, a man fell through a weakened sheet of galvanised iron that was covering a mine shaft and was killed. It was reported that the galvanised iron covering the mine shaft was covered in dirt and looked like solid ground. The mine entry was not properly sealed and was located in an area accessible to the public.

If this legacy area had been properly remediated, this mine shaft could have been closed and the death may have been prevented.

The company's SASB input to EM-MM-320a.1 before remediation: 1 fatality

The company's SASB input to EM-MM-320a.1 if remediation had occurred: 0 fatalities

Apart from the tragic loss of life, the implications for a company when there is a loss of life on a mine site are costs incurred through workers compensation, property damage, lost earnings and reputational damage (Camm & Girard-Dwyer 2005). By rehabilitating a mine, the risk of serious injury or death by any person is reduced. By reporting this metric under a SASB-guided sustainability report, the ESG performance of the company can be improved through remediation. Improving an ESG performance can lead to increases in CFP and investor valuation, as discussed in Section 2.5.

4 Conclusion

Through the case studies presented, it has been demonstrated how closing and rehabilitating legacy areas can improve a company's SASB report under areas EM-MM-140a.2 (Water Management), EMM-MM-160a.1 (EMP disclosures), EM-MM-160a.2 (ARD) and EM-MM-320a.1 (Health and Safety).

It is likely that through the rehabilitation of legacy areas other SASB disclosure topics will be improved, including:

- Waste and hazardous materials management.
- Final land profile and its productive use.
- Security, human rights and rights of Indigenous peoples.
- Community relations.

- Labour relations.
- Business ethics and transparency.
- Tailings storage and facilities management.

The SASB Standards are often summarised or used to guide a company's public annual sustainability report. This report is often mined for information by independent companies to rate similar companies against one another. Investors pay for this data to guide their investment decisions.

Being able to provide the best possible information to an annual sustainability report, guided by a well-regarded international ESG standard, will give investors the confidence to invest in a company, and return a favourable ESG score by independent companies.

5 Recommendations

ESG reporting standards are a moving feast, with a plethora of options available for companies to use. In this paper, we have focused on the improvement of a SASB report, as we believe at the time of writing that this standard will inspire the ISSB standards, not yet released. We recommend regular research and reading on ESG standards and trends in the market. Publicly available information is numerous and becoming more mainstream.

ESG data collection, reporting and validation will only reap positive rewards in a rapidly evolving ESG reporting landscape. With increasing stakeholder engagement with their investments, it can only be expected that more stringent reporting frameworks are required, involving the reporting of data not previously captured. We recommend researching tools to capture on-the-ground data in anticipation of more stringent reporting requirements before it becomes an impossible task.

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