

Final Report Project 2.3

Current Tools, Techniques and Gaps in Evaluating Mine Closure

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PROJECT PARTNERS:





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Executive Summary

This project identified the decision-making (evaluation and valuation) tools and techniques that are being used in the mining sector to determine the value, costs and risks associated with mine closure. It also outlines the gaps inherent within those identified techniques.

In addressing the aims and objectives outlined above, this foundational project delivers an “audit” of the current industry practices that details what information is used, how it is quantified and how this information is assessed to inform mine closure decision making.

After collecting and collating all the relevant industry-sourced data, the information was used to identify to what extent risks and uncertainties inherent within mine closure programs are differentiated between tangible and intangible factors. Risks and uncertainties were also expounded on to gauge the industry’s response to whether a difference exists between risks and uncertainties and how each is defined.

Another notable limitation identified by the interviewed companies’ responses is the inaccurate determination of an appropriate discount rate to be used in a net present value (NPV) calculation, if cash flows are used.

Arising from the interviews, it is expected that this research will lead into a more detailed analysis of how to quantify these risks and how to accurately determine an appropriate discount factor associated with an appropriate evaluation methodology in the identification and determination of the risks and uncertainties outlined above and in this report.

Specifically, the recommendations for further research are based on the findings of the interviews, and are summarized as being:

- Researching and developing a framework to identify direct and indirect Environmental, Social and Governance (ESG) factors, in order to develop tools to quantify these factors.
- Developing a road map to guide companies on how best to assist communities reach a sustainable solution once mining operations have ceased.
- Researching and developing appropriate tools to quantify mine closure assets and liabilities as a complement to the use of the DCF NPV method.
- Providing a framework and recommending a solution-based-processes for the identification and evaluation of intangible factors that contribute to risk and.

1. Introduction

This project has been conducted and led / managed by Eric Lilford (Curtin), and assisted by David Williams (UQ), Marit Kragt (UWA), Will Mackay (UniSA), Rodolfo Garcia-Flores (CSIRO) and Nicholas Green (CSIRO).

In accordance with the National Statement on Ethical Conduct in Human Research (2007) 2.2.6h, funding was provided by grant from CRC TiME (Transformations in Mining Economies). This research study has been approved by the Curtin University Human Research Ethics Committee (HREC) (HREC number HRE2021-0080).

Over ten companies hosting mining assets in most of Australia's States, and hosting mining assets in all of Australia's mining States, were asked to participate in a survey that investigates how they address mine closure and its risk, as well as aspects of economics associated with mine closure. A few of these companies did not respond at all, other responded too late, and some required total anonymity in their responses.

The nature of the questions, as can be seen in Section 2 below, seek to determine what current practices, procedures and tools are utilized when making mine closure decisions. The companies approached are all multi-project companies and at least half of them are multi-commodity producers.

This initial study identifies different practices, processes and tools that companies currently adopt under the auspices of mine closure. While this in itself may be useful to participating companies, it is important to note that subsequent projects will be proposed as an analytical phase that may take a considerably longer period of time to complete, resulting in more measureable benefits.

In addition, the key aims of this foundation project included the determination of what practices, techniques and procedures are currently employed by various mining companies and mining services companies to quantify mine closure costs, mine closure benefits and associated mine closure risks and uncertainties. This included a focus on Australian mining companies hosting Australian and non-Australian operations.

Through the information collection and collation activities, this project identified the current industry mine-closure decision making (evaluation and valuation) practices and highlighted gaps that exist in those practices. This research study is intended to increase understanding with regards to current mine closure-related decision-making processes and identify future research opportunities.

This foundation project report does not provide solutions to the identified gaps, but has analysed the industry inputs and responses to determine where further analysis and research is required.

Questions Posed

To determine the current practices and existing gaps in the tools and methodologies employed to discern mine closure risks and opportunities, a series of predetermined questions were asked of the various participating companies. The specific questions asked of each company follows:

Q1: What information do you use to determine mine closure costs, closure value and closure risk for closure costs and benefits? Is it based on industry costing tools, internal policies or some other measure?

Q2: Who is involved from your company when collating and assessing this information?

Q3: What are the drivers for you to use this information? Is it based on regulations, company policy, just what has always been used, community expectations or other?

Q4: Does your company have policies and procedures that address mine closure costs and benefits? Does your company have a closure-guidance document that must be adhered to?

Q5: Are you faced with internal procedures or operational frameworks that detail mine closure valuation requirements? If “yes”, do you feel these frameworks constrain the valuation and risk analysis processes?

Q6: Do you consider intangible (non-monetary) value in mine closure valuation processes? If yes, what techniques are undertaken to identify them and how are they used in the decision-making and valuation process?

Q7: What techniques and tools do you use to evaluate and value mine closure costs and benefits?

Q8: What techniques (if any) do you use to evaluate and value intangible costs, values and benefits of closure and post-mining land use?

Q9: Does your company undertake any reconciliation activities of closure costs to better inform valuations?

Q10: If closure risk and uncertainty (both tangible and intangible risks and uncertainties) are factored into your technique as some form of a discounting factor over time, then:
how is the discounting factor determined?
are discount factors separated to account for tangible and intangible factors?

Q11: Do different commodities give rise to different tools or techniques being used?

Q12: Do different operational jurisdictions give rise to different mine closure valuation tools or techniques being used?

Q13: Do different geological settings give rise to different mine closure valuation tools or techniques being used?

Q14: Do different existing or proposed mining methods give rise to different mine closure valuation techniques being used?

Q15: Can you identify any gaps (in existing tools and techniques) or needs (in potentially alternative tools and techniques), uncertainties, or known shortfalls in the existing tools and techniques being used to determine mine closure values? If yes, what could you suggest that could be done better?

Q16: What do you feel are the risks associated with not completing or considering mine closure evaluations?

Q17: Are there other industries that we could learn from that may provide input into the determination of mine closure valuation best practice?



2. General Responses to Questions

The various responses to each of the posed questions were captured by the interviewers and were transcribed to an Excel file. Certain responses, being those that are not strictly confidential, have been included in the Appendix.

Many mining companies, according to the responses to the interview questions, estimate their own closure costs, benefits and liabilities and then consult with an independent practitioner or team of independent practitioners to review their assumptions and estimations. These estimations are nearly always driven by regulations alone, being a compliant-based estimation, and the cost estimates are based on standard industry costings associated with the regulated closure requirements. The companies also factor in an element of ESG (environmental, social and governance) into their closure estimates, notably as they relate to local communities.

All of the companies interviewed face internal pressures and operational frameworks that detail mine closure valuation requirements. These frameworks typically do not constrain or limit the process, but rather inform it. However, within the process, it is apparent that most companies struggle to attribute adequate attention and resolutions to intangible risks and uncertainties, and at times only consider tangible uncertainties superficially. It appears that tangible risks are adequately addressed.

Microsoft Excel is most commonly used in the process of companies evaluating and valuing mine closure costs and benefits.



3. Common Themes Emerging

While detailed responses are available from the various participants in the interviews, in summary, the following themes arose.

It is strongly stated that the various information and processes necessary to determine mine closure costs, risks and value are dictated by regulatory frameworks and local and national rules and regulations. Either industry-based or internal tools are used to define and refine closure-related data, generally by employees allocated to the task, with generated results often being reviewed by independent third parties. The information used in the tools is mostly collated and assessed by a company-appointed team of employees who encourage and obtain input from other disciplines (e.g. legal, environmental, social, operations, etc.) within their organisation. Thereafter, the collated information is often sent to an external reviewer for comment and possibly further input.

Another common response that became evident was that regulations, accounting requirements and notably social considerations were the key drivers ensuring that companies addressed mine closure appropriately. While respondents stated that the first two factors were readily accommodated, the social aspect was harder to address because there were many unknowns involved. Most companies have in place closure guidance documents of some kind, but other than generic guidelines around social aspects, find this to be somewhat less-well defined due to its often intangible nature.

It is interesting to note that there are a number of available tools that can assist a company in qualifying and potentially quantifying mine closure costs and benefits, but most companies rely on the simpler Excel tool. Within Excel, companies compile cash flow analyses, often culminating in the generation of a discounted cash flow (DCF) and also a net present value (NPV).

There are two clearly stated pitfalls using the DCF NPV tool. The most commonly identified shortfall using this method is the fact that many of the ESG (environmental, social and governance) factors fall into the intangible basket, making them difficult to identify and even more difficult to quantify. These intangible factors are mostly associated with uncertainty, and less to do with risk (where uncertainty is typically related to risk), as depicted below.

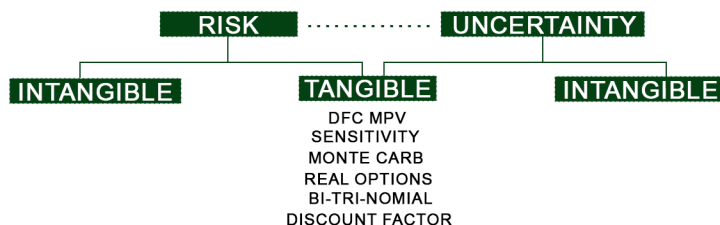


Figure 1: Quantifying Mine Closure Risk and Uncertainty

The second major shortfall identified by the interviewed companies is the determination of an appropriate discount rate to be used in the NPV calculation. It can be generalized that the company practitioners are provided with a discount rate to use, and this rate is not determined using fundamental economic theory.

Explaining the survey results more clearly and using Donald Rumsfeld's US Department of Defence news briefing of 12 February 2002 for nomenclature, risks tend to be tangible and are therefore "known knowns". Intangible risks are few and far between, but where they do occur, they are deemed to be "unknown knowns". Tangible uncertainties tend to be "known unknowns" while intangible uncertainties are best described as being "unknown unknowns". From this, companies are challenged to adequately identify and thereafter quantify the intangible components of both risks and uncertainties.

Another important aspect raised through the interviews included the identification of a number of risks associated with failing to accurately evaluate mine closure, being the financial quantification of mine closure costs, refining the accuracy of mine closure planning, the Social License to Operate as it relates to mine closure, ESG and mine closure, reputation and non-compliance (regulations).

In the final analysis, each interviewee was asked to identify any potential gaps in the existing tools and techniques being used to determine mine closure values by their companies. Four consistent themes were put forward, being:

- ESG (identification and quantification) inadequate;
- addressing community (social) aspects and future needs;
- inappropriate discounting factors used in a DCF NPV; and
- the determination (identification and quantification) of intangible values (liabilities and assets).



4. Recommendations – Research Questions to be Pursued

Arising from the interviews held with various mining companies, it has become apparent that those companies share common frustrations and inadequacies when considering mine closure and post closure fundamentals.

In summary, four challenge-pillars were shared as being common to most companies, with these pillars representing major themes for further research and development. These four themes are:

- i. Researching and developing a framework to identify direct and indirect ESG factors, and then building on that work to create tools that will facilitate the quantification of those ESG factors.
- ii. Under the “S” in ESG (i.e. “social”), and specifically the community most impacted by mining and mine closure, develop a road map to guide companies on how best to assist the community reach a sustainable presence and existence once mining operations have ceased and mine closure has been achieved.
- iii. Research and develop appropriate tools to quantify mine closure assets and liabilities (costs and value) as a complement to the use of the DCF NPV method currently implemented in Excel.
- iv. Provide a framework and recommend solution-based-processes for the identification and evaluation of intangibles that contribute to risk and uncertainty as they relate to mine closure.

5. Conclusion

Despite the number of interviews that were conducted being less than ten companies, these companies spoke for dozens of mining operations. A comforting factor became apparent very early in the study, as each company answered the various questions in a rather similar manner, suggesting that they all had similar views around the discussion points that were put forward in the questionnaire.

It is clear that there are a number of streams of work and research that need to be addressed in order to provide an improved framework and resolute outcome for mining companies as they determine mine closure costs, closure values and closure risks and uncertainties in their planning processes. These recommended streams of additional research are identified in Section 5 above.



6. Appendix

Core Questions:	1. Response:
The key research question is “What, in general, is the industry’s current practice to determine and quantify mine closure costs and values?”	
Below are some example questions to be posed to industry practitioners that aim to inform the above and provide the bases of this foundational project:	
What techniques (if any) do you use to evaluate and value intangible costs, values and benefits of closure and post-mining land use?	We use a number of standards related to stakeholder engagements, Indigenous People, FPIC that drives regular engagement with local communities and first nations. SIA's are conducted every 5 years, Community Partnership Agreements and Indigenous Land-use Agreements are in place and are avenues for discussions on values and benefits during and post mine closure.
Does your company undertake any reconciliation activities of closure costs to better inform valuations?	Reconciliation of closure cost is done annually and can be used to inform closure budget updates
If closure risk and uncertainty (both tangible and intangible risks and uncertainties) are factored into your technique as some form of a discounting factor over time, then:	We use closure as a current cost
how is the discounting factor determined?	Don't apply discounting to cash flows = escalation and discounting applied to accounting values to make sure that it represent current monetary values
are discount factors separated to account for tangible and intangible factors?	No, however we do use a probability adjustment for ARO to account for uncertainty
Do different commodities give rise to different tools or techniques being used?	No mainly work in Gold and Copper
Do different operational jurisdictions give rise to different mine closure valuation tools or techniques being used?	SRCE (SRK Tool) previously prescribed by regulators in Nevada. Currently no mining in Nevada so we use a combination of relatively standardised excel workbooks and SCRE (for ex-Goldcorp sites) In process of looking at building a standardised tool for use throughout The Company.
Do different geological settings give rise to different mine closure valuation tools or techniques being used?	No, closure cost is developed by domain (e.g. waste rock dumps, TSF etc). Different geological settings may have a higher risk due to ore/waste acid forming properties, but that then require different water treatment or acid prevention techniques
Do different existing or proposed mining methods give rise to different mine closure valuation techniques being used?	No , as above underground may have less waste coming to surface etc, but does not require change in evaluation techniques.
Can you identify any gaps (in existing tools and techniques) or needs (in potentially alternative tools and techniques), uncertainties, or known shortfalls in the existing tools and techniques being used to determine mine closure values? If yes, what could you suggest that could be done better?	Social closure cost is almost always underestimated partly as the requirements and expectations are unclear and the line between who is responsible for post mining economic sustainable living in the region are complex. Challenge will always be to account for closure appropriately during planning, designing and development of projects especially due to short term vs long term planning horizons and multigenerational stakeholder expectations.
What do you feel are the risks associated with not completing or considering mine closure evaluations?	For the larger mining companies I don't think that there is a risk of not doing mine closure evaluations, the risk is more about how realistic the evaluations are and then groundtruthing it. When looking at some of the minors and marginal mines the issue becomes much more of an issue. The fact that we've got almost no examples of a closed and relinquished mine also means that we cannot really compare planned vs actual costs.
Are there other industries that we could learn from that may provide input into the determination of mine closure valuation best practice?	Not sure - maybe oil&gas or the oil sands companies?

Core Questions:	2. Response:
The key research question is “What, in general, is the industry’s current practice to determine and quantify mine closure costs and values?”	
Below are some example questions to be posed to industry practitioners that aim to inform the above and provide the bases of this foundational project:	
What information do you use to determine mine closure costs, closure value and closure risk for closure costs and benefits? Is it based on industry costing tools, internal policies or some other measure?	Legal/regulatory obligations, permitting commitments, policy commitments, accounting standards, stakeholder consultation (regulators, communities, neighbours, post closure landholders etc), physical disturbance data, mine plans, closure knowledge base studies (geochemical characterisation, geotech, hydro, groundwater, ecology, soils, geomorph etc etc), actual unit rates from ops and quoted unit rates from contractors. It is based on a combination of industry costing tools, regulator costing tools, international accounting standards. Independent peer review is also utilised.
Who is involved from your company when collating and assessing this information?	Closure planner primarily, then supported by colleagues from legal, SHEC, MTS, Finance, Supply, Risk etc.
What are the drivers for you to use this information? Is it based on regulations, company policy, just what has always been used, community expectations or other?	Drivers includes environmental regulatory requirements (bonds/guarantees), financial reporting obligations (stock exchange, corporations law, accounting standards), shareholder expectations and most importantly internal business planning and enterprise evaluation.
Does your company have policies and procedures that address mine closure costs and benefits? Does your company have a closure-guidance document that must be adhered to?	Yes, and yes, we have several guidance documents (closure studies, cost estimation, integrated planning, M&A due diligence)
Are you faced with internal procedures or operational frameworks that detail mine closure valuation requirements? If “yes”, do you feel these frameworks constrain the valuation and risk analysis processes?	Yes. And no they do not constrain the processes, they inform them.
Do you consider intangible (non-monetary) value in mine closure valuation processes? If yes, what techniques are undertaken to identify them and how are they used in the decision-making and valuation process?	We do as part of risk analysis (reputation, stakeholder views, access to future resources etc), but very difficult to quantify in financial terms.
What techniques and tools do you use to evaluate and value mine closure costs and benefits?	Excel. Cost estimation, economic evaluation (NPV/NPC, cashflow timing, tax benefits, risk range analysis), deterministic & probabilistic estimates. Then integrate into mine plan.
What techniques (if any) do you use to evaluate and value intangible costs, values and benefits of closure and post-mining land use?	Risk assessments, stakeholder consultation

Core Questions:	2. Response:
The key research question is “What, in general, is the industry’s current practice to determine and quantify mine closure costs and values?”	
Below are some example questions to be posed to industry practitioners that aim to inform the above and provide the bases of this foundational project:	
Does your company undertake any reconciliation activities of closure costs to better inform valuations?	Yes. Planned vs actuals from progressive rehab works. Updated/revised unit rates, methods, assumptions etc.
If closure risk and uncertainty (both tangible and intangible risks and uncertainties) are factored into your technique as some form of a discounting factor over time, then:	
how is the discounting factor determined?	Combination of WACC, Gov bond rates over similar time frame, country risk, closure risk.
are discount factors separated to account for tangible and intangible factors?	Not currently.
Do different commodities give rise to different tools or techniques being used?	Not currently, but each asset chooses their tools, within guidance provided by Head Office.
Do different operational jurisdictions give rise to different mine closure valuation tools or techniques being used?	Yes, each asset chooses their tools, within the bounds of the guidance provided by Head Office.
Do different geological settings give rise to different mine closure valuation tools or techniques being used?	Not currently. However different settings may have a different risk profile due to impacts, receptors etc, so would make adjustments to what is included and how in the closure valuations, but at a high level it is basically the same process.
Do different existing or proposed mining methods give rise to different mine closure valuation techniques being used?	Not valuation, but different mining methods to lead to differing closure strategies and rehabilitation methodologies. Which influences cost.
Can you identify any gaps (in existing tools and techniques) or needs (in potentially alternative tools and techniques), uncertainties, or known shortfalls in the existing tools and techniques being used to determine mine closure values? If yes, what could you suggest that could be done better?	Could explore: <ul style="list-style-type: none"> - Differential discount rates - Including closure costs within cut off grades - Penalty costs in mine plan for waste dumping, segregation of PAF material - Increased costs for deferring closure activities (can increase latent env impacts) - Dealing with evaluation of intangibles
What do you feel are the risks associated with not completing or considering mine closure evaluations?	Misleading the business and the market/shareholders. Eventual impairments and devaluing assets. Financial and reputational losses. Legal action/compliance risks. Licence to operate loss.
Are there other industries that we could learn from that may provide input into the determination of mine closure valuation best practice?	Oil and Gas, and Nuclear site decommissioning. Contaminated land.

Core Questions:	3. Response:
The key research question is “What, in general, is the industry’s current practice to determine and quantify mine closure costs and values?”	
Below are some example questions to be posed to industry practitioners that aim to inform the above and provide the bases of this foundational project:	
What information do you use to determine mine closure costs, closure value and closure risk for closure costs and benefits? Is it based on industry costing tools, internal policies or some other measure?	Use closure standards that are incorporated into the accounts (under rehabilitation). Standard A37 Internatioanl Accounting Standards. Every 2.5 to 3 years a Deep Dive is conducted during which the closure plan/budget is rebased for updaing/modification pruposes. Recreate the Closure Plan arising from results of the Deep Dive. The risk areas present as tailings management (TSF), demolishing and ranging (between a min and max_) and then some probabilistic determinations (not being deterministic, but probabilistic). Specific, identified risks are dealt with separately (e.g. water treatment)
Who is involved from your company when collating and assessing this information?	Internal expertise is largely aligned with mining, not closure, so external consultant are used extensively, as they have experience and a great handle on updated closure costs. Necessary to be compliant based on audit requirements.
What are the drivers for you to use this information? Is it based on regulations, company policy, just what has always been used, community expectations or other?	Internal policies, regulations dictating and social considerations and best practice.
Does your company have policies and procedures that address mine closure costs and benefits? Does your company have a closure-guidance document that must be adhered to?	Yes and yes again.
Are you faced with internal procedures or operational frameworks that detail mine closure valuation requirements? If “yes”, do you feel these frameworks constrain the valuation and risk analysis processes?	Yes
Do you consider intangible (non-monetary) value in mine closure valuation processes? If yes, what techniques are undertaken to identify them and how are they used in the decision-making and valuation process?	Until a written agreement is signed between parties, potential "assets" remaining after closure will be treated as liabilities to be cleaned up (e.g. buildings, airports, facilities, etc) - this is an internal policy. Intangible costs are considered separately from tangible costs. However, no costs for social intangibles go into the provisions, so it's considered separately.
What techniques and tools do you use to evaluate and value mine closure costs and benefits?	Excel valuation model incorporating capex and opex for closure, based on ICMM practice guides. A discounted cashflow NPV is used for Provisions(assumptive and critical). Tend to be not overly optimistic on closure costing (more conservative). Cash flows incorporate inflation (CPI) and FX factors (discounting), with rolling rehabilitation noted (incurred clean up costs netted off of forecasts).
What techniques (if any) do you use to evaluate and value intangible costs, values and benefits of closure and post-mining land use?	Discounting provisions based. The full LoM plan for operations incorporate closure costs estimate, factoring in future likely (planned) disturbances too

Core Questions:	3. Response:
The key research question is “What, in general, is the industry’s current practice to determine and quantify mine closure costs and values?”	
Below are some example questions to be posed to industry practitioners that aim to inform the above and provide the bases of this foundational project:	
What techniques (if any) do you use to evaluate and value intangible costs, values and benefits of closure and post-mining land use?	Discounting provisions based. The full LoM plan for operations incorporate closure costs estimate, factoring in future likely (planned) disturbances too
Does your company undertake any reconciliation activities of closure costs to better inform valuations?	
If closure risk and uncertainty (both tangible and intangible risks and uncertainties) are factored into your technique as some form of a discounting factor over time, then:	Yes
how is the discounting factor determined?	specified by the Executive (interest, inflations, etc). The discount rate factors in some risk and uncertainty but mostly captures CPI.
are discount factors separated to account for tangible and intangible factors?	Not really, but intangibles may be considered separately dependent on materiality.
Do different commodities give rise to different tools or techniques being used?	Same techniques and tools, different inputs
Do different operational jurisdictions give rise to different mine closure valuation tools or techniques being used?	Same techniques and tools, different inputs
Do different geological settings give rise to different mine closure valuation tools or techniques being used?	Same techniques and tools, different inputs
Do different existing or proposed mining methods give rise to different mine closure valuation techniques being used?	Same techniques and tools, different inputs
Can you identify any gaps (in existing tools and techniques) or needs (in potentially alternative tools and techniques), uncertainties, or known shortfalls in the existing tools and techniques being used to determine mine closure values? If yes, what could you suggest that could be done better?	Gaps: - valuations defining the "right outcome for the community" is a gap (social aspect). Can't quantify the social aspect associated with closure.
What do you feel are the risks associated with not completing or considering mine closure evaluations?	Very high. There are Govt calculators available to deal with some of this risk.
Are there other industries that we could learn from that may provide input into the determination of mine closure valuation best practice?	Doing something with the site post closure (any precedents?). Learn from communities. Use land for educational purposes (training, Unis) Monitoring social components.

Core Questions:	4. Response:
The key research question is “What, in general, is the industry’s current practice to determine and quantify mine closure costs and values?”	
Below are some example questions to be posed to industry practitioners that aim to inform the above and provide the bases of this foundational project:	
What information do you use to determine mine closure costs, closure value and closure risk for closure costs and benefits? Is it based on industry costing tools, internal policies or some other measure?	Based on consultants' inputs, vendors (supply) quotes and inputs and costing of assets. Allowance are made for indirect costs too. There's no attribution of value after closure (residual value/benefit/assets ignored). Only account and recognise costs (liabilities), not potential benefits.
Who is involved from your company when collating and assessing this information?	Vendors (external consultants) mostly, with internal personnel as part of the Closure Team. Cost estimations are obtained from Jacobs, Golder, etc mostly for QA/QC purposes on internal inputs. Closure Plan is refreshed every 3 years. However, with reporting obligations (annual report, etc), yearly reports and updates are performed (internal policy delivering into provisioning for accounting/audit purposes and policies)
What are the drivers for you to use this information? Is it based on regulations, company policy, just what has always been used, community expectations or other?	Accommodation Regulations and Corporate policies in terms of reporting requirements. Consideration is being given to repurposing Pilbara after mining (other uses after closure/rehab), communities consideration, towns for use beyond mining, repurposing camps for alternate uses (e.g. into solar park) Repurposing is asset-dependent as well as jurisdiction dependent. But core philosophy is to create a "safe, stable and non-polluting land form" after mining.
Does your company have policies and procedures that address mine closure costs and benefits? Does your company have a closure-guidance document that must be adhered to?	Yes (internal standards and guidance note), as well as accounting standards
Are you faced with internal procedures or operational frameworks that detail mine closure valuation requirements? If “yes”, do you feel these frameworks constrain the valuation and risk analysis processes?	There are no demand procedures, but embodiment of "doing the right thing" dictates. If a risk is determined or even perceived, it is addressed.
Do you consider intangible (non-monetary) value in mine closure valuation processes? If yes, what techniques are undertaken to identify them and how are they used in the decision-making and valuation process?	This is under consideration more often and includes monitoring, ranging on a case by case basis.
What techniques and tools do you use to evaluate and value mine closure costs and benefits?	Excel driven, both internally and externally.
What techniques (if any) do you use to evaluate and value intangible costs, values and benefits of closure and post-mining land use?	By giving consideration to the various stakeholders, allowing for greater input. This is current/ongoing. Being quantitative in this is the challenge (such as emissions and targets)

Core Questions:	4. Response:
The key research question is “What, in general, is the industry’s current practice to determine and quantify mine closure costs and values?”	
Below are some example questions to be posed to industry practitioners that aim to inform the above and provide the bases of this foundational project:	
What techniques (if any) do you use to evaluate and value intangible costs, values and benefits of closure and post-mining land use?	By giving consideration to the various stakeholders, allowing for greater input. This is current/ongoing. Being quantitative in this is the challenge (such as emissions and targets)
Does your company undertake any reconciliation activities of closure costs to better inform valuations?	Not specific reconciliations, but this is something that will be done in the future. Reviews are annual, but there's no reconciliation from previous forecasts at this stage.
If closure risk and uncertainty (both tangible and intangible risks and uncertainties) are factored into your technique as some form of a discounting factor over time, then:	Yes
how is the discounting factor determined?	The discount rate is provided by the controller at The Company Global level. No input from other input-providers
are discount factors separated to account for tangible and intangible factors?	No separation of tangibles from intangibles
Do different commodities give rise to different tools or techniques being used?	No, the same tools and methods are used across the board
Do different operational jurisdictions give rise to different mine closure valuation tools or techniques being used?	No, the same tools and methods are used across the board, but a necessary look at the local regulations is required. Also, this may be influenced by terms of JVs
Do different geological settings give rise to different mine closure valuation tools or techniques being used?	No, the same tools and methods are used across the board
Do different existing or proposed mining methods give rise to different mine closure valuation techniques being used?	No, the same tools and methods are used across the board
Can you identify any gaps (in existing tools and techniques) or needs (in potentially alternative tools and techniques), uncertainties, or known shortfalls in the existing tools and techniques being used to determine mine closure values? If yes, what could you suggest that could be done better?	Gaps: incorporating closure into the LoM Plan: no one likes the discount rate; Planning done upfront; GHG targets stated; Historical requirements being updated, despite historical requirements addressed (now need to comply with updates) (relinquish before standatrds/requirements are updated is ideal)
What do you feel are the risks associated with not completing or considering mine closure evaluations?	Stakeholders (repercussions), cost blowouts, social and environmental risk, financial risk and SLO - reputation
Are there other industries that we could learn from that may provide input into the determination of mine closure valuation best practice?	Not necessarily. Maybe strtegies needed around waste dumps (future use) and backfilling behind mining to reduce final liability (ongoing reparation, filling in mined out pits)

Core Questions:	5. Response:
The key research question is “What, in general, is the industry’s current practice to determine and quantify mine closure costs and values?”	
Below are some example questions to be posed to industry practitioners that aim to inform the above and provide the bases of this foundational project:	
What information do you use to determine mine closure costs, closure value and closure risk for closure costs and benefits? Is it based on industry costing tools, internal policies or some other measure?	This is cost-driven, some regulated (USA-S.Carolina) and others estimated. The costs are estimated internally, and then are overviewed by an external third party for reasonableness. These costs are updated annually. For closure risk, environmental closure is a material risk. Health and Safety requires a management plan supporting closure risks, updated annually. These updates include closure plans and costings, with a notable focus on risk.
Who is involved from your company when collating and assessing this information?	Driven by on-site personnel, who do the initial assessing of costs (environmental department at operations). The assessment teams are multi-disciplinary, who meet quarterly to discuss site-costs for closure. Third party overview of results performed annually.
What are the drivers for you to use this information? Is it based on regulations, company policy, just what has always been used, community expectations or other?	Regulations drive this. Also, reputation is critical, so appropriate costs above what's regulated are factored in to support reputation.
Does your company have policies and procedures that address mine closure costs and benefits? Does your company have a closure-guidance document that must be adhered to?	Yes A statement of position sits between regulations (standards) and policy. These align with closure guidelines. Legacy issues are incorporated as ESG is recognised as a potential significant risk.
Are you faced with internal procedures or operational frameworks that detail mine closure valuation requirements? If “yes”, do you feel these frameworks constrain the valuation and risk analysis processes?	There are no constraints. A dual assessment process (regulatory and internal) ensures all facets are covered, without constraint.. The process is cost-driven, so little constraint
Do you consider intangible (non-monetary) value in mine closure valuation processes? If yes, what techniques are undertaken to identify them and how are they used in the decision-making and valuation process?	No, do not consider intangible values. Recognise the importance, but methods to quantify them are limited. This provides for an area requiring further attention (any research would help)
What techniques and tools do you use to evaluate and value mine closure costs and benefits?	LoM costing. USA dictates tbhis, but NZ and Philippines rely on Excel-driven modelling
What techniques (if any) do you use to evaluate and value intangible costs, values and benefits of closure and post-mining land use?	Do not consider intangibles due to complexity around quantification

Core Questions:	5. Response:
The key research question is “What, in general, is the industry’s current practice to determine and quantify mine closure costs and values?”	
Below are some example questions to be posed to industry practitioners that aim to inform the above and provide the bases of this foundational project:	
What techniques (if any) do you use to evaluate and value intangible costs, values and benefits of closure and post-mining land use?	Do not consider intangibles due to complexity around quantification
Does your company undertake any reconciliation activities of closure costs to better inform valuations?	Reconciliation activities have recently commenced, so still early stages. Reconcile for discrepancies and future planning.
If closure risk and uncertainty (both tangible and intangible risks and uncertainties) are factored into your technique as some form of a discounting factor over time, then:	The Company employs a contingency methodology, not a discounting (DR) methodology. The contingency is factored into the calcs as the "unknown" or risk.
how is the discounting factor determined?	NA
are discount factors separated to account for tangible and intangible factors?	NA
Do different commodities give rise to different tools or techniques being used?	No (only have 1 commodity, but with Cu and/or Ag by-products), so tools and techniques are the same.
Do different operational jurisdictions give rise to different mine closure valuation tools or techniques being used?	Yes. USA dictates costs method, while the rest don't, so methods vary.
Do different geological settings give rise to different mine closure valuation tools or techniques being used?	No, the same tools and methods are used across the board
Do different existing or proposed mining methods give rise to different mine closure valuation techniques being used?	No, the same tools and methods are used across the board
Can you identify any gaps (in existing tools and techniques) or needs (in potentially alternative tools and techniques), uncertainties, or known shortfalls in the existing tools and techniques being used to determine mine closure values? If yes, what could you suggest that could be done better?	Uncertainty around intangibles (quantification). Provisioning gaps. Inappropriate allocation of funds for closure (errs on the side of "insufficiency" or underestimation.
What do you feel are the risks associated with not completing or considering mine closure evaluations?	Regulatory non-compliance, reputational risk, insufficient funding
Are there other industries that we could learn from that may provide input into the determination of mine closure valuation best practice?	Possibly waste disposal (land fill) operators, but hasn't been checked. Hydro schemes potentially, but many don't close for decades. O&G not the same.

Core Questions:	6. Response:
The key research question is “What, in general, is the industry’s current practice to determine and quantify mine closure costs and values?”	
Below are some example questions to be posed to industry practitioners that aim to inform the above and provide the bases of this foundational project:	
What information do you use to determine mine closure costs, closure value and closure risk for closure costs and benefits? Is it based on industry costing tools, internal policies or some other measure?	<p>We are consultants used by the mining industry for landform modelling, planning for closure through animations, reshaping tools, cut/fill balance, scenarios, material balance, costing of material movement. Other products include - enviro landform engineering tool, water catchment module, geo chem module, water balance model, sediment dam module, water mangement tool.</p> <p>Focused on the physical elements of mining and costing. (ie material movement) primarily</p> <p>Inputs into costing generally provided by clients, although The Company can provide different costings through scenarios. Use regulators costs calcs & experience if clients don't provide costs.</p> <p>Info inputs is - topography, finalised PMLU/landform, pit limit, getting more invovled in material characterisation, min closure risk ratio (ainsley to provide more info)</p> <p>In my experience, typical costs generated by GIS poloygon (2D) focus not 3D appreciation. As such, costs focused on \$ per ha (reshape). Material movement accounts for approx 80% of closure costs</p> <p>Our Group has developed risk maturity model for closure risks</p>
Who is involved from your company when collating and assessing this information?	We are a software company. Mining engineers working on behalf of clients demands.
What are the drivers for you to use this information? Is it based on regulations, company policy, just what has always been used, community expectations or other?	Typically, regulators calculators are used but aware that most clients use 2-3 sets of different numbers. Aware that companies may underestimate values using calculators
Does your company have policies and procedures that address mine closure costs and benefits? Does your company have a closure-guidance document that must be adhered to?	No as our Group is governed by client demands, really an input into the clients closure valuation process. If asked by a client to assist in mine closure planning, would be directed to Anglo toolkit, ICMM etc. Have not done any work for regulators but regulators are interested in their products and how they can assist them (regulators) with assessing PRCP applications
Are you faced with internal procedures or operational frameworks that detail mine closure valuation requirements? If “yes”, do you feel these frameworks constrain the valuation and risk analysis processes?	<p>Constraints in mining industry - getting mining engineers to care about closure/env, corporate management changes are need to have a focus on closure.</p> <p>Biggest constraint is NPV. Assets mine life, extended don't ever want to think about it until closer. Destroying the value of your asset early. Drives short term thinking.</p> <p>Need change of attitudes, incentivise needed as currently drive is production (\$/tonne) and closure is the opposite. Change the discussion needed. Other problems is silo's amongst bigger mining groups, not talking to the right people, having the right capabilities on site, why would you care, inter-disciplinary experience needed.</p>
Do you consider intangible (non-monetary) value in mine closure valuation processes? If yes, what techniques are undertaken to identify them and how are they used in the decision-making and valuation process?	No only tangible costs. Never been involved with a client that has asked to assist in valuation of intangible costs.

Core Questions:	6. Response:
The key research question is “What, in general, is the industry’s current practice to determine and quantify mine closure costs and values?”	
Below are some example questions to be posed to industry practitioners that aim to inform the above and provide the bases of this foundational project:	
What techniques and tools do you use to evaluate and value mine closure costs and benefits?	Use of software packages developed by The Company. Focus on material movement, scheduling, AMD/material placement, knowledge management, material balance
What techniques (if any) do you use to evaluate and value intangible costs, values and benefits of closure and post-mining land use?	Don't value intangible costs
Does your company undertake any reconciliation activities of closure costs to better inform valuations?	
If closure risk and uncertainty (both tangible and intangible risks and uncertainties) are factored into your technique as some form of a discounting factor over time, then:	
how is the discounting factor determined?	Client information that The Company is not privy to clients processes/info
are discount factors separated to account for tangible and intangible factors?	
Do different commodities give rise to different tools or techniques being used?	
Do different operational jurisdictions give rise to different mine closure valuation tools or techniques being used?	Only with expectations of mining companies, eg Geofluv (landform evolution program) in a focus in NSW but not in QLD.
Do different geological settings give rise to different mine closure valuation tools or techniques being used?	Only around what is being costed ie metal mines more waste problems (AMD, cover system requirements), tailings dams larger and more problematic than coal mines who dump in pit, metal mines less dynamic than coal mines. Population and location of mine are drivers in community expectations & company demands
Do different existing or proposed mining methods give rise to different mine closure valuation techniques being used?	
Can you identify any gaps (in existing tools and techniques) or needs (in potentially alternative tools and techniques), uncertainties, or known shortfalls in the existing tools and techniques being used to determine mine closure values? If yes, what could you suggest that could be done better?	Shortfall not using tools, no allowing people to go through options, 2D (typically used) is a snapshot in time, trying to evaluate 3D problems When closure is not considered into planning results in high expense & can be blindsided later on with actual costs. Why isn't it happening - Too hard to plan that far, lack of resources, don't want/need to do it, is production profile driven & cost driven, lack of foresight, investigate consequence lacking
What do you feel are the risks associated with not completing or considering mine closure evaluations?	
Are there other industries that we could learn from that may provide input into the determination of mine closure valuation best practice?	Not that I am aware of. Our Group is trying to get into civil.

Core Questions:	7. Response:
<p>The key research question is “What, in general, is the industry’s current practice to determine and quantify mine closure costs and values?”</p> <p>Below are some example questions to be posed to industry practitioners that aim to inform the above and provide the</p> <p>What are the company accounting policies for exploration & evaluation assets and mine rehabilitation provisions?</p>	<p>No provisioning, all rehab within 6 months of disturbance. Once production starts "provisioning is undertaken every 12 months, based on the ground disturbance that has occurred within the previous financial year and using that standard accounting practice"</p>
<p>Are you involved in the calculation of the mine rehabilitation provision prior to the commencement of the mine? If so, please explain your involvement.</p>	<p>Yes. Although there is a closure plan end landform, we estimate the cost to now by "we then apply the closure strategies that are relevant to that level of disturbance". "we basically divvy everything up into what we call cost domains. So, we're areas where you're going to be doing very similar activities based on very similar closure strategies" "For each of those closure cost domain is a cost perspective that has been built up from first principles of what are the steps steps that you need to do to move or rehabilitate one hectare of area using that strategy. And then we apply that in terms of the rehabilitation costs, across all the disturbance activities that we've that we see. And that disturbance is identified through visual inspection of aerial photos that are collected every 12 months for decommissioning costs. For our large operations, we get the decommissioning cost developed by an independent court quantity surveyor. So they come in and give us an estimate for bringing down all of the infrastructure and the disposal of that infrastructure, in terms of steel, concrete, and all the rest of the inventory. So at that point in time, they also develop the inventories for the site that is reviewed only every three years. So it's basically issued to be relatively static. So the cost estimates that we're producing at the moment, we give them a plus or minus 30%. accuracy."</p>
<p>At what point is a mine rehabilitation provision recognised on the balance sheet? Is there a policy regarding when to recognise the mine rehabilitation provision.</p>	<p>As soon as The Company moves into production phase, and as required by the Corporations Act.</p>
<p>Is the mine manager involved in the ongoing valuation of the exploration & evaluation assets and mine rehabilitation provision? How frequently is the mine rehabilitation provisions adjusted? What are triggers for adjustment?</p>	<p>"the mine manager has, has no contact at all, with the closure status or the rehabilitation that is required for the sites. The responsibility for rehabilitation activities themselves hasn't been allocated within folders key. Interesting. The closure planning aspects, though, yeah, it sits within our strategic planning team,""Well, we don't have a provision that's put forward at the start of mine. So there is no bonding process in who there is no provisioning allocation for the closure of the mind at the end of days. So we are effectively increasing the provision in the liability for the company over time."</p>
<p>Are there any ongoing external reporting obligations that from a part of the mine approval conditions?</p>	<p>"I, honestly, I can tell you how they're doing, how they're doing the actual financial treatment at the end of days. And we're at sitting on the books other than sitting in there on the balance sheet as a liability."</p>
<p>What information do you use to determine mine closure costs, closure value and closure risk for closure costs and benefits? Is it based on industry costing tools, internal policies or some other measure?</p>	<p>"at the moment, under our environmental regulation, we do a closure risk register. Yep. But we've been explicitly told to remove any financial aspects from that risk register, which is a very interesting move by the regulator that they've asked for. Not none of those risks to be captured. And their primary driver is that they're unable to regulate any of the financial aspects. Therefore, they can't approve a closure plan that is talking to something that is outside of their purview for regulating. So we don't look at the financial risks per se, as part of the closure plan development." "in the closure plans that Western Australia has got established at the moment, because we've also been asked to remove any aspects of social obligation from our closure plans, because they can't be regulated by the environmental regulator. Well, so that removes so much that is necessary component of closure of financial and economic but both our social economic both out okay""when we do do our provisioning, it's actually managed through the CFOs. Office. So we work on behalf of the CFOs. Team in order to come up with the the numbers that need to be used before they discounted for the provisioning purpose"</p>

Core Questions:	7. Response:
<p>The key research question is “What, in general, is the industry’s current practice to determine and quantify mine closure costs and values?”</p> <p>Who is involved from your company when collating and assessing this information?</p>	<p>"strategic planning and water planning teams would be the key areas that are involved in the preparation of the mind closure plans. So within the strategic planning that includes life of mine planning, five year planning, from a mind planning perspective, it includes the disciplines of geotech engineering, include surf, surface water, and groundwater management from a water planning perspective. They probably the key ones that would be informing our mind closure plan development, we go out to a large group for a squad check, which basically, then comm brings in the environmental teams, that are environmental teams are really only set up to manage environmental obligations with the operation of the site. We also go out to heritage and more and more we're seeing involvement with the heritage chain and the preservation of heritage as part of our closure plan preparation." "And we do have an impairment model, it's run by a different group, again, for this view, and the impairment models are not based off of any of the activities that we do for the present cost obligations. The impairment models used, a rough estimate of closure cost, based on some simple projections from the life of mine plan that looks at our likelihood for backfill and makes a provision on the basis of how much below water table activities that we're doing to as a cost for hauling material to backfill, it uses a rough Hector's that might be disturbed at what the forward projection, and a rough rehabilitation cost per hectare. As part of that process. It then looks at the cash flow. So we mound all that we have all those different costs, we expect all of our operations to be continuing for at least another 20 to 30 years. Each of the operation has a different closeout time. We then look at the cash flow expenditure beyond that as part of that impairment model, which suggests that we would never spend more than \$200 million a year during that period. And so we've been unwind however much cost it's going to be going forward, which takes us almost to the beginning of the next century to meet all our closure obligations. "</p>
<p>What are the drivers for you to use this information? Is it based on regulations, company policy, just what has always been used, community expectations or other?</p>	<p>"They have absolutely nothing in Western Australia, bonds that they're talking about or the economy, they have the option to put a bond on if the environmental impact is during the of so greatest significance that they want to put a ball on. But since bonding was removed in about 2010, nothing has been bonded that I'm aware of. The state government instead set up the mind rehabilitation Fund, which is effectively a disturbance tax. So I have nothing to do with rehab. It's all to do with. If we then fail to rehabilitate our minds, the state will have a separate pool of money from which to access to the plane up.</p>
<p>Does your company have policies and procedures that address mine closure costs and benefits? Does your company have a closure-guidance document that must be adhered to?</p>	<p>"No, we haven't got anything around cost benefit or opportunities or anything along those lines? Yeah, we haven't looked at any of those aspects as yet." "No, I haven't written it yet. And it's on my to do list there on my to do list, and we'll get to it when I have time. You had time in five years yet? So?"</p>
<p>Are you faced with internal procedures or operational frameworks that detail mine closure valuation requirements?</p>	<p>No</p>
<p>If “yes”, do you feel these frameworks constrain the</p>	
<p>Do you consider intangible (non-monetary) value in mine closure valuation processes? If yes, what techniques are undertaken to identify them and how are they used in the</p>	<p>No</p>
<p>What techniques and tools do you use to evaluate and value</p>	<p>None</p>
<p>What techniques (if any) do you use to evaluate and value intangible costs, values and benefits of closure and post-</p>	<p>None</p>
<p>Does your company undertake any reconciliation activities of closure costs to better inform valuations?</p>	<p>"Yeah, never. I don't think there's been any of that type of valuation, most likely, it's because of where we're located and lands that we're on, because we're in the Pilbara, the only land use at the moment in that neighbouring facility is partial range lands. If it's, if it's allocated, the rest of it is actually unallocated crown land that has no commercial value associated with it"</p>

Core Questions:	7. Response:
The key research question is “What, in general, is the industry’s current practice to determine and quantify mine closure costs and values?”	
If closure risk and uncertainty (both tangible and intangible risks and uncertainties) are factored into your technique as	N/A
how is the discounting factor determined?	N/A
are discount factors separated to account for tangible	N/A
Do different commodities give rise to different tools or	N/A
Do different operational jurisdictions give rise to different mine closure valuation tools or techniques being used?	N/A
Do different geological settings give rise to different mine closure valuation tools or techniques being used?	N/A
Do different existing or proposed mining methods give rise to different mine closure valuation techniques being used?	
Can you identify any gaps (in existing tools and techniques) or needs (in potentially alternative tools and techniques), uncertainties, or known shortfalls in the existing tools and techniques being used to determine mine closure values? If yes, what could you suggest that could be done better?	<p>"Well, large suite of things would be awesome. All the way through from just easily available benchmarking information. Okay. So just even the basics to have that information that was nationally available, so that now we work, our cost estimates for that per hectare stuff based on the equipment rates that we are achieving within our minds. But we're also one of the lowest cost producing iron ore mines in the world. We're not normally number one or number two, that means we've optimised beautifully for that condition, that does not necessarily mean we're going to be able to optimise in that beautiful condition when we try to rehab. And unfortunately, the only numbers that we can really use are with, with what we know the ability to access more than anything else. It's it's not just the ability to access but the ability to demonstrate to others within the business who are used to seeing such low costs. For that activity, why the cost for rehabilitation would not be the same why the two activities would not be comparable. That he can that's at the moment one of my biggest challenges is trying to explain that same equipment would be used in different ways with different downtimes and therefore it's a higher unit cost high at New rates. So that would help monumentally even just having a standardised framework for how the PC Oh should be presented. So I do my numbers. I do it my way. I come from an epcm background. So my closure cost estimates that work in April. See, that's acceptable to the business and my work it out because at the end of the day, they're only looking for the bottom line. It also means that my numbers are not comparable with Rio Tinto that is in a mine right next door to me, it means my numbers are not comparable with bhp or anybody else. So even if the regulator asks for a copy of your financial statement of your closure cost estimate, they can't compare line item with line item with you know, whether you're allowing enough money to do anything across the site. Simply because it's it, then they're not comparable or presented in a similar manner. So that would be helpful if we want to start the conversation around where the companies are actually putting enough money aside, simply because you can't tell."</p>
What do you feel are the risks associated with not completing or considering mine closure evaluations?	the state actually hasn't set a standard that defines what an acceptable closure outcome looks like
Are there other industries that we could learn from that may provide input into the determination of mine closure valuation best practice?	<p>"can't really say, to be honest, I think maybe some of the costs associated with the contamination management. Something that could be transferred over, particularly because the orders of magnitude of increase of potential contamination, but we end up in this so contamination is only contamination, if a regulator says it's contamination. If they haven't, if they don't come to an agreement that a lot of areas that will be contaminated on closure. There is no contamination provision that's been made during the mine life for the management of those areas. So contamination can crop up but at that last moment, as being an aspect that needs to be managed, that we're completely unaware of. "</p>

Core Questions:	8. Response:
<p>The key research question is “What, in general, is the industry’s current practice to determine and quantify mine closure costs and values?”</p> <p>Below are some example questions to be posed to industry practitioners that aim to inform the above and provide the bases of this foundational project:</p>	
What are the company accounting policies for exploration & evaluation assets and mine rehabilitation provisions?	"we just reuse very basic accounting systems that just add one on one" Broader policies. One only mine sites where the land owner welcomes us. Two, always leave site at least as good condition or better than before the mining activity.
Are you involved in the calculation of the mine rehabilitation provision prior to the commencement of the mine? If so, please explain your involvement.	No
At what point is a mine rehabilitation provision recognised on the balance sheet? Is there a policy regarding when to recognise the mine rehabilitation provision.	Only operate small mines and remediate as we go. "we'll start remediation and rehabilitation behind us immediately" "we don't have to have a million or \$10 million lump sum of money that to do the rehab on the on the property afterwards"
Is the mine manager involved in the ongoing valuation of the exploration & evaluation assets and mine rehabilitation provision? How frequently is the mine rehabilitation provisions adjusted? What are triggers for adjustment?	No
Are there any ongoing external reporting obligations that from a part of the mine approval conditions?	No. Although remediating and reporting environmental performance is undertaken on an ongoing basis "And it's got another benefit to us, because we pay fairly hefty bonds. Environmental bonds, yeah, the larger your footprint is, the bigger that bond is. Yeah. Okay. And if we can remediate behind this, we can actually get bond reductions as we go along. And less land exposed to, to being left behind"
What information do you use to determine mine closure costs, closure value and closure risk for closure costs and benefits? Is it based on industry costing tools, internal policies or some other measure?	Not considered, only review mine operations if the operation is not running as expected such as separating the ore, environmental issues or an end of lease.
Who is involved from your company when collating and assessing this information?	Contract engineering companies and management, only a small team
What are the drivers for you to use this information? Is it based on regulations, company policy, just what has always been used, community expectations or other?	Case by case
Does your company have policies and procedures that address mine closure costs and benefits? Does your company have a closure-guidance document that must be adhered to?	No

Core Questions:	8. Response:
The key research question is “What, in general, is the industry’s current practice to determine and quantify mine closure costs and values?”	
Are you faced with internal procedures or operational frameworks that detail mine closure valuation requirements? If “yes”, do you feel these frameworks constrain the valuation and risk analysis processes?	No
Do you consider intangible (non-monetary) value in mine closure valuation processes? If yes, what techniques are undertaken to identify them and how are they used in the decision-making and valuation process?	No
What techniques and tools do you use to evaluate and value mine closure costs and benefits?	N/A
What techniques (if any) do you use to evaluate and value intangible costs, values and benefits of closure and post-mining land use?	N/A
Does your company undertake any reconciliation activities of closure costs to better inform valuations?	No
If closure risk and uncertainty (both tangible and intangible risks and uncertainties) are factored into your technique as some form of a discounting factor over time, then:	N/A
how is the discounting factor determined?	N/A
are discount factors separated to account for tangible and intangible factors?	N/A
Do different commodities give rise to different tools or techniques being used?	Not really, mainly bauxite

Core Questions:	8. Response:
The key research question is “What, in general, is the industry’s current practice to determine and quantify mine closure costs and values?”	
Do different operational jurisdictions give rise to different mine closure valuation tools or techniques being used?	More broadly different rules in every state make operations difficult but not specifically for mine closure
Do different geological settings give rise to different mine closure valuation tools or techniques being used?	No
Do different existing or proposed mining methods give rise to different mine closure valuation techniques being used?	Maybe, but not relevant to us
Can you identify any gaps (in existing tools and techniques) or needs (in potentially alternative tools and techniques), uncertainties, or known shortfalls in the existing tools and techniques being used to determine mine closure values? If yes, what do you suggest that could be done better?	N/A
What do you feel are the risks associated with not completing or considering mine closure evaluations?	N/A
Are there other industries that we could learn from that may provide input into the determination of mine closure valuation best practice?	"I just wish we could standardise across across Australia, it's so difficult, dealing with the different or even finding your way through the minefield of different departments from state to state. And they're all changing their names and their responsibilities. every election, someone gets lumped in a bit more or a little bit less than it gets moved to this section, that section. So that's an issue in itself. But then also, just the rules and regulations are so different. Yeah, yeah. In one, one state we can, we can write a letter to a landowner, give them 14 days, notice that we're coming on the land and walking. Not that that's the outcome. We never do that we don't send letters, we always do a personal visit number one, and we always give the land and the right to say yes or no. But the law says you can just give them a letter in 14 days. In another state. It's seven days, and in another it's 28 days. the compensation you pay to a landowner for drilling is is mandated in New South Wales, but it's opened your own interpretation in Queensland. But it's just it's a more so we try and standardise our own procedure. So what I forgot to pay people in New South Wales is much for drilling a hole, then we'll pay to everybody. Yeah. But you don't need to you will pay a difference. Yeah, whatever state we're in. That's a standard operating. Yeah. It's not a fortune. And I get a fortune open. Yeah, it's, it's just standard for us. Yeah. built into our cost of doing business. And, and they're pretty appreciative as well, especially if they're not entitled to it."